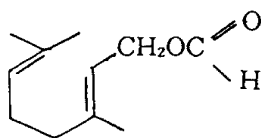


II. Synthetic Additives, Natural Additives and Mixed Preparations

Article 3. Standards and Specification

A. Synthetic Additives

1. Geranyl Formate



Chemical Formula $C_{11}H_{18}O_2$

Molecular Weight 182.26

Compositional Specifications of Geranyl Formate

Content Geranyl Formate should contain not less than 85.0% of Geranyl Formate ($C_{11}H_{18}O_2$).

Description Geranyl Formate is a colorless or slightly yellowish, transparent liquid having a characteristic odor.

Identification (1) To 1 ml of Geranyl Formate, add 10 ml of 10% alcoholic solution of potassium hydroxide, and heat in a water bath for 5 minutes while shaking. The characteristic odor disappears, and an odor of geraniol is evolved.

(2) To 1 ml of Geranyl Formate, add 10 ml of sodium hydroxide solution, heat in a water bath for 5 minutes while shaking, and allow to stand. To 1 ml of the solution of the lower layer, add 1.5 ml of diluted hydrochloric acid, and add 20 mg of magnesium dust divided into several portions. After effervescence ceases, add 3 ml of diluted sulfuric acid (3→5) and 10 mg of chromotropic acid, shake, and warm in a hot water for 10 minutes. A pink-purple color develops.

Purity (1) Specific Gravity : Specific gravity of Geranyl Formate should be within a range of 0.906~0.920

(2) Refractive Index : Refractive Index n_D^{20} of Geranyl Formate should be within a

range of 1.457~1.466

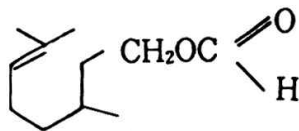
(3) Clarity and Color of Solution : When 1 ml of Geranyl Formate is dissolved in 3 ml of 80% ethanol, the solution should be clear.

(4) Acid Value : Acid value of Geranyl Formate is tested by Acid Value in Flavoring Substance Test. It should not be more than 3. In this case, titrate while cooling in ice water, and continue the titration until a light pink color persists for 10 seconds.

Assay Accurately weigh about 1 g of Geranyl Formate, and proceed as directed under Saponification Value and Acid Value in Flavoring Substances Tests. Calculate the content by the following formula:

$$\text{Content (\%)} = \frac{\text{Saponification value} - \text{Acid value}}{561.1} \times 182.26$$

2. Citronellyl Formate



Chemical Formula $C_{11}H_{20}O_2$

Molecular Weight 184.28

Compositional Specifications of Citronellyl Formate

Content Citronellyl Formate should contain not less than 86.0% of citronellyl formate ($C_{11}H_{20}O_2$)

Description Citronellyl Formate is a colorless, transparent liquid having a characteristic odor.

Identification (1) To 1 ml of Citronellyl Formate, add 10 ml of 10% alcoholic solution of potassium hydroxide, and heat in a water bath for 5 minutes while shaking. The characteristic odor disappears, and an odor of citronellyl is evolved.

(2) Proceed as directed under Identification (2) in Geranyl Formate.

Purity (1) Specific Gravity : Specific gravity of Geranyl Formate should be within a range of 0.890~0.903

(2) Refractive Index : Refractive Index n_D^{20} of Geranyl Formate should be within a range of 1.443~1.449

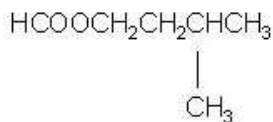
(3) Clarity and Color of Solution : When 1 ml of the solution is dissolved in 3 ml of 80% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Citronellyl Formate is tested by Acid Value in Flavoring Substance Test. It should not be more than 3. In this case, titrate while cooling in ice water until a light pink color persists for 10 seconds.

Assay Accurately weigh about 1 g of Citronellyl Formate and proceed as directed under Saponification Value and Acid Value in Flavoring Substances Tests. Calculate the content by the following formula

$$\text{Content (\%)} = \frac{\text{Saponification value} - \text{Acid value}}{561.1} \times 184.28$$

3. Isoamyl Formate



Chemical Formula $\text{C}_6\text{H}_{12}\text{O}_2$

Molecular Weight 116.16

Compositional Specifications of Isoamyl Formate

Content Isoamyl Formate should contain not less than 92.0% of isoamyl formate ($\text{C}_6\text{H}_{12}\text{O}_2$).

Description Isoamyl Formate is a colorless, transparent liquid having a characteristic odor.

Identification (1) To 1 ml of Isoamyl Formate, add 10 ml of sodium hydroxide solution, and heat in a water bath for 5 minutes while shaking. The characteristic odor disappears, and the oil phase of the upper layer is evolved an odor of isoamyl alcohol.

(2) To 1 ml of the solution the lower layer obtained in (1) above, add 1.5 ml of diluted hydrochloric acid. and add 20 mg of magnesium dust divided into several portions. After effervescence ceases, add 3 ml of diluted sulfuric acid (3→5) and 10 mg of chromotropic acid, shake, and warm in hot water for 10 minutes. A red-purple color develops.

Purity (1) Specific Gravity : Specific gravity of Isoamyl Formate should be within a range of 0.878~0.885

(2) Refractive Index : Refractive Index n_D^{20} of Isoamyl Formate should be within a range of 1.396~1.400

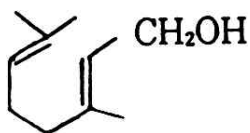
(3) Clarity and Color of Solution : When 1 ml of the solution is dissolved in 4 ml of 70% alcohol. The solution should be clear.

(4) Acid Value : Acid value of Isoamyl Formate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1. In this case, titrate in ice water while cooling, and continue until the light pink color persists for 10 seconds.

Assay Accurately weigh about 1 g of Isoamyl Formate, and proceed as directed under saponification value and acid value in Flavoring Substances Tests. Calculate the content by the following formula :

$$\text{Content (\%)} = \frac{\textit{Saponification value} - \textit{Acid value}}{561.1} \times 116.16$$

4. Geraniol



Chemical Formula C₁₀H₁₈O

Molecular Weight 154.25

Compositional Specifications of Geraniol

Content Geraniol should contain not less than 88.0% of geraniol (C₁₀H₁₈O).

Description Geraniol is a colorless to light yellow, transparent liquid having a characteristic odor.

Identification To 1 ml of Geraniol, add 1 ml of acetic acid, anhydrous and 1 drop of phosphoric acid, keep at a slightly warm temperature for 10 minutes, add 1 ml of water, shake in hot water for 5 minutes, cool, and make slightly alkaline with anhydrous sodium carbonate solution. An odor of geranyl acetate is evolved.

Purity (1) Specific Gravity : Specific gravity of Geraniol should be within a range of 0.870~0.885

(2) Refractive Index : Refractive Index n_D^{20} of Geraniol should be within a range of 1.469~1.478.

(3) Clarity and Color of Solution : When 1 ml of the solution is dissolved in 3 ml of 70% alcohol, the solution should be clear.

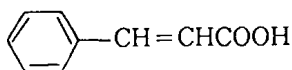
(4) Acid Value : Acid value of Geraniol is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

(5) Ester Value : Accurately weigh about 5 g Geraniol is tested by Ester Value and in Flavoring Substance Test. It should not be more than 3.

(6) Aldehyde : Accurately weigh about 5 g of Geraniol, and proceed as directed under Method 2 in aldehyde and ketone content in Flavoring Substances Tests. In the procedure, allow the mixture to stand for 15 minutes before titrating. The volume of consumed 0.5 N hydrochloric acid is not more than 0.65 ml.

Assay Proceed as directed under Method 1 in alcohol content in Flavoring Substances Tests, using 1 g of acetylated oil.

5. Cinnamic Acid



Chemical Formula $\text{C}_9\text{H}_8\text{O}_2$

Molecular Weight 148.16

Compositional Specifications of Cinnamic Acid

Content Cinnamic Acid, when calculated on the dried basis, should contain not less than 99.0% of cinnamic acid ($\text{C}_9\text{H}_8\text{O}_2$).

Description Cinnamic Acid occurs as a white crystalline powder having a characteristic odor.

Identification (1) To 0.5 g of Cinnamic Acid, add 1 ml of sulfuric acid, and dissolve while heating in a water bath. The color of the solution changes to a yellow-green color. Continue heating. The color changes to a dark red color.

(2) Dissolve 0.1 g of Cinnamic Acid in 2 ml of potassium hydroxide solution, add 5 ml of potassium permanganate solution, and warm in hot water. An odor of benzaldehyde is evolved.

Purity (1) Melting Point : Melting point of Cinnamic Acid should be within a range of 132~135°C

(2) Clarity and Color of Solution : When 1 g of Cinnamic Acid is dissolved in 7 ml of alcohol, the solution should be clear.

(3) Characteristics of Alkali Solution : When 0.2 g of Cinnamic Acid is dissolved in 2 ml of sodium carbonate solution and 8 ml of water, the solution should be clear.

(4) Chloride : When Cinnamic Acid is tested by Copper Mesh Test Method in Test Methods for Flavorings, it should be appropriate.

(5) Arsenic : Transfer about 0.25 g of Cinnamic Acid into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid

is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should be appropriate. (Not more than 4 ppm).

- (6) Lead : When 5.0 g of Cinnamic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

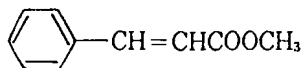
Loss on Drying When Cinnamic Acid is dried for 4 hours in a vacuum desiccator (silica gel), the weight loss should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done with Cinnamic Acid, the residue should not be more than 0.05%.

Assay Dissolve about 0.2 g of Cinnamic Acid, previously dried and accurately weighed, in 50% alcohol, which is neutralized and 10ml of water and titrate with 0.1 N sodium hydroxide solution.(indicator : 3 drops of phenolphthalein solution).

$$1\text{ml of } 0.1 \text{ N sodium hydroxide solution} = 14.816 \text{ mg } \text{C}_9\text{H}_8\text{O}_2$$

6. Methyl Cinnamate



Chemical Formula $C_{10}H_{10}O_2$

Molecular Weight 162.19

Compositional Specifications of Methyl Cinnamate

Content Methyl Cinnamate should contain not less than 98.0% of methyl cinnamate ($C_{10}H_{10}O_2$)

Description Methyl Cinnamate occurs as a white to light yellow solid having a matsutake like odor.

Identification To 1 g of Methyl Cinnamate, add 10 ml of 10% alcoholic solution of potassium hydroxide, and heat in a water bath. Methyl Cinnamate dissolves, a white precipitate is formed, and the matsutake like odor disappears. Add 10 ml of water while warm. The precipitate dissolves. Acidify with diluted sulfuric acid. A white crystalline precipitate is formed.

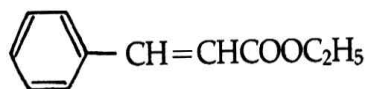
Purity

- (1) Solidification Temperature : Solidification temperature should not be less than 33.8°C.
- (2) Clarity and Color of Solution : When 1 g of Methyl Cinnamate is dissolved in 4 ml of 80% alcohol by heating at 40°C, the solution should be almost clear.
- (3) Acid Value : Acid value of Methyl Cinnamate is tested by Acid Value in Flavoring Substance Test. It should not be more than 2.

Assay Accurately weigh 1 g of Methyl Cinnamate tested by Ester Value in Flavoring Substances Test. In this case, 5 ml of water is added before heating.

1ml of 0.5 N alcoholic solution of potassium hydroxide = 81.10 mg $C_{10}H_{10}O_2$

7. Ethyl Cinnamate



Chemical Formula $C_{11}H_{12}O_2$

Molecular Weight 176.21

Compositional Specifications of Ethyl Cinnamate

Content Ethyl Cinnamate should contain not less than 99.0% of ethyl cinnamate($C_{11}H_{12}O_2$).

Description Ethyl Cinnamate is a colorless to light yellow liquid having a characteristic odor.

Identification To 1 ml of Ethyl Cinnamate, add 10 ml of 10% alcoholic solution of sodium_hydroxide, and proceed as directed under Identification in Methyl Cinnamate.

Purity (1) Specific Gravity : Specific gravity of Ethyl Cinnamate should be within a range of 1.045~1.051

(2) Refractive Index : Refractive Index n_D^{20} of Ethyl Cinnamate should be within a range of 1.558~1.560

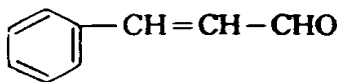
(3) Clarity and Color of Solution : When 1ml of Ethyl Cinnamate is dissolved in 5 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Ethyl Cinnamate is tested by acid value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh 1 g of Ethyl Cinnamate tested by Ester Value and Ester Content in Flavoring Substances Test. In this case, 5 ml of water is added before heating.

1ml of 0.5 N alcoholic solution of potassium hydroxide = 88.11 mg $C_{11}H_{12}O_2$

8. Cinnamaldehyde



Chemical Formula $\text{C}_9\text{H}_8\text{O}$

Molecular Weight 132.16

Compositional Specifications of Cinnamaldehyde

Content Cinnamaldehyde should contain not less than 98.0% of cinnamaldehyde ($\text{C}_9\text{H}_8\text{O}$).

Description Cinnamaldehyde is a colorless to light yellow transparent liquid having a cinnamon-like odor.

Identification (1) When 1 drop of fluoroglucyn hydrochloric acid solution is added to 5 drops of Cinnamaldehyde, the solution turns red and precipitates are formed.

(2) When 4 drops of nitric acid are added to 4 drops of Cinnamaldehyde and cooled to 5°C or lower, white~pale yellow crystallites are formed.

Purity (1) Specific Gravity : Specific gravity of Cinnamaldehyde should be within a range of 1.051~1.056

(2) Refractive Index : Refractive Index n_D^{20} of Cinnamaldehyde should be within a range of 1.619~1.625

(3) Clarity and Color of Solution : When Cinnamaldehyde 1 ml is dissolved in 5 ml of 60% alcohol, the solution should be clear.

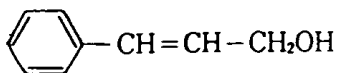
(4) Chlorinated Compounds : When Cinnamaldehyde is tested by Copper Mesh Test Method in Test Methods for Flavorings, it should be appropriate.

(5) Acid Value : Acid value of Cinnamaldehyde is tested by Acid Value in Flavoring Substance Test. It should not be more than 5.

Assay Approximately 1 g of Cinnamaldehyde is accurately weighed and tested by Method 1 under aldehydes and ketons content in Flavoring Substances Test. In this case, the mixture is set-aside for 15 minutes.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 66.08 mg $\text{C}_9\text{H}_8\text{O}$

9. Cinnamyl Alcohol



Chemical Formula $C_9H_{10}O$

Molecular Weight 134.14

Compositional Specifications of Cinnamyl Alcohol

Content Cinnamyl Alcohol should contain not less than 98.0% of cinnamyl alcohol ($C_9H_{10}O$).

Description Cinnamyl Alcohol is a colorless to light yellow liquid or occurs as white to light yellow crystalline lumps, having a characteristic odor.

Identification To 3 drops or 0.2 g of Cinnamyl Alcohol, add 5 ml of potassium permanganate solution (1→20) and 1 ml of diluted sulfuric acid. An odor of cinnamaldehyde is evolved.

Purity (1) Solidification Temperature : Solidification temperature should not be less than 31°C.

(2) Clarity and Color of Solution : When 1 g of Cinnamyl Alcohol is dissolved in 1 ml of 70% alcohol by heating at 35°C, the solution should be clear.

(3) Acid Value : Acid value of Cinnamyl Alcohol is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

(4) Cinnamaldehyde : Approximately 5 g of Cinnamyl Alcohol is accurately added and tested by the Method 2 of Hydroxylamine Method in Content Measurement Methods for Aldehydes and Ketones. The content should not be more than 1.5%. In the procedure, the mixture is set-aside for 15 minutes.

Residue on Ignition When thermogravimetric analysis is done with Cinnamyl Alcohol, the residue should not be more than 0.03%.

Assay Approximately 0.5 g of Cinnamyl Alcohol is accurately weighed and tested by Alcohol Content Measurement Method 2 in Flavoring Substances Test.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 67.09 mg $C_9H_{10}O$

10. Ketones

○ Designed Cancellation

The date of cancellation: 12.14.05 (Notification No. 2005-77).

11. Calcium Hypochlorite

Compositional Specifications of Calcium Hypochlorite

Content Calcium Hypochlorite should contain not less than 60.0% effective chlorine.

Description Calcium Hypochlorite is white~milky white granule or powder with a characteristic odor of chlorine.

Identification (1) 0.5 g of Bleaching Powder is mixed with 5 ml of water by shaking.

When a red litmus paper is dipped into this solution, it turns blue and then decolorizes.

(2) When 2 ml of acetic acid is added to 0.1 g of Bleaching Powder, gas is evolved and it dissolves. 5 ml of water is added. It is then filtered. The filtrate responds to test of Calcium Slat of Identification.

Assay Accurately weighed 4 g of Calcium Hypochlorite is finely ground with approximately 50 ml of water in a mortar. The mixture transfer into a 1000 ml volumetric flask and water is added so that the total volume is brought up to 1000 ml. To 50 ml of this solution, 2 g of potassium iodide and 10 ml of glacial acetic acid (1→2) are added. Free iodine is titrated with 0.1 N sodium thiosulfate solution (indicator : starch solution). Separately, a blank test is carried out in the same manner.

1 ml of 0.1 N sodium thiosulfate solution = 3.546 mg Cl

12. Diluted Benzoyl Peroxide

Definition Diluted Benzoyl Peroxide is benzoyl peroxide ($C_{14}H_{10}O_4$) diluted with one or more of the following : Aluminum Potassium Sulfate, calcium salts of phosphate, Calcium Sulfate. Calcium Carbonate, Magnesium Carbonate, and starch.

Compositional Specifications of Diluted Benzoyl Peroxide

Content Diluted Benzoyl Peroxide should contain within a range of 19.0~22.0% of Benzoyl peroxide ($C_{14}H_{10}O_4=242.23$)

Description Diluted Benzoyl Peroxide occurs as a white powder.

Identification Transfer 0.2 g of Diluted Benzoyl Peroxide into test tube, add 7 ml of chloroform and mix by shaking and settled. White insoluble substances are observed. When 2 ml of 4,4-diaminophenylamine solution is added, the solution and the insoluble substances turn bluish green.

Purity (1) Fineness : Transfer 5 g of Diluted Benzoyl Peroxide into a dried 53 μ standard sieve and sieved vigorously for 2 minutes, while occasionally tapping the bottom of the receiving container. Fine particles are settled for 1 minute and the residues on the screen is weighed. The amount of the residues should not be more than 1 g.

(2) Spread of Fire : 1 g of Diluted Benzoyl Peroxide is packed (3 mm height and 10 mm width) on a glass plate and ignited from one end. It should not be ignited all the way to the other end.

(3) Hydrochloric Acid Insoluble Substances : To 0.2 g of Diluted Benzoyl Peroxide, add 10 ml of dilute hydrochloric acid. It is well mixed by shaking, heated for approximately for 1 minute, and cooled. Approximately 8 ml of ether is added and shaken. When it is settled, both liquid layers should be clear. There should not be any definite floating matters in the interface.

(4) pH : To 3 g of Diluted Benzoyl Peroxide, add 30 ml of water and shaking for 3 minutes. It is then filtered and the pH of the filtrate is measured by glass electrode method. pH should be within a range of 6.0~9.0.

(5) Ammonium Salt : When 0.2 g of Diluted Benzoyl Peroxide is boiled in 3 ml of sodium hydroxide solution (2→5), the gas generated should not turn a red litmus paper (wetted with water) blue.

(6) Arsenic : To 0.25 g of Diluted Benzoyl Peroxide is gently heated in 5 ml of dilute hydrochloric acid, which is immediately cooled in an ice water. It is then filtered. The residues are washed with 15 ml of water and the wash water is added to the filtrate, Test Solution. When this Test Solution is tested by Arsenic Limit Test, it

should be appropriate. In this case, the solution is not neutralized with ammonia water or ammonia solution (Not more than 4 ppm).

(7) Lead : When 5.0 g of Diluted Benzoyl Peroxide is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(8) Barium : 2 g of Diluted Benzoyl Peroxide is mixed with 15 ml of dilute nitric acid by shaking, which is filtered. The residues are washed with water and the wash water is added to the filtrate. Water is added to the filtrate to bring the total volume to 40 ml. pH of the resulting solution is adjusted to 2.4~2.8 with ammonia solution, where water is added to bring the total volume to 50 ml. When 1 ml of dilute sulfuric acid is added to this solution and set aside for 10 minutes, it should not turn turbid.

Assay Transfer about 1 g of Diluted Benzoyl Peroxide, accurately weigh, into a flask with a ground-glass stopper, add 50 ml of chloroform-methanol mixture (1:1), and shake. Add 0.5 ml of a solution of citric acid in methanol (1→10) and 2 ml of potassium iodide solution (1→2), immediately stopper tightly, allow to stand in a dark place for 20 minutes while shaking occasionally, and titrate the liberated iodine with 0.1 N sodium thiosulfate (indicator : starch TS). Separately, perform a blank test in the same manner.

1 ml of 0.1 N sodium thiosulfate = 12.11 mg of $C_{14}H_{10}O_4$

13. Hydrogen Peroxide

Compositional Specifications of Hydrogen Peroxide

Content Hydrogen Peroxide should contain not less than 30.0% of hydrogen peroxide ($\text{H}_2\text{O}_2 = 34.01$).

Description Hydrogen Peroxide is a colorless, clear liquid. It is odorless or has a slight odor.

Identification (1) Hydrogen Peroxide is acidic.

(2) When 5 ml of dilute sulfuric acid and 1 ml of potassium permanganate solution are added to Hydrogen Peroxide solution (1→10), bubbles are formed and the color of the solution disappears.

(3) Hydrogen Peroxide responds to test of peroxide in Identification.

Purity (1) Free Acid : 3 ml of Hydrogen Peroxide is diluted to 50 ml with freshly boiled and cooled water. When 1 ml of 0.02 N sodium hydroxide solution and 3 drops of phenolphthalein solution are added, the solution should turn red.

(2) Arsenic : To 0.25 ml of Hydrogen Peroxide, add water to make 10 ml. A small amount of this solution is added at a time to a platinum crucible in a water bath to evaporate the liquid to dryness. A small amount of water is added to the residues and the entire solution is used as a Test Solution. This Test Solution is tested by Arsenic Limit Test and it should be appropriate (Not more than 4 ppm).

(3) Lead : To 5.0 g of Hydrogen Peroxide, add 10 ml of water. Add this solution in small portions to a beaker in a water bath. Gently heat this solution until bubbling stops. Then, the test solution, 25 ml of 0.5 N nitric acid solution, is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy and its content should not be more than 4.0 ppm.

(4) Tin : To 5.0 g of Hydrogen Peroxide, add 10 ml of water. Add this solution in small portions to a beaker in a water bath. Gently heat the solution until bubbling stops. Then the volume of the solution becomes 25 ml with 1 N hydrochloric acid. Use this as test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy and its content should not be more than 10 ppm.

(5) Iron : To 5.0 g of Hydrogen Peroxide, add 10 ml of water. This solution is added in small portions to a beaker in a water bath. It is gently heated until bubbling subsides. Then the test solution, 0.5 N nitric acid make to 25 ml, is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy and its content should not be more than 0.5 ppm.

- (6) Residue on Evaporation : Accurately weigh 50 g of Hydrogen Peroxide is added in small portions to a platinum crucible. It is gently heated and evaporated to dryness in a water bath and cooled. The residues are dried for 1 hour at 105°C and the amount should not be more than 3 mg.
- (7) Phosphate : To 8 ml of Hydrogen Peroxide, add 10 ml of water and 3 ml of hydrochloric acid. It is then evaporated to dryness by gently heating in a water bath. Approximately 30 ml of warm water is added to dissolve the residues, which is then cooled. Water is added to the solution to bring the total volume to 50 ml, Test Solution. 5 ml of Test Solution is transferred into a Nestler tube, where 4 ml of dilute sulfuric acid (1→6) and 1 ml of ammonium molybdate solution (1→20) are added. It is then well mixed by shaking and set-aside for 3 minutes, where 1 ml of 1-amino-2-naphthol-4- sulfonate solution is added. It is heated for 30 minutes in a water bath at 60°C and cooled in running water. The resulting blue color should not be deeper than that of the solution prepared by the same procedure with 5 ml of Phosphate standard solution.

Assay Dissolve about 1 g of Hydrogen Peroxide, accurately weigh, in water make to 250 ml. 25 ml of the solution is mixed with 10 ml of dilute sulfuric acid. It is then titrated with 0.1 N potassium permanganate solution.

$$1 \text{ ml of } 0.1 \text{ N potassium permanganate solution} = 1.701 \text{ mg H}_2\text{O}_2$$

14. Ammonium Persulfate

Chemical Formula $(\text{NH}_4)_2\text{S}_2\text{O}_8$

Molecular Weight 228.20

Compositional Specifications of Ammonium Persulfate

Content Ammonium Persulfate should contain not less than 95.0% of ammonium persulfate $(\text{NH}_4)_2\text{S}_2\text{O}_8$.

Description Ammonium Persulfate occurs as colorless crystals or as a white crystalline powder.

Identification (1) To 0.5 g of Ammonium Persulfate, add 5 ml of sodium hydroxide solution, and a gas with an odor of ammonia is evolved after heating. This gas changes from red litmus paper wetted with water to blue litmus paper.

(2) Add 2~3 drops of manganese sulfate solution (1→100) to 5 ml of diluted sulfuric acid. Then, add 1 drop of silver nitrate solution and 0.2 g of Ammonium Persulfate is warmed, the solution develops a pink color.

Purity (1) Clarity and Color of Solution : When 1 g of Ammonium Persulfate is dissolved in 10 ml of water, the solution should be colorless and almost clear.

(2) Arsenic : 0.5 g of Ammonium Persulfate is dissolved in 5 ml of water, where 1 ml of sulfuric acid and 10 ml of sulfurous acid are added. The resulting solution is concentrated to approximately 2 ml by evaporation, which is diluted to 10 ml with water. 5 ml of this solution is tested by Arsenic Limit Test. The content of arsenic should not be more than 4 ppm.

(3) Lead : Ammonium persulfate is tested by Purity (2) for Sodium Metaphosphate(not more than 2 ppm).

Residue on Ignition When thermogravimetric analysis is done with Ammonium Persulfate (gently at first, then strongly until the weight becomes constant), the residue should not be more than 0.2%.

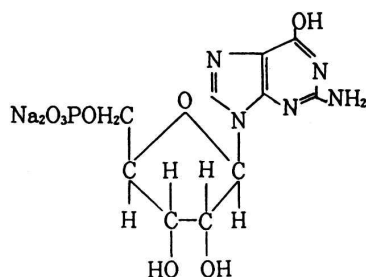
Assay Dissolve about 1.5 g of Ammonium Persulfate, precisely weighed, in water make to 250 ml. 50 ml of the solution is mixed with 40 ml of 0.1 N ammonium ferrous sulfate solution and 5 ml of phosphoric acid. The excess amount of ammonium ferrous sulfate is titrated with 0.1 N potassium permanganate solution. Separately, a blank test is carried out by the same method.

0.1 N ammonium ferrous solution 1 ml = 11.41 mg $(\text{NH}_4)_2\text{S}_2\text{O}_8$.

15. Disodium 5'-Guanylate

Sodium 5'-Guanylate

Sodium Guanylate



Chemical Formula $C_{10}H_{12}O_8N_5PNa_2$

Molecular Weight 407.20

Compositional Specifications of Disodium 5'-Guanylate

Content Disodium 5'-Guanylate, when calculated on the dried basis, should contain within a range of 97.0~102.0% of disodium 5'-guanylate ($C_{10}H_{12}O_8N_5PNa_2$).

Description Disodium 5'-Guanylate occurs as colorless to white crystals or powder, having a characteristic taste.

Identification (1) 20 mg of Disodium 5'-Guanylate is dissolved in 100 ml of 0.01 N hydrochloric acid, 10 ml of which is diluted to 100 ml with 0.01 N hydrochloric acid. The resulting solution shows a maximum absorption band at 256 ± 2 nm.

(2) To 3 ml of aqueous solution of Disodium 5'-Guanylate (3→10,000), add 0.2 ml of alcoholic solution of (1→10) and 3 ml of ammonium ferrous sulfate (1→1,000), which is heated for 10 minutes in a water bath. The solution turns green.

(3) To 2 ml of magnesia solution, add 5 ml of Disodium 5'-Guanylate solution (1→100), precipitates are not formed. To the resulting solution, 7 ml of nitric acid is added and boiled for 10 minutes. When this solution is neutralized with sodium hydroxide solution, it responds to test of phosphate (B) in Identification.

(4) Disodium 5'-Guanylate responds to test of Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : When 0.1 g of Disodium 5'-Guanylate is dissolved in 10 ml of water, the solution should be colorless and almost clear.

(2) pH : pH of Disodium 5'-Guanylate solution (1→20) should be within a range of 7.0~8.5 as determined by the glass electrode method.

(3) Arsenic : 0.25 g of Disodium 5'-Guanylate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be

more than 4 ppm.

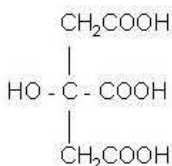
- (4) Lead : When 5.0 g of Disodium 5'-Guanylate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (5) Absorption Ratio : Absorption (A_1 , A_2 , and A_3) of Disodium 5'-Guanylate in 0.01 N solution of hydrochloric acid (1→50,000) is measured at wavelengths of 250 nm, 260 nm, and 280 nm. Absorption ratios, A_1/A_2 and A_3/A_2 are 0.95~1.03 and 0.63~0.71, respectively.
- (6) Other Decomposed Substances of Nucleic Acid : When thin plate chromatography is carried out with 1 μ l of aqueous solution of Disodium 5'-Guanylate (1→200) using a mixture of acetone, ammonia solution, and n-propyl alcohol (2 : 5 : 6) as a developing solvent, only one spot should be observed. In this case, silica gel for thin layer chromatography (with phosphor) that is dried for 1 hour at 110°C is used as a porous support material. It is developed until the solvent front reaches approximately 10 cm from the starting point. It is then dried in air and observed under UV light (wavelength : approximately 250 nm) in a dark place. Reference solution is not used.

Loss on Drying When Disodium 5'-Guanylate is dried for 4 hours at 120°C, the weight loss should not be more than 25%.

Assay Dissolve about 500 mg of Disodium 5'-Guanylate, accurately weighed, in 0.01 N hydrochloric acid (Total volume = 1,000 ml), 10 ml of which is diluted to 250 ml with 0.01 N hydrochloric acid, Test Solution. Using 0.01 N hydrochloric acid as a reference solution, absorption A is measured at 260 nm with a path length of 1 cm. The content of Disodium 5'-Guanylate is obtained by the following equation

$$\text{Content(\%)} = \frac{A}{289.8} \times \frac{250,000}{\text{Weight of sample(mg)}} \times \frac{100}{100 - \text{loss on drying(\%)}} \times 100$$

16. Citric Acid



Chemical Formula $\text{C}_6\text{H}_8\text{O}_7$

Molecular Weight 192.13

Definition Citric Acid occurs as crystals (mono hydrated) called citric acid (crystal) or as anhydrous material called citric acid (anhydrous).

Compositional Specifications of Citric Acid

Content Citric Acid, when calculated on the anhydrous of dried basis, should contain not less than 99.5% of citric acid ($\text{C}_6\text{H}_8\text{O}_7=192.13$).

Description Citric Acid occurs as colorless, transparent crystals. granules. or lumps, or as a white powder. It is odorless and has a strongly acid taste.

Identification (1) Citric Acid solution (1→10) is acidic.

(2) Citric Acid responds to test of Citrate Salt in Identification.

Purity (1) Sulfate : When 0.5 g of Citric Acid is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.

(2) Oxalate : When 1 g of Citric Acid is dissolved in 10 ml of water, and added 2 ml of calcium chloride solution, it should not be turn turbid.

(3) Arsenic : When 0.77 g of Citric Acid is dissolved in 5 ml of water, which is tested by Arsenic Limit Test, its content should not be more than 1.3 ppm.

(4) Lead : When 5.0 g of Citric Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 0.5 ppm.

(5) Mercury : When citric acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Calcium : 1 g of Citric Acid is dissolved in 10 ml of water, which is neutralized with ammonia solution. Then, 1 ml of ammonium oxalate solution is added, it should not be turn turbid.

(7) Readily Carbonizable Substances : When 0.5 g of Citric Acid is dissolved in 5 ml

- of sulfuric acid by heating at about 90°C for 1 hour, the color of the solution should not be deeper than that of the color standard solution K.
- (8) Polynuclear Aromatic Hydrocarbon : 25 g of Citric Acid is dissolved in 30 ml of water by heating at approximately 50°C. After cooling, the solution is extracted 3 times with 20 ml each of n-hexane (UV absorption spectrophotometry grade). It is centrifuged at 2,500~3,000 rpm for approximately 10 minutes and concentrated to 1~2 ml by evaporating n-hexane out. After cooling, n-hexane (UV absorption spectrophotometry grade) is added to the concentrate to bring the total volume to 10 ml, Test Solution. Absorption of test solution is measured at 260~350 nm with 1 cm path length. The difference in absorbance (compared to reference solution) should not be more than 0.05 in this range. In this case, use the reference solution obtained by following method. To 30 ml of water, extract 20 ml of n-hexane (UV absorption spectrophotometry grade) 3 times repeatedly, and follow the same procedure as test solution.
- (9) Isocitric Acid : 0.5 g of Citric Acid is heated at 105°C for 3 hours and cooled, which is dissolved in 10 ml of acetone, Test Solution. Using 0.005 ml of the test solution, it is tested by the Method 1 in Paper Chromatography. Only one spot should be observed. For the filter paper, a No.2 filter paper for chromatography is used. When the developing solvent front reaches approximately 25 cm, and stop developing and dry in air. Bromophenol blue solution is sprayed upon the paper. A reference solution is not used for this test. N-butyl alcohol, formic acid, and water (8:3:2) are mixed and set-aside. The supernatant of solution is used as a developing solvent.

Residue on Ignition When thermogravimetric analysis is done with 2 g of citric acid, the residue should not be more than 0.05%.

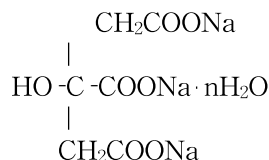
Water Content Water Content of Citric Acid is tested by the direct titration method in water content determination (Karl-Fischer Method). The water content should not be more than 0.5% for citric acid (anhydrous) and 8.8% for citric acid (crystal)

Assay Accurately weigh about 1.5 g of Citric Acid is dissolved in water and make to 250 ml, and 25 ml of which is then titrated with 0.1 N sodium hydroxide solution (indicator : 2~3 drops of phenolphthalein solution).

$$1 \text{ ml of } 0.1 \text{ N sodium hydroxide} = 6.404 \text{ mg } \text{C}_6\text{H}_8$$

17. Trisodium Citrate

Sodium Citrate



Chemical Formula $\text{C}_6\text{H}_5\text{Na}_3\text{O}_7 \cdot n\text{H}_2\text{O}$ ($n=0, 2, 5$)

Molecular Weight pentahydrate : 348.15, dihydrate : 294.10, anhydrous : 258.07

Definition Trisodium citrate occurs as crystals (dihydrate, pentahydrate) called trisodium citrate (crystal) and as anhydrous material called trisodium citrate (anhydrous).

Compositional Specifications of Trisodium Citrate

Content Trisodium Citrate, when calculated on the dried basis, should contain within a range of 99.0~101.0% of trisodium citrate ($\text{C}_6\text{H}_5\text{O}_7\text{Na}_3 = 258.07$).

Description Trisodium Citrate occurs as colorless crystals or as a white powder. It is odorless and has a fresh, salty taste.

Identification (1) Trisodium Citrate responds to test of Citrate and Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : When Trisodium Citrate 1 g is dissolved in 20 ml of water, the solution should be colorless and almost clear.

(2) pH : pH of Trisodium Citrate solution (1→20) should be within a range of 7.6~9.0 as determined by a glass electrode method.

(3) Sulfate : When 1 g of Trisodium Citrate is tested by Sulfate Limit Test in Identification, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.

(4) Arsenic : When 0.77 g of Trisodium Citrate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 1.3 ppm.

(5) Lead : When 5.0 g of Trisodium Citrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(6) Mercury : When Trisodium Citrate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Trisodium Citrate is dried at 180°C for 4 hours, the weight loss should be 30.3 % or less for pentahydrate, 13.5 % or less for dihydrate, and 1.0% or less for anhydrous form.

Assay Dissolve 0.2 g trisodium Citrate, previously dried at 180°C for 2 hours and accurately weighed, in 30 ml of glacial acetic acid (for non-aqueous titration) by heating. After cooling, the solution is titrated with 0.1 N perchloric acid (indicator : 1 ml of crystal violet-acetic acid solution). The end point is where the violet color of the solution changes to blue and then green. Separately, a blank test is carried out by the same procedure.

1 ml of 0.1 N perchloric acid = 8.602 mg of $\text{C}_6\text{H}_5\text{O}_7\text{NNa}_3$

18. Ferric Citrate

Compositional Specifications of Ferric Citrate

Content Ferric Citrate should contain within a range of 16.5~18.5 % of iron (Fe = 55.85).

Description Ferric Citrate occurs as transparent reddish crystalline platelets or as brown powder.

Identification Ferric Citrate responds to test of Citrate (A) and Ferric Salt in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Ferric Citrate is dissolved in 20 ml of water by heating in a water bath, the solution should be almost clear.

(2) Ammonium Salt : When 1 g of Ferric Citrate is boiled in 10 ml of water and 5 ml of calcium hydroxide solution, it should not generate an odor of ammonia.

(3) Sulfate : 0.4 g of Ferric Citrate is dissolved in 50 ml of water, and make to 100 ml with water. 10 ml of this solution is boiled with 1 ml of dilute hydrochloric acid (1→4) and 0.1 g of hydroxylamine hydrochloride for 1 min. After cooling, the solution make to 50 ml with water, Test Solution. This Test Solution is tested by Sulfate Limit Test. Separately, a color standard solution is prepared by adding 1 ml of hydrochloric acid (1→4) and water to 0.4 ml of 0.01 N sulfuric acid, and make to 50 ml with water.

(4) Arsenic : To 0.5 g of Ferric Citrate, add in 5 ml of water, and 1 ml of sulfuric acid and 10 ml of sulfurous acid. The solution is concentrated to approximately 2 ml by evaporation, which is diluted to 10 ml with water. 5 ml of this solution is tested by Arsenic Limit Test. The content of arsenic should not be more than 4 ppm.

(5) Lead : When 5.0 g of Ferric Citrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Assay Transfer about 1 g of Ferric Citrate into a flask with a ground-glass stopper, and 5 ml of hydrochloric acid and 30 ml of water are added. It is dissolved by heating. After cooling, 4 g of potassium iodide is added. The flask with a ground-glass stopper is placed on the flask, which is set-aside for 15 minutes in a dark place. 100 ml of water is added to the solution and the free iodine is titrated with 0.1 N sodium thiosulfate (indicator: starch solution). Separately, a blank test is carried out by the same procedure.

1 ml of 0.1 N sodium thiosulfate = 5.585 mg of Fe

19. Ferric Ammonium Citrate

Compositional Specifications of Ferric Ammonium Citrate

Content Ferric Ammonium Citrate should contain within a range of 14.5~21.0% of iron (Fe= 55.85).

Description Ferric Ammonium Citrate occurs as green, red-brown, deep red, brown, or brownish yellow, transparent flaky crystals. powder, granules, or lumps. it is odorless or has a slight odor of ammonia and a weak iron taste.

Identification (1) To 5 ml of ferric ammonium citrate solution (1→10), add 5 ml of sodium hydroxide solution, and heat. An odor of ammonia is evolved, and a red-brown precipitate is formed.

(2) To Ferric Ammonium Citrate solution (1→100), add an ammonia solution. A black color develops, and no precipitate is formed.

(3) To 5 ml of Ferric Ammonium Citrate solution (1→100), add 0.3 ml of potassium permanganate solution and 4 ml of mercury II sulfate solution, and boil. A white precipitate is formed.

(4) To 10 ml of Ferric Ammonium Citrate solution (1→10), add 4 ml of potassium hydroxide solution, and heat, and filter. Take 4 ml of filtrate, add acetic acid to make it slightly acidic, and cool. 2 ml of calcium chloride solution is added to the resulting solution, and boil. A white crystalline precipitate is slowly formed.

Purity (1) Sulfate : 0.4 g of Ferric Ammonium Citrate is dissolved in 50 ml of water, and make to 100 ml with water. 10 ml of this solution is boiled with 1 ml of dilute hydrochloric acid (1→4) and 0.1 g of hydroxylamine hydrochloride for 1 min. After cooling, the solution make to 50 ml with water, Test Solution. This Test Solution is tested by Sulfate Limit Test. Separately, a color standard solution is prepared by adding 1 ml of hydrochloric acid (1→4) and water to 0.4 ml of 0.01 N sulfuric acid, and make to 50 ml with water.

(2) Arsenic : To 0.5 g of Ferric Ammonium Citrate, add in 5 ml of water, and 1 ml of sulfuric acid and 10 ml of sulfurous acid. The solution is concentrated to approximately 2 ml by evaporation, which is diluted to 10 ml with water. 5 ml of this solution is tested by Arsenic Limit Test. The content of arsenic should not be more than 4 ppm.

(3) Lead : When 5.0 g of Ferric Ammonium Citrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Mercury : When Ferric Ammonium Citrate is tested by Mercury Limit Test, its

content should not be more than 1.0 ppm.

- (5) Ferric Citrate : To 10 ml of Ferric Ammonium Citrate solution (1→100), add 1 drop of potassium ferrocyanide solution, no blue precipitate is formed.

Assay Accurately weigh about 1 g of Ferric Ammonium Citrate, transfer into a flask with a ground-glass stopper, dissolve in 25 ml of water, and add 5 ml of hydrochloric acid and 4 g of potassium iodide. The flask with a ground-glass stopper is placed on the flask, which is set-aside for 15 minutes in a dark place. 100 ml of water is added to the solution and the free iodine is titrated with 0.1 N sodium thiosulfate (indicator : starch solution). Separately, a blank test is carried out by the same procedure.

1 ml of 0.1 N potassium thiosulfate = 5.585 mg of Fe

20. Potassium Citrate



Chemical Formula $\text{C}_6\text{H}_5\text{K}_3\text{O}_7 \cdot \text{H}_2\text{O}$

Molecular Weight 324.41

Compositional Specifications of Potassium Citrate

Content Potassium Citrate, when calculated on the dried basis, should contain not less than 99.0% of potassium citrate ($\text{C}_6\text{H}_5\text{K}_3\text{O}_7$).

Description Potassium Citrate occurs as colorless crystals or as a white crystalline powder, and is odorless.

Identification Potassium Citrate solution (1→20) responds to test of Citrate and Potassium Salt in Identification.

Purity (1) Arsenic : When 0.77 g of Potassium Citrate is dissolved in 5 ml of water and the solution is tested by arsenic test, its content should not be more than 1.3 ppm.

(2) Lead : When 5.0 g of Potassium Citrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(3) Mercury : When Potassium Citrate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

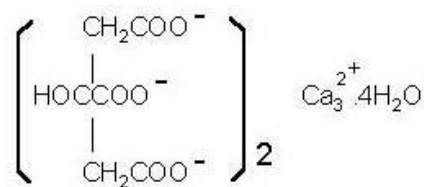
(4) Alkalinity : Potassium Citrate solution(1→20) is alkaline as tested with a litmus paper.

Loss on Drying When Potassium Citrate is dried for 4 hours at 180°C, the weight loss should be within a range of 3~6%.

Assay 250 mg of Potassium Citrate, precisely dried and accurately weighed, is dissolved in 40 ml of glacial acetic acid by heating. After cooling to room temperature, the solution is titrated with 0.1 N perchloric acid (indicator : 2 drops of crystal violet–glacial acetic acid solution). Separately, a blank test is carried out by the same procedure.

$$1 \text{ ml of } 0.1 \text{ N perchloric acid} = 10.213 \text{ mg } \text{C}_6\text{H}_5\text{K}_3\text{O}_7$$

21. Calcium Citrate



Chemical Formula $\text{C}_6\text{H}_8\text{Ca}_3\text{O}_{14} \cdot 4\text{H}_2\text{O}$

Molecular Weight 570.51

Compositional Specifications of Calcium Citrate

Content Calcium Citrate, when calculated on the dried basis, should contain not less than 97.5% of calcium citrate ($\text{C}_6\text{H}_8\text{Ca}_3\text{O}_{14} = 498.44$).

Description Calcium Citrate occurs as a white powder. It is odorless.

Identification Calcium Citrate responds to test of Potassium Salt and Citrate in Identification.

- Purity**
- (1) Hydrochloric Acid-Insoluble Substances : To 5 g of Calcium Citrate, add 10 ml of hydrochloric acid and 50 ml of water, and heat in a water bath for 30 minutes. Add water to make 200 ml. and filter through a filter paper for quantitative analysis. Wash the residue on the filter paper thoroughly with boiling water. Reduce to ash together with the filter paper, and weight the residue. The amount of residue should not be more than 3 mg.
 - (2) pH : Weigh 1 g of Calcium Citrate and dissolve in 20 ml of water, pH of the solution should be within a range of 6.0~8.0.
 - (3) Chloride : When 1 g of Calcium Citrate is dissolved in 10 ml of dilute nitric acid by heating, which is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.
 - (4) Sulfate : 1 g of Calcium Citrate is dissolved in 10 ml of dilute hydrochloric acid by heating. After cooling, the solution is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.
 - (5) Arsenic : 0.77 g of Calcium Citrate is dissolved in 5 ml of dilute hydrochloric acid by heating, Test Solution. This test solution is tested by Arsenic Limit Test and its content should not be more than 1.3 ppm.
 - (6) Lead : When 5.0 g of Calcium Citrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content

should not be more than 1.0 ppm.

(7) Mercury : When Calcium Citrate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(8) Fluoride : 1 g of Calcium Citrate transfer into a beaker, and dissolve in 10 ml of hydrochloric acid (1→10). Then heat the solution for 1 minute, transfer into a PE(polyethylene) beaker, and immediately cool down. Add 15 ml of Trisodium Citrate Solution (1→4) and 10 ml of Disodium Ethylenediaminetetraacetate solution (1→40) and mix by shaking. Adjust the pH of this solution to 5.4~5.6 using Hydrochloric acid (1 in 10) or Sodium Hydroxide Solution (2 in 5) and dilute to volume of 100 ml with water. Place 50 ml of the solution in a PE(polyethylene) beaker. Then measure electric potential by using fluorine electrode and the obtained content of fluorine from calibration curve should not be more than 30 ppm.

Standard Solution : Accurately weigh 2.210 g of sodium fluoride, which is previously dried for 4 hours at 200°C, place it into a PE(polyethylene) beaker and dissolve in 200 ml of water. Then add water to bring the total volume to 1,000ml and preserve it in a PE(polyethylene) beaker. Add 5 ml of this solution into a measuring flask, and add water to bring the total volume to 1,000 ml. (1 ml of this solution contains 5μg of fluorine).

Calibration Curve Preparation : Pipet 1, 2, 3, 5, 10, and 15 ml each of standard solution respectively into a PE(polyethylene) beaker, and add 15 ml of Trisodium Citrate Solution (1→4) and 10 ml of Disodium Ethylenediaminetetraacetate solution (1→40) and mix. Adjust the pH of this solution to 5.4~5.6 using dilute Hydrochloric acid (1→10) or Sodium Hydroxide Solution (2→5). To the solution, respectively, add water to bring the total volume to 100ml. Separately, place 50 ml of the solution in a PE(polyethylene) beaker. Then measure electric potential by using fluorine electrode and prepare calibration curve with the log of fluorine concentration.

Loss on Drying When Calcium Citrate is dried for 4 hours at 150°C, the weight loss should be within a range of 10~14%.

Assay Dissolve about 1 g of Calcium Citrate, previously dried, in 10 ml of dilute hydrochloric acid and 10 ml of water, which is diluted to 100 ml with water. Take 25 ml of this solution, and diluted to 100 ml with water, which is neutralized with 10% sodium hydroxide solution. Add 15 ml of 10% sodium hydroxide solution and 20 ml of 0.05 M EDTA solution, it is set-aside for approximately 1 minute. Add 0.1 g of 2-oxy-1-(2'-oxy-4'-sulfo-1-naphtylazo) -3-naphthoic acid, which is titrated with 0.05 M EDTA solution. At the end point, the red color completely disappears and the solution turns blue.

1 ml of 0.05 M EDTA solution = 8.307 mg of $\text{Cl}_2\text{H}_{10}\text{Ca}_3\text{O}_{14}$

22. Silicone Resin

Dimethylpolysiloxane

Compositional Specifications of Silicone Resin

Description Silicone Resin is a colorless~light grey, transparent or translucent, viscous or gluey liquid with almost no odor.

Identification Transfer 100 mg of Silicone Resin into platinum crucible, and add a few drops of sulfuric acid and nitric acid and heat, it burns with white smoke. A cold glass plate is placed over the white smoke to collect particles. Collected powder transfer into a platinum crucible, where 3 g of sodium hydroxide is added. It is melted by heating. After cooling, the residues is dissolved in 50 ml of water, which is then filtered. On a filter paper, 1 drop of the resulting solution, 1 drop of ammonium molybdate solution, and 1 drop of benzidine solution are dropped. When the paper is exposed to ammonia vapor, a blue color appears.

Purity (1) Specific Gravity : Specific gravity of Silicone Resin should be within a range of 0.98~1.02

(2) Refractive Index of Extracted Silicone Oil : Weigh 15 g of Silicone Resin is transfer into a Soxhlet extractor and extracted with 150 ml of carbon tetrachloride for 3 hours. When the extract is evaporated in a water bath, a gluey liquid remains. When the viscosity is measured by Method 1 Capillary Viscosity Measurement in Viscosity at 25°C, it should be 100~1,100 centi stokes. Refractive Index $[n]_D^{25}$ should be within a range of 1.400~1.410.

(3) Silicon Dioxide : When the extraction residue above (2) is dried for 1 hour at approximately 100°C, the content should not be more than 2.25 g (not more than 15%).

(4) Arsenic : 0.25 g of Silicone Resin transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath, test solution. When the test solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

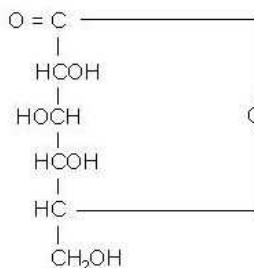
(5) Lead : When 5.0 g of Silicone Resin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(6) Mercury : When Silicone Resin is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Silicone Resin is dried for 4 hours at 150°C, the weight loss should not be more than 0.5%.

23. Glucono- δ -Lactone

Gluconolactone

Chemical Formula $C_6H_{10}O_6$

Molecular Weight 178.15

Compositional Specifications of Glucono- δ -Lactone

Content Glucono- δ -Lactone, when calculated on the dried basis, should contain not less than 99.0% of glucono- δ -lactone ($C_6H_{10}O_6$).

Description Glucono- δ -Lactone occurs as white crystals or crystalline powder. It is odorless or has a slight odor. It has a sweet taste at first and changes to a slight acid taste.

Identification (1) The solution of Glucono- δ -Lactone (1 \rightarrow 50) is acidic.

(2) To 1 ml of Glucono- δ -Lactone solution (1 \rightarrow 10), add 1 drop of ferric chloride solution, the solution appears a deep yellow color.

(3) To 5 ml of Glucono- δ -Lactone solution (1 \rightarrow 10), add 0.7 ml of glacial acetic acid and 1ml of freshly distilled phenylhydrazine, and heat in a water bath for 30 minutes and cool. When the inner wall is rubbed with a glass rod, crystals are precipitated. These crystals are collected and dissolved in 10 ml of hot water, where activated carbon is added. After mixing by shaking, it is filtered. After cooling, the inner wall is rubbed with a glass rod to precipitate crystals. The melting point of crystals, previously dried, should be within a range of 196 \sim 202 $^{\circ}$ C (decomposition).

(4) 2.5 g of Glucono- δ -Lactone is dissolved in 25 ml of water. Optical rotation is immediately measured. $[\alpha]_D^{25} = +60 \sim +67^{\circ}$.

Purity (1) Clarity and Color of Solution : When 1 g of Glucono- δ -Lactone is dissolved in 10 ml of water, the solution should be colorless and almost clear.

(2) Chloride : When 0.5 g of Glucono- δ -Lactone is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N hydrochloric acid.

- (3) Sulfate : When 1 g of Glucono- δ -Lactone is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.
- (4) Arsenic : 0.25 g of Glucono- δ -Lactone is dissolved in water, and make to 10 ml. When the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.
- (5) Lead : When 5.0 g of Glucono- δ -Lactone is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Sucrose or Reducing Sugar : To 0.5 g of Glucono- δ -Lactone, add 10 ml of water and 2 ml of dilute hydrochloric acid, and boil for 2 minutes. After cooling, 5 ml of sodium carbonate solution is added, which is set-aside for 4 minutes. The solution is diluted to 20 ml with water, 5 ml of which is mixed with 2 ml of Fehling solution, which is boiled for 1 minute. An orange-yellow~red precipitate should not form immediately.

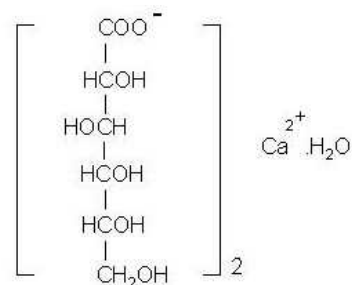
Loss on Drying When Glucono- δ -Lactone is dried for 2 hours at 105°C, the weight loss should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done with Glucono- δ -Lactone, the residue should not be more than 0.1%.

Assay Accurately weigh about 0.3 g of Glucono- δ -Lactone, precisely dried, and dissolve in 30 ml of 0.1 N sodium hydroxide solution. After the solution is set-aside for 20 minutes, the excess alkali is titrated with 0.1N sulfuric acid (indicator : 3 drops of phenolphthalein solution).

1 ml of 0.1 N sodium hydroxide solution = 17.82 mg of C₆H₁₀O₆

24. Calcium Gluconate



Chemical Formula $(\text{C}_6\text{H}_{11}\text{O}_7)_2\text{Ca} \cdot \text{H}_2\text{O}$

Molecular Weight 448.40

Compositional Specifications of Calcium Gluconate

Content Calcium Gluconate, when calculated on the dried basis, should contain within a range of 98.0~104.0% of calcium gluconate $[(\text{C}_6\text{H}_{11}\text{O}_7)_2\text{Ca} \cdot \text{H}_2\text{O}]$.

Description Calcium Gluconate occurs as a white crystalline or granular powder without odor or taste.

Identification (1) A solution of Calcium Gluconate (1→40) responds to test of Calcium Salt in Identification.

(2) To 1 ml of Calcium Gluconate solution (1→40), add 1 drop of ferric chloride solution, the solution develops a dark yellow color.

(3) To 5 ml of warm solution of Calcium Gluconate (1→10), add 0.7 ml of glacial acetic acid and 1 ml of freshly distilled phenylhydrazine and heat in a water bath for 30 minutes and cool. When the inner wall is rubbed with a glass rod, crystals are precipitated. These crystals are collected and dissolved in 10 ml of boiling water, where small amount of activated carbon is added. After mixing by shaking, it is filtered. After cooling, the inner wall is rubbed with a glass rod to precipitate crystals. The melting point of the dried crystals should be 196~202°C (decomposition).

Purity (1) Clarity and Color of Solution : When 1 g of Calcium Gluconate is dissolved in 20 ml of water by heating at 60°C, the solution should be almost clear.

(2) Chloride : When 0.3 g of Calcium Gluconate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.6 ml of 0.01 N hydrochloric acid.

(3) Sulfate : When 0.5 g of Calcium Gluconate is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N

sulfuric acid.

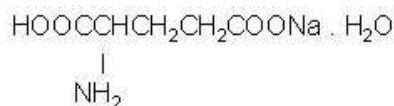
- (4) Arsenic : 0.25 g of Calcium Gluconate is dissolved in 20 ml of warm water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.
- (5) Lead : When 5.0 g of Calcium Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Sucrose or Reducing Sugar : To 0.5 g of Calcium Gluconate, add 10 ml of water and 2 ml of dilute hydrochloric acid, and boiling for 2 minutes. After cooling, 5 ml of sodium carbonate solution is added, which is set-aside for 5 minutes. The solution is diluted to 20 ml with water, which is then filtered. Take 5 ml of the filtrate is mixed with 2 ml of Fehling solution, which is boiled for 1 minute. An orange-yellow~red precipitate should not form immediately.

Loss on Drying When Calcium Gluconate is dried for 2 hours at 80°C, the weight loss should not be more than 0.5%.

Assay Accurately weigh about 0.5 g of Calcium Gluconate, previously dried, and dissolve in 5 ml of dilute hydrochloric acid, and add 50 ml of water, 25 ml of sodium hydroxide solution, and about 0.1 g 2-oxy-1-(2'-oxy-4'-sulfo-1-naphthylazo)-3-naphthoic acid. Immediately, the solution titrated with 0.05 M EDTA solution. At the end point, the red color completely disappears and the solution turns blue.

1 ml of 0.05 M EDTA solution = 22.42 mg $(C_6H_{11}O_7)_2Ca \cdot H_2O$

25. Monosodium L-Glutamate



Chemical Formula $\text{C}_5\text{H}_8\text{NNaO}_4 \cdot \text{H}_2\text{O}$

Molecular Weight 187.13

Compositional Specifications of Monosodium L-Glutamate

Content Monosodium L-Glutamate, when calculated on the dried basis, should contain not less than 99.0% of monosodium L-glutamate ($\text{C}_5\text{H}_8\text{NNaO}_4 \cdot \text{H}_2\text{O}$).

Description Monosodium L-Glutamate occurs as colorless~white prismatic crystallites or as white crystalline powder with a characteristic taste.

Identification (1) To 5 ml of Monosodium L-Glutamate solution (1→1,000), add 1 ml of ninhydrin solution (1→1,000), and heat for 3 minutes. A purple color develops.

(2) Monosodium L-Glutamate responds to test of Sodium Salt in Identification

Purity (1) Clarity and Color of Solution : When 1 g of Monosodium L-Glutamate is dissolved in 10 ml of water, the solution should be colorless and almost clear.

(2) pH : pH of Monosodium L-Glutamate solution (1→10) is tested by glass electrode method. It should be within a range of 6.7~7.2.

(3) Specific Rotation : Dissolve about 10 g of Monosodium L-Glutamate, accurately weigh, in hydrochloric acid (1→4) and to make 100 ml. Optical rotation of Monosodium L-Glutamate is measure and converted to a value of a dried form.
 $[\alpha]_D^{20} = +24.8 \sim +25.3^\circ$

(4) Chloride : When 0.3 g of Monosodium L-Glutamate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.35 ml of 0.01 N hydrochloric acid.

(5) Arsenic : 0.4 g of Monosodium L-Glutamate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 2.5 ppm.

(6) Lead : When 5.0 g of Monosodium L-Glutamate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(7) Pyrrolidone Carboxylic Acid : Weigh 1g of Monosodium L-Glutamate and dissolve in 100 ml of water, test solution. Separately, weigh 1 g of pyrrolidone carboxylic

acid and dissolve in water, reference solution. Drop 1 μ l of test solution and reference solution on Thin Layer Plate prepared by using silica gel for thin-layer chromatography, and develop about 10cm by using n-butanol: glacial acetic acid : water mixture (2:1:1) as developing solvent. Dry Thin Layer Plate at 80 °C for 30 minutes. Spray color developing solution to it and heat it at 80°C for 10 minutes. Pyrrolidone carboxylic acid spot in test solution should not be observed at the same position as reference solution.

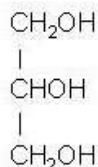
Color Developing Solution : To 1g of Ninhydrin and 3ml of acetic acid, add n-butanol to make 100 ml.

Loss on Drying When Monosodium L-Glutamate is dried for 5 hours at 100°C, the weight loss should not be more than 0.5%.

Assay Dissolve about 0.15 g of Monosodium L-Glutamate, accurately weighed, in 3 ml of formic acid and add 50 ml of glacial acetic acid, and titrate with 0.1 N perchloric acid (indicator : 0.5 ml of α -naphthol benzene). The end point is where the solution changes its color from brown to green. Separately, a blank test is carried out by the same method.

$$1 \text{ ml of } 0.1 \text{ N perchloric acid} = 9.356 \text{ mg } \text{C}_5\text{H}_8\text{NNaO}_4\cdot\text{H}_2\text{O}$$

26. Glycerin



Chemical Formula $\text{C}_3\text{H}_8\text{O}_3$

Molecular Weight 92.10

Compositional Specifications of Glycerin

Content Glycerin, when calculated on the anhydrous basis, should contain not less than 99.0% of glycerin ($\text{C}_3\text{H}_8\text{O}_3$).

Description Glycerin is a colorless and odorless liquid with sweet flavor.

Identification To 2~3 drops of Glycerin, add 0.5 g of potassium hydrogen sulfate and heating, pungent odor of acrolein is generated.

Purity (1) Chloride : When 3.5 g of Glycerin tested by Chloride Limit Test, the content should not be more than the amount that corresponds to 0.1 ml of 0.01 N hydrochloric acid.

(2) Arsenic : 0.25 g of Glycerin is dissolved in 5 ml of water and tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(3) Lead : When 5.0 g of Glycerin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Cadmium : When 5.0 g of Glycerin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(5) Mercury : When Glycerin is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Water Content Water content of Glycerin proceed as directed under Water Determination (Karl-Fisher Titration) and should not be more than 5.0%.

Residue on Ignition To 10 g of Glycerin, add 1~2 drops of sulfuric acid and slowly ignited by heating. The residue proceed as directed under Thermogravimetric Analysis, its content should not be more than 0.01%

Assay To 0.5 g of Glycerin, quickly and accurately weighed, add water to make 500 ml. Take 50 ml of this solution, add about 200 ml of water. Then, the pH of this solution is

adjusted to 7.9 ± 0.1 using dilute sulfuric acid (3→1,000) or dilute sodium hydroxide (1→250). Adding 50 ml of sodium periodate solution for glycerin and mixing, which is then kept with a watch glass cover in a dark place for 30 minutes. Then 10 ml of 1:1 mixture of ethylene glycol and water is added and stir-mixed, which is again kept in a dark place for 20 minutes. Adding 5 ml of sodium formate solution (1→15), and titrate with 0.1 N sodium hydroxide solution until reaches pH of 7.9 ± 0.2 . A blank test is done separately. Water used in this test is to be freshly boiled and cooled prior to use.

1 ml of 0.1 N Sodium Hydroxide Solution = 9.209 mg $\text{C}_3\text{H}_8\text{O}_3$

27. Glycerin Esters of Fatty Acids

Definition Glycerin Esters of Fatty Acids are esters of fatty acids and glycerin or polyglycerin and their derivatives. Glycerin Esters of Fatty Acids include glycerin fatty acid ester, glycerin acetic acid fatty acid ester, glycerin lactic acid fatty acid ester, glycerin citric acid fatty acid ester, glycerin succinic acid fatty acid ester, glycerin diacetyl tartaric acid fatty acid ester, glycerin acetic acid ester, polyglycerin fatty acid ester, and polyglycerin condensed ricinoleic acid ester.

Content Specifications of Glycerin Esters of Fatty Acids

Description Glycerin Esters of Fatty Acids occur as colorless to brown powders, flakes, coarse powders, or granular or waxy lumps, or are a colorless to brown semi-fluids or liquids. They are odorless or have a characteristic odor.

Identification (1) To approximately 5 g of Glycerin Ester of Fatty Acid (in case of, 1.5 g of glycerol acetic acid ester), add 50 ml of ethanolic potassium hydroxide solution, equip with a reflux condenser, heat in a water bath for 1 hour, and evaporate the ethanol to an almost dry state. Add 50 ml of diluted hydrochloric acid (1→9), shake well, separate the produced fatty acid by extracting three times with 40 ml of petroleum ether · methyl ethyl ketone mixture (7 : 1) each time. Stir the water layer well, add sodium hydroxide solution (1→9) until it is almost neutral, and concentrate under reduced pressure in a water bath. Add 20 ml of methanol at about 40°C, shake well, cool, filter, and evaporate the methanol of the filtrate in a water bath. Perform Thin-Layer Chromatography on 5μl of the test solution, using a solution (1→10) of the residue dissolved in methanol as the test solution. methanol glycerin mixture (9:1) as the reference solution, and, n-butanol · methanol · chloroform mixture (5:3:2) as the developing solvent. In cases of glycerin esters, a white spot is observed at the same position as the reference solution : in cases of polyglycerin ester, a white spot or a white band-shaped spot is observed at a position not above that of the reference solution. For the thin layer plate. use silica gel for thin-layer chromatography dried at 110°C for 1 hour as the support. Stop the development when the solvent front rises 15 cm above the original line. Air-dry, heat at 110°C for 10 minutes to remove the solvent, cool, spray the thymol · sulfuric acid solution, and heat at 110°C for 20 minutes to develop the color.

(2) Except in the case of glycerin acetic acid ester, combine the petroleum ether · methyl ethyl ketone layers obtained by separation in (1) above, and evaporate the solvent. An oily substance or a white to yellow-white solid remains. Add 5 ml of ether to 0.1 g of the residue, and shake, it is dissolves.

- (3) Except in the cases of glycerin fatty acid ester and polyglycerin ester, add 50 ml of water to 5 ml of the test solution of (1) above, and shake. In cases of glycerin acetic acid fatty acid ester and glycerin acetic acid ester, the solution responds to the test for Acetate; in the case of glycerin lactic acid fatty acid ester, to that for Lactate; in the case of glycerin citric acid fatty acid ester, to that for Citrate (2); in the case of glycerin succinic acid fatty acid ester, to that for Succinate; and in the case of glycerin diacetyl tartaric acid fatty acid ester, to those for Acetate and Tartrate, respectively.
- (4) In case of polyglycerin condensed ricinoleic acid ester, combine the petroleum ether-methyl ethyl ketone layers obtained by separation in (1) above. Wash this solution twice with 50 ml of water each time, dehydrate with anhydrous sodium sulfate, filter, remove the solvent by warming under reduced pressure. Accurately weigh about 1 g of the residue. Weigh 1 g accurately, put this into a 200ml round bottom-type flask and proceed as directed under Hydroxyl Value in Fats and Related Substances. In this case, use about 0.5 g of the residue to measure the acid value. The hydroxyl value is 150~170.

- Purity** (1) Acid Value : Dissolve about 6 g of Glycerin Esters of Fatty acid, accurately weighed, in a mixture of alcohol and ester (1:1) and proceed as directed under Acid Value in Fats and Related substances Tests. Glycerin fatty acid ester, Glycerin acetic acid fatty acid ester, Glycerin lactic acid fatty acid ester, Glycerin acetic acid ester should not be more than 6.0, Polyglycerin fatty acid ester, Polyglycerin condensed ricinoleic acid ester should not be more than 12, Glycerol citric acid fatty acid ester should not be more than 100, Glycerin succinic acid fatty acid ester, Glycerin diacetyl tartaric acid ester should not be more than 60~120.
- (2) Arsenic : Transfer 0.25 g of Glycerin Esters of Fatty Acids into a platinum, quartz, or porcelain crucible, add 10 ml of magnesium nitrate in ethyl alcohol (1→50) and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When the solution is tested by Arsenic Limit Test, it should not be more than 4 ppm.
- (3) Lead : When 5.0 g of Glycerin Esters of Fatty acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (4) Cadmium : When 5.0 g of Glycerin Esters of Fatty acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy,

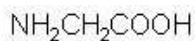
its content should not be more than 1.0 ppm.

(5) Mercury : When Glycerin Esters of Fatty acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Polyoxyethylene : Weigh 1 g of Glycerin Esters of Fatty Acids, transfer into a 200 ml flask, add 25 ml of ethanolic potassium hydroxide solution, equip with a ground reflux condenser, and boil on a water bath for 1 hour while shaking occasionally. Evaporate the ethanol on a water bath or under reduced pressure until it becomes almost dry, add 20 ml of diluted sulfuric acid (3→100), shake well while warming, add 15 ml of ammonium thiocyanate cobalt nitrate solution, shake well, add 10 ml of chloroform, shake again, and allow to stand. The color of the chloroform layer does not change to blue.

Residue on Ignition When 1 g of Glycerin Esters of Fatty Acids, accurately weighed, is tested by thermogravimetric analysis at $800 \pm 25^{\circ}\text{C}$, the amount of residue should not be more than 0.5%.

28. Glycine



Chemical Formula $\text{C}_2\text{H}_5\text{O}_2\text{N}$

Molecular Weight 75.07

Compositional Specifications of Glycine

Content Glycine, when calculated on the dried basis, contains 98.5~101.5% of glycine ($\text{C}_2\text{H}_5\text{O}_2\text{N}$).

Description Glycine occurs as white crystals or crystalline powder, having a sweet taste.

Identification (1) To 5 ml of solution of Glycine (1→10), add 5 drops of dilute hydrochloric acid and 1 ml of sodium nitrite solution, colorless gas is generated.
(2) Take 5 drops of the resulting solution above (1), transfer into small test tube and boil for a while and evaporate to dryness in a drying oven at 120°C and cool. To dried residues, add 5~6 drops of chromotropic acid, which is then heated for 10 minutes in a water bath. The solution shows a deep violet color.
(3) To 5 ml of Monosodium L-Glutamate solution (1→1,000), add 1 ml of ninhydrin solution (1→1,000), and heat for 3 minutes. A purple color develops.

Purity (1) Clarity and Color of Solution : Dissolve 1 g of Glycine in 10 ml of water, it should be colorless and clear.
(2) pH : pH of Glycine solution (1→10) determined by glass electrode method, it should be within a range of 5.5~7.0.
(3) Chloride : When 0.5 g of Glycine is tested by Chloride Limit Test, the content should not be more than the amount that corresponds to 0.3 ml of F (4) Arsenic : When 0.25 g of Glycine is dissolved in 5 ml of water, which is then tested by Arsenic Limit Test, the content should not be more than 4 ppm.
(5) Lead : When 5.0 g of Glycine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
(6) Mercury : When Glycine is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Glycine is dried for 3 hours at 105°C, the weight loss should not be more than 0.2%.

Residue on Ignition 1 g of Glycine proceed as directed under Residues on ignition, it

should not be more than 0.1%.

Assay Accurately weigh about 0.15 g of Glycine and dissolve in 3 ml of formic acid. Add 50 ml of glacial acetic acid, and titrated with 0.1 N perchloric acid (indicator : 0.5 ml of α -naphtholbenzein solution). The end point is where the solution changes its color from brown to green. Separately, a blank test is carried out by the same method.

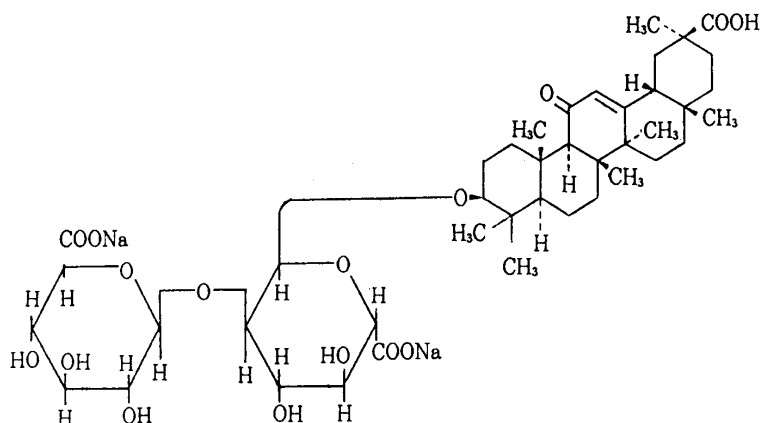
1 ml of 0.1 N perchloric acid = 7.507 mg of $\text{C}_2\text{H}_5\text{O}_2\text{N}$

29. Trisodium Glycyrrhizinate

○ Designed Cancellation

The date of cancellation: 12.11.'10 (Notification No. 2010-82).

30. Disodium Glycyrrhizinate



Chemical Formula $C_{42}H_{60}Na_2O_{16}$

Molecular Weight 866.92

Compositional Specifications of Disodium Glycyrrhizinate

Content Disodium Glycyrrhizinate, when calculated on the dried basis(anhydrous), should contain within a range of 95.0~102.0% of disodium glycyrrhizinate ($C_{42}H_{60}Na_2O_{16}$).

Description Disodium Glycyrrhizinate occurs as a white~light yellow powder with an extremely sweet taste.

Identification (1) To 0.5 g of Disodium Glycyrrhizinate, add 10 ml of 1 N hydrochloric acid. It is boiled gently for 10 minutes and filtered. The residue on the filter paper is washed with water thoroughly and dried at 105°C for 1 hour. To 1 ml of a solution of the dried substance in alcoholic solution (1→1,000), add 0.5 ml of a dibutyl hydroxytoluene solution in alcohol (1→100) and 1 ml of sodium hydroxide solution (1→5), which is then heated for 30 minutes in a water bath while evaporating the alcohol. Reddish purple~purple flocculent substances are formed in the residual solution.

(2) To 1 ml of the filtrate in (1), add 10 mg of naphthoresorcin and 5 drops of hydrochloric acid, and boiled gently for 1 minute, and allowed to stand for 5 minutes, and immediately cooled. To this solution, add 3 ml of benzene and shake. The color of the benzene layer changes to reddish purple.

(3) The residue on ignition of Disodium Glycyrrhizinate responds to test of Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : Dissolve 0.5 g of Disodium Glycyrrhizinate in 5 ml

- of water, it should be clear and its color should not be deeper than that of the color standard solution I.
- (2) pH : pH of Disodium Glycyrrhizinate solution (1→20) is measured with a pH meter using a glass electrode, it should be within a range of 5.5 ~ 6.5.
- (3) Chloride : To 0.5 g of Disodium Glycyrrhizinate, add 6 ml of diluted nitric acid (1→10) and 10 ml of water, and boil gently for 10 minutes and filter. Residues on the filter paper are washed twice with a small amount of water and the wash water is combined with the filtrate. If the filtrate is colored, 1 ml of hydrogen peroxide is added and heated in a water bath for 10 minutes. After cooling, the precipitate is filtered and washed twice with a small amount of water. The filtrate and wash water is combined and tested by Chloride Limit Test. The content of chloride should not be higher than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.
- (4) Sulfate : To 0.5 g of Disodium Glycyrrhizinate, add 5 ml of diluted hydrochloric acid (1→4) and 10 ml of water, and boil gently for 10 minutes and filter. The residue on the filter paper is washed twice with a small amount of water and the wash water is combined with the filtrate. The filtrate is neutralized with ammonia solution. If the filtrate is colored, 1 ml of hydrogen peroxide is added and heated in a water bath for 10 minutes. It is then cooled and filtered if necessary. The residue on the filter paper is washed twice with a small amount of water and wash water is combined with the filtrate, Test Solution. When Test Solution is tested by Sulfate Limit Test, the content should not be higher than the amount that corresponds to 0.3 ml of 0.01 N sulfuric acid
- (5) Arsenic : 1.25 g of Disodium Glycyrrhizinate transfer into a flask for decomposition, add 10 ml of sulfuric acid and 10 ml of nitric acid, and heat until white smoke appears. When the liquid turns brown, it is cooled and then heated again with additional 2 ml of nitric acid. This series of operation is repeated until the liquid becomes colorless~pale yellow. After cooling, 15 ml of saturated ammonium oxalate solution is added. It is heated until white smoke appears. After cooling, add water to make in 25 ml. 5 ml of this solution is taken out and used as test solution by Arsenic Limit Test. Color standard is prepared using 5 ml of arsenic standard solution, 10 ml of sulfuric acid, and 10 ml of nitric acid in a decomposed flask. The rest of the preparation should follow the procedure described for the test sample. (Not more than 4 ppm).
- (6) Lead : Disodium Glycyrrhizinate is tested by Purity (2) for Sodium Metaphosphate(not more than 2 ppm).

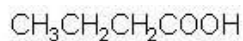
Water Content Accurately weigh about 0.2 g of Disodium Glycyrrhizinate, and tested by the back titration method in water content determination (Karl-Fischer Method). The water content should not be more than 13%.

Residue on Ignition When thermogravimetric analysis is done with 1 g of Disodium Glycyrrhizinate, the amount of residue should be within a range of 15~18% (calculated on the anhydrous basis).

Assay Accurately weigh about 100 mg of Disodium Glycyrrhizinate, and dissolve in water to make 1,000 ml. Take 10 ml of this solution, add water to make 25 ml, Test Solution. Separately, 50 mg of nicotinamide standard, previously dried in a vacuum desiccator (sulfuric acid) for 4 hours, and dissolved in water to make 1,000 ml. Take 10 ml of this solution, add water to make 25 ml, standard reference solution. Absorbance A of the test solution is measured at a wavelength of 259 nm, using water as a reference. Absorbance A_s of the standard reference solution at a wavelength of 261 nm is measured using water as a reference. The content of disodium glycyrrhizinate is calculated by the following equation

$$\text{Content (\%)} = \frac{2A}{A_s \times 1.0928} \times \frac{\text{amount of nicotinamide (mg)}}{\text{Weight of sample (mg)} - \text{water content (mg)}} \times 100$$

31. Butyric Acid



Chemical Formula $\text{C}_4\text{H}_8\text{O}_2$

Molecular Weight 88.11

Compositional Specifications of Butyric Acid

Content Butyric Acid should contain not less than 99.0% of butyric acid ($\text{C}_4\text{H}_8\text{O}_2$).

Description Butyric Acid is a colorless, transparent liquid with a characteristic irritative odor.

Identification (1) To 1 ml of Butyric Acid, add 2 ml of water. The solution is clear and strongly acidic.

(2) To 1 ml of Butyric Acid, add 1 ml of alcohol and 3 drops of sulfuric acid. When the solution is heated in a water bath, an odor of ethylbutyrate is generated.

Purity (1) Specific Gravity: Specific gravity of Butyric Acid should be within a range of 0.952~0.956.

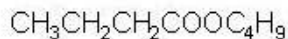
(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Butyric Acid should be within a range of 1.397~1.399.

(3) Sulfate : When 10 g of Butyric Acid is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.

Assay Accurately weigh 1.5 g of butyric acid, add 75 ml of water, which is then titrated with 0.5 N sodium hydroxide solution (indicator: 2 drops of phenolphthalein solution).

1 ml of 0.5 N sodium hydroxide = 44.06 mg of $\text{C}_4\text{H}_8\text{O}_2$

32. Butyl Butyrate



Chemical Formula $\text{C}_8\text{H}_{16}\text{O}_2$

Molecular Weight 144.21

Compositional Specifications of Butyl Butyrate

Content Butyl Butyrate should contain not less than 98.0% of butyl butyrate ($\text{C}_8\text{H}_{16}\text{O}_2$).

Description Butyl Butyrate is a colorless to light yellow, transparent liquid having a fruity odor.

Identification To 1 ml of Butyl Butyrate, add 5 ml of 10% alcoholic solution of potassium hydroxide. When this solution is shaking and heating in a water bath, its characteristic odor disappears, and an odor of n-butanol develops. After cooling, this solution is acidified with dilute sulfuric acid. Then, an odor of butyric acid is generated.

Purity (1) Specific Gravity : Specific gravity of Butyl Butyrate should be within a range of 0.867~0.871

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Butyl Butyrate should be within a range of 1.405~1.407

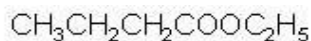
(3) Clarity and Color of Solution : When 1 ml of Butyl Butyrate is dissolved in 4 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Butyl Butyrate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 1 g of Butyl Butyrate, test by Ester Value in Flavoring Substances Test.

1 ml of 0.5 N alcoholic potassium hydroxide solution = 72.11 mg $\text{C}_8\text{H}_{16}\text{O}_2$

33. Ethyl Butyrate



Chemical Formula $\text{C}_6\text{H}_{12}\text{O}_2$

Molecular Weight 116.16

Compositional Specifications of Ethyl Butyrate

Content Ethyl Butyrate should contain not less than 98.0% of ethyl butyrate ($\text{C}_6\text{H}_{12}\text{O}_2$).

Description Ethyl Butyrate is a colorless to light yellow, transparent liquid having a fruity odor.

Identification To 1 ml of Ethyl Butyrate, add 5 ml of 10% alcoholic solution of potassium hydroxide. When this solution is shaking and heating in a water bath, its characteristic odor disappears. After cooling, this solution is acidified with dilute sulfuric acid, an odor of butyric acid is generated.

Purity (1) Specific Gravity : Specific gravity of Ethyl Butyrate should be within a range of 0.870~0.877.

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Ethyl Butyrate should be within a range of 1.391~1.394.

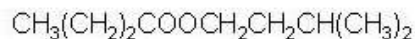
(3) Clarity and Color of Solution : When 1 ml of Ethyl Butyrate is dissolved in 3 ml of 60% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Ethyl Butyrate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 1 g of Ethyl Butyrate, test by Ester Value in Flavoring Substances Test.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 58.08 mg $\text{C}_6\text{H}_{12}\text{O}_2$

34. Isoamyl Butyrate



Chemical Formula $\text{C}_9\text{H}_{18}\text{O}_2$

Molecular Weight 158.24

Compositional Specifications of Isoamyl Butyrate

Content Isoamyl Butyrate should contain not less than 98.0% of isoamyl butyrate ($\text{C}_9\text{H}_{18}\text{O}_2$).

Description Isoamyl Butyrate is a colorless to light yellow, transparent liquid having a fruity odor.

Identification To 1 ml of Isoamyl Butyrate, add 5 ml of 10% alcoholic solution of potassium hydroxide. When this solution is shaking and heating in a water bath, its characteristic odor disappears. After cooling, this solution is acidified with dilute sulfuric acid, an odor of butyric acid is generated.

Purity (1) Specific Gravity : Specific gravity of Isoamyl Butyrate should be within a range of 0.860~0.864

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Isoamyl Butyrate should be within a range of 1.409~1.414

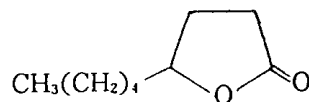
(3) Clarity and Color of Solution : When 1 ml of Isoamyl Butyrate is dissolved in 4 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Isoamyl Butyrate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 0.8 g of Isoamyl Butyrate, test by Ester Value in Flavoring Substances Test.

1 ml of 0.5 N alcoholic potassium hydroxide = 79.12 mg of $\text{C}_9\text{H}_{18}\text{O}_2$

35. γ -Nonalactone



Chemical Formula $C_9H_{16}O_2$

Molecular Weight 156.23

Compositional Specifications of γ -Nonalactone

Content γ -Nonalactone should contain not less than 98.0% of γ -nonalactone ($C_9H_{16}O_2$).

Description γ -Nonalactone is a colorless to light yellow, transparent liquid having a sweet coconut-like odor.

Identification To 1 ml of γ -Nonalactone, add 7 ml of sodium hydroxide solution, and shaking and heating in a water bath, γ -nonalactone almost dissolves, and its characteristic odor disappears. When the solution is acidified with dilute sulfuric acid, and shaking and heating in water bath, fat is separated and a characteristic odor is generated.

Purity (1) Specific Gravity : Specific gravity of γ -Nonalactone should be within a range of 0.958~0.966

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of γ -Nonalactone should be within a range of 1.446~1.450

(3) Clarity and Color of Solution : When 1 ml of γ -Nonalactone is dissolved in 5 ml of 60% alcohol, the solution should be clear.

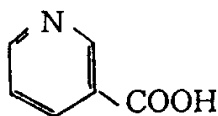
(4) Acid Value : Acid value of γ -Nonalactone is tested by Acid Value in Flavoring Substance Test. It should not be more than 2.

Assay Accurately weigh about 1 g of γ -Nonalactone, test by Ester Value in Flavoring Substances Test.

1 ml of 0.5 N alcoholic potassium hydroxide = 78.11 mg of $C_9H_{16}O_2$

36. Nicotinic Acid

Niacin



Chemical Formula $C_6H_5O_2N$

Molecular Weight 123.11

Compositional Specifications of Nicotinic Acid

Content Nicotinic Acid, when calculated on the dried basis, should contain within a range of 99.5~101.0% of nicotinic acid ($C_6H_5O_2N$).

Description Nicotinic Acid occurs as white crystals or crystalline powder. It is odorless and has a slightly acid taste.

Identification (1) 10 mg of mixture of Nicotinic Acid:2,4-dinitrochlorobenzene(1:2) transfer into a test tube, heat to melt the content for a few seconds and cool. When 3 ml of alcoholic potassium hydroxide is added, it turns red~reddish purple

(2) 50 mg of Nicotinic Acid is dissolved in 20 ml of water, which is neutralized with 0.1 N sodium hydroxide solution. When 3 ml of cupric sulfate solution is added, a blue precipitate is gradually formed.

Purity (1) Melting Point : Melting point of Nicotinic Acid should be within a range of 234~238°C.

(2) Chloride : When 0.5 g of Nicotinic Acid is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

(3) Sulfate : When 0.5 g of Nicotinic Acid is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N sulfuric acid.

(4) Lead : When 5.0 g of Nicotinic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying When Nicotinic Acid is dried for 1 hour at 105°C, the weight loss should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done, the amount of residue

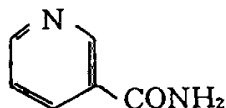
should not be more than 0.1%.

Assay Accurately weigh about 0.3 g of Nicotinic Acid, dissolve in 50 ml of water and titrate with 0.1 N sodium hydroxide (indicator : 5 drops of phenolphthalein solution). Calculate on the dried basis.

1 ml of 0.1 N sodium hydroxide= 12.31 mg of $\text{C}_6\text{H}_5\text{O}_2\text{N}$

37. Nicotinamide

Niacinamide



Chemical Formula $\text{C}_6\text{H}_6\text{N}_2\text{O}$

Molecular Weight 122.13

Compositional Specifications of Nicotinamide

Content Nicotinamide, when calculated on the dried basis, should contain within a range of 98.5~101.0% of nicotinamide ($\text{C}_6\text{H}_6\text{N}_2\text{O}$).

Description Nicotinamide occurs as a white crystalline powder. it is odorless and has a bitter taste.

Identification (1) A solution of Nicotinamide (1→10) is neutral.

(2) When 10 mg of Nicotinamide is burned on a platinum plate, an odor of pyridine is generated.

(3) To 20 ml of Nicotinamide, add 5 ml of sodium hydroxide solution, and boil, an odor of ammonia is evolved.

Purity (1) Melting Point : Melting point of Nicotinamide should be within a range of 128~131°C.

(2) pH : Weight 1 g of Nicotinamide, dissolved in 20 ml water. pH of this solution should be within a range of 6.0~7.5.

(3) Heavy Metals : Dissolve 1 g of Nicotinamide in 20 ml of water, add 15 ml of 1N hydrochloric acid, Test Solution. This Test Solution is tested by Heavy Metals Limit Test and its content should not be more than 30 ppm.

(4) Readily Carbonizable Substances : 0.2 g of Nicotinamide is tested by Readily Carbonized Substances. The color of the solution should not be deeper than that of a color standard A.

Loss on Drying When Nicotinamide is dried for 4 hours in a vacuum desiccator (silica gel), the content of loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with Nicotinamide, the amount of residue should not be more than 0.1%.

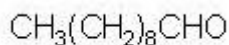
Assay Accurately weigh about 0.2 g of Nicotinamide, dissolve in 30 ml of glacial acetic acid (for non-aqueous titration) by heating, if necessary. After cooling, add 100

ml of benzene, which is titrated with 0.1 N perchloric acid (indicator : 2 drops of crystal violet-acetic acid solution). The end point is where the violet color of the solution changes to blue and then green. Separately, a blank test is carried out by the same procedure.

1 ml of 0.1 N perchloric acid = 12.21 mg of $\text{C}_6\text{H}_6\text{N}_2\text{O}$

38. Decanal

Decyl Aldehyde



Chemical Formula $\text{C}_{10}\text{H}_{20}\text{O}$

Molecular Weight 156.27

Compositional Specifications of Decanal

Content Decanal should contain not less than 92.0% of decanal ($\text{C}_{10}\text{H}_{20}\text{O}$).

Description Decanal occurs as transparent liquid of a colorless to light yellow. It has a characteristic odor.

Identification To 1 ml of Decanal, add 3 ml of sodium hydrogen sulfite solution, and shake. Immediately, the solution evolves and forms crystalline lumps.

Purity (1) Specific Gravity : Specific gravity of Decanal should be within a range of 0.823~0.832

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Decanal should be within a range of 1.426~1.430

(3) Clarity and Color of Solution : When 2 ml of Decanal is dissolved in 2 ml of 80% alcohol, the solution should be clear.

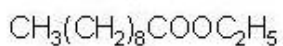
(4) Acid Value : Acid value of Decanal is tested by Acid Value in Flavoring Substance Test. It should not be more than 10.

Assay Accurately weigh about 1 g of Decanal, and proceed as directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure allow the mixture to stand for 15 minutes before titrating.

1 ml of 0.5 N hydrochloric acid = 78.13 mg of $\text{C}_{10}\text{H}_{20}\text{O}$

39. Ethyl Decanoate

Ethyl Caprate



Chemical Formula $\text{C}_{12}\text{H}_{24}\text{O}_2$

Molecular Weight 200.32

Compositional Specifications of Ethyl Decanoate

Content Ethyl Decanoate should contain not less than 98.0% of ethyl decanoate ($\text{C}_{12}\text{H}_{24}\text{O}_2$).

Description Ethyl Decanoate is a colorless, transparent liquid having a characteristic scent.

Identification (1) To 1 ml of Ethyl Decanoate, add 5 ml of ethanolic 10% potassium hydroxide solution, equip with a reflux condenser, and heat in a water bath for 1 hour. The characteristic scent disappears. After cooling, the solution is acidified with diluted sulfuric acid and shaking in a warm water bath. A characteristic odor of decanoic acid is evolved.

(2) Dissolve 1 ml of Ethyl Decanoate in 1 ml of ethanol, add 0.4 g of hydrazine (hydrated), equip with a reflux condenser, and heat in a water bath for 3 hours. After cooling, collect the deposited crystalline lumps, wash with a small amount of alcohol, and recrystallize from alcohol. The melting point of Ethyl Decanoate should be approximately 98°C

Purity (1) Specific Gravity : Specific gravity of Ethyl Decanoate should be within a range of 0.863~0.868

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Ethyl Decanoate should be within a range of 1.424~1.427

(3) Clarity and Color of Solution : When 1 ml of Ethyl Decanoate is dissolved in 4 ml of 80% alcohol, the solution should be clear.

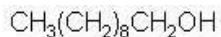
(4) Acid Value : Acid value of Ethyl Decanoate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 1 g of Ethyl Decanoate and proceed as directed under Ester Value and Ester Content in Flavoring Substance Test.

1 ml of 0.5 N alcoholic potassium hydroxide = 100.2 mg of $\text{C}_{12}\text{H}_{24}\text{O}_2$

40. Decanol

Decyl Alcohol



Chemical Formula $\text{C}_{10}\text{H}_{22}\text{O}$

Molecular Weight 158.28

Compositional Specifications of Decanol

Contents Decanol should contain not less than 98.0% of decanol ($\text{C}_{10}\text{H}_{22}\text{O}$).

Description Decanol is a colorless~pale yellow, transparent liquid having a characteristic odor.

Identification To 2~3 drops of Decanol, add 5 ml of potassium permanganate solution (1→20) and 1 ml of diluted sulfuric acid, and shake. An odor of Decyl aldehyde is evolved.

Purity (1) Solidification Temperature : Solidification Temperature of Decanol should not be less than 5°C.

(2) Specific Gravity : Specific gravity of Decanol should be within a range of 0.826~0.831.

(3) Refractive Index : Refractive Index $[n]_D^{20}$ of Decanol should be within a range of 1.435~1.439.

(4) Clarity and Color of Solution : When 1ml of Decanol is dissolved in 3 ml of 60% alcohol, the solution should be clear.

(5) Acid Value: Acid value of Decanol is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

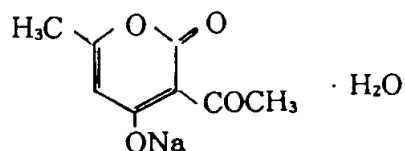
Assay Proceed as directed under Method 1 in Alcohol Content Measurement in Flavoring Substance Test. In this case, approximately 1 g of acetylated oil is used.

41. Dehydroacetic Acid

○ Designed Cancellation

The date of cancellation: 12.11.'10 (Notification No. 2010-82).

42. Sodium Dehydroacetate



Chemical Formula $\text{C}_8\text{H}_7\text{O}_4\text{Na} \cdot \text{H}_2\text{O}$

Molecular Weight 208.15

Compositional Specifications of Sodium Dehydroacetate

Content Sodium Dehydroacetate, when calculated on the dried basis, should contain not less than 98.0% of sodium dehydroacetate ($\text{C}_8\text{H}_7\text{O}_4\text{Na} \cdot \text{H}_2\text{O} = 190.13$).

Description Sodium Dehydroacetate occurs as a white crystalline powder. It is odorless or has a slight odor.

Identification (1) To 2 ml of an solution of Sodium Dehydroacetate (1→100), add 3 drops of potassium sodium tartarate solution and 2 drops of strong cupric acetate solution , and shaking, a purple precipitate with white tint is produced.

(2) To 0.1 g of Dehydroacetic Acid, add 1 ml of water and 3~5 drops of salicylaldehyde solution and 0.1 ml of sodium hydroxide solution (1→2), and heat in water bath, it turns red.

(3) Sodium Dehydroacetate responds to test of Sodium Salt in Identification.

Purity (1) Dehydroacetic Acid : Dissolve 0.5 g of Sodium Dehydroacetate in 100 ml of water, add 1 ml of diluted hydrochloric acid, filter the resulting precipitate, and wash thoroughly with water. After drying at 75~80℃ for 4 hours, the melting point should be within a range of 109~112℃.

(2) Clarity and Color of Solution : Dissolve 0.5 g of Sodium Dehydroacetate in 10 ml of water, it should be colorless.

(3) Free Alkali : Dissolve 1 g of Sodium Dehydroacetate in 20 ml of freshly boiled and cooled water, add 2 drops of phenolphthalein solution. Even if a pink color develops, it should disappear upon addition of 0.3 ml of 0.1 N sulfuric acid.

(4) Chloride : Dissolve 1 g of Sodium Dehydroacetate in 30 ml of water, and shaking and add 9.5 ml of dilute nitric acid, and filtering. The residue is washed with water and the wash water is added to the filtrate. The filtrate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of

- 0.01 N hydrochloric acid.
- (5) Sulfate : Dissolve 1 g of Sodium Dehydroacetate in 30 ml of water, and shaking, add 3 ml of dilute hydrochloric acid and filter. The residue is washed with water and the wash water is added to the filtrate. The filtrate is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N sulfuric acid.
- (6) Arsenic : Dissolve 0.25 g of Sodium Dehydroacetate in 5 ml of water, test by Arsenic Limit Test, its content should not be more than 4 ppm.
- (7) Heavy Metals : 2 g of Sodium Dehydroacetate transfer into a quartz or porcelain crucible, carbonize by heating mildly. After cooling, add 2 ml of nitric acid and 5 drops of sulfuric acid, it is heated until white smoke disappears, which is then reduced to ash by further heating at 450~550°C. After cooling, add 2 ml of hydrochloric acid, and evaporate to dryness in a water bath. 3 drops of hydrochloric acid and 10 ml of hot water are added to the resulting residue, which is then heated for 2 minutes. After cooling, 1 drop of phenolphthalein indicator solution is added, then ammonia solution is added until the color of the solution becomes pale red. The resulting solution is transferred into a Nestler cylinder by rinsing with water. 50 ml of test solution is prepared by adding 2 ml of diluted acetic acid (1→20) and water. When this solution tested by Heavy Metal Limit Test, the content should not be more than 10 ppm. Color standard solution is prepared by the following procedure. 2 ml of nitric acid, 5 drops of sulfuric acid, and 2 ml of hydrochloric acid are added and evaporated to dryness in a crucible that is made of the same material used for test solution preparation. 3 drops of hydrochloric acid are added to the residue, which is then transferred into another Nestler cylinder as described above. Finally, 2 ml of lead standard solution, 2 ml of diluted acetic acid (1→20), add water to make 50 ml.
- (8) Readily Carbonizable Substances : To 0.3 g of Sodium Dehydroacetate, test by Readily carbonizable substances. Its color should not be deeper than that of a color standard solution C.

Water Content Accurately weigh 0.3 g of Sodium Dehydroacetate and test by the back titration method in Water Content Determination (Karl-Fischer Method). The water content should be within a range of 8.3~10.0%.

Residues on Ignition When thermogravimetric analysis is done with 1 g of Sodium Dehydroacetate, the residue should be within a range of 33.3~34.6%.

Assay Accurately weigh about 0.4 g of Sodium Dehydroacetate, add 50 ml of glacial acetic acid(for nonaqueous titration), and titrate with 0.1 N perchloric acid (indicator:

10 drops of α -naphtholbenzein solution) The end point is until the brown color of the solution changes to green.

1 ml of 0.1 N perchloric acid = 19.01 mg of $\text{C}_8\text{H}_7\text{O}_4\text{Na}$

43. Sodium Copper Chlorophyllin

Compositional Specifications of Sodium Copper Chlorophyllin

Description Sodium Copper Chlorophyllin occurs as a blue-black to green-black powder. It is odorless or has a slight, characteristic odor.

Identification (1) Residues on ignition of Sodium Copper Chlorophyllin is dissolved in 10 ml of dilute hydrochloric acid by heating in a water bath. If the solution is not clear, it is filtered. Add water to make 10 ml, Test Solution. Following tests are carried out with this Test Solution.

(A) The test solution is tested by Perform Flame Coloration Test. The color of the flame is first green and then changes to yellow.

(B) To 5 ml of the test solution, add 0.5 ml of sodium diethyldithiocarbamate solution (1→1,000), a brown precipitate is formed.

(2) To 1 ml of Sodium Copper Chlorophyllin solution (1→1,000), add phosphate buffer solution (pH 7.5) to make 100 ml, and measure the absorbance. The solution exhibits maximum absorption bands at wavelengths of 403~407 nm and 627~633 nm. When the absorbances at these absorption maxima are A_1 and A_2 , the absorbance ratio A_1/A_2 is should not be more than 4.0.

Purity (1) pH : pH of this solution of Sodium Copper Chlorophyllin (1→100) is tested by glass electrode method. It should be within a range 9.5~11.0

(2) Specific Absorbance : Dissolve 0.1 g of Sodium Copper Chlorophyllin, accurately weighed, in water to make 1,000 ml. Take 10 ml of this solution, add phosphate buffer solution (pH 7.5) to make 100 ml. When the absorbance at the maximum absorption band near 405 nm and its value is converted into that of a dried form, $E_{1cm}^{1\%} = 508$ or higher. In this case, a light-shielded container should be used to avoid direct light.

(3) Arsenic : 0.5 g of Sodium Copper Chlorophyllin and 0.3 g of anhydrous sodium carbonate transfer into a porcelain crucible, add 1 ml of bromine· potassium bromide solution and well mixed. It is then evaporated to dryness in a water bath. The residue is reduced to ash by heat treating at approximately 400°C. After cooling, add 2 ml of bromine · hydrochloric acid, and add water to make 10 ml. Take 5 ml of this solution, test by Arsenic Limit Test (not more than 4 ppm). In this case, a color standard solution is prepared by the same procedure using 2 ml of arsenic standard solution, 0.3 g of anhydrous sodium carbonate, 1 ml of bromine · potassium bromide solution. (not more than 4 ppm)

(4) Lead : When 5.0 g of Sodium Copper Chlorophyllin is tested by Atomic

Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(5) Cadmium : When 5.0 g of Sodium Copper Chlorophyllin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(6) Mercury : When Sodium Copper Chlorophyllin is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

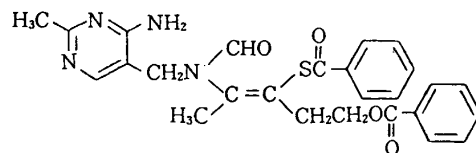
(7) Residue Solvent : When Sodium Copper Chlorophyllin is tested by Purity (5) for [Oleoresin Paprika],

Acetone]	not more than 50 ppm(separate or total in case of use in combination)
Methyl Alcohol		
Isopropyl Alcohol		
Hexane		
Methylene Chloride		should not be more than 10 ppm

(8) Inorganic Copper Salt : 1 g of Sodium Copper Chlorophyllin is dissolved in 60 ml of water. 1 μ l of this solution is tested by Thin-Layer Chromatography without using a reference solution. Mixture of n-butanol:water:acetic acid (4:2:1) is used as a developing solvent. No light brown spots should be observed. For the thin-layer plate, silica gel for thin-layer chromatography is dried at 110°C for 1 hour. The development is stopped when the solvent front reaches approximately 10 cm. It is then air dried and sodium diethyldithiocarbamate solution (1 \rightarrow 1,000) is sprayed upon the plate (not more than 300 μ g/g as Cu).

Loss on Drying When Sodium Copper Chlorophyllin is dried for 2 hours at 105°C, the weight loss should not be more than 5%.

44. Dibenzoyl Thiamine



Chemical Formula $C_{26}H_{26}N_4O_4S$

Molecular Weight 490.59

Compositional Specifications of Dibenzoyl Thiamine

Content Dibenzoyl Thiamine, when calculated on the dried basis, should contain not less than 97.0% of dibenzoyl thiamine ($C_{26}H_{26}N_4O_4S$).

Description Dibenzoyl Thiamine is a white crystalline powder without scent.

Identification (1) To 5 mg of Dibenzoyl Thiamine, add 1 ml of methanol, and dissolve while warming. Add 2 ml of water, 2 ml of cysteine hydrochloride solution (1→100), and 2 ml of phosphate buffer (pH 7), and shake and allow to stand for 30 minutes. Add 1 ml of freshly prepared potassium ferricyanide solution, 5 ml of 0.5 N sodium hydroxide solution, and 5 ml of n-butyl alcohol, shake vigorously for 2 minutes and allow to stand to form two layers. Expose to ultraviolet light from above, and observe the top of the upper-layer solution from a direction perpendicular to the direction of irradiation. A blue-purple fluorescence is observed. This fluorescence disappears when the solution is made acidic, and reappears when it is made alkaline.

(2) To 30 mg of Dibenzoyl Thiamine, add 7 ml of diluted 0.1 N hydrochloric acid, and dissolve by heating in a water bath. Add 2 ml of mixture of hydroxylamine hydrochloride solution (3→20) : sodium hydroxide solution (3→20)(1:1), and shake for 1 minute. 0.8 ml of hydrochloric acid and 0.5 ml of ferric chloride solution is added, a purple color develops.

Purity (1) Melting Point : Melting point of Dibenzoyl Thiamine should be within a range of 163~174°C.

(2) Chloride : Dissolve 0.4 g of Dibenzoyl Thiamine in 20 ml of methanol, add 6 ml of diluted nitric acid, and add water to make 50 ml, and add 1 ml of silver nitrate solution. The turbidity of this solution should be lower than that of a solution prepared by the following procedure. To 0.6 ml of 0.01 N hydrochloric acid, add 20 ml of methanol, 6 ml of diluted nitric acid and water to make 50 ml, where 1 ml of

silver nitrate solution in added.

- (3) Lead : When 5.0 g of Dibenzoyl Thiamine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

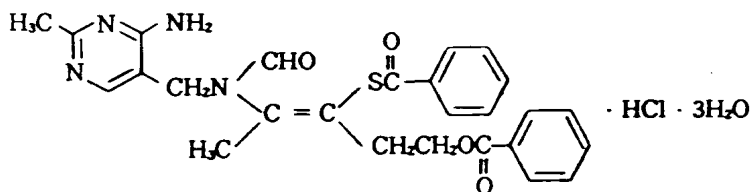
Loss on Drying When Dibenzoyl Thiamine is dried for 2 hours at 105°C, the weight loss should not be more than 3%.

Residue on Ignition When thermogravimetric analysis is done with Dibenzoyl Thiamine, the residue should not be more than 0.2%.

Assay Accurately weigh about 0.4 g of Dibenzoyl Thiamine, previously dried, dissolve in 40 ml of methanol and 40 ml of diluted hydrochloric acid (1→100), and add water to make 1,000 ml. Take 5 ml of this solution, add 0.1 N hydrochloric acid to make 250 ml. Use this solution as the test solution. Measure absorbance A of the test solution at a wavelength of 237 nm, using water as a reference solution. Separately a blank test is carried out by the same procedure and absorbance A_0 is measured. The content is calculated by the following equation:

$$\text{Content (\%)} = \frac{(A - A_0) \times 400}{\text{Weight of the sample (mg)} \times 0.452} \times 100$$

45. Dibenzoyl Thiamine Hydrochloride



Chemical Formula $C_{26}H_{26}O_4N_4S \cdot HCl \cdot 3H_2O$

Molecular Weight 581.10

Compositional Specifications of Dibenzoyl Thiamine Hydrochloride

Content Dibenzoyl Thiamine Hydrochloride, when calculated on the dried basis, should contain not less than 97.0% of dibenzoyl thiamine hydrochloride ($C_{26}H_{26}O_4N_4S \cdot HCl = 527.06$).

Description Dibenzoyl Thiamine Hydrochloride occurs as a white crystalline powder. It is odorless.

Identification (1) Dissolve 0.1 g of Dibenzoyl Thiamine Hydrochloride in 10 ml of methyl alcohol, add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution, white precipitate is produced.

(2) Proceed as directed under Identification in [Dibenzoyl Thiamine].

Purity (1) Clarity and Color of Solution : When 1 g of Dibenzoyl Thiamine Hydrochloride is dissolved in 10 ml of water by heating in a water bath, the solution should be almost clear.

(2) Lead : When 5.0 g of Dibenzoyl Thiamine Hydrochloride is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying When Dibenzoyl Thiamine Hydrochloride is dried for 24 hours in a vacuum desiccator (silica gel), the weight loss should not be more than 11%.

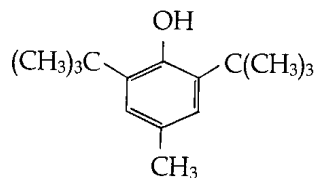
Residue on Ignition When thermogravimetric analysis is done with Dibenzoyl Thiamine Hydrochloride, the amount of residue should not be more than 0.2%.

Assay 0.4 g of Dibenzoyl Thiamine Hydrochloride, previously dried and accurately weigh, proceed as directed under Assay in [Dibenzoyl Thiamine].

$$\text{Content (\%)} = \frac{(A - A_0) \times 400}{\text{Weight of the sample (mg)} \times 0.421} \times 100$$

46. Butylated Hydroxy Toluene

BHT



Chemical Formula $C_{15}H_{24}O$

Molecular Weight 220.36

Compositional Specifications of Butylated Hydroxy Toluene

Description Butylated Hydroxy Toluene occurs as colorless crystals or as white crystalline powder or lumps. It is odorless or has a slight characteristic odor.

Identification (1) To 5 mg of Butylated Hydroxy Toluene, add 1~2 drops of 5-nitroso-8-hydroxyquinoline sulfuric acid solution (1→100). As it dissolves, a yellow color develops, after which it changes to a red-brown color.

(2) To 1 ml of Butylated Hydroxy Toluene in alcoholic solution (1→30), add 3~4 drops of ferric chloride solution, no color develops. Add α,α'-dipyridyl crystals. A red color develops. In the case, use a ferric chloride solution which produces no color in a blank test.

Purity (1) Melting Point : Melting point of Butylated Hydroxy Toluene should be within a range of 69~72°C.

(2) Clarity and Color of Solution : When 1 g of Butylated Hydroxy Toluene is dissolved in 10 ml of alcohol, the solution should be colorless and clear.

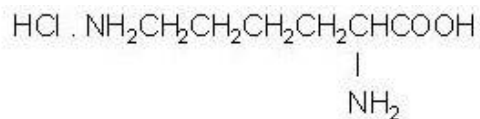
(3) Sulfate : To 0.5 g of Butylated Hydroxy Toluene, add 30 ml of water, and heat in a water bath for 5 minutes while shaking occasionally, cool and filter. To the filtrate, add 1 ml of dilute hydrochloric acid, Test Solution. Test Solution is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N sulfuric acid.

(4) Arsenic : 0.25 g of Butylated Hydroxy Toluene transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50), then ethyl alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, add 3 ml of hydrochloric

- acid, dissolve by heating in a water bath. When this solution is tested by Arsenic Limit Test, it should not be more than 4 ppm.
- (5) Lead : When 5.0 g of Butylated Hydroxy Toluene is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Mercury : When Butylated Hydroxy Toluene is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) p-Cresol : To 1.0 g of Butylated Hydroxy Toluene, add 10 ml of water and 1 ml of ammonia water, and heat in a water bath for 3 minutes while shaking occasionally, cool and filter. Wash the residue on the filter paper with a small amount of water, combine the washings and the filtrate, add water to make 100 ml, Test Solution. Take 3 ml of the test solution, transfer into a Nestler tube, add 1 ml of a solution of phosphomolybdic acid in ethanol (1→20) and 0.2 ml of ammonia solution, and shake. Add water to make 50 ml, and allow to stand for 10 minutes. The color of the solution should not be deeper than that of the solution prepared by the same procedure as the test solution, using 3 ml of p-cresol solution (1→100,000) (Not more than 0.1% as p-cresol).

Residue on Ignition When thermogravimetric analysis is done with Butylated Hydroxy Toluene, the amount of residue should not be more than 0.02%.

47. L-Lysine Monohydrochloride



Chemical Formula $\text{C}_6\text{H}_{14}\text{O}_2\text{N}_2 \cdot \text{HCl}$

Molecular Weight 182.65

Compositional Specifications of L-Lysine Monohydrochloride

Content L-Lysine Monohydrochloride, when calculated on the dried basis, should contain not less than 98.0% of L-lysine monohydrochloride ($\text{C}_6\text{H}_{14}\text{O}_2\text{N}_2 \cdot \text{HCl}$).

Description L-Lysine Monohydrochloride occurs as a white powder. It is odorless or has a light, characteristic odor.

Identification (1) To 5 ml of a solution of L-Lysine Monohydrochloride (1→100), add 1 ml of ninhydrin solution, and heat for 3 minutes. The color of this solution becomes violet.

(2) L-Lysine Monohydrochloride responds to test of chloride in Identification.

Purity (1) Clarity and Color of Solution : When 0.5 g of L-Lysine Monohydrochloride is dissolved in 10 ml of water, the solution should be colorless and almost clear.

(2) Specific Rotation : Weigh approximately 4 g of L-Lysine Monohydrochloride, precisely dried, and dissolve in 6N hydrochloric acid to make 50 ml. Optical rotation of this solution is measured, It is $[\alpha]_D^{20} = +19.0 \sim +21.5^\circ$

(3) Arsenic : Dissolve 0.25 g of L-Lysine Monohydrochloride in 5 ml of water. The solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : When 5.0 g of L-Lysine Monohydrochloride is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Loss on Drying When L-Lysine Monohydrochloride is dried for 3 hours at 105°C, the weight loss should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done with L-Lysine Monohydrochloride, the residue should not be more than 0.2%.

Assay Dissolve about 0.2 g of L-Lysine Monohydrochloride, previously dried and accurately weigh, in 3 ml of formic acid, add 50 ml of glacial acetic acid and 5 ml of

mercury II acetate–glacial acetic acid solution (3→50), and titrated with 1N perchloric acid (indicator : 0.5 ml of α -naphthol benzene). The end point is where the solution changes its color from brown to green. Separately, a blank test is carried out by the same method.

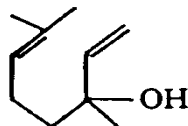
$$1 \text{ ml of } 0.1 \text{ N perchloric acid} = 9.133 \text{ mg } \text{C}_6\text{H}_{14}\text{O}_2\text{N}_2 \cdot \text{HCl}$$

48. Lactones

○ Designed Cancellation

The date of cancellation : 12.14.'05 (Notification No. 2005-77).

49. Linalool



Chemical Formula $C_{10}H_{18}O$

Molecular Weight 154.25

Compositional Specifications of Linalool

Content Linalool should contain not less than 92.0% of linalool ($C_{10}H_{18}O$).

Description Linalool is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Linalool, add 1 ml of anhydrous acetic acid and 1 drop of phosphoric acid, keep at a slight warm temperature for 10 minutes, add 1 ml of water, shake in warm water for 5 minutes. cool, and add sodium carbonate solution to weakly alkalize the solution. An odor of sodium acetate is evolved.

Purity (1) Specific Gravity : Specific gravity of Linalool should be within a range of 0.858~0.867.

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Linalool should be within a range of 1.461~1.465

(3) Clarity and Color of Solution : When 1 ml of Linalool is dissolved in 4 ml of 60% alcohol, the solution should be clear.

(4) Chlorides : When Linalool is tested by Copper Mesh Test Method in Halogenated Compounds for Flavoring substance test, it should be appropriate.

(5) Acid Value : Acid value of Linalool is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

(6) Ester Value : When 5 g of Linalool, precisely weighed, is tested by Ester Value in Flavoring Substance Test. It should not be more than 2.

Assay Transfer 10 ml of Linalool into a flask, allow to stand in ice water for 10 minutes, add 20 ml of dimethylaniline, and shake well. Add 10 ml of acetyl chloride(for linalool Assay) and 5 ml of anhydrous acetic acid. With a air condenser, shake well, allow to stand in ice water for 5 minutes. and allow to stand for 30 minutes at room temperature. Heat in a water bath at 50°C for 4 hours, cool, transfer

the contents to a separatory funnel, and wash 3 times with 75 ml of ice water each time. Wash the oily layer with 25 ml of dilute sulfuric acid. Add sodium hydroxide solution to alkalinize the washings until it does not become turbid. Wash with 10 ml of sodium carbonate solution until washing become alkaline. Wash with 25 ml of sodium chloride solution until the washings become neutral. Oily phase is transferred into a dried flask. Add 2 g of anhydrous sodium sulfate, shake and allow to stay for 30 minutes, and filter. Take 1 g of filtrate, precisely weighed, test by Ester Value in Flavoring Substances Test. Separately, a blank test is carried out by the same method.

$$\text{Content (\%)} = \frac{(a-b) \times 77.12}{[s - (a-b) \times 0.02102] \times 1,000} \times 100$$

a : Consumed amount of 0.5 N hydrochloric acid in blank test (ml)

b : Consumed amount of 0.5 N hydrochloric acid of the Test Solution (ml)

s : Amount of filtrate used (g)

50. Disodium 5'-Ribonucleotide

Definition Disodium 5'-Ribonucleotide is a mixture of disodium 5'-inosinate, disodium 5'-guanylate, disodium 5'-cytidylate, and disodium 5'-uridylate or a mixture of disodium 5'-inosinate and disodium 5'-guanylate.

Compositional Specifications of Disodium 5'-Ribonucleotide

Content Disodium 5'-Ribonucleotide, when calculated on the dried basis(anhydrous), should contain within a range of 97.0~102.0% of disodium 5'-ribonucleotide, not less than 95.0% of the disodium 5'-ribonucleotide consists of disodium 5'-inosinate and disodium 5'-guanylate.

Description Disodium 5'-Ribonucleotide occurs as white to milky white crystals or powder. It is odorless and has a characteristic taste.

Identification (1) To 1 ml of Disodium 5'-Ribonucleotide solution (1→2,000), add 0.2 ml of a solution of orcinol in ethanol (1→10), then add 3 ml of a solution of ferric ammonium sulfate in hydrochloric acid (1→1,000), and heat in a water bath for 10 minutes. A green color develops.

(2) To 5 ml of Disodium 5'-Ribonucleotide solution (1→20), add 2 ml of magnesia solution. No precipitate is formed. Add 7 ml of nitric acid, boil for 10 minutes, and neutralize with sodium hydroxide solution. The solution respond to the test for Phosphate (2).

(3) To 1 ml of Disodium 5'-Ribonucleotide solution (1→1,000), add 2 ml of diluted hydrochloric acid and 0.1 g of zinc dust, heat in a water bath for 10 minutes, filter, and cool the filtrate in ice water. Add 1 ml of sodium nitrite solution (3→1,000), and shake, allow to stand for 10 minutes. Add 1 ml of ammonium sulfamate solution (1→200), and shake well, allow to stand for 5 minutes. Add 1 ml N-1-naphtylethylene diamine dihydrochloride (1→500). In this solution become to red.

(4) To 1 ml of Disodium 5'-Ribonucleotide solution (1→5,000), add 1 ml of diluted hydrochloric acid, and heat in a water bath for 10 minutes and cool. Add 0.5 ml of Folin's solution and 2 ml of sodium carbonate saturated solution, this color become to blue.

(5) 0.5 g of Disodium 5'-Ribonucleotide dissolve in 10 ml of the solution, which of 50 ml of hydroxylamine hydrochloride solution (7→50) adjusted to pH 6.5 by adding sodium hydroxide solution, and heat for 2 hours in a water bath. Take 1 ml of the solution is evaporated to dryness in a water bath. The residue is dissolved in 10 ml of water, which is cooled in an ice bat. Add 2 ml of sulfanilic acid diluted with

hydrochloric acid (1→100) and mixed by shaking, where 1 ml of sodium nitrite solution (1→4) is drop-wise added and allowed to stand for 10 minutes. When 2 ml of sodium hydroxide solution (2→5) is added to the solution, become to orange red color.

(6) Disodium 5'-Ribonucleotide solution (1→10) responds to test of Sodium Salt in Identification.

Purity (1) pH : A solution of Disodium 5'-Ribonucleotide (1→20) is tested by a glass electrode method. It should be within a range of 7.0~8.5.

(2) Arsenic : Dissolve 0.25 g of Disodium 5'-Ribonucleotide solution in 5 ml of water, and test by Arsenic Limit Test, it should be appropriate. (Not more than 4 ppm)

(3) Lead : When 5.0 g of Disodium 5'-Ribonucleotide is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

Water Content When 150 mg of Disodium 5'-Ribonucleotide, precisely weighed, is tested by the back titration method in water content determination (Karl-Fischer Method), the water content should not be more than 27%. However, titration is carried out by the following procedure. Disodium 5'-Ribonucleotide transfer into dried titration flask, where 10 ml of methyl alcohol(for Karl-Fischer) is added and Karl-Fischer solution (approximately 10 ml excess) is added. It is sealed and stir-mixed for 20 minutes. It is titrated with water-methyl alcohol standard solution while stirring vigorously. Separately, a blank test is carried out.

Assay The content of disodium 5'-ribonucleotide and that of disodium 5'-inosinate ($C_{10}H_{11}N_4Na_2O_8P$) and disodium 5'-guanylate ($C_{10}H_{11}N_4Na_2O_8P$) calculate from the values for I, G, and P obtained in (1), (2), and (3) below by the following formulas

$$\text{Content of Disodium 5'-Ribonucleotide(\%)} = \frac{I+G+P}{100 - \text{water content}(\%)} \times 100$$

Content of Disodium 5'-Inosinate($C_{10}H_{11}N_4Na_2O_8P$)

$$\text{and 5'-Disodium Guanylate } (C_{10}H_{12}N_5Na_2O_8P)(\%) = \frac{I+G}{100 - \text{water content}(\%)} \times 100$$

(1) Disodium 5'-Inosinate : Accurately weigh about 650 mg of Disodium 5'-Ribonucleotide, dissolve in water to make 500 ml, and this solution is referred to as A solution. To 1 ml of A solution, add 4 ml of 6 N hydrochloric acid and water to make 10 ml, heat in a water bath for 40 minutes, cool, add 0.4 g of zinc powder, allow to stand for 50 minutes while vigorously shaking occasionally, add water to

make 20 ml, and filter. To 10 ml of the filtrate, add 1 ml of 6 N hydrochloric acid (1→2), add 1 ml of sodium nitrite solution (3→1,000) while cooling in ice, shake well, and allow to stand for 10 minutes. Add 1 ml of ammonium sulfamate solution (1→200), shake well, and allow to stand for 5 minutes. To this solution, add 1 ml of N-1-naphthylethylenediamine dihydrochloride solution (1→500), shake well, allow to stand for 15 minutes, and add water to make 20 ml. Use this solution as the test solution. Separately, prepare the reference solution in the same manner as the test solution, using 1 ml of water in place of the A solution, and measure the absorbance of the test solution at a wavelength of 515 nm using the reference solution. Separately, accurately weigh each 3 mg of disodium 5'-inosinate and 3 mg of disodium 5'-guanylate, dissolve in 100 ml of 0.01 N hydrochloric acid, reference solution use 0.01 N hydrochloric acid, and measure the absorbances of both solutions. Determine at a wavelength of 250 nm for disodium 5'-inosinate and a wavelength of 260 nm for disodium 5'-guanylate. Calculate the molecular extinction coefficients E_I and E_G from the absorbances obtained, and calculate the contents of disodium 5'-inosinate and disodium 5'-guanylate, respectively, by the following formulas

$$\text{Contents of disodium 5'-inosinate (C}_{10}\text{H}_{11}\text{N}_4\text{Na}_2\text{O}_8\text{P})(\%) = \frac{E_I}{12,160} \times 100$$

$$\text{Contents of 5'-disodium guanylate (C}_{10}\text{H}_{12}\text{N}_5\text{Na}_2\text{O}_8\text{P})(\%) = \frac{E_G}{11,800} \times 100$$

Based on the contents above, Accurately weigh corresponding amount to about 50 mg of each, combine them, dissolve in water to make 200 ml. and this is referred to as B solution. Take 1 ml, 2 ml. and 3 ml of the B solution, add 4 ml of 6 N hydrochloric acid and water to make 10 ml each, and prepare the standard solution in the same manner as the sample solution. Using the same reference solution as in the case of the test solution, measure the absorbance of each solution at a wavelength of 515 nm, and prepare a calibration curve.

From the calibration curve and the absorbance of the test solution, calculate the content I (%) of disodium 5'-inosinate in the test solution.

(2) Disodium 5'-Guanylate : To 1 ml of the A solution in Assay (1) , add 4 ml of 2N hydrochloric acid and water to make 10 ml, heat in a water bath for 30 minutes, cool, add 2 ml of Folin's solution and 5 ml of sodium carbonate solution (4→5),

allow to stand for 15 minutes, add water to make 50 ml, and centrifuge if necessary. Use the supernatant as the test solution. Prepare the reference solution in the same manner as the test solution, using 1 ml of water in place of the sample solution, and determine the absorbance of the test solution at a wavelength of 750 nm using the reference Solution. Take 1 ml, 2 ml, and 3 ml of the B solution in Assay (1), add 4 ml of 2 N hydrochloric acid and water to make 10 ml each, and prepare the standard solution, using these 3 solutions in the same manner as the A solution. Measure the respective absorbances at a wavelength of 750 nm, using the same reference solution as for the test solution, and prepare a calibration curve. From the calibration curve and absorbance of the test solution, calculate the content G (%) of disodium 5'-guanylate ($C_{10}H_{11}N_4Na_2O_8P$) in the test solution.

- (3) Disodium 5'-Cytidylate and Disodium 5'-Uridylate : Accurately weigh about 1.5 g of Disodium 5-Ribonucleotide, add water to make exactly 50 ml, and this solution is referred to as C solution. To 1 ml of the sample solution, add 2 ml of hydrazine (hydrate), heat in a water bath for 1 hour, cool, add 1 N hydrochloric acid to make the solution slightly acidic, and add 0.01 N hydrochloric acid to make exactly 100 ml. Measure exactly 10 ml of this solution, add 0.01 N hydrochloric acid to make exactly 100 ml, and use this solution as the test solution. Prepare the reference solution in the same manner as the test solution, using 1 ml of water in place of the C solution, and determine absorbances A_{260} and A_{280} of the test solution at wavelengths of 260 nm and 280 nm, respectively.

To 1 ml of the sample solution, add 0.01 N hydrochloric acid to make 100 ml, and measure 10 ml of this solution, and add 0.01 N hydrochloric acid to make 100 ml. Determine absorbances A'_{260} and A'_{280} of this solution at wavelengths of 260 nm and 280 nm, respectively, and calculate the content P (%) of disodium 5'-cytidylate ($C_9H_{12}N_3Na_2O_8P$) and disodium 5'-uridylate ($C_9H_{11}N_2O_8P$) in the sample by the following formula

$$P (\%) = \frac{170.5 \times (A'_{260} - A_{260}) + 68.6 \times (A'_{280} - A_{280})}{\text{Weight of the sample (g)}}$$

51. Calcium 5'-Ribonucleotide

Definition Calcium 5'-Ribonucleotide is a mixture of calcium 5'-inosinate, calcium 5'-guanylate, calcium 5'-cytidylate, and calcium 5'-uridylate.

Compositional Specifications of Calcium 5'-Ribonucleotide

Content If Calcium 5'-Ribonucleotide, when calculated on the anhydrous dried basis, it should contain within a range of 97.0~102.0% of 5'-calcium ribonucleotide, 95% of which is made of calcium 5'-inosinate and calcium 5'-guanylate.

Description Calcium 5'-Ribonucleotide occurs white to milky white crystal or powder. It is odorless and has a characteristic taste.

Identification (1) 0.1 g of Calcium 5'-Ribonucleotide is dissolved in 200 ml water by heating in a water bath. After cooling, 1 ml of this solution taken 0.2 ml of orcinol in ethanol (1→10) is added, which is tested by the Identification (1) of [Disodium 5'-Ribonucleotide]

(2) To 0.1 g of Calcium 5'-Ribonucleotide, add 5 ml of water and 5 ml of nitric acid, and gently boil and cool. It is then titrated with aqueous ammonia or ammonia solution. Add water to make 100 ml, this solution shows reaction of phosphate (B) of Identification.

(3) To 2 ml of Calcium 5'-Ribonucleotide in diluted hydrochloric acid (1→2,000), add 0.1 g of zinc powder, and test by Identification (3) [Disodium 5'-Ribonucleotide].

(4) 0.1 g of Calcium 5'-Ribonucleotide is dissolved in 500 ml of water by heating in a water bath. After cooling, take 1 ml of the solution, add 1 ml of dilute hydrochloric acid, the solution is tested by Identification (4) [Disodium 5'-Ribonucleotide].

(5) To 0.5 g of Calcium 5'-Ribonucleotide, add 10 ml of 0.5 N sulfuric acid, thoroughly stir-mixed and settled for 5 minutes, which is neutralized with sodium hydroxide solution and then filtrated. The filtrate is evaporated to dryness. The residue is dissolved in 10 ml of this solution, that sodium hydroxide solution is added to 50 ml of hydroxylamine hydrochloride solution (7→50), so that pH becomes approximately 6.5, and test by Identification (5) of [Disodium 5'-ribonucleotide].

(6) 0.1 g of Calcium 5'-Ribonucleotide is dissolved in 20 ml of water by heating in a water bath. The solution responds to test of Calcium Salts in Identification.

Purity

(1) Water Solubles : 1 g of Calcium 5'-Ribonucleotide is dissolved in 50 ml of water by stir-mixing for 10 minutes, which is then filtered through a filter paper for quantitative analysis. Take 25 ml of filtrate, evaporate to dryness and the residue is further dried at 105°C for 1 hour. The amount of water solubles should not be more

- than 80 mg.
- (2) pH : 0.1 g of Calcium 5'-Ribonucleotide is dissolved in 200 ml of water by heating in a water bath. After cooling, pH of the solution, measured by glass electrode method, should be within in a range of 7.0~8.0.
- (3) Arsenic : 0.25 g of Calcium 5'-Ribonucleotide dissolve in 5 ml of dilute hydrochloric acid, test by Arsenic Limit Test (Not more than 4 ppm).
- (4) Lead : When 5.0 g of Calcium 5'-Ribonucleotide is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

Water Content

Proceed as directed under Water Content in [Disodium 5'-Ribonucleotide], it should not be more than 23%.

Assay

Using the values of *Ica*, *Gca*, and *Pca* from (1), (2), and (3), contents of calcium 5'-ribonucleotide, ($C_{10}H_{11}CaN_4O_8P$), and calcium 5'-guanylate ($C_{10}H_{12}CaN_5O_8P$) are calculated using the following equations.

$$\text{Content of calcium 5'-ribonucleotide (\%)} = \frac{Ica + Gca + Pca}{100 - \text{water content (\%)}} \times 100$$

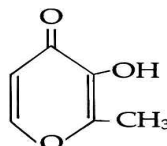
Content of calcium 5'-inosinate

$$\text{and calcium 5'-guanylate(\%)} = \frac{Ica + Gca}{100 - \text{water content (\%)}} \times 100$$

- (1) Calcium 5'-Inosinate : 650 mg of Calcium 5'-Ribonucleotide is precisely weighed and dissolved in 0.1 N hydrochloric acid to make 500 ml. This solution is referred to as A solution. A solution is tested by Assay (1) of [Disodium 5'-ribonucleotide]. The resulting value is *I* (%). The content of calcium 5'-inosinate, *Ica* (%), is obtained by multiplying *I* (%) with 0.985.
- (2) Calcium 5'-Guanylate : 1 ml of A solution is tested by Assay (2) of [Disodium 5'-guanylate]. The resulting value is *G* (%). The content of calcium 5'-guanylate, *Gca* (%), is obtained by multiplying *G* (%) with 0.986.
- (3) Calcium 5'-Cytidylate and Calcium 5'-Uridylate : Approximately 1.5 g of Calcium 5'-Ribonucleotide is precisely weighed and dissolved in 10 ml of 1 N hydrochloric acid, where 1 ml of sodium phosphate (monobasic) standard solution is added. This solution is neutralized with 1 N sodium hydroxide solution and then filtered. Filter paper is rinsed with 10 ml water. This is added to filtrate, where warm water is

added so that the total volume is brought up to 50 ml (This solution is referred to as C). C solution is tested by (3) disodium 5'-cytidylate and disodium 5'-uridylate of Assay for [Disodium 5'-Ribonucleotide]. The resulting value is P (%). The content of calcium 5'-cytidylate ($C_9H_{12}CaN_3O_8P$) and calcium 5'-uridylate ($C_9H_{11}CaN_2O_9P$), Pca (%) is obtained by multiplying P (%) with 0.984

52. Maltol



Chemical Formula $C_6H_6O_3$

Molecular Weight 126.11

Compositional Specifications of Maltol

Content Maltol should contain not less than 99.0% of maltol ($C_6H_6O_3$).

Description Maltol occurs as white or lightly yellowish needles or crystalline powder, having a sweet odor.

Identification (1) Dissolve 0.1 g of Maltol in 10 ml of alcohol, and add 3 drops of ferric chloride solution. The color become to red-purple.

(2) To 0.5 g of Maltol, add 10 ml of sodium hydroxide solution, and shake. It dissolves clearly. Pass carbon dioxide through the solution, produce white crystals. Collect the crystals and recrystallize using 50% alcohol. The melting point should be within a range of 160~163°C.

(3) Dissolve 0.1 g of Maltol in 5 ml of dioxane, add 1 ml of sodium hydroxide solution, add iodine-potassium iodide solution while shaking until the color of iodine disappears, and heat in hot water for 5 minutes. Yellow crystals are deposited.

Purity (1) Melting Point : Melting point of Maltol should be within a range of 160~164°C

(2) Clarity and Color of Solution : When 0.1 g of Maltol is dissolved in 5 ml of 70% alcohol, the solution should be clear.

(3) Arsenic : 0.25 g of Maltol transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) and then ignite alcohol. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Maltol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be

more than 2 ppm.

Loss on Drying When Maltol is dried for 4 hours in a vacuum desiccator (silica gel), the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with Maltol, the amount of residue should not be more than 0.2 %.

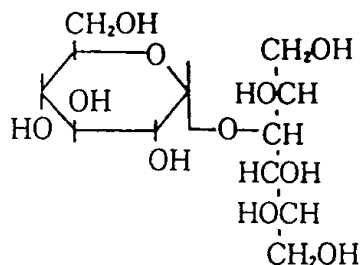
Assay Accurately weigh about 50 mg of Maltol, dissolve in 0.1 N hydrochloric acid to make 250 ml. Take 5 ml of this solution, add 0.1 N hydrochloric acid to make 100 ml, Test Solution. Separately, a standard solution is prepared by following the same procedure with standard of maltol. Measure the absorbances of the test solution and the standard solution (express as A_u and A_s , respectively) at a wavelength of 274 nm, using 0.1 N hydrochloric acid as the reference solution. Calculate the content by the following formulas:

$$\text{Content of Maltol (C}_6\text{H}_6\text{O}_3\text{)(\%)} = C \times \frac{A_u}{A_s} \times \frac{1}{2 \times \text{Weight of sample (g)}}$$

C : Concentration of maltol in standard solution ($\mu\text{g/ml}$)

53. D-Maltitol

Hydrogenated Maltose



Chemical Formula $C_{12}H_{24}O_{11}$

Molecular Weight 344.31

Content Specifications of D-Maltitol

Content D-Maltitol should not contain less than 98.0% of D-Maltitol ($C_{12}H_{24}O_{11}$)

Description D-Maltitol is white crystallite with sweet taste.

Identification (1) D-Maltitol is readily soluble in water and lightly soluble in alcohol.

(2) Melting point of D-Maltitol should be a range of 148~151°C.

(3) Accurately weigh about 5 g of D-Maltitol, dissolve in water to make 100 ml.

Optical rotation of this solution is measured and it should be within a range of $[\alpha]_D^{20} = +105.5 \sim +108.5^\circ$.

(4) 50 mg of D-Maltitol is dissolved in 20 ml of water, Test Solution. Each 2 μ l of Test solution and Reference solution is tested by thin layer chromatography. In this case, silica gel is used as a porous support material and development is stopped when the solvent front reaches approximately 17 cm. It is dried in air, where colorizing solution 1 is sprayed. It is set-aside in air for 15 minutes. Colorizing solution 2 is sprayed upon. The colorized spots are compared. Positions, colors, and sizes of the major spots from Test Solution should match those of reference solution.

Solution

◦ Reference Solution : 50 mg of maltitol standard is dissolved in 20 ml of water. ◦

Developing Solvent : propyl alcohol : ethyl acetate : water (70 : 20 : 10)

◦ Colorizing Solution :

1. 0.2% sodium periodate

2. 2 g of tetramethylaminophenylmethane is dissolved in a mixture of glacial acetic acid : acetone (20:80) to make 100ml.

Purity

- (1) Reducing Sugars : 7 g of D-Maltitol transfer into a 400 ml of beaker, add 35 ml of water, and shaking, add 50 ml of Fehling solution, which is then covered with a watch glass. It is heated so that the content boils within 4 minutes and is boiled for 2 minutes. Deposited cupric oxide (Cu_2O) is filtered through a glass filter (previously weighed). It is then washed with hot water, alcohol, and then ether. It is dried for 30 minutes at 100°C . It is again thoroughly washed with 10 ml of hot water, 10 ml of alcohol, and then 10 ml of ether. It is dried for 1 hour at 100°C . The amount of cupric oxide should not be more than 20 mg.
- (2) Chloride : When 10 g of D-Maltitol is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 1.5 ml of 0.01 N hydrochloric acid.
- (3) Sulfate : When 10 g of D-Maltitol is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 2 ml of 0.01 N sulfuric acid.
- (4) Arsenic : Dissolve 0.25 g of D-Maltitol in 5 ml of water, test by Arsenic Limit Test, its content should not be more than 4 ppm.
- (5) Lead : When 5.0 g of D-Maltitol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Nickel : When 5.0 g of D-Maltitol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Water Content When D-Maltitol is tested by Water Content Determination Method (Karl-Fischer Method), its content should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of D-Maltitol, the residue should not be more than 0.1%.

Assay Accurately weigh 1.5 g of D-Maltitol, transfer into a 100 ml volumetric flask, where water is added to completely dissolve the solid by stirring at a constant rate for 1 hour. Add water to make 100 ml in flask. The solution is filtered through a $0.45\ \mu\text{m}$ Millipore Filter, use as the test Solution. Separately, 0.5 g, 1.0 g, 1.5 g, and 2.0 g each of maltitol (quantitative analysis grade), precisely weighed, transfer into 100 ml volumetric flasks. The same procedure is followed to prepare 4 standard solutions. Liquid chromatography is carried out with $20\ \mu\text{l}$ of standard solutions under the following operation conditions. A calibration curve is prepared from heights or areas of the peaks. The A of concentration (g/100 ml) of maltitol in Test Solution is

obtained from the calibration curve. The content is calculated from the following equation.

$$\text{Content of Maltitol(\%)} = \frac{A \times 100}{\text{Weight of sample (g)}}$$

Operation Conditions

- Detector : Differential refractometer
- Column : AMINEX HPX 87C or its equivalent 30 cm x 8 mm
- Column Temperature : 85°C
- Mobile carrier Phase : water
- Flow Rate : 0.5 ml/min

54. Sodium Metaphosphate

Compositional Specifications of Sodium Metaphosphate

Content Sodium Metaphosphate, when calculated on the dried basis, should contain within a range of 60.0~83.0% of phosphorus pentaoxide ($P_2O_5 = 141.95$).

Description Sodium Metaphosphate occurs as colorless~white glassy lump, flakes, or white fibrous crystals or powder.

Identification (1) Sodium Metaphosphate solution (1→40) weakly acidic with diluted acetic acid or sodium hydroxide solution, add 5 ml of egg white solution. A white precipitate is formed.

(2) A solution of Sodium Metaphosphate (1→20) responds to test of Sodium Salt in Identification.

Purity (1) Arsenic : When 0.25 g of Sodium Metaphosphate is dissolved in 5 ml of water, test by Arsenic Limit Test, its content should not be more than 4 ppm.

(2) Lead : Accurately weigh 5.0 g of Sodium Metaphosphate transfer into a 150 ml beaker, add 30 ml of water, hydrochloric acid in small portion to the solution until the solid is dissolved throughly and 1 ml of hydrochloric acid. Heat this solution for about 5 minutes and cool down. Add water to make 100 ml, adjust within a range of pH of 2~4 with sodium hydroxide solution(1→4) or hydrochloric acid(1→4). Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 4 ppm.

(3) Cadmium : When the test solution of (2) in Purity is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When Sodium Metaphosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Fluoride : 10.0 g of Sodium Metaphosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When Sodium Metaphosphate is dried for 4 hours at 110°C, the weight loss should not be more than 5%.

Assay About 0.2 g of Sodium Metaphosphate, previously dried and accurately weighed, add 5 ml of nitric acid and 25 ml of water. It is then boiled for 30 minutes while adding water to supplement evaporating water. After cooling, add water to make 500 ml. It is filtered through a dried filter paper, use as the Test Solution. Take 5 ml of Test Solution, add 20 ml of vanadate molybdate solution and water to make 100 ml. It is mixed well by shaking and set-aside for 30 minutes. Absorbance of this solution is measured at 400 nm with 1cm path length. A reference solution is prepared by the same procedure with 5 ml of water instead of Test Solution. Separately, 10 ml of potassium phosphate, monobasic standard solution is mixed with 20 ml of diluted nitric acid (1→25) and water to make 250 ml. With 10 ml, 15 ml, and 20 ml each of this solution, same procedure is followed to measure absorbances, from which a calibration curve is prepared. From the calibration curve and the absorbance of Test Solution, the amount of Phosphorus (mg) in 5 ml of Test Solution is obtained. The content of P_2O_5 is calculated from the following equation.

$$\text{Content of } P_2O_5 \text{ (\%)} = \frac{\text{Weight of P in 5ml of Test Solution} \times 2.291 \times 100}{\text{Weight of sample (mg)}} \times 100$$

55. Potassium Metaphosphate

Compositional Specifications of Potassium Metaphosphate

Content Potassium Metaphosphate, when calculated on the dried basis, should contain within a range of 53.0~80.0% of phosphorus pentaoxide ($P_2O_5 = 141.95$).

Description Potassium Metaphosphate occurs as white fibrous crystals or powder, or as colorless to white glassy flakes or lumps.

Identification (1) When Potassium Metaphosphate is tested by Flame Coloration Test, it shows light violet color

(2) To 0.1 g of Potassium Metaphosphate, add 0.4 g of sodium acetate, dissolve in 10 ml of water, make slightly acidic with diluted acetic acid or sodium hydroxide solution, and add 5 ml of egg white solution. A white precipitate is formed.

Purity (1) Clarity and Color of Solution : To 1 g of Potassium Metaphosphate, add 50 ml of water, and heat in a water bath. Sodium acetate solution is prepared by dissolving 4 g of sodium acetate in 50 ml of water and heating in a water bath. The resulting solution should be colorless and slightly turbid or better.

(2) Chloride : When 0.1 g of Potassium Metaphosphate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N sulfuric acid.

(3) Sulfate : 0.1 g of Potassium Metaphosphate is dissolved in 30 ml of water and 2 ml of dilute hydrochloric acid by boiling for 1 minute. After cooling, the solution is tested by Sulfate Limit Test and its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N sulfuric acid.

(4) Orthophosphate : To 1 g of Potassium Metaphosphate, add 2~3 drops of silver nitrate solution. No brilliant yellow color develops.

(5) Arsenic : When 0.25 g of Potassium Metaphosphate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(6) Lead : Potassium Metaphosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(7) Cadmium : Potassium Metaphosphate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(8) Mercury : When Potassium Metaphosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(9) Fluoride : 1 g of Potassium Metaphosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When Potassium Metaphosphate is dried for 4 hours at 110°C, the weight loss should not be more than 5%.

Loss on Ignition When Potassium Metaphosphate is dried for 4 hours at 105°C and heated for 30 minutes at 550°C, the weight loss should not be more than 2.0%.

Assay Proceed as directed under Assay in Potassium Metaphosphate.

56. Potassium Metabisulfite

Potassium pyrosulfite

Chemical Formula $K_2S_2O_5$

Molecular Weight 222.33

Compositional Specifications of Potassium Metabisulfite

Content Potassium metabisulfite should contain not less than 93.0% of potassium metabisulfite ($K_2S_2O_5$).

Description Potassium metabisulfite occurs as white crystals or crystalline powder, having an odor of sulfur dioxide.

Identification (1) To Potassium metabisulfite, add dilute hydrochloric acid, sulfur dioxide is generated.

(2) To 5 ml of a solution of Potassium metabisulfite (1→10), add 1 ml of dilute acetic acid. When iodine potassium iodine solution is drop-wise added to this solution, the color of the solution disappears.

(3) Potassium metabisulfite responds to test of Potassium Salt in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Potassium metabisulfite is dissolved in 10 ml of water, the solution should be almost clear.

(2) Arsenic : Proceed as directed under Arsenic Limit Test in Sodium Sulfite. (Not more than 4 ppm)

(3) Lead : Accurately weigh 5.0 g of Potassium metabisulfite transfer into a 150 ml beaker, add 30 ml of water. Hydrochloric acid is added in small portion to the solution until the solid is dissolved thoroughly and add 1 ml of hydrochloric acid. Add hydrochloric acid in small portion to the solution until the solid is dissolved thoroughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to make 100 ml. Add Sodium Hydroxide Solution(1→4) or Hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

(4) Iron : When the test solution of (3) in Purity is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 10 ppm.

(5) Selenium : Accurately weigh 2.0 g of Potassium metabisulfite transfer into a 50 ml beaker, add 10 ml of water and 5 ml of hydrochloric acid, and boiled to remove sulfur dioxide, Test Solution. Accurately weigh 1.0 g of Potassium metabisulfite transfer into another beaker, add 0.5 ml of selenium standard solution. Then prepare a reference solution by the same manner as for test solution. Add 2 g of hydrazin sulfate transfer into each beaker, heat and dissolve. Transfer the resulting solution into a Nestler cylinder with adding water to make 50 ml. When comparing both colors, the red color of test solution should not be darker than that of reference solution. (Not more than 5 ppm)

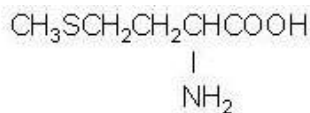
(6) Mercury : When Potassium metabisulfite is tested by Mercury Limit Test, its content should not be more than 1.0ppm.

(7) Thiosulphate : When 10% solution of potassium metabisulfite is acidified with sulfuric Acid or hydrochloric acid, it should be transparent (not more than 0.1%).

Assay Accurately weigh about 0.2 g of Potassium metabisulfite transfer into a flask with a ground glass stopper, add 50 ml of 0.1 N iodine solution. It is set-aside for 5 minutes, where 2 ml of diluted hydrochloric acid (2→3) is added. The excess iodine is titrated with 0.1N sodium thiosulfate solution (indicator : starch solution).

$$1 \text{ ml of } 0.1 \text{ N iodine solution} = 5.558 \text{ mg } \text{K}_2\text{S}_2\text{O}_5$$

57. DL-Methionine



Chemical Formula $\text{C}_5\text{H}_{11}\text{O}_2\text{NS}$

Molecular Weight 149.21

Compositional Specifications of DL-Methionine

Content DL-Methionine, when calculated on the dried basis, should contain within a range of 98.5~101.0% of DL-methionine ($\text{C}_5\text{H}_{11}\text{O}_2\text{NS}$).

Description DL-Methionine occurs as white flaked crystal or crystalline powder, has a characteristic odor and a slightly sweet taste.

Identification (1) To 5 ml of DL-Methionine solution (1→1,000), add 1 ml of ninhydrin solution (1→1,000), and heat for 3 minutes. The color becomes purple.

(2) DL-Methionine solution (1→100) exhibits no optical activity.

(3) To 25 mg of DL-Methionine, add 1 ml of anhydrous cupric sulfate saturated sulfuric acid. The color becomes yellow.

(4) To 2 ml of DL-Methionine solution (1→100), add 2 ml of sodium hydroxide solution (1→25), and shake, add 0.3 ml of sodium nitroprusside solution, and shake again. Allow to stand for 1-2 minutes, and add 4 ml of diluted hydrochloric acid (1→10). The color becomes reddish purple.

Purity (1) Clarity and Color of Solution : When 2 g of DL-Methionine is dissolved in 100 ml of water, the solution should be colorless and clear.

(2) pH : pH of DL-Methionine solution (1→100) should be within a range of 5.6~6.1 as determined by a glass electrode method.

(3) Chloride : To 20 ml of the solution of (1) in Purity, add 6 ml of dilute nitric acid and tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid.

(4) Arsenic : 0.5 g of DL-Methionine transfer into a 500 ml flask for decomposition. Add 5 ml of sulfuric acid and 5 ml of nitric acid, and heat. Add 2~3 ml of nitric acid, and heat until the liquid becomes colorless to light yellow. After cooling, add 15 ml of saturated ammonium hydroxide, which is then heated and concentrated to 2~3 ml until white smoke is generated. After cooling, the concentrate is diluted to

10 ml with water. 5 ml of this solution is tested by Arsenic Limit Test. Color standard is prepared using 2 ml of arsenic standard solution, the preparation should follow the procedure for the test sample. The content should not be more than 4 ppm.

- (5) Lead : When 5.0 g of DL-Methionine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

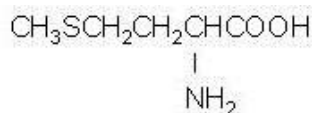
Loss on Drying When DL-Methionine is dried for 4 hours at 105°C, the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with DL-Methionine, the residue should not be more than 0.1%.

Assay Dissolve 0.6 g of DL-Methionine, previously dried and accurately weighed, in water to make 100 ml. Transfer about 50 ml of the solution into a flask with a ground glass stopper, add 5 ml water, 5 g of dipotassium phosphate, 2 g of monopotassium phosphate, and 2 g of potassium iodide, and dissolve while shaking. To this solution, add 50 ml of 0.1 N iodine, seal tightly, shake well, allow to stand in a dark place for 30 minutes, and titrate the excess iodine with 0.1 N sodium thiosulfate solution (indicator : starch solution). Perform a blank test in the same manner.

1 ml of 0.1 N iodine = 7.461 mg of $C_5H_{11}O_2NS$

58. L-Methionine



Chemical Formula $\text{C}_5\text{H}_{11}\text{O}_2\text{NS}$

Molecular Weight 149.21

Compositional Specifications of L-Methionine

Content L-Methionine, when calculated on the dried basis, should contain within a range of 98.5~101.0% of L-methionine ($\text{C}_5\text{H}_{11}\text{O}_2\text{NS}$).

Description L-Methionine occurs as white flaked crystal or crystalline powder, having a characteristic odor and a slight sweet taste.

Identification (1) L-Methionine solution(1→100) is L-form. When it is acidified with hydrochloric acid, it becomes D-form.

(2) To 5 ml of L-Methionine solution (1→1,000), add 1 ml of ninhydrin solution (1→1,000), and heat for 3 minutes. The color becomes purple.

(3) To 25 mg of L-Methionine, add 1 ml of anhydrous cupric sulfate saturated sulfuric acid. The color becomes yellow.

(4) To 2 ml of L-Methionine solution (1→100), add 2 ml of sodium hydroxide solution (1→25), and shake, add 0.3 ml of sodium nitroprusside solution, and shake again. Allow to stand for 1-2 minutes, and add 4 ml of diluted hydrochloric acid (1→10). The color becomes reddish purple.

Purity (1) Clarity and Color of Solution : 0.5 g of L-Methionine dissolve in 20 ml of water. The solution should be colorless and clear.

(2) pH : pH of L-Methionine solution (1→100) is 5.6~6.1 as determined by a glass electrode method.

(3) Specific rotation : Dissolve 1 g of L-Methionine, previously dried for 4 hours and accurately weighed, in 6 N hydrochloric acid to make 50 ml. Optical rotation $[\alpha]_D^{20}$ is measured and it should be within a range of +21 ~ +25°

(4) Chloride : To 20 ml of the solution(2 g of L-Methionine dissolved in 100 ml of water) of (1) in Purity, add 6 ml of dilute nitric acid and tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid.

(5) Arsenic :0.5 g of L-Methionine transfer into a 500 ml flask for decomposition. Add

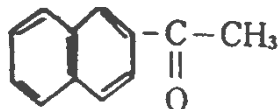
5 ml of sulfuric acid and 5 ml of nitric acid, and heat. Add 2~3 ml of nitric acid, and heat until the liquid becomes colorless to light yellow. After cooling, add 15 ml of saturated ammonium hydroxide, which is then heated and concentrated to 2~3 ml until white smoke is generated. After cooling, the concentrate is diluted to 10 ml with water. 5 ml of this solution is tested by Arsenic Limit Test. Color standard is prepared using 2 ml of arsenic standard solution, the preparation should follow the procedure for the test sample. The content should not be more than 4 ppm.

- (6) Lead : When 5.0 g of L-Methionine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Loss on Drying When L-Methionine is dried for 4 hours at 105°C, the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with L-Methionine, the residue should not be more than 0.1%.

Assay Proceed as directed under Assay in [DL-Methionine].

59. Methyl β -Naphthyl Ketone

Chemical Formula $C_{12}H_{10}O$

Molecular Weight 170.21

Compositional Specifications of Methyl β -Naphthyl Ketone

Content Methyl β -Naphthyl Ketone should contain not less than 99.0% of Methyl β -Naphthyl Ketone ($C_{12}H_{10}O$).

Description Methyl β -Naphthyl Ketone occurs as white to light yellow crystals or crystalline powder, having a characteristic odor.

Identification (1) To 0.1 g of Methyl β -Naphthyl Ketone, add 3 g of zinc powder, mix well, and ignite directly on a burner while shaking. The mixture has odor of naphthalene.

(2) To 1 ml of solution of Methyl β -Naphthyl Ketone in ethanol (1 \rightarrow 100), add 2 drops of sodium nitroprusside solution, add 6 drops of sodium hydroxide solution, and shake. The color becomes red-purple, add 3 drops of acetic acid. The color becomes blue.

Purity (1) Melting Point : Melting point of Methyl β -Naphthyl Ketone should not be more than 53°C.

(2) Clarity and Color of Solution : When 1 g of Methyl β -Naphthyl Ketone is dissolved in 5 ml of 95% alcohol by heating at 30°C, the solution should be clear.

(3) Chlorinated compounds : When Methyl β -Naphthyl Ketone is tested by Copper Mesh Test Method for Halogens in Test Methods for Flavorings, it should be appropriate.

(4) Arsenic : 0.25 g of Methyl β -Naphthyl Ketone transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1 \rightarrow 50) and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be

more than 4 ppm.

- (5) Lead : When 5.0 g of Methyl β -Naphthyl Ketone is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying When Methyl β -Naphthyl Ketone is dried for 4 hours in a vacuum desiccator(silica gel), the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with Methyl β -Naphthyl Ketone, the residue should not be more than 0.05%.

Assay Accurately weigh about 1 g of Methyl β -Naphthyl Ketone, and proceed as directed under hydroxylamine Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure, boil the mixture for 1 hour before titrating.

1 ml of 0.5 N hydrochloric acid = 85.11 mg of $C_{12}H_{10}O$

60. Methyl Cellulose

Compositional Specifications of Methyl Cellulose]

Content Methyl Cellulose, when calculated on the dried basis, should contain within a range of 25.0~33.0% of methoxyl group ($-\text{OCH}_3 = 31.04$).

Description Methyl Cellulose occurs as a white to whitish powder or fibrous substance. It is odorless.

Identification To 1 g of Methyl Cellulose, add 100 ml of water at about 70°C. Stir well, cool while shaking. and allow to stand in a cold place until it becomes a uniformly pasty solution. Use this solution as the test solution.

- (1) Heat 10 ml of the test solution in a water bath. White turbidity appears or a white precipitate is formed. After cooling, the white turbidity or precipitate dissolves and becomes a uniformly pasty solution again.
- (2) Transfer 2 ml of the test solution into test tube, superimpose 1 ml of anthrone solution gently along the tube wall. The color of the junction changes to a blue to green color.

Purity (1) Viscosity : When the viscosity is expressed, perform the following test. The viscosity should be 80~120% of the expressed amount when the expressed amount is not more than 100 centistokes. and 75-140% when it exceeds 100 centistokes. Accurately weigh the amount of Methyl Cellulose corresponding to 2 g calculated on the dried basis, add 50 ml of water at 85°C and stir for 10 minutes, using a stirrer. Add 40 ml of water, dissolve the sample in ice water while stirring for 40 minutes. add water to make exactly 100 ml, remove the effervescence by centrifuging if necessary, and measure the viscosity at $20 \pm 0.1^\circ\text{C}$.

- (2) Chloride : 0.5 g of Methyl Cellulose transfer into a beaker. add 30 ml of hot water, stir well, and filter while hot with an insulated funnel. Wash the beaker and the residue on filter paper, using 15 ml of hot water each time, 3 times, combine the filtrate and the washings, and add water to make 100 ml, Use this solution, as the Solution A. Add 6 ml of dilute nitric acid to 5 ml of Solution A, Use this solution, as the Test Solution. Test this solution by Chloride Limit Tests. Its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid.
- (3) Sulfate : To 40 ml of Solution A in (2) above, add 1 ml of dilute hydrochloric acid. which is then tested by Sulfate Limit Test. Its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.
- (4) Arsenic : Proceed as directed under (1) Purity in [Guar Gum] (Not more than 4

ppm).

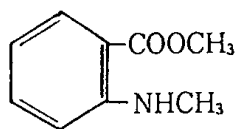
- (5) Lead : When 5.0 g of Methyl Cellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Cadmium : When 5.0 g of Methyl Cellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (7) Mercury : When Methyl Cellulose is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Methyl Cellulose is dried for 4 hours at 105°C, the weight loss should not be more than 5.0%.

Residue on Ignition When thermogravimetric analysis is done with 1 g of Methyl Cellulose, previously dried for 4 hours at 105°C, the residue should not be more than 1.5%.

Assay Accurately weigh about 25 mg of Methyl Cellulose, previously dried, and proceed as directed under Methoxyl Determination.

$$\text{Content (\%)} = \frac{\text{Weight of 0.1N sodium thiosulfate solution (ml)} \times 0.5172}{\text{Weight of sample (mg)}} \times 100$$

61. Methyl *N*-Methylantranilate

Chemical Formula $\text{C}_9\text{H}_{11}\text{NO}_2$

Molecular Weight 165.19

Compositional Specifications of Methyl *N*-Methylantranilate

Content Methyl *N*-Methylantranilate should contain within a range of 98.0~101.3% of methyl *N*-methylantranilate ($\text{C}_9\text{H}_{11}\text{NO}_2$).

Description Methyl *N*-Methylantranilate occurs as colorless to light yellow, transparent crystalline lumps or liquid. It has a grape-like scent. The solution shows a bluish purple fluorescence.

Identification To 1 ml of Methyl *N*-Methylantranilate, add 5 ml of ethanolic 10% potassium hydroxide solution, equip with a reflux condenser, and heat for 1 hour. Its characteristic scent disappears. Cool, and acidify with diluted hydrochloric acid. Crystals are formed. Collect the crystals, and recrystallize from 50% alcohol. The melting point should be within a range of 164~174°C

Purity (1) Specific Gravity : Specific gravity of Methyl *N*-Methylantranilate should be within a range of 1.126~1.132.

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Methyl *N*-Methylantranilate should be within a range of 1.578~1.581

(3) Solidification Temperature : Solidification temperature of Methyl *N*-Methylantranilate should not be more than 14°C.

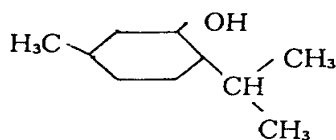
(4) Clarity and Color of Solution : When 1 g of Methyl *N*-Methylantranilate is dissolved in 3 ml of 80% alcohol, the solution should be clear.

(5) Acid Value : Acid value of Methyl *N*-Methylantranilate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay

Approximately 1 g of Methyl *N*-Methylantranilate is precisely weighed and tested by Ester Value and Ester content in Flavoring Substances Test.

1 ml of 0.5 N alcoholic potassium hydroxide solution = 82.60 mg $\text{C}_9\text{H}_{11}\text{NO}_2$ **62.**

***dl*-Menthol**

Chemical Formula $C_{10}H_{20}O$

Molecular Weight 156.27

Compositional Specifications of *dl*-Menthol

Content *dl*-Menthol should contain not less than 98.0% of *dl*-menthol ($C_{10}H_{20}O$).

Description *dl*-Menthol occurs as colorless prisms or needles or as a white crystalline powder, having a refreshing scent. Taste is bitter at first but it becomes refreshing.

Identification (1) *dl*-Menthol is mixed with an equal quantity of camphor or thymol, it becomes a liquid.

(2) To 1 g of *dl*-Menthol, add 20 ml of sulfuric acid, and shake. Yellowish red turbidity appears. Allow to stand for 24 hours. A transparent, oily layer having no scent of menthol separates.

Purity (1) Solidification Temperature : Solidification Temperature of *dl*-Menthol should be within a range of $27\sim 28^{\circ}\text{C}$.

(2) Thymol : To 0.2 g of *dl*-Menthol, add to a cold mixture of 2 ml of acetic acid, 6 drops of sulfuric acid, and 2 drops of nitric acid. No color should develop.

(3) Specific Rotation : Approximately 2.5 g of *dl*-Menthol is precisely weighed and dissolved in alcohol to make 25 ml. Optical rotation $[\alpha]_D^{20}$ of *dl*-Menthol should be within a range of $-2\sim +2^{\circ}$

(4) Arsenic : 1 g of *dl*-Menthol transfer into a platinum, quartz, or porcelain crucible. add 10 ml solution of magnesium nitrate in ethyl alcohol (1 \rightarrow 50) and then alcohol is ignited. It is then reduced to ash by heating at $450\sim 550^{\circ}\text{C}$. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at $450\sim 550^{\circ}\text{C}$. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

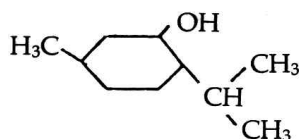
(5) Lead : When 5.0 g of *dl*-Menthol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Assay Accurately weigh about 1 g of *dl*-Menthol and test by Alcohol Content

Measurement Method 2 in Flavoring Substances Test.

1 ml of 0.5 N alcoholic potassium hydroxide solution = 78.13 mg $C_{10}H_{20}O$

63. *l*-Menthol



Chemical Formula $C_{10}H_{20}O$

Molecular Weight 156.27

Compositional Specifications of *l*-Menthol

Content *l*-Menthol should contain not less than 98.0% of l-menthol ($C_{10}H_{20}O$).

Description *l*-Menthol occurs as colorless prisms or needles or as a white crystalline powder, having a characteristically refreshing scent. Taste is bitter at first but it becomes refreshing.

Identification (1) A solution of *l*-Menthol in ethanol (1→10) is levorotatory.

(2) Proceed as directed under Identification (1) and (2) in *dl*-Menthol.

Purity (1) Melting Point : Melting point of *l*-Menthol should be within a range of 42~43°C.

(2) Specific Rotation : Approximately 2.5 g of *l*-Menthol is precisely weighed in alcohol to make 25 ml. Optical rotation $[\alpha]_D^{20}$ of this solution is measured and it should be within a range of -45~-51°

(3) Thymol : To 0.2 g of *l*-Menthol add a cold mixture of 2 ml of glacial acetic acid, 6 drops of sulfuric acid, and 2 drops of nitric acid. No color should develop.

(4) Arsenic : 1 g of *l*-Menthol transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

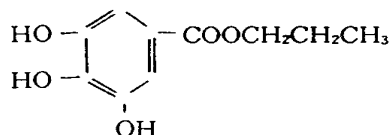
(5) Lead : When 5.0 g of *l*-Menthol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Assay Accurately weigh about 1 g of *l*-Menthol and test by Alcohol Content Measurement Method 2 in Flavoring Substances Test.

1 ml of 0.5 N alcoholic potassium hydroxide solution = 78.13 mg C₁₀H₂₀O

64. Propyl Gallate

Gallic Acid, Propyl Ester



Chemical Formula $C_{10}H_{12}O_5$

Molecular Weight 212.21

Compositional Specifications of Propyl Gallate

Content Propyl Gallate, when calculated on the dried basis, should contain within a range of 98.0~102.0% of propyl gallate ($C_{10}H_{12}O_5$).

Description Propyl Gallate occurs as a white to light brown-yellow crystalline powder. It is odorless and has a light bitter taste.

Identification (1) Dissolve 0.5 g of Propyl Gallate in 10 ml of sodium hydroxide solution, distill, and take about 4 ml of the initial distillate. The distillate is clear. An scent of propyl alcohol is evolved upon heating.

(2) Dissolve 0.1 g of Propyl Gallate in alcohol to make 5 ml. Add 1 drop of dilute ferric chloride solution. The color of Propyl Gallate becomes purple.

Purity (1) Melting Point : Melting point of Propyl Gallate, previously dried for 2 hours at 105°C, should be within a range of 146~150°C.

(2) Clarity and Color of Solution : Dissolve 0.5 g of Propyl Gallate in 10 ml of alcohol. The color of the solution should not be deeper than that of Color standard Solution C.

(3) Chloride : To 1.5 g of Propyl Gallate, add 75 ml of water, warm for 5 minutes to about 70°C, cool to about 20°C, and filter. To 25 ml of the filtrate, add 6 ml of dilute nitric acid, which is then tested by Chloride Limit Test. The content of the solution should not be more than the almost corresponds to 0.4 ml of 0.01 N sulfuric acid.

(4) Sulfate : To 25 ml of the filtrate in (3) above, add 1 ml of dilute hydrochloric acid, which is then tested by Sulfate Limit Test. Its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.

(5) Arsenic : 0.25 g of Propyl Gallate transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) and then

alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(6) Lead : When 5.0 g of Propyl Gallate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(7) Mercury : When Propyl Gallate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Propyl Gallate is dried for 2 hours at 105°C, the weight loss should not be more than 1.5%.

Residues on Ignition When thermogravimetric analysis is done with 1 g of Propyl Gallate, the residue should not be more than 0.1%.

Assay Dry a glass filter (1G4) at 110°C for 30 minutes. allow to cool in a vacuum desiccator, and cool and accurately weigh. Accurately weigh about 0.2 g of Propyl Gallate, previously dried. add 150 ml of water, and boil. Add 50 ml of bismuth nitrate solution while stirring forcefully, stir for several minutes more, filter the precipitate through the above glass filter, wash twice with 5 ml of diluted nitric acid (1→300) cooled in ice water, and wash with ice water until the blue litmus paper does not change to red. Dry at 110°C for 3 hours, allow to cool in a vacuum desiccator, Accurately weigh, and calculate the content by the following formula

$$\text{Content of propyl gallate}(\text{C}_{10}\text{H}_{12}\text{O}_5)(\%) = \frac{\text{Weight of the precipitate(g)} \times 0.4865}{\text{Weight of the sample(g)}} \times 100$$

65. Morpholine Salts of Fatty Acids

Compositional Specifications of Morpholine Salts of Fatty Acids

Description Morpholine Salts of Fatty Acids occurs as a light yellow to yellow-brown waxy or oily substance.

Identification (1) To 10 g of Morpholine Salts of Fatty Acids, add 20 ml of diluted hydrochloric acid (3→5), heat in a water bath for 10 minutes while shaking occasionally, and allow to cool. Remove separately oily or solid deposited portions. make the rest of the solution alkaline with sodium hydroxide solution. and perform the fractional distillation at 102~104°C. To 5 ml of the distillate, add 10 ml of picric acid saturated benzene, and shake. A yellow precipitate is formed. Recrystallize this precipitate, using benzene as the solvent. The melting point should be within a range of 144~147°C.

(2) To 1 g of Morpholine Salts of Fatty Acids, add 2 ml of ethanol, dissolve by heating, add 5 ml of diluted sulfuric acid, heat in a water bath for 30 minutes, and cool. Oil drops or white to yellow-white solids are precipitated. Separate the oil drops or solids, add 5 ml of ether, and shake. The oil drops or solids dissolve.

Purity (1) Arsenic : To 0.25 g of Morpholine Salts of Fatty Acids, add 5 ml of diluted sulfuric acid, and heat in a water bath for 30 minutes, and cool. Remove the deposited fatty acid by extraction with ether. Concentrate the rest of the solution in a water bath to approximately 5 ml. Test this solution by Arsenic Limit Test (Not more than 4 ppm).

(2) Lead : When 5.0 g of Morpholine Salts of Fatty Acids is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

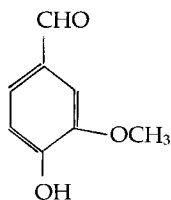
Residue on Ignition When thermogravimetric analysis is done with Morpholine Salts of Fatty Acids, the residue should not be more than 1%.

66. Sulfur Dioxide

Chemical Formula SO_2

Molecular Weight 64.06

67. Vanillin



Chemical Formula $\text{C}_8\text{H}_8\text{O}_3$

Molecular Weight 152.15

Compositional Specifications of Vanillin

Content Vanillin, when calculated on the dried basis, should contain within a range of 97.0~103.0% of vanillin ($\text{C}_8\text{H}_8\text{O}_3$).

Description Vanillin occurs as white to light yellow needles or crystalline powder, having a vanilla-like scent and taste.

Identification (1) To the saturated solution of Vanillin, add 3 drops of ferric chloride solution. Then the color becomes blue-purple. Heat the solution to about 80°C for 5 minutes. The color of the solution changes to brown, and a white to gray-white precipitate is formed.

(2) To 1 g of Vanillin, add 5 ml of sodium hydrogen sulfite solution, dissolve while warming in hot water and shaking, add 10 ml of diluted sulfuric acid, warm at $60\sim 70^\circ\text{C}$ for approximately 5 minutes, and allow to stand. Crystals are precipitated.

Purity (1) Melting Point : Melting point of Vanillin should be within a range of $81\sim 83^\circ\text{C}$

(2) Clarity and Color of Solution : When 1 g of Vanillin is dissolved in 20 ml of water by heating at 80°C , the solution should be clear.

(3) Arsenic : 0.25 g of Vanillin transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1 \rightarrow 50) and then alcohol is ignited. It is then reduced to ash by heating at $450\sim 550^\circ\text{C}$. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at $450\sim 550^\circ\text{C}$. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Vanillin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be

more than 2 ppm.

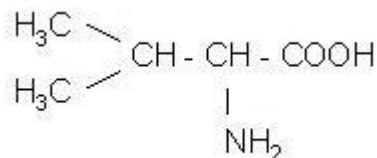
Loss on Drying When Vanillin is dried for 4 hours in a vacuum desiccator(silica gel), the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with Vanillin, the residue should not be more than 0.05%.

Assay Accurately weigh about 1 g of Vanillin, and proceed as directed under Hydroxylamine Method 2 in Aldehyde and Ketone Content (3) in Flavoring Substances Tests, using 15 minutes as the time to allow to stand.

1 ml of 0.5 N hydrochloric acid = 76.07 mg of $\text{C}_8\text{H}_8\text{O}_3$

68. L-Valine



Chemical Formula $\text{C}_5\text{H}_{11}\text{NO}_2$

Molecular Weight 117.15

Compositional Specifications of L-Valine

Content L-Valine, when calculated on the dried basis, should contain within a range of 98.0~102.0% of L-valine ($\text{C}_5\text{H}_{11}\text{NO}_2$).

Description L-Valine occurs as white crystals or crystalline powder. It is odorless and has a light, characteristic taste.

Identification (1) Solution of L-Valine in 6 N hydrochloric acid (1→25) is D-form.

(2) To 5 ml of L-Valine solution (1→1,000), add 1 ml of ninhydrin solution, and heat for 3 minutes. The color of solution becomes purple.

Purity (1) Clarity and Color of Solution : 0.5 g of L-Valine is dissolved in 20 ml water. The solution should be colorless and clear.

(2) pH : pH of L-Valin solution (1→30) should be within a range of 5.5~7.0 as determined by a glass electrode method.

(3) Specific Rotation : Dissolve 4 g of L-Valine, previously dried for 3 hours at 105°C and precisely weighed, add 6 N hydrochloric acid to make 50 ml. Optical rotation $[\alpha]_D^{20}$ of this solution is measured, It should be within a range of +26.5~+29.0°

(4) Arsenic : 0.25 g of L-Valine is dissolved in 10 ml of water. When this solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(5) Lead : When 5.0 g of L-Valin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(6) Chloride : When 0.5 g of L-Valine is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

Loss on Drying When L-Valine is dried for 3 hours at 105°C, the weight loss should not be more than 0.3%.

Residue on Ignition When thermogravimetric analysis is done with L-Valine, the residue should not be more than 0.1%.

Assay Proceed as directed under Assay in 『Glycine』.

1 ml of 0.1 N perchloric acid = 11.71 mg of $\text{C}_5\text{H}_{11}\text{NO}_2$

69. Aromatic Aldehydes

○ Designed Cancellation

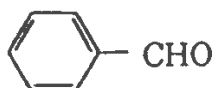
The date of cancellation : 12. 14. '05(Notification No. 2005-77).

70. Aromatic Alcohols

○ Designed Cancellation

The date of cancellation : 12. 14. '05(Notification No. 2005-77).

71. Benzaldehyde



Chemical Formula C_7H_6O

Molecular Weight 106.12

Compositional Specifications of Benzaldehyde

Content Benzaldehyde should contain not less than 98.0% of benzaldehyde (C_7H_6O).

Description Benzaldehyde is a colorless liquid having an almond-like odor.

Identification (1) To 1 ml of Benzaldehyde, add 3 ml of sodium hydrogen bisulfite solution, and shake. The mixture evolves heat immediately and forms crystalline lumps. Add 5 ml of water to this mixture. The crystalline lumps are dissolved.
(2) To 3 drops of Benzaldehyde, add 0.1 g of phenol and 2 ml of sulfuric acid, and shake. The color of this solution becomes dark-red, and the mixture partly forms resinous lumps. Take 2 drops of this solution in 5 ml of water, and make alkaline with sodium hydroxide solution. The color becomes purple.

Purity (1) Specific Gravity : Specific gravity of Benzaldehyde should be within a range of 1.041~1.046

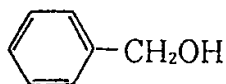
(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Benzaldehyde should be within a range of 1.544~1.547

(3) Chlorides : When Benzaldehyde is tested by Copper Mesh Test Method for Halogens in Test Methods for Flavorings, it should be appropriate.

Assay Accurately weigh about 0.8 g of Benzaldehyde, and proceed as directed under hydroxyl amine Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure, allow the mixture to stand for 10 minutes.

1 ml of 0.5 N hydrochloric acid = 53.06 mg of C_7H_6O

72. Benzyl Alcohol



Chemical Formula C_7H_8O

Molecular Weight 108.14

Compositional Specifications of Benzyl Alcohol

Content Benzyl Alcohol should contain not less than 98.0% of benzyl alcohol (C_7H_8O).

Description Benzyl Alcohol is a colorless, transparent liquid having a characteristic odor.

Identification Add 2~3 drops of Benzyl Alcohol to 5 ml of potassium permanganate solution (1→20), and acidify with diluted sulfuric acid. An odor of benzaldehyde is evolved.

Purity (1) Specific Gravity : Specific gravity of Benzyl Alcohol should be within a range of 1.042~1.047

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Benzyl Alcohol should be within a range of 1.539~1.541

(3) Clarity and Color of Solution : When 1 ml of Benzyl Alcohol is dissolved in 50 ml of water, even though the solution is turbid, the oily layer does not separate immediately.

(4) Chlorides : When Benzyl Alcohol is tested by Copper Mesh Test Method in Halogenated Compounds for Flavoring, it should be appropriate.

(5) Free Acid and Free Alkali : 100 ml of Benzyl Alcohol dissolve in 10 ml of neutralized ethanol, and add 2 drops of phenolphthalein solution. No pink color develops. Add 0.2 ml of 0.1 N sodium hydroxide, and shake. The color of Benzyl Alcohol becomes pink.

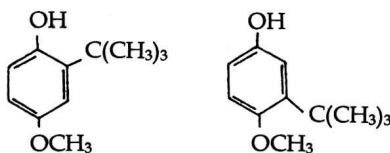
(6) Aldehyde : Weigh exactly 5 g of Benzyl Alcohol, and proceed as directed under hydroxyl amine Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. The volume of consumed 0.5 N hydrochloric acid should not more than 0.2 ml.

Assay Proceed as directed under Method 2 in Alcohol Content in Flavoring Substances Tests, using 0.5 g of the sample.

1 ml of 0.5 N alcoholic potassium hydroxide = 54.07 mg of C_7H_8O

73. Butylated Hydroxy Anisole

BHA



Chemical Formula $C_{11}H_{16}O_2$

Molecular Weight 180.25

Compositional Specifications of Butylated Hydroxy Anisole

Description Butylated Hydroxy Anisole occurs as colorless or slightly yellow-brown crystals or lumps or as a white crystalline powder, having a slight characteristic odor and irritating taste.

Identification (1) To 2~3 ml of solution of Butylated Hydroxyanisole in ethanol (1→100), add 2~3 drops of sodium borate solution (1→50) and crystals of 2,6-dichloroquinone- chloroimide, and shake. An indigo blue color develops. The color of Butylated Hydroxy Anisole becomes indigo blue.

(2) Proceed as directed under Identification (2) in [Butylated Hydroxytoluene].

Purity (1) Melting Point : Melting point of Butylated Hydroxy Anisole should be within a range of 57~65°C

(2) Clarity and Color of Solution : 0.5 g of Butylated Hydroxy Anisole is dissolved in 1 ml of alcohol. The solution should be Colorless and clear.

(3) Sulfate : 0.5 g of Butylated Hydroxy Anisole is dissolved in 35 ml of acetone, add 1 ml of dilute hydrochloric acid and water to make 50 ml. Use this solution as the test solution. Separately, a reference solution is prepared by mixing 0.2 ml of 0.01 N sulfuric acid, 35 ml of acetone, 1 ml of dilute hydrochloric acid, and water to make 50 ml. 2 ml each of barium chloride solution is added to each solution, which is set-aside for 10 minutes. Turbidity of the Test Solution should not be more than that of the reference solution.

(4) Arsenic : Proceed as directed under Purity (4) in [Dibutylhydroxy Toluene] (Not more than 4 ppm).

(5) Lead : When 5.0 g of Butylated Hydroxy Anisole is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content

should not be more than 2.0 ppm.

- (6) Mercury : When Butylated Hydroxy Anisole is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) p-Hydroxyanisole : 1.0 g of Butylated Hydroxy Anisole dissolve in 20 ml of an ether · petroleum benzine mixture (1:1), add 10 ml of water and 1 ml of sodium hydroxide solution, shake well, allow to stand, and collect the lower layer. Add 20 ml of the ether · petroleum benzine mixture (1:1), shake well, allow to stand, collect the lower layer, and add water to make 500 ml. 1.0 ml of this solution transfer into a Nestler tube, and add 2 ml of sodium hydroxide solution, 5 ml of boric acid solution (3→100), and water to make 30 ml. Add 5 ml of 4-amino- antipyrine solution (1→1,000), shake, add 1 ml of potassium ferricyanide solution (1→100), shake again, add water to make 50 ml, and allow to stand for 15 minutes. The color of the solution should not be darker than that of a 50 ml solution made by adding water to 0.6 ml of Colorimetric Cobalt(II) Chloride Standard Solution.

Residue on Ignition When thermogravimetric analysis is done with Butylated Hydroxy Anisole, the residue should be not more than 0.05%.

74. Dry Formed Vitamin A

Definition Dry Formed Vitamin A is powdered vitamin A oil.

Compositional Specifications of Dry Formed Vitamin A

Content Dry Formed Vitamin A should contain within a range of 90.0~120.0% of the indicated amount of vitamin A. 150 mg of vitamin A corresponds to 500,000 units of international standard.

Description Dry Formed Vitamin A occurs as a light yellow to light red-brown powder.

Identification Grind 0.5 g of Dry Formed Vitamin A in a mortar, add 10 ml of hot water, stir thoroughly to make milky emulsion, add 10 ml of ethanol to break emulsion, and transfer the mixture into a flask. Add 20 ml of benzene, shake well, and either allow to stand or centrifuge to separate into two layers. Take the benzene layer. wash with 20 ml of water by shaking well. separate the water layer, and evaporate the benzene layer to dryness under reduced pressure. To residue add 1 ml of chloroform, add 5 ml of antimony trichloride solution. The color of the solution become to blue

Purity (1) Decay : Dry Formed Vitamin A should not have unpleasant odor.

(2) Arsenic : 1 g of Dry Formed Vitamin A transfer into a flask for decomposition, add 20 ml of nitric acid, gently heat until the content becomes fluidal. After cooling, add 5 ml of sulfuric acid and heat until white smoke is generated. When the liquid becomes brown, 5 ml of nitric acid is added, which is then heated. This is repeated until the liquid becomes colorless~pale yellow. After cooling, 15 ml of saturated ammonium hydroxide is added to the flask, which is then heated until white smoke is generated. After cooling, water is added to bring the total volume to 20 ml. 5 ml of this test solution is test by Arsenic Limit Test. The content should be not more than 4 ppm

(3) Lead : When 5.0 g of Dry Formed Vitamin A is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying When Dry Formed Vitamin A is dried for 4 hours in a vacuum desiccator, the weight loss should be not more than 5%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of Dry Formed Vitamin A, the residue should be not more than 5%.

Assay Accurately weigh about 5 g of Dry Formed Vitamin A. add a small amount of hot water, shake thoroughly to milky emulsion, transfer into a flask. and proceed as

directed under Assay in [Vitamin A in Oil].

Storage Standards of Dry Formed Vitamin A

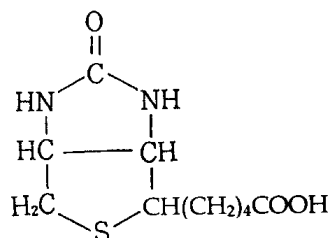
Store in a light-shielded, hermetic container filled with nitrogen.

75. Potassium Bromate

- Designation canceled

Date of Cancellation : 4. 26. '96 (Notification No. 1996-45)

76. Biotin



Chemical Formula $C_{10}H_{16}N_2O_3S$

Molecular Weight 224.31

Compositional Specifications of Biotin

Content Biotin should contain not less than 97.5% of biotin ($C_{10}H_{16}N_2O_3S$).

Description Biotin is white crystalline power.

Identification The saturated solution of Biotin is prepared using hot water. Upon drop-wise adding the solution, bromine standard solution gets decolorized.

Purity (1) Arsenic : 0.38 g of Biotin is placed in a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath, use the Test solution. When this test solution proceed as directed under Arsenic, it should not be more than 2.6ppm.

(2) Lead : When 5.0 g of Biotin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(3) Melting Point : Melting point of Biotin should be within a range of 229~232°C

(4) Specific Rotation : To 500 mg of Biotin, add 0.1 N sodium hydroxide solution to make 25 ml. The optical rotation of this solution should be within a range of $[\alpha]_D^{20} = +89 \sim +93^\circ$

(5) Biotin-like substances: 0.1 g of Biotin is weighted and dissolved in 10 ml of ammonia solution(7→100), which is used as test solution. And then ammonia solution(7→100) is added to 1 ml of test solution to make to 100 ml. Again, take 1 ml of this solution and make to 10 ml, it is used as standard solution. Take 10 $\mu\ell$

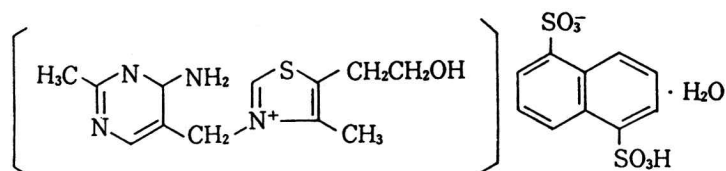
of test solution and standard solution , and spot respectively them to the prepared thin layer plate. The mixed solution of n-butanol·water·acetic acid(5:2:1) is used as the solvent. When the solvent is developed up to 10 cm from base line, stop developing. After doing air-dry the plate at 105°C for 30 minutes, p-dimethylaminocinnamaldehyde·ethanol solution(1→500)/sulfuric acid·ethanol solution(1→50) is equally nebulized. The spot except for a major red spot which is obtained from the test solution should not thicker than a spot(this spot is obtained from the reference solution). However, a supporting material of thin layer plate, which is prepared by using silica gel for thin layer chromatography is used as the dried thing at 110°C for 1 hour.

Assay Precisely weighed 500 mg of Biotin dissolve in 100 ml of water, add phenolphthalein indicator, heat and continuously stir and titrate with 0.1 N sodium hydroxide solution until the color of the solution becomes pale red

1 ml of 0.1 N sodium hydroxide solution = 24.43 mg $C_{10}H_{16}N_2O_3S$

77. Vitamin B₁ Naphthalene-1,5-disulfonate

Thiamine Naphthalene-1,5-disulfonate

Chemical Formula $C_{22}H_{24}O_7N_4S \cdot H_2O$

Molecular Weight 570.68

Compositional Specifications of Vitamin B₁ Naphthalene-1,5-disulfonate

Content Vitamin B₁ Naphthalene-1,5-disulfonate, when calculated on the dried basis, should contain within a range of 98.0~102.0% of thiamine naphthalene-1,5-disulfonate ($C_{22}H_{24}O_7N_4S_3 = 552.66$).

Description Vitamin B₁ Naphthalene-1,5-disulfonate occurs as a white, fine crystalline powder. It is odorless or has a slight, characteristic odor.

Identification (1) Dissolve 10 mg of Vitamin B₁ Naphthalene-1,5-disulfonate in 100 ml of 0.001 N hydrochloric acid. Take 5 ml of the solution, add 0.001 N hydrochloric acid to make 100 ml. The solution exhibits an absorption maximum at a wavelength of 226 ± 1 nm.

(2) Proceed as directed under Identification (1) and (2) in [Vitamin B₁ Hydrochloride].

Purity (1) Chloride : To 0.25 g of Vitamin B₁ Naphthalene-1,5-disulfonate, add 30 ml of water, and shaking, which is set-aside for 10 minutes. Add 6 ml of dilute nitric acid and filter. The filtrate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid.

(2) Lead : When 5.0 g of Vitamin B₁ Naphthalene-1,5-disulfonate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying When Vitamin B₁ Naphthalene-1,5-disulfonate is dried for 2 hours at 105°C, the weight loss should be not more than 5%.

Residue on Ignition The amount of residue of Vitamin B₁ Naphthalene-1,5-disulfonate should be not more than 0.2%.

Assay Accurately weigh about 0.16 g of Vitamin B₁ Naphthalene-1,5-disulfonate, previously dried, add 25 ml of diluted hydrochloric acid, and heat in a water bath and

cool, add water to make exactly 1,000 ml. Take 2 ml of this solution, and proceed as directed under Assay in [Vitamin B₁ Hydrochloride]

$$\text{Contents(\%)} = \frac{A_T - A_{T'}}{A_S - A_{S'}} \times \frac{\text{Weight of Vitamin B}_1 \text{ Hydrochloride reference standard calculated on the anhydrous basis(g)}}{\text{Weight of the sample(g)}} \times 1.6386 \times 100$$

78. Vitamin B₁ Naphthalene-2,6-disulfonate

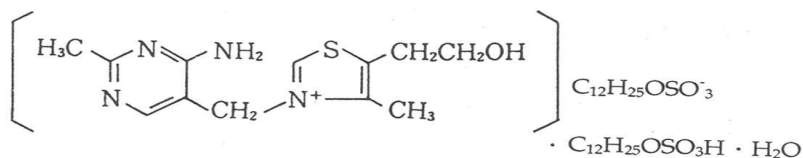
Thiamine Naphthalene-2,6-disulfonate

- Designation canceled

Date of Cancellation : 11. 12. '10 (Notification No. 2010-82)

79. Vitamin B₁ Dilaurylsulfate

Thiamine Dilaurylsulfate

Chemical Formula $C_{36}H_{68}O_9N_4S_3 \cdot H_2O$

Molecular Weight 815.19

Compositional Specifications of Vitamin B₁ Dilaurylsulfate

Content Vitamin B₁ Dilaurylsulfate, when calculated on the dried basis, should contain within a range of 98.0~102.0% of Vitamin B₁ dilaurylsulfate ($C_{36}H_{68}O_9N_4S_3 \cdot H_2O$).

Description Vitamin B₁ Dilaurylsulfate occurs as colorless to white crystals or as a white crystalline powder. It is odorless or has a slight characteristic odor.

Identification (1) To 1 g of Vitamin B₁ Dilaurylsulfate, add 30 ml of water and 15 ml of hydrochloric acid, which is boiled for approximately 4 hours with a reflux condenser. After cooling, it is extracted twice with 15 ml each of ether. Ether extracts are combined and washed with water. Ether is removed by evaporation in a water bath. The residue is dried for 15 minutes at 100°C and cooled. The melting point of Vitamin B₁ Dilaurylsulfate should be within a range of 20~28°C.

(2) To 0.1 g of Vitamin B₁ Dilaurylsulfate, add 20 ml of potassium chloride-hydrochloric acid solution, and boil for approximately 30 minutes and cool and filter. Take 1 ml of the filtrate, add 1 ml of lead acetate solution and 1 ml of sodium hydroxide solution (1→10), it becomes yellow. And the solution is heated in a water bath, it turns brown. If it is further set-aside, black brown precipitate is formed.

(3) To 1 ml of the filtrate above (2), add 5 ml of 0.5 N sodium hydroxide solution, 0.5 ml of potassium ferricyanide solution, and 5 ml of n-butyl alcohol. It is tested by Identification (1) in [Vitamin B₁ Hydrochloride].

Purity (1) Chloride : To 0.25 g of Vitamin B₁ Dilaurylsulfate, add 30 ml of water and shaking, which is set-aside for 10 minutes. Add 6 ml of dilute nitric acid and filter and wash with water. Wash water is added to the filtrate, Test Solution. It is tested by Chloride Limit Test. Its content should not be more than the amount that

corresponds to 0.4 ml of 0.01 N hydrochloric acid.

(2) Lead : When 5.0 g of Vitamin B₁ Dilaurylsulfate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying When Vitamin B₁ Dilaurylsulfate is dried for 24 hours in a vacuum desiccator (silica gel), the weight loss should be not more than 2%.

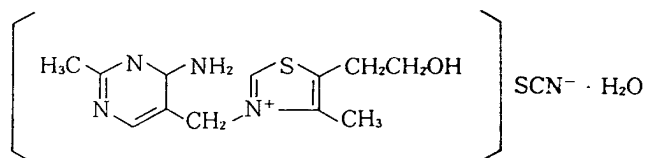
Residue on Ignition When thermogravimetric analysis is done with Vitamin B₁ Dilaurylsulfate, the residue should be not more than 0.3%.

Assay Accurately weigh about 0.12 g of Vitamin B₁ Dilaurylsulfate, previously dried, and add 40 ml of potassium chloride–hydrochloric acid solution, heat in a water bath for 30 minutes while shaking occasionally, cool, filter, wash with 50 ml of water, combine the filtrate and the washings, and add water to make 100 ml. Measure exactly 2 ml of this solution, and add water to make 50 ml. Use this solution as the test solution. Accurately weigh about 0.1 g of Vitamin B₁ Hydrochloride Reference Standard (measure previously the water content in the same manner as for [Vitamin B₁ Hydrochloride]), dissolve in 40 ml of potassium chloride hydrochloric acid solution, add water to make exactly 200 ml. 2 ml of this solution is diluted to 50 ml, Standard Solution. Quantitative analysis is carried out with test solution and standard solution following [Vitamin B₁ Hydrochloride]

$$\text{Contents(\%)} = \frac{A_T - A_{T'}}{A_S - A_{S'}} \times \frac{\text{Weight of Vitamin B}_1 \text{ Hydrochloride reference standard calculated on the anhydrous basis(g)}}{\text{Weight of the sample(g)}} \times 2.417 \times 100$$

80. Vitamin B₁ Rhodanate

Thiamine Thiocyanate

Chemical Formula C₁₃H₁₇ON₅S₂ · H₂O

Molecular Weight 341.17

Compositional Specifications of Vitamin B₁ Rhodanate

Content Vitamin B₁ Rhodanate, when calculated on the dried basis, should contain within a range of 98.0~102.0% of Vitamin B₁ Rhodanate (C₁₃H₁₇ON₅S₂ = 323.45).

Description Vitamin B₁ Rhodanate occurs as white crystals or crystalline powder. It is odorless or has a slight, characteristic odor.

Identification (1) Proceed as directed under Identification (1) and (2) in [Vitamin B₁ Hydrochloride].

(2) A concentrated solution of Vitamin B₁ Rhodanate responds to test of thiocyanide salt in Identification.

Purity (1) Chloride : To 0.3 g of Vitamin B₁ Rhodanate, add 1.5 ml of water, 0.3 g of ammonium nitrate, and 0.9 ml of sodium hydroxide solution (2→5). Then add drop-wise 3 ml of hydrogen peroxide gradually while shaking. Heat in a water bath for 30 minutes while shaking occasionally, cool, add 3 ml of diluted nitric acid (2→3) and water to make 50 ml. Add 0.1 ml of dextrin solution (1→50) and 0.5 ml of silver nitrate solution. Then allow to stand for 5 minutes. The solution should be not more turbid than the reference solution prepared as follows. Take 0.5 ml of 0.01 N hydrochloric acid and proceed in the same manner as the test solution.

(2) Lead : When 5.0 g of Vitamin B₁ Rhodanate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying When Vitamin B₁ Rhodanate is dried for 2 hours at 105°C, the weight loss should not be more than 6%.

Residue on Ignition When thermogravimetric analysis is done with Vitamin B₁

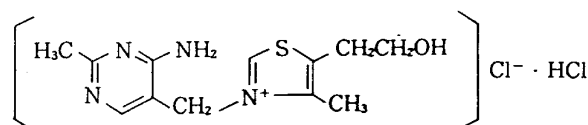
Rhodanate, the residue should not be more than 0.2%.

Assay Proceed as directed under Assay in [Vitamin B₁ Hydrochloride].

$$\text{Contents(\%)} = \frac{A_T - A_{T'}}{A_S - A_{S'}} \times \frac{\text{Weight of Vitamin B}_1 \text{ Hydrochloride reference standard calculated on the anhydrous basis(g)}}{\text{Weight of the sample(g)}} \times 0.959 \times 100$$

81. Vitamin B₁ Hydrochloride

Thiamine Hydrochloride



Chemical Formula $C_{12}H_{17}ON_4ClS \cdot HCl$

Molecular Weight 337.29

Compositional Specifications of Vitamin B₁ Hydrochloride

Content Vitamin B₁ Hydrochloride, when calculated on the anhydrous dried basis, should contain within a range of 98.0~102.0% of Vitamin B₁ hydrochloride ($C_{12}H_{17}ON_4ClS \cdot HCl$)

Description Vitamin B₁ Hydrochloride occurs as white, fine crystals or crystalline powder. It is odorless or has a slight, characteristic odor.

Identification (1) Dissolve 5 mg of Vitamin B₁ Hydrochloride in a mixture of 5 ml of 0.5 N sodium hydroxide solution and 0.5 ml of potassium ferricyanide solution, add 5 ml of n-butyl alcohol, shake vigorously for 2 minutes, allow to stand, and observe under ultraviolet light. The upper layer emits a blue-purple fluorescence. The fluorescence disappears upon acidifying the solution. It reappears on making the solution alkaline.

(2) Dissolve 5 mg of Vitamin B₁ Hydrochloride in a mixture of 1 ml of lead acetate solution and 1 ml of sodium hydroxide solution (1→10). The color of the solution becomes yellow. Warm in a water bath. It changes to brown. Then allow to stand. A black brown precipitate is formed.

(3) Vitamin B₁ Hydrochloride responds to test of Chloride in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Vitamin B₁ Hydrochloride dissolves in water to make 10 ml, the solution should not be darker than the solution of 1.5 ml of 0.1 N potassium dichromate solution added with water to make 1,000 ml

(2) pH : pH of Vitamin B₁ Hydrochloride solution (1→100) should be within a range of 2.7~3.4.

(3) Sulfate : When 1.5 g of Vitamin B₁ Hydrochloride is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.35 ml of 0.01 N sulfuric acid.

(4) Lead : When 5.0 g of Vitamin B₁ Hydrochloride is tested by Atomic Absorption

Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

- (5) Nitrate: 0.02 g of Vitamin B₁ Hydrochloride is dissolved in water to make to 20 ml, and add 2 ml of sulfuric acid. After shaking it to mix, cool it. When 2 ml of ferrous sulfate solution is added to make layer, the interface layer of two solutions should not produce a band of brown color.

Water Content Vitamin B₁ Hydrochloride is tested by the Back Titration Method in Water Content Determination (Karl-Fischer Method). The water content should not be more than 5%.

Residue on Ignition When thermogravimetric analysis is done with Vitamin B₁ Hydrochloride, the residue should not be more than 0.2%.

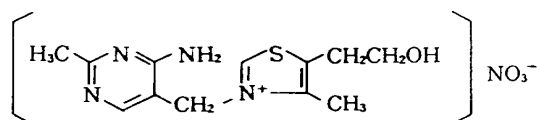
Assay Accurately weigh about 0.1 g each of Vitamin B₁ Hydrochloride and Vitamin B₁ Hydrochloride Reference Standard (measure previously the water content in the same manner as for Vitamin B₁ Hydrochloride), separately dissolve each in diluted hydrochloric acid (1→10.000) to make exactly 200 ml, take 2 ml each, and add diluted hydrochloric acid (1→10,000) to make 50 ml each. Use these solutions as the test solution and the standard solution, respectively. Measure exactly 5 ml of the test solution, and transfer into test tubes T and T' with ground-glass stoppers. Transfer 3 ml of cyanogen bromide for Vitamin B₁ Assay, exactly measured, into T, shake, add quickly 5 ml of sodium hydroxide solution (1→10), exactly measured, and shake again. Transfer 5 ml of sodium hydroxide solution (1→10), exactly measured, into T'. shake, add 3 ml of cyanogen bromide IS for Vitamin B₁ Assay, exactly measured. and shake again. Separately, measure exactly 5 ml of the standard solution, transfer into test tubes S and S' with ground-glass stoppers, and proceed in the same manner as for the test solution. Measure absorbances A_T, A_{T'}, A_S and A_{S'} of respective solutions at a wavelength of 368 nm using water as the reference solution, and calculate the content by the following formula:

- Bromine Cyanide solution for quantitative method of Vitamin B₁ hydrochloride : To 2 ml of bromine, add 100 ml of ice cold water and shaking, where ice cold potassium thiocyanide solution (1→10) until the color of bromine completely decolorizes

$$\text{Contents(\%)} = \frac{A_T - A_{T'}}{A_S - A_{S'}} \times \frac{\text{Weight of Vitamin B}_1 \text{ Hydrochloride reference standard calculated on the anhydrous basis(g)}}{\text{Weight of the sample(g)}} \times 100$$

82. Vitamin B₁ Mononitrate

Thiamine mononitrate

Chemical Formula C₁₂H₁₇O₄N₅S

Molecular Weight 327.37

Compositional Specifications of Vitamin B₁ Mononitrate

Content Vitamin B₁ Mononitrate, when calculated on the dried basis, should contain within a range of 98.0~102.0% of Vitamin B₁ Mononitrate (C₁₂H₁₇O₄N₅S).

Description Vitamin B₁ Mononitrate occurs as white to white crystalline powder. It is odorless or has a slight, characteristic odor.

Identification (1) Proceed as directed under Identification (1) and (2) in [Vitamin B₁ Hydrochloride].

(2) Vitamin B₁ Mononitrate responds to the test for Nitrate.

Purity (1) pH : To 1.0 g of Vitamin B₁ Mononitrate is dissolved in 50 ml water. It should within a range of pH 6.5~8.0.

(2) Chloride : When 0.25 g of Vitamin B₁ Mononitrate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid.

(3) Lead : When 5.0 g of Vitamin B₁ Mononitrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Loss on Drying When Vitamin B₁ Mononitrate is dried for 2 hours at 105°C, the weight loss should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done with Vitamin B₁ Mononitrate, the residue should not be more than 0.2%.

Assay Proceed as directed under Assay in [Vitamin B₁ Hydrochloride].

$$\text{Contents(\%)} = \frac{A_T - A_{T'}}{A_S - A_{S'}} \times \frac{\text{Weight of Vitamin B}_1 \text{ Hydrochloride reference standard calculated on the anhydrous basis(g)}}{\text{Weight of the sample(g)}} \times 0.9706 \times 100$$

83. Vitamin B₁ Phenolphthalinate

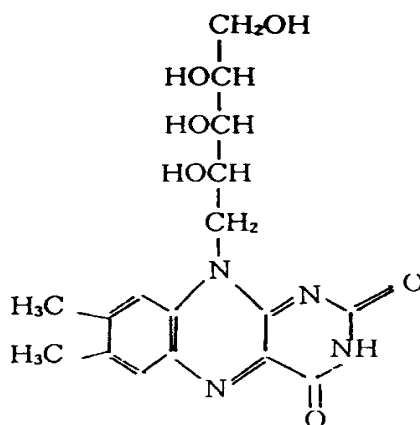
Thiamine Phenolphthahlnate

- Designation canceled

Date of Cancellation : 12. 11. '10 (Notification No. 2010-82)

84. Vitamin B₂

Riboflavin

Chemical Formula C₁₇H₂₀N₄O₆

Molecular Weight 376.38

Compositional Specifications of Vitamin B₂

Content Vitamin B₂, when calculated on the dried basis, should contain within a range of 98.0~102.0% of Vitamin B₂ (C₁₇H₂₀N₄O₆).

Description Vitamin B₂ occurs as yellow to light yellow crystals or crystalline powder, having a slight odor and a bitter taste.

Identification 1 mg of Vitamin B₂ dissolved in water to make 100 ml. The solution is light yellow-green in color and emits a strong yellowish green fluorescence. The fluorescence disappears on addition of diluted hydrochloric acid or sodium hydroxide solution.

Purity (1) Specific Rotation : After drying for 2 hours at 105°C, Dissolve 50 mg of Vitamin B₂, precisely weighed, in 2 ml of 0.1 N sodium hydroxide solution. add 5 ml of freshly boiled and cooled water, and add 2 ml of ethanol while shaking sufficiently. Add freshly boiled and cooled water to make exactly 10 ml. Optical rotation of this solution is measured within 30 minutes, should be within a range of $[\alpha]_D^{20} = -120 \sim -140^\circ$

(2) Lumiflavin : To 25 mg of Vitamin B₂, add 10 ml of alcohol-free chloroform, shake for 5 minutes, and filter. The color of the filtrate should not darker than that of the solution prepared by adding water to 3.0 ml of 0.1 N potassium dichromate to make 1,000 ml.

- (3) Arsenic : When Vitamin B₂ is tested by Arsenic Limit Test in Coloring Matter Tests, its content should not be more than 4 ppm.
- (4) Lead : When 5.0 g of Vitamin B₂ is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (5) Cadmium : When 5.0g of Vitamin B₂ is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Mercury : When Vitamin B₂ is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.]
- (7) Unsulfonated Primary Aromatic Amines : When G. Unsulfonated Primary Aromatic Amines in Coloring Matter Tests is done, the content should not be more than 0.01% as Aniline.

Loss on Drying When Vitamin B₂ is dried for 2 hours at 105°C, the weight loss should not be more than 1.5%.

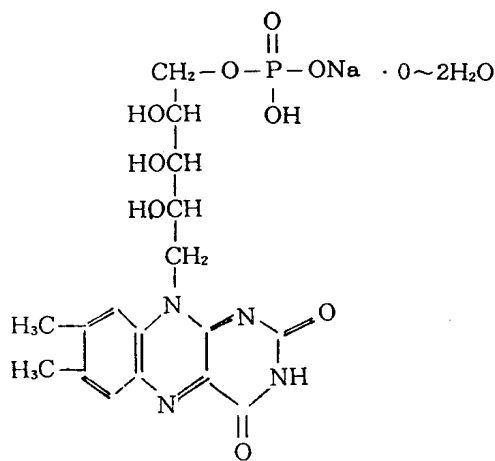
Residue on Ignition When thermogravimetric analysis is done with Vitamin B₂, the amount of residue should not be more than 0.3%.

Assay Dissolve 0.015g of Vitamin B₂, previously dried and accurately weighed, in 800 ml of diluted glacial acetic acid (1→400) by heating at 60~70°C, cool, and add water to make exactly 1,000 ml. Use this solution as the test solution. Prepare the standard solution, using Riboflavin Reference Standard and proceeding in the same manner as the sample. Using water as the reference solution, measure absorbances A_T and A_S of the test solution and standard solution, respectively, at a wavelength of 445 nm, add 0.02 g of sodium hydrosulfite to solution of each. Decolorize by shaking well, and immediately measure absorbances A_T' and A_S' . Calculate the content by the following formula. Avoid direct sunlight during the procedure. and use light-shielded containers.

$$\text{Content(\%)} = \text{Weight of Vitamin B}_2 \text{ Standard(mg)} \times \frac{A_T - A_T'}{A_S - A_S'} \times \frac{100}{\text{Weight of sample(mg)}}$$

85. Vitamin B₂ Phosphate Sodium

Riboflavin 5'-Phosphate Sodium

Chemical Formula $C_{17}H_{20}N_4NaO_9P \cdot nH_2O$ ($n=2$ or 0)

Molecular Weight 514.38

Compositional Specifications of Vitamin B₂ 5'-Phosphate Sodium

Content Vitamin B₂ Phosphate Sodium, when calculated on the anhydrous basis, should contain not less than 95.0% of Vitamin B₂ Phosphate Sodium ($C_{17}H_{20}N_4NaO_9P = 478.33$).

Description Vitamin B₂ Phosphate Sodium occurs as yellow to orange crystals or crystalline powder. It is almost odorless and has a bitter taste.

Identification (1) Proceed as directed under Identification in [Vitamin B₂].

(2) To 50 mg of Vitamin B₂ Phosphate Sodium, The solution, which is made by decomposition of 50 mg this item as B. Semi-micro Kjeldahl Method in Nitrogen Determination. The solution responds to the test by Sodium Salt and Phosphate.

Purity (1) Clarity and Color of Solution : When 0.2 g of Vitamin B₂ Phosphate Sodium is dissolved in 10 ml of water, the solution should be clear.

(2) Specific Rotation : Approximately 0.3 g of Vitamin B₂ Phosphate Sodium is precisely weighed and dissolved in 5 N hydrochloric acid to make 20 ml. Optical rotation of Vitamin B₂ Phosphate Sodium is measured and converted to a value of a anhydrous. It should be a within a range of $[\alpha]_D^{20} = +38 \sim +43^\circ$

(3) Lumiflavin : To 35 mg of Vitamin B₂ Phosphate Sodium, add 10 ml of alcohol-free chloroform, shake for 5 minutes, and filter. The color of the filtrate should not be darker than that of the solution prepared by adding water to 3.0 ml of 0.1 N potassium dichromate to make 1,000 ml.

(4) Arsenic : 0.25 g of Vitamin B₂ Phosphate Sodium transfer into a platinum, quartz, or

porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol(1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

- (5) Lead : When 5.0 g of Vitamin B₂ Phosphate Sodium is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Cadmium : When 5.0g of Vitamin B₂ Phosphate Sodium is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (7) Mercury : When Vitamin B₂ Phosphate Sodium is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (8) Unsulfonated Primary Aromatic Amines : When G. Unsulfonated Primary Aromatic Amines in Coloring Matter Tests is done, the content should not be more than 0.007% as Aniline. 10 mg of aniline is precisely weighed and dissolved in 30 ml of diluted hydrochloric acid (3→10), which is diluted to 100 ml with water. To 1.4ml of this solution, hydrochloric acid(1→10) is added to make 100 ml, reference solution.

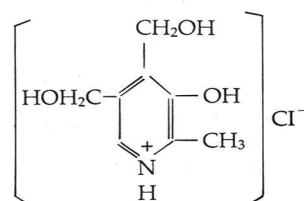
Water Content Karl-Fischer methyl alcohol : 25 ml of Karl-Fischer methyl alcohol solution (1:1) transfer into a dried titration flask and titrated with Karl-Fischer solution until the end point. 0.1 g of Vitamin B₂ Phosphate Sodium is precisely weighed and immediately placed into a titration flask. It is then titrated by the Back Titration Method in Water Content Method (Karl-Fischer Method). Water content should not be more than 10%.

Assay Accurately weigh about 20 mg of Vitamin B₂ Phosphate Sodium, and proceed as directed under Assay in [Vitamin B₂]. Calculate the content by the following formula. Avoid direct sunlight during the procedure and use light-shielded containers.

$$\text{Contents(\%)} = \text{Weight of Vitamine B2 standard (mg)} \times \frac{A_T - A_T'}{A_S - A_S'} \times \frac{1.271}{\text{Weight of Sample(mg)}} \\ \times \frac{100}{100 - \text{Water Contents(\%)}} \times 100$$

86. Vitamin B₆ Hydrochloride

Pyridoxine Hydrochloride

Chemical Formula $C_8H_{11}O_3N \cdot HCl$

Molecular Weight 205.64

Compositional Specifications of Vitamine B₆ Hydrochloride

Content Vitamin B₆ Hydrochloride, when calculated on the dried basis, should contain not less than 98.0% of Vitamin B₆ Hydrochloride ($C_8H_{11}O_3N \cdot HCl$)

Description Vitamin B₆ Hydrochloride occurs as white to light yellow crystals or crystalline powder. It is odorless.

Identification (1) To 1 ml of Vitamin B₆ Hydrochloride solution (1→10,000), add 2 ml of a solution of 2,6-dibromoquinone chloroamide in ethanol (1→4,000) and 1 drop of ammonia solution. A blue color develops. When 1 ml of saturated boric acid solution is added before the test, and the same test is carried out, blue color does not develop.

(2) Vitamin B₆ Hydrochloride responds to the test by Chloride Limit Test in Identification.

Purity (1) Melting Point : Melting point of Vitamin B₆ Hydrochloride should be within a range of 203~209°C.

(2) pH : pH of Vitamin B₆ Hydrochloride solution (0.5→25) should be within a range of 2.5~3.5.

(3) Lead : When 5.0 g of Vitamin B₆ Hydrochloride is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Chloride : 0.5 g of Vitamin B₆ Hydrochloride is dissolved in 50 ml of methanol. Add 5 ml of glacial acetic acid and 2~3 drops of eosin Y solution. When it is titrated by 0.1 N silver nitrate solution, the content which is calculated on the dried basis should be 16.9~17.6%.

1 ml of 0.1 N silver nitrate solution = 3.545mg Cl

Eosin Y solution : 50 mg of eosin Y is dissolved in 10 ml of water.

Loss on Drying When Vitamin B₆ Hydrochloride is dried for 4 hours in a vacuum desiccator, the weight loss should not be more than 0.5%.

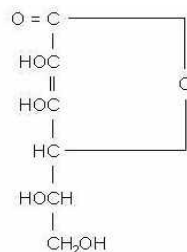
Residue on Ignition When thermogravimetric analysis of Vitamin B₆ Hydrochloride, the residue should not be more than 0.1%.

Assay Accurately weigh about 0.4 g of Vitamin B₆ Hydrochloride, dissolve in 60 ml of glacial acetic acid (for non-aqueous titration) and 10 ml of mercury II acetate solution (for non-aqueous titration). Titrate with 0.1 N perchloric acid (indicator : 1 ml of crystal violet-glacial acetic acid solution). Separately, carry out a blank test.

1 ml of 0.1 N perchloric acid = 20.56 mg C₈H₁₁O₃N · HCl

87. Vitamin C

L-Ascorbic Acid

Chemical Formula $C_6H_8O_6$

Molecular Weight 176.13

Compositional Specifications of Vitamin C

Content Vitamin C, when calculated on the dried basis, should contain no less than 99.0% of Vitamin C($C_6H_8O_6$).

Description Vitamin C occurs as white to yellowish white crystals or crystalline powder. It is odorless and has an acid taste.

Identification (1) Melting point of Vitamin C should be within a range of 187~192°C.

(2) To 2 ml of Vitamin C solution (1→100), 5~6 drops of sodium nitroprusside solution are added. When 1 drop of sodium hydroxide solution is added, the solution turns blue immediately.

(3) Dissolve 0.1 g of Vitamin C in 100 ml of metaphosphoric acid solution (1→50), and add drop wise iodine solution of the solution until a slightly yellowish color develops. Add 1 drop each of cupric sulfate solution (1→1,000) and pyrrole. and heat in a water bath at 50~60°C for 5 minutes. A blue to blue-bluish green color develops.

(4) To 10 ml of Vitamin C solution (1→100), add 1 ml of potassium permanganate solution, the color disappears immediately.

(5) To 5 ml of Vitamin C solution (1→100), add 0.3 ml of sodium hydroxide solution and 2 drops of uranyl acetate solution, and then the solution turns brown. When 2 ml of sodium hydroxide solution is added, it changes to light yellow.

Purity (1) Specific Rotation : Approximately 1 g of Vitamin C is precisely weighed and dissolved in freshly boiled and cooled water to make 10 ml. Optical rotation of this solution, when calculated on the dried basis, should within a range of $[\alpha]_D^{20} = +20.5 \sim +21.5^\circ$

(2) Arsenic : Proceed as directed under Purity (4) in [Vitamin E]. The content should not more than 4 ppm.

(3) Lead : When 5.0 g of Vitamin C is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Mercury : When Vitamin C is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Vitamin C is dried for 3 hours in a vacuum desiccator (silica gel), the weight loss should not be more than 0.4%.

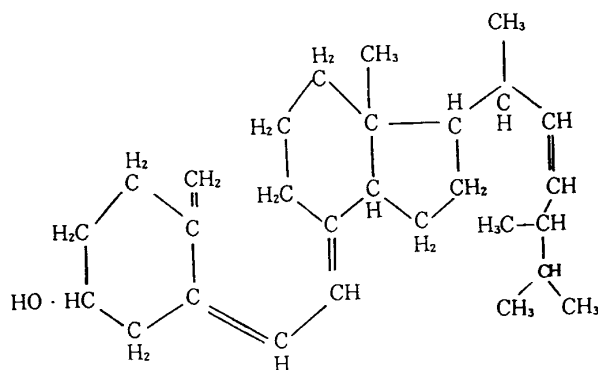
Residue on Ignition When thermogravimetric analysis is done with Vitamin C, the amount of residue should not be more than 0.1%.

Assay Dissolve 0.2 g of Vitamin C, previously dried and accurately weighed, in 50 ml of metaphosphoric acid solution (1→50). Titrate with 0.1 N iodine solution (indicator : starch solution).

1 ml of 0.1 N iodine solution = 8.806 mg of $C_6H_8O_6$

88. Vitamin D₂

Calciferol

Chemical Formula C₂₈H₄₄O

Molecular Weight 396.66

Compositional Specifications of Vitamin D₂**Description** Vitamin D₂ is white crystal and odorless.

Identification (1) 50 mg of Vitamin D₂ is dissolved in 1 ml of anhydrous pyridine, where a solution of 50 mg 3,5-dinitro benzoyl in 1 ml anhydrous pyridine is added and heated for 10 minutes in a water bath. After cooling, 5 ml of water is added to form precipitates, which are then filtered and washed with water. Precipitates are twice recrystallized in acetone and then dried for 2 hours in a vacuum desiccator (sulfuric acid). Melting point should be within a range of 147~149°C.

(2) Dissolve 0.5 mg of Vitamin D₂ in 5ml of chloroform, add 0.3 ml of anhydrous acetic acid and 0.1 ml of sulfuric acid and shake. The color of this mixture turns red then violet, blue and finally green.

Purity (1) Specific Rotation : Approximately 0.3 g of Vitamin D₂ is precisely weighed and dissolved in alcohol to make 20 ml. The optical rotation of this solution should be within a range of $[\alpha]_D^{20} = +102 \sim +107^\circ$

(2) Specific Optical Density : Optical density is measured at 265nm with a solution of Vitamin D₂ in alcohol (aldehyde free). $[E]_{1cm}^{1\%} = 445 \sim 485$ at 265 nm.

(3) Ergosterol : 10 mg of Vitamin D₂ is dissolved in 2 ml of 90% alcohol. 20 mg of digitonin is dissolved in 2 ml of 90% alcohol. Two solutions are mixed and kept for 18 hours. Precipitates should not form in this solution.

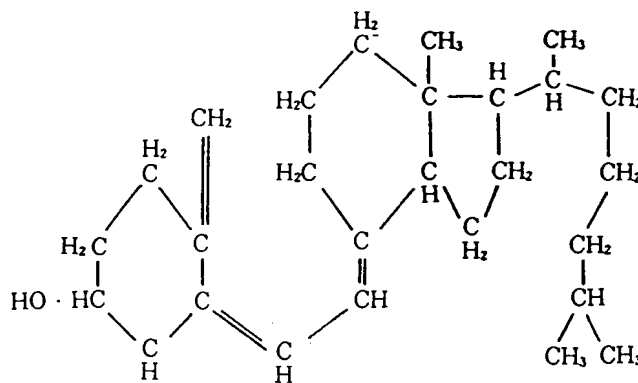
(4) Melting Point : Melting point of Vitamin D₂ should be within a range of 115~119°C.

Storage Standards of Vitamin D₂

Vitamin D₂ should be preserved in a light shielded hermetic container filled with nitrogen in a cool place.

89. Vitamin D₃

Cholecalciferol

Chemical Formula C₂₇H₄₄O

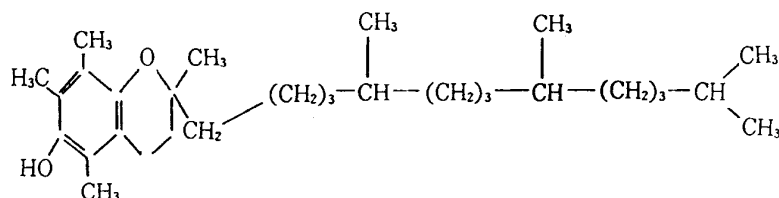
Molecular Weight 384.65

Compositional Specifications of Vitamin D₃**Description** Vitamin D₃ occurs as white crystals. It is odorless.**Identification** (1) Proceed as directed under Identification (1) in [Vitamin D₂]. The melting point should be within a range of 133~135°C.(2) Proceed as directed under Identification (2) in [Vitamin D₂].**Purity** (1) Specific Rotation : Approximately 0.1 g of Vitamin D₃ is precisely weighed and dissolved in alcohol to make 200 ml. Optical rotation of this solution should be within a range of $[\alpha]_D^{20} = +103 \sim +112^\circ$ (2) Specific Absorbance : Specific absorbance is measured at 265 nm with a solution of Vitamin D₃ in aldehyde free alcohol. $[E]_{1cm}^{1\%} = 450 \sim 490$.(3) 7-Dehydrocholesterol : 10 mg of Vitamin D₃ dissolve in 2 ml of 90% alcohol, and add the solution, which 20 mg of digitonin dissolve in 2 ml of 90% alcohol, and allow to stand for 18 hours. Precipitate is not formed.(4) Melting Point : Melting point of Vitamin D₃ should be within a range of 84~89°C.**Storage Standards of Vitamin D₃**

Place in a light-resistant, hermetic container, replace the air with nitrogen gas, and store in a cold place.

90. Vitamin E

dl- α -Tocopherol



Chemical Formula $C_{29}H_{50}O_2$

Molecular Weight 430.72

Compositional Specifications of Vitamin E

Content Vitamin E should contain not less than 96.0% of Vitamin E ($C_{29}H_{50}O_2$).

Description Vitamin E is yellow, viscous and transparent liquid. It is odorless. It is miscible with ether, acetone, chloroform and vegetable oil. It is readily soluble in ethyl alcohol but almost insoluble in water. It become to dark by oxidase to air or light.

Identification Dissolve 10 mg of Vitamin E in 10 ml of anhydrous ethanol, add 2 ml of nitric acid, and heat at 75°C for 15 minutes. The color of the solution becomes red~orange.

Purity (1) Refractive Index : Refractive Index $[\alpha]_D^{20}$ of Vitamin E should be within a range of 1.503~1.507

(2) Clarity and Color of Solution : When 0.1 g of Vitamin E is dissolved in 10 ml of anhydrous alcohol, it should be clear.

(3) Specific Absorbance : Accurately weigh about 10 mg of Vitamin E, and dissolve in anhydrous alcohol to make exactly 200 ml and measure the absorbance a cell with 1 cm thickness. Path length at 292 nm. It should be within a range of $[E]_{1cm}^{1\%}$ (292 nm) = 71.0~76.0

(4) Arsenic : 0.25 g of Vitamin E transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid

is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

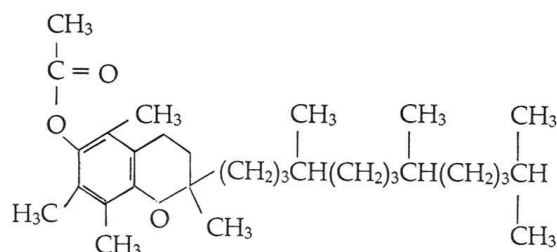
- (5) Lead : When 5.0 g of Vitamin E is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Residue on Ignition When thermogravimetric analysis is done with Vitamin E, the amount of residue should not be more than 0.1%.

Assay Accurately weigh approximately 50 mg of Vitamin E, dissolve in 100 ml of sulfuric acid in ethyl alcohol mixture (3→200), add 20 ml of water, and titrate with 0.01 N ceric ammonium sulfate solution while stirring well (indicator : 2 drops of diphenylamine solution). Perform the procedure in a dark place, and the rate of the titration is about 25 drops per 10 seconds. Titrate until a blue-purple color of the solution persists for 10 seconds. Perform a blank test in the same manner, and make any necessary correction.

$$1 \text{ ml of } 0.01 \text{ N ceric ammonium sulfate} = 2.154 \text{ mg of } \text{C}_{29}\text{H}_{50}\text{O}_2$$

91. *dl*- α -Tocopherol Acetate



Chemical Formula $\text{C}_{31}\text{H}_{52}\text{O}_3$

Molecular Weight 472.75

Compositional Specifications of *dl*- α -Tocopherol Acetate

Content *dl*- α -Tocopherol Acetate should contain not less than 96.0% of *dl*- α -Tocopherol ($\text{C}_{31}\text{H}_{52}\text{O}_3$).

Description *dl*- α -Tocopherol Acetate is colorless~yellow viscous liquid and odorless.

Identification 10 mg of *dl*- α -Tocopherol Acetate is dissolved in 10 ml of anhydrous ethyl alcohol, add 2 ml of nitric acid. After heating for 15 minutes at 75°C, the solution turns red~orange.

Purity (1) Refractive Index : Refractive Index $[\alpha]_D^{20}$ of *dl*- α -Tocopherol Acetate should be within a range of 1.494~1.499.

(2) Specific Gravity : Specific gravity of *dl*- α -Tocopherol Acetate should be within a range of 0.952~0.966.

(3) Clarity and Color of Solution : When 0.1 g of *dl*- α -Tocopherol Acetate is dissolved in 10 ml of anhydrous ethyl alcohol, the solution should be clear.

(4) Specific Optical Density : 10 mg of *dl*- α -Tocopherol Acetate is dissolved in anhydrous ethyl alcohol to make 100 ml. Optical density is measured in a cell with 1 cm thickness. It should be a range of $[E]_{1\text{cm}}^{1\%} = 41.0\sim 45.0$.

(5) Arsenic : 0.5 g of *dl*- α -Tocopherol Acetate transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 2 ppm.

- (6) Lead : When 5.0 g of *d,l*- α -Tocopherol Acetate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (7) α -Tocopherol : Accurately weigh about 1 g of *d,l*- α -Tocopherol Acetate and proceed as directed under Assay in Vitamine B (Not more than 0.5%).
- (8) Acid Value : To 25 ml of the mixture of ethyl alcohol and eter, 0.5 ml of phenolphthalein solution is added to 1 g of *d,l*- α -Tocopherol Acetate , 0.1 N sodium hydroxide is added for at least 30 seconds until pale red persists. The consumed amount should not be more than 1.0 ml.

Assay Accurately weigh about 0.25 g of *d,l*- α -Tocopherol Acetate transfer into a 100 ml brown round bottom flask, add 25 ml of anhydrous ethyl alcohol and 20 ml solution of sulfuric acid in ethyl alcohol (3 \rightarrow 20), a reflux condenser is attached to the flask. The solution is then boiled for 3 hours. After cooling, the solution transfer into a 200 ml brown mass flask, add anhydrous ethyl alcohol to make 200 ml. Take 50 ml of this solution, add 50 ml solution of sulfuric acid in ethyl alcohol (3 \rightarrow 200) and 20 ml of water and proceed as directed under Assay in for [Vitamin E] .

1 ml of 0.01 N ceric ammonium sulfate solution = 2.3638 mg $C_{31}H_{52}O_3$

92. Glacial Acetic Acid

Chemical Formula CH_3COOH

Molecular Weight 60.05

Content Specifications of Glacial Acetic Acid

Content Glacial Acetic Acid should contain not less than 99.0% of acetic acid ($\text{C}_2\text{H}_4\text{O}_2$).

Description Glacial Acetic Acid is colorless transparent liquid or crystalline lump with characteristic irritating odor.

Identification (1) Glacial Acetic Acid solution (1→3) is strongly acidic.

(2) Glacial Acetic Acid solution (1→3) responds to test of acetate salts in Identification.

Purity (1) Solidification Temperature : Solidification temperature of Glacial Acetic Acid should not be less than 14.5°C .

(2) Arsenic : When 0.77 g of Glacial Acetic Acid is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 1.3 ppm.

(3) Lead : When 5.0 g of Glacial Acetic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 0.5 ppm.

(4) Mercury : When Glacial Acetic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Readily Oxidized Matter : 2 g of Glacial Acetic Acid is dissolved in 10 ml of water, where 0.1 ml of 0.1 N potassium permanganate solution is added. The color of the solution should not disappear within 30 minutes

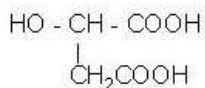
(6) Residue on Evaporation : 10 g of Glacial Acetic Acid is evaporated and then dried for 2 hours at 100°C . The residue should not be more than 1 mg.

Assay Accurately weigh about 1 g of Glacial Acetic Acid and dissolve in 40 ml of water, which is titrated with 1 N sodium hydroxide solution (indicator : 2 drops of phenolphthalein solution).

1 ml of 1 N sodium hydroxide solution = 60.05 mg $\text{C}_2\text{H}_4\text{O}_2$

93. DL-Malic Acid

dl- Malic Acid



Chemical Formula $\text{C}_4\text{H}_6\text{O}_5$

Molecular Weight 134.09

Compositional Specifications of DL-Malic Acid

Content DL-Malic Acid should contain not less than 99.0% of DL-malic acid ($\text{C}_4\text{H}_6\text{O}_5$).

Description DL-Malic Acid occurs as white crystals or crystalline powder. It is odorless or has a light, characteristic odor, and a characteristic acid taste.

Identification (1) Place 1 ml of DL-Malic Acid solution (1→20) into a test tube, add 2~3 mg of resorcinol and 1 ml of sulfuric acid, shake, heat at 120~132°C for 5 minutes, cool, and add water to make 5 ml. Make the solution alkaline by adding drop wise sodium hydroxide solution (2→5) while cooling, and add water to make 10 ml. A light blue fluorescence is observed under ultraviolet light.

(2) Place DL-Malic Acid solution (1→20) into a porcelain dish, neutralize with ammonia solution, add 10 mg of sulfanilic acid, and heat in a water bath for several minutes. Add 5 ml of sodium nitrite solution (1→5), warm slightly, and make alkaline with sodium hydroxide solution. It is become to red.

Purity (1) Melting Point : Melting point of DL-Malic Acid should be within a range of 127~132°C

(2) Clarity and Color of Solution : When 1 g of DL-Malic Acid is dissolved in 20 ml of water, it should be clear.

(3) Chloride : When 1 g of DL-Malic Acid is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.1 ml of 0.01 N hydrochloric acid.

(4) Arsenic : When 0.25 g of DL-Malic Acid is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(5) Lead : When 5.0 g of DL-Malic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(6) Mercury : When DL-Malic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Readily Oxidizable Substances : Weigh 0.1 g of DL-Malic Acid, dissolve in 25 ml of water and 25 ml of diluted sulfuric acid (1→20), keep at 20°C, and add 1 ml of 0.1 N potassium permanganate. The pink color of the solution does not disappear within 3 minutes.

Residue on Ignition When thermogravimetric analysis is done with DL-Malic Acid, the residue should not be more than 0.05%.

Assay Accurately weigh about 1.5 g of DL-Malic Acid, and dissolve in water to make exactly 250 ml. Take 25 ml of this solution, and titrate with 0.1 N sodium hydroxide (indicator : 2 drops of phenolphthalein solution).

1 ml of 0.1 N sodium hydroxide = 6.704 mg of $C_4H_6O_5$

94. Sodium DL-Malate

Sodium *d*L-Malic Acid

Chemical Formula $\text{C}_4\text{H}_4\text{O}_5\text{Na}_2 \cdot n\text{H}_2\text{O}$ ($n=3$ or $1/2$)

Molecular Weight trihydrate : 232.10, hemihydrate : 187.06

Definition Sodium DL-Malate occurs as trihydrate and hemihydrate.

Compositional Specifications of Sodium DL-Malate

Content Sodium DL-Malate, when calculated on the dried basis, should contain within a range of 98.0~102.0% of Sodium DL-Malate ($\text{C}_4\text{H}_4\text{O}_5\text{Na}_2=178.07$).

Description Sodium DL-Malate occurs as white crystalline powder or lumps. It is odorless and has a salty taste.

Identification (1) Proceed as directed under Identification (1) in [DL-Malic Acid].

(2) Place Sodium DL-Malate solution (1→20) into a porcelain dish, add 10 mg of sulfanilic acid, and proceed as directed under Identification (1) in [DL-Malic Acid].

(3) Sodium DL-Malate responds to the test for Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Sodium DL-Malate is dissolved in 10 ml of water, the solution should be colorless and clear.

(2) Free Alkali : Weigh 1 g of Sodium DL-Malate, dissolve in 20 ml of freshly boiled and cooled water, and add 2 drops of phenolphthalein solution. Even if become to pink color, the color disappears on addition of 0.4 ml of 0.1 N sulfuric acid.

(3) Chloride : When 1 g of Sodium DL-Malate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

(4) Arsenic : When 0.25 g of Sodium DL-Malate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(5) Lead : When 5.0 g of Sodium DL-Malate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(6) Mercury : When Sodium DL-Malate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Readily Oxidizable Substances : Weigh 0.1 g of Sodium DL-Malate, dissolve in 25 ml of water and 25 ml of diluted sulfuric acid (1→20), and maintain at 20°C. Add 1.0 ml of 0.1 N potassium permanganate and the pink color of the solution should not disappear within 3 minutes.

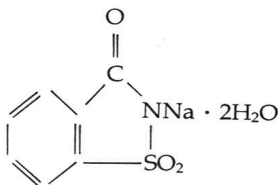
Loss on Drying When Sodium DL-Malate is dried for 4 hours at 130°C, the weight loss of trihydrate hydrate should be within a range of 20.5~23.5% and the weight loss of hemihydrate should not more than 7.0%.

Residue on Ignition Sodium DL-Malate is dried for 4 hours at 130°C. When thermogravimetric analysis is done with dried material, the residue should be within a range of 78.2~84.4%.

Assay Dissolve 0.15 g of Sodium DL-Malate, precisely dried and accurately weighed, in 30 ml of acetic acid (For non-aqueous titration). Then it is titrated with 0.1 N perchlorate solution. Potentiometer is used to confirm the end point. When the indicator (1 ml of crystal violet acetic acid) is used, the end point is the point where the color turns from red to blue and to green. Separately in the same method, the blank test is performed.

1 ml of 0.1 N perchlorate solution = 8.903 C₄H₄Na₂O₅.

95. Sodium Saccharin



Chemical Formula $C_7H_4O_3NSNa \cdot 2H_2O$

Molecular Weight 241.21

Compositional Specifications of Sodium Saccharin

Content Sodium Saccharin, when calculated on the dried basis, should contain within a range of 98.0~101.0% of soluble saccharin ($C_7H_4O_3NSNa = 205.17$).

Description Sodium Saccharin occurs as colorless to white crystals or crystalline powder. It has strong sweet taste in Sodium Saccharin solution.

Identification (1) Dissolve 0.5 mg of Sodium Saccharin in 10 ml of water, add 1 ml of diluted hydrochloric acid, allow to stand for 1 hour, filter the white crystalline precipitate formed, wash the residue on the filter paper thoroughly with water, dry at 105°C for 2 hours, and measure the melting point. It should be within a range of 226~230°C.

(2) To 20 mg of Sodium Saccharin, add 40 mg of resorcinol and 10 drops of sulfuric acid, and heat gently until the color of the mixture changes to dark green. After cooling, and dissolve in 10 ml of water and 10 ml of sodium hydroxide solution. The solution become to green fluorescence.

(3) Dissolve 0.1 g of Sodium Saccharin in 5 ml of sodium hydroxide solution, evaporate to dryness while gently heating. Careful to avoid being carbonized, and continue heating until the odor of ammonia no longer develops. Cool, dissolve in about 20 ml of water, neutralize with diluted hydrochloric acid, filter. and then add 1 drop of ferric chloride solution to the filtrate. The color is pink.

(4) Sodium Saccharin solution (1→10) responds to the test for Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : Dissolve each 1 g of Sodium Saccharin, previously powdered, in 1.5 ml of water and 70 ml of 95% alcohol, respectively, both solutions should be colorless and clear.

(2) Free Acid and Free Alkali : Weigh 1.0 g of Sodium Saccharin, dissolve in 10 ml

- of freshly boiled and cooled water, and add 1 drop of phenolphthalein solution. The color is not become to pink. Add 1 drop of 0.1 N sodium hydroxide. Color of Sodium Saccharin becomes to pink.
- (3) Benzoate and Salicylate : Weigh 0.5 g of Sodium Saccharin, dissolve in 10 ml of water, and add 5 drops of acetic acid and 3 drops of ferric chloride solution. No precipitate is formed, and no purple to red-purple color develops.
- (4) Arsenic : 1.25 g of Sodium Saccharin transfer into a 500 ml flask for decomposition. Add 10 ml of nitric acid and 5 ml of sulfuric acid and slowly heated. This is repeated until the liquid becomes colorless~pale yellow. After cooling, 10 ml of water and 15 ml of saturated ammonium hydroxide are added to the flask, which is then heated until white smoke is generated. After cooling, add water to make 25 ml. 5 ml of this test solution is tested by Arsenic Limit Test. Color standard is prepared using 5 ml of arsenic standard solution, 5 ml of sulfuric acid, and 10 ml of nitric acid in a flask for decomposition. The rest of the preparation should follow the procedure described for the test sample. The content should not be more than 4 ppm.
- (5) Lead : When 5.0 g of Sodium Saccharin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) o-Toluenesulfonamide : Weigh 40 g of Sodium Saccharin, dissolve in 200 ml of water. extract 3 times with 30 ml of ethyl acetate each time, combine all the ethyl acetate layers, wash with 30 ml of 25% sodium chloride solution, dehydrate to anhydrous sodium sulfate, and then evaporate the ethyl acetate. Dissolve the residue in 5 ml of solution of caffeine in ethyl acetate, test solution. Separately, measure 1.0 ml of a solution of o-toluenesulfonamide in ethyl acetate (1→1,000), remove the ethyl acetate while heating on a water bath, and dissolve the residue in 5 ml of a solution of caffeine in ethyl acetate (1→5,000), reference solution.

Procedure Perform Gas Chromatography on the test solution and the reference solution under the conditions given below. The ratio H/HS of the peak height of o-toluenesulfonamide (H) of the test solution to the peak height of caffeine (HS) does not more than the ratio H'/HS' of the peak height of o-toluenesulfonamide (H') of the reference solution to the peak height of caffeine (HS'). Specially, caffeine·ethyl acetate solution(1→5,000) is used as solution of internal standard.

Operation Conditions

- Column : Glass or stainless steel tube (length : 1 m, internal diameter: 3~4 mm)
- Column filler : To 177-250" diatomite for gas chromatography, add chloroform

containing 3% succinic acid diethylene glycol polyester and evaporate it

- Detector : Hydrogen flame ionization detector(FID)
- Column temperature : Constant temperature of 195~205°C
- Carrier gas and flow rate : N₂ and Adjust the column temperature and the flow rate of the carrier gas so that the caffeine peak appears after about 6 minutes.

(7) Selenium : 1 g of Sodium Saccharin is dissolved in 100 ml of water, and tested by Cold Vapor Type in Atomic Spectrophotometry. The absorbance should not be more than that of selenium standard solution (3 ml → 100 ml) (Not more than 30 ppm).

Loss on Drying When Sodium Saccharin is dried for 4 hours at 120°C, the weight loss should not be more than 15%.

Assay Dissolve 0.3 g of Sodium Saccharin, precisely dried and accurately weighed, in 20 ml of acetic acid (For non-aqueous titration), and titrate with 0.1 N perchloric acid (indicator: 2 drops of crystal violet-glacial acetic acid solution) until the color of the solution changes from purple through blue to green. Perform a blank test in the same manner.

1 ml of 0.1 N perchloric acid = 20.52 mg of C₇H₄O₃NSNa

96. Sodium Bisulfite

Definition Sodium Bisulfite is mixture of sodium bisulfite ($\text{NaHSO}_3 = 104.06$) and sodium pyrosulfite ($\text{Na}_2\text{S}_2\text{O}_5 = 190.11$).

Compositional Specifications of Sodium Bisulfite

Content Sodium Bisulfite should contain within a range of 58.5~67.4% as sulfur dioxide(SO_2).

Description Sodium Bisulfite is white powder. It has a odor of sulfur dioxide.

Identification Sodium Bisulfite responds to test of Bisulfite Salts and Sodium Salts in Identification.

Purity (1) Clarity and Color of Solution : When 0.5 g of Sodium Bisulfite is dissolved in 10 ml of water, the turbidity of the solution should be very low or less.

(2) Arsenic : When 2.5 g of Sodium Bisulfite is dissolved in water to make 25 ml of solution. Take 5 ml of this solution, add 1 ml of sulfuric acid, which is concentrated to approximately 2 ml by evaporation. The concentrate is diluted to 10 ml. Take 5 ml of the resulting solution, and test by Arsenic Limit Test, the content should not be more than 4 ppm.

(3) Lead : Accurately weigh 5.0 g of Sodium Bisulfite into a 150 ml beaker, add 30 ml of water. Add Hydrochloric acid in small portion to the solution until the solid is dissolved thoroughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to make 100 ml. Add Sodium Hydroxide Solution(1→4) or Hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

(4) Selenium : 2.0 g of Sodium Bisulfite, accurately weighed, transfer into a 50 ml beaker, add 10 ml of water and 5 ml of hydrochloric acid and boil to remove sulfur dioxide, Test Solution. Separately, 1.0 g of this solution is precisely weighed into a beaker, where 0.05 ml of selenium standard solution is added. Then a reference

solution is prepared by the same manner as for test solution. 2 g of hydrazin sulfate is added into each beaker, heated and dissolved. After setting for 5 minutes, the resulting solution is transferred into a Nestler cylinder with adding water to make 50 ml. The red color of this test solution should not be deeper than that of reference solution. (Not more than 5 ppm)

(5) Iron : When the test solution in (3) Purity is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 10 ppm.

(6) Mercury : When Sodium Bisulfite is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Assay Dissolve 0.2 g of Sodium Bisulfite, accurately weighed, in 50 ml of 0.1 N iodine solution into an Erlenmeyer flask with a stopper. Proceed as directed under Assay in [Sodium Sulfite].

$$1 \text{ ml of } 0.1 \text{ N iodine solution} = 3.203 \text{ mg SO}_2$$

97. Disodium Dihydrogen Pyrophosphate

Chemical Formula $\text{Na}_2\text{H}_2\text{P}_2\text{O}_7$

Molecular Weight 221.94

Compositional Specifications of Disodium Dihydrogen Pyrophosphate

Content Disodium Dihydrogen Pyrophosphate, when calculated on the dried basis, should contain not less than 95.0% of disodium dihydrogen pyrophosphate ($\text{Na}_2\text{H}_2\text{P}_2\text{O}_7$).

Description Disodium Dihydrogen Pyrophosphate occurs as a white crystalline powder or granular.

Identification (1) To 10 ml of Disodium Dihydrogen Pyrophosphate solution (1→100), add 1 ml of silver nitrate solution. A white precipitate is formed.

(2) Disodium Dihydrogen Pyrophosphate responds to the test for Sodium Salt in Identification.

Purity (1) Water Insoluble Substances : 5 g of Disodium Dihydrogen Pyrophosphate, accurately weighed, dissolve in 100 ml of hot water. Insoluble substances are separated by a glass filter (1G4) and washed with 30 ml of hot water. The glass filter is dried for 2 hours at 105°C. The amount of insoluble substances should not be more than 1.0%.

(2) pH : pH of Disodium Dihydrogen Pyrophosphate solution (1→100) should be within a range of 3.7~5.0.

(3) Arsenic : Dissolve 0.25 g of Disodium Dihydrogen Pyrophosphate in 5 ml of water and test by Arsenic Limit Test. Its content should not be more than 4 ppm.

(4) Lead : Disodium Dihydrogen Pyrophosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(5) Cadmium : Disodium Dihydrogen Pyrophosphate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(6) Mercury : When Disodium Dihydrogen Pyrophosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Fluoride : 1 g of Disodium Dihydrogen Pyrophosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When this additive is dried for 4 hours at 110°C, the weight loss should not be more than 5%.

Assay 400 mg of Disodium Dihydrogen Pyrophosphate, previously dried for 4 hours at 105°C and accurately weighed, dissolved in 100 ml of water. Its pH is adjusted 3.8, using a pH meter with hydrochloric acid. To this solution, 50 ml of zinc sulfate solution (1→8) [125 g of zinc sulfate (hepta hydrated) is dissolved in water to have a total volume of 1,000 ml and its pH is adjusted to 3.8 is added.] After 2 minutes, free acid is titrated with 0.1 N sodium hydroxide solution until pH becomes 3.8. Near the end point, the solution should be set-aside so that precipitated zinc hydroxide gets dissolved again.

1 ml of 0.1 N sodium hydroxide solution = 11.10 mg $\text{Na}_2\text{H}_2\text{P}_2\text{O}_7$

98. Zinc Oxide

Chemical Formula ZnO

Molecular Weight 81.38

Compositional Specifications of Zinc Oxide

Content After ignition, Zinc Oxide should contain not less than 99.0% of zinc oxide (ZnO).

Description Zinc Oxide is fine white scentless powder, and odorless.

Identification (1) Zinc Oxide is strong heated, become to yellow. After cooling, the color disappears.

(2) The solution, which Zinc Oxide dissolve in 3 N hydrochloric acid, responds to test of Zinc Salt in Identification.

Purity (1) Alkalinity : 2 g of Zinc Oxide is dispersed in 20 ml of water and boiled for 1 minute, which is then filtered. When 0.1 ml of phenolphthalein indicator solution is added, this solution should not become to red.

(2) Lead : Zinc Oxide is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 10 ppm.

(3) Cadmium : Zinc Oxide is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 3.0 ppm.

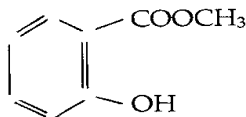
(4) Substances that do not precipitate by sulfate : Dissolve about 2 g of Zinc Oxide, accurately weighed, in 20 ml diluted acetic acid (1→4) and add water to make 200 ml. Zinc is completely precipitated by adding ammonium sulfide standard solution and the precipitates are filtered. First portion of the filtered solution is discarded. 100 ml from the later portion is then placed on a platinum dish, which was previously heat treated until the weight doesn't change. A few drops of sulfuric acid are added to this solution, which is then evaporated to dryness. It is then heat treated carefully at $800 \pm 25^\circ\text{C}$ until sublimes. After the weight becomes constant, the amount of residue not more than 5 mg.

Loss on Ignition 2 g of Zinc Oxide is precisely weighed and heat treated at $800 \pm 25^\circ\text{C}$ until the weight becomes constant, the residue should not be more than 1%.

Assay Dissolve about 1.5 g of Zinc Oxide, previously heat and accurately weigh, in 50 ml of 1 N sulfuric acid that contains 2.5 g of ammonium chloride (heated if necessary). The solution is then titrated with 1 N sodium hydroxide solution (indicator : methyl orange solution).

1 ml of 1 N Sulfuric Acid = 40.69 mg ZnO

99. Methyl Salicylate



Chemical Formula $C_8H_8O_3$

Molecular Weight 152.15

Compositional Specifications of Methyl Salicylate

Content Methyl Salicylate should contain not less than 98.0% of methyl salicylate ($C_8H_8O_3$).

Description Methyl Salicylate is a colorless to light yellow liquid, has a characteristic odor.

Identification 25 ml of alcoholic solution of potassium hydroxide is added to 1 ml of Methyl Salicylate. When it is heated in a water bath with a reflux condenser, a characteristic scent disappears. It is heated again in a water bath and cooled, where 75 ml of water is added. The resulting solution responds to test of salicylate salt (B) in Identification.

Purity (1) Specific Gravity : Specific gravity of Methyl Salicylate should be within a range of 1.180~1.185

(2) Refractive Index : Refractive index $[n]_D^{20}$ of Methyl Salicylate should be within a range of 1.535~1.538

(3) Clarity and Color of Solution : When 1 ml of Methyl Salicylate is dissolved in 7 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Methyl Salicylate is tested by Ester Value and Ester Contents in Flavoring Substance Test. It should not be more than 1. In this case, phenol red solution is used as an indicator.

Assay Accurately weigh about 0.9 g of Methyl Salicylate, and proceed as directed under Ester Content in Flavoring Substances Tests, using phenol red solution as the indicator.

1 ml of 0.05 N ethanolic potassium hydroxide = 76.08 mg of $C_8H_8O_3$

100. Iron Sesquioxide

Chemical Formula Fe_2O_3

Molecular Weight 159.69

Compositional Specifications of Iron Sesquioxide

Content Iron Sesquioxide should contain not less than 98.0% of iron sesquioxide (Fe_2O_3).

Description Iron Sesquioxide occurs as a red to yellow-brown powder.

Identification To 1 g of Iron Sesquioxide, add 3 ml of diluted hydrochloric acid (1→2), and dissolve by heating. The solution responds to the test for Ferric Salt in Identification.

Purity (1) Water Soluble Substances : To 5 g of Iron Sesquioxide, add 200 ml of water, and boil for 5 minutes. After cooling, add water to make 250 ml, and filter. Discard 50 ml of the initial filtrate, measure exactly 100 ml of the subsequent titrate, and evaporate to dryness on a water bath. Dry the residue at 105~110°C for 2 hours. The content should not be more than 15 mg.

(2) Arsenic : To 1 g of Iron Sesquioxide, add 30 ml of diluted hydrochloric acid (1→2) and 1 ml of nitric acid. dissolve while heating, evaporate to about 5 ml on a water bath, add 15 ml of water, filter. Wash the insoluble substance three times with 5 ml of hot water each time, combine the filtrate and the washings, add water to make 50 ml. Add 1 ml of sulfuric acid to this solution (25 ml), and evaporate until white fumes are no longer evolved. Add 10 ml of sulfurous acid, evaporate to about 2 ml, and add water to make 5 ml. Test this solution by Arsenic Limit Test. The content should not be more than 2 ppm.

(3) Lead : 1.0 g of Iron Sesquioxide is weighed and transferred into 50 ml flask. Add 10 ml of 9 N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid-sodium iodide solution and 5 ml of trioctyl phosphine oxide solution and shake it to mix for 30 seconds. Add keep it to separate the layer and again add water so that organic layer reaches to neck part of flask. After shaking to mix it, keep it to separate the layer. This organic solvent layer is used as test solution. Separately, take 10 ml of lead standard solution and make it precisely to 100 ml. Take 2 ml of this solution and transfer into 50 ml flask. And operate under condition as test solution method, this solution is used as reference solution. When it is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, absorbance(luminous intensity) of test solution should not be more than absorbance(luminous intensity) of reference solution.(not be more than 2.0 ppm.)

Ascorbic acid-sodium iodide solution : 10 g of ascorbic acid and 19.3 g sodium

iodide are dissolved in water to make to 100 ml.

Trioctyl phosphine oxide solution : 5 g of trioctyl phosphine oxide is dissolved in methyl isobutyl ketone to make to 100 ml.

Assay Accurately weigh about 1 g of Iron Sesquioxide, add 30 ml of hydrochloric acid, heat until the insoluble substance becomes almost white, and add water to make about 50 ml. Filter the solution, and wash the residue on the filter paper with about 50 ml of water. Combine the filtrate and the washings, add water to make exactly 250 ml. Measure exactly 25 ml of this solution, and evaporate to about 10 ml. Add 5% stannous chloride solution while heating until the solution becomes colorless, add 1~2 drops of 5% stannous chloride solution, and cool rapidly. Add 10 ml of mercuric chloride saturated solution all at once, add 25~30 ml of manganese sulfate solution and about 100 ml of water, and titrate with 0.1 N potassium permanganate. Perform a blank test in the same manner, and make any necessary correction.

1 ml of 0.1 N potassium permanganate = 7.985 mg of Fe_2O_3

101. Sorbitan Esters of Fatty Acids

Compositional Specifications of Sorbitan Esters of Fatty Acids

Description Sorbitan Esters of Fatty Acids is white~yellowish brown powders, flakes, granular, waxy lumps or liquid.

Identification (1) Dissolve 0.5 g of Sorbitan Esters of Fatty Acids in 5 ml of anhydrous ethanol while heating, add 5 ml of diluted sulfuric acid, heat in a water bath for 30 minutes, and cool. Oil drops or a white to yellowish white solid is deposited. Separate the oil drops or the solid, add 5 ml of ether, and shake. It dissolves.

(2) Take 2 ml of the remaining solution after the separation of the oil drops or the solid in (1) above, add 2 ml of freshly prepared catechol solution (1→20), shake, add 5 ml of sulfuric acid, and shake. A pink to red-brown color develops.

Purity (1) Acid Value : Approximately 5 g of Sorbitan Esters of Fatty Acids is precisely weighed and dissolved in 100 ml of 1:1 mixture of alcohol and ether by heating for the test solution. This test solution is proceeded as directed under Acid Value in Fats Test. The acid value should not be more than 10.

(2) Arsenic : 0.25 g of Sorbitan Esters of Fatty Acids transfer into a platinum, quartz, or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

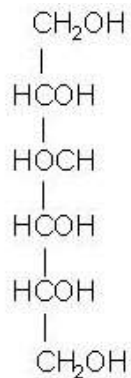
(3) Lead : When 5.0 g of Sorbitan Esters of Fatty Acids is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Polyoxyethylene : Weigh 1 g of Sorbitan Esters of Fatty Acids, add 20 ml of water, shake well while warming, and cool. Add 10 ml of ammonium thiocyanate-cobalt nitrate solution, shake well, add 10 ml of chloroform, shake again, and allow to stand. The color of the chloroform layer does not change to blue.

Residue on Ignition When thermogravimetric analysis is done with 2 g of Sorbitan Esters of Fatty Acids, the residue should not be more than 1.5%.

102. D-Sorbitol

D-Glucitol



Chemical Formula $\text{C}_6\text{H}_{11}\text{O}_6$

Molecular Weight 182.18

Compositional Specifications of D-Sorbitol

Content D-Sorbitol, when calculated on the dried basis, should contain within a range of 97.0~101.0% of D-sorbitol ($\text{C}_6\text{H}_{11}\text{O}_6$).

Description D-Sorbitol occurs as white granules, powder, or crystalline solid. It is odorless and has a cool, sweet taste.

Identification (1) Liquid : To 1 ml of D-Sorbitol solution (7→10), add 2 ml of ferrous sulfate solution and 1 ml of sodium hydroxide solution (1→5). The color of the solution changes to blue-green, but no turbidity appears.

(2) To 1 ml of D-Sorbitol solution (1→100), add 1 ml of freshly prepared catechol solution (1→10), shake well, add 2 ml of sulfuric acid, and shake. A red color develops immediately.

Purity (1) Free acid : 5 g of D-Sorbitol dissolve in 50 ml of freshly boiled and cooled water, add 1 drop of phenolphthalein solution and 0.5 ml of 0.01 N sodium hydroxide, and shake. The color of the solution changes to red color that persists for not less than 30 seconds.

(2) Arsenic : When 0.25 g of D-Sorbitol is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(3) Lead : When 5.0 g of D-Sorbitol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Nickel : When 5.0 g of D-Sorbitol is tested by Atomic Absorption

Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

- (5) Chloride : Weigh 10 g of D-Sorbitol and proceed as directed under chloride, and its content should not be more than the amount that corresponds to 1.5 ml of 0.01 N hydrochloric acid. (not more than 0.005%).
- (6) Sulphate : When 10 g of D-Sorbitol is tested for sulphate, its content should not be more than the amount that corresponds to 2.0 ml of 0.01 N sulfuric acid (not more than 0.01%).
- (7) Saccharide : 10 g of D-Sorbitol dissolve in 25 ml of water, add 8 ml of dilute hydrochloric acid, attach a reflux condenser, heat for 3 hours in a water bath, and cool. The solution is neutralized with sodium hydroxide using methyl orange as an indicator. Bring the total volume of the solution to 100 ml with water, add 10 ml of water and 40 ml of Fehling's solution to 10 ml of the solution, boil gently for 3 minutes, allow to stand to form a precipitate of cuprous oxide, and filter the supernatant through a glass filter. Add immediately hot water to the precipitate in the flask, wash, filter through the above glass filter, and discard the washings. Repeat the procedure until the washings are no longer alkaline. Immediately dissolve the precipitate in the flask in 20 ml of ferric sulfate solution, filter through the above glass filter, wash with water, combine the filtrate and the washings, heat to 80°C and add 20 ml of 0.1 N potassium permanganate. The color of the solution should not disappear immediately.
- (8) Reducing sugar : 1 g of D-Sorbitol dissolve in 25 ml of water, add 40 ml of Fehling's solution, boil gently for 3 minutes, follow the procedure in (7) Purity. In this case, 2 ml of 0.1 N potassium permanganate solution is used.

Loss on Drying When D-Sorbitol is dried for 3 hours at 80°C, the weight loss should not be more than 3%.

Residue on Ignition When thermogravimetric analysis is done with 5 g of D-Sorbitol, the residue should not be more than 0.02%.

Assay Dissolve 1 g of D-Sorbitol, precisely dried and accurately weighed, in water and then add water to make 500 ml. To 10 ml of test solution, add 50 ml of 0.3% potassium periodate solution and 1 ml of sulfuric acid is heated for 15 minutes in a water bath. After cooling, 2.5 g of potassium iodide is added to the solution, which is set-aside in a cold dark place for 5 minutes. Isolated iodine is titrated with 0.1 N sodium thiosulfate solution (indicator : starch solution). Separately, a blank test is carried out.

1 ml of 0.1 N Sodium thiosulfate solution = 1.822 mg $\text{C}_6\text{H}_{11}\text{O}_6$

103. D-Sorbitol Solution

Compositional Specifications of D-Sorbitol Solution

Content D-Sorbitol Solution should contain within a range of 67.0~73.0% of D-Sorbitol ($C_6H_{14}O_6 = 182.18$).

Description D-Sorbitol Solution is colorless transparent syrup-like liquid. Upon cooling, it may precipitate colorless crystals. It is scentless and has sweet flavor.

Identification Proceed as directed under Identification in [D-Sorbitol].

Purity (1) Specific Gravity : Specific gravity of D-Sorbitol Solution should not be less than 1.285.

(2) Free Acid : 5 g of D-Sorbitol Solution dissolve in 50 ml of freshly boiled and cooled water, add 1 drop of phenolphthalein solution and 0.5 ml of 0.01 N sodium hydroxide, and shake. The color of the solution changes to red color that persists for not less than 30 seconds.

(3) Arsenic : When 0.25 g of D-Sorbitol is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4ppm.

(4) Lead : When 5.0 g of D-Sorbitol Solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(5) Nickel : When 5.0 g of D-Sorbitol Solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(6) Saccharide : 10 g of D-Sorbitol Solution dissolve in 25 ml of water, add 8 ml of dilute hydrochloric acid, attach a reflux condenser, heat for 3 hours in a water bath, and cool. The solution is neutralized with sodium hydroxide using methyl orange as an indicator. Add water to make 100 ml. Take 10 ml of this solution, add 10 ml water and 40 ml of Fehling's solution, boil gently for 3 minutes, allow to stand to form a precipitate of cuprous oxide, and filter the supernatant through a glass filter. Add immediately hot water to the precipitate in the flask, wash, filter through the above glass filter, and discard the washings. Repeat the procedure until the washings are no longer alkaline. Dissolve the precipitate in the flask in 20 ml of ferric sulfate solution, filter through the above glass filter, wash with water, combine the filtrate and the washings, heat to 80°C and add 20 ml of 0.1 N potassium permanganate. The color of the solution should not disappear immediately

(7) Reducing Sugar : 1 g of D-Sorbitol Solution dissolve in 25 ml of water, add 40 ml of Fehling's solution, boil gently for 3 minutes, follow the procedure in (6)

Purity. Saccharide. In this case, 2 ml of 0.1 N potassium permanganate solution is used.

Residue on Ignition To 5 g of D-Sorbitol Solution, add 2~3 drops of sulfuric acid and slowly boiled by heating and ignited to ash. After thermogravimetric analysis with the residue, the amount of the final residue should not be more than 1 mg.

Assay Accurately weigh about 1 g of D-Sorbitol Solution, dissolve in water to make 500 ml. Proceed as directed under Assay in [D-Sorbitol].

104. Sorbic Acid



Chemical Formula $\text{C}_6\text{H}_8\text{O}_2$

Molecular Weight 112.13

Compositional Specifications of Sorbic Acid

Content Sorbic Acid, when calculated on the anhydrous basis, should contain within a range of 99.0~101.0% of sorbic acid ($\text{C}_6\text{H}_8\text{O}_2$).

Description Sorbic Acid occurs as colorless needles or as a white crystalline powder. It is odorless or has a slight, characteristic odor.

Identification (1) To 0.1 g of Sorbic Acid, 10 ml of water is added. The suspension solution is acidic.

(2) To 1 ml solution of Sorbic Acid in acetone (1→100), add 1 ml of water and 2 drops of bromine solution and mix. The color of the solution disappears immediately.

Purity (1) Melting Point : Melting point of Sorbic Acid should be within a range of 132~135°C

(2) Liquid Characteristics : When 0.2 g of Sorbic acid is dissolved in 5 ml of acetone, the color should not be deeper than that of Colorimetric Standard Solution C.

(3) Chloride : Weigh 1.5 g of Sorbic Acid, add 120 ml of water, and dissolve while boiling. Cool, add water to make 120 ml, and filter. Measure 40 ml of the filtrate, add 6 ml diluted nitric acid, and use as the test solution. Test by Chloride Limit Test content should not be more than correspond to 0.2 ml of 0.01 N hydrochloric acid.

(4) Sulfate : Take 40 ml of the test solution prepared in (3) above, add 1 ml of diluted hydrochloric acid. Test by Sulfate Limit Test content should not be more than correspond to 5 ml of 0.01 N sulfuric acid

(5) Arsenic : 0.25 g of Sorbic Acid transfer into platinum, quartz or porcelain crucible, add 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(6) Lead : When 5.0 g of Sorbic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content

should not be more than 2.0 ppm.

(7) Mercury : When Sorbic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(8) Aldehyde : To 3.0g of Sorbic Acid, add 450 ml of water, and adjust the pH of this solution to 4 using diluted Hydrochloric acid(1 → 12). Add water to make 500 ml and filter it, test solution. Separately, add water to 2.5ml of 40% formaldehyde solution to make 1,000ml. Accurately pipet 3 ml of this solution and add water to make 500 ml, reference solution. To 5 ml of each of test solution and reference solution, add 2.5 ml of fuchsin sulfurous acid test solution. Then allow the solution to stand for 15~30 minutes. The color of test solution should not be more intense than that of reference solution. (not more than 0.1% as formaldehyde).

Water Content 2 g of Sorbic Acid is tested by Water Content Determination Method (Karl-Fischer Method). The water content should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of Sorbic Acid, the residue should not be more than 0.2%.

Assay Accurately weigh about 1 g of Sorbic Acid, dissolve in neutralized ethanol to make exactly 100 ml, measure exactly 25 ml of this solution, and titrate with 0.1 N sodium hydroxide (indicator : 2~3 drops of phenolphthalein solution).

1 ml of 0.1 N sodium hydroxide = 11.21 mg of $C_6H_8O_2$

105. Potassium Sorbate



Chemical Formula $\text{C}_6\text{H}_7\text{O}_2\text{K}$

Molecular Weight 150.22

Compositional Specifications of Potassium Sorbate

Content Potassium Sorbate, when calculated on the dried basis, should contain within a range of 98.0~101.0% of Potassium Sorbate ($\text{C}_6\text{H}_7\text{O}_2\text{K}$).

Description Potassium Sorbate occurs as white to light yellow-brown-flaky crystals, crystalline powder or granules. It is odorless or has a slight odor.

Identification (1) To 1 ml of Potassium Sorbate solution (1→100), add 1 ml of acetone. Add drop wise diluted hydrochloric acid to make the solution slightly acidic, add 2 drops of bromine solution, and shake. The color of the solution disappears immediately.

(2) Potassium Sorbate responds to test of Potassium Salt in Identification.

Purity (1) Clarity and Color of Solution : When 0.2 g of Potassium Sorbate is dissolved in 5 ml of water, the color of the solution should not be darker than the Color Standard Solution F.

(2) Free Alkali : 1.0 g of Potassium Sorbate dissolve in 20 ml of freshly boiled and cooled water, and add 2 drops of phenolphthalein solution. Even if a red color develops, the color disappears on addition of 0.4 ml of 0.1 N sulfuric acid.

(3) Chloride : 1.0 g of Potassium Sorbate dissolve in about 30 ml of water, and add 11 ml of diluted nitric acid while shaking well. Filter, wash with water, combine the filtrate and the washings. Its content should not be more than the amount that correspond to 0.5 ml of 0.01 N hydrochloric acid.

(4) Sulfate : 0.5 g of Potassium Sorbate dissolve in about 30 ml of water, and add 3 ml of diluted hydrochloric acid while shaking well. Filter, wash with water, combine the filtrate and the washings. Its content should not be more than the amount that correspond to 0.4 ml of 0.01 N sulfuric acid.

(5) Arsenic : 0.25 g of Potassium Sorbate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test. Its content should not be more than 4 ppm.

(6) Lead : When 5.0 g of Potassium Sorbate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(7) Mercury : When Potassium Sorbate is tested by Mercury Limit Test, its content

should not be more than 1.0 ppm.

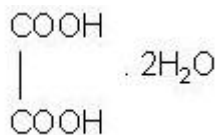
- (8) Aldehyde : To 3.0g of Potassium Sorbate, add 450 ml of water, adjust pH of this solution to 4 using hydrochloric acid. Then water is added to make 500 ml and filtered, test solution. Separately, water is added to 2.5ml of 40% formaldehyde solution to make 1,000ml. 3 ml of this solution is precisely measured and water is added to make 500 ml, reference solution. To 5 ml of each of test solution and reference solution, 2.5 ml of puccine sulfite solution is added. Then set aside the solution for 15~30 minutes. The color of test solution should not be deeper than that of reference solution. (not more than 0.1% as formaldehyde).

Loss on Drying When Potassium Sorbate is dried for 3 hours at 105°C, the weight loss should not be more than 1%.

Assay Accurately weigh about 0.3 g of Potassium Sorbate, previously dried, add 50 ml of acetic acid for nonaqueous titration, and titrate with 0.1 N perchloric acid (indicator: 10 drops of α -naphtholbenzein solution) until the brown color of the solution changes to green.

1 ml of 0.1 N perchloric acid = 15.02 mg of $C_6H_7O_2K$

106. Oxalic Acid



Chemical Formula $\text{C}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$

Molecular Weight 126.07

Compositional Specifications of Oxalic Acid

Content Oxalic acid should contain within a range of 99.5~101.0% of oxalic acid ($\text{C}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$).

Description Oxalic acid occurs as colorless crystals. It is odorless.

Identification (1) Oxalic Acid is sublimed by heating.

(2) To 1 ml of Oxalic Acid solution (1→10) add 2 drops of sulfuric acid and 1 ml of potassium permanganate solution, and heat. The color of the solution disappears.

(3) Make Oxalic Acid solution (1→10) alkaline with ammonia solution and add 1 ml of calcium chloride solution. A white precipitate is formed.

Purity (1) Clarity and Color of Solution : When 1 g of Oxalic Acid is dissolved in 20 ml of water by boiling, the solution should be colorless and almost clear.

(2) Sulfate : To 1.0 g of Oxalic Acid, add 20 ml of water and 1 ml of anhydrous sodium carbonate solution, evaporate to dryness in a water bath, heat gradually, and heat treated to 600~700°C. To the residue, add 10 ml of water and 0.5 ml of nitric acid, boil, add 2 ml of hydrochloric acid, and evaporate to dryness on a water bath. Add water to the residue to make 100 ml. and filter. Measure 25 ml of the filtrate, add 1 ml diluted hydrochloric acid, and use as the test solution. Test by Sulfate Limit Test content. Its content should correspond to 0.4 ml of 0.01 N sulfuric acid.

(3) Arsenic : When 0.25 g of Oxalic Acid is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Oxalic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Residue on Ignition When thermogravimetric analysis is done with 1 g of Oxalic Acid, the residue should not be more than 0.3%.

Assay Accurately weigh about 1 g of Oxalic Acid, dissolve in water to make 250 ml, measure accurately 50 ml, add 3 ml of sulfuric acid, warm to about 80°C, and titrate with 0.1 N potassium permanganate while hot.

1 ml of 0.1 N potassium permanganate = 6.304 mg of $\text{C}_2\text{H}_2\text{O}_4 \cdot \text{H}_2\text{O}$

107. Sodium Hydroxide

Chemical Formula NaOH

Molecular Weight 40.00

Definition Sodium Hydroxide occurs as crystals called Sodium Hydroxide (crystal) and as Anhydrous called Sodium Hydroxide (Anhydrous). Sodium Hydroxide (crystal) is a mixture of sodium hydroxide (NaOH) and sodium hydroxide hydrated ($\text{NaOH} \cdot \text{H}_2\text{O}$).

Compositional Specifications of Sodium Hydroxide

Content Sodium Hydroxide (crystal) should contain within a range of 70.0~75.0% of sodium hydroxide (NaOH). Sodium Hydroxide (Anhydrous) should contain not less than 95.0% of sodium hydroxide (NaOH).

Description Sodium Hydroxide (crystal) occurs as white crystalline powder or granules. Sodium Hydroxide (Anhydrous) occurs as white lumps having various shapes including pellets, flakes, and rods, or as a white powder.

Identification (1) Sodium Hydroxide solution (1→50) is strongly alkaline.

(2) Sodium Hydroxide solution (1→25) responds to the test for Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : 50 g of Sodium Hydroxide dissolve in freshly boiled and cooled water to make 250 ml. When 5 ml of this test solution is mixed with 20 ml of water, the solution should not be more than colorless and almost clear.

(2) Sodium Carbonate : The content of Sodium Carbonate (Na_2CO_3) obtained in Assay is not more than 2%.

(3) Arsenic : To 1.3 ml of the test solution prepared in (1) above, add 5 ml of water, and neutralize by gradually adding hydrochloric acid. The content should not be more than 4 ppm

(4) Lead : Accurately weigh 5.0 g of Sodium Hydroxide into a 150 ml beaker, and dissolved in 100 ml of water. Add hydrochloric acid in small portion to the solution until the solid is dissolved throughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to bring the total volume to 100 ml. Add Sodium Hydroxide solution(1→4) or hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of nitric acid to the residue and heat it until

nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 0.5 ppm.

2% APDC Solution : 2.0 g of ammonium pyrrolidine dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

(5) Mercury : Take 10 ml of the test solution prepared in (1) above, add 1ml of potassium permanganate solution (3→50) and about 30 ml of water, and shake. Neutralize by gradually adding purified hydrochloric acid, add 5 ml of diluted sulfuric acid (1→2). and cool. Procedure add hydroxylamine hydrochloride solution (1→5) until the purple color of the potassium permanganate in the test solution disappears and the precipitate of manganese dioxide dissolves, add water to make 100 ml, and transfer into the gas washing bottle of an atomic absorption spectrophotometer. Add 10 ml of stannous chloride solution, immediately connect with the atomic absorption spectrophotometer. and start the diaphragm pump to circulate the air. When the recorder reading increases rapidly and then it indicates a constant value, measure the absorbance. The absorbance is not more than that of the following solution. Measure 2.0 ml of Mercury Standard Solution, add 1 ml of potassium permanganate solution (3→50), 30 ml of water, and the same amount of purified hydrochloric acid as that used for preparing the test solution, and proceed in the same manner as the test solution. The content should not be more than 0.1 ppm as Hg.

Assay Accurately weigh about 50 g of Sodium Hydroxide, add freshly boiled and cooled water to make 1,000 ml. Use this solution as the test solution. Take 25 ml of the test solution, add 10 ml of freshly boiled and cooled water, and titrate with 1 N hydrochloric acid (indicator : 1 ml of bromophenol blue solution). After neutralizing, add about 1 ml of 1 N hydrochloric acid, and boil for about 5 minutes. Cool, titrate the excess acid with 0.1 N sodium hydroxide, and determine the volume (A ml) of consumed 1 N hydrochloric acid. Separately, measure exactly 25 ml of the test solution, transfer into a flask with a ground-glass stopper, and add 25 ml of freshly boiled and cooled water. To the solution. add 10 ml of barium chloride solution. stopper, shake gently, and titrate with 1 N hydrochloric acid (indicator: 1 ml of phenolphthalein solution). Let (B ml) be the consumed volume.

$$\text{Content of sodium hydroxide (NaOH) (\%)} = \frac{0.0400 (g) \times B \times 40}{\text{Weight of the sample (g)}} \times 100$$

$$\text{Content of sodium carbonate (Na}_2\text{CO}_3\text{) (\%)} = \frac{0.0530 (g) \times (A - B) \times 40}{\text{Weight of the sample (g)}} \times 100$$

108. Sodium Hydroxide Solution

Compositional Specifications of Sodium Hydroxide Solution

Content Sodium Hydroxide Solution should contain within a range of 95.0~120% of the declared content of sodium hydroxide ($\text{NaOH} = 40.00$).

Description Sodium Hydroxide Solution is a colorless or slightly colored liquid.

Identification (1) Sodium Hydroxide Solution (1→50) is strongly alkaline.

(2) Sodium Hydroxide Solution (4% as NaOH) responds to test of Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : Test solution to Sodium Hydroxide Solution, add freshly boiled and cooled water to prepare 20% w/v solution of NaOH , calculating from the indicated amount. When 5 ml of this test solution is mixed with 20 ml of water, the solution should not be more than colorless and almost clear.

(2) Sodium Carbonate : Proceed as directed under Purity (2) in [Sodium Hydroxide]

(3) Arsenic : To 1.3 ml of the test solution prepared in (1) Purity above, add 5 ml of water, and neutralize by gradually adding hydrochloric acid test solution. When this solution is tested by Arsenic Limit Test, the content should not be more than 4.0 ppm

(4) Lead : Sodium Hydroxide Solution is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(5) Mercury : When Sodium Hydroxide Solution is tested by Mercury Limit Test, its content should not be more than 0.1 ppm.

Assay Accurately weigh about Sodium Hydroxide Solution corresponding to about 5 g of sodium hydroxide (NaOH). Add freshly boiled and cooled water to make exactly 100 ml, and use this solution as the test solution. Take 25 ml of the test solution, and proceed as directed under Assay in [Sodium Hydroxide]. However, the number 40 in the equation is replaced with 4.

109. Potassium Hydroxide

Chemical Formula KOH

Molecular Weight 56.11

Compositional Specifications of Potassium Hydroxide

Content Potassium Hydroxide should contain not less than 85.0% of Potassium Hydroxide (KOH).

Description Potassium Hydroxide occurs as white having various shapes including small spheres, pellets, flakes, and rods, and lumps.

Identification (1) Potassium Hydroxide solution in water (1→50) is strongly alkaline.

(2) Potassium Hydroxide solution in water (1→25) responds to test of Potassium Salt in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Potassium Hydroxide is dissolved in 20 ml of water, the solution should be colorless and clear.

(2) Potassium Carbonate : The content of potassium Carbonate (K_2CO_3) obtained in Assay is not more than 3.5%.

(3) Arsenic : To 0.25 g of Potassium Hydroxide, add 5 ml of water, and neutralize by gradually adding hydrochloric acid. The content should not be more than 4.0 ppm.

(4) Heavy Metals : 1 g of Potassium Hydroxide dissolve in 5 ml of water, which is neutralized by slowly adding hydrochloric acid or dilute hydrochloric acid. Add 2 ml of dilute acetic acid and water to make 50 ml, Test Solution. This Test Solution is tested by Heavy Metal Limit Test and its content should not be more than 30 ppm.

(5) Lead : 0.8 g of Potassium Hydroxide dissolve in 5 ml of water, and add 9 ml of dilute hydrochloric acid and cool add water to make 50 ml, Test Solution. It is tested for lead (Dithizone Method) and its content should not be more than 10 ppm.

(6) Mercury : Dissolve 2 g of Potassium Hydroxide in 10 ml of water, add 1 ml of the potassium permanganate solution (3→50) and about 30 ml of water, and shake well. Neutralize by gradually adding purified hydrochloric acid, add 5 ml of diluted sulfuric acid (1→2), and cool. Use this solution as the test solution. Add hydroxylamine hydrochloride solution (1→5) until the purple color of the permanganate in the test solution disappears and the precipitate of the manganese dioxide dissolves, add water to make 100 ml, and transfer into the gas washing bottle of an atomic absorption spectrophotometer. Add 10 ml of stannous chloride solution, immediately connect with the atomic absorption spectrophotometer, and

start the diaphragm pump to circulate the air. When the recorder reading increases rapidly and then it indicates a constant value, measure the absorbance. The absorbance of test solution should not be higher than that of the following solution: Take 2.0 ml of Mercury Standard Solution, add 1 ml of potassium permanganate solution (3→50), 30 ml of water, and the same amount of purified hydrochloric acid as that used for preparing the test solution, and process in the same manner as the test solution not more than 0.1 ppm.

Assay Accurately weigh about 50 g of Potassium Hydroxide, and dissolve in freshly boiled and cooled water to make 1,000 ml. Use this solution as the test solution. Take 25 ml of the test solution, add 10 ml of freshly boiled and cooled water, and titrate with 1 N hydrochloric acid (indicator : 1 ml of bromophenol blue solution). After neutralizing, add about 1 ml of 1 N hydrochloric acid, and boil for about 5 minutes. Cool, titrate the excess acid with 0.1 N sodium hydroxide, and determine the volume (A ml) of consumed 1 N hydrochloric acid. Separately, measure exactly 25 ml of the test solution, transfer into a flask with a ground stopper, and add 25 ml of freshly boiled and cooled water. To the solution, add 10 ml of the barium chloride solution, stopper, shake gently, and titrate with 1 N hydrochloric acid (indicator : 1 ml of phenolphthalein solution). Let (B ml) be the consumed volume.

$$\text{Content of potassium hydroxide (KOH) (\%)} = \frac{0.0561(g) \times B \times 40}{\text{Weight of the sample (g)}} \times 100$$

$$\text{Content of potassium carbonate (K}_2\text{CO}_3\text{)(\%)} = \frac{0.0691(g) \times (A - B) \times 40}{\text{Weight of the sample (g)}} \times 100$$

110. Calcium Hydroxide

Chemical Formula Ca(OH)_2

Molecular Weight 74.10

Compositional Specifications of Calcium Hydroxide

Content Calcium Hydroxide should contain not less than 95.0% of calcium hydroxide (Ca(OH)_2).

Description Calcium Hydroxide occurs as a white powder.

Identification (1) To Calcium Hydroxide, add 3~4 times the amount of calcium hydroxide with water. The mixture becomes muddy and alkaline.

(2) To 1 g of Calcium Hydroxide, add 20 ml of water and 6 ml of diluted acetic acid and dissolve. The solution responds to test of Calcium Salt in Identification.

Purity (1) Hydrochloric Acid-Insoluble Substances : 2 g of Calcium Hydroxide is dissolved in 10 ml of hydrochloric acid and 20 ml of water, and boil. After cooling, filter through a filter paper for quantitative analysis, wash the residue on the filter paper with boiling water until the washings no longer respond to the test by Chloride Limit Test. Incinerate together with the filter paper and weigh the residue. The amount of residue should not be more than 10 mg.

(2) Carbonate : To 2 g of Calcium Hydroxide, add 50 ml of water, shake well, and add 25 ml of diluted hydrochloric acid. No remarkable bubbles should occur.

(3) Arsenic : When 0.25 g of Calcium Hydroxide is dissolved in 5 ml of diluted hydrochloric acid (1→2) and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : Calcium Hydroxide is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(5) Fluoride : 1 g of Calcium Hydroxide is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 50 ppm.

(6) Alkali Metals and Magnesium : 0.5 g of Calcium Hydroxide dissolve in 30 ml of 1N hydrochloric acid by heating in a water bath, if necessary. Neutralize with ammonia solution, add 30 ml of ammonium oxalate, and boil for 1 hour in a water bath. After cooling, add water to make total volume to 100 ml, mix well by stirring, and filter. Add 0.5 ml of sulfuric acid to 50 ml of the filtrate, evaporate to dryness, and heat treat until weight becomes constant. The amount of residue should not be more than 12 mg.

(7) Barium : 1.5 g of Calcium Hydroxide dissolve in 15 ml of dilute hydrochloric acid, add water to make 30 ml, and filter. Take 20 ml of the filtrate, using this solution

as the test solution, add 2 g of sodium acetate, 1 ml of diluted acetic acid, and 0.5 ml of potassium chromate solution. After setting it aside for 15 minute, its turbidity should not be more than the that of the solution which is made in the same manner, to 0.3 ml of Barium standard solution, water is added to make 20 ml(not more than 0.03%).

Assay Approximately 2 g of Calcium Hydroxide is precisely weighed and dissolved in 30 ml of dilute hydrochloric, which is diluted to 250 ml with water. To 10 ml of this solution, add 15 ml of sodium hydroxide solution (1→10), 3 ml of potassium cyanide solution (1→20), and 100 ml of water, which is set-aside for approximately 1 minute. 0.1 g of 2-oxy-1-(2'-oxy-4'-sulfo-1-naphtyl azo)-3- naphthoic acid, which is immediately titrated with 0.05 M EDTA solution. At the end point, the red color completely disappears and the solution turns blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA solution} = 3.705 \text{ mg Ca(OH)}_2$$

111. Annatto, Water-soluble

Definition Annatto, Water-soluble is prepared from the red pericarpitate of the seed of the annatto tree (*Bixa orellana* L (Bixaceae)) by hydrolysis. The coloring principle is the potassium or sodium salt of the norbixin.

Compositional Specifications of Annatto, Water-soluble

Content Annatto, Water-soluble should contain within a range of 100.0~125.0% of the declared amount of norbixin ($C_{24}H_{28}O_4=380.49$)

Description Annatto, Water-soluble occurs as red-brown to brown powder, lumps, liquid, or pasty substances, having a slight, characteristic odor.

Identification (1) Dilute Annatto, Water-soluble in 0.1 N sodium hydroxide solution until the color of the solution becomes almost the same as that of potassium dichromate solution (1→1,000). Add 2 ml of diluted sulfuric acid to 50 ml of this solution, mix, add 10 ml of benzene, and extract by shaking well. Wash this extract three times with 5 ml of water each time. Perform the following tests, using this solution as the test solution.

(A) Extract 5 ml of the test solution, using 5 ml of 0.01 N sodium hydroxide solution each time until the sodium hydroxide solution is not colored. Combine the extracts and add 0.01 N sodium hydroxide solution to make 50 ml. The solution exhibits absorbance maxima at wavelengths of 454 ± 2 nm and 482 ± 2 nm.

(B) Transfer a suspension of aluminum for vitamin A determination in benzene to a glass tube to make an alumina layer about 5 cm high, and keep the alumina layer constantly immersed in benzene. Place small pieces of filter paper on the top of the alumina layer, pour 10 ml of benzene and adjust the rate of the flow so that the benzene drops at a rate of about 30 drops per minute. When the level of the benzene becomes about 1 cm above the upper end of the alumina layer, put 3 ml of the test solution into the column. Add 5 ml of chloroform while the level of the test solution remains slightly in the upper part of the alumina layer. In the same manner, add twice 5 ml of chloroform each time, and add 2 ml of antimony trichloride solution. The yellow~orange color of the adsorption band in the upper part of the alumina layer slowly changes to blue~green.

(2) To 1 g of Annatto, Water-soluble, add 50 ml of water, shake, and filter. Add 2 ml of diluted hydrochloric acid to the filtrate. A red-brown to yellow-brown precipitate is formed.

Purity (1) Absorption Ratio : Proceed as directed under (A) in Identification (1). The absorbance ratio between the maximum absorption band at 482 ± 2 nm and 454 ± 2

nm should be within a range of 1.18 ± 0.07 .

- (2) Arsenic : 1 g of Annatto, Water-soluble is tested by Arsenic Limit Test in Coloring Matter Tests. The content should not be more than 4 ppm.
- (3) Lead : When 5.0 g of Annatto, Water-soluble is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (4) Cadmium : When 5.0g of Annatto, Water-soluble is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (5) Mercury : When Annatto, Water-soluble is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (6) Free Alkali : To 10 g of Annatto, Water-soluble add 100 ml of water and 8 ml of 1 N hydrochloric acid, shake, and mix it. Allow the solution to stand for 30 minutes and filter it. The pH of the solution should be not more than 7.0.

Assay Accurately weigh 0.1~1 g of Annatto, Water-soluble, add 0.01 N sodium hydroxide to make exactly 100 ml, and mix thoroughly. Take 1 ml of this solution, transfer into a separating funnel, and add 10 ml of sodium chloride (1→10) and water to make 50 ml. Add 2 ml of diluted sulfuric acid, and mix thoroughly. Repeat the extraction procedure, using 10 ml of benzene each time, until the extract is not colored. Combine the extracts, wash three times with 5 ml of water each time, allow to stand for a while, and completely remove the water layer. Transfer the extract into another separating funnel, and wash the previous separating funnel three times with 2 ml of benzene each time. Combine the washings with the benzene extract. Add an equal amount of petroleum benzine to the extract, mix, repeat the extraction procedure, using 5 ml of 0.01 N sodium hydroxide each time, until the 0.01 N sodium hydroxide is not colored, combine the extracts, and add 0.01 N sodium hydroxide to make exactly 100 ml. Measure absorbance A of this solution at a wavelength of 454 nm, and calculate the content of norbixin by the following formula

$$\text{Content (\%)} = \frac{A}{3,473} \times \frac{100,000}{\text{Weight of sample (mg)}} \times 100$$

112. Magnesium Stearate

Definition Magnesium Stearate is a mixture of magnesium stearate and palmitate.

Compositional Specifications of Magnesium Stearate

Content Quantitatively, Magnesium Stearate, when calculated, should contain within a range of 6.8~8.3% of magnesium oxide (MgO).

Description Magnesium Stearate is light powder with white color and unique slight scent.

Identification (1) To 1 g of Magnesium Stearate, add Hydrochloric acid (1→6) and heat, cool. After settling, liquid is separated into two layers. Upper layer is fatty acid and lower aqueous layer responds to test of Magnesium Salts in Identification.

(2) To 25 g of Magnesium Stearate, add 200 ml of hot water and 60 ml of dilute sulfuric acid and heat by stirring until clear supernatant is separated. Sulfate ions are completely washed away from this supernatant with water. This is heated in a water bath until water is separated so that the fatty acid becomes clear. After settling, aqueous layer is discarded. Fatty acid is melted by heating, which is then filtered. It is then dried for 20 minutes at 105°C. Solidification temperature of the fatty acid should not be less than 54°C.

Purity (1) Lead : When 5.0 g of Magnesium Stearate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(2) Chloride:

(3) Sulfate : When 10 ml of test solution for purity(2) is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 10.2 ml of 0.01 N sulfuric acid.(Not be more than 0.10%)

Loss on Drying 3 g of Magnesium Stearate is dried for 2 hours at 105°C until the weight becomes constant. Loss on drying should not be more than 4%.

Assay Accurately weigh about 1 g of Magnesium Stearate, add 50 ml of 0.1 N hydrochloric acid and boil for 30 minutes. Occasionally, water is added to maintain the liquid level. After cooling, the solution is filtered. Filtrate is thoroughly washed with water until it is no longer acidic. This water is added to the filtrate, which is then titrated with 1 N sodium hydroxide solution. 30 ml of 0.05 M EDTA solution, 5 ml of Ammonia · Ammonium Chloride buffer solution, and 0.15 ml of Eriochrome Black T (EBT) indicator solution are added to this test solution, which is then titrated with 0.05 M EDTA until it turns blue.

1 ml of 0.05 M EDTA Solution = 2.015 mg MgO

113. Sodium Stearoyl Lactylate

Definition Sodium Stearoyl Lactylate is a mixture of sodium stearoyl lactylate (major component) and its related acids and sodium salts.

Compositional Specifications of Sodium Stearoyl Lactylate

Description Sodium Stearoyl Lactylate is white~yellow powder, thin platelet, or lump with unique scent.

Identification (1) 2 g of Sodium Stearoyl Lactylate is well mixed with 10 ml of dilute hydrochloric acid, which is then heated in a water bath for 5 minutes and filtered while hot. Filtrate is neutralized with ammonia standard solution. This test solution responds to test of Sodium Salt in Identification.

(2) The filtrate in (1) responds to test of Lactate Salt in Identification.

(3) To the filter residue in (1), add 30 ml of sodium hydroxide, which is then heated for 30 minutes in a water bath. After cooling, 20 ml of dilute hydrochloric acid is added, which is then extracted twice with 30 ml of ether. Ether extracts are added and washed with 20 ml of water, which is then dehydrated with anhydrous sodium sulfate. Ether is evaporated in a water bath. The melting point of the residue is in a temperature range of 54~69°C.

(4) 1 g of Sodium Stearoyl Lactylate dissolves instantaneously in 20 ml of benzene.

Purity (1) Acid Value : Approximately 0.5 g of Sodium Stearoyl Lactylate is accurately weighed, 20 ml mixture of alcohol and ether(1:1) is added, (heated and dissolved if necessary) test solution, and proceeded as directed under Acid Value in Fats Test. The acid value should be within a range of 60~80.

(2) Esther Value : Approximately 1 g of Sodium Stearoyl Lactylate is precisely weighed and dissolved in 25 ml of 0.5 N alcoholic potassium hydroxide and 40 ml of toluene, test solution. It is proceeded as directed under Saponification Value and Esther value in Fats Test, and the esther value should be within a range of 150~190.

(3) Arsenic : 0.25 g of Sodium Stearoyl Lactylate is tested by Purity (1) for [Guar Gum] (4 ppm).

(4) Lead : When 5.0 g of Sodium Stearoyl Lactylate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Cadmium : When 5.0g of Sodium Stearoyl Lactylate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(6) Mercury : When Sodium Stearoyl Lactylate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Total lactates

- Test Solution : Approximately 200 mg of Sodium Stearoyl Lactylate is accurately weighed, where 10 ml of 0.5 N alcoholic solution of potassium hydroxide and 10 ml of water. Air condenser is attached and the solution is gently boiled for 45 minutes. Inner walls of the condenser and the flask are washed with 40 ml of water. The solution is then heated in a water bath until the scent of alcohol disappears. 6 ml of sulfuric acid (1→2) is added to the solution, which is then heated until fatty acid dissolves. The solution is then cooled to 60°C, and 25 ml of petroleum ether is added and stir mixed. This mixture is carefully transferred into a separatory funnel with a stop cock and settled until aqueous phase is separated. The aqueous phase is separated out into a 100 ml volumetric flask. Petroleum phase is washed several times with 20 ml of water each time. This water is added to the volumetric flask and the total volume is brought up to 100 ml. Test solution is prepared by adding water to 1 ml of this solution and bringing up the total solution to 100 ml.
- Test procedure : 1 ml of test solution and 1 ml of water as a reference are placed in test tubes. 1 drop of copper sulfate standard solution is added to each test tube and well mixed by shaking. 9 ml of sulfuric acid is quickly added using a burette. Stop cock is loosely placed on the test tube that is then heated at 90°C for exactly 5 minutes in a water bath. The tube is then cooled below 20°C in an ice bath for exactly 5 minutes. 3 drops of p-phenyl phenol agent are added. While shaking, the tube is heated for 30 minutes at 30°C in a water bath. The tube is then heated for 90 seconds at 90°C then cooled to room temperature with ice water. Optical density is measure using an 1 cm path length cell at a wavelength of 570 nm. Using a calibration curve, that is prepared separately, the amount of total lactates (mg) in the test solution is obtained. The amount of total lactates from Sodium Stearoyl Lactylate should be within a range of 31~34%.
- Calibration curve : Lithium lactate is dried at 105°C for 4 hours. Precisely weighed 1.067 g of dried lithium lactate is dissolved in water so that the total volume is 1000 ml. 10 ml of this solution is further diluted to 100 ml. 1, 2, 4, 6, and 8 ml of this solution is diluted to 100 ml, respectively. Each contains 1, 2, 4, 6, and 8 µg of lactic acid, respectively. 1 ml of each of this solution is taken. By following the procedure described after [1 drop of copper sulfate standard solution is added] in Test Procedure section, optical density is measured and a calibration curve is prepared.

- (8) Sodium: Transfer 250 mg of Sodium Stearoyl Lactylate, accurately weigh, to a beaker, dissolve with heating in 10 ml of alcohol and quantitatively transfer the solution into a 25 ml of volumetric flask. Wash the beaker with two 5 ml portions of alcohol, adding the washings to the flask. Dilute to volume with alcohol and mix. Transfer 2.5 ml of the Stock lanthanum solution to a second 25 ml volumetric flask. Measure Atomic absorbance by the use of spectrophotometer by following operation condition. Separately, measure absorbance values of sodium standard solution and prepare a calibration curve. Absorbance of the test solution is substituted to the calibration curve, and the concentration of sodium $C(\mu\text{g/ml})$ is obtained. The content should be within a range of 3.5~5.0%.
- Standard Solution : Transfer 10.0 of the Stock lanthanum solution into each of three 100 ml volumetric flasks. Transfer 0.2 ml of the stock sodium solution to the first flask, 0.4 ml to the second flask, and 0.5 ml to the third flask. Dilute the contents of each flask to volume with water and mix(1 ml of the solution contains 2.0, 4.0, and 5.0 μg of sodium, respectively.)

$$\text{Sodium (\%)} = \frac{2.5 \times C}{\text{Weight of the sample (mg)}} \times 100$$

Operation Conditions

- Gas used : Combustible gas (acetylene or hydrogen)
Combustible support gas (air)
- Lamp : Cadmium hollow cathode lamp
- Wavelength : 589 nm

114. Calcium Stearoyl Lactylate

Definition Calcium Stearoyl Lactylate is a mixture having calcium of stearoyl lactylates as a major component of related acids and their calcium salts

Compositional Specifications of Calcium Stearoyl Lactylate

Description Calcium Stearoyl Lactylate is a white~yellow powder with a characteristic scent.

Identification (1) 1 g of Calcium Stearoyl Lactylate is heat-treated for 1 hour at 50 °C. The residue is dissolved in 5 ml of dilute hydrochloric acid (1→3). This solution responds to test of calcium salts in Identification.

(2) 2 g of Calcium Stearoyl Lactylate is well mixed with 10 ml of dilute hydrochloric acid, which is heated for 5 minutes in a water bath. It is filtered while hot. 30 ml of sodium hydroxide solution is added to the residue on the filter paper. While shaking, it is heated for 30 minutes in a water bath at 95°C or higher. After cooling, 20 ml of dilute hydrochloric acid is added. The resulting solution is extracted twice with 30 ml each of ether. Ether extracts are combined and washed with 20 ml of water. It is then dehydrated with anhydrous sodium sulfate. Ether is evaporated out in a water bath. The melting point of the residue should be within a range of 54~69°C.

(3) Calcium Stearoyl Lactylate responds to test of Lactate Salts in Identification.

Purity (1) Acid Value : Approximately 0.5 g of Calcium Stearoyl Lactylate is precisely weighed, 20 ml 1:1 mixture of alcohol and ether is added, (heated and dissolved if necessary) test solution, and proceeded as directed under Acid Value in Fats Test. The acid value should be within a range of 50~86.

(2) Ester Value : Approximately 1 g is precisely weighed and dissolved in 25 ml of 0.5 N alcoholic solution of potassium hydroxide and 40 ml of toluene, test solution. It is proceeded under Saponification Value and Esther value in Fats Test, and the esther value should be within a range of 125~164.

(3) Arsenic : 0.25 g of Calcium Stearoyl Lactylate transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Calcium Stearoyl Lactylate is tested by Atomic Absorption

Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

- (5) Cadmium : When 5.0g of Calcium Stearoyl Lactylate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Mercury : When Calcium Stearoyl Lactylate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Total Lactate Content : Calcium Stearoyl Lactylate is tested by following the procedure in Purity (5) for [Sodium Stearoyl Lactylate]. Total lactate content should be within a range of 32~38%.
- (8) Calcium : Accurately weigh 250 mg of Calcium Stearoyl Lactylate into a beaker and dissolve it in 10 ml of alcohol with heating. This solution is transferred into a 25 ml volumetric flask. The beaker is rinsed with two 5 ml portions of alcohol. This alcohol is added to the volumetric flask and alcohol is added so that the total volume is brought up to 25 ml. Test solution is prepared by adding 0.25 ml of that solution, 2.5 ml of lanthanum standard solution into a 25 ml volumetric flask, and make 25 ml with water. Measure Atomic absorbance by the use of spectrophotometer by following operation condition. Separately, measure absorbance values of calcium standard solution and prepare a calibration curve. Absorbance of the test solution is substituted to the calibration curve, and the concentration of Calcium $C(\mu\text{g/ml})$ is obtained. Using the equation below, calcium content in Sodium Stearoyl Lactylate is calculated. This value should be within a range of 1.0~5.2%.

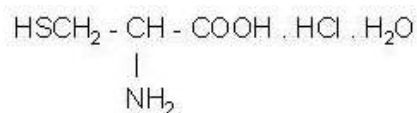
$$\text{Calcium (\%)} = \frac{2.5 \times C}{\text{Weight of the sample (mg)}} \times 100$$

Operation Conditions

- Gas used : Combustible gas (acetylene or hydrogen)
Combustible support gas (air)
- Lamp : Cadmium hollow cathode lamp
- Wavelength : 422.7 nm
- Standard Solution : To 250 mg of calcium carbonate, add 100 ml of diluted hydrochloric acid (1 in 10), heat with not boiling, and cool it down. Then water is added to make 1,000 ml. 0.2, 0.4, and 0.5 ml of this solution is added to each 100 ml volumetric flask, 10 ml of lanthanum standard solution is added to it, respectively. Then the water is added so that the total volume of each flask becomes 100 ml. (1 ml of the solution contains 2.0, 4.0, and 5.0 μg of sodium, respectively.)

Residues on Ignition When thermogravimetric analysis is done with Calcium Stearoyl Lactylate at 800°C, the amount of residues should be within a range of 14.3~17.7%.

115. L-Cystein Monohydrochloride



Chemical Formula $\text{C}_3\text{H}_7\text{NO}_2\text{S} \cdot \text{HCl} \cdot \text{H}_2\text{O}$

Molecular Weight 175.64

Compositional Specifications of L-Cysteine Monohydrochloride

Content L-Cystein Monohydrochloride, when calculated on the dried basis, should contain within a range of 98.0~102.0% of L-cysteine monohydrochloride ($\text{C}_3\text{H}_7\text{NO}_2\text{S} \cdot \text{HCl}$ =157.62).

Description L-Cystein Monohydrochloride occurs as colorless to white crystals or as a white crystalline powder, having a characteristic odor and taste.

Identification (1) To 5 ml of L-Cysteine Monohydrochloride solution (1→1,000), add 0.5 ml of pyridine and 1 ml of ninhydrin solution (1→100), and heat for 5 minutes. A purple to purple-brown color develops.

(2) To 10 ml of L-Cystein Monohydrochloride solution (1→1,000), add 2 ml of sodium hydroxide solution and 2 drops of sodium nitroprusside solution. A purple-red color develops.

(3) To 10 ml of L-Cysteine Monohydrochloride solution (1→50), add 1 ml of hydrogen peroxide, and heat in a water bath for 10 minutes. The solution respond to the test by Chloride Limit Test (2) in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of L-Cystein Monohydrochloride is dissolved in 20 ml of water, the solution should be colorless and clear.

(2) Specific Rotation : Approximately 4 g of L-Cystein Monohydrochloride is precisely weighed, which is dissolved in 1 N hydrochloric acid so that the total volume becomes 50 ml. When optical rotation of the solution is measured, $[\alpha]_D^{20} = +5.0 \sim +8.0^\circ$

(3) Arsenic : 0.5 g of L-Cystein Monohydrochloride transfer into a 100 ml flask for decomposition. After adding 5 ml of sulfuric acid and 5 ml of nitric acid, the flask is heated. 2~3 ml of nitric acid is added at a time and the flask is heated until the liquid becomes colorless~pale yellow. After cooling, 15 ml of saturated ammonium hydroxide is added to the flask, which is then heated and concentrated to 2~3 ml until white smoke is generated. After cooling, water is added to bring the total volume to 10 ml. 5 ml of the resulting solution is tested by Arsenic Limit Test.

The content should not be more than 2 ppm.

- (4) Lead : When 5.0 g of L-Cystein Monohydrochloride is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
- (5) Cystine : Weigh 100 mg of L-Cysteine Monohydrochloride, dissolve in 50 ml of N-ethylmaleimide solution (1→50), and allow to stand for 2 hours. Use this solution as the test solution. Measure 5 µl the test solution, perform Paper Chromatography using an n-butyl alcohol, glacial acetic acid, and water mixture (5:1:2) as the developing solvent. Only one spot should be observed. For the filter paper, use a No. 2 filter paper for chromatography. Stop the development when the developing solvent front rises about 30 cm. Air-dry, then dry at 100°C for 20 minutes, spray with a solution of ninhydrin saturated n-butyl alcohol (1→500), and heat at 100°C for 5 minutes to develop a color. Observe under natural light. Reference solution is not used.

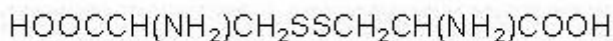
Loss on Drying L-Cystein Monohydrochloride is dried for 24 hours in a vacuum desiccator (silica gel) and the weight loss should be within a range of 8~12%.

Residue on Ignition When thermogravimetric analysis is done with L-Cystein Monohydrochloride 1 g in a quartz or porcelain crucible, the amount of residues should not be more than 0.1%.

Assay Dissolve 0.25 g of L-Cysteine Monohydrochloride, previously dried and accurately weighed in 20 ml of water, and add 4 g of potassium iodide to dissolve in this solution. To this solution, add 5 ml of diluted hydrochloric acid and 25 ml of 0.1 N iodine, and allow to stand in ice water for 20 minutes in a dark place. Titrate the excess iodine with 0.1 N sodium thiosulfate solution (indicator: starch solution). Separately, perform a blank test by the same procedure.

0.1 N iodine 1 ml = 15.76 mg of $\text{C}_3\text{H}_7\text{NO}_2\text{S} \cdot \text{HCl}$

116. L-Cystine



Chemical Formula $\text{C}_6\text{H}_{12}\text{N}_2\text{O}_4\text{S}_2$

Molecular Weight 240.29

Compositional Specifications of L-Cystine

Content L-Cystine, when calculated on dried basis for 3 hours in a desiccator with phosphorous pentoxide, should contain within a range of 98.0~102.0% of L-Cystine ($\text{C}_6\text{H}_{12}\text{N}_2\text{O}_4\text{S}_2$).

Description L-Cystine is white colorless scentless crystal.

Identification (1) To 5 ml of L-Cystine saturated solution (1→50), and heat for 5 minutes. A purple to purple-brown color develops.

(2) To 3ml of 2N hydrochloric acid (1→30), add 0.04 g of zinc powder and heat in a water bath for 10 minutes. If there is need to cool, do cooling and filtering it. Add 10 ml of sodium hydroxide solution(1→20) and shake it to mix. When 1 drop of sodium nitroprusside solution is added, a purple-red color develops.

Purity (1) Clarity and Color of Solution : When 1 g of L-Cystine is dissolved in 20 ml of hydrochloric acid, the solution should be colorless and clear.

(2) Acidity, and Alkalinity : pH of L-Cystine saturated solution should be within a range of 5.0~6.5.

(3) Specific Rotation : 2 g of pre-dried material is dissolved in 1 N hydrochloric acid, where the total volume of the solution is 100 ml. Optical density of this solution should be within a range of $[\alpha]_D^{25} = -215 \sim -225^\circ$

(4) Chloride: When 0.07 g of L-Cystine is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.(Not be more than 0.1%)

(5) Arsenic : 0.25 g of L-Cystine is precisely weighed and is tested by purity (1) for 「Guar gum」, its content should not be more than 4 ppm.

(6) Lead : When 5.0 g of L-Cystine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

Loss on Drying When L-Cystine is dried for 3 hours at 105°C, loss should not be more than 0.2%.

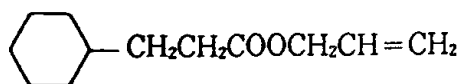
Residue on Ignition When thermogravimetric analysis is done with 2 g of L-Cystine, the amount of residue should not be more than 0.1%.

Total Nitrogen 300 mg of previously dried material is precisely weighed and tested by Total Kjeldahl Nitrogen Test (nitrogen determination method), the amount should be within a range of 11.5~11.9%.

Assay After drying L-Cysteine, weigh precisely 300 mg. It is tested by Kjeldahl method of Nitrogen determination method to obtain amount of nitrogen(N). And L-Cysteine is obtained below formula.

$$\text{Amount of L-Cystine in the sample (\%)} = N \times 8.58$$

117. Allyl Cyclohexanepropionate



Chemical Formula $C_{12}H_{20}O_2$

Molecular Weight 196.29

Compositional Specifications of Allyl Cyclohexanepropionate

Content Allyl Cyclohexanepropionate should contain not less than 98.0% of allyl cyclohexylpropionate ($C_{12}H_{20}O_2$).

Description Allyl Cyclohexanepropionate is a colorless to light yellow and transparent liquid having a characteristic odor.

Identification To 1 ml of Allyl Cyclohexanepropionate, add 5 ml of 10% alcoholic solution of potassium hydroxide. Equip with a reflux condenser, and heat in a water bath for 30 minutes. The characteristic odor disappears, and an odor of alcohol evolved.

Purity (1) Specific Gravity : Specific gravity should be within a range of 0.945~0.950

(2) Refractive Index : Refractive Index n_D^{20} should be within a range of 1.457~1.462

(3) Clarity and Color of Solution : When 1 ml of Allyl Cyclohexanepropionate is dissolved in 4 ml of 80% alcohol, the solution should be clear.

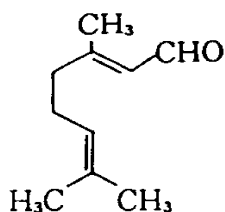
(4) Acid value : Acid value of Allyl Cyclohexanepropionate is tested by Acid Value in Flavoring Substance Test. It should not be more than 5.

Assay

Accurately weigh about 1.5 g of Allyl Cyclohexanepropionate, and proceed as directed under Ester Content in Flavoring Substances Tests.

0.5 N Ethanolic potassium hydroxide 1 ml = 98.15 mg of $C_{12}H_{20}O_2$

118. Citral



Chemical Formula $C_{10}H_{16}O$

Molecular Weight 152.24

Compositional Specifications of Citral

Content Citral should contain not less than 96.0% of citral ($C_{10}H_{16}O$).

Description Citral is a colorless to light yellow liquid having a lemon-like odor.

Identification To 1 ml of Citral, add 2 ml of sodium hydrogen sulfite solution and 2 drops of anhydrous sodium carbonate solution, and shake. The mixture evolves heat and forms white crystalline lumps. Add 10 ml of sodium hydrogen sulfite solution, and heat in a water bath while shaking. The crystalline lumps dissolve, and the lemon-like odor disappears.

Purity (1) Specific Gravity : Specific gravity should be within a range of 0.885~0.891

(2) Refractive Index : Refractive Index n_D^{20} should be within a range of 1.486~1.490

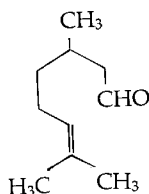
(3) Clarity and Color of Solution : When 1 ml of this additive is dissolved in 10 ml of 60% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Citral is tested by Acid Value in Flavoring Substance Test. It should not be more than 5.

Assay Accurately weigh about 1 g of Citral, and proceed as directed under Method 2 of Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure, allow the mixture to stand for 15 minutes before titrating.

1 ml of 0.5 N Hydrochloric acid = 76.12 mg of $C_{10}H_{16}O$

119. Citronellal



Chemical Formula $C_{10}H_{18}O$

Molecular Weight 154.25

Compositional Specifications of Citronellal

Content Citronellal should contain not less than 85.0% of citronellal ($C_{10}H_{18}O$).

Description Citronellal is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Citronellal, add 2 ml of sodium hydrogen sulfite solution and 2 drops of anhydrous sodium carbonate solution, and shake. The mixture evolves heat and forms white crystalline lumps. Add 10 ml of sodium hydrogen sulfite solution, and heat in a water bath while shaking. The crystalline lumps dissolve.

Purity (1) Specific Gravity : Specific gravity should be within a range of 0.850~0.860.

(2) Refractive Index : Refractive Index n_D^{20} should be within a range of 1.446~1.456.

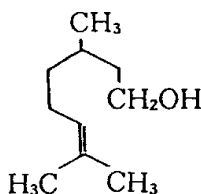
(3) Clarity and Color of Solution : When 1 ml of Citronellal is dissolved in 5 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Citronellal is tested by Acid Value in Flavoring Substance Test. It should not be more than 3.

Assay Accurately weigh about 1.1 g of Citronellal, and proceed as directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure allow the mixture to stand for 1 hour before titrating.

1 ml of 0.5 N hydrochloric acid = 77.13 mg of $C_{10}H_{18}O$

120. Citronellol



Chemical Formula $C_{10}H_{20}O$

Molecular Weight 156.27

Compositional Specifications of Citronellol

Content Citronellol should contain not less than 90.0% of citronellol ($C_{10}H_{20}O$).

Description Citronellol is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Citronellol, add 1 ml of acetic anhydrous and 1 drop of phosphoric acid, keep the solution at a lukewarm temperature for 10 minutes, add 1 ml of water, shake in warm water for 5 minutes, cool, and add anhydrous sodium carbonate solution to make slightly alkaline. An odor of citronellyl acetate is evolved.

Purity (1) Specific Gravity : Specific gravity should be within a range of 0.850~0.860.

(2) Refractive Index : Refractive Index n_D^{20} should be within a range of 1.454~1.462

(3) Clarity and Color of Solution : When 2 ml of Citronellol is dissolved in 4 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Citronellol is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

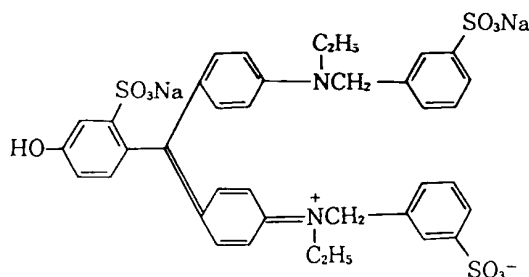
(5) Ester Value : Accurately weigh about 5 g of citronellol, Ester value of Citronellol is tested by Ester Value in Flavoring Substance Test. It should not be more than 1.

(6) Aldehyde : Approximately 5 g of Citronellol is precisely weighed and tested by Hydroxylamine Method 2 of Aldehyde and Ketone Content Measurement in Flavoring Test. The volume of consumed 0.5 N hydrochloric acid should not be more than 1.3 ml.

Assay Proceed as directed under Method 1 in Alcohol Content in Flavoring Substances Tests, using about 1 g of acetylated oil.

121. Food Green No.3

Fast Green FCF

Chemical Formula $C_{37}H_{34}O_{10}N_2S_3Na_2$

Molecular Weight 808.88

Definition Food Green No.3 consists principally of disodium 2-[bis[4-[N-ethyl-N-(3-sulfonatophenylmethyl)mino]phenyl]methyl]-5-hydroxybenzenesulfonate

Compositional Specifications of Food Green No.3

Content Food Green No.3 should contain not less than 85.0% of disodium 3-[bis[4-N-ethyl-N-[4-[[4-[N-ethyl-N(3-sulfonatebenzyl)phenyl](4-hydroxy-2-sulfonatephenyl)methylene]-2,5-cyclohexadienylidene]ammonio-methyl]benzenesulfonate ($C_{37}H_{34}O_{10}N_2S_3Na_2$).

Description Food Green No.3 occurs as dark green powder or granules. It is odorless and has a metallic luster.

Identification (1) Dissolve 50 mg of Food Green No.3 in 100 ml of water. This solution is bluish green in color.

(2) To 0.1 g of Food Green No.3 is dissolved in 200 ml of 0.02 N ammonium acetate solution. When 1 ml of this solution is diluted to 100 ml with 0.02 N ammonium acetate solution, it shows a maximum absorption band at 628 ± 2 nm.

(3) When 1 ml of hydrochloric acid is added to 5 ml of an aqueous solution (1→1,000) of Food Green No.3, the color of the solution changes to brown.

(4) When 1 ml of sodium hydroxide solution (1→10) to 5 ml of an aqueous solution (1→1,000) of Food Green No.3, the color of the solution changes to bluish purple.

(5) When 0.1 g of Food Green No.3 is dissolved in 10 ml of sulfuric acid, it shows an orange color. When 2~3 drops of this solution are added to 5 ml of water, the color becomes green.

Purity (1) Water Insoluble Matter : When Food Green No.3 proceeds as directed under water insoluble matter in the Coloring Matter Test, the content should not be more than 0.2%.

- (2) Chlorides and Sulfates : When Food Green No.3 proceed as directed under Chlorides and Sulfates in the Coloring Matter Test, the total content should not be more than 5%.
- (3) Arsenic : Food Green No.3 is tested by Arsenic Limit Test by Coloring Matter Tests (not more than 4 ppm)
- (4) Chrome : When Food Green No.3 is tested by Heavy Metal Limit Test (2) in Coloring Matter Tests, its content should not be more than 50 ppm.
- (5) Mangan : When Food Green No.3 is tested by Heavy Metals (4) in Coloring Matter Tests, its content should not be more than 50 ppm.
- (6) Lead : When 5.0 g of Food Green No.3 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (7) Mercury : When Food Green No.3 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (8) Unsulfonated Primary Aromatic Amines : When G. Unsulfonated Primary Aromatic Amines in Coloring Matter Tests is done, the content should not be more than 0.01% as Aniline.
- (9) Other coloring matters : 0.1 g of Food Green No.3 is dissolved in water (total volume = 200 ml), 0.002 ml of which is tested by Method 1 in Paper Chromatography. A mixture of n-butyl alcohol, anhydrous alcohol, and 1% ammonia solution (6:2:3) is used as a developing solution. There should be only one spot. In this case, No.2 filter paper for chromatography is used and developing is stopped when the developing solvent front reaches approximately 15 cm. It is blow dried and observed under a natural light with a white background from the top. A reference solution is not used.

Loss on Drying Food Green No.3 is dried for 6 hours at 135°C and the weight loss should not be more than 10%.

Assay Accurately weigh about 4.7 g of Food Green No. 3, and dissolve in water to make exactly 250 ml. Measure exactly 50 ml of this solution, use it as the test solution, and proceed as directed under Titanium Trichloride Method (B) of H. Assay in Coloring Matter Tests.

1 ml of 0.1 N titanium trichloride = 40.44 mg of $C_{37}H_{34}O_{10}N_2S_3Na_2$

122. Food Green No. 3 Aluminum Lake

Fast Green FCF Aluminum Lake

Definition Food Green No. 3 Aluminum Lake is prepared by reacting an aluminum salt solution with alkali, making the reaction product adsorb Food Green No. 3, filtering, drying, and crushing.

Compositional Specifications of Food Green No.3 Aluminum Lake

Content Food Green No.3 Aluminum Lake should contain not less than 10.0% of 3-[N-ethyl-N-[4-[[4[N-ethyl-N-(3-sulfobenzil)amino]phenyl]]-(4-hydroxy-2-sulphophenyl)methylene]-2,5-cyclohexanedianiliden] ammoniomethyl] benzenesulfonic acid ($C_{37}H_{36}O_{10}N_2S_3 = 764.90$).

Description Food Green No. 3 Aluminum Lake occurs as a fine, dark green-blue powder. It is odorless.

Identification (1) 0.1 g of Food Green No. 3 Aluminum Lake is added to 5 ml of dilute sulfuric acid, where 0.02 N ammonium acetate solution is added to bring the total volume to 200 ml. When this solution is not clear, it is centrifuged. 1~10 ml of this solution is diluted to 100 ml with 0.02 N ammonium acetate solution so that the measured absorbance falls in a range of 0.2~0.7. This solution has a maximum absorption band at 626 ± 2 nm.

(2) 0.1 g of Food Green No.3 Aluminum Lake is added to 5 ml of dilute hydrochloric acid. While shaking occasionally, it is heated for 5 minutes in a water bath. The solid dissolves completely and the solution becomes clear and dark green. After cooling, the solution is neutralized with ammonia solution, it become bluish green and gel-like precipitates with same color are produced.

(3) 0.1 g of Food Green No.3 Aluminum Lake is added to 5 ml of sodium hydroxide solution (1→10). While shaking occasionally, it is heated for 5 minutes in a water bath. The solid dissolves completely and the solution becomes clear and reddish violet. After cooling, the solution is neutralized with dilute hydrochloric acid, it become bluish green and gel-like precipitates with same color are produced.

(4) 0.1 g of Food Green No. 3 Aluminum Lake is added to 5 ml of sulfuric acid . While shaking occasionally, it is heated for 5 minutes in a water bath. The solution becomes dark orange in color. After cooling, 2~3 drops of the supernatant are added to 5 ml of water. This solution turns green.

(5) 0.1 g of Food Green No.3 Aluminum Lake is added to 10 ml of dilute hydrochloric acid, which is heated in a water bath. Most of the solid material is dissolved. 0.5 g

of activated carbon is added and well mixed, which is then filtered. The colorless filtrate is neutralized with sodium hydroxide solution (1→10). It responds to test of aluminum salt in Identification.

- Purity** (1) Hydrochloric Acid and Ammonia Insoluble Substances : When Food Green No.3 Aluminum Lake is tested for Hydrochloric acid and ammonia insoluble substances in Coloring Matter Aluminum Lake Test, its content should not be more than 0.5%.
- (2) Arsenic : When Food Green No.3 Aluminum Lake is tested by the procedure in Arsenic Limit Test for [Aluminum Lake], it should be appropriate (not more than 4 ppm).
- (3) Lead : When 5.0 g of Food Green No.3 Aluminum Lake is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
- (4) Barium : When Food Green No.3 Aluminum Lake is tested by the procedure in Barium Test for [Aluminum Lake], it should be appropriate (not more than 500 ppm as Ba).
- (5) Other Coloring Matters : 60 ml of dilute acetic acid (1→20) is added to an amount of Food Green No. 3 Aluminum Lake containing 50 mg as a coloring acid. It is heated to boil and cooled. to this solution, acetone is added to bring the total volume to 100 ml. 0.002 ml of the supernatant is used as Test Solution. Using a mixture of n-butyl alcohol, anhydrous alcohol, and 1% ammonia solution (6:2:3) as a developing solvent, Test Solution is tested by Method 1 in Paper Chromatography. There should be only one spot. In this case, No. 2 filter paper for chromatography is used and developing is stopped when the developing solvent front reaches approximately 15 cm. It is blow dried and observed under a natural light with a white background from the top. A reference solution is not used.

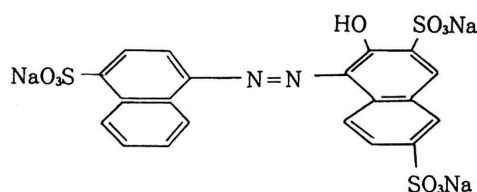
Loss on Drying Food Green No.3 Aluminum Lake is dried for 6 hours at 135°C and the weight loss should not be less than 30%.

Assay Accurately weigh Food Green No. 3 Aluminum Lake, so that the volume of consumed 0.1N titanium trichloride is approximately 20 ml, and proceed as directed under H. Assay (2) in the Coloring Aluminum Lake Matter Test.

$$1 \text{ ml of } 0.1 \text{ N titanium trichloride} = 38.24 \text{ mg of } \text{C}_{37}\text{H}_{36}\text{O}_{10}\text{N}_2\text{S}_3$$

123. Food Red No.2

Amaranth

Chemical Formula $C_{20}H_{11}O_{10}N_2S_3Na_3$

Molecular Weight 604.50

Definition Food Red No. 2 is obtained by coupling diazotized 4-amino-1-naphthalenesulfonic acid with 3-hydroxy-2,7-naphthalenedisulfonic acid, salting out, and refining. It consists principally of the trisodium salt of 3-hydroxy-4-(4-sulfonaphthylazo)-2,7-naphthalenedisulfonic acid.

Compositional Specifications of Food Red No. 2

Content Food Red No. 2 should contain not less than 85.0% of trisodium-2-hydroxyazonaphthalene-3,4',6-sulfonate ($C_{20}H_{11}O_{10}N_2S_3Na_3 = 604.50$).

Description Food Red No.2 occurs as reddish brown to dark reddish brown powder or granule. It is odorless

Identification (1) When 0.1 g of Food Red No.2 dissolved in 100 ml of water, the solution becomes purplish red color.

(2) When 0.1 g of Food Red No.2 dissolved in 100 ml of 0.02 N ammonium acetate solution. 1 ml of this solution is diluted to 100 ml with 0.02 N ammonium acetate solution. The resulting solution exhibits absorption maximum at a wavelength of 520 ± 2 nm.

(3) When 0.1 g of Food Red No. 2 dissolved in 10 ml of sulfuric acid, the solution becomes red color. When 5 ml of water is added to 2~3 drops of this solution, it becomes purplish red color.

Purity (1) Water Insoluble Substances : When Food Red No.2 proceed as directed under Water Insoluble Substances in the Coloring Matter Test, the content should not be more than 0.2%.

(2) Chlorides and Sulfates : When Food Red No.2 proceed as directed under Chlorides and Sulfates in the Coloring Matter Test, the total content should not be more than

5%.

- (3) Arsenic : When Food Red No.2 proceed as directed under Arsenic in the Coloring Matter Test, the content should not be more than 4 ppm.
- (4) Lead : When 5.0 g of Food Red No.2 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (5) Cadmium : When 5.0 g of Food Red No.2 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Mercury : When Food Red No.2 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Unsulfonated Primary Aromatic Amines : When G. Unsulfonated Primary Aromatic Amines in Coloring Matter Tests is done, the content should not be more than 0.01% as Aniline.
- (8) Other Coloring Matters : Proceed as directed under Purity (9) in [Food Green No.3]. In this case, 0.1 g of sample is dissolved in water to make 100 ml solution.

Loss on Drying When Food Red No.2 is dried for 6 hours at 135°C, the weight loss should not be more than 10%.

Assay Accurately weigh about 1.7 g of Food Red No.2, and dissolve in water to make 250 ml solution. Measured exactly 50 ml of the solution proceed as directed under Assay (A) Titanium Trichloride in the Coloring Matter Test.

1 ml of 0.1 N titanium trichloride solution = 15.11 mg $C_{20}H_{11}O_{10}N_2S_3Na_3$

124. Food Red No.2 Aluminum Lake

Amaranth Aluminum Lake

Definition Food Red No. 2 Aluminum Lake is prepared by reacting an aluminum salt solution with alkali, making the reaction product adsorb Food Red No. 2, filtering, drying, and crushing.

Compositional Specifications of Food Red No.2 Aluminum Lake

Content Food Red No.2 Aluminum Lake should contain not less than 10.0% of 2-hydroxyazonaphthalene-3,4',6-trisulfonic acid ($C_{20}H_{14}O_{10} N_2S_3 = 538.54$).

Description Food Red No.2 Aluminum Lake occurs as a fine, purplish red powder. It is odorless.

Identification (1) To 0.1 g of Food Red No.2 Aluminum Lake, add 5 ml of diluted sulfuric acid, where 0.02 N ammonium acetate solution is added to make the total volume to 100 ml. When this solution is not clear, it is centrifuged. 1~10 ml of this solution is diluted to 100 ml with 0.02 N ammonium acetate solution so that the absorbance to be measured will be within a range of 0.2 to 0.7. This solution has a maximum absorption band at 520 ± 2 nm.

(2) To 0.1 g of Food Red No.2 Aluminum Lake, add 5 ml of hydrochloric acid. While shaking occasionally, it is heated for 5 minutes in a water bath. The solution becomes violet color. After cooling, 2~3 drops of supernatant are added to 5 ml of water, then it becomes reddish violet color.

(3) To 0.1 g of Food Red No.2 Aluminum Lake, add 10 ml of diluted hydrochloric acid, which is heated in a water bath. Most of the solid material is dissolved. 0.5 g of activated carbon is added and well mixed, which is then filtered. The colorless filtrate is neutralized with sodium hydroxide solution (1→10). It responds to test of aluminum salt in Identification.

Purity (1) Hydrochloric Acid and Ammonia Insoluble Substances : When Food Red No.2 Aluminum Lake proceed as directed under Hydrochloric Acid and Ammonia Insoluble Substances in the Coloring Matter Aluminum Lake, the content should not be more than 0.5%.

(2) Arsenic : When Food Red No.2 Aluminum Lake proceed as directed under Arsenic Limit Test in the Coloring Matter Aluminum Lake, the content should not be more than 4 ppm.

(3) Lead : When 5.0 g of Food Red No.2 Aluminum Lake is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(4) Barium : When Food Red No.2 Aluminum Lake proceed as directed under Barium Test in Coloring Matter Aluminum Lake, the content should not be more than 500 ppm as barium.

(5) Other coloring matters : Proceed as directed under Purity (6) in [Food Green No. 3 Aluminum Lake]. In this case, sample is taken so that it contains 0.1 g of color acid.

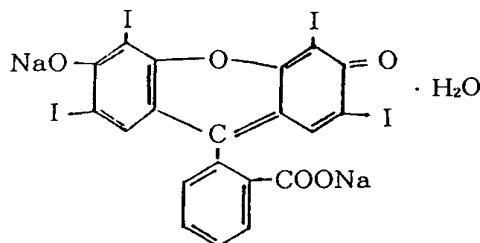
Loss on Drying When Food Red No.2 Aluminum Lake is dried for 6 hours at 135°C and the weight loss should not be more than 30%.

Assay Accurately weigh of Food Red No.2 Aluminum Lake so that the volume of consumed 0.1 N titanium trichloride will be about 20 ml, and proceed as directed under Assay (1) in the Coloring Matter Aluminum Lake Tests.

1 ml of 0.1 N titanium trichloride = 13.46 mg of $C_{20}H_{14}O_{10}N_2S_3$

125. Food Red No.3

Erythrosine

Chemical Formula $C_{20}H_6O_5I_4Na_2 \cdot H_2O$

Molecular Weight 897.91

Definition Food Red No. 3 consists principally of the disodium salt of 3',6'-dihydroxy-2'',4'',5'',7''-tetraiodospiro[isobenzofuran-1(3H),9'']-[9H]xanthene]-3-one, monohydrate.

Compositional Specifications of Food Red No.3

Content Food Red No.3 should contain not less than 85.0% of the disodium salt of 2',4',5',7'-tetraiodofluorocene mono hydrate ($C_{20}H_6O_5I_4Na_2 \cdot H_2O$).

Description Food Red No.3 occurs as red to brown powder or granules. It is odorless.

Identification (1) When 0.1 g of Food Red No.3 is dissolved in 100 ml of water, it becomes bluish red color.

(2) To 0.1 g of Food Red No.3 is dissolved in 500 ml of 0.02 N ammonium acetate solution, 3 ml of which is diluted to 200 ml with 0.02 N ammonium acetate solution. The resulting solution exhibits absorption maximum at a wavelength of 526 ± 2 nm.

(3) When 1 ml of hydrochloric acid is added to 5 ml of Food Red No.3 solution (1→1,000), precipitates are formed.

(4) When 0.1 g of Food Red No.3 is dissolved in 10 ml of sulfuric acid, it becomes yellowish brown color. When 2~3 drops of this solution is added to 5 ml of water, orange red precipitates are formed.

Purity (1) Water-Insoluble Substances : When Food Red No.3 proceed as directed under Water-Insoluble Substance in the Coloring Matter Test, the content should not be more than 0.2%.

(2) pH : When Food Red No.3 proceed as directed under glass electrode method, pH of Food Red No.3 solution (1→100) should be within a range of 6.5~10.0

(3) Chloride and sulfate : When Food Red No.3 proceed as directed under Chloride

- and sulfate in the Coloring Matter Test, the content should not be more than 2% as total amount.
- (4) Arsenic : When Food Red No.3 proceed as directed under Arsenic in the Coloring Matter Test, the content should not be more than 4 ppm.
 - (5) Zinc : When Food Red No.3 proceeds as directed under Heavy Metals (1) in the Coloring Matter Test, the content should not be more than 50 ppm. In this case, 10 ml of test solution and blank test solution are taken.
 - (6) Lead : When 5.0 g of Food Red No.3 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
 - (7) Cadmium : When 5.0 g of Food Red No.3 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
 - (8) Mercury : When Food Red No.3 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
 - (9) Other Coloring Matters : Proceed as directed under Purity (9) in [Food Green No.3]. In this case, a 1:1 mixture of 25% alcohol and 5% ammonia solution is used as a developing solvent.

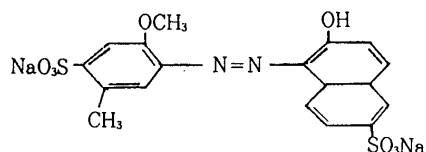
Loss on Drying Food Red No.3 is dried for 6 hours at 135°C and the weight loss should not be more than 12%.

Assay Accurately weigh about 1 g of Food Red No.3, and dissolved in water to make exactly 100 ml. Measure exactly 50 ml of this solution, use it as the test solution, and proceed as directed under (2) Weight Method in the Assay in the Coloring Matter Tests.

$$\text{Content of Food Red No.3} = \frac{\text{Weight of the precipitate (g)} \times 2.148}{\text{Weight of the sample (g)}} \times 100$$

126. Food Red No.40

Allura Red

Chemical Formula $C_{18}H_{14}O_8N_2S_2Na_2$

Molecular Weight 496.44

Definition Food Red No.40 is obtained by coupling diazotized 4-amino-5-methoxy-2-methylbenzenesulfonic acid with 6-hydroxy-2-naphthalenesulfonic acid, salting out, and refining. It consists principally of the disodium salt of 6-hydroxy-5-(2-methoxy-5-methyl-4-sulfophenylazo)-2-naphthalenesulfonic acid.

Compositional Specifications of Food Red No.40

Content Food Red No.40 should contain not less than 85.0% of the disodium salt of 6-hydroxy-5-(2-methoxy-5-methyl-4-sulfophenyl)azo-2-naphthalenesulfonic acid ($C_{18}H_{14}O_8N_2S_2Na_2$)

Description Food Red No.40 occurs as dark red power or granules. It is odorless.

Identification (1) When 0.1 g of Food Red No.40 is dissolved in 100 ml of water, the resulting solution becomes red color.

(2) To 0.1 g of Food Red No.40 is dissolved in 100 ml of 0.02 N ammonium acetate solution, 1 ml of which is diluted to 100 ml with 0.02 N ammonium acetate solution. The resulting solution exhibits absorption maximum at a wavelength of 500 ± 2 nm.

(3) When 1 ml of hydrochloric acid is added to 5 ml of Food Red No.40 solution (1→1,000), a precipitate is not formed and the solution becomes dark red color.

(4) When 1 ml of sodium hydroxide solution (1→10) is added to 5 ml of Food Red No.40 solution (1→1,000), the solution becomes dark red color.

(5) When 0.1 g of Food Red No.40 is dissolved in 10 ml of sulfuric acid, it becomes reddish violet color. When 2~3 drops of the supernatant are added to 5 ml of water, it becomes red color.

Purity (1) Water Insoluble : When Food Red No.40 proceed as directed under Water-Insoluble Substance in the Coloring Matter Test, the content should not be more than 0.2%

(2) Chloride and Sulfate : When Food Red No.40 proceed as directed under Chloride

- and Sulfate in the Coloring Matter Test, the content should not be more than 5.0% as total amount
- (3) Arsenic : When Food Red No.40 proceed as directed under Arsenic in the Coloring Matter Test, it should be appropriate (Not more than 4 ppm)
 - (4) Lead : When 5.0 g of Food Red No.40 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
 - (5) Cadmium : When 5.0 g of Food Red No.40 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
 - (6) Mercury : When Food Red No.40 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
 - (7) Lower Sulfonated Subsidiary Colors : Weigh 10.0 mg of Food Red No.40 is dissolved in ammonium acetate solution (7.7→1000) to make 100 ml as the Test Solution. Separately, cresidine sulfonic acid azo β -naphthol color [4-(2-Hydroxy-1-naphthylazo)-5-methoxy-2-methyl-4-benzenesulfonic acid monosodium salt] and cresidine azo Schaeffer's salt color [6-Hydroxy-5-(2-methoxy-5-methylphenylazo)-2-naphthalenesulfonate monosodium salt] are dried for 24 hours in a vacuum desiccator. 10 mg each of these colors is dissolved in ammonium acetate solution (7.7→1,000) to make exactly 100 mL as the standard stock solution. Using these solutions, the content of each colors (cresidine sulfonic acid azo β -naphthol colors and cresidine azo Schaeffer's salt colors) in the Test Solution is obtained by proceed as directed under E. Subsidiary Colors in the Tar Coloring Matter Test, the content sum of two should not be more than 1.0 %.
 - (8) Higher Sulfonated Subsidiary Colors : Use 20 μ l of the Test Solution in (7) Purity as the Test Solution. Separately, cresidine sulfonic acid azo G colors [7-Hydroxy-8-(2-methoxy-5-methyl-4-sulfonatephenylazo)-1,3-naphthalene-disulfonic acid trisodium salt] and cresidine sulfonic acid azo R color [3-Hydroxy-4-(2-methoxy-5-methyl-4-sulfonatephenylazo)-2,7-naphthalenedisulfonic acid trisodium salt] are dried for 24 hours in a vacuum desiccator. 10 mg each of these colors is dissolved in ammonium acetate solution (7.7→1,000) to make exactly 100 mL as the standard stock solution. Using these solutions, the content of each colors (cresidine sulfonic acid azo G and R colors) in Test Solution is obtained by proceed as directed under E. Subsidiary Colors in the Tar Coloring Matter Test, the content sum of two should not be more than 1.0 %.
 - (9) Disodium salt 6-hydroxy(2-naphthalenesulfonate) : Use 20 μ l of Test Solution in

- (7) Purity as the Test Solution. Separately, Disodium 6-hydroxy(2-naphthalene-sulfonate) is dried for 24 hours in a vacuum desiccator. 10.0 mg of dried material is dissolved in ammonium acetate solution (7.7→1,000) to make 100 ml as the standard solution. Using this solution, the content of Disodium 6-hydroxy(2-naphthalenesulfonate) in Test Solution is obtained by proceed as directed under F. Unreacted Raw Material and Reaction Intermediate in the Tar Coloring Matter, the content should not be more than 0.3%.
- (10) 4-Amino-5-methoxy-2-methylbenzene sulfonic acid : Use 20 µl of Test Solution in (7) Purity as the Test Solution. Separately, 10.0 mg of 4-Amino-5-methoxy-2-methylbenzenesulfonic acid is dried for 24 hours in a vacuum desiccator. 100 mg of dried material is dissolved in ammonium acetate solution (7.7→1,000) to make 100 mL as the standard stock solution. Using this solution, the content of 4-Amino-5-methoxy-2-methylbenzenesulfonic acid in Test Solution is obtained by proceed as directed under F. Unreacted Raw Material and Reaction Intermediate in the Tar Coloring Matter Test, the content should not be more than 0.2%.
- (11) Disodium salt 6,6'-oxybis(2-naphthalenesulfonate) : Use 20 µl of Test Solution in (7) Purity as the Test Solution. Separately, Disodium 6,6'-oxybis(2-naphthalene-sulfonate) is dried for 24 hours in a vacuum desiccator. 10.0 mg of dried material is dissolved in ammonium acetate solution (7.7→1,000) to make 100 ml as the standard solution. Using this solution, the content of Disodium 6,6'-oxybis(2-naphthalenesulfonate) in Test Solution is obtained by proceed as directed under F. Unreacted Raw Material and Reaction Intermediate in the Tar Coloring Matter, the content should not be more than 1.0%.
- (12) Unsulfonated Primary Aromatic Amines : When Food Red No.4 proceed as directed under G. Unsulfonated Primary Aromatic Amines in Coloring Matter Test, the content should not be more than 0.01 % as aniline

Loss on Drying When Food Red No.40 is dried for 6 hours at 135°C, the weight loss should not be more than 10 %.

Assay Accurately weigh about 1.7 g of Food Red No. 40, dissolve in water to make exactly 250 ml. Measure 50 ml of this solution to use as the test solution, and proceed as directed under Titanium Trichloride Method (A) of H. Assay in Coloring Matter Tests.

$$1 \text{ ml of } 0.1 \text{ N Titanium trichloride} = 12.41 \text{ mg } \text{C}_{18}\text{H}_{14}\text{O}_8\text{N}_2\text{S}_2\text{Na}_2$$

127. Food Red No.40 Aluminum Lake

Allura Red AC Aluminum Lake

Definition Food Red No.40 Aluminum Lake is prepared by reacting an aluminum salt solution with alkali, making the reaction product adsorb food Red No.40, filtering, drying, and crushing.

Compositional Specifications of Food Red No.40 Aluminum Lake

Content Food Red No.40 Aluminum Lake should contain not less than 10.0 % of 6-hydroxy-5-(2-methoxy-5-methyl-4-sulfophenylazo)-2-naphthalenesulfonic acid ($C_{18}H_{16}N_2O_8S_2$).

Description Food Red No.40 Aluminum Lake occurs as an orange red fine powder. It is odorless.

Identification (1) To 0.1 g of Food Red No.40 Aluminum Lake, add 5 ml of sulfuric acid. While shaking occasionally, it is heated for 5 minutes in a water bath. The solution becomes dark reddish violet color. After cooling, 2~3 drops of the supernatant are added to 5 ml of water. This solution becomes red color.

(2) To 0.1 g of Food Red No.40 Aluminum Lake, add 5 ml of diluted sulfuric acid Where 0.02 N ammonium acetate solution is added to make the total volume to 100 ml. When this solution is not clear, it is centrifuged. 1~10 ml of this solution is diluted to 100 ml with 0.02 N ammonium acetate solution so that the absorbance to be measured will be within a range of 0.2 to 0.7. This solution exhibits absorption maximum at a wavelength of 497~501 nm.

(3) To 0.1 g of Food Red No.40 Aluminum Lake, add 10 ml of diluted hydrochloric acid, heat in a water bath until most of it dissolves, add 0.5 g of active carbon, shake well. and filter. The colorless filtrate neutralize with sodium hydroxide solution (1→10). The solution responds to the test for Aluminum Salt in Identification.

Purity (1) Hydrochloric Acid and Ammonia Insoluble Substances : When Food Red No.40 Aluminum Lake proceed as directed under Hydrochloric acid-and ammonia-insoluble substances in the Coloring Matter Aluminum Lake Test, the content should not be more than 0.5%.

(2) Arsenic : When Food Red No.40 Aluminum Lake proceed as directed under Arsenic in the Coloring Matter Aluminum Lake Test, the content should not be more than 4 ppm.

(3) Lead : When 5.0 g of Food Red No.40 Aluminum Lake is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

- (4) Barium : When Food Red No.40 Aluminum Lake proceed as directed under Barium in the Coloring Matter Aluminum Lake Test, the content should not be more than 500 ppm as Ba.
- (5) Lower Sulfonated Subsidiary Colors : 0.1 g of Food Red No 40 Aluminum Lake is dissolved in 5 ml diluted sulfuric acid, where ammonium acetate solution (7.7→1000) is added to make 100 ml as the Test Solution. If the solution is not clear, it is centrifuged. It is tested proceed as directed under Purity (7) in [Food Red No. 40], and the content should not be more than 1.0% (based on 85.0% content).
- (6) Higher Sulfonated Subsidiary Colors : Use 20 µl of the test solution in (5) as the Test Solution. Proceed as directed under Purity (8) in [Food Red No.40], and the content should not be more than 1.0% (based on 85.0% content).
- (7) Sodium Salt of 6-Hydroxy-2-Naphthalenesulfonic Acid : Use 20 µl of the test solution in (5) as the Test Solution. Proceed as directed under Purity (9) in [Food Red No. 40], and the content should not be more than 0.3% (based on 85.0% content).
- (8) 4-Amino-5-methoxy-2-methylbenzenesulfonic acid : Use 20 µl of the test solution in (5) as the Test Solution. It is tested by the procedure in Purity (10) in [Food Red No. 40], and the content should not be more than 0.2% (based on 85.0 % content).
- (9) Disodium salt of 6,6'-oxybis(2-naphthalenesulfonic acid) : Use 20 µl of the test solution in (5) as the Test Solution. It is tested by the procedure in Purity (11) in [Food Red No.40], and the content should not be more than 1.0% (based on 85.0% content).
- (10) Unsulfonated primary aromatic amines : Weigh 5.0 g of Food Red No.40 Aluminum Lake, add 70 ml of chloroform, set-aside for 1 hour while shaking occasionally. Filter through a dried filter paper (5C) for quantitative analysis and place the filtrate into a 200 ml round bottom flask. Wash three times the residue with 10 ml of chloroform each, combine the filtrate with the washings, and add 5 ml of sulfuric acid (0.15→1,000). Proceed as directed under Purity (12) in [Food Red No.40], and the content should not be more than 0.01% as aniline (based on 85.0% content).

Loss on Drying

When Food Red No.40 Aluminum Lake is dried for 6 hours at 135°C, the weight loss should not be less than 30%

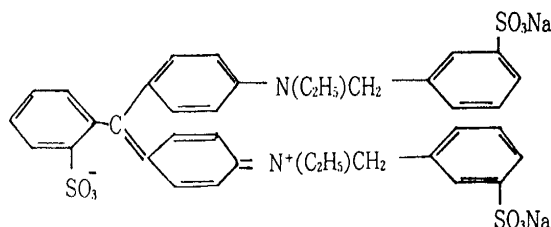
Assay

Accurately weigh of Food Red No.40 Aluminum Lake so that the volume of consumed 0.1 N titanium trichloride will be about 20 ml, and proceed as directed under H. Assay (1) in the Coloring Matter Aluminum Lake Tests.

1 ml of 0.1 N titanium trichloride = 12.411 mg $C_{18}H_{14}O_8N_2S_2Na_2$

128. Food Blue No.1

Brilliant Blue FCF

Chemical Formula $C_{37}H_{31}O_9N_2S_3Na_2$

Molecular Weight 792.88

Definition Food Blue No. 1 consists mainly of disodium 2-[bis[4-[N-ethyl-N-(3-sulfonatophenylmethyl)amino]phenyl]methylio]benzenesulfonate

Compositional Specifications of Food Blue No.1

Content Food Blue No.1 should contain not less than 85.0% of disodium 3-[N-ethyl-N-4-[[4-[N-ethyl-N-(3-sulfonatebenzyl)amino]phenyl](2-sulfonatephenyl)methylene]-2,5-cyclohexadienyliden]ammoniomethyl]benzene sulfonate ($C_{37}H_{31}O_9N_2S_3Na_2$).

Description Food Blue No.1 occurs as reddish purple powder or granules. It is odorless and has a metallic luster.

Identification (1) When 50 mg of Food Blue No.1 dissolved in 100 ml of water, the solution becomes blue color.

(2) When 0.1 g of Food Blue No.1 dissolved in 200 ml of 0.02 N ammonium acetate solution. To 1 ml of this solution, add 0.02 N ammonium acetate solution to make 100 ml. The solution exhibits absorption maximum at a wavelength of 630 ± 2 nm.

(3) To 5 ml of Food Blue No. 1 solution (1→1,000), add 1 ml of hydrochloric acid. The color of the solution becomes dark yellow~green color.

(4) When 1 ml of sodium hydroxide solution (1→10) is added to 5 ml of Food Blue No.1 solution (1→1,000), precipitate is not formed and color does not change.

(5) When 1 g of Food Blue No.1 dissolved in 10 ml of sulfuric acid, the solution becomes a dark orange color. When 5 ml of water is added to 2~3 drops of this solution, it becomes green color.

Purity (1) Water-insoluble substances : When Food Blue No.1 proceed as directed under Water-insoluble substance in Coloring matter Test, the content should not be more than 0.2%

- (2) Chloride and sulfate : When Food Blue No.1 proceed as directed under Chloride and sulfate in Coloring matter Test, the content should not be more than 4% as total amount
- (3) Arsenic : When Food Blue No.1 proceed as directed under Arsenic in Coloring matter Test, the content should not be more than 4 ppm.
- (4) Chrome : When Food Blue No.1 is tested by Heavy Metals (2) in Coloring Matter Tests, its content should not be more than 50 ppm.
- (5) Mangan : When Food Blue No.1 is tested by Heavy Metals (4) in Coloring Matter Tests, its content should not be more than 50 ppm.
- (6) Lead : When 5.0 g of Food Blue No.1 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (7) Cadmium : When 5.0 g of Food Blue No.1 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (8) Mercury : When Food Blue No.1 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (9) Unsulfonated Primary Aromatic Amines : When G. Unsulfonated Primary Aromatic Amines in Coloring Matter Tests is done, the content should not be more than 0.01% as Aniline.
- (10) Other Coloring Matters : Proceed as directed under Purity (9) in [Food Green No. 3].

Loss on Drying When Food Blue No.1 is dried for 6 hours at 135°C, the weight loss should not be more than 10%.

Assay Accurately weigh about 4.8 g of Food Blue No. 1, and dissolved in water to make exactly 250 ml. Measure exactly 50 ml of this solution, and use it as the test solution. Proceed as directed under Titanium Trichloride Method (B) of Assay in Coloring matter Tests.

1 ml of 0.1 N titanium trichloride = 39.64 mg of $C_{37}H_{34}O_9N_2S_3Na_2$

129. Food Blue No. 1 Aluminum Lake

Brilliant Blue FCF Aluminum Lake

Definition Food Blue No. 1 Aluminum Lake is prepared by reacting an aluminum salt solution with alkali, making the reaction product adsorb Food Blue No. 1, filtering, drying, and crushing.

Compositional Specifications of Food Blue No. 1 Aluminum Lake

Content Food Blue No.1 Aluminum Lake should contain not less than 10.0% of 3-[N-ethyl-N-[4-[[4-[N-ethyl-N-(3-sulfobenzyl)amino]phenyl](2-sulfophenyl)methylene]-2,5-cyclohexadienylidene]ammoniomethyl]benzene sulfonic acid ($C_{37}H_{36}O_9N_2S_3=748.90$).

Description Food Blue No.1 Aluminum Lake occurs as a fine blue powder. It is odorless.

Identification (1) To 0.1 g of Food Blue No. 1 Aluminum Lake, add 5 ml of diluted sulfuric acid, shake well and add 0.02 N ammonium acetate solution to make 200 ml. If the solution is not clear, centrifuged. Measure 1~10 ml of this solution so that the absorbance to be measured will be within a range of 0.2~0.7, and add ammonium acetate solution to make 100 ml. The solution exhibits absorption maximum at a wavelength of 630 ± 2 nm.

(2) To 0.1 g of Food Blue No.1 Aluminum Lake, add 5 ml of diluted hydrochloric acid and heat in a water bath for about 5 minutes while shaking occasionally. It dissolves almost clearly, and becomes a green to dark green color. Cool. and neutralize with ammonia solution. A blue color becomes and a gelatinous precipitate of the same color is formed.

(3) To 0.1 g of Food Blue No.1 Aluminum Lake, add 5 ml of sodium hydroxide solution (1→10). and heat in a water bath for about 5 minutes while shaking occasionally. It dissolves almost clearly, and becomes a red purple color. Cool, and neutralize with diluted hydrochloric acid. A blue to red purple color becomes, and a gelatinous precipitate of the same color is formed.

(4) To 0.1 g of Food Blue No.1 Aluminum Lake, add 5 ml of sulfuric acid, and heat in a water bath for about 5 minutes while shaking occasionally. A dark yellow to dark gray-brown color becomes. Cool, and add 2~3 drops of the supernatant to 5 ml of water. A blue to blue-green color becomes.

(5) To 0.1% of Food Blue No.1 Aluminum Lake, add 10 ml of diluted hydrochloric acid, heat in a water bath until most of it dissolves, add 0.5 g of active carbon, shake well. and filter. The colorless filtrate neutralize with sodium hydroxide solution (1→10). The solution responds to the test for Aluminum Salt in

Identification.

- Purity** (1) Hydrochloric Acid and Ammonia Insolubles Substances : When Food Blue No.1 Aluminum Lake proceed as directed under Hydrochloric Acid and Ammonia Insolubles Substances in Coloring Matter Aluminum Lake Test, the content should not be more than 0.5%.
- (2) Arsenic : When Food Blue No.1 Aluminum Lake proceed as directed under Arsenic in Coloring matter Aluminum Lake Test, it should be appropriate (Not more than 4 ppm)
- (3) Lead : When 5.0 g of Food Blue No.1 Aluminum Lake is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
- (4) Barium : When Food Blue No.1 Aluminum Lake proceed as directed under Barium in Coloring matter Aluminum Lake Test, the content should not be more than 500 ppm as Ba.
- (5) Other Coloring matters : Proceed as directed under Purity (5) in [Food Green No.3 Aluminum Lake].

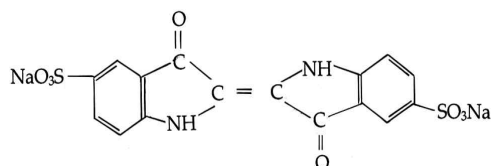
Loss on Drying When Food Blue No.1 is dried for 6 hours at 135°C, the weight loss should not be more than 30%.

Assay Accurately weigh Food Blue No.1 Aluminum Lake so that the volume of consumed 0.1 N titanium trichloride will be about 20 ml, and proceed as directed under Assay (2) in Coloring Matter Aluminum Lake Test.

1 ml of 0.1 N titanium trichloride solution = 37.44 mg $C_{37}H_{36}O_9N_2S_3$

130. Food Blue No.2

Indigocarmin

Chemical Formula $C_{16}H_8O_8N_2S_2Na_2$

Molecular Weight 466.37

Definition Food Blue No.2 consists principally of the disodium salt of 3,3'-dioxo-2,2'-biindolinylidene-5,5'-disulfonic acid.

Compositional Specifications of Food Blue No. 2

Content Food Blue No.2 should not be less than 85.0 % of the disodium salt of 3,3'-dioxo-2,2'-biindolinylidene-5,5'-disulfonic acid ($C_{16}H_8O_8N_2S_2Na_2$)

Description Food Blue No.2 occurs as dark purple-blue to dark purple-brown powder or granules. It is odorless.

Identification (1) When 50 mg of Food Blue No.2 dissolved in 10 ml of water, the solution becomes purple~blue in color.

(2) To 0.1 g of Food Blue No.2 dissolved in 100 ml of 0.02 N ammonium acetate solution. To 1 ml of this solution, add 0.02 N ammonium acetate solution to make 100 ml. The solution exhibits absorption maximum at a wave-length of 612 ± 2 nm.

(3) To 5 ml of Food Blue No.2 solution (1→1,000) add 1 ml of sodium hydroxide solution (1→10). The color of the solution changes to yellow-green.

(4) To 0.1 g of Food Blue No.2 in 10 ml of sulfuric acid, the solution becomes deep purple in color. Add 2 to 3 drops of this solution to 5 ml of water, the solution becomes purple-blue in color.

Purity (1) Water-insoluble substances : When Food Blue No.2 proceed as directed under Water-insoluble substance in Coloring matter Test, the content should not be more than 0.2%.

(2) Chloride and sulfate : When Food Blue No.2 proceed as directed under Chloride and sulfate in Coloring matter Test, the content should not be more than 7.0% as total amount.

(3) Arsenic : When Food Blue No.2 proceed as directed under Arsenic in Coloring matter Test, it should be appropriate (Not more than 4 ppm)

(4) Iron : When Food Blue No.2 proceed as directed under Heavy Metals (3) in

Coloring matter Test, its content should not be more than 500 ppm.

- (5) Lead : When 5.0 g of Food Blue No.2 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Cadmium : When 5.0 g of Food Blue No.2 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (7) Mercury : When Food Blue No.2 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (8) Unsulfonated Primary Aromatic Amines : When G. Unsulfonated Primary Aromatic Amines in Coloring Matter Tests is done, the content should not be more than 0.01% as Aniline.
- (9) Other Coloring Matters : Proceed as directed under Purity (9) in [Food Green No. 3]. In this case, 0.1 g of sample is dissolved in water to make 100 ml solution.

Loss on Drying When Food Blue No.2 is dried for 6 hours at 135°C, the weight loss should not be more than 10%.

Assay Accurately weigh about 2.7 g of Food Blue No.2, and dissolve in water to make exactly 500 ml. Measure exactly 100 ml of this solution, and use it as the test solution. Proceed as directed under Titanium Trichloride Method (B) of Assay in Coloring Matter Tests.

1 ml of 0.1 N titanium trichloride = 23.32 mg of $C_{16}H_8O_8N_2S_2Na_2$

131. Food Blue No.2 Aluminum Lake

Indigo carmine Aluminum Lake

Definition Food Blue No.2 Aluminum Lake is prepared by reacting an aluminum salt solution with alkali, making the reaction product adsorb Food Blue No.2, filtering, drying, and crushing.

Compositional Specifications of Food Blue No.2 Aluminum Lake

Content Food Blue No.2 Aluminum Lake should not be less than 10.0% of 3,3'-dioxo-2,2'-biindolinylidene-5,5'-disulfonic acid ($C_{16}H_{10}N_2O_8S_2 = 422.40$).

Description Food Blue No.2 Aluminum Lake occurs as a fine purplish-blue powder. It is odorless.

Identification (1) To 0.1 g of Food Blue No.2 Aluminum Lake, add 5 ml of diluted sulfuric acid, where 0.02 N ammonium acetate solution is added to make the total volume to 100 ml. When this solution is not clear, it is centrifuged. 1~10 ml of this solution is diluted to 100 ml with 0.02 N ammonium acetate solution so that the absorbance to be measured will be within a range of 0.2~0.7. This solution exhibits absorption maximum at a wavelength of 612 ± 2 nm.

(2) To 0.1 g of Food Blue No.2 Aluminum Lake, add 5 ml of sodium hydroxide solution (1→10). While shaking occasionally, it is heated for 5 minutes in a water bath. The solution becomes almost clear and becomes yellowish brown color. After cooling, the solution is neutralized with diluted hydrochloric acid, it becomes blue purple~light green color and gelatinous precipitate of the same color is formed.

(3) To 0.1g of Food Blue No.2 Aluminum Lake, add 5 ml of sulfuric acid. While shaking occasionally, it is heated for 5 minutes in a water bath. The solution becomes dark blue~purple color. After cooling, 2~3 drops of the supernatant are added to 5 ml of water. This solution becomes blue~purple.

(4) To 0.1 g of Food Blue No.2 Aluminum Lake, add 10 ml of dilute hydrochloric acid, which is heated in a water bath. Most of the solid material is dissolved. 0.5 g of activated carbon is added and well mixed, which is then filtered. The colorless filtrate is neutralized with sodium hydroxide solution (1→10). It responds to test of aluminum salt in Identification.

Purity (1) Hydrochloric Acid and Ammonia Insolubles Substances : When Food Blue No.2 Aluminum Lake, proceed as directed under Hydrochloric Acid and Ammonia Insolubles Substances in Coloring Matter Aluminum Lake Test, the content should not be more than 0.5%.

(2) Arsenic : When Food Blue No.2 Aluminum Lake, proceed as directed under

Arsenic in Coloring matter Aluminum Lake Test, the content should not be more than 4 ppm.

- (3) Iron : When Food Blue No.2 Aluminum Lake proceed as directed under Heavy Metals (3) in Coloring matter Test, the content should not be more than 250 ppm.
- (4) Lead : When 5.0 g of Food Blue No.2 Aluminum Lake is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
- (5) Barium : When Food Blue No.2 Aluminum Lake, proceed as directed under Barium in Coloring matter Aluminum Lake Test, the content should not be more than 500 ppm as Ba.
- (6) Other Coloring Matters : Proceed as directed under Purity (5) in [Food Green No.3 Aluminum Lake]. In this case, an amount of sample is used so that it contains 0.1 g as Color acid. Take a sample of Food Blue No. 2 Aluminum Lake to contain 0.1 g as color acid and use acetic acid(1→3) stead of acetic acid(1→20)

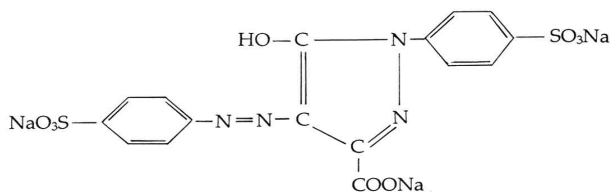
Loss on Drying When Food Blue No.2 Aluminum Lake is dried for 6 hours at 135°C, the weight loss should not be more than 30%.

Assay Accurately weigh Food Blue No.2 Aluminum Lake so that the volume of consumed 0.1 N titanium trichloride will be about 20 ml, and proceed as directed under Assay (2) in Coloring Matter Aluminum Lake Test.

1 ml of 0.1 N titanium trichloride = 21.12 mg of $C_{16}H_{10}O_8N_2S_2$

132. Food Yellow No.4

Tartrazine

Chemical Formula $\text{C}_{16}\text{H}_9\text{O}_9\text{N}_4\text{S}_2\text{Na}_3$

Molecular Weight 534.38

Definition Food Yellow No.4 is obtained by coupling diazotized 4-aminobenzenesulfonic acid with 5-hydroxy-1-(4-sulfophenyl)-3-pyrazolecarboxylic acid, followed by salting out, and refining. It consists essentially of the trisodium salt of 5-hydroxy-1-(4-sulfophenyl)-4-(4-sulfophenylazo)-3-pyrazolecarboxylic acid

Compositional Specifications of Food Yellow No.4

Content Food Yellow No.4 should contain not less than 85.0% of the trisodium salt of 3-carboxate-5-hydroxy-1-(4-sulfonatephenyl)-1H-pyrazol-4-azo-4'-(benzene sulfonate) ($\text{C}_{16}\text{H}_9\text{O}_9\text{N}_4\text{S}_2\text{Na}_3$).

Description Food Yellow No.4 occurs as orange-yellow to orange powder or granules. It is odorless.

Identification (1) When 0.1 g of Food Yellow No.4 dissolved in 100 ml of water, the solution becomes yellow color.

(2) To 0.1 g of Food Yellow No.4 is dissolved in 100 ml of 0.02 N ammonium acetate solution. To 1 ml of this solution, add 0.02 N ammonium acetate solution to make 100 ml. The resulting solution exhibits absorption maximum at a wavelength of 428 ± 2 nm.

(3) To 0.1 g of Food Yellow No.4, add 10 ml of sulfuric acid. The solution becomes yellow color. Add 2~3 drops of this solution to 5 ml of water, this solution becomes yellow color.

Purity (1) Water-Insoluble Substances : When Food Yellow No.4 proceed as directed under Water-insoluble substance in Coloring matter Test, the content should not be more than 0.2%.

(2) Chloride and sulfate : When Food Yellow No.4 proceed as directed under Chloride and sulfate in Coloring matter Test, the content should not be more than 6% as total amount.

(3) Arsenic : When Food Yellow No.4 proceed as directed under Arsenic in Coloring

- matter Test, the content should not be more than 4 ppm.
- (4) Lead : When 5.0 g of Food Blue No.4 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (5) Cadmium : When 5.0 g of Food Blue No.4 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Mercury : When Food Blue No.4 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Unsulfonated Primary Aromatic Amines : When G. Unsulfonated Primary Aromatic Amines in Coloring Matter Tests is done, the content should not be more than 0.01% as Aniline.
- (8) Other Coloring Matters : Proceed as directed under Purity (9) in [Food Green No.3]. In this case, 0.1 g of the sample is dissolved in water to make 100 ml solution.

Loss on Drying When Food Yellow No.4 is dried for 6 hours at 135°C, the weight loss should not be more than 10%.

Assay Accurately weigh about 1.5 g of Food Yellow No.4, and dissolve in water to make exactly 250 ml. Measure exactly 50 ml of this solution, use it as the test solution, and proceed as directed under Titanium Trichloride Method (C) of Assay in Coloring Matter Tests.

1 ml of 0.1 N titanium trichloride = 13.36 mg of $C_{16}H_9O_9N_4S_2Na_3$

133. Food Yellow No.4 Aluminum Lake

Tartrazine Aluminium Lake

Definition Food Yellow No.4 Aluminum Lake is prepared by reacting an aluminum salt solution with alkali, making the reaction product adsorb Food Yellow No.4, filtering, drying, and crushing.

Compositional Specifications of Food Yellow No.4 Aluminum Lake

Content Food Yellow No.4 Aluminum Lake should contain not less than 10.0% of 3-carboxyl-5-hydroxyl-1-(4-sulfophenyl)1H-pyrazol-4-azo-(4'-benzenesulfonate) ($C_{16}H_{12}O_9N_4S_2=468.42$)

Description Food Yellow No.4 Aluminum Lake occurs as a fine yellow powder. It is odorless.

Identification (1) To 0.1 g of Food Yellow No.4 Aluminum Lake, add 5 ml of diluted sulfuric acid, where 0.02 N ammonium acetate solution is added to make the total volume to 100 ml. When this solution is not clear, it is centrifuged. 1~10 ml of this solution is diluted to 100 ml with 0.02 N ammonium acetate solution so that the absorbance to be measured will be within a range of 0.2~0.7. This solution exhibits absorption maximum at a wavelength of 428 ± 2 nm.

(2) To 0.1 g of Food Yellow No.4 Aluminum Lake, add 5 ml of sulfuric acid. While shaking occasionally, it is heated for 5 minutes in a water bath, it becomes yellow. After cooling, 2~3 drops of supernatant are added to 5 ml of water. This solution becomes yellow.

(3) To 0.1 g of Food Yellow No.4 Aluminum Lake is dissolved in 10 ml diluted hydrochloric acid, which is heated in a water bath. Most of the solid material is dissolved. 0.5 g of activated carbon is added and well mixed, which is then filtered. The colorless filtrate is neutralized with sodium hydroxide solution (1→10). It responds to test of aluminum salt in Identification.

Purity (1) Hydrochloric Acid and Ammonia Insoluble Substances: When Food Yellow No.4 Aluminum Lake proceed as directed under Hydrochloric Acid and Ammonia Insoluble Substances in Coloring Matter Aluminum Lake Test, the content should not be more than 0.5%

(2) Arsenic : When Food Yellow No.4 Aluminum Lake proceed as directed under Arsenic in Coloring Matter Aluminum Lake Test, the content should not be more than 4 ppm.

(3) Lead : When 5.0 g of Food Yellow No.4 Aluminum Lake is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(4) Barium : When Food Yellow No.4 Aluminum Lake proceed as directed under Barium in Coloring Matter Aluminum Lake Test, the content should not be more than 500 ppm as Ba.

(5) Other coloring matters : Proceed as directed under Purity (5) in [Food Green No.3]. In this case, an amount of sample is used so that it contains 0.1 g as color acid.

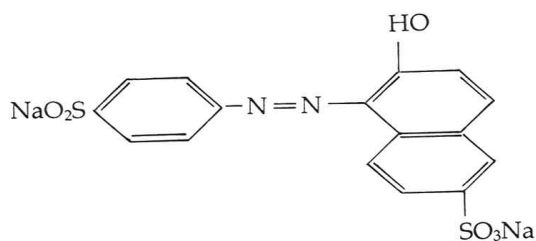
Loss on Drying When Food Yellow No.4 Aluminum Lake is dried for 6 hours at 135°C, weight loss should not be more than 30%.

Assay Accurately weigh Food Yellow No.4 Aluminum Lake so that the volume of consumed 0.1N titanium trichloride will be about 20 ml, and proceed as directed under Assay (3) in Coloring Matter Aluminum Lake Test.

1 ml of 0.1 N titanium trichloride solution = 11.71 mg $C_{16}H_{12}O_9N_4S_2$

134. Food Yellow No. 5

Sunset Yellow FCF

Chemical Formula $C_{16}H_{10}O_7N_2S_2Na_2$

Molecular Weight 452.39

Definition Food Yellow No. 5 is obtained by coupling diazotized 4-aminobenzene sulfonic acid with 6-hydroxy-2-naphthalenesulfonic acid, salting out, and refining. It consists principally of the disodium salt of 6-hydroxy-5-(4-sulfophenylazo)-2-naphthalene sulfonic acid.

Compositional Specifications of Food Yellow No. 5

Content Food Yellow No.5 should contain not less than 85.0% of the disodium salt of 2-(hydroxy-6-sulfonatenaphthalene)-1-azo-(4'-benzene sulfonate)($C_{16}H_{10}O_7N_2S_2Na_2$).

Description Food Yellow No.5 occurs as orange-red powder or granules. It is odorless.

Identification (1) When 0.1 g of Food Yellow No.5 dissolved in 100 ml of water, the solution becomes orange color.

(2) To 0.1 g of Food Yellow No.5 is dissolved in 100 ml of 0.02 N ammonium acetate solution. To 1 ml of the solution, add 0.02 N ammonium acetate solution to make 100 ml. The solution exhibits absorption maximum at a wave-length of 483 ± 2 nm.

(3) When 0.1 g of Food Yellow No.5 is dissolved in 10 ml of sulfuric acid. the solution becomes orange red color. When 5 ml of water is added to 2~3 drops of the solution, it becomes orange yellow color.

Purity (1) Water-Insoluble Substances : When Food Yellow No.5 proceed as directed under Water-insoluble substance in Coloring matter Test, the content should not be more than 0.2%.

(2) Chloride and Sulfate : When Food Yellow No.5 proceed as directed under Chloride and sulfate in Coloring matter Test, the content should not be more than 5% as total amount.

- (3) Arsenic : When Food Yellow No.5 proceed as directed under Arsenic in Coloring matter Test, the content should not be more than 4 ppm.
- (4) Lead : When 5.0 g of Food Yellow No.5 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (5) Cadmium : When 5.0 g of Food Yellow No.5 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Mercury : When Food Yellow No.5 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Sudan I(1-phenylazo -2-naphtol) : Accurately weigh 0.2 g of Food Yellow No.5 into a 10 ml volumetric flask. And dissolve it in 4 ml of water, add 5 ml of methanol is, mix and cool. Then water is added to make 10 ml, test solution. Test solution is filtered by 0.2 μ m membrane filter made by polytetrafluoro ethylene (PTFE) and liquid chromatography is carried by following operation condition. Separately, filter sudan standard solution with 0.2 μ m membrane filter made by PTFE. And then inject the solution of standard and sample into liquid chromatograph respectively, and prepare a calibration curve. Peak areas or heights acquired from test solution is substituted to the calibration curve and the content of sudan I is determined. This value should not be more than 1.0 ppm.

Operation Dondition

- Column packing materials : 5 μ m octadecyl silyl silicagel for liquid chromatography
- Standard solution : Accurately weigh Standard Sudan I and dissolve it in methanol to make 10 ppm. Each 20, 50, 100, 150, 200 and 250 μ l is transferred into 10 ml volumetric flask, dissolved in 5 ml of methanol. Then water is added to make 10 ml, respectively. (1 ml of this solution contains 0.02, 0.05, 0.10, 0.15, and 0.20 μ g of Sudan I, respectively.)
- (8) Subsidiary Colors : To 100.0 mg of Food Yellow No.5 is weighed and dissolved in ammonium acetate solution (1.54 \rightarrow 1000, pH 8.0) to make 100 ml as the Test Solution. Separately, sulfonic acid azo G salt color (1,3-naphthalenedisulfonic acid, 7-hydroxy-8-[4-sulfophenyl] azo, trisodium salt), sulfonic acid azo R salt color (2,7-naphthaleindisulfonic acid, 3-hydroxy-4- [4-sulfophenyl]azo, trisodium salt), sulfonic acid azo-naphthol color, (benzenesulfonic acid, 4-[4-hydroxy-1-naphthalenyl]azo), monosodium salt), and aniline azo Schaeffer's salt color (2-naphthalenesulfonic acid, 6-hydroxy- 5(phenylazo), monosodium salt) was dried for 24 hours in a vacuum desiccator. 10 mg each of dried material is dissolved in

ammonium acetate solution (1.54→1000, pH 8.0) to make 100 ml as Standard Solution. Using this solution, the content of sulfonic acid azo G salt color, sulfonic acid azo R salt color, sulfonic acid azo-naphthol color, and aniline azo Schaeffer's salt color in Test solution is obtained by proceed as directed under E. Subsidiary Colors in the Tar Coloring Matter test, the content should not be more than 5.0% as total mount. The content sum (except sulfonic acid azo R salt color) should not be more than 2.0%.

Operation Conditions

-Detector : Visible Absorption Detector (wave length 482 nm)

-Carrier Phase: A-Ammonium acetate solution (1.54→1000)

B-Acetonitrile

Solution A : Solution B (100:0)→Solution A : Solution B (60:40) 50 minutes

- (9) Unreacted Raw Material and Reaction Intermediate : To 100 mg of Food Yellow No. 5 is dissolved in ammonium acetate solution (1.54→1000, pH 8.0) to make precisely 100 ml. This solution as the Test Solution. Separately, 4-amino-benzene-sulfonic acid, 7-hydroxy-1,3- naphthalenedisulfonic acid disodium salt, 3-hydroxy- 2,7-naphthalene-disulfonic acid disodium salt, 6-hydroxy-2-naphthalenedisulfonic acid monosodium salt, 6,6'-oxybis[2- naphthalenesulfonic acid], and disodium salt of 4,4'-(Diazo amino)-dibenzensulfonic acid was dried for 24 hours in a vacuum desiccator. 10.0 mg each of dried material is dissolved in ammonium acetate solution (1.54→1,000) to make 100 ml as Standard Solution. Using this solution, the content of 4-aminobenzenesulfonic acid, 7-hydroxy-1,3-naphthalenedisulfonic acid disodium salt, 3-hydroxy-2,7-naphthalene- disulfonic acid disodium salt, 6-hydroxy-2-naphthalenesulfonicacid monosodium salt, 6,6'-oxybis[2-naphthalene-sulfonic acid disodium salt], and disodium salt of 4,4'-(diazoamino)dibenzensulfonic acid in Test solution is obtained by proceed as directed under F. Unreacted Raw Material and Reaction Intermediate in the Coloring Matter Tests, the content should not be more than 0.5% as total mount.

Operation Conditions

-Detector: Visible Absorption Detector (wave length 232 nm, but 358 nm for disodium salt of 4,4'-(diazoamino)-dibenzensulfonic acid)

-Carrier Phase: A- Ammonium acetate solution (1.54→1000)

B- Acetonitrile

Solution A : Solution B (100:0) → Solution A: Solution B (60:40) 50 minutes

- (10) Unsulfonated Primary Aromatic Amines : When Food Yellow No.5 proceed as directed under G. Unsulfonated Primary Aromatic Amines in Coloring matter Test ,

the content should not be more than 0.01% as aniline.

Loss on Drying When Food Yellow No.5 is dried for 6 hours at 135°C, the weight loss should not be more than 10%.

Assay Accurately weigh about 1.3 g of Food Yellow No.5, and dissolve in water to make exactly 250 ml. Measure exactly 50 ml of this solution, use it as the test solution, and proceed as directed under Titanium Trichloride Method (A) of Assay in Coloring matter test Tests.

1 ml of 0.1 N titanium trichloride = 11.31 mg of $C_{16}H_{10}O_7N_2S_2Na_2$

135. Food Yellow No.5 Aluminum Lake

Sunset Yellow FCF Aluminum Lake

Definition Food Yellow No. 5 Aluminum Lake is prepared by reacting an aluminum salt solution with alkali, making the reaction product adsorb Food Yellow No. 5, filtering, drying, and crushing.

Compositional Specifications of Food Yellow No.5 Aluminum Lake

Content Food Yellow No.5 Aluminum Lake should contain not less than 10.0% of 2-hydroxy- 6-sulfo naphthalene-1-azo-(4'-benzene sulfonic acid) ($C_{16}H_{12}N_2O_7S_2 = 408.41$).

Description Food Yellow No.5 Aluminum Lake occurs as a fine, orange~yellow powder. It is odorless.

Identification (1) To 0.1 g of Food Yellow No.5 Aluminum Lake, add 5 ml of diluted sulfuric acid, where 0.02 N ammonium acetate solution is added to make 100 ml. When this solution is not clear, it is centrifuged. 1~10 ml of this solution is diluted to 100 ml with 0.02 N ammonium acetate solution so that the absorbance to be measured will be within a range of 0.2 to 0.7. The resulting solution exhibits absorption maximum at a wavelength of 482 ± 2 nm.

(2) To 0.1 g of Food Yellow No.5 Aluminum Lake, add 5 ml of sulfuric acid. While shaking occasionally, it is heated for 5 minutes in a water bath. The solution becomes orange red color. After cooling, 2~3 drops of the supernatant are added to 5 ml of water. This solution becomes orange yellow.

(3) To 0.1 g of Food Yellow No.5 Aluminum Lake, 10 ml of diluted hydrochloric acid, which is heated in a water bath. Most of the solid material is dissolved. 0.5 g of activated carbon is added and well mixed, which is then filtered. The colorless filtrate is neutralized with sodium hydroxide solution (1→10). It responds to test of aluminum salt in Identification.

Purity (1) Hydrochloric Acid and Ammonia Insolubles Substances: When Yellow No.5 Aluminum Lake proceed as directed under Hydrochloric Acid and Ammonia Insolubles Substances in Coloring Matter Aluminum Lake Test, the content should not be more than 0.5%.

(2) Arsenic : When Yellow No.5 Aluminum Lake proceed as directed under Arsenic in Coloring Matter Aluminum Lake Test, the content should not be more than 4.0 ppm.

(3) Lead : When 5.0 g of Yellow No.5 Aluminum Lake is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(4) Barium : When Yellow No.5 Aluminum Lake proceed as directed under Barium in

Coloring Matter Aluminum Lake Test, the content should not be more than 500 ppm as Ba.

- (5) Other color matters : Proceed as directed under Purity (5) in [Food Green No.3 Aluminum Lake]. In this case, 0.1 g of sample is dissolved in water to make 100 ml solution. In this case, an amount of sample is used so that it contains 0.1 g as color acid.

Loss on Drying When Yellow No.5 Aluminum Lake is dried for 6 hours at 135°C, the weight loss should not be more than 30%.

Assay Accurately weigh Food Yellow No.5 Aluminum Lake so that the volume of consumed 0.1 N titanium trichloride will be about 20 ml, and proceed as directed under Assay (1) in Coloring Matter Aluminum Lake Test.

$$1 \text{ ml of } 0.1 \text{ N titanium trichloride} = 10.21 \text{ mg of } \text{C}_{16}\text{H}_{12}\text{O}_7\text{N}_2\text{S}_2$$

136. Sodium Silicoaluminate

Definition Sodium Silicoaluminate a sodium aluminum silicate which contains Na_2O : Al_2O_3 : SiO_2 with a molar ration of 1:1:13.2.

Compositional Specifications of Sodium Silicoaluminate

Content Sodium Silicoaluminate, when calculated on the dried basis at 105°C for 2 hours, should contain within a range of 66.0~71.0% of silica (SiO_2), 9.0~13.0% of alumina (Al_2O_3), and 4.0~7.0% of sodium oxide (Na_2O).

Description Sodium Silicoaluminate is fine amorphous white powder or particle.

Purity (1) Arsenic : To 10 g of Sodium Silicoaluminate transfer into a 250 ml beaker, where 50 ml of 0.5 N hydrochloric acid is added. It is covered with a watch glass and boiled slowly until it boils. It is boiled gently for 15 minutes and cooling and the insoluble substances are settled. The supernatant is filtered though a Whatman No.4 filter paper or its equivalent. The insoluble substances and the beaker are washed 4 times with 10 ml each of hot water and added to the previous filtrate, where water is added to make 100 ml as the Test Solution. 2.5 ml of Test Solution is tested by Arsenic Limit Test and its content should not be more than 4 ppm.

(2) Lead : Accurately weigh 5.0 g of Sodium Silicoaluminate into a 150 ml beaker, add 30 ml of water. Add hydrochloric acid in small portion to the solution until the solid is dissolved throughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to bring the total volume to 100 ml. Add sodium hydroxide solution(1→4) or hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

(3) Mercury : When Sodium Silicoaluminate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Sodium Silicoaluminate is dried for 2 hours at 105°C , the

weight loss should not be more than 8%.

Loss on Ignition When Sodium Silicoaluminate is dried for 2 hours at 150°C. When thermogravimetric analysis is done with 5 g of the dried material at 900°C until the weight becomes constant, weight loss should be within a range of 8~11%.

Assay (1) Silicon Oxide : Sodium Silicoaluminate is dried for 2 hours at 105°C. 500 mg of dried additive is accurately weighed into a 250 ml beaker (inner wall of the beaker is washed with a small amount of water), where 30 ml of 72% perchloric acid and 15 ml of hydrochloric acid. It is then heated until thick white smoke is generated. After cooling, 70 ml of water is added to the solution, which is filtered through a Whatman No. 40 filter paper or its equivalent. The residue and the filter paper are washed with hot water until perchloric acid is removed. The residues along with that filter paper are transferred into a platinum crucible with a known weight. The filtrate is collected in a 250 ml Erlenmeyer flask for quantitative analysis of aluminum oxide. The content in the platinum crucible is carbonized and then heat-treated at 900°C until the weight becomes constant. It is then cooled and weighed. The residue is wetted with small amount of water, where 15 ml of hydrofluoric acid and 8 drops of sulfuric acid are added and heated on a hot plate until sulfite gas evolves. After cooling, 5 ml of water, 10 ml of hydrofluoric acid, and 3 drops of sulfuric acid added and evaporated to dryness on a hot plate. It is heated carefully until sulfite gas subsides. It is further heated at 900°C until the weight becomes constant. It is then cooled and weighed. The loss in weight is the weight of silicon dioxide. The residues are collected for quantitative analysis of aluminum oxide.

(2) Aluminum Oxide : 2 g of potassium pyrosulfate is added to the residues obtained in silicon dioxide test, which is heated until it melts completely. After cooling, 5 ml of water and 5 drops of sulfuric acid, which is heated until it is dissolved completely. Water is added if necessary. This solution is transferred into the Erlenmeyer flask in silicon dioxide test. Ammonia solution is added to the flask until aluminum hydroxide is completely dissolved while heating. To this solution, 50 ml of 0.05 M EDTA solution is added, which is heated gently for 5 minutes and cooled. 20 ml of pH 4.5 buffer solution (77.1 g ammonium acetate and 57 ml of glacial acetic acid are dissolved in water to make 1,000 ml solution), 20 ml of alcohol, and 2 ml of dithizone solution are added to the resulting solution while stirring. This is titrated with 0.05 M zinc sulfate solution until the color of the solution changes from greenish violet to red.

1 ml of 0.05 M EDTA solution = 2.549 mg Al_2O_3

- (3) Sodium Oxide : Sodium Silicoaluminate is dried at 105°C for 2 hours. Approximately 500 mg of dried material is precisely weighed into a platinum dish with a known weight. The content is wetted with 8~10 drops of water. After adding 25 ml of 70% perchloric acid and 10 ml of hydrofluoric acid, it is heated on a hot plate until thick white smoke of perchloric acid is generated. Again, 10 ml of hydrofluoric acid is added and it is heated on a hot plate until thick white smoke is generated. After cooling, the residue is dissolved in water to make 250 ml of solution. Atomic absorption spectrophotometer is adjusted so that transmission of water at 589.0 nm is 0 for water and transmission of a standard solution (200 g of sodium per 1 ml, using sodium chloride) is 100%. With a set of 3 standard solutions each containing 50, 100, 150 μg of sodium per 1 ml, transmission is measured and a calibration curve (% transmission vs. concentration) is prepared. With Test Solution, the concentration of sodium is measured from the calibration curve. The amount of sodium oxide is calculated from the following equation.

$$\text{Amount of sodium oxide (mg)} = (250C \times 1,348/1,000) - F$$

F is obtained by the following method and corresponds the amount of sodium sulfate that is included in the sample.

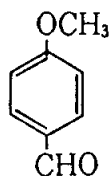
Sodium Silicoaluminate is dried for 2 hours at 105°C , 12.5 g of which is precisely weighed and mixed with 240 ml of water in a high speed blender for longer than 5 minutes. This mixture is transferred into a 250 ml volumetric flask and water is added to fill the flask, Test Solution. A stopper is placed and it is shaken to thoroughly mix the sample. Electrical conductivity is measured using an appropriate tester. Separately, a calibration curve is prepared using a set of standard solutions containing 50, 200, 500 mg of sodium sulfate per 100 ml. The concentration of sodium sulfate (C') is obtained in terms of mg from the calibration curve. F is obtained by the following equation

$$F = 0.437(2.5C' \times w/W)$$

w : amount of sample used in quantitative test of sodium oxide

W : amount of sample used to prepare test solution

137. Anisaldehyde



Chemical Formula $C_8H_8O_2$

Molecular Weight 136.15

Compositional Specifications of Anisaldehyde

Content Anisaldehyde should contain no less than 97.0% of anisaldehyde ($C_8H_8O_2$).

Description Anisaldehyde is a colorless to light yellow and transparent liquid having a characteristic odor.

Identification To 5 drops of Anisaldehyde, add 1 ml of sodium hydrogen sulfite solution, and shake. The mixture forms crystalline lumps. Add 7 ml of water, and shake. The crystalline lumps dissolve almost clearly.

Purity (1) Specific Gravity : Specific gravity should be within a range of 1.119~1.123.

(2) Refractive Index : Refractive Index n_D^{20} should be within a range of 1.571~1.574

(3) Clarity and Color of Solution : When 1 ml of Anisaldehyde is dissolved in 7 ml of 50% alcohol, the solution should be clear.

(4) Acid value : Acid value of Anisaldehyde is tested by Acid Value in Flavoring Substance Test. It should not be more than 6.

Assay Accurately weigh about 0.8 g of Anisaldehyde, and proceed as directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure, allow the mixture to stand for 15 minutes before titrating

1 ml of 0.5 N hydrochloric acid = 68.08 mg of $C_8H_8O_2$,

138. Adipic Acid

Chemical Formula $C_6H_{10}O_4$

Molecular Weight 164.14

Compositional Specifications of Adipic Acid

Content Adipic Acid should contain within a range of 99.6~101.0% of adipic acid ($C_6H_{10}O_4$).

Description Adipic Acid occurs as white crystals or crystalline powder. It is readily soluble in alcohol but hardly soluble in water.

Purity (1) Arsenic : With 0.25 g of Adipic Acid, Proceed as directed under (1) Purity in [Guar Gum] (not more than 4 ppm).

(2) Lead : When 5.0 g of Adipic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(3) Mercury : When Adipic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

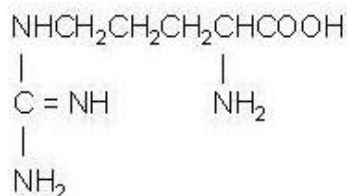
(4) Melting Point : Melting point of Adipic Acid should be within a range of 151.5~154.0°C.

Water Content Water content of Adipic Acid as determined by water content determination method (Karl-Fischer Method) should not be more than 0.2%.

Assay 1.5 g of this material is accurately weighed into a 250 ml Erlene Meyer flask with a stopper, where 75 ml of freshly boiled and cooled water is added. It is then titrated with 0.5 N sodium hydroxide solution (indicator : 2~3 drops of phenolphthalein solution).

1 ml of 0.5 N sodium hydroxide = 36.54 mg of $C_6H_{10}O_4$

139. L-Arginine



Chemical Formula $\text{C}_6\text{H}_{14}\text{N}_4\text{O}_2$

Molecular Weight 174.20

Compositional Specifications of L-Arginine

Content L-Arginine, when calculated on the dried basis, should contain within a range of 98.0~102.0% of L-arginine ($\text{C}_6\text{H}_{14}\text{N}_4\text{O}_2$).

Description L-Arginine is white crystallite or crystalline powder with unique scent and taste.

Identification (1) 1 ml of ninhydrine solution (1→50) is added to 5 ml aqueous solution of L-Arginine (1→1,000). Upon heating for 3 minutes in a water bath, this solution turns jade green.

(2) Aqueous solution of L-Arginine is alkaline.

Purity (1) Clarity and Color of Solution : When 1 g of L-Arginine is dissolved in 20 ml of water, the solution should be colorless and clear.

(2) pH : pH of L-Arginine solution (1→20) should be within a range of 10.5~12.5.

(3) Specific Rotation : Approximately 8 g of L-Arginine is accurately weighed, which is dissolved in 6 N hydrochloric acid so that the total volume becomes 100 ml. Optical rotation of the solution is measured. When it is translated to dried material, $[\alpha]_D^{20} = +25.0 \sim +27.9^\circ$

(4) Chlorides : When 0.07 g of L-Arginine tested by Chloride Limit Test, the detected amount should not be more than to the chloride content of 0.2 ml of 0.01 N hydrochloric acid.

(5) Arsenic : 0.25 g of L-Arginine is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(6) Lead : When 5.0 g of L-Arginine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

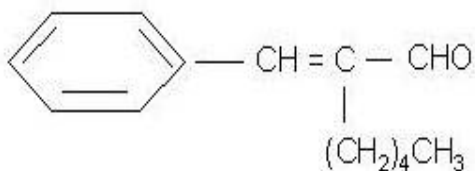
Loss on Drying When L-Arginine is dried for 3 hours at 105°C, the weight loss should not be more than 1.0%.

Residue on Ignition Residue after ignition should not be more than 0.2%.

Assay Approximately 0.2 g is accurately weighed and dissolved in 3 ml of formic acid, where glacial acetic acid (for non-aqueous titration) is added to bring the total volume to 50 ml. This solution is titrated with 0.1 N perchloric acid (indicator : 1 ml of crystal violet buffered in glacial acetic acid). At the end point, solution turns from pale violet to blue, then to green. Separately, a blank experiment is done following the same procedure.

1 ml of 0.1 N perchloric acid solution = 8.710 mg $\text{C}_6\text{H}_{14}\text{N}_4\text{O}_2$

140. α-Amylcinnamaldehyde



Chemical Formula $C_{14}H_{18}O$

Molecular Weight 202.30

Compositional Specifications of α-Amylcinnamaldehyde

Content α-Amylcinnamaldehyde should contain not less than 97.0% of α-Amylcinnamaldehyde ($C_{14}H_{18}O$)

Description α-Amylcinnamaldehyde is a light yellow to yellow and transparent liquid having a characteristic odor.

Identification (1) To 1 drop of α-Amylcinnamaldehyde, add 1 ml of water shake well, add 2 drops of sodium nitroprusside solution, add 2 drops of sodium hydroxide solution (3→10), and shake. A dark yellow color develops. Add 5 drops of diluted acetic acid. The color of the solution becomes lighter.

(2) Dissolve 5 ml of α-Amylcinnamaldehyde in 20 ml of ethanol. To this solution add solution 1.3 g in 5 ml of water containing 1.7 g of hydroxylamine hydrochloride, shake well, and allow to stand for about 90 minutes. White crystals are deposited Collect the crystals by filtration, and recrystallize using ethanol as the solvent. The melting point is approximately 75°C.

Purity (1) Specific Gravity : Specific gravity should be within a range of 0.963~0.968.

(2) Refractive Index : Refractive Index n_D^{20} should be within a range of 1.554~1.559.

(3) Clarity and Color of Solution Clear : When 1 ml of α-Amylcinnamaldehyde is dissolved in 4.5 ml of 80% alcohol, the solution should be clear.

(4) Acid Value : Acid value of α-Amylcinnamaldehyde is tested by Acid Value in Flavoring Substance Test. It should not be more than 5.

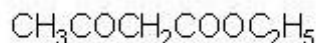
Residue on Ignition Residue after ignition should not be more than 0.05%.

Assay Accurately weigh about 1.5 g of α-Amylcinnamaldehyde, and proceed as

directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests, In the procedure, heat the mixture for 30 minutes before titrating.

1 ml of 0.5 N hydrochloric acid = 101.1 mg of $C_{14}H_{18}O$

141. Ethyl Acetoacetate



Chemical Formula $\text{C}_6\text{H}_{10}\text{O}_3$

Molecular Weight 130.14

Compositional Specifications of Ethyl Acetoacetate

Content Ethyl Acetoacetate should contain not less than 97.5% of ethyl acetoacetate ($\text{C}_6\text{H}_{10}\text{O}_3$).

Description Ethyl Acetoacetate is a colorless, transparent liquid having a characteristic odor.

Identification (1) Dissolve 1 ml of Ethyl Acetoacetate in 3 ml of ethanol, and add 1 drop of ferric chloride solution. A purple-red color develops.

(2) To 0.5 ml of Ethyl Acetoacetate, add 5 ml of 10% alcoholic solution of potassium hydroxide, warm in hot water for 5 minutes, and cool. To the solution, add 10 ml of water and 2 ml of diluted hydrochloric acid. The solution responds to the test for Acetate (C) in Identification.

Purity (1) Specific Gravity : Specific gravity should be within a range of 1.022~1.027

(2) Refractive Index : Refractive Index n_D^{20} should be within a range of 1.418~1.421

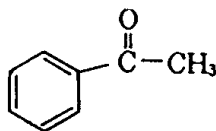
(3) Clarity and Color of Solution : When 1 ml of Ethyl Acetoacetate is dissolved in 3 ml of 30% alcohol, the solution should be clear.

(4) Free Acid : Measure 15 ml of Ethyl Acetoacetate, add 15 ml of freshly boiled and cooled water, shake for 2 minutes, and allow to stand. Measure 10 ml of the water layer, and add 2 drops of phenolphthalein solution and 3.4 ml of 0.1 N potassium hydroxide. A pink color develops.

Assay Accurately weigh about 0.8 g of Ethyl Acetoacetate, and proceed as directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure, allow the mixture to stand for 15 minutes before titrate

0.5 N hydrochloric acid 1 ml = 65.07 mg of $\text{C}_6\text{H}_{10}\text{O}_3$

142. Acetophenone



Chemical Formula $\text{C}_8\text{H}_8\text{O}$

Molecular Weight 120.15

Compositional Specifications of Acetophenone

Content Acetophenone should contain not less than 98.0% of Acetophenone ($\text{C}_8\text{H}_8\text{O}$).

Description Acetophenone occurs as white crystalline lumps or is a colorless or slightly yellowish and transparent liquid. It has a characteristic odor.

Identification (1) To 1 drop of Acetophenone, add 1 ml of water, shake well, add 2 drops of sodium nitroprusside solution, add 2 drops of sodium hydroxide solution (3 \rightarrow 10), and shake. A dark red color develops. Add 5 drops of diluted acetic acid. A deep blue color develops.

(2) 5 ml of a solution 5 g of semicarbazide hydrochloric acid salt and 5 g of potassium acetate are dissolved in 15 ml of water is added to 1 g of Acetophenone. When 5 ml of alcohol is added to this solution, white crystals are formed after mixing and settling. The crystals are recrystallized in dilute alcohol. The melting point is approximately 198°C.

Purity (1) Solidification Temperature : Solidification Temperature should not be less than 19°C.

(2) Refractive Index : Refractive Index n_D^{20} should be within a range of 1.533~1.535

(3) Clarity and Color of Solution : When 1 ml of Acetophenone is dissolved in 5 ml of 50% alcohol, the solution should be clear.

(4) Chlorides : When Acetophenone is tested by Copper Mesh Test Method in Halogenated Compounds for Flavoring, it should be appropriate.

Assay Accurately weigh about 1 g of Acetophenone, and proceed as directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests, In the procedure, heat the mixture for 1 hour before titrating.

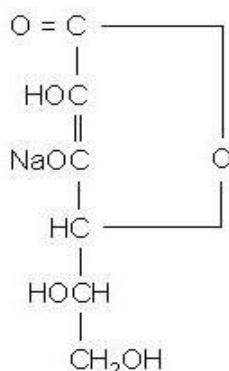
0.5 N hydrochloric acid 1 ml = 60.08 mg of $\text{C}_8\text{H}_8\text{O}$

143. Acetylated Distarch Adipate

Designation canceled

Date of Cancellation: 6.2. '97 (Notification No. 1997 - 31)

144. Sodium L-Ascorbate



Chemical Formula $\text{C}_6\text{H}_7\text{NaO}_6$

Molecular Weight 198.11

Compositional Specifications of Sodium L-Ascorbate

Content Sodium L-Ascorbate when calculated on the dried basis, should contain no less than 99.0% of Sodium L-Ascorbate ($\text{C}_6\text{H}_7\text{NaO}_6$).

Description Sodium L-Ascorbate occurs as white to yellowish white crystalline powder, granules, or fine granules. It is odorless and has a slightly salty taste.

Identification (1) 0.1 g of Sodium L-Ascorbate is dissolved in 100 ml of metaphosphoric acid solution (1→50) 100 ml. To 5 ml of this solution, iodine solution is drop-wise added until the solution turns pale yellow. 1 drop each of cupric sulfate solution (1→1,000) and pyrol are added to the resulting solution, which is heated for 5 minutes 50~60°C. The solution becomes blue~bluish green.

(2) When 1~2 drops of sodium 2,6-dichloroindohenol solution (0.1→100) are added to 10 ml of aqueous solution of Sodium L-Ascorbate (1→100), blue color of the solution disappears.

(3) Sodium L-Ascorbate responds to the test for Sodium Salt in Identification.

Purity (1) Specific Rotation : Approximately 1 g of Sodium L-Ascorbate is accurately weighed, which is dissolved in freshly boiled and cooled water so that the total volume becomes 10 ml. Optical rotation of the solution is measured. When it is translated to dried material, $[\alpha]_D^{20} = +103.0 \sim +108.0^\circ$

(2) pH : When Sodium L-Ascorbate proceed as directed under glass electrode method, pH of an aqueous solution (1→50) should be within a range of 6.5~8.0

(3) Arsenic : When 0.25 g of Sodium L-Ascorbate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4

ppm.

- (4) Lead : When 5.0 g of Sodium L-Ascorbate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (5) Mercury : When Sodium L-Ascorbate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying

When Sodium L-Ascorbate is dried for 24 hours in a vacuum desiccator, the weight loss should not be more than 0.5%.

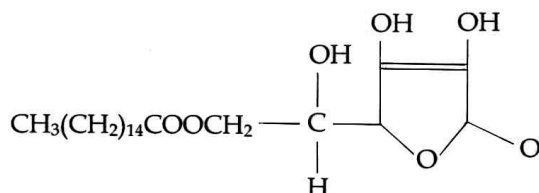
Assay

Accurately weigh about 0.2 g of Sodium L-Ascorbate, accurately dried, dissolve in 50 ml of metaphosphoric acid solution (1→50), and titrate with 0.1 N iodine (indicator: starch solution).

0.1 N iodine 1 ml = 9.906 mg of $C_6H_7NaO_6$

145. Ascorbyl Palmitate

Vitamin C palmitate



Chemical Formula $C_{22}H_{38}O_7$

Molecular Weight 414.54

Compositional Specifications of L-Ascorbyl Palmitate

Content Ascorbyl Palmitate should contain not less than 95.0% of L-ascorbyl palmitate ($C_{22}H_{38}O_7$)

Description Ascorbyl Palmitate is white~pale yellow powder with a fruity taste.

Identification Solution of Ascorbyl Palmitate in ethyl alcohol (1→10) decolorizes sodium 2,6-dichlorophenolindophenol solution (1→1,000).

Purity (1) Melting Point : Melting point of Ascorbyl Palmitate should be within a range of 107~117°C

(2) Specific Rotation : 1 g of Ascorbyl Palmitate is accurately weighed and dissolved in methyl alcohol to make 10 ml of solution. $[\alpha]_D^{20} = +21 \sim +24^\circ$ (as dried material).

(3) Arsenic : 0.25 g of Ascorbyl Palmitate transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Ascorbyl Palmitate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Mercury : When Ascorbyl Palmitate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Ascorbyl Palmitate is dried for 1 hours at 50~60°C in a vacuum desiccator, the weight loss should not be more than 2%.

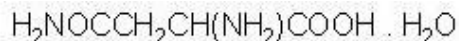
Residues on Ignition When thermogravimetric analysis is done with approximately 2 g of Ascorbyl Palmitate, the amount of residues should not be more than 0.1%.

Assay Approximately 0.3 g of Ascorbyl Palmitate is accurately weighed and dissolved in 50 ml of ethyl alcohol in an 250 ml Erlenmeyer flask, add 30 ml of water. It is then titrated with 0.1 N iodine solution until the solution becomes yellow.

1 ml of 0.1 N sodium thiosulfate = 20.73 mg of $C_{22}H_{38}O_7$

Storage Standards of L-Ascorbyl Palmitate

Should be stored in a light shielded hermetic container in a cold place.

146. L-AsparagineL- α -Aminosuccinamic AcidChemical Formula $\text{C}_4\text{H}_8\text{N}_2\text{O}_3 \cdot \text{H}_2\text{O}$

Molecular Weight 150.13

Compositional Specifications of L-Asparagine

Content If L-Asparagine is converted to a dried form, it should contain 98.0~102.0% L-asparagine ($\text{C}_4\text{H}_8\text{N}_2\text{O}_3$).

Description L-Asparagine is scentless white crystal or crystalline powder with slightly sweet taste.

Identification (1) 1 ml of ninhydrine solution (1→50) is added to 5 ml aqueous solution of L-Asparagine (1→1,000). Upon heating for 3 minutes in a water bath, this solution turns violet.

(2) 5 ml of sodium hydroxide solution (1→10) is added to 0.1 g of L-Asparagine, which is then heated in a water bath. The resulting gas (NH_3) turns water-wet litmus paper blue.

Purity (1) Clarity and Color of Solution : Solution of 1 g in 50 ml water should be clear.

(2) pH : Solution of 1 g in 100 ml water should have a pH range of 3.5~5.5.

(3) Specific Rotation : 10 g of L-Asparagine is accurately weighed, which is dissolved in 6 N hydrochloric acid so that the total volume becomes 100 ml. Optical rotation of the solution is measured. When it is translated to dried material, $[\alpha]_D^{20} = +33.0 \sim +36.5^\circ$

(4) Chlorides : When 0.07 g of L-Asparagine is tested by Chloride Limit Test, the detected amount should not be more than the chloride content of 0.2 ml of 0.01 N hydrochloric acid.

(5) Arsenic : 0.25 g of L-Asparagine transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be

more than 4 ppm.

- (6) Lead : When 5.0 g of L-Asparagine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5 ppm.

Loss on Drying When L-Asparagine is dried for 3 hours at 130°C, the loss should not be more than 12.5%.

Residue on Ignition Residue after ignition should not be more than 0.1%.

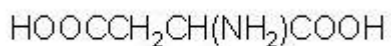
Assay Approximately 0.3 g is accurately weighed and dissolved in 3 ml of formic acid, where glacial acetic acid (for non-aqueous titration) is added to bring the total volume to 50 ml. This solution is titrated with 0.1 N perchloric acid solution (indicator : 1 ml of crystal violet buffered in glacial acetic acid). At the end point, the solution turns from pale violet to blue, then to green. Separately, a blank experiment is done following the same procedure.

0.1 N perchloric acid solution 1 ml = 13.212 mg $\text{C}_4\text{H}_8\text{N}_2\text{O}_3$

147. L-Aspartic Acid

L-Asparaginic Acid

L-Aminosuccinic Acid

Chemical Formula $\text{C}_4\text{H}_7\text{NO}_4$

Molecular Weight 133.10

Compositional Specifications of L-Aspartic Acid

Content If L-Aspartic Acid is converted to a dried form, it should contain 98.0~102.0% L-Aspartic acid ($\text{C}_4\text{H}_7\text{NO}_4$).

Description L-Aspartic Acid is scentless white crystal or crystalline powder with slightly sour taste.

Identification (1) 1 ml of ninhydrine solution (1→50) is added to 5 ml aqueous solution of L-Aspartic Acid (1→1,000). Upon heating for 3 minutes in a water bath, this solution turns jade green.

(2) L-Aspartic Acid is dissolved in 1 N hydrochloric acid (1→25). Upon adding 1 ml of sodium nitrite standard solution to 5 ml of this solution, colorless gas evolves with bubbles.

Purity (1) Clarity and Color of Solution : A solution of 1 g of L-Aspartic Acid in 20 ml of 1 N hydrochloric acid should be colorless and clear.

(2) pH : Saturated aqueous solution of L-Aspartic Acid should have pH of 2.5~3.5.

(3) Specific Rotation : 8 g of L-Aspartic Acid is accurately weighed, which is dissolved in 6 N hydrochloric acid so that the total volume becomes 100 ml. Optical rotation of the solution is measured. When it is translated to dried material, $[\alpha]_D^{20} = +24.0 \sim +26.0^\circ$

(4) Chlorides : When 0.07 g of L-Aspartic Acid is tested by Chloride Limit Test, the detected amount should not be more than the chloride content of 0.2 ml of 0.01 N hydrochloric acid.

(5) Arsenic : 0.25 g of L-Aspartic Acid transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If

carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

- (6) Lead : When 5.0 g of L-Aspartic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5 ppm.

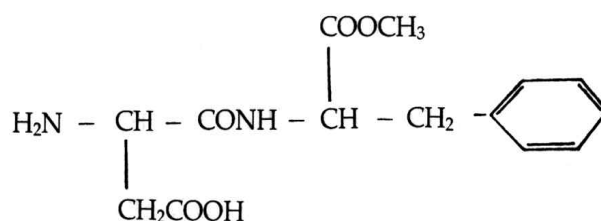
Loss on Drying When L-Aspartic Acid is dried for 3 hours at 105°C, the loss should not be more than 0.3%.

Residue on Ignition Residue after ignition should not be more than 0.1%.

Assay Approximately 0.3 g is accurately weighed and dissolved in 6 ml of formic acid, where glacial acetic acid (for non-aqueous titration) is added to bring the total volume to 50 ml. This solution is titrated with 0.1 N perchloric acid solution (indicator : 1 ml of crystal violet buffered in glacial acetic acid). At the end point, the solution turns from pale violet to blue, then to green. Separately, a blank experiment is done following the same procedure.

$$0.1 \text{ N perchloric acid solution } 1 \text{ ml} = 13.310 \text{ mg } \text{C}_4\text{H}_7\text{NO}_4$$

148. Aspartame



Chemical Formula $\text{C}_{14}\text{H}_{18}\text{N}_2\text{O}_5$

Molecular Weight 294.31

Compositional Specifications of Aspartame

Content Aspartame, when calculated on the dried basis, should contain within a range of 98.0~102.0% of aspartame ($\text{C}_{14}\text{H}_{18}\text{N}_2\text{O}_5$).

Description Aspartame occurs as a white crystalline powder or granules. It is odorless and has a strong sweet taste.

Identification (1) To 10 mg of Aspartame, add 3 ml of water and 2 ml of ninhydrin-hydrindantin solution (2 g of ninhydrin is dissolved in 75 ml of dimethylsulfoxide, where 62 mg of hydrindantin and 4 M acetate lithium buffer solution, pH 9.0 are added to make 100 ml of solution), and heat. A black-purple color develops.

(2) Dissolve 20 mg of Aspartame in 1 ml of methanol, add 0.5 ml of methanol saturated with hydroxylamine hydrochloride, mix, then add 0.3 ml of methanolic 35% potassium hydroxide solution, and boil in a water bath. Cool, adjust the pH to 1.0~1.5 with 0.1 N hydrochloric acid, and add 0.1 ml of ferric chloride solution (1→100). A deep red-purple color develops.

Purity (1) Clarity and Color of Solution : When 1 g of Aspartame is dissolved in 0.2 N hydrochloric acid to make 100 ml solution, it should be colorless and clear.

(2) pH : Weigh 0.8 g of Aspartame, and dissolve in water to make 100 ml. pH of This solution should be within a range of 4.5~6.0.

(3) Specific Rotation : Approximately 2 g of Aspartame is accurately weighed, which is dissolved in 15 N folic acid within 30 minutes so that the total volume becomes 50 ml. Optical rotation of the solution is measured. When it is translated to dried material, $[\alpha]_D^{20} = +12.5 \sim +17.5^\circ$

(4) Arsenic : 0.25 g of Aspartame is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4

ppm.

- (5) Lead : When 5.0 g of Aspartame is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) 5-Benzyl-3,6-Dioxo-2-Piperazine Acetic Acid : Weigh 10 mg of Aspartame, place into a test tube 3 ml with a stopper, add 1.0 ml of silylation solution, stopper, and shake. Heat at 80°C for 30 minutes, shake for 15 seconds, allow to cool, and use as the test solution. Measure separately 3.0 ml of a standard solution, place into a test tube with a stopper, evaporate to dryness on a water bath, add 1.0 ml of silylation solution to the residue, and proceed as in the case of the sample. Use this solution as the reference solution. Perform Gas Chromatography under the operation conditions given below. The content should not be more than 1.5%.

5-benzyl-3,6-dioxo-2-piperazine acetate content (%)

$$= St(mg) \times \frac{\text{peak height of } Sa}{\text{peak height of } St} \times \frac{1}{Sa(mg)} \times \frac{100}{167}$$

Operation Conditoins

- Injector : Microtech 220 or its equivalent.
- Column : inner diameter 3~4 mm, length 2 m glass tube
- Column filler : 80~100 Mesh Schupelcoport or its equivalent, approximately 3% of porous support for gas chromatography
- Detector : hydrogen flame ionization detector (FID)
- Temperature at injection port : 200°C
- Column temperature : 200°C
- Detector temperature : 275°C
- Carrier gas and flow rate : nitrogen, flow rate is adjusted so that 5-benzyl-3,6-dioxo-2-piperazineacetic acid is detected after about 7~9 minutes

Solutions

- Silylation Solution : N,O-bis(trimethylsilyl)acetamide and dimethylforma is mixed at a ratio of 3 : 2 Prepared before use
 - Standard Solution : 25 mg of 5-benzyl-3,6-dioxo-2-piperazine aceate standard is accurately weighed into a 50 ml flask and dissolved in methyl alcohol to make 50 ml solution. 10 ml of this solution is diluted to 100 ml with methyl alcohol.
- (7) Transmittance : 1% of Aspartame in 2 N hydrochloric acid should have the absorbance of 0.022 at 430 nm (spectrophotometer, 1cm path length, reference solution : 2 N hydrochloric acid)

Loss on Drying When Aspartame is dried for 4 hours at 105°C, the loss should not be more

than 4.5%.

Residue on Ignition Residue after ignition should not be more than 0.2%.

Assay Approximately 0.3 g of Aspartame is accurately weighed and dissolved in 3 ml of formic acid. After adding 50 ml of glacial acetic acid to this solution, it is titrated with 0.1 N perchloric acid (indicator : 0.5 ml of α -naphthol benzene). The end point is where the solution changes its color from brown to green. Separately, a blank test is carried out for the correction by the same method and it is converted into a dried form.

$$1 \text{ ml of } 0.1 \text{ N perchloric acid} = 29.431 \text{ mg } \text{C}_{14}\text{H}_{18}\text{N}_2\text{O}_5$$

149. Azodicarbonamide

Chemical Formula $\text{C}_2\text{H}_4\text{N}_4\text{O}_2$

Molecular Weight 116.08

Compositional Specifications of Azodicarbonamide

Content Azodicarbonamide, when calculated on the dried basis, should contain not less than 98.6% of azodicarbonamide ($\text{C}_2\text{H}_4\text{N}_4\text{O}_2$).

Description Azodicarbonamide is yellow~orange red scentless crystalline powder.

Identification (1) A solution of 35 mg of Azodicarbonamide in 1000 mL of water exhibits an ultraviolet absorption maximum at a wavelength of 245 nm.

(2) 10 mg of Azodicarbonamide transfer into a crucible and heat and add a few drops of barium hydroxide standard solution, the liquid turns turbid.

Purity (1) pH : To 2 g of Azodicarbonamide, add 100 ml of water and suspend for 5 minutes. Using a glass electrode, pH of this suspension should not less than 5.0.

(2) Arsenic : 0.25 g of Azodicarbonamide transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(3) Lead : When 5.0 g of Azodicarbonamide is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Nitrogen : 50 mg of Azodicarbonamide transfer into a 100 ml flask for decomposition. To decompose Azodicarbonamide, 3 ml of freshly prepared 57% hydroiodic acid solution is added and then heated for 1 hour and 30 minutes. Sufficient amount of water is added to maintain the initial volume of the liquid. After decomposition is complete, the flask is heated at a higher temperature so that the volume is reduced to 1/2. After cooling, the liquid is continuously decomposed and tested by Kjeldahl Nitrogen Test (nitrogen determination method) and the amount should be within a range of 47.2~48.7%.

Loss on Drying When Azodicarbonamide is dried for 2 hours at 50°C under a reduced pressure, weight loss should not be more than 0.5%.

Residue on Ignition Residue on ignition of Azodicarbonamide should not be more than 0.15%.

Assay Accurately weigh 225 mg of dried material transfer into a 250 ml iodine flask with a glass stop cock, and dissolve with 25 ml dimethylsulfoxide (DMSO). After adding 5 g of potassium iodide, 15 ml of water, and 10 ml of hydrochloric acid, the stop cock is quickly placed on the flask, which is then kept in a dark place for 20~25 minutes (it needs to be shaken until potassium iodide is dissolved). Free iodine is titrated with 0.1 N sodium thiosulfate (indicator : starch standard solution). Separately, a blank test is done following the same procedure.

1 ml of 0.1 N sodium thiosulfate solution = 5.804 mg $\text{C}_2\text{H}_4\text{N}_4\text{O}_2$

150. Sodium Nitrite

Chemical Formula NaNO_2

Molecular Weight 69.00

Compositional Specifications of Sodium Nitrite

Content Sodium Nitrite, when calculated on the dried basis, should contain not less than 97.0% of sodium nitrite (NaNO_2).

Description Sodium Nitrite occurs as white to light yellow crystalline powder or granular or rod-shaped lumps.

Identification Sodium Nitrite responds to the tests for Sodium Salt and Nitrite in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Sodium Nitrite is dissolved in 20 ml of water, the solution should be almost clear.

(2) Chloride : 1 g of Sodium Nitrite dissolve in water to make 500 ml. Take 10 ml of this solution, add 3 ml of diluted acetic acid. and warm gradually. After the gas is no longer evolved, add 6 ml of diluted nitric acid. When test by Chloride Limit Test limit test is carried out with this test solution, its content should not be more than the amount that corresponds to 0.40 ml of 0.01 N hydrochloric acid.

(3) Sulfate: 1 g of Sodium Nitrite dissolve in water to make 100 ml. Take 10 ml of this solution, add 1 ml of hydrochloric acid. 1 ml of diluted hydrochloric acid and 20 ml water is added to the residue, which is then dissolved Test by Sulfate Limit Test limit test. The content should not be more than the amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.

(4) Arsenic : Dissolve 0.25 g of Sodium Nitrite in 5 ml of water, add 2 ml of hydrochloric acid, evaporate to dryness in a water bath. Dissolve the residue in 5 ml of water. The solution test by Arsenic Limit Test, it should not be more than 4 ppm.

(5) Lead : Accurately weigh 5.0 g of Sodium Nitrite into a 150 ml beaker, add 30 ml of water. Add hydrochloric acid in small portion to the solution until the solid is dissolved thoroughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool and add water to make 100 ml. Add sodium hydroxide solution(1→4) or hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water

bath. Add 3 ml of nitric acid to the residue and heat it until nearly evaporated. Add 0.5 ml of nitric acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

2% APDC Solution : 2.0 g of ammonium pyrolidine dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

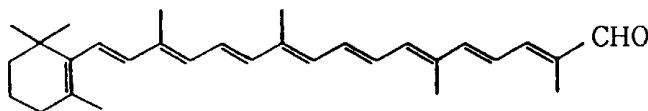
(6) Mercury : When Sodium Nitrite is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Sodium Nitrite is dried for 5 hours at 100°C, the loss should not be more than 3%.

Assay 1 g of Sodium Nitrite, previously dried and accurately weighed, dissolve in water to make 100 ml, and use this solution as solution A. Weigh exactly 40 ml of 0.1 N potassium permanganate, transfer into an erlenmeyer flask, and add 100 ml of water and 5 ml of sulfuric acid. Take 10 ml of solution A while keeping the tip of the pipette below the surface of the liquid in an erlenmeyer flask. Allow to stand for 5 minutes, add 25 ml of 0.1 N oxalic acid, exactly measured. warm to about 80°C, and titrate the excess oxalic acid with 0.1 N potassium permanganate while hot. Perform a blank test in the same manner

1 ml of 0.1 N potassium permanganate = 3.450 mg of NaNO_2

151. β -Apo-8'-Carotenal



Chemical Formula $C_{30}H_{40}O$

Molecular Weight 416.65

Compositional Specifications of β -Apo-8'-Carotenal

Content β -Apo-8'-Carotenal should contain not less than 96.0% β -Apo-8'-Carotenal($C_{30}H_{40}O$).

Description β -Apo-8'-Carotenal is deep violet crystal or crystalline powder with metallic gloss.

Identification (1) 40 mg of β -Apo-8'-Carotenal, accurately weighed, transfer into a 100 ml volumetric flask. It is then dissolved in 10 ml of acid free chloroform and cyclohexane is added to bring the total volume to 100 ml. 2 ml of this solution transfer into a 50 ml volumetric flask, which is then filled with cyclohexane (solution A). Take 5 ml of solution transfer into 50 ml, which is then filled with cyclohexane (solution B). Absorption of solution B is measured is at 460 nm and 488 nm. Absorption ratio $[A_{488}/A_{460}]$ should be within a range of 0.77~0.85.

(2) Absorption of solution B, as prepared following procedure (1), is measured is at 460 nm and absorption of solution A is measured at 332 nm. Absorption ratio $[A_{332}/10 \times A_{460}]$ should be within a range of 0.063~0.075.

(3) 0.1 g of β -Apo-8'-Carotenal dissolve in 10 ml of acetone, add 5% sodium nitrite solution and 1 N sulfuric acid, its color disappears.

(4) 0.1 g of β -Apo-8'-Carotenal dissolve in 10 ml of chloroform, add antimony trichloride solution, it turns blue.

Purity (1) Arsenic : Proceed as directed under Purity (1) in [Guar Gum] (not more than 4 ppm).

(2) Lead : When 5.0 g of β -Apo-8'-Carotenal is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(3) Cadmium : When 5.0 g of β -Apo-8'-Carotenal is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When β -Apo-8'-Carotenal is tested by Mercury Limit Test, its content

should not be more than 1.0 ppm.

- (5) **Accessory Pigments** : 0.25 mm thin layer silica gel plate is wetted by immersing it in 3% potassium hydroxide solution in methyl alcohol. After drying for 5 minutes in air, the plate is activated by heating at 110°C for 1 hour, which is then kept in a desiccator (calcium chloride). 80 mg of β -Apo-8'-Carotenal is dissolved in 100 ml of chloroform. 400 μ l of this solution is spotted at 2cm from the bottom of thin layer plate, which is then developed to approximately 10 cm in a bath saturated developing with n-cyclohexane, chloroform, and ethyl acetate (70 : 20 : 10). This is to be carried out in a light shielded hermetic container. The thin layer plate is dried at room temperature and the spot is marked. Thin layer of developed β -apo-8'-carotenal is scraped off into a 100 ml centrifuge tube and 40 ml of chloroform is added, which is then shaken for 10 minutes and centrifuged for 5 minutes (Solution A₁). Thin layer of other developed carotinoids is scraped off and 20 ml of chloroform is added, which is then shaken for 10 minutes and centrifuged for 5 minutes (Solution A₂). Solution A₃ is prepared by taking 10 ml of A₁ and bringing the total volume to 50 ml with chloroform. Using chloroform as a reference, optical absorption of A₂ and A₃ is measured at 474 nm using 1 cm path length. The content of other carotinoids, as obtained by the equation below, should not be more than 3%.

$$\text{Content of other carotinoids (\%)} = \frac{A_2 \times 10}{A_3}$$

- (6) **Melting Point** : Melting point of β -Apo-8'-Carotenal should be within a range of 136~142°C.

Residue on Ignition When thermogravimetric analysis is done with 2 g of β -Apo-8'-Carotenal, the amount of residue should not be more than 0.1%.

Loss on Drying When β -Apo-8'-Carotenal is dried in a vacuum desiccator (sulfuric acid) for 4 hours, the loss should not be more than 0.2%.

Assay 40 mg of β -Apo-8'-Carotenal is accurately weighed into a 100 ml mess flask and dissolved in 10 ml acid-free chloroform, which is then filled with cyclohexane. 2 ml of this solution is then transferred into a 50 ml mess flask, which is then filled with cyclohexane. Again, 5 ml of this solution is transferred into a 50 ml mess flask, which is filled with cyclohexane, Test Solution. Using cyclohexane as a reference, absorption of the resulting test solution is measured at 460 nm with 1cm path length. The content of β -apo-8'-carotenal is obtained using the following equation.

$$\text{Content of } \beta\text{-apo-8'-carotenal (\%)} = \frac{25,000 \times A}{264}$$

A : Absorption of test solution

264 : Absorption of pure β -apo-8'-carotenal ($E_{1cm}^{1\%}$)

152. Sodium Sulfite

Chemical Formula Na_2SO_3

Molecular Weight 126.04

Definition Sodium Sulfite occurs as crystals (heptahedra) called Sodium Sulfite (crystal) or as anhydrous called Sodium Sulfite (anhydrous).

Compositional Specifications of Sodium Sulfite

Content Sodium Sulfite, when calculated on the anhydrous basis, should contain not less than 95.0% of sodium sulfite (Na_2SO_3).

Description Sodium Sulfite occurs as colorless to white crystals or as a white powder.

Identification Sodium Sulfite responds to the tests for Sodium Salt (A) & (B) and Sulfite in Identification.

Purity In the case of Sodium Sulfite (crystal), weigh two times as much as the quantity of the sample prescribed in Purity, and perform the test.

- (1) Clarity and Color of Solution : When 0.5 g of Sodium Sulfite dissolve in 10 ml of water, the solution should be Almost clear.
- (2) Arsenic : When 2.5 g of Sodium Sulfite dissolve in water to make 25 ml. To 5 ml of this solution, add 1 ml of sulfuric acid, which is concentrated to approximately 2 ml by evaporation. The concentrate is diluted to 10 ml. 5 ml of the resulting solution is tested by Arsenic Limit Test (not more than 4 ppm, when calculated on the anhydrous basis).
- (3) Lead : Accurately weigh 5.0 g of Sodium Sulfite transfer into a 150 ml beaker, add 30 ml of water. Add hydrochloric acid in small portion to the solution until the solid is dissolved throughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to make 100 ml. Add sodium hydroxide solution(1→4) or hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of nitric acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

- (4) Selenium : 2.0 g of Sodium Sulfite, precisely weighed, transfer into a 50 ml beaker, add 10 ml of water and 5 ml of hydrochloric acid and boil to remove sulfur dioxide, Test Solution. Separately, 1.0 g of Sodium sulfite is precisely weighed into a beaker, where 0.05 ml of selenium standard solution is added. Then a reference solution is prepared by the same manner as for test solution. 2 g of hydrazin sulfate is added into each beaker, heated and dissolved. After setting for 5 minutes, the resulting solution is transferred into a Nestler cylinder with adding water to make 50 ml. The red color of this test solution should not be deeper than that of reference solution. (Not more than 5 ppm)
- (5) Iron : When 5.0 g of Sodium Sulfite is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 10 ppm.
- (6) Mercury : When Sodium Sulfite is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Thiosulphate : When the 10% aqueous solution of Sodium Sulfite is acidified with Sulfuric Acid or hydrochloric acid, it should be transparent (not more than 0.1%).

Assay A quantity of Sodium Sulfite corresponding to approximately 0.25 g of Sodium Sulfite (anhydrous) transfer into a flask with a stopper, dissolve in 50 ml of 0.1 N iodine solution. After settling for 5 minutes with a stopper, 2 ml of dilute hydrochloric acid (2→3) is added. An excess amount of iodine is titrated with 0.1 N sodium thiosulfate solution. (indicator: starch solution)

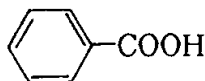
$$1 \text{ ml of } 0.1 \text{ N iodine solution} = 6.302 \text{ mg Na}_2\text{SO}_3$$

$$\text{Content of sodium sulfite (Na}_2\text{SO}_3) (\%) = a \times \frac{6.302 \times (50 - V)}{\text{weight of sample (g)} \times 10}$$

a Crystals : 2
Anhydrous : 1

V : 0.1 N amount of sodium thiosulfate solution (ml)

153. Benzoic Acid



Chemical Formula $C_7H_6O_2$

Molecular Weight 122.12

Compositional Specifications of Benzoic Acid

Content Benzoic Acid, when calculated on the dried basis, should contain not less than 99.5% of benzoic acid ($C_7H_6O_2$)

Description Benzoic Acid occurs as white laminar crystals or needles. It is odorless or has a slight odor of benzaldehyde.

Identification Dissolve Benzoic Acid in sodium hydroxide solution (1→20). The Solution responds to the test for Benzoate.

Purity (1) Melting Point : Melting point of Benzoic Acid should be within a range of 121~123°C

(2) Chlorinated Compounds : Weigh 0.5 g of Benzoic Acid and 0.7 g of calcium carbonate, transfer into a porcelain crucible, add a small amount of water, mix, dry at 100°C, and heat at about 600°C for 10 minutes. After cooling, add 20 ml of diluted nitric acid to dissolve the residue, and filter. Wash the insoluble substances with about 15 ml of water, combine the washings and the filtrate, add water to make 50 ml. This solution as the test solution. Weigh 0.7 g of calcium carbonate, dissolve in 20 ml of diluted nitric acid, filter if necessary, add 0.2 ml of 0.01 N hydrochloric acid and water shake well, and allow to stand for 5 minutes. This solution as the reference solution. The test solution is not more turbid than the reference solution.

(3) Phthalic acid : 0.1 g of Benzoic Acid transfer into a test tube, where freshly sublimed 2~3 mg of resorcin and 1 ml of sulfuric acid are added and shaken. It is heated for 5 minutes at 125~130°C. After cooling, water is added to make 5 ml of solution. While cooling, it is alkalinized by adding sodium hydroxide solution (2→5) drop-wise. The resulting solution is diluted to 10 ml with water. It should not show green fluorescence under UV.

(4) Arsenic : 0.25 g of Benzoic Acid transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric

acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

- (5) Lead : When 5.0 g of Benzoic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Mercury : When Benzoic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Readily Carbonizable Substances : When 0.5 g of Benzoic Acid is tested for Readily Carbonizable Substances, its color should not be darker than the color standard solution Q.
- (8) Readily Oxidizable Substances : Add 1.5 ml of sulfuric acid to 100 ml of water, add drop wise 0.1 N potassium permanganate while boiling until the pink color persists for 30 seconds. Weigh 1 g of Benzoic Acid, and dissolve in the solution. Titrate with 0.1 N potassium permanganate at about 70°C until the pink color persists for 15 seconds. The amount is not more than 0.5 ml.

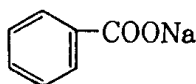
Loss on Drying When Benzoic Acid is dried for 3 hours in a vacuum desiccator (silica gel), the loss should not be more than 0.5%.

Residue on Ignition Residue after ignition should not be more than 0.05%.

Assay Accurately weigh about 0.25 g of Benzoic Acid, after dried, dissolve in 25 ml of 50% v/v ethanol neutralized with 0.1 N sodium hydroxide, and titrate with 0.1 N sodium hydroxide (indicator : 3 drops of phenol red solution).

$$1 \text{ ml of } 0.1 \text{ N sodium hydroxide} = 12.21 \text{ mg of } \text{C}_7\text{H}_6\text{O}_2$$

154. Sodium Benzoate



Chemical Formula $\text{C}_7\text{H}_5\text{NaO}_2$

Molecular Weight 144.11

Compositional Specifications of Sodium Benzoate

Content Sodium Benzoate, when calculated on the dried basis, should contain not less than 99.0% of sodium benzoate ($\text{C}_7\text{H}_5\text{NaO}_2$).

Description Sodium Benzoate occurs as white crystalline powder or granules. It is odorless.

Identification Sodium Benzoate responds to Sodium Salt and Benzoate in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Sodium Benzoate is dissolved in 5 ml of water, the solution should be colorless and clear.

(2) Free Acid and Free Alkali : Weigh 2 g of Sodium Benzoate, dissolve in 20 ml of boiling water, and add 2 drops of phenolphthalein solution and 0.2 ml of 0.1 N sulfuric acid. The solution is colorless. To this solution, add 0.4 ml of 0.1 N sodium hydroxide. The color of the solution become to red.

(3) Chlorinated Compounds : Weigh 0.5 g of Sodium Benzoate and 0.8 g of calcium carbonate. transfer into a porcelain crucible, add 2.5 ml of diluted nitric acid, and mix thoroughly. Dry at 100°C , follow the procedure in Purity (2) for [Benzoic Acid]. To prepare a reference solution, use 0.8 g of calcium carbonate and 22.5 ml of diluted nitric acid.

(4) Sulfate : Weigh 0.2 g of Sodium Benzoate, dissolve in water to make 100 ml, measure 40 ml of this solution, and add drop wise 2.5 ml of diluted hydrochloric acid while shaking well. Filter, wash with water, combine the filtrate and the washings, Test Solution. Test by Sulfate Limit Test. The content should not be more than the amount corresponding to 0.5 ml of 0.01 N sulfuric acid.

(5) Phthalate : Proceed as directed under Purity (3) in 「Benzoic Acid」

(6) Arsenic : When 0.25 g of Sodium Benzoate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(7) Lead : When 5.0 g of Sodium Benzoate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content

should not be more than 2.0 ppm.

(8) Mercury : When Sodium Benzoate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(9) Readily Carbonizable Substances : When 0.5 g of Sodium Benzoate is tested for Readily Carbonizable Substances, its color should not be darker than the color standard solution Q.

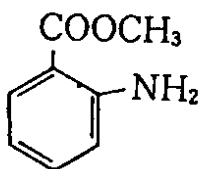
(10) Readily Oxidizable Substances : Add 1.5ml of sulfuric acid to 100 ml of water, heat to boiling and add 0.1N potassium permanganate, dropwise, until the pink colour persists for 30 sec. Dissolve 1 g of Sodium Benzoate, in the heated solution, and titrate with 0.1N potassium permanganate to a pink colour that persists for 15 sec at 70 °C. Not more than 0.5 ml should be required.

Loss on Drying When Sodium Benzoate is dried for 4 hours at 110°C, the loss should not be more than 1%.

Assay About 1.5 g of Sodium Benzoate, previously dried and accurately weighed, transfer into a 300 ml flask with a ground-glass stopper, dissolve in 25 ml of water adding 75 ml of ether, and 5 drops of methyl orange reagent titrate with 0.5 N hydrochloric acid. Perform the titration while mixing the water and ether layers well by shaking. Titrate until a light green color persists in the water layer.

1 ml of 0.5 N hydrochloric acid = 72.06 mg of $C_7H_5NaO_2$

155. Methyl Anthranilate



Chemical Formula $C_8H_9NO_2$

Molecular Weight 151.16

Compositional Specifications of Methyl Anthranilate

Content Methyl Anthranilate should contain not less than 98.0% of methyl anthranilate ($C_8H_9NO_2$).

Description Methyl Anthranilate occurs as colorless to light yellow lumps or is a colorless to light yellow liquid. It has a grape-like odor. The liquid shows a characteristic fluorescent blue-purple color.

Identification (1) Dissolve 0.1 g of Methyl Anthranilate in diluted hydrochloric acid (1 → 10). Add 1 ml of sodium nitrite solution and 2 ml of the solution prepared by dissolving 0.1 g of β -naphthol in 5 ml of sodium hydroxide solution. An orange-red precipitate is formed.

(2) To 1 g of Methyl Anthranilate, add 5 ml of 10% alcoholic solution of potassium hydroxide, and heat in a water bath. Add 5 ml of water while hot. Then cooling, and add 4 ml of diluted hydrochloric acid. A white to gray-white precipitate is formed.

Purity (1) Solidification Temperature : Solidification Temperature should of Methyl Anthranilate should not be less than 23.8°C.

(2) Clarity and Color of Solution : 1.0 ml of Methyl Anthranilate melted at 30°C by warming, and dissolve in 6 ml of 60% ethanol. This solution should be clear.

(3) Refractive Index : Refractive Index n_D^{20} of Methyl Anthranilate should be within a range of 1.582~1.584

(4) Acid Value : Acid value of Methyl Anthranilate is tested by Acid Value and in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 0.5 g of Methyl Anthranilate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N ethanolic potassium hydroxide = 75.58 mg of $C_8H_9NO_2$

156. Sodium Alginate

Compositional Specifications of Sodium Alginate

Content Sodium Alginate, when calculated on the dried basis, should contain not less than 90.0% of sodium alginate.

Description Sodium Alginate occurs as a white to yellowish-white powder. It is tasteless and almost odorless.

Identification (1) To 0.5 g of Sodium Alginate, add 50 ml of water in small portions while stirring, warm at 60~70°C for 20 minutes while stirring occasionally to make the solution homogeneous, and cool. Use this solution as the test solution.

(A) To 5 ml of the test solution, add 1 ml of calcium chloride solution. A gelatinous precipitate is formed immediately.

(B) To 10 ml of the test solution, add 1 ml of diluted sulfuric acid (1→20). A gelatinous precipitate is formed immediately.

(C) To 1 ml of the test solution, add 1 ml of ammonium sulfate saturated solution. No precipitate is formed.

(2) The residue on ignition of Sodium Alginate responds to the test for Sodium Salt in Identification.

Purity (1) pH : Weigh 0.5 g of Sodium Alginate, add in small portions to 50 ml of water while stirring, warm at 60~70°C for 20 minutes while stirring occasionally to make the solution homogeneous, cool and measure under glass electrode method. pH of the solution should be within a range of 6.0~8.0

(2) Sulfate : To 0.1 g of Sodium Alginate, add 20 ml of water to make it pasty, add 1 ml of hydrochloric acid, shake well, heat in a water bath for several minutes, cool, and filter. Wash a beaker three times with 10 ml of water each time, filter the washings through the filter paper used above, combine the filtrates, and add water to make 50 ml. Measure 10 ml of this solution, and add water to make 50 ml. Test by Sulfate Limit Test. To Prepare Reference solution, to 0.4 ml of 0.01 N sulfuric acid, add 1 ml of diluted hydrochloric acid (1→4) and water to make 50 ml.

(3) Arsenic : 0.25 g of Sodium Alginate transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not

- be more than 4 ppm.
- (4) Lead : When 5.0 g of Sodium Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
- (5) Cadmium : When 5.0 g of Sodium Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Mercury : When Sodium Alginate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Phosphate : To 0.1 g of Sodium Alginate, add in small portions to 20 ml of water while stirring, and warm at 60~70°C for 20 minutes while stirring occasionally to make the solution homogeneous. Cool, add 5 ml of diluted nitric acid (1→4) and 20 ml of ammonium molybdate solution, and warm. No yellow precipitates are formed.
- (8) Total Viable Aerobic Count : When Sodium Alginate is tested by Microbe Test Methods for Total Viable Aerobic Count (Number of General Germs) in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 5,000 per 1 g
- (9) E. coli : When sodium alginate is tested by Microbe Test Methods for E. coli in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).
- (10) Salmonella : When Sodium Alginate is tested by Microbe Test Methods for Salmonella in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).
- (11) Fungi : When Sodium Alginate is tested by Microbe Test Methods for Fungi in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 500 per 1 g

Loss on Drying When Sodium Alginate is dried for 4 hours at 105°C, the loss should not be more than 15%.

Residue on Ignition Sodium Alginate is dried for 4 hours at 105°C. When thermogravimetric analysis is done with approximately 1 g of dried material, weight the amount of residues should be within a range of 33~37%.

Assay Glass filter (1G4) is dried for 30 minutes at 80°C under vacuum, cooled in a desiccator, and weighed accurately. Approximately 0.5 g of Sodium Alginate, previously dried and accurately weighed, dissolve in 10 ml of sodium hydroxide solution (1→25), add 90 ml of water. It is filtered, if necessary. To this solution, 15 ml of hydrochloric acid (1→3) and 100 ml of 90% alcohol are added, which is well shaken and set-aside

for 2 hours. It is centrifuged and the supernatant is discarded. 10 ml of 90% alcohol is added to the residues, which is well shaken and centrifuged. The supernatant is discarded. This is repeated until the supernatant does not show a reaction of chlorides. The resulting residues are filtered through the glass filter using 90% alcohol. The residue is washed with acetone, which is dried for 1 hour at 80°C under vacuum. It is set-aside in a desiccator and accurately weighed. The content is calculated by the following equation.

$$\text{Content of Sodium Alginate(\%)} = \frac{1.125 \times \text{weight of residue (g)}}{\text{Weight of sample (g)}} \times 100$$

157. Propylene Glycol Alginate

Compositional Specifications of Propylene Glycol Alginate

Description Propylene Glycol Alginate occurs as a white to yellowish~white coarse or fine powder. It is almost odorless.

Identification To 1 g of Propylene Glycol Alginate, add 100 ml of water to produce a pasty solution. Use this solution as the test solution.

- (1) To 5 ml of the test solution, add 5 ml of lead acetate solution. It immediately solidifies into a gelatinous state.
- (2) To 10 ml of the test solution, add 1 ml of sodium hydroxide solution, heat in a water bath for 5~6 minutes, cool, and add 1 ml of diluted sulfuric acid. It immediately solidifies to a gelatinous state.
- (3) To 1ml of the test solution, add 4 ml of water, and shake vigorously. Effervescence persists.

Purity (1) Arsenic : 0.25 g of Propylene Glycol Alginate transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Lead : When 5.0 g of Propylene Glycol Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(3) Cadmium : When 5.0 g of Propylene Glycol Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When Propylene Glycol Alginate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Total Propylene Glycol : 1 g of Propylene Glycol Alginate, precisely dried and accurately weighed, transfer into a 400 ml beaker, dissolve in 100 ml distilled water. Add 50 ml of 0.1N sodium hydroxide solution and stir for 30 min. At the end of this period, neutralize with 0.1N hydrochloric acid and precipitate the gum with 25 ml of a 5% calcium chloride solution. Filter the mixture using filter paper collecting

the filtrate in a 250 ml volumetric flask. Wash the precipitate with several small portions of distilled water combining the washing with the filtrate and dilute to 250 ml with distilled water, test solution. Pipette a 25 ml aliquot of the test solution and 25 ml of the periodic acid solution into a 250ml conical flask, swirl and let stand for 30 min. At the end of this period, add 2 g of potassium iodide and titrate with 0.1N sodium thiosulfate using 1% starch solution as an indicator. Perform a blank determination using 50 ml of distilled water and 25 ml of the periodic acid solution. The content of total Propylene Glycol calculated by the following equation. Its content should be within a range of 15~45%.

$$\text{Propylene Glycol(\%)} = \frac{3.8 \times (A - B)}{W}$$

A : 0.1 N sodium thiosulfate consumed used for a blank (ml)

B : 0.1 N sodium thiosulfate consumed used for test solution (ml)

W : Weight of the sample (g)

Periodic Acid Solution : To 5.5 g of iodic acid, add 200 ml of water add glacial acetic acid to make 1,000ml.

(6) Free Propylene Glycol : Accurately weigh 2 g of Propylene Glycol Alginate, previously dried, transfer into flask and add 80 ml of isopropyl alcohol, attach a reflux condenser, heat for 3 hours in a water bath. Allow the solution to cool to room temperature, then determine the quantity of free propylene glycol as described under the procedure for (5) Purity. This content of total Propylene glycol should not be more than 15 %.

(7) Degree of Esterification : Degree of Esterification of Propylene Glycol Alginate is calculated by the following equation and its value should not be less than 75%.

$$\text{Degree of Esterification (\%)} = 100 - (a+b+c)$$

a, b, and c are obtained from (1), (2), and (3).

A : content of free alginic acid (%)

b : content of sodium alginate (%)

c : content of insoluble ash (%)

(A) Free Alginic Acid : Accurately weigh about 0.5 g of Propylene Glycol Alginate, previously dried for 4 hours at 105°C, dissolve in 200 ml of freshly

boiled and cooled water, add 2 drops of phenolphthalein solution, and titrate with 0.02 N sodium hydroxide until the pink color persists for about 20 seconds. Calculate the content by the following formula. Perform a blank test in the same manner, and make any necessary correction.

Content of free alginic acid (%)

$$= \frac{\text{Volume of 0.02N sodium hydroxide consumed}(ml) \times 0.00352}{\text{Weight of the sample}(g)} \times 100$$

(B) Sodium Alginate : Accurately weigh about 1 g of Propylene Glycol Alginate Alginate, previously dried for 4 hours at 105°C, proceed as directed under Assay in Alkaline Salt of Organic Acid. In this case, 20 ml of 0.1 N sulfuric acid and 0.1 N sodium hydroxide solution are used instead of 50 ml of 0.5 N sulfuric acid and 0.5 N sodium hydroxide solution. The content of sodium alginate is calculated by the following equation (indicator : 3 drops of methyl red solution).

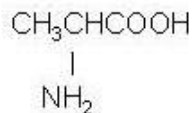
Content of sodium alginate (%)

$$= \frac{\text{Volume of 0.1N sulfuric acid consumed}(ml) \times 0.0198}{\text{Weight of the sample}(g)} \times 100$$

- (8) Insoluble ash : Dry the residue on the filter paper obtained in (B) of (1). ignite to constant weight, cool, and accurately weigh. The content of Insoluble ash should not be more than 1.5%.
- (9) Total Viable Aerobic Count : When Propylene Glycol is tested by Microbe Test Methods for Total Viable Aerobic Count (Number of General Germs) in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 5,000 per 1 g
- (10) E. coli : When Propylene Glycol is tested by Microbe Test Methods for E. coli in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).
- (11) Salmonella : When Propylene Glycol is tested by Microbe Test Methods for Salmonella in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).
- (12) Fungi : When Propylene Glycol is tested by Microbe Test Methods for Fungi in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 500 per 1 g

Loss on Drying When Propylene Glycol Alginate is dried for 4 hours at 105°C, the loss should not be more than 20%.

158. DL-Alanine



Chemical Formula $\text{C}_3\text{H}_7\text{NO}_2$

Molecular Weight 89.09

Compositional Specifications of DL-Alanine

Content DL-Alanine, when calculated on the dried basis, should contain within a range of 98.5~102.0% of DL-alanine ($\text{C}_3\text{H}_7\text{NO}_2$).

Description DL-Alanine occurs as a colorless to white crystalline powder having a sweet taste.

Identification (1) Dissolve 0.2 g of DL-Alanine in 10 ml of diluted sulfuric acid. Add 0.1 g of potassium permanganate, and boil. An odor of acetaldehyde is evolved.

(2) To 5 ml of DL-Alanine solution (1→1,000), add 1 ml of ninhydrin solution, and heat for 3 minutes. A purple color develops.

Purity (1) Clarity and Color of Solution : Weight 1.0 g of DL-Alanine, dissolved in 10 ml of water. It is colorless and clear.

(2) pH : pH of DL-Alanine solution (1→20) should be within a range of 5.5~7.0 (measured by a glass electrode).

(3) Arsenic : 0.25 g of DL-Alanine dissolve in 5 ml of water and test by Arsenic Limit Test. It should not be more than 4 ppm.

(4) Lead : When 5.0 g of DL-Alanine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

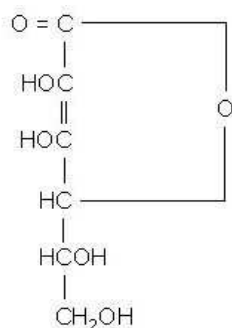
Loss on Drying When DL-Alanine is dried for 3 hours at 105°C, the loss should not be more than 0.3%.

Residue on Ignition Residue on Ignition of DL-Alanine should not be more than 0.2%.

Assay Accurately weigh about 0.2 g of DL-Alanine, dissolve in 3 ml of formic acid fproceed as directed under Assay in [Glycine]

1 ml of 0.1 N perchloric acid = 8.909 mg of $\text{C}_3\text{H}_7\text{NO}_2$

159. Erythorbic Acid



Chemical Formula $C_6H_8O_6$

Molecular Weight 176.13

Compositional Specifications of Erythorbic Acid

Content Erythorbic Acid, when calculated on the dried basis, should contain not less than 99.0% of erythorbic acid ($C_6H_8O_6$)

Description Erythorbic Acid occurs as white to yellowish white crystals or crystalline powder. It is odorless and has an acid taste.

Identification (1) Dissolve 0.1 g of Erythorbic Acid in 100 ml of metaphosphoric acid solution (1→50). To 5 ml of this solution, add drop wise iodine solution until a slightly yellow color develops. To the solution, add 1 drop of cupric sulfate solution (1→1,000) and 1 drop of pyrrole, and warm in a water bath at 50–60°C for 5 minutes. A blue to blue-green color develops.

(2) To 10 ml of Erythorbic Acid solution (1→100), add 1 ml of potassium permanganate solution. A pink color develops, and this color disappears immediately.

Purity (1) Specific Rotation : Approximately 1 g of Erythorbic Acid is accurately weighed, which is dissolved in freshly boiled and cooled water so that the total volume becomes 10 ml. Optical rotation of this solution should be within a range of $[\alpha]_D^{20} = 16.5 \sim 18.0^\circ$

(2) Melting Point : Melting point of Erythorbic Acid should be within a range of 164~171°C

(3) Arsenic : 0.25 g of Erythorbic Acid is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Erythorbic Acid is tested by Atomic Absorption

Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

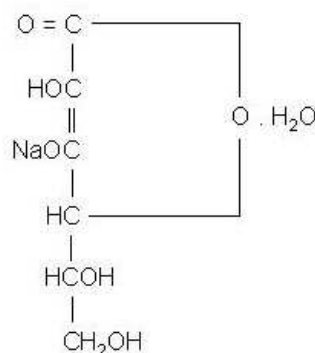
Loss on Drying When Erythorbic Acid is dried for 3 hours in a vacuum desiccator (silica gel), the loss should not be more than 0.4%.

Residue on Ignition When thermogravimetric analysis is done with Erythorbic Acid, the residues should not be more than 0.3%.

Assay 0.4 g of Erythorbic Acid, dried previously and accurately weighed, dissolve in metaphosphoric acid solution (1→50) to make 100 ml, measure exactly 50 ml of this solution, and titrate with 0.1 N iodine solution (indicator : starch solution).

1 ml of 0.1 N iodine solution = 8.806 mg of $C_6H_8O_6$

160. Sodium Erythorbate



Chemical Formula $\text{C}_6\text{H}_7\text{O}_6\text{Na} \cdot \text{H}_2\text{O}$

Molecular Weight 216.13

Compositional Specifications of Sodium Erythorbate

Content Sodium Erythorbate, when calculated on the dried basis, should contain not less than 98.0% of sodium erythorbate ($\text{C}_6\text{H}_7\text{O}_6\text{Na} \cdot \text{H}_2\text{O}$).

Description Sodium Erythorbate occurs as white to yellowish white crystalline powder, granules, or fine granules. It is odorless and has a slightly salty taste.

Identification (1) Dissolve 0.1 g of Sodium Erythorbate in 100 ml of metaphosphoric acid solution (1→50). To 5 ml of this solution, add drop wise iodine solution until a slightly yellow color develops. To this solution, add 1 drop of cupric sulfate solution (1→1,000) and 1 drop of pyrrole, and warm in a water bath at 50~60°C for 5 minutes. A blue to blue~green color develops.

(2) To 10 ml of Sodium Erythorbate (1→100), add 1 ml of potassium permanganate solution. A pink color develops, and this color disappears immediately.

(3) Sodium Erythorbate responds to test of Sodium Salt in Identification.

Purity

(1) Specific Rotation : Approximately 1 g of Sodium Erythorbate is precisely weighed, which is dissolved in freshly boiled and cooled water so that the total volume becomes 10 ml. Optical rotation of this solution should be within a range of $[\alpha]_D^{25} = +95.5 \sim +98.0^\circ$

(2) Clarity and Color of Solution : Weigh 1 g of Sodium Erythorbate, and dissolve in 10 ml of water. This solution is clear, and its color is not darker than that of color standard solution J.

(3) pH : pH of Sodium Erythorbate solution (1→20) should be within a range of 5.5~

8.0 (measured by a glass electrode).

- (4) Arsenic : 0.25 g of Sodium Erythorbate is dissolved in 5 ml of water, and test by Arsenic Limit Test. It should not be more than 4 ppm.
- (5) Lead : When 5.0 g of Sodium Erythorbate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Mercury : When Sodium Erythorbate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying Sodium Erythorbate is dried for 24 hours in a vacuum desiccator (silica gel) and the weight loss should not be more than 0.3%.

Assay Accurately weigh about 1 g of Sodium Erythorbate, previously dried, and dissolve in metaphosphoric acid solution (1→50) to make exactly 250 ml. Measure exactly 50 ml of this solution, and titrate with 0.1 N iodine (indicator : starch solution).

$$1 \text{ ml of } 0.1 \text{ N iodine} = 10.81 \text{ mg of } \text{C}_6\text{H}_7\text{O}_6\text{Na} \cdot \text{H}_2\text{O}$$

161. Ester Gum

Definition Ester Gum is esters of rosin or derivatives of rosins, such as polymerizates.

Compositional Specifications of Ester Gum

Description Ester Gum occurs as light yellow to light brown glassy lumps, or as a clear, viscous liquid. It is odorless or has a slight, characteristic odor.

Identification (1) To 1 g of Ester Gum, add 5 ml of sodium hydroxide solution and 5 ml of water, and shake vigorously. Light yellow turbidity appears, and effervescence persists.

(2) To 0.1 g of Ester Gum, add 10 ml of acetic Anhydrous, dissolve by heating in a water bath, cool, and add 1 drop of sulfuric acid. A purple~red color develops.

Purity (1) Clarity and Color of Solution : Weigh 10 g of Ester Gum, add 10 ml of toluene, dissolve by warming to 70~75°C, filter while warming, and allow to stand for 24 hours. It should be clear.

(2) Acid Value : 3 g of Ester Gum is precisely weighed and dissolved in 50 ml of a 2:1 mixture of benzene and alcohol (neutralized with 0.1 N alcoholic solution of potassium hydroxide using phenolphthalein solution as an indicator). The solution is titrated with 0.1 N alcoholic solution of potassium hydroxide. Acid value is obtained by the following equation and it should not be more than 8

(3) Arsenic : Proceed as directed under (1) Purity in [Guar Gum](Not more than 4 ppm).

(4) Lead : When 5.0 g of Ester Gum is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Cadmium : When 5.0 g of Ester Gum is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(6) Mercury : When Ester Gum is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Residue on Ignition When thermogravimetric analysis is done with 1 g of Ester Gum, the residues should not be more than 0.1%.

162. Esters

○ Designed Cancellation

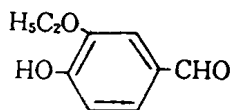
The date of cancellation : 12.14.05(Notification No. 2005-77).

163. Ethers

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

164. Ethyl vanillin



Chemical Formula $C_9H_{10}O_3$

Molecular Weight 166.18

Compositional Specifications of Ethyl vanillin

Content Ethyl vanillin should contain within a range of 98.0~101.0% of Ethyl vanillin($C_9H_{10}O_3$).

Description Ethyl vanillin occurs as white to light yellow, flaky crystals or crystalline powder, having a vanilla-like odor and taste.

Identification (1) To 0.1 g of Ethyl vanillin, add 1 ml of diluted hydrochloric acid 25%, heat in a water bath for 5 minutes, cool, add 1 ml of hydrogen peroxide solution, shake well for 3 minutes, allow to stand until a precipitate is formed, add 2 ml of benzene, and shake. The color of the benzene layer changes to deep blue.
(2) Proceed as directed under Identification (2) in [Vanillin].

Purity (1) Melting Point : Melting point of Ethyl vanillin should be within a range of 76~78°C

(2) Clarity and Color of Solution : When 1g of Ethyl vanillin is dissolved in 10 ml of 60% alcohol, the solution should be clear.

(3) Arsenic : 0.25 g of Ethyl vanillin is tested by the procedure in Purity (1) for [Guar Gum] (not more than 4 ppm).

(4) Lead : When 5.0 g of Ethyl vanillin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying Ethyl vanillin is dried for 4 hours in a vacuum desiccator(silica gel) and the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with Ethylvanillin, the residues should not be more than 0.05%.

Assay Accurately weigh about 1 g of Ethyl vanillin, and proceed as directed under

Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure allow the mixture to stand for 15 minutes before titrating.

$$1 \text{ ml of } 0.5 \text{ N hydrochloric acid} = 83.09 \text{ mg of } \text{C}_9\text{H}_{10}\text{O}_3$$

165. Basic Sodium Aluminum Carbonate

○ Designed Cancellation

The date of cancellation : 12.27.06(Notification No. 2006-65).

166. Hydrochloric Acid

Chemical Formula HCl

Molecular Weight 36.46

Compositional Specifications of Hydrochloric Acid

Content Hydrochloric Acid should contain within a range of 90.0~120.0% of the declared content of hydrogen chloride (HCl = 36.46).

Description Hydrochloric Acid is a colorless to light yellow liquid having a pungent odor.

Identification (1) Hydrochloric Acid solution (1→100) is strongly acidic.

(2) Hydrochloric Acid responds to test of Chloride in Identification.

Purity (1) Sulfate : To 1 ml of Hydrochloric Acid, add water to make 100 ml. Take 5 ml of this solution, add 20 ml of water, and neutralize with ammonia solution. This solution is tested by Sulfate Limit Test. The amount should be not more than the amount corresponding to 0.5 ml of 0.01 N sulfuric acid.

(2) Arsenic : 5 ml of Hydrochloric Acid is diluted to 50 ml with water. 5 ml of the resulting solution is tested by Arsenic Limit Test. The content should not exceed 2 ppm.

(3) Lead : Accurately weigh 5.0 g of Hydrochloric Acid and add water to make 25 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(4) Mercury : When Hydrochloric Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Iron : When 5.0 g of Hydrochloric Acid is precisely weighed and water is added to make 25 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(6) Oxidizing substances : Transfer 1 ml of Hydrochloric Acid into a 30 ml test tube, dilute to 20 ml with freshly boiled and cooled water, and add 1 ml of potassium iodide solution and 1 ml of starch solution. Stopper the test tube and mix thoroughly, test solution. The intensity of any blue colour developed does not exceed that produced in a control prepared similarly but containing 1 ml of 0.001N iodide (instead of potassium iodide solution) and 1 ml of reagent grade concentrated

hydrochloric acid (instead of sample) (Not more than 30 ppm as chlorine).

(7) Reducing substances : Transfer 1 ml of Hydrochloric Acid into a 30 ml test tube, dilute to 20 ml with freshly boiled and cooled water, and add 1 ml of potassium iodide solution, 1 ml of starch solution and 2 ml of 0.001N iodide solution. Stopper the test tube and mix thoroughly. The blue colour produced is not discharged by 1 ml of the sample. (Not more than 70 ppm as sulfur dioxide).

(8) Residue on Evaporation : Transfer 10 g of Hydrochloric Acid into a tared glass dish, evaporate to dryness on a steam bath, dry at 105°C for 30 min, cool in a desiccator and weigh. The weight of the residue does not exceed 50 mg (not more than 0.5%).

Residue on Ignition To 100 g of Hydrochloric Acid, add 1 drop of sulfuric acid, and evaporate to dryness in a water bath. It is then heat treated until the weight becomes constant. The amount of residue should not be more than 0.02%.

Assay Transfer 20 ml of water into a flask with a ground-glass stopper, Accurately weigh, add about 3 ml of Hydrochloric Acid, and Accurately weigh again. Add 25 ml of water. and titrate with 1 N sodium hydroxide (indicator : 3~5 drops of bromothymol blue solution).

1 ml of 1 N sodium hydroxide = 36.46 mg of HCl

167. Chlorine

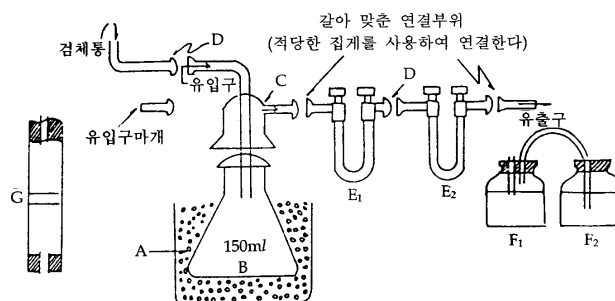
Chemical Formula Cl_2

Molecular Weight 70.91

Compositional Specifications of Chlorine**Content** Chlorine should contain not less than 99.5% of chlorine (Cl_2).**Description** Chlorine is pale greenish yellow and irritative gas. It liquefies under certain pressure.**Identification** Chlorine is passed through 10 ml of ice-chilled sodium hydroxide solution(4.3→100). The resulting solution shows the chloride reaction of Identification.**Purity**

(1) Involatiles

(A) Apparatus



-A : Hard glass container with 190 mm diameter × 100 mm depth

-B : 150 ml graduated Erlenmeyer flask

-C : adaptor

-D : ground glass tube

-E₁, E₂ : U-shaped absorbent tube with 100 mm length (Absorbent tube is washed clean and dried, which is then filled with anhydrous magnesium perchlorate up to 20 mm of the tube. The tube is plugged with cotton. Stoppers are placed to isolate the tube from atmospheric air). Before connecting to the apparatus, the U tube is connected to the chlorine gas tube and the container valve is opened so that the flow rate is 2~3 bubbles per second at the outlet. is attached. After the valve is kept open for 1 hour, dry air is passed through for exactly 5 minutes at a flow rate of 4.5 L per minute. After plugging the inlet and outlet, the tube is

kept for 10 minutes at normal temperature, which is then weighed for use. Chlorine gas is passed only when the drying agent is replaced and dry air is passed prior to water content test.

–F₁, F₂ : 2 l glass capturing bottle

–G : glass drying tower with 50 mm external diameter x 480 mm length (Bottom is filled with glass wool up to 40 mm, filled with anhydrous magnesium perchlorate by 190 mm, filled with glass wool by 20 mm, filled with anhydrous magnesium perchlorate by 190 mm, and finally filled with glass wool). At the top of the tower, a flow meter is installed so that air flux can be measured.

(B) Test Method : A container (equipped with a valve to control the outlet flux) is connected to the inlet of the adapter (C). Glass container (A) is filled with dry ice and 100 ml of trichloroethylene. The adapter (C) is connected to the Erlenmeyer flask (B), which is then kept immersed in (A) so that it is completely cooled. Gas outlet tube of the adapter is connected to the capturing bottle (F₁) that is filled with 1.5 L of water. This capturing bottle (F₁) is connected to another capturing bottle (F₂), which is filled with 1.5 L of 20% sodium hydroxide solution. When the apparatus is set up, the valve of the container is slowly opened so that the gas flows in. The container is slightly tilted so that liquid chlorine flows out slowly. When liquid chlorine fills 30~50 ml in the Erlenmeyer flask (B), the valve is closed. After a while, the Erlenmeyer flask (B) is disconnected from the glass container (A).

Previously weighed Erlenmeyer flask (B) transfer into a glass container (A) and adapter (C) is attached. Precisely measured 150 ml of liquid chlorine is added to the Erlenmeyer flask(B). The inlet is closed by disassembling the connection tube. Gas outlet tube of the adapter (C) is disconnected from the capturing bottle (F₁). To this gas outlet tube, U-shaped absorbent tubes (E₁, E₂), which are previously weighed for water content test, are connected serially. The capturing bottle (F₁) is again connected to the absorbent tube (E₂) and glass container (A) is separated. Liquid chlorine in the Erlenmeyer flask (B) is evaporated at room temperature. When liquid chlorine in the Erlenmeyer flask(B) evaporates, a drying tower is attached to the inlet of the adapter (C) and dry air is supplied precisely for 5 minutes at a flow rate of 4.5 L/minute. The Erlenmeyer flask (B) is separated and covered with a small watch glass. After 10 minutes, the flask is wiped clean with filter paper and weighed. The content of involatiles should not be more than 0.015%.

$$\text{Involatiles(\%)} = \frac{(a-b)}{(V \times 1.68)} \times 100$$

a : Previously known weight of Erlenmeyer flask (B) (g) + weight of involatiles (g)

b : Previously known weight of Erlenmeyer flask (B) (g)

V : Volume of sample (ml)

1.68 : Weight of 1 ml liquid chlorine at -80°C (g)

(2) Arsenic : The residue obtained from the Involatiles Test is dissolved in 2 ml of freshly prepared aqua Regina and 250 ml of water is added, Test Solution (A). 1 ml of this solution corresponds to 1 g of Cl_2 . 10 ml of Test Solution(A) is diluted to 100 ml with water. 2.5 ml of this solution tested by Arsenic Limit Test and the content should not be more than 4 ppm.

(3) Lead : To 10 ml of Test Solution (A) in (2) Purity, add 0.5N nitric acid to make 25 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Mercury: 2 ml of Test Solution (A) is tested for mercury following the Purity (5) for [Sodium Hydroxide] (not more than 1 ppm).

Water Content Inlets and outlets of the U shaped absorbent tubes (E_1 , E_2), which is set up for water content test of Involatiles in Purity (1), are closed. The tubes are then wiped cleanly with filter paper. After 10 minutes, they are weighed and water content is calculated using the following equation. The water content should not be more than 0.015%.

$$\text{Water content (\%)} = \frac{(E_1 - E_1') + (E_2 - E_2')}{V \times 1.68} \times 100$$

E_1 , E_2 : The weight of absorbent tube after sample is passed through (g)

E_1' , E_2' : The weight of absorbent tube before sample is passed through (g)

V : Weight of sample (ml)

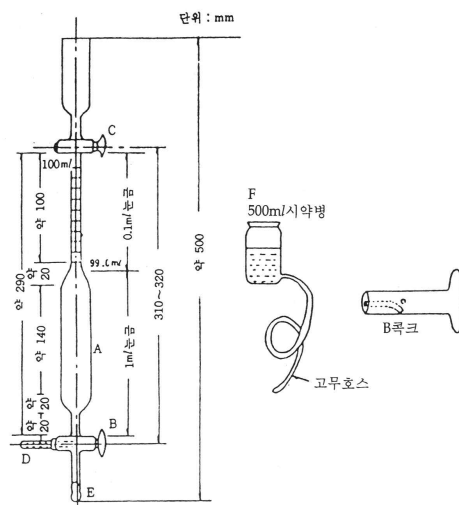
1.68 : Weight of 1 ml liquid chlorine at -80°C (g)

Assay A Bunde burette is used for apparatus as shown below. An auxiliary valve is connected to the container valve. The auxiliary valve is then connected to E. Stopcocks B and C are then opened. Chlorine gas is introduced to A by slowly opening the auxiliary valve. Air is completely replaced by passing the gas for 10~15 minutes. After closing C and B, E is separated from the auxiliary valve and

set-aside until it reaches room temperature. Then the pressure of A is equilibrated with the atmosphere by slightly opening the valve C. A bottle F is filled with 10% potassium iodide and then connected to E. Small amount of solution is passed through E and D by turning the stopcock B. Then the stopcock B is turned to add small amount of potassium iodide solution to A. B is then closed and chlorine gas is absorbed by shaking the burette. After the absorption is completed by repeating this procedure, it is cooled for 10~15 minutes. Liquid in A and F are adjusted to a same level. The volume of the gas in A is obtained and the chlorine content is calculated from the following equation.

$$\text{Chlorine Content(\%)} = 100 - V$$

V : Volume of the gas left in A (ml)



※Caution : Chlorine is very irritating gas. Care must be taken to avoid contacts with the respiratory organs and eyes. (draft room should be used for testing).

168. Magnesium Chloride

Chemical Formula $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$

Molecular Weight 203.30

Compositional Specifications of Magnesium Chloride

Content Magnesium Chloride should contain not less than 99.0% of magnesium chloride ($\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$).

Description Magnesium Chloride occurs as colorless to white crystals, powder, fragments, granules, or lumps.

Identification Magnesium Chloride responds to the tests for Magnesium Salt and Chloride in Identification.

Purity (1) Clarity and Color of Solution : 1 g of Magnesium Chloride is dissolved in 10 ml of water. The turbidity of resulting solution should show slightly low level of turbid or better.

(2) Arsenic : 0.25 g of Magnesium Chloride is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(3) Lead : Magnesium Chloride is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(4) Mercury : When Magnesium Chloride is tested by Mercury Limit Test, its content should not be more than 1.0ppm.

(5) Zinc : Weigh 4 g of Magnesium Chloride, dissolve in water to make 40 ml, and use it as the sample solution. Measure 30 ml of the sample solution, add 5 drops of acetic acid and 2 ml of potassium ferrocyanide solution (1→20), shake, and allow to stand for 10 minutes. The turbidity of this solution should not be more than the reference solution. Measure 14 ml of Zinc Standard Solution. and add 10 ml of the sample solution and water to make 30 ml. Add 5 drops of acetic acid and 2 ml of potassium ferrocyanide solution (1→20), shake, and allow to stand for 10 minutes. This solution as the reference solution.

(6) Calcium : Weigh 0.5 g of Magnesium Chloride, and dissolve in water to make 50 ml. Take 5 ml of this solution, add 1 ml of ammonium oxalate solution, and allow to stand for 5 minutes. The solution is very slightly turbid.

(7) Ammonium ion : Dissolve 1 g of Magnesium Chloride in 90 ml water, and slowly add 10 ml of a freshly boiled and cooled solution of sodium hydroxide (1 in 10 solution.). Allow to settle, then decant 20 ml of the supernatant liquid into a colour

comparison tube, dilute to 50 ml with water, and add 2 ml of Nessler's TS. Any colour does not exceed that produced by 48ml of ammonium standard solution and 2 ml of the sodium hydroxide solution. (not more than 50 ppm)

Standard solution : 0.618 g of ammonium chloride is precisely weighed and dissolved in water to make 1,000 ml. 1 ml of this solution is weighed again, and water is added to make 1, 000 ml. (48 ml of this solution contains 10µg of Ammonium ion)

Assay Accurately weigh about 0.6 g of Magnesium Chloride, and dissolve in water to make exactly 100 ml. Take 20 ml of this solution, add 50 ml of water and 5 ml of ammonia-ammonium chloride buffer (pH 10.7). and titrate with 0.01 M EDTA (indicator : 2 drops of Eriochrome black T solution) until the red color of the solution changes to blue. Calculate the content by the following formula:

Content of Magnesium Chloride ($\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$)(%) =

$$\frac{\text{Consumed amount of } 0.01M \text{ EDTA solution} \times 1.0165}{\text{Weight of sample (g)}}$$

169. Ammonium Chloride

Chemical Formula NH_4Cl

Molecular Weight 53.50

Compositional Specifications of Ammonium Chloride

Content Ammonium Chloride, when calculated on the dried basis, should contain not less than 99.0% of ammonium chloride (NH_4Cl).

Description Ammonium Chloride occurs as white crystalline powder or crystalline lumps, having a salty and cool taste.

Identification Ammonium Chloride responds to the tests for Ammonium Salt and Chloride in Identification.

Purity (1) Clarity and Color of Solution : 2 g of Ammonium Chloride is dissolved in 20 ml of water. The turbidity of resulting solution should not be more than clear.

(2) Arsenic : When 0.25 g of Ammonium Chloride is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(3) Lead : Ammonium Chloride is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

Loss on Drying When Ammonium Chloride is dried for 4 hours in a vacuum desiccator, the loss should not be more than 2%.

Residue on Ignition When thermogravimetric analysis is done with Ammonium Chloride, the residues should not be more than 0.5%.

Assay 3 g of Ammonium Chloride, previously dried and accurately weighed, test by Assay for [Ammonium Sulfate]

$$1 \text{ ml of } 0.2 \text{ N sulfuric acid} = 10.70 \text{ mg } \text{NH}_4\text{Cl}$$

170. Potassium Chloride

Chemical Formula KCl

Molecular Weight 74.56

Compositional Specifications of Potassium Chloride

Content Potassium Chloride, when calculated on the dried basis, should contain not less than 99.0% of potassium chloride (KCl).

Description Potassium Chloride occurs as colorless crystals or as a white powder. It is odorless and has a salty taste.

Identification Potassium Chloride responds to the tests for Potassium Salt and Chloride in Identification.

Purity (1) Free Acid and Free Alkali : Weigh 5 g of Potassium Chloride, dissolve in 50 ml of freshly boiled and cooled water, and add 3 drops of phenolphthalein solution. The color of the solution does not change to pink. Add 0.3 ml of 0.02 N sodium hydroxide. The color of the solution changes to pink.

(2) Arsenic : When 0.25 g of Potassium Chloride is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(3) Lead : Potassium Chloride is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(4) Cadmium : Potassium Chloride is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(5) Mercury : When Potassium Chloride is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Bromide : Weigh 1 g of Potassium Chloride, and dissolve in water to make 100 ml. Take 5 ml of this solution, add 3 drops of diluted hydrochloric acid (1→4) and 1 ml of chloroform, and add 3 drops of chloramine T solution (1.25 g of chloramines T in 100 ml of water, prepared before use) while shaking. The color of the chloroform layer does not change to yellow to yellow~red.

(7) Iodide : Weigh 0.5 g of Potassium Chloride, dissolve in 10 ml of water, add 3 drops of ferric chloride solution (1→10) and 1 ml of chloroform, shake, allow to stand for 30 minutes, and shake again. The color of the chloroform layer does not change to red-purple to purple.

(8) Sodium : When Flame Coloration Test is conducted with Potassium Chloride solution (1→20), it should not show yellow or bright flame.

(9) Calcium or Magnesium : Weigh 0.2 g of Potassium Chloride, dissolve in 20 ml of water, add 2 ml of ammonia solution, 2 ml of ammonium oxalate solution (1→30), and 2 ml of disodium phosphate solution (1→8), and allow to stand for 5 minutes. The solution does not become turbid.

Loss on Drying When Potassium Chloride is dried for 4 hours at 105°C, the loss should be more than 1.0%.

Assay 0.25 g of Potassium Chloride, previously dried and accurately weighed, transfer into a flask with a ground-glass stopper, dissolve in 50 ml of water, add 50 ml of 0.1 N silver nitrate and 5 ml of nitric acid and 5 ml of nitrobenzene while shaking, and shake vigorously. Add 2 ml of ferric ammonium sulfate solution, and titrate the excess silver nitrate with 0.1 N ammonium thiocyanate.

1 ml of 0.1 N silver nitrate = 7.456 mg of KCl

171. Calcium Chloride

Chemical Formula $\text{CaCl}_2 \cdot 0 \sim 2\text{H}_2\text{O}$

Compositional Specifications of Calcium Chloride

Content Calcium Chloride should contain not less than 70.0% of calcium chloride ($\text{CaCl}_2=110.99$).

Description Calcium Chloride occurs as white crystals, powder, flakes, granules, or lumps. It is odorless.

Identification Calcium Chloride responds to the tests for Calcium Salt and Chloride.

Purity (1) Clarity and Color of Solution : 1 g Calcium Chloride is dissolved in 20 ml of water. The turbidity of resulting solution should show slightly low level of turbid or better.

(2) Free Acid and Free Alkali : Weigh 1 g of Calcium Chloride, dissolve in 20 ml of freshly boiled and cooled water, add 2 drops of phenolphthalein solution, and perform the following test for this solution

① If the solution is colorless, add 2 ml of 0.02 N sodium hydroxide. A pink color develops.

② If the solution is pink, add 2 ml of 0.02 N hydrochloric acid. The color disappears.

(3) Arsenic : 0.25 g of Calcium Chloride is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(4) Lead : Calcium Chloride is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(5) Mercury : When Calcium Chloride is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Fluoride : 1 g of Calcium Chloride is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 40 ppm.

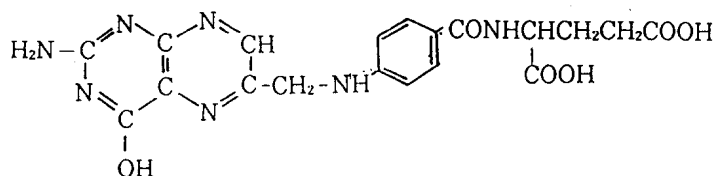
(7) Alkali Metals and Magnesium : Weigh 1 g of Calcium Chloride, dissolve in 50 ml of water, mix with 500 mg of ammonium chloride, and boil for 1 minute. Quickly add 40 ml of oxalic acid solution (3→50), stir vigorously to form a precipitate, immediately add 2 drops of methyl red solution and drop wise ammonia solution to make slightly alkaline, and cool. Transfer the solution into a 100 ml measuring cylinder, add water to make 100 ml, allow to stand for 4 hours to overnight, and filter the supernatant through a dried filter paper. Measure 50 ml of the filtrate, add 0.5 ml of sulfuric acid, evaporate to dryness, ignite to constant weight, and weigh

the residue. The residue should not be more than 25 mg (Not more than 5%).

Assay Approximately 5 g of Calcium Chloride is precisely weighed and dissolved in water to make 500 ml. Take 25 ml of this solution, add water to make 100 ml, and add 15 ml of 10% sodium hydroxide solution. After 1 minute, approximately 0.1 g of 2-oxy-1-(2'-oxy-4'-sulfo-1'-naphthylazo)-3-naphthoic acid. It is then immediately titrated with 0.05 M EDTA solution. End point is where the red color of the solution completely disappears and changes to blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA} = 5.550 \text{ mg of CaCl}_2$$

172. Folic Acid



Chemical Formula $C_{19}H_{19}O_6N_7$

Molecular Weight 441.42

Compositional Specifications of Folic Acid

Content Folic Acid should contain within a range of 98.0%~102.0% of folic acid ($C_{19}H_{19}O_6N_7$).

Description Folic Acid occurs as a yellow to orange~yellow crystalline powder. It is odorless.

Identification Dissolve 1.5 mg of Folic Acid in sodium hydroxide solution (1→250) to make 100 ml. The solution exhibits absorption maxima at wave-lengths of 255~257 nm, 281~285 nm, and 361~369 nm.

Purity (1) Free Amine : Accurately weigh about 0.05 g of p-Aminobenzoylglutamic Acid Reference Standard, previously dried for 4 hours under reduced pressure in a desiccator, dissolve in diluted alcohol(2→5) to make 100 ml. Take 5 ml of this solution, add water to make 1,000 ml. Take the 4 ml of the solution and 5ml water and designate the solutions obtained through the ways to prepare test solution from B solution of each assay as S' solution and D solution. As setting D solution for the control solution, measure the absorption ratio of S' solution at 550 nm wavelength, obtaining the number as As'. Calculate the amount of free amine by the following formula from As' and Ac obtained in the Assay. It is not be more than 1%.

Amount of free amine (%)

$$= \frac{Ac}{As} \times \frac{\text{Weight of } p\text{-Aminobenzoylglutamic Acid Reference Standard}(g)}{\text{Weight of the sample}(g) \times \frac{100 - \text{Water content of the sample}(\%)}{100}}$$

Water Content Folic Acid is tested by the back titration method in water content determination (Karl-Fischer Method). The water content should not be more than 8.5%.

Residue on Ignition Residue on ignition of Folic Acid should not be more than 0.5%.

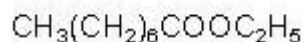
Assay 0.1 g of Folic Acid is precisely weighed and dissolved in 0.1 N sodium

hydroxide solution to make 200 ml by well shaking. Take 25 ml of this solution add 20 ml of dilute hydrochloric acid and water to make 100 ml, Solution A. Take 60 ml of Solution A add 0.5 g of zinc powder, which is set-aside for 20 minutes while shaking occasionally. It is then filtered through a dry filter. Approximately 10 ml of the first filtrate is discarded. 10 ml of the remaining filtrate is diluted to 100 ml with water, Solution B. Take 5 ml of Solution B, add 1 ml of dilute hydrochloric acid and 1 ml of sodium nitrite solution (1→1,000) and mix well and set-aside for 2 minutes. 1 ml of ammonium sulfamate (1→200) is mixed well and set-aside for 2 minutes. To this solution, 1 ml of N-(1-naphthyl)-N-diethyl-ethylenediamine oxalate solution (1→1,000) is added, mixed, and set-aside for 10 minutes. This solution is diluted to 20 ml with water, Test Solution. Solution C is prepared using Solution A by following the same procedure to prepare Test Solution using Solution B. Standard Solution is prepared with approximately 0.1 g (precisely weighed) of folic acid standard by following the same procedure as sample. Separately, 5 ml of water is treated by the same procedure as the sample, Reference Solution. Absorption at 550 nm is measured for Test Solution, Solution C, and Standard Solution using Reference Solution as a reference, A, Ac, and As. The content of folic acid is calculated from the following equation. However, water contents in folic acid standard and sample are measured by the specified method.

$$\text{Content(\%)} = \frac{\text{Weight of Folic acid standard (g)}}{\text{As}} \times \frac{100 - \text{Water content of Folic acid standard(\%)}}{100} \times \frac{100}{\text{Weight of sample(g)}} \times \frac{100}{100 - \text{Water content of sample(\%)}}$$

173. Ethyl Octanoate

Ethyl Caprylate



Chemical Formula $\text{C}_{10}\text{H}_{20}\text{O}_2$

Molecular Weight 172.27

Compositional Specifications of Ethyl Octanoate

Content Ethyl Octanoate should contain not less than 98.0% of ethyl octanoate ($\text{C}_{10}\text{H}_{20}\text{O}_2$).

Description Ethyl Octanoate is a colorless or slightly yellowish, transparent liquid having a brandy-like odor.

Identification (1) To 1 ml of Ethyl Octanoate, add 5 ml of 10% alcoholic solution of potassium hydroxide, equip with a reflux condenser, and heat in a water bath for 30 minutes. The brandy-like odor disappears. Cool, and acidify with diluted sulfuric acid. An odor of octanoic acid is evolved.

(2) Dissolve 1 ml of Ethyl Octanoate in 1 ml of alcohol, add 0.4 g of hydrazine (hydrate), equip with a reflux condenser, and heat in a water bath for 3 hours. Cool, collect the deposited crystal lumps by filtration, wash with a small amount of alcohol, and recrystallize from alcohol. The melting point is 88°C.

Purity (1) Specific Gravity : Specific gravity of Ethyl Octanoate should be within a range of 0.865~0.869.

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Ethyl Octanoate should be within a range of 1.417 ~1.419

(3) Clarity and Color of Solution : When 1 ml of Ethyl Octanoate is dissolved in 4 ml of 70% alcohol, the solution be almost clear.

(4) Acid Value : Acid value of Ethyl Octanoate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 1 g of Ethyl Octanoate, and proceed as directed under Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N ethanolic potassium hydroxide = 86.13 mg of $\text{C}_{10}\text{H}_{20}\text{O}_2$

174. Food Starch Modified

Modified Food Starch

Definition Food Starch Modified is a modification of starch, which derived from various grains and rootstocks. Physical characteristics of starch are modified by chemical modification (reaction between hydroxyl group in starch and reactant) or by gelatinization. In this category, Oxidized Starch, Acetylated Distarch Adipate, Acetylated Distarch Phosphate, Starch Sodium Octenyl Succinate, Distarch Phosphate, Monostarch Phosphate, Phosphated Distarch Phosphate, Starch Acetate, Hydroxypropyl Distarch Phosphate, and Hydroxypropyl Starch are included. Reaction of formation for each material is as follows.

Oxidized Starch	Oxidation reaction by sodium hypochlorite
Acetylated Distarch Adipate	Esterification reaction by anhydrous adipic acid and anhydrous acetic acid
Acetylated Distarch Phosphate	Esterification reaction by phosphorous trichloride or sodium trimetaphosphate and anhydrous acetic acid or vinyl acetate
Starch Sodium Octenyl Succinate	Esterification by anhydrous octenyl succinate
Distarch Phosphate	Esterification reaction by phosphorous trichloride or sodium metaphosphate, tribasic
Monostarch Phosphate	Starch phosphate and distarch phosphate reaction
Phosphated Distarch Phosphate	Esterification reaction by sodium tripolyphosphate and sodium trimetaphosphate
Starch Acetate	Esterification reaction by anhydrous acetic acid or vinyl acetate
Hydroxypropyl Distarch Phosphate	Esterification reaction by phosphorous trichloride or sodium trimetaphosphate or propylene oxide
Hydroxypropyl Starch	Esterification reaction by propylene oxide

Compositional Specifications of Food Starch Modified

Description Food Starch Modified is white or almost white powder or granule. Gelatinized form is crumb, amorphous powder, or coarse granule without scent and

flavor.

Identification (1) 1 g of Food Starch Modified is suspended in 20 ml of water. Upon adding a few drops of iodine solution, the suspension turns dark blue~red.

(2) 2.5 g of Modified Food Starch transfer into a flask and then mixed with 10 ml of 3% hydrochloric acid and 70 ml of water by shaking. This is then heated for 3 hours in a water bath equipped with a cooling apparatus. When 0.5 ml of this liquid (after cooling) is added to 5 ml of Fehling solution, significant amount of red precipitates are formed.

(3) 50 mg of Food Starch Modified is suspended in 25 ml of 1% methylene blue solution by stirring occasionally. Excess supernatant is discarded and the starch is washed with water. When this is observed with optical microscope, it is colored (for oxidized starch only).

(4) 10 g of Food Starch Modified is suspended in 25 ml of water and 20 ml of 0.4 N sodium hydroxide solution 20 ml is added. After shaking for 1 hour, it is then filtered and the filtrate is evaporated at 110°C in a drier. The residue is dissolved in a few drops of water, which is then transferred into a test tube. Calcium hydroxide is added to the test tube, which is then heated. Acetone vapor evolves upon heating. This vapor turns a filter paper, which is wetted with saturated o-nitrobenzaldehyde solution, blue. When a drop of diluted hydrochloric acid (1→10) is dropped on the paper, yellow color of o-nitrobenzaldehyde saturated solution disappears, which makes the blue color more distinctive. (This is applicable only for acetylated distarch adipate, acetylated distarch phosphate, and starch acetate)

Saturated o-Nitrobenzaldehyde solution : o-Nitrobenzaldehyde is dissolved in 2 N sodium hydroxide solution to saturation. This is prepared freshly before use.

(5) Infrared absorption spectrum of Food Starch Modified is obtained using Infrared Spectrophotometry (1) Potassium Bromide Disk Method. Absorption band for ester group is located approximately at 1720 cm⁻¹. Detection limit is approximately 0.5% for acetyl, adipyl, and succinyl groups (This is applicable only for acetylated distarch adipate, acetylated distarch phosphate, starch sodium octenyl succinate, and starch acetate).

Purity (1) Arsenic : 0.77 g of Food Starch Modified transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath.

When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 1.3 ppm.

- (2) Heavy Metals : 0.5 g of Food Starch Modified transfer into a quartz or porcelain crucible and carbonize by heating mildly. After cooling, Add 2 ml of nitric acid and 5 drops of sulfuric acid, it is heated until white smoke disappears, which is then reduced to ash by further heating at 450~550°C. After cooling, 2 ml of hydrochloric acid is added, which is then evaporated to dryness in a water bath. 3 drops of hydrochloric acid and 10 ml of hot water are added to the resulting residue, which is then heated for 2 minutes. After cooling, 1 drop of phenolphthalein indicator solution is added, then ammonia solution is added until the color of the solution becomes pale red. The resulting solution is transferred into a Nestler cylinder by rinsing with water. 50 ml of test solution is prepared by adding 2 ml of diluted acetic acid (1→20) and water. When this solution tested by Heavy Metal Limit Test, the content should not be more than 40 ppm. Color standard solution is prepared by the following procedure. 2 ml of nitric acid, 5 drops of sulfuric acid, and 2 ml of hydrochloric acid are added and evaporated to dryness in a crucible that is made of the same material used for test solution preparation. 3 drops of hydrochloric acid are added to the residue, which is then transferred into another Nestler cylinder as described above. Finally, 2 ml of lead standard solution, 2 ml of diluted acetic acid (1→20), and water are added to bring the total volume to 50 ml.
- (3) Lead : 4 g of Food Starch Modified is slowly carbonized by heating, which is reduced ash by further heat treatment at a temperature below 500°C. Carefully 20 ml of dilute nitric acid is added to the ash, which is then gently boiled for 5 minutes. It is then filtered (if necessary), the residue is washed with water, which is then added to the filtrate. Water is added so that total volume of this solution becomes 50 ml. This test solution is tested for lead (Dithizone Method). The detected amount of lead should not be more than 2 ppm.
- (4) Sulfur Dioxide : 30 g of Modified Food Starch is tested according to Purity (7) for [Caramel]. The content of sulfur dioxide is obtained by titrating with 0.01 N sodium hydroxide solution using the following equation. The content should not be more than 50 ppm.

$$\text{Content of Sulfur Dioxide (ppm)} = \frac{[(S - B) \times 32.02 \times 10]}{\text{Weight of sample (g)}}$$

- (5) Adipic Group : When Modified Food Starch is tested for adipic group according the following test method, the amount of adipic group should not be more than 0.135%. (This applies only for acetylated starch adipate).

Total Adipate Salt : 1 g of Modified Food Starch is precisely weighed into a 250 ml Erlenmeyer flask and 50 ml of water and 1 ml of 0.1% glutaric acid are added, which is then shaken so that the starch is well dispersed. 50 ml of 4 N sodium hydroxide solution is added to this suspension, which is shaken for 5 minutes. 20 ml of 12 N hydrochloric acid is carefully added and the resulting mixture is cooled and then transferred into a 250 ml separatory funnel with a stop cock. 100 ml of ethyl acetate is extracted three times. The solvent layer is collected into a Erlenmeyer flask, where 20 g of anhydrous sodium sulfate transfer into advance. This is then shaken periodically for 10 minutes, which is then filtered through a Whatman No.1 filter paper. The Erlenmeyer flask and the residue are washed twice with 50 ml of ethyl acetate. The resultant is vacuum dried (50 mmHg) as quickly as possible at a temperature of 40°C or lower. This needs to be carried out quickly since ethyl acetate may be hydrolyzed. Hydrolyzed ethyl acetate may affect the analysis of the adipate. After it is completely dried, 2 ml of pyridine and 1 ml of N,N-bis-trimethyl-silyl-trifluoro acetamide are added and stopper is placed. The mixture is slowly shaken so that the content is completely wetted and settled for 1 hour. This liquid is transferred into a small vial and 4 µl of it is injected into a gas chromatography.

Free Adipate : 5.0 g of Food Starch Modified is precisely weighed into a 250 ml Erlenmeyer flask. 100 ml of water and 1.0 ml of 0.1% glutaric acid solution are added and the resultant is transferred into a 250 ml separatory funnel with a stop cock. The rest of the procedure is the same as in Total Adipate Salt. The content of total acetate salt or free adipate is calculated from the following equation.

$$\text{Content of total adipate or free adipate(\%)} = \frac{A}{\text{Weight of sample (g)} \times 10}$$

A : The amount of adipate in test solution(mg) obtained from standard calibration curve

The content of adipate(%) = Content of total adipate(%) - Content of free adipate(%)

Standard Calibration Curve : 1.0 g of corn starch and 0.1% glutaric acid are added to 4 Erlenmeyer flasks, respectively. 0.25, 0.5, 0.75, and 1.0 ml of adipic acid standard solution are added to each flask, respectively. Each flask is sufficiently shaken so that the starch is well dispersed. The rest of the procedure is the same as in Total Adipate Salt. The areas of the peaks for adipic acid and glutaric acid are measured.

A standard reference curve is obtained for the ratio of area (area of adipic acid peak / area of glutaric acid peak) vs. the amount of adipic acid (mg).

The standard solution of adipic acid : 1.00 g of adipic acid is dissolved in 900 ml of warm water. After cooling, the total volume is brought up to 1,000 ml by adding water.

Operation Conditions

- Column : A stainless tube with inner diameter of 1.83 mm and length of 2 m
- Column Filler : 80~100 Mesh Chromosorb GAW-DMCS coated with 5% OV-17 or its equivalent
- Detector : Hydrogen Flame Ionization Detector (FID)
- Temperature at injection hole : 280°C
- Column Temperature : 140°C
- Detector Temperature : 250°C
- Carrier gas and flow rate : Nitrogen, 30 ml per minute

- (6) Acetyl Group : 5 g of Food Starch Modified is precisely weighed into a 200 ml Erlenmeyer flask and dispersed with 50 ml of water. Using phenolphthalein solution as an indicator, the suspension is titrated with 0.1 N sodium hydroxide solution until pale red color persists. After adding 25 ml of 0.45 N sodium hydroxide solution, a stopper is placed and the flask is shaken for 30 minutes at a temperature of 30°C or lower. The stopper and the flask are rinsed with water. Excess alkali inside the flask is titrated with 0.2 N hydrochloric acid until the pale red color disappears. The amount of 0.2 N hydrochloric acid consumed is S. A blank test is carried out with 25 ml of 0.45 N sodium hydroxide solution, where the amount of 0.2 N hydrochloric acid consumed is B. The amount of acetyl group is calculated from the following equation and it should not be more than 2.5% (This only applies to acetylated distarch adipate, acetylated distarch phosphate, and starch acetate).

$$\text{Content of acetyl group (\%)} = \frac{(B - S) \times F \times 0.0086}{\text{Weight of sample (g)}} \times 100$$

- (7) Degree of Substitution of Starch Sodium Octenyl Succinate : 5 g of Food Starch Modified transfer into a 150 ml beaker and thoroughly wetted with a few ml of isopropyl alcohol. Beaker wall is washed down with 25 ml of 2.5 N solution of hydrochloric acid in isopropyl alcohol. It is well mixed for 30 minutes. It is then mixed for 10 minutes with additional 100 ml of 90% isopropyl alcohol. The suspension is filtered through a Buchner funnel. 1 ml of 1% silver nitrate solution is added to the filtrate. The residue is washed with 90% isopropyl alcohol until

turbidity or precipitates do not persist over 1 minute. The residue is transferred into a 600 ml beaker and water is added to bring the total volume to 300 ml, which is then heated for 10 minutes in a water bath while stirring. While still hot, it is titrated with 0.1 N sodium hydroxide solution using phenolphthalein as an indicator. The degree of substitution is calculated using the following equation and it should not be more than 0.02 (This is applicable only for starch sodium octenyl succinate).

$$\text{Degree of Substitution (DS)} = \frac{0.162A}{1 - 0.210A}$$

A : Milli-equivalent of sodium hydroxide required for 1 g of starch sodium octenyl succinate

$$A = \frac{0.1N \text{ sodium hydroxide solution consumed (ml)} \times 0.1}{\text{Weight of sample (g)}}$$

- (8) Phosphate (as phosphorous) : 10 g of dried material as obtained from the procedure below transfer into a silica crucible. It is thoroughly wetted with 10 ml of zinc acetate solution, which is then evaporated to dryness on a hot plate and carbonized by further heat treatment. It is then reduced to ash at 550°C. Ash is wetted with 15 ml of water and the crucible wall is rinsed with 5 ml nitric acid. The crucible is heated to boil and then cooled. The content is transferred to a 200 ml flask. The crucible is rinsed with 20 ml of water three times and the rinse water is added to the flask. V (ml) of this solution, which should not be more than 1.5 mg of phosphorus, is taken into a 100 ml flask. 50 ml of water is added to a 100 ml flask for a blank test. To each flask, 10 ml of diluted nitric acid, 10 ml of ammonium vanadate solution, and 10 ml of ammonium molybdate are added sequentially and respectively. After mixing thoroughly, water is added to bring the volume to 100 ml and the resulting solution is settled for 10 minutes. Using the blank test solution as a reference, optical absorption is measured at 460nm with a 1 cm path length. The amount of phosphorus (%) is calculated using the following equation using the content of phosphorus a (mg/100ml) from a standard calibration curve. Specifications are as follows.

$$\text{Content of Phosphorus (\%)} = \frac{a \times 200 \times 100}{\text{Weight of dried material (mg)} \times V} \times \frac{S}{W}$$

Sample Preparation Procedure : 200 ml mixture of methyl alcohol and water (7:3) is added to 20~25 g(W) of Food Starch Modified and stirred mechanically for 15

minutes. This is vacuum filtered through a glass or Buchner funnel with a medium disc (10~15 μm). Precipitates are rinsed with 200 ml of methyl alcohol and water mixture. Precipitates are dispersed again. Filtering and rinsing process is repeated. The resulting precipitates are dried at a temperature 50°C or lower. This is ground to 20 mesh or finer, which is then vacuum dried for 5 hours at 120°C and 100 mmHg or below. The weight of dried material (S) is obtained. (This procedure is for the starch that is insoluble in cold water. For gelatinized or other water soluble starch, it is prepared as 1~2% aqueous paste. This transfer into a cellophane tube and dialyzed for 30~40 hours while replacing water. Starch is precipitated by stir-mixing in acetone with a 4 times volume of dialyzed paste. This is vacuum filtered through a glass or Buchner funnel with a medium disc (10~15 μm) and rinsed with ethyl alcohol. The amount of dried material is obtained following the procedure for insoluble starch as described above.)

Standard Calibration Curve : 5, 10, and 15 ml of phosphorus standard solution is added to each of three 100 ml volumetric flasks. To each flask and a blank 100 ml volumetric flask, 10 ml of diluted nitric acid, 10 ml of ammonium vanadate solution, and 10 ml of ammonium molybdate are added sequentially and respectively. After mixing thoroughly, water is added to bring the volume to 100 ml and the resulting solution is settled for 10 minutes. Using the blank test solution as a reference, optical absorption is measured at 460 nm with a 1 cm path length. Standard calibration curve is prepared with absorption vs. phosphorus concentration (mg/100ml).

Solutions

- Ammonium Molybdate Solution (5%) : Ammonium molybdate (4 hydrate) is dissolved in 900 ml of warm water. After cooling, additional water is added to bring the total volume to 1000 ml.
- Ammonium Vanadate Solution (0.25%) : 2.5 g of ammonium meta vanadate is dissolved in 600 ml of boiling water. The solution is then cooled to 60~70°C and 20 ml of nitric acid is added. After cooling to normal temperature, water is added to bring the total volume to 1,000 ml.
- Zinc Acetate Solution (10%) : 120 g of zinc acetate (2 hydrate) is added in 880 ml of water. Prior to use, the solution is filtered through a Whatman No.2 V filter paper or its equivalent.
- Diluted Nitric Acid (29%) : 300 ml of nitric acid (specific gravity 1.42) is added to 600 ml of water.

- Phosphorus Standard Solution : 438.7 mg of mono potassium phosphate is dissolved in water and the total volume is brought up to 1,000 ml. (100 µg P/ml).
- (9) Vinyl Acetate : 30 g of Food Starch Modified is weighed into a 100 ml flask. The flask is tightly sealed with a septum. This solution and a standard solution are kept in a 70°C water bath for 30 minutes. 2.0 ml of gas is extracted using gas-tight syringe from head-space of each flask and injected into gas chromatography. The content of vinyl acetate is calculated using the following equation and should not be more than 0.1 ppm. (This is applicable only for acetylated distarch phosphate).

$$\text{The content of vinyl acetate (ppm)} = 150 \times \frac{A}{S} \times \frac{1}{\text{Weight of sample (g)}}$$

A : Peak area of test solution

S : Peak area of standard solution

150 : Amount of vinyl acetate in standard solution (µg)

Preparation of Standard Solution : Water is added to 150 mg of vinyl acetate to bring the total volume to 100 ml. Water is added to 1 ml of this solution so that the total volume becomes 10 ml (0.15 mg/ml). 1 ml of the resulting solution is added to 30 g of unmodified starch from the same raw material. Then the container is tightly sealed with a septum.

Operation Conditions

- Column : A glass tube with inner diameter of 2 mm and length of 2 m
- Column Filler : Porapak Q or its equivalent
- Detector : Hydrogen Flame Ionization Detector (FID)
- Temperature at injection hole: 200°C
- Column Temperature : 150°C
- Detector Temperature : 200°C
- Carrier gas and flow rate : Nitrogen, 20 ml per minute

- (10) Carboxyl Group : Food Starch Modified is sieved through 20 mesh or finer screen. 0.25 meq (milliequivalent number) of Food Starch Modified (5 g for weakly oxidized, 0.15 g for strongly oxidized) is precisely weighed into a beaker. 25 ml of 0.1 N hydrochloric acid added and stirred occasionally for 30 minutes. This is vacuum filtered through a glass wool filter paper with a medium pore size (10~20 µ m). 1 ml of 1% silver nitrate solution is added to 5 ml of the filtrate. It is then washed with water (generally 300 ml) until turbidity or precipitates do not persist for 1 minutes. The residue is transferred into a beaker and heated in a water bath

until it is gelatinized. It is further heated for 15 minutes to ensure that gelatinization is complete. While hot, it is titrated with sodium hydroxide solution using phenolphthalein solution as an indicator. The amount of 0.1 N sodium hydroxide solution is S. A blank test is carried out with the same amount of sample. 10 ml of water is added and stirred in 5 minute interval for 30 minutes, which is then vacuum filtered. It is then rinsed with 200 ml of water. The residue is processed further following the same procedure and the consumed amount of sodium hydroxide is obtained. The content of carboxyl group is obtained using the following equation and it should not be more than 1.1% (it is applicable only for oxidized starch).

$$\text{Carboxyl Group (\%)} = \frac{(S - B) \times 0.0045 \times 100}{\text{Weight of sample (g)}}$$

For potato starch, the amount of Phosphate is subtracted using the amount of phosphorus (P in %).

$$\frac{2 \times 45.02 \times P}{30.97} = 2.907P$$

(11) Propylenechlorohydrine : 50 g of Modified Food Starch is precisely weighed into a pressurizing bottle. 125 ml of 2 N sulfuric acid is added and stopper is placed. After mixing by shaking, it is heated for 10 minutes in a water bath. It is then shaken again and heated for 15 minutes. After cooling, it is neutralized to pH 7 with 25% sodium hydroxide solution, which is then filtered through Whatman No.1 filter paper. The filter paper and the bottle is rinsed with 25 ml of water, which is added to the filtrate. 30 g of anhydrous sodium sulfate is completely dissolved in the filtrate using a magnetic stir plate. The solution is transferred to a 500 ml separatory funnel with a stop cock. The container is rinsed with 25 ml of water and the rinse water is added to the funnel. This is then extracted with 50 ml of ether for five times for 5 minutes. Extracts are concentrated to 8 ml using a Kuderna-Danish concentrator in a 50~55°C water bath. Column tube is filled with 10 g of florisil PR (60~100 mesh), which is previously heat-treated for 16 hours at 130°C, and 1g of anhydrous sodium sulfate is placed on top. The column is wetted with 25 ml of ether. The concentrate is transferred into the column and 25 ml of ether is passed through the column three times. Collected solution is concentrated to 5 ml (test solution). Separately, standard solutions are prepared as follows. 50 g of unmodified corn starch transfer into 5 pressurizing bottles and 125 ml of 2N sulfuric acid is added to each bottle. To each bottle, 0, 0.5, 1, 2, and 5 ml of propylene

chlorohydrine standard solution is added, respectively. Each is processed following the same procedure as the test solution. Concentrations (as starch) of these standard solutions correspond to 0, 0.5, 1, 2, 5 mg/kg(ppm). 2 μ l of both test and standard solutions are injected into gas chromatography and chromatograms (2 peaks per each) are obtained. Standard calibration curve is obtained from the peak area (sum of two different materials) against the concentration (ppm) of the standard solution. The content of propylene chlorohydrine is obtained from the curve and it should not be more than 1 ppm (this is applicable only for hydroxypropyl starch and hydroxypropyl distarch phosphate).

Operation Conditions

- Column : A 3 m \times 3.2 mm stainless
- Column Filler : 80~100 Mesh Gas chrom 2 coated with 10% carbowax 20 M or it sequivalent
- Detector : Hydrogen Flame Ionization Detector (FID)
- Temperature at injection hole : 210°C
- Column Temperature : 110°C
- Detector Temperature : 240°C
- Carrier gas and flow rate : Helium, 25 ml per minute

Solution

- Propylenechlorohydrine solution : 25 μ l of propylenechlorohydrine (2-chloro-1-propanol which contains 25% of 1-chloro-2-propanol) is taken using a 50 μ l syringe and weighed. It is then transferred into a 500 ml volumetric flask that is filled with small amount of water. The amount of propylenechlorohydrine is obtained by weighing the empty syringe. The total volume of the flask is brought up to 500 ml with water. This solution contains approximately 27.5 mg of mixed chlorohydrine (55 μ g/ml) and is freshly prepared prior to use.
- (12) Hydroxypropyl Group : 50~100 mg of Food Starch Modified is precisely weighed into a 100 ml volumetric flask and 25 ml of 1 N sulfuric acid is added. As a blank test, unmodified starch, that is derived from the same raw material as the modified starch, is treated exactly the same as above. These two flasks are heat-treated until the contents become solutions in a boiling water batch. After cooling, water is added to bring the volume to 100 ml. Test solution is further diluted, if necessary, so that the amount of hydroxypropyl group should not be more than 4 mg. 1 ml of each solution is transferred into a 25 ml graduated test tube, which is then immersed in cold water. 8 ml of sulfuric acid is added to each test tube and stopper is placed, which is then well mixed and heated for 3 minutes in a boiling water

bath. Test tubes are immediately chilled in an ice bath. When the solution is cold, 0.6 ml of ninhydrine solution is added to each test tube and well shaken. Both tubes are set-aside for 100 minutes in a 25°C water bath. Sulfuric acid is added to each tube to bring the total volume to 25 ml. Each tube is turned upside down a few times (but it is not to be shaken). Absorption is immediately measured at 590 nm with 1 cm path length using a blank test solution as a reference. The content of hydroxypropyl group is calculated from the following equation and should not be more than 7.0% (this is applicable only for hydroxypropyl starch and hydroxypropyl distarch phosphate). Test solution is measured in 5 minutes after it is transferred into a cell. Separately, 1 ml of each propylene glycol standard solution (10, 20, 30, 40, and 50 µg/ml) is added to 25 ml graduated test tube and a standard calibration curve is obtained following the same procedure as above.

$$\text{Content of hydroxy propyl group (\%)} = \frac{C \times 0.7763 \times 10 \times D}{\text{Weight of sample (mg)}}$$

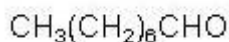
C : Amount of propylene glycol obtained from standard calibration curve (µg/ml)

D : Dilution factor

◦ Inhydrine Solution : 1 g of ninhydrine is dissolved in 100 ml of 5% sodiumbisulfite solution.

175. Octyl Aldehyde

n-Octanal



Chemical Formula $\text{C}_8\text{H}_{16}\text{O}$

Molecular Weight 128.22

Compositional Specifications of Octyl Aldehyde

Content Octyl Aldehyde should contain not less than 92.0% of octyl aldehyde ($\text{C}_8\text{H}_{16}\text{O}$).

Description Octyl Aldehyde is a colorless or slightly yellowish, transparent liquid having a characteristic odor.

Identification (1) To 1 ml of Octyl Aldehyde, add 4 ml of sodium hydrogen sulfite solution, and shake. The solution evolves heat immediately, and crystalline lumps are formed.

(2) To 1 ml of Octyl Aldehyde, add 1 g of hydroxylamine hydrochloride, 5 ml of ethanol, and 5 ml of pyridine. Equip with a reflux condenser, and heat for 30 minutes in a water bath while shaking occasionally, evaporate the solvent, and cool. Crystals are deposited. Add 10 ml of water, shake, collect the crystals by filtration, and recrystallize, using 60% alcohol. The melting point is approximately 60°C

Purity (1) Specific Gravity : Specific gravity of Octyl Aldehyde should be within a range of 0.810~0.830.

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Octyl Aldehyde should be within a range of 1.417~1.425

(3) Clarity and Color of Solution : When 1 ml of Octyl Aldehyde is dissolved in 3 ml of 70% alcohol, the solution be almost clear.

(4) Acid Value : Acid value of Octyl Aldehyde is tested by Acid Value in Flavoring Substance Test. It should not be more than 10.

Assay Accurately weigh about 1 g of Octyl Aldehyde, and proceed as directed under Method 1 in Aldehyde and Ketone Content in Flavoring Substances Tests. In this procedure, allow the mixture to stand for 15 minutes before titrating.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 64.11 mg of $\text{C}_8\text{H}_{16}\text{O}$

176. Potassium Iodide

Chemical Formula KI

Molecular Weight 166.00

Compositional Specifications of Potassium Iodide

Content Potassium Iodide, when calculated on the dried basis, should contain within a range of 99.0~101.5% of potassium iodide (KI).

Description Potassium Iodide is transparent, colorless, or opaque hexagonal crystal or white or milky white granular powder.

Identification Potassium Iodide solution (1→10) responds to test of Potassium Salt and Iodide Salt in Identification.

Purity (1) Arsenic : 0.25 g of Potassium Iodide is dissolved in 10 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Lead : Potassium Iodide is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(3) Iodate : 1.1 g of Potassium Iodide is dissolved in ammonia and carbon dioxide free water to make 10 ml, which is transferred to a comparator tube. 1 ml of starch solution and 0.25 ml of 1 N sulfuric acid are added to the tube, which is then mixed (test solution). 1 ml of iodate standard solution (potassium iodate solution (1→2,500) is diluted with water to 100 ml) is diluted with water to 10 ml in another Nestler tube. This solution is mixed with 1 ml of starch solution and 0.25 ml of 1 N sulfuric acid (standard solution). The color of test solution should not be deeper than that of standard solution.

(4) Nitrate, Nitrite, and Ammonia : 1 g of Potassium Iodide transfer into a 40 ml test tube and dissolve in 5 ml of water. Add 2 ml of sodium hydroxide solution and approximately 200 mg of aluminum wire, which is then plugged with cotton ball. Red litmus paper is placed on the cotton ball. The tube is heated for 15 minutes in a water bath. The color of the litmus paper should not turn blue.

(5) Thiosulfate Salt and Barium : 500 mg of Potassium Iodide is dissolved in 10 ml of ammonia and carbon dioxide free water. When 2 drops of dilute sulfuric acid is added to this solution, it should not become turbid within 1 minute.

Loss on Drying When Potassium Iodide is dried for 4 hours at 105°C, the loss should not be more than 1%.

Assay Approximately 500 mg of Potassium Iodide, previously dried and accurately weighed, dissolve in approximately 10 ml of water. After adding 35 ml of hydrochloric acid and 5ml of chloroform, it is titrated with 0.05 M potassium iodate solution until the purple color disappears in the chloroform layer. Near the end point, it is vigorously shaken while adding the potassium iodate solution. If the purple color in the chloroform persists, it is further titrated with potassium iodate solution.

1 ml of 0.05 M potassium iodate solution = 16.60 mg KI

177. Methyl Hesperidin

Compositional Specifications of Methyl Hesperidin

Content Methyl Hesperidin when calculated on the dried basis, should contain not less than 90.0% of methyl hesperidin.

Description Methyl Hesperidin occurs as a yellow to orange-yellow powder. It is odorless or has a slight odor.

Identification (1) To 10 mg of Methyl Hesperidin, add 2 ml of sulfuric acid. A red color develops. Add 1~2 drops of hydrogen peroxide solution. A dark red color develops.

(2) To 0.1 g of Methyl Hesperidin, add 5 ml of ethanol and 1 ml of sodium hydroxide solution, boil for 3 minutes, cool, and filter. The color of the filtrate changes to yellow to orange-yellow. To the filtrate, add 1 ml of hydrochloric acid and about 10 mg of magnesium dust, and allow to stand. A pink color develops.

(3) To 0.1 g of Methyl Hesperidin, add 10 ml of diluted hydrochloric acid, boil for 5 minutes, cool, and filter. Neutralize the filtrate with sodium hydroxide solution (1→5), add 2 ml of Fehling's solution, and heat. A red precipitate is formed.

Purity (1) Clarity and Color of Solution : When 1 g of Methyl Hesperidin is dissolved in 10 ml of water, the solution be almost clear.

(2) Sulfate : When 0.5 g of Methyl Hesperidin is tested by Sulfate Limit Test, the content should correspond to that of 0.2 ml of 0.01 N sulfuric acid.

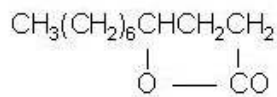
(3) Lead : When 5.0 g of Methyl Hesperidin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Loss on Drying When Methyl Hesperidin is dried for 24 hours in a vacuum desiccator (silica gel), the loss should not be more than 3%.

Residue on Ignition Residue on ignition of Methyl Hesperidin should not be more than 0.5%.

Assay Accurately weigh about 0.3 g of Methyl Hesperidin, previously dried, dissolve in water to make 1,000 ml. Take 10 ml of this solution, add water to make 100 ml, measure absorbance A at a wave-length of 300 nm with 1 cm path length, and calculate the content of methyl hesperidin by the following formula

$$\text{Content (\%)} = \frac{753.7A}{\text{Weight of sample (mg)}} \times 100$$

178. γ -Undecalactone

Chemical Formula $\text{C}_{11}\text{H}_{20}\text{O}_2$

Molecular Weight 184.28

Compositional Specifications of γ -Undecalactone

Content γ -Undecalactone should contain not less than 98.0% of γ -undecalactone ($\text{C}_{11}\text{H}_{20}\text{O}_2$).

Description γ -Undecalactone is a colorless to light yellow, transparent liquid having a peach-like odor.

Identification To 1 ml of γ -Undecalactone, add 6 ml of sodium hydroxide, and heat in a water bath while shaking. It almost dissolves, and the peach-like odor disappears. Acidify this solution with diluted sulfuric acid, and heat in a water bath while shaking. Oil phase separates, and a peach-like odor develops.

Purity (1) Specific Gravity : Specific gravity of γ -Undecalactone should be within a range of 0.942~0.945

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of γ -Undecalactone should be within a range of 1.450~1.454

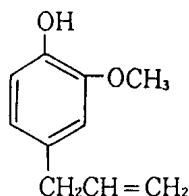
(3) Clarity and Color of Solution : When 1 ml of γ -Undecalactone is dissolved in 5 ml of 60% alcohol, the solution be almost clear.

(4) Acid Value : Acid value of γ -Undecalactone is tested by Acid Value in Flavoring Substance Test. It should not be more than 5.

Assay Accurately weigh about 1 g of γ -Undecalactone, and proceed as directed under Ester Value and Ester Content in flavoring Substances Tests.

1 ml of 0.5 N alcoholic potassium hydroxide = 92.14 mg of $\text{C}_{11}\text{H}_{20}\text{O}_2$

179. Eugenol



Chemical Formula $C_{10}H_{12}O_2$

Molecular Weight 164.20

Compositional Specifications of Eugenol

Content Eugenol should contain not less than 100.0% of eugenol ($C_{10}H_{12}O_2$).

Description Eugenol is a colorless to light yellow-brown, transparent liquid having a clove-like odor.

Identification (1) 5 drops of Eugenol is dissolved in 10 ml of water. When 3 drops of ferrous chloride solution are added to this solution, bluish green color appears.

(2) To 0.5 g of Eugenol, add 0.1 g of picric acid, 1 ml of benzene, and 9 ml of petroleum benzene and heated until crystals dissolve, the solution becomes orange yellow.

Purity (1) Specific Gravity : Specific gravity of Eugenol should be within a range of 1.064~1.070

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Eugenol should be within a range of 1.540~1.542

(3) Clarity and Color of Solution : When 2 ml of Eugenol is dissolved in 4 ml of 70% alcohol, the solution be almost clear.

Assay Proceed as directed under Phenol Content in Flavoring Substances Tests. Instead of allowing to stand for 30 minutes, heat in a water bath for 30 minutes, and allow to cool to room temperature.

180. Vitamin A in Oil

Definition Vitamin A in Oil is a fatty oil obtained from the fresh liver, pyloric appendage, other parts of marine animals, its vitamin A (retinol) concentrate or vitamin A fatty acid ester (retinol fatty acid ester), or such substances dissolved in edible fats and oils.

Compositional Specifications of Vitamin A in Oil

Content 1 g of Vitamin A in Oil should contain not less than 30 mg of vitamin A, and 90.0~120.0% of the declared content of vitamin A. 300 mg of vitamin A is equivalent to 1,000,000 international units.

Description Vitamin A in Oil occurs as a light yellow to reddish-light yellow oily substance having a slight, characteristic odor.

Identification (1) Dissolve 50 mg of Vitamin A in Oil in chloroform to obtain the solution containing about 3 µg of vitamin A per ml. To 1 ml of the solution, add 5 ml of antimony trichloride solution. A blue color develops and immediately fades.

(2) Dissolve 50 mg of Vitamin A in Oil in isopropyl alcohol for vitamin A determination to obtain the solution containing about 3 µg of vitamin A per ml. The solution exhibits an absorption maximum at a wavelength of 327 ± 1 nm.

Purity (1) Free Acid : 2 g of Vitamin A in Oil is dissolved in 20 ml of alcohol. Acid value of this solution is tested by Acid Value in Flavoring Substance Test. It should not be more than 2.8.

(2) Lead : When 5.0 g of Vitamin A in Oil is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Assay Accurately weigh an amount of Vitamin A in Oil corresponding to not less than 0.15 mg as vitamin A and containing not less than 1 g of fats and oils, transfer into a flask, and add 30 ml of aldehyde-free alcohol and 1 ml of a solution of pyrogallol in alcohol (1→10). Add 3 ml of potassium hydroxide solution (9→10), equip with a reflux condenser, and heat in a water bath for 30 minutes to saponify. Cool quickly to ordinary temperature. add 30 ml of water, transfer into separating funnel. Wash the flask with 10 ml of water and then 40 ml of ether for vitamin A determination, transfer the washings into the separating funnel, shake well, and allow to stand. Transfer the aqueous layer into a separatory funnel and extract twice with 30 ml of ether for vitamin A determination. Wash the ether extract with 50 ml of water until the aqueous layer is not colorized with phenolphthalein solution. Allow to stand for 10 minutes. Remove water completely and transfer the ether layer into an Erlenmeyer

flask. Wash the separatory funnel twice with 10 ml of ether for vitamin A determination each time and transfer the washings to the Erlenmeyer flask above. Add 5 g of anhydrous sodium sulfate, shake, and decant the ether extract into an Erlenmeyer flask. Wash the remaining sodium sulfate more than twice with 10 ml of ether for vitamin A determination each time, and transfer the washings into the Erlenmeyer flask above. Concentrate the ether extract to approximately 1 ml using a Guternadanish concentrator while shaking in a water bath at 45°C, immediately dissolve in isopropyl alcohol for vitamin A determination, diluting exactly to obtain the solution containing approximately 3µg of vitamin A per 1µl. Use this solution as the test solution. Measure absorbances at wavelengths of 310 nm, 325 nm, and 334 nm, respectively, and calculate the content by the following formula. In this case, ether and isopropyl for vitamin A determination are used :

$$\text{Content of vitamin A (mg)} = [E]_{1cm}^{1\%}(325\text{nm}) \times 0.549$$

$$[E]_{1cm}^{1\%}(325\text{nm}) = \frac{A_{325}}{W_1} \times \frac{V}{100} \times f$$

$$f = 6.815 - 2.555 \times \frac{A_{310}}{A_{325}} - 4.260 \times \frac{A_{334}}{A_{325}}$$

A : Absorbance at each wavelength

W : Weight (g) of the sample in V ml of the test solution.

f : Correction factor (when it is within 0.970~1.030, 1 is used instead.)

V : Total volume (ml) of the test solution,

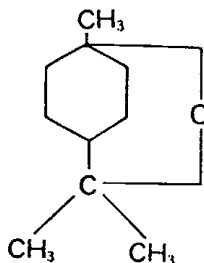
l : Path length of the solution (cm)

Storage Standards of Vitamin A in Oil

Place in a light-resistant hermetic container, replace the air with an inert gas, and store.

181. Eucalyptol

1, 8 - Cineol



Chemical Formula $C_{10}H_{18}O$

Molecular Weight 154.25

Compositional Specifications of Eucalyptol

Content Eucalyptol should contain not less than 85.0% 1,8-cineol ($C_{10}H_{18}O$).

Description Eucalyptol is transparent colorless~pale yellow liquid with characteristic scent and refreshing taste.

Identification To 3 g of Eucalyptol, add melted 2 g of o-cresol by heating and mix by shaking. Then it turns into crystalline lump, which melts upon heating in a water bath.

Purity (1) Specific Gravity: Specific gravity of Eucalyptol should be within a range of 0.921~0.924.

(2) Optical Rotation : Optical rotation, $[\alpha]_D^{25}$ of Eucalyptol should be within a range of $-0.5 \sim +0.5^\circ C$.

(3) Refractive Index : Refractive Index, $[n]_D^{20}$ of Eucalyptol should be within a range of 1.455~1.460.

(4) Clarity and Color of Solution : Dissolve 1 ml of Eucalyptol in 5 ml of 60% alcohol. This solution should be clear.

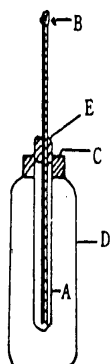
(5) Resorcin : 1 ml of Eucalyptol is well mixed with 5 ml of water and 1 drop of a mixture (1 ml of mercury (II) nitrate and 3 ml of water). While shaking, the mixture is heated for 2 minutes in a water bath. After cooling, 1 drop of dilute sulfuric acid and 1 drop of sodium nitrite solution are added, which is then heated again for 2 hours in a water bath. The aqueous layer should not turn yellow~yellowish brown.

(6) Phenanthrene : 2.5 ml of Eucalyptol is added to 5 ml of petroleum benzene. To this solution, 10 ml of sodium nitrite solution (1→20) is added and then 5 ml of

glacial acetic acid is slowly added. Solution should not show crystallization within 10 minutes.

Assay 3 g of Eucalyptol and 2.1 g of heat-melted o-cresol are added into a test tube (A) with approximately 15 mm diameter and 80~160 mm length. A thermometer (B) is fixed with a cork stopper so that the mercury filling is slightly lower than the center of the liquid. While stirring the liquid with the thermometer, a temperature where crystallites start to form. A is heated so that the content is completely melted. A is transferred to a bottle (D) with a cork stopper (C) and slowly cooled. When crystallites start to form again or the first recorded temperature is reached, the thermometer is vigorously rubbed against the inner wall of the tube, which lowers the temperature slightly. Then the temperature becomes constant, the temperature is recorded. This procedure is repeated and the highest temperature is taken and the content of eucalyptol is calculated from the table below.

Content of Eucalyptol (%)

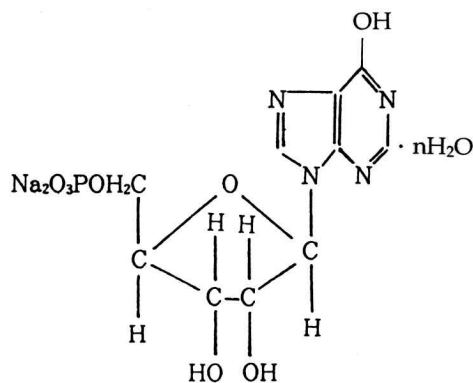


온도	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
47	80.0	80.2	80.4	80.6	80.8	81.1	81.3	81.5	81.7	81.9
48	82.1	82.3	82.5	82.7	82.9	83.2	83.4	83.6	83.8	84.0
49	84.2	84.4	84.6	84.8	85.0	85.3	85.5	85.7	85.9	86.0
50	86.3	86.6	86.8	87.1	87.3	87.6	87.8	88.1	88.3	88.6
51	88.8	89.1	89.3	89.6	89.8	90.1	90.3	90.6	90.8	91.1
52	91.3	91.6	91.8	92.1	92.3	92.6	92.8	93.1	93.3	93.6
53	93.8	94.1	94.3	94.6	94.8	95.1	95.3	95.6	95.8	96.1
54	96.3	96.6	96.9	97.2	97.5	97.8	98.1	98.4	98.7	99.0
55	99.3	99.7	100.0							

182. Disodium 5'-Inosinate

Sodium 5'-Inosinate

Sodium Inosinate

Chemical Formula $C_{10}H_{11}O_8N_4PNa_2 \cdot nH_2O$

Molecular Weight 372.24

Compositional Specifications of Disodium 5'-Inosinate

Content Disodium 5'-Inosinate, when calculated on the anhydrous basis, should contain within a range of 97.0~102.0% of disodium 5'-inosinate ($C_{10}H_{11}O_8N_4PNa_2$)

Description Disodium 5'-Inosinate occurs as colorless to white crystals or as a white crystalline powder, having a characteristic taste.

Identification (1) Dissolve 20 mg of Disodium 5'-Inosinate in 100 ml of 0.01 N hydrochloric acid. The solution exhibits an absorption maximum at a wavelength of 250 ± 2 nm.

(2) To 3 ml of Disodium 5'-Inosinate solution (3→10,000), add 0.2 ml of a solution of orcinol in alcohol (1→10), then add 3 ml of a solution of ferric ammonium sulfate in hydrochloric acid (1→1,000), and heat in a water bath for 10 minutes. A green color develops.

(3) To 5 ml of Disodium 5'-Inosinate solution (1→20), add 2 ml of magnesia solution. No precipitate is formed. Then, add 7 ml of nitric acid, boil for 10 minutes, and neutralize with sodium hydroxide solution. The solution responds to the test for Phosphate (2).

(4) Disodium 5'-Inosinate responds to test of Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : 0.5 g of Disodium 5'-Inosinate, dissolved in 10 ml of water. This solution should be Colorless and almost clear

(2) pH : pH of Disodium 5'-Inosinate solution (1→20), measured by glass electrode method, should be within a range of 7.0~8.5

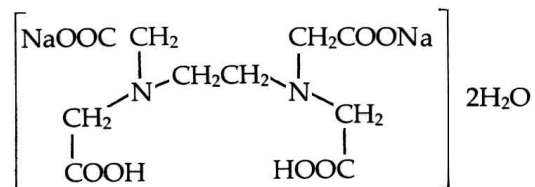
- (3) Arsenic : When 0.25 g of Disodium 5'-Inosinate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.
- (4) Lead : When 5.0 g of Disodium 5'-Inosinate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (5) Absorption Ratio : Disodium 5'-Inosinate dissolve in 0.01 N hydrochloric acid (1→50,000). Measure absorbances A1, A2, and A3 of this solution at wavelengths of 250 nm, 260 nm, and 280 nm, respectively. A1/A2 is 1.55~1.65, and A3/A2 is 0.2~0.3
- (6) Other Decomposed Substances of Nucleic Acid : Use Disodium 5'-Inosinate solution (0.1→20), as the test solution. Measure 1μl of the test solution, perform Thin-Layer Chromatography without a reference solution, using n-propanol-ammonia solution- acetone mixture (6:5:2) as the developing solvent. Only one spot is observed. For the thin-layer plate, use a plate prepared by applying silica gel for thin-layer chromatography (fluorescent material coated) dried at 110°C for 1 hour as the support. Stop the development when the solvent front rises about 10 cm above the original line, air-drying in a dark place, and observe under ultraviolet light (wavelength : about 250 nm).

Water Content When approximately 500 mg of Disodium 5'-Inosinate is tested for water content, it should not be more than 28.5%. In this case, sample transfer into a dried titration flask, where 10 ml of Karl-Fischer methyl alcohol is added. Additionally Karl-Fischer methyl alcohol is added to have excess of 10 ml. It is then mixed by shaking with a cap for 20 minutes. It is titrated with water-ethyl alcohol standard solution. Separately, a blank test is carried out. Perform a blank test in the same manner.

Assay Accurately weigh about 500 mg of Disodium 5'-Inosinate, dissolve in 0.01 N hydrochloric acid to make 1,000 ml. Take 10 ml of this solution, and add 0.01 N hydrochloric acid to make 250 ml. Use this solution as the test solution. Use 0.01 N hydrochloric acid as the reference solution. Measure absorbance A of the test solution at a wavelength of 250 nm with 1 cm path length, and calculate the content by the following formula:

$$\text{Content (\%)} = \frac{A}{310} \times \frac{250,000}{\text{Weight of sample (mg)}} \times \frac{100}{100 - \text{water content (\%)}} \times 100$$

183. Disodium Ethylenediaminetetraacetate



Chemical Formula $\text{C}_{10}\text{H}_{14}\text{N}_2\text{Na}_2\text{O}_8 \cdot 2\text{H}_2\text{O}$

Molecular Weight 372.24

Compositional Specifications of Disodium Ethylenediaminetetraacetate

Content Disodium Ethylenediaminetetraacetate should contain not less than 99.0% of disodium ethylenediaminetetraacetate ($\text{C}_{10}\text{H}_{14}\text{N}_2\text{Na}_2\text{O}_8 \cdot 2\text{H}_2\text{O}$).

Description Disodium Ethylenediaminetetraacetate occurs as a whitish crystalline powder. It is odorless.

Identification (1) Disodium Ethylenediaminetetraacetate solution (1→20) responds to the test for Sodium Salt in Identification.

(2) Pink color solution of 5ml of water, 2 drops of ammonium thiocyanate solution, and 2 drops of ferric chloride solution, add approximately 50 mg of Disodium Ethylenediaminetetraacetate. its red color disappears.

Purity (1) pH : Disodium Ethylenediaminetetraacetate solution(1→100) measured by glass electrode method, should be within a range of 4.3~4.7.

(2) Arsenic : When 0.25 g of Disodium Ethylenediaminetetraacetate is dissolved in 10 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(3) Lead : When 5.0 g of Disodium Ethylenediaminetetraacetate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

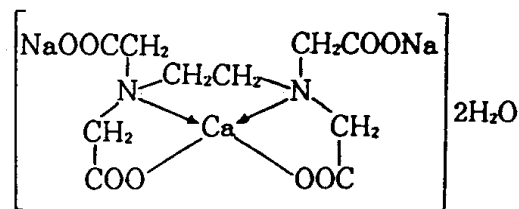
(4) Cyanide : 1.0 g of Disodium Ethylenediaminetetraacetate transfer into a round-bottom flask, dissolve in 100 ml of water, add 10 ml of phosphoric acid, and distilled. Use a 100 ml mass flask containing 15 ml of 0.5 N sodium hydroxide solution as the receiver, immerse the end of the condenser in it, and distill until the total amount becomes 100 ml. Use this solution as the test solution. 2 ml of test solution transfer into a test tube with a ground glass stopper, which is neutralized with dilute acetic acid using 1 drop of phenolphthalein solution. 5 ml of phosphate

buffer solution (pH 6.8) and 1 ml of chloramine solution (1→5) are added to the solution and the stopper is placed. Mix gently, and allow to stand for 2~3 minutes. Add 5 ml of pyridine · pyrazolone solution, mix thoroughly, and allow to stand at 20~30°C for 50 minutes. The color of the solution should not be deeper than that of the reference solution. To prepare Reference solution, measure 1.0 ml of cyanide standard solution, add 15 ml of 0.5 N sodium hydroxide solution and water to make 100 ml. The same procedure is repeated with 2 ml of the resulting solution in a test tube with a ground glass stopper.

Assay Accurately weigh about 0.4 g of Disodium Ethylenediaminetetraacetate, dissolve in 20 ml of water, add 10 ml of ammonia · ammonium chloride buffer (pH 10.7), and titrate with 0.05 M zinc chloride (indicator : 2 drops of Eriochrome black T solution) until the blue color of the solution changes to red.

1 ml of 0.05 M Zinc Chloride = 18.612 mg of $\text{C}_{10}\text{H}_{14}\text{N}_2\text{Na}_2\text{O}_8 \cdot 2\text{H}_2\text{O}$

184. Calcium Disodium Ethylenediaminetetraacetate



Chemical Formula $\text{C}_{10}\text{H}_{12}\text{CaN}_2\text{Na}_2\text{O}_8 \cdot 2\text{H}_2\text{O}$

Molecular Weight 410.31

Compositional Specifications of Calcium Disodium Ethylenediaminetetraacetate

Content Calcium Disodium Ethylenediaminetetraacetate, when calculated on the anhydrous basis, should contain within a range of 97.0~102.0% of calcium disodium ethylenediaminetetraacetate ($\text{C}_{10}\text{H}_{12}\text{CaN}_2\text{Na}_2\text{O}_8 \cdot 2\text{H}_2\text{O} = 374.27$)

Description Calcium Disodium Ethylenediaminetetraacetate occurs as white crystallin granules or white to whitish crystalline powder. It is odorless, slightly hygroscopic, has a faint salty taste.

Identification (1) Calcium Disodium Ethylenediaminetetraacetate solution (1→20) responds to the tests for Calcium Salt (2) and Sodium Salt in identification.

(2) Add 2 drops of ammonium thiocyanate solution and 2 drops of ferric chloride solution to 5 ml of water. Into this solution, place 50 mg of Calcium Disodium Ethylenediaminetetraacetate, and shake. The red color of the solution disappears.

Purity (1) pH : pH of Calcium Disodium Ethylenediamine-tetraacetate solution (1→100) measured by Glass Electrode Method should be within a range of 6.5~7.5.

(2) Arsenic : 0.25 g of Calcium Disodium Ethylenediaminetetraacetate is dissolved in 10 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(3) Lead : When 5.0 g of Calcium Disodium Ethylenediaminetetraacetate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Mercury : When Calcium Disodium Ethylenediaminetetraacetate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Magnesium-Chelating Substance : Weigh 1.0 g of Calcium Disodium Ethylenediaminetetraacetate, dissolve in 5 ml of water, add 5 ml of ammonia · ammonium chloride buffer, and titrate with 0.1 M magnesium acetate (indicator : 5

drops of Eriochrome black T solution). The consumed volume is not more than 2 ml.

Water Content Approximately 0.5 g of Calcium Disodium Ethylenediaminetetraacetate is precisely weighed and tested by direct titration method of water determination (Karl-Fischer Method). Water content should not be more than 13%.

Assay Accurately weigh about 1.2~1.5 g of Calcium Disodium Ethylenediaminetetraacetate, transfer into a Erlen Meyer flask, and dissolve in 75 ml of water. 25 ml of dilute acetic acid and 1 ml of diphenylcarbazone solution are added. It is then slowly titrated with 0.1 M mercuric chloride solution until initial purple color appears.

$$1 \text{ ml of } 0.1 \text{ M mercuricnitrate} = 37.43 \text{ mg of } \text{C}_{10}\text{H}_{12}\text{CaH}_2\text{Na}_2\text{O}_8$$

185. Silicon Dioxide

Synthetic Amorphous Silica

Chemical Formula SiO_2

Molecular Weight 60.08

Definition Silicon dioxide is noncrystalline amorphous material as observed by X-ray diffractometer. Colloidal silica is prepared by vapor phase hydrolysis. Precipitated silica, silica gel, and hydrolyzed silica are prepared by wet chemistry.

Compositional Specifications of Silicon Dioxide

Content Silicon dioxide, when calculated on dried at 105°C for 2 hours and treated at $900\sim 1,000^\circ\text{C}$ for 1 hour, should contain not less than 99.0% silicon dioxide ($\text{SiO}_2 = 60.08$) for colloidal silica and not less than 94.0% of silicon dioxide for precipitated silica, silica gel, and hydrolyzed silica.

Description Silicon dioxide is white powder, particle, or colloidal liquid. It is odorless.

Identification (1) 5 mg of Silicon dioxide transfer into a platinum crucible and 200 mg of anhydrous potassium carbonate added. The crucible is calcined with red flame of a burner for 10 minutes. After cooling, the resulting material is dissolved in 2 ml of freshly distilled water. If necessary, the solution is heated and 2 ml of ammonium molybdate solution is slowly added. The resulting solution becomes dark yellow.

(2) 1 drop of the solution in Identification (1) is dropped on a filter paper. After liquid is removed, 1 drop of o-tolidine saturated glacial acetic acid solution is dropped. After the paper is exposed to ammonia gas, a greenish blue spot is formed.

Purity (1) Arsenic : When test by Arsenic Limit Test is carried out with 2.5 ml of solution A in (2) Purity, it should not be more than 4 ppm.

(2) Lead : 10.0 g of Silicon dioxide, previously dried and accurately weighed, transfer into a beaker, add 50ml of 0.5 N hydrochloric acid. Cover it with a watch glass, boil for 15 minutes, and cool it down. Transfer it into 100~150 ml centrifuge tube and centrifuge it for 10~15 minutes until the insoluble substances are settled. Filter the supernatant through a filter paper(a Whatman No.4 filter paper or its equivalent) and transfer the filtrate to a 100 ml flask. To the residue, add 10~15 ml of hot water, mix, and centrifuge it. Filter the supernatant and add it to the filtrate. Repeat this preparation twice and add the solution to filtrate, dilute to 100 ml with water, test solution. When this test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

- (3) Mercury : Silicon dioxide, previously dried, is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (4) Soluble Ionized Salts : After drying for 2 hours at 105°C, 5 g of Silicon dioxide is precisely weighed and 150 ml of water is added. This is mixed for 5 minutes using a homogenizer. The resulting mixture is vacuum filtered. The filtering apparatus and the residue are rinsed with 100 ml water and the rinse water is added to the filtrate, where water is added to make 250 ml. Use this solution as the test solution. The resulting test solution is tested for conductivity using an appropriate equipment. The conductivity of the test solution should not be higher than that of a solution of 250 mg anhydrous sodium nitrite in 250 ml water.

Loss on Drying When Silicon dioxide is dried for 2 hours at 105°C, the loss should not be more than 2.5% for colloidal silica, Not more than 7% for precipitated silica and silica gel, not more than 70% for hydrolyzed silica.

Loss on Ignition When 1 g of Silicon dioxide, previously dried at 105°C for 2 hours and accurately weighed, heat-treated at 900~1,000°C for 1 hour, the residues should not be more than 2% for colloidal silica, not more than 8.5% for precipitated silica, silica gel, and hydrolyzed silica.

Assay Approximately 1 g of Silicon dioxide transfer into a previously weighed platinum crucible, which is then dried for 2 hours at 105°C. It is further heat-treated for 1 hour at 900~1,000°C. After cooling in a desiccator, the weight of the sample is weighed (W_1). The resulting residue is wetted with 3~4 drops of alcohol and 2 drops of sulfuric acid are added. Hydrofluoric acid is added so that the residue is immersed. It is then evaporated at 95~105°C on a hot plate. With 5 ml of hydrofluoric acid, the crucible wall is washed and it is evaporated again. The crucible is then heated with a burner until the residue turns red. After cooling in a desiccator, the weight of the final residue is weighed (W_2). The content of silicon dioxide is calculated from the following equation.

$$\text{Content of Silicon Dioxide (\%)} = \frac{(W_1 - W_2)}{W_1} \times 100$$

186. Chlorine Dioxide

Chemical Formula ClO_2

Molecular Weight 67.46

187. Carbon Dioxide

Chemical Formula CO_2

Molecular Weight 44.01

Compositional Specifications of Carbon Dioxide

Content Chlorine dioxide should contain not less than 99.5% of carbon dioxide (CO_2).

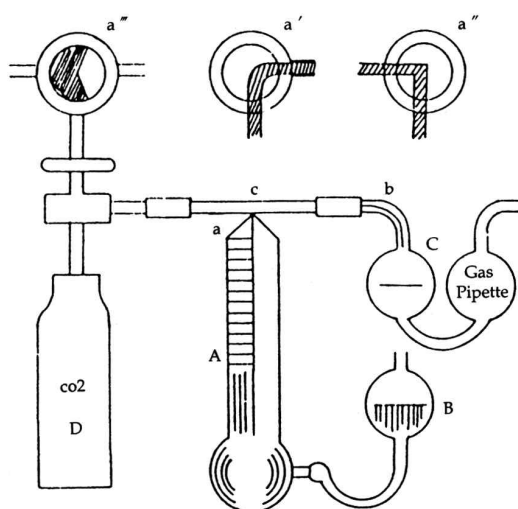
Description Chlorine dioxide is a colorless, tasteless and odorless gas.

Identification Chlorine dioxide is fire extinguishing. Pass Carbon Dioxide through calcium hydroxide solution. A white precipitate is formed. Collect the precipitate, and add diluted acetic acid (1→4). It dissolves while effervescence occurs.

Purity The amount of Carbon Dioxide is calculated as the capacity at 20°C and 760 mmHg atmospheric pressure.

- (1) Free Acid : 1000 ml of Chlorine dioxide pass 50 ml of freshly boiled and cooled water into a 50 ml Nestler tube. Insert a gas induction tube (internal diameter : about 1 mm) into the Nestler tube, keep it so that the end is 2 mm from the bottom of the Nestler tube, pass 1,000 ml of Carbon Dioxide in 15 minutes. After passing Chlorine dioxide, add this water to one of two comparison tubes which are same in length. To another comparison tube, add 50 ml of freshly boiled and cooled water and 1 ml of 0.01N hydrochloric acid. To both comparison tubes, add 0.1 ml of methyl orange solution respectively, mix, penetrate, and compare. The color of the solution where the sample is added should not be darker than the color of the tube where 0.01N hydrochloric acid is added.
- (2) Hydrogen Phosphide, Hydrogen Sulfide, and Reducing Organic Substances : Transfer 25 ml of silver nitrate-ammonia solution and 3 ml of ammonia solution into a Nestler tube, and pass 1,000 ml of Carbon Dioxide. The color of this solution is not darker than the color of mixture of 25 ml of silver nitrate-ammonia solution and 3 ml of ammonia solution.
- (3) Carbon Monoxide : Both ends of a Carbon monoxide detection tube are cut off. One end is connected to a container of Carbon Dioxide and the other end to an appropriate flow meter. When 300 ml of Carbon Dioxide is passed trough at approximately 100 ml/min, the color at the yellow part should not be deeper green than that of a detection tube treated with 300 ml/min of air (Not more than 10 ppm).

Assay For the sampling, proceed in the same manner as directed under Purity.



188. Titanium Dioxide

Chemical Formula TiO_2

Molecular Weight 79.90

Compositional Specifications of Titanium Dioxide

Content Titanium Dioxide, when calculated on the dried basis, should contain not less than 99.0% of Titanium Dioxide (TiO_2).

Description Titanium Dioxide occurs as a white powder. It is odorless and tasteless.

Identification To 0.5 g of Titanium Dioxide, add 5 ml of sulfuric acid, and heat gently until fumes of sulfuric acid are evolved. Cool, add water gradually to make about 100 ml, filter, and add 2~3 drops hydrogen peroxide solution to 5 ml of the filtrate. The color becomes orange~red color.

Purity (1) Water-Soluble Substances : To 4.0 g of Titanium Dioxide, add 50 ml of water, shake, and allow to stand 24 hours transfer into a 100 ml volumetric flask and add 2 ml of ammonium chloride solution, and shake. If a precipitate of titanium dioxide is not formed, add another 2 ml of ammonium chloride solution, and allow to stand. After the precipitate is formed, add water to make 200 ml, and filter while shaking. Discard 10 ml of the initial filtrate, transfer 100 ml of the subsequent filtrate into a platinum crucible previously weighed, evaporate to dryness, ignite to constant weight, and weigh the residue. The residue should not be more than 5 mg. (Not more than 0.25%)

(2) Hydrochloric Acid-Soluble Substances : Weigh 5 g of Titanium Dioxide, add 100 ml of diluted hydrochloric acid (1→20), shake, heat in a water bath for 30 minutes while stirring occasionally, and filter. Wash the residue three times with 10 ml of diluted hydrochloric acid (1→20) each time, combine the filtrate and the washings, evaporate to dryness, ignite to constant weight, and weigh the residue. The residue should not be more than 25 mg. (Not more than 0.5%)

(3) Arsenic : 10 g of Titanium Dioxide transfer into a 250 ml beaker. 50 ml of diluted hydrochloric acid (1→20) is added and the flask is covered with a watch glass and slowly heated until the liquid boils. After gently boiling for another 15 minutes, it is centrifuged to separate the insolubles. The supernatant is filtered. Insoluble substances and beaker are washed with three times with 10 ml of hot water, which is then passed through the previous filter paper. The filter paper is washed with 10~15 ml of hot water, which is then added to the filtrate. After cooling, the filtrate is diluted to 100 ml with water. Use this solution as the solution A. 7.5 ml of the

Solution A is tested by Arsenic Limit Test. The content should not be more than 1.3 ppm.

- (4) Lead : 10.0 g of Titanium Dioxide, previously dried and accurately weighed, transfer into a beaker, add 50 ml of 0.5 N hydrochloric acid. Cover it with a watch glass, boil for 15 minutes, and cool it down. Transfer it to 100~150 ml centrifuge tube and centrifuge it for 10~15 minutes until the insoluble substances are settled. Filter the supernatant through a filter paper (a Whatman No.4 filter paper or its equivalent) and transfer the filtrate to a 100 ml flask. To the residue, add 10~15 ml of hot water, mix, and centrifuge it. Filter the supernatant and add it to the filtrate. Repeat this preparation twice and add the solution to filtrate, dilute to 100 ml with water, test solution. When this test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 10 ppm.
- (5) Cadmium : When the test solution of (4) Purity is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Antimony : When the test solution of (4) Purity is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (7) Zinc : When the test solution of (4) Purity is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 50 ppm.
- (8) Mercury : When Titanium Dioxide is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (9) Aluminum Oxide and Silicon Dioxide : The total content of aluminum oxide and silicon dioxide determined by the following methods is not more than 2.0%.
 - (i) Aluminum Oxide : Weigh 1.0 g of Titanium Dioxide and 10 g of sodium hydrogen sulfate, transfer into a quartz Erlenmeyer flask, and heat gently until completely fused. Cool, add 25 ml of diluted sulfuric acid (1→2). and heat carefully until the precipitate dissolves. Cool, and add water to make 120 ml. To the solution, add 65 ml of sodium hydroxide solution (1→4) while stirring, transfer gradually into a 500-ml volumetric flask containing 135 ml of sodium hydroxide solution (1→4) while stirring, and add water to make 500 ml. Allow to stand or centrifuge for 5 minutes. and filter. Transfer 100 ml of the filtrate into a 500-ml Erlenmeyer flask, add 1 drop of methyl orange solution, acidify with diluted hydrochloric acid (1→2), add 3 ml of diluted hydrochloric acid (1→2). And add 25

ml of 0.02 M EDTA exactly measured. Add drop wise ammonia solution until the color of the solution changes from red to orange-yellow, and add 10 ml of ammonium acetate buffer (77 g of ammonium acetate, add 10 ml of glacial acetic acid and add water to make 1,000 ml) and 10 ml of diammonium phosphate buffer (150 g of diammonium phosphate, add 700 ml of water and adjust to pH 5.5 with diluted hydrochloric acid (1→20) and add water to make 1,000 ml). It is boiled for 5 minutes and then cool rapidly in flow water. Add 3 drops of xylene orange solution, and mixed. If the color of the solution changes to purple, yellow-brown, or pink, adjust the pH to 5.3~5.7 with acetic acid. if no pink color develops, use this solution as the test solution. if a pink color develops. repeat the above procedure with another 100-ml portion of the filtrate, using 50 ml of 0.02 M EDTA exactly measured. Use the resulting solution as the test solution. Add titrated 0.01 M zinc sulfate to the sample solution until the yellow-brown color of the solution becomes reddish (This persists for 5~10 seconds).

(Note: This titration should be carried out quickly. Near the end point, it is added by 0.2 ml until the color appears first. Even the color disappears in 5~10 seconds, it is regarded as the end point. If the observation of the first color change fails, it becomes an inaccurate titration. The consumption for the first color change should not be more than 8 ml. To be accurate, it should be 10~15 ml).

Add 2 g of sodium fluoride, boil for 2~5 minutes, cool rapidly in flow water, titrate the liberated EDTA with 0.01 M zinc sulfate until the yellow-brown color of the solution becomes reddish, and calculate the content by the following formula:

Content of aluminum oxide (Al_2O_3) (%)

$$= \frac{T \times \text{Volume of 0.01M zinc sulfate titrated (ml)}}{\text{Weight of the sample (ml)} \times 2}$$

T = weight of aluminum oxide(mg) (Al_2O_3) corresponding to 1 ml of 0.01 M zinc sulfate.

- 0.01 M zinc sulfate solution : 2.9 g of zinc sulfate ($\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$) is dissolved in water to make 1,000 ml. 500 mg of aluminum (high purity, 99.0%) is precisely weighed and dissolved in 20 ml hydrochloric acid by gently heating. It is then diluted to 1,000 ml. 10 ml of this solution is transferred into a 500 ml Erlen Meyer flask with 90 ml of water and 3 ml of hydrochloric acid. 1 drop of methyl orange solution and 25 ml of 0.02 M EDTA solution are added and ammonia solution is

added drop-wise until its red color turns orange yellow. After adding 10 ml of ammonium acetate buffer solution and 10 ml of diammonium phosphate buffer solution, it is boiled for 5 minutes and then quenched, where 3 drops of xylenol orange solution are added. Zinc sulfate solution is added until the yellow color becomes red. 2 g of sodium fluoride is added to the resulting solution, which is then boiled for 2~5 minutes and quenched. The free EDTA is titrated with this zinc sulfate solution until the yellow color becomes red. T is calculated from the following equation.

$$T = \frac{18.896 \times W}{V}$$

W : Weight of aluminum (g)

V : Weight of zinc sulfate solution consumed in second titration (ml)

$$18.896 = \frac{\text{Molecular weight of } Al_2O_3}{\text{Molecular Weight of } Al} \times \frac{1000 \text{ mg}}{g} \times \frac{100 \text{ ml}}{2}$$

(ii) Silicon Dioxide : Weigh 1.0 g of Titanium Dioxide and 10 g of sodium hydrogen sulfate, transfer into a platinum crucible, and heat gently until completely fused. Cool, add 25 ml of diluted sulfuric acid (1→2). heat carefully until the precipitate dissolves, cool, and add 150 ml of water gradually while shaking occasionally. Filter the solution through a filter paper for quantitative analysis (SC), wash the crucible with diluted sulfuric acid (1→2), and filter through the same filter paper. Transfer the filter paper into another platinum crucible. dry at 120°C, and ignite carefully at 450~550°C. Ignite at 1,000°C for 30 minutes, allow to cool in a desiccator, and Accurately weigh the total weight W(g). Add 2 drops of diluted sulfuric acid (1→2) and 5 ml of hydrofluoric acid, heat gradually and evaporate to dryness. ignite at 1,000°C for 30 minutes. allow to cool in a desiccator, Accurately weigh the total weight w (g), and calculate the content by the following formula :

$$\text{Content of silicon dioxide (SiO}_2\text{)} = \frac{W(g) - w(g)}{\text{Weight of the sample (g)}} \times 100$$

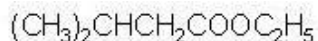
Loss on Drying When Titanium Dioxide is dried for 3 hours at 105°C, the loss should not be more than 0.5%.

Loss on Ignition When Titanium Dioxide is dried for 3 hours at 105°C and heat-treated at 775~825°C, weight loss should not be more than 0.5%.

Assay Transfer about 0.2 g of Titanium Dioxide, previously dried and accurately weighed, into platinum crucible, add 2 g of sodium hydrogen sulfate, covered, and heat gently until completely fused. Ignite at a high temperature until the color turn to a deep orange to almost clear liquid. Cool, transfer the contents into a 250 ml beaker, wash the crucible with 75 ml of diluted sulfuric acid (1→30). transfer the washings into the beaker, and heat in a water bath until it dissolves and becomes almost clear. Dissolve 2 g of tartaric acid in the solution, add 2~3 drops of bromothymol blue solution, and neutralize with ammonia solution. If necessary filtered, and acidify with 1~2 ml of diluted sulfuric acid (1→2), pass an ample amount of hydrogen sulfide through it, add 30 ml of ammonia solution. Pass hydrogen sulfide through it until saturated, allow to stand for 10 minutes, filter, and wash the precipitate on the filter paper 10 times with 25 ml of mixture of ammonium tartrate solution(1→100) and ammonium sulfide solution (9:1). During filtering and washing, keep the filter paper immersed in the solution. Combine the filtrate and the washings. To this solution, add 40 ml of diluted sulfuric acid (1→2). boil until the hydrogen sulfide is removed, cool, and add water to make 400 ml. Add gradually 40 ml of cupferron solution while stirring, and allow to stand. After a yellow precipitate is formed, add cupferron IS until a white precipitate is formed. Filter the precipitate with light suction through a filter paper for quantitative analysis (SC), wash 20 times with diluted hydrochloric acid (1→10). and remove the water with slightly strong suction. Dry the precipitate together with the filter paper at 70°C, transfer into a crucible previously accurately weighed. heat very weakly until the fumes are not appear , ignite gradually. and then ignite at 900~950°C to constant weight. Cool. and weigh the amount of residue W (g). Using the values obtained in Purity (5), calculate the content by the following formula:

$$\begin{aligned} \text{Content of titanium dioxide (TiO}_2\text{)(\%)} &= \frac{W(g) \times 100}{\text{Weight of the sample (g)}} \\ &\times \frac{100}{100 - \text{Content of aluminum oxide and silicon dioxide (\%)}} \end{aligned}$$

189. Ethyl Isovalerate



Chemical Formula $\text{C}_7\text{H}_{14}\text{O}_2$

Molecular Weight 130.19

Compositional Specifications of Ethyl Isovalerate

Content Ethyl Isovalerate should contain not less than 98.0% of ethyl isovalerate ($\text{C}_7\text{H}_{14}\text{O}_2$).

Description Ethyl Isovalerate is a colorless to light yellow, transparent liquid has characteristic odor.

Identification To 1 ml of Ethyl Isovalerate, add 5 ml of 10% alcoholic solution of potassium hydroxide, and heat in a water bath while shaking. The characteristic odor disappears. Cool, and acidify with diluted sulfuric acid. An odor of isovaleric acid is evolved.

Purity (1) Specific Gravity : Specific gravity of Ethyl Isovalerate should be within a range of 0.862~0.866

(2) Refractive Index : Refractive Index n_D^{20} of Ethyl Isovalerate should be within a range of 1.395~1.399

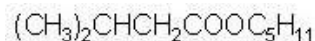
(3) Clarity and Color of Solution : 2 ml of Ethyl Isovalerate is dissolved 6 ml of 70% alcohol solution, The solution should be Clear.

(4) Acid Value : Acid value of Ethyl Isovalerate is tested by Acid Value in Flavoring Substance Test. It should not be more than 2.

Assay Accurately weigh 1.5 g of Ethyl Isovalerate, and proceed as directed under Ester value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N ethanolic potassium hydroxide = 65.09 mg of $\text{C}_7\text{H}_{14}\text{O}_2$

190. Isoamyl Isovalerate



Chemical Formula $\text{C}_{10}\text{H}_{20}\text{O}_2$

Molecular Weight 172.27

Compositional Specifications of Isoamyl Isovalerate

Content Isoamyl Isovalerate should contain not less than 98.0% of isoamyl isovalerate ($\text{C}_{10}\text{H}_{20}\text{O}_2$).

Description Isoamyl Isovalerate is a colorless to light yellow, transparent liquid, It has a charactersitic odor.

Identification To 1 ml of Isoamyl Isovalerate, add 5 ml of 10% alcoholic potassium hydroxide solution, and heat in a water bath while shaking. The characteristic odor disappears, and an odor of isoamyl alcohol is evolved. After cooling, acidify with diluted sulfuric acid. An odor of isovaleric acid is evolved.

Purity (1) Specific Gravity : Specific Gravity of Isoamyl Isovalerate should be within a range of 0.851~0.857

(2) Refractive Index : Refractive Index n_D^{20} of Isoamyl Isovalerate should be within a range of 1.411~1.414

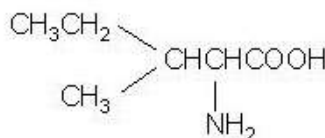
(3) Clarity and Color of Solution : 1 ml of Isoamyl Isovalerate is dissolved 8 ml of 70% alcohol solution. The solution should be clear.

(4) Acid value : Acid value of Isoamyl Isovalerate is tested by Acid Value in Flavoring Substance Test. It should not be more than 2.

Assay Accurately weigh about 1.5 g of Isoamyl Isovalerate. and proceed as directed under Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N ethanolic potassium hydroxide = 86.13 mg of $\text{C}_{10}\text{H}_{20}\text{O}_2$.

191. L-Isoleucine



Chemical Formula $C_6H_{13}NO_2$

Molecular Weight 131.18

Compositional Specifications of L-Isoleucine

Content L-Isoleucine, when calculated on the dried basis, should contain within a range of 98.0~102.0% of L-isoleucine ($C_6H_{13}NO_2$).

Description L-Isoleucine occurs as white crystals or as a crystalline powder. It is odorless and has a lightly bitter taste.

Identification (1) A solution of L-Isoleucine in 6 N hydrochloric acid (1→25) is dextrorotatory (D-form).

(2) To 5 ml of L-Isoleucine solution (1→1,000), add 1 ml of ninhydrin solution, and heat for 3 minutes. The color becomes purple.

Purity (1) Clarity and Color of Solution : 0.5 g of L-Isoleucine is dissolved 20 ml of water. It is colorless and almost clear.

(2) pH : pH of L-Isoleucine solution(1→100), measured by glass electrode method, should be within a range of 5.5~7.0.

(3) Specific Rotation : Dissolve 2 g of L-Isoleucine, precisely weighed and accurately dried, in 50 ml of 6 N hydrochloric acid. Optical rotation $[\alpha]_D^{20}$ of this solution should be within a range of +39.5~+41.5°

(4) Arsenic : Dissolve 0.25 g of L-Isoleucine in 10 ml of 1 N hydrochloric acid, Use this solution as the test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(5) Lead : When 5.0 g of L-Isoleucine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(6) Chloride : When 0.5 g of L-Isoleucine is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

Loss on Drying When L-Isoleucine is dried for 3 hours at 105°C, the loss should not

be more than 0.3%.

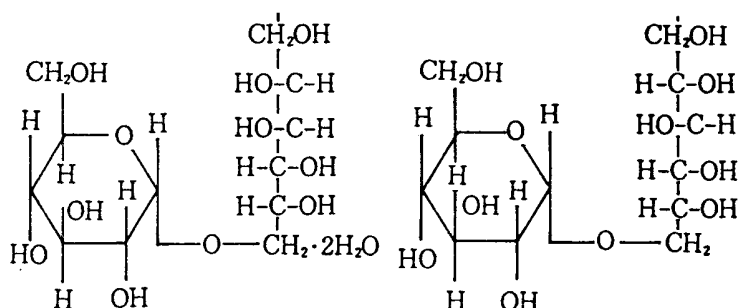
Residue on Ignition Residue on ignition of L-Isoleucine should not be more than 0.1%.

Assay Approximately 0.3 g of L-Isoleucine is dissolved in 50 ml of glacial acetic acid by heating. After cooling, the solution is titrated with 0.1 N perchloric acid solution (indicator : 10 drops of α -naphtholbenzein solution). End point is where the brown color of the solution changes to green.

1 ml of 0.1 N perchloric acid = 13.12 mg of $C_6H_{13}NO_2$

192. Isomalt

Hydrogenated palatinose : Isomaltitol

Chemical Formula GPS : $C_{12}H_{24}O_{11}$ /GPM : $C_{12}H_{24}O_{11} \cdot 2H_2O$

Molecular Weight GPS : 344.32/GPM : 380.32

Compositional Specifications of Isomalt

Content Isomalt should contain not less than 98.0% as anhydrous isomalt. The sum of contents (α -D-Glucopyranosyl-1,6-D-Sorbitol (GPS, $C_{12}H_{24}O_{11}$) and α -D-Glucopyranosyl-1,1-D-Mannitol 2 hydrate[GPM, $C_{12}H_{24}O_{11} \cdot 2H_2O$]) should not be more than 86.0%.

Description Isomalt is slightly hygroscopic scentless white crystallite with sweet taste.

Identification (1) Isomalt is soluble in water but insoluble in alcohol.

(2) 500 mg of Isomalt is dissolved in 100 ml of water to make the test solution. 0.3 μ l of test solution and 0.3 μ l of the reference solution are tested using thin layer chromatography. However, in the thin layer, silica gel is used as the carrier. When the elution solution reaches about 10 cm up, elution is stopped and the layer is dried with wind and then chromagen 1 is sprayed on the layer. To dry, the layer transfer into air for 15 mins and again chromagen 2 is sprayed for comparative observation, spots should appear almost in the same locations, colors, and sizes as in the reference solution.

◦ Reference solution : 500 mg of sorbitol, mannitol, lactitol, maltitol, α -D-glucopyranosyl-1,1-D-mannitol ($2H_2O$), and α -D-glucopyranosyl-1,6- sorbitol are respectively dissolved in 100 ml of water.

◦ Developing solvent

① Isopropanol : n-Butanol : Boric Acid (2.5→100) : Acetic Acid : Propionic Acid (50 : 30 : 20 : 2 : 16)

- ② Ethylacetate : Pyridin : Water : Acetic Acid : Propionic Acid
(50 : 50 : 10 : 5 : 5)

◦ Chromagen

- ① 0.1% sodium metaperiodate
② Ethyl Alcohol: Sulfuric Acid: Anisaldehyde: Acetic Acid (90: 5: 1: 1)

- Purity** (1) Reducing Material : 7 g (converted to a dehydrated form) of Isomalt transfer into a 400 ml beaker add 35 ml of water and shake. 50 ml of Fehling solution is added and the beaker is covered with a watch glass. The mixture is heated so that it boils within 4 minutes. After boiling exactly for 2 minutes, precipitated cupric oxide (Cu_2O) is filtered through a glass filter. Precipitates are sequentially rinsed with hot water, alcohol, and ether. It is then dried for 30 minutes at 100°C . Cupric oxide on the filter is again washed thoroughly with 10 ml of hot water, 10 ml of alcohol, and 10 ml of ether. After drying for 1 hour at 100°C , the weight of cupric oxide should not be more than 50 mg.
- (2) D-Mannitol : 10 g of Isomalt is precisely weighed and quantitatively tested for D-mannitol. The amount of D-mannitol should not be more than 3.0 %. Standard solution is prepared by dissolving precisely weighed 50 mg of standard D-mannitol in water to make 100 ml.
- (3) D-Sorbitol : 10 g of Isomalt is precisely weighed and quantitatively tested for D-mannitol. The amount of D-mannitol should not be more than 6.0%. Standard solution is prepared by dissolving precisely weighed 50 mg of standard D-sorbitol in water to make 100 ml.
- (4) Arsenic : 0.25 g of Isomalt transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at $450\sim 550^\circ\text{C}$. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat-treated at $450\sim 550^\circ\text{C}$. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.
- (5) Lead : When 5.0 g of Isomalt is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Nickel : 10 g of Isomalt is weighed into a flask for decomposition. 50~70 ml of water and 30 ml of nitric acid are added to the flask and set-aside. It is then

gently heated until the violent reaction is completed. After cooling the flask, 10 ml of sulfuric acid is added and the flask is gently heated again. When the content darkens, 2~3 ml of nitric acid is added at a time while continuously heating. The decomposition is complete when the content is pale yellow~colorless. After cooling the liquid, 30 ml of water and 15 ml of saturated ammonium hydroxide solution are added to the flask, which is then heated until white smoke of sulfuric acid is generated. This is then cooled and water is added to bring the total volume to 100 ml. Use this solution as the test solution. 10 ml of test solution is transferred into an extraction bottle. At the same time, a blank test is carried out with the Test Solution. Separately, 1 ml of nickel standard solution (2 ppm) transfer into an extraction bottle and a blank test is carried out with this Standard Solution. 10 ml of 25% ammonium citrate solution and 2 drops bromothymol blue solution are added to each Test Solution and Standard Solution. The resulting solution is titrated with ammonium solution until the color of the solution turn green from yellow. Then 10 ml of 40% ammonium sulfate solution and water is added to bring the total volume to 100 ml. 10 ml of sodium diethyldithiocarbamate solution is added, shaken vigorously, and set-aside for few minutes. 10 ml of methyl isobutylketone is added to this Test Solution as well as its blank test solution, standard solution, and its blank test solution, respectively. Each is shaken vigorously. After settling, ethyl isobutyl ketone layer is separated out from each bottle and analyzed with flame atomic absorption spectrophotometry. The absorption (or peak height) of Test Solution should not be higher than that of the Standard Solution (Mot more than 2 ppm).

Water Content Isomalt is well ground with a mortar and a pestle, which is then sieved. It is then analyzed for water content (Karl-Fisher Method). The content of water should not be more than 7%.

Residue on Ignition When thermogravimetric analysis is done with precisely weighed 5 g of Isomalt, the amount of residue should not be more than 0.05%.

Assay 1 g of Isomalt is dissolved in 100 ml water. Use this solution as the test solution. Separately, 100 ml solution each containing 0.8 g of GMP standard and 0.883 g of GPS standard is prepared, respectively (Standard Solution). 25 µl of each Standard Solution and Test Solution is injected into liquid chromatography equipment following the operation conditions below. The contents of GMP and GPS are calculated using the following equations.

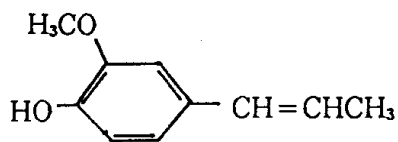
$$\text{GMP(\%)} = \frac{(\text{peak area of Test Solution})}{(\text{peak area of Peak Solution})} \times \frac{\text{Weight of standard (GMP)}}{\text{Weight of sample (g)}} \times 100$$

$$\text{GPS}(\%) = \frac{(\text{peak area of Test Solution})}{(\text{peak area of Peak Solution})} \times \frac{\text{Weight of standard (GPS)}}{\text{Weight of sample (g)}} \times 100$$

Operation Conditions

- Detector : Differential refractometer (RI Detector)
- Column : Aminex HPX 87C or its equivalent, 7.8mm × 300 mm stainless steal tube
- Column Temperature : 60℃
- Mobile Phase : Water
- Flow Rate : 0.6 ml/min

193. Isoeugenol



Chemical Formula $C_{10}H_{12}O_2$

Molecular Weight 164.20

Compositional Specifications of Isoeugenol

Content Isoeugenol should contain not less than 99.0% v/v of isoeugenol ($C_{10}H_{12}O_2$).

Description Isoeugenol is a colorless to light yellow-brown, transparent liquid having a characteristic odor.

Identification (1) 5 drops of Isoeugenol is dissolved in 10 ml of alcohol. When 3 drops of ferrous chloride solution are added to this solution, bluish green color appears.

(2) To 0.5 g of Isoeugenol add 0.1 g of picric acid, 1 ml of benzene, and 9 ml of petroleum benzene and heated until crystals dissolve, the solution becomes reddish brown.

Purity (1) Specific Gravity : Specific gravity of Isoeugenol should be within a range of 1.079~1.08

(2) Refractive Index : Refractive Index n_D^{20} of Isoeugenol should be within a range of 1.572~1.577

(3) Clarity and Color of Solution : 1 ml of Isoeugenol is dissolved 5 ml of 50% alcohol. It is clear.

Assay Proceed as directed under Phenol Content in Flavoring Substances Tests. Instead of allowing to stand for 30 minutes, heat in a water bath for 30 minutes, and allow to cool to room temperature.

194. Isothiocyanates

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

195. Allyl Isothiocyanate

Chemical Formula $\text{C}_4\text{H}_5\text{NS}$

Molecular Weight 99.15

Compositional Specifications of Allyl Isothiocyanate

Content Allyl Isothiocyanate should contain not less than 93.0% of allyl isothiocyanate ($\text{C}_4\text{H}_5\text{NS}$).

Description Allyl Isothiocyanate is a transparent and colorless to light yellow liquid having a strong and irritating odor.

Identification (1) Measure 3 ml of Allyl Isothiocyanate, add gradually 4 ml of sulfuric acid while cooling, and shake. A gas is evolved. The solution is transparent yellow, gradually becoming viscous, and the strong, irritating odor disappears.

(2) To 2 ml of Allyl Isothiocyanate, add 3 ml of alcohol and 4 ml of ammonia solution, warm to about 50°C , and allow to stand. The solution is transparent at first, but after about 3 hours, crystals appear.

Purity (1) Specific Gravity : Specific gravity of Allyl Isothiocyanate should be within a range of 1.013~1.020

(2) Refractive Index : Refractive Index n_D^{20} of Allyl Isothiocyanate should be within a range of 1.527~1.531

(3) Carbon Disulfide, Petroleum Oil, Refined Oil, Fatty Oil : When 4 ml of sulfuric acid is added to 3 ml of Allyl Isothiocyanate, it should not turn red or turbid. It also should not form oily layer.

(4) Phenols and Thiocyanate Compounds : Measure 1.0 ml of Allyl Isothiocyanate, dissolve in 5 ml of alcohol, and add 1 drop of ferric chloride solution. Neither red nor blue color develops.

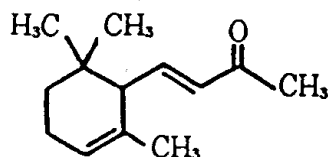
Assay Accurately weigh about 3 g of Allyl Isothiocyanate, and dissolve in alcohol to make 100 ml. Take 5 ml of this solution, add 5 ml of ammonia solution, 50 ml of 0.1 N silver nitrate. Equip with a reflux condenser, and heat for 1 hour in a water bath. Cool, add water to make exactly 100 ml, and filter through a dry filter paper. Discard about 10 ml of the initial filtrate. Take 50 ml of the subsequent filtrate, add 5 ml of nitric acid and 2 ml of ferric ammonium sulfate solution, and titrate the excess silver nitrate with 0.1 N ammonium thiocyanate. Perform a blank test in the same manner.

1 ml of 0.1 N silver nitrate = 4.958 mg of $\text{C}_4\text{H}_5\text{NS}$

196. Sodium Dichloroisocyanurate

○ Designed Cancellation

The date of cancellation : 11.19.09(Notification No. 2009-168). Only, this standard is enforced from the date passed 6 months after notifying.

197. α -Ionone

Chemical Formula $C_{13}H_{20}O$

Molecular Weight 192.30

Compositional Specifications of α -Ionone

Content α -Ionone should contain not less than 90.0% of α -Ionone ($C_{13}H_{20}O$).

Description α -Ionone is a colorless to light yellow transparent liquid having a violet like odor.

Identification (1) To 1 drop of α -Ionone, add 1 ml of water, shake well, add 2 drops of sodium nitroprusside solution, add 2 drops of sodium hydroxide solution (3 \rightarrow 10), and shake. An orange~red color develops. Add 5 drops of acetic acid (1 \rightarrow 3). A light purple color develops.

(2) To 1~2 drops of α -Ionone, add 2 ml of hydrochloric acid, and shake. The color of the solution becomes to a yellow color. Add 3 drops of chloral hydrate solution (1 \rightarrow 20), and heat in a water bath. A red~purple color develops.

Purity (1) Specific Gravity : Specific gravity of α -Ionone should be within a range of 0.927~0.933.

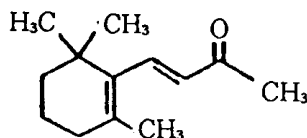
(2) Refractive Index : Refractive Index n_D^{20} of α -Ionone should be within a range of 1.497~1.502.

(3) Clarity and Color of Solution : 1g of α -Ionone is dissolved 10 ml of 60% ethanol. It is clear.

Residues on Ignition When thermogravimetric analysis is done with α -Ionone, the amount of residues should not be more than 0.05%.

Assay Accurately weigh about 1.3 g of α -Ionone, and proceed as directed under hydroxyl amine Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure, boil the mixture for 1 hour before titrating.

$$1 \text{ ml of } 0.5 \text{ N hydrochloric acid} = 96.15 \text{ mg } C_{13}H_{20}O$$

198. β -Ionone

Chemical Formula $C_{13}H_{20}O$

Molecular Weight 192.30

Compositional Specifications of β -Ionone

Content β -Ionone should contain not less than 90.0% of β -ionone ($C_{13}H_{20}O$).

Description β -Ionone is colorless~pale yellow transparent liquid with a scent of wood.

Identification (1) To 1 drop of β -Ionone, add 1 ml of water shake well, add 2 drops of sodium nitroprusside solution, add 2 drops of sodium hydroxide solution (3 \rightarrow 10), and shake. A dark yellow color develops. Add 5 drops of acetic acid. The color of the solution becomes light purple.

(2) To 1~2 drops of β -Ionone, add 2 ml of hydrochloric acid shake well, color becomes yellow, add 3 drops of hydrated chloral solution (1 \rightarrow 20), heat in a water bath, color becomes reddish purple.

Purity (1) Specific Gravity : Specific gravity of β -Ionone should be within a range of 0.940~0.947.

(2) Refractive Index : Refractive Index n_D^{20} β -Ionone of should be within a range of 1.517~1.522.

(3) Clarity and Color of Solution : When 1 ml of β -Ionone is dissolved in 4 ml of 70% alcohol, it should be clear.

Residue on Ignition When thermogravimetric analysis is done with β -Ionone, the amount of residues should not be more than 0.05%.

Assay Approximately 1.3 g of β -Ionone is tested by the procedure in Hydroxylamine Method 2 in Aldehyde and Ketone Content Measurement for Flavorings. In this case, it is heated for 1 hour.

$$1 \text{ ml of } 0.5 \text{ N hydrochloric acid} = 96.15 \text{ mg } C_{13}H_{20}O$$

199. Ion Exchange Resins

Definition Ion Exchange Resins occur as granules, powders, and suspensions called Ion Exchange Resin (granule), Ion Exchange Resin (powder), and Ion Exchange Resin (suspension), respectively.

A. Content Specifications of Ion Exchange Resins (Granular Form)

Description Ion Exchange Resin (granule) occurs as a black, brown, light brown, or white, spherical, mass, or granular substance. It is almost odorless.

Identification (1) Cation Exchange Resin : Make a resin column pouring 5 ml of Ion Exchange Resin (granule) with water into a glass tube for chromatography (internal diameter: about 1 cm). Flow 25 ml of diluted hydrochloric acid (1→10) at a rate of about 5 ml per minute, and wash by flowing 100 ml of water at the same rate. Flow 25 ml of potassium hydroxide solution (1→15) at the same rate, and wash again by flowing 75 ml of water at the same rate. To 5 ml of the last washings, add 2 ml of diluted acetic acid (1→20), and add 3 drops of sodium cobalt nitrite solution. No yellow turbidity appears. Transfer 2 ml of the resin of the resin column into a test tube, add 5 ml of diluted hydrochloric acid (1→9), shake well for 5 minutes, and filter. Wash the resin on the filter paper with water, and combine the filtrate and the washings to make about 5 ml. Add 4 ml of sodium hydroxide solution (1→25) to the solution, shake, add 2 ml of diluted acetic acid (1→20), and add 3 drops of sodium cobalt nitrite solution. A yellow precipitate is formed.

(2) Anion exchange resin make a resin column pouring 5 ml of Ion Exchange Resin (granule) with water into a glass tube for chromatography (internal diameter : about 1 cm). Flow 25 ml of diluted hydrochloric acid (1→10) at a rate of about 5 ml per minute, and wash by flowing 100 ml of water at the same rate. To 5 ml of the last washings, add 1 ml of diluted nitric acid (1→9), and add 3 drops of silver nitrate solution (1→50). No white turbidity appears. Transfer 1 ml of the resin of the resin column into a test tube, add 3 ml of sodium hydroxide solution (1→25), shake well for 5 minutes, and filter. Wash the resin on the filter paper with water, and combine the filtrate and the washings to make about 5 ml. Add 3 ml of diluted nitric acid (1→9) to the solution, and add 3 drops of silver nitrate solution (1→50). A white precipitate is formed.

Purity Prepare the sample of the cation exchange resin or the anion exchange resin by ① or ② as appropriate, given below, immerse thoroughly in water, and blot the adhering water with a filter paper, and use as sample A.

- ① Cation Exchange Resin : Measure 25 ml of Ion Exchange Resin (granule), transfer into a glass tube for chromatography (internal diameter : about 3 cm), flow 1,000 ml of 10% hydrochloric acid at a rate of 15~20 ml per minute, and wash by flowing water at the same rate. Measure 10 ml of the washings, and perform the test by Chloride Limit Test. Wash with water until the amount is not more than the amount corresponding to 0.3 ml of 0.01 N hydrochloric acid and then prepared the sample (H form)
- ② Anion Exchange Resin : Measure 25 ml of Ion Exchange Resin (granule), transfer into a glass tube for chromatography (internal diameter : about 3 cm), flow 1,000 ml of 4% sodium hydroxide solution at a rate of 15~20 ml per minute, and wash by flowing water at the same rate. Wash with water until the washings become neutral with phenolphthalein solution. and then prepare the sample (OH form)
- (1) Solids : Weigh 10 g of Ion Exchange Resins. In the case of the cation exchange resin, dry at 100°C for 12 hours, and weigh again; in the case of the anion exchange resin, dry at 40°C for 12 hours in a vacuum desiccator at 30 mmHg, and weigh again. The amount of residue should not be less than 2.5 mg.
- (2) Water-Soluble Substances : Weigh 10 g of Ion Exchange Resins, transfer into a cylindrical filter (internal diameter : 28 mm, length : 100 mm), suspend in 1,000 ml of water, and extract for 5 hours while shaking occasionally. Measure 50 ml of the extract, evaporate carefully, and dry at 110°C for 3 hours. Weigh the amount of the residue should not be more than 2.5 mg. Perform a blank test in the same manner, and make any necessary correction.
- (3) Arsenic : 0.25 g of Ion Exchange Resins transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.
- (4) Lead : When 5.0 g of Ion Exchange Resins is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Total Ion Exchange Capacity

- ① Cation Exchange Resin : Accurately weigh about 5 g of Ion Exchange Resins

prepared in Purity. Add 500 ml of 0.2 N sodium hydroxide, exactly measured, and allow to stand for 12 hours while shaking occasionally. Measure exactly 10 ml of the supernatant, and titrate with 0.1 N sulfuric acid (indicator : 3 drops of methyl orange solution). Perform a blank test in the same manner, and calculate the total ion exchange capacity by the following formula : Not less than 1.0 milliequivalent/g.

Total ion exchange capacity =

$$\frac{\text{Volume of 0.1N sulfuric acid consumed in the blank test(ml)} - \text{Volume of 0.1N sulfuric acid consumed in this test(ml)}}{\text{Weight of the sample(g)} \times \frac{\text{Solid}}{100} (\%)} \times 5 (\text{milliequivalent/g})$$

- ② Anion Exchange Resin : Accurately weigh about 5 g of sample A prepared in Purity. Add 500 ml of 0.2 N hydrochloric acid, exactly measured, and allow to stand for 12 hours while shaking occasionally. Measure exactly 10 ml of the supernatant, and titrate with 0.1 N sodium hydroxide (indicator: 3 drops of phenolphthalein solution). Perform a blank test in the same manner, and calculate the total ion exchange capacity by the following formula : Not less than 1.0 milliequivalent/g.

Total ion exchange capacity =

$$\frac{\text{Volume of 0.1N sodium hydroxide consumed in the blank test(ml)} - \text{Volume of 0.1N sodium hydroxide consumed in this test(ml)}}{\text{Weight of the sample(g)} \times \frac{\text{Solid}}{100} (\%)} \times 5 (\text{milliequivalent/g})$$

B. Content Specifications of Ion Exchange Resins (Powder Form)

Description Ion Exchange Resin (powder) occurs as a black, brown, light brown, or white, powder. It is almost odorless.

Identification (1) Cation Exchange Resin : Make a layer of resin, pouring 2 g of Ion Exchange Resin (powder) with water into a pressure filter with membrane filter (internal Diameter: about 7.5 cm, pore size : 1 μm). Flow 25 ml of diluted hydrochloric acid (1→9) at a rate of about 5 ml per minute. and wash by flowing 100 ml of water at the same rate. Flow 25 ml of potassium hydroxide solution (1→

15) at the same rate, and wash again by flowing 75 ml of water at the same rate. To 5 ml of the last washings, add 2 ml of diluted acetic acid (1→20), and add 3 drops of sodium cobalt nitrite solution. Not yellow turbidity appears. Transfer 0.5 g of the resin of the pressure filter into a test tube, add 5 ml of diluted hydrochloric acid (1→9), shake well for 5 minutes, and filter. Wash the resin on the filter paper with water, and combine the filtrate and the washings to make about 5 ml. Add 4 ml of sodium hydroxide solution (1→25) to the solution, shake, add 2 ml of diluted acetic acid (1→20), and add 3 drops of sodium cobalt nitrite solution. A yellow precipitate is formed.

- (2) Anion Exchange Resin : Make a layer of resin, pouring 2 g of Ion Exchange Resin (powder) with water into a pressure filter with membrane filter (internal Diameter : about 7.5 cm, pore size : 1 μ m). Flow 25 ml of diluted hydrochloric acid (1→9) at a rate of about 5 ml per minute, and wash by flowing 100 ml of water at the same rate. To 5 ml of the last washings, add 1 ml of diluted nitric acid (1→9), and add 3 drops of silver nitrate solution (1→50). Not white turbidity appears. Transfer 0.5 g of the resin of the resin column into a test tube, add 3 ml of sodium hydroxide solution (1→25), shake well for 5 minutes, and filter. Wash the resin on the filter paper with water, and combine the filtrate and the washings to make about 5 ml. Add 3 ml of diluted nitric acid (1→9) to the solution, and add 3 drops of silver nitrate solution (1→50). A white precipitate is formed.

Purity Prepare the sample of the cation exchange resin or the anion exchange resin by

① or ② as appropriate, given below, immerse thoroughly in water, and blot the adhering water with a filter paper, and use as sample.

- ① Cation Exchange Resin : Make a layer of resin, add 10 g of Ion Exchange Resin (powder) into a vacuum filter with membrane filter (internal diameter : about 7.5 cm, pore size : 1 μ m), flow 1,000 ml of diluted hydrochloric acid (1→10) at a rate of 15~20 ml per minute, and wash by flowing water at the same rate. Measure 10 ml of the washings, and perform the test by Chloride Limit Test. Wash with water until the amount is not more than the amount corresponding to 0.3 ml of 0.01 N hydrochloric acid, and then prepared the sample (H form)
- ② Anion Exchange Resin : Make a layer of resin, add 10 g of Ion Exchange Resin (powder) into a vacuum filter with membrane filter (internal diameter : about 7.5 cm, pore size : 1 μ m), flow 1,000 ml of sodium hydroxide solution (1→25) at a rate of 15~20 ml per minute, and wash by flowing water at the same rate. Wash with water until the washings become neutral with phenolphthalein solution, and then prepare the sample (OH form).

- (1) Solids : Proceed as directed under Purity (1) in [Ion exchange Resin (Granule)].
- (2) Water Solubles : 10 g of Ion Exchange Resin (powder) is suspended in 1,000 ml of water. It is then extracted for 5 hours while stirring occasionally. The suspension is pressure filtered through a 7.5 cm membrane filter (1 μ m pore size). 50 ml of the filtrate is carefully evaporated and further dried for 3 hours at 110°C. The residue should not be more than 2.5 mg.
- (3) Arsenic : Proceed as directed under Purity (3) in [Ion exchange Resin (Granule)].
- (4) Lead : When 5.0 g of Ion exchange Resin (Granule) is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Total Ion Exchange Capacity

- ① Cation Exchange Resin : Accurately weigh about 5 g of sample prepared in Purity. Add 500 ml of 0.2 N sodium hydroxide, exactly measured, and allow to stand for 12 hours while shaking occasionally. The suspension is pressure-filtered through a 7.5 cm membrane filter (1 μ m pore size). Measure exactly 10 ml of the supernatant, and titrate with 0.1 N sulfuric acid (indicator : 3 drops of methyl orange solution). Perform a blank test in the same manner, and calculate the total ion exchange capacity by the following formula : Not less than 1.0 milliequivalent/g.

Total ion exchange capacity

$$\frac{\text{Volume of 0.1N sulfuric acid consumed in the blank test (ml)} - \text{Volume of 0.1N sulfuric acid consumed in this test (ml)}}{\text{Weight of the sample (g)} \times \frac{\text{Solid}}{100} (\%)} \times 5 \text{ (milliequivalent/g)}$$

- ② Anion Exchange Resin : Accurately weigh about 5 g of sample prepared in Purity. Add 500 ml of 0.2 N hydrochloric acid, exactly measured, and allow to stand for 12 hours while shaking occasionally. The suspension is pressure-filtered through a 7.5 cm membrane filter (1 μ m pore size). Measure exactly 10 ml of the supernatant, and titrate with 0.1 N sodium hydroxide (indicator : 3 drops of phenolphthalein solution). Separately, a blank test is carried out by the same procedure and total ion exchange capacity is obtained by the following equation. It should not be less than 1.0 milliequivalent/g.

Total ion exchange capacity =

$$\frac{\text{Volume of 0.1N sodium hydroxide consumed in the blank test(ml)} - \text{Volume of 0.1N sodium hydroxide consumed in this test(ml)}}{\text{Weight of the sample(g)} \times \frac{\text{Solid}}{100} (\%)} \times 5 (\text{milliequivalent/g})$$

C. Content Specifications of Ion Exchange Resins (Suspension)

Description Ion Exchange Resins (Suspension) is brown, pale reddish brown, or white suspension. It is almost odorless.

Identification (1) Cation Exchange Resin : 0.5 ml of Ion Exchange Resins (Suspension) is mixed with 5 ml of water and 1 ml of strongly acidic cation exchange resin, which is reacted for 1 hour while shaking. It is filtered through gauze. 0.3 g of sodium chloride is added and mixed for 3 minutes, where 1 drop of methyl red solution is added. The liquid turns red.

(2) Anion Exchange Resin : 0.5 ml of Ion Exchange Resins (Suspension) is mixed with 5 ml of water and 1 ml of strongly alkaline anion exchange resin, which is reacted for 1 hour while shaking. It is filtered through gauze. 0.3 g of sodium chloride is added and mixed for 3 minutes, where 1 drop of phenolphthalein solution is added. The liquid turns red.

Purity (1) Solids : 1 g of Ion Exchange Resins (Suspension) is precisely weighed and dried for 5 hours at 105°C and weighed. It should not be less than 40 mg.

(2) Water Solubles : 100 ml of Ion Exchange Resins (Suspension) is pressure-filtered through a 7.5 cm membrane filter (1 µm pore size). 10 ml of the filtrate is carefully evaporated and then dried for 3 hours at 105°C. The residue should not be more than 50 mg.

(3) Arsenic : Proceed as directed under Purity (3) in [Ion Exchange Resin (Suspension)].

(4) Lead : When 5.0 g of Ion Exchange Resin (Suspension) is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

Total Ion Exchange Capacity

① Cation Exchange Resin : An equivalent amount of 0.2 g of solid is precisely weighed and eluted through a chromatography glass tube (inner diameter : 1cm) at a flow rate of approximately 2 ml per minute. This glass tube is filled with 10 ml of strongly acidic cation exchange resin. Again, approximately 80 ml of water is eluted at a flow rate of approximately 15~20 ml per minute. The effluent and rinse water are combined, where approximately 1 g of sodium chloride is added. It is then titrated with 0.1 N sodium hydroxide solution using a pH meter until the pH of the solution becomes 7.0. Separately, a blank test is carried out and the total ion

exchange capacity is obtained by the following equation. It should not be less than 1.0 milliequivalent/g.

Total ion exchange capacity =

$$\frac{\text{Volume of 0.1N sodium hydroxide consumed in the blank test (ml)} - \text{Volume of 0.1N sodium hydroxide consumed in this test (ml)}}{\text{Weight of the sample (g)} \times \frac{\text{Solid}}{100} (\%)} \times 5 (\text{milliequivalent/g})$$

- ② Anion Exchange Resin : An equivalent amount of 0.2 g of solid is precisely weighed and eluted through a chromatography glass tube (inner diameter : 1cm) at a flow rate of approximately 2 ml per minute. This glass tube is filled 10 ml of strongly alkaline anion exchange resin. Again, approximately 80 ml of water is eluted at a flow rate of approximately 15~20 ml per minute. The effluent and rinse water are combined, where approximately 1 g of sodium chloride is added. It is then titrated with 0.1 N hydrochloric acid using a pH meter until the pH of the solution becomes 7.0. Separately, a blank test is carried out and the total ion exchange capacity is obtained by the following equation. It should not be less than 1.0 milliequivalent/g.

Total ion exchange capacity =

$$\frac{\text{Volume of 0.1N hydrochloric acid consumed in the blank test (ml)} - \text{Volume of 0.1N hydrochloric acid consumed in this test (ml)}}{\text{Weight of the sample (g)} \times \frac{\text{Solid}}{100} (\%)} \times 5 (\text{milliequivalent/g})$$

**200. Indol, Amine, Oxazol, Thiazole, Quinoline, Pyrazine, Pyrol,
Pyrodine, and their derivatives**

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

201. Phosphoric Acid

Chemical Formula H_3PO_4

Molecular Weight 98.00

Compositional Specifications of Phosphoric Acid

Content Phosphoric Acid should contain not less than 75.0% of phosphoric acid (H_3PO_4).

Description Phosphoric Acid is a colorless, transparent syrupy liquid. It is odorless.

Identification (1) Phosphoric Acid solution (1→20) is acidic.

(2) To Phosphoric Acid solution (1→20), add 2~3 drops of phenolphthalein solution, and neutralize with sodium hydroxide solution. The solution responds to the test for Phosphate.

Purity (1) Chloride : 1.78 g of Phosphoric Acid is tested by Chloride Limit Test, and its content should not be more than 200 ppm.

(2) Sulfate : When 0.2 g of Phosphoric Acid is dissolved in water to make 50 ml of solution and tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.6 ml of 0.01 N sulfuric acid.

(3) Nitrate : 3.4 g of Phosphoric Acid is dissolved in 10 ml of water, where 5 g of sodium chloride is added. When 0.1 ml of indigocarmin solution and 10 ml of sulfuric acid are added to this solution, the blue color of the solution should not disappear in 5 minutes (Not more than 5 ppm).

◦ Indigocarmin solution : 0.18 g of indigocarmin is dissolved in water to make 100 ml solution.

(4) Arsenic : 0.38 g of Phosphoric Acid is dissolved in 20 ml of water, Use this solution as the test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 2.6 ppm.

(5) Lead : When 5.0 g of Phosphoric Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 4.0 ppm.

(6) Cadmium : When 5.0 g of Phosphoric Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(7) Mercury : When Phosphoric Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(8) Volatile Acid : 60.05 g of Phosphoric Acid is dissolved in 75 ml of freshly and cooled water, which is distilled to 50 ml. It is titrated with 0.1 N sodium hydroxide

solution. The consumed amount of titrant should not exceed 0.1 ml.

Indicator : Phenolphthalein solution (Not more than 10 ppm as acetic acid)

- (9) Fluoride : 1 g of Phosphoric Acid is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Assay Accurately weigh about 1.5 g of Phosphoric Acid, dissolve in 25 ml of water, keep the temperature at about 15°C, and titrate with 1 N sodium hydroxide (indicator : 5 drops of thymol phthalein solution) until the color of the solution changes to light blue.

1 ml of 1 N sodium hydroxide = 49.00 mg of H_3PO_4

202. Ferric Phosphate

Chemical Formula $\text{FePO}_4 \cdot n\text{H}_2\text{O}$

Molecular Weight 150.82 (an anhydride)

Compositional Specifications of Ferric Phosphate

Content Ferric Phosphate should contain within a range of 26.0~32.0% of iron(Fe).

Description Ferric Phosphate is pale yellow powder and odorless.

Identification 1 g of Ferric Phosphate is dissolved in 5 ml of diluted hydrochloric acid (1→2). Upon adding excess sodium hydroxide solution, reddish brown precipitates are formed. This is then heated and filtered to separate iron. The filtrate is acidified with hydrochloric acid and cooled, where the same volume of magnesia solution is added. When slight excess amount of ammonia solution is added to the resulting solution, white precipitates are formed. The precipitates are washed with water. Upon adding a few drops of silver nitrate solution, the precipitates turn yellowish green.

Purity (1) Arsenic : 0.25 g of Ferric Phosphate is dissolved in 5 ml of diluted hydrochloric acid (1→2). When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Lead : 1.0 g of Ferric Phosphate is weighed and transferred into 50 ml flask. Add 10 ml of 9 N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid-sodium iodide solution and 5 ml of trioctyl phosphine oxide solution and shake it to mix for 30 seconds. Add keep it to separate the layer and again add water so that organic layer reaches to neck part of flask. After shaking to mix it, keep it to separate the layer. This organic solvent layer is used as test solution. Separately, take 10 ml of lead standard solution and make it precisely to 100 ml. Take 2 ml of this solution and transfer into 50 ml flask. And operate under condition as test solution method, this solution is used as reference solution. When it is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, absorbance(luminous intensity) of test solution should not be more than absorbance(luminous intensity) of reference solution.(not be more than 2.0 ppm.)

Ascorbic acid-sodium iodide solution : 10 g of ascorbic acid and 19.3 g sodium iodide are dissolved in water to make to 100 ml.

Trioctyl phosphine oxide solution : 5 g of trioctyl phosphine oxide is dissolved in methyl isobutyl ketone to make to 100 ml.

(3) Mercury : Proceed as directed under Purity (4) in [Reduced Iron]. 3 ml of mercury standard solution (for Reduced Iron) is tested by the same procedure as the test

solution. (Not more than 3 ppm)

Loss on Ignition When thermogravimetric analysis is done at 800°C for 1 hour, weight loss should not be more than 32.5%.

Assay 3.5 g of Ferric Phosphate is dissolved in 75 ml of diluted hydrochloric acid (1→2), which is then boiled for 5 minutes. After cooling, the solution is diluted to 100 ml with diluted hydrochloric acid (1→2). This is again boiled for 5 minutes. While stirring, stannous chloride solution is drop-wise added to the resulting solution until iron is reduced and yellow color disappears. 2 drops of stannous chloride solution and approximately 50 ml of water are added. After cooling to room temperature, and add 15 ml of saturated mercury chloride solution and then stirring vigorously. This solution allow to stand for 5 minutes and 15 ml of a mixture of sulfuric acid and phosphoric acid (75 ml of sulfuric acid is slowly added to 300 ml of water. After cooling, 75 ml of phosphoric acid and water to make 500 ml). After adding 0.5 ml of barium diphenylamine sulfonate solution, the solution is titrated with 0.1 N potassium bichromate solution until it turns reddish purple.

1 ml of 0.1 N Potassium bichromate = 5.585 mg Fe

203. Sucrose Esters of Fatty Acids

Compositional Specifications of Sucrose Esters of Fatty Acids

Definition Sucrose Esters of Fatty Acids are esters of fatty acids and sucrose and sucrose acetate isobutylate.

Description Sucrose Esters of Fatty Acids occur as white to yellow~brown powder or mass substances, or as colorless to light brown, viscous resinous or liquid substances. They are odorless or have a slight, characteristic odor.

Identification (1) To 1 g of Sucrose Esters of Fatty Acids, add 25 ml of 0.5 N alcoholic potassium hydroxide solution, equip with a reflux condenser, and heat in a water bath for 1 hour. Add 50 ml of water to the solution, and distill until the residual solution becomes about 30 ml. After cooling, add 5 ml of diluted hydrochloric acid to the residual solution, shake well, add sodium chloride to make a saturated solution, and extract twice with 30 ml of ether each time. Combine the ether layers, wash with 20 ml of water. Evaporate the ether and cool the residue to 5°C. Either colorless to light yellow solids are deposited or a liquid with an odor of acetic acid and isobutyric acid remains.

(2) Place 2 ml of the water layer separated from the ether layer in (1) above in a test tube. warm in a water bath until the odor of ether disappears. cool, and superimpose gently 1 ml of anthrone solution along the tube wall. The color of the interface changes to a blue to green color.

Purity (1) Acid Value : Accurately weigh about 3 g of Sucrose Esters of Fatty Acids, and dissolve in 40 ml of isopropyl alcohol and 20 ml of water and test by Acid Value in Flavoring Substance Test. It should not be more than 6.

(2) Arsenic : 0.25 g of Sucrose Esters of Fatty Acids transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(3) Lead : When 5.0 g of Sucrose Esters of Fatty Acids is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Cadmium : When 5.0 g of Sucrose Esters of Fatty Acids is tested by Atomic

- Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (5) Mercury : When Sucrose Esters of Fatty Acids is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (6) Other solvent(sucrose acetate isobutylate is excluded) : When Sucrose Esters of Fatty Acids proceed under following (A) and (B),

Isopropyl Alcohol] not more than 350 ppm(separate or total in case of use in combination)
Ethyl acetate	
Propylene glycol	
Isobutyl alcohol	not more than 10 ppm
Methyl Alcohol	not more than 10 ppm
Methyl ethyl ketone	should not be more than 10 ppm

(A) Isopropyl Alcohol, Ethyl Acetate, Isobutyl alcohol, Methyl Alcohol and Methyl Ethyl Ketone : Accurately weigh 1 g of sample into each of four sample vials. To one vial, add 5 ml of water, to the second, third, and fourth, add, respectively, standard solution A, B, and C, and seal them quickly with a septum. Place the sample vials in a headspace sampler and analyze by gas chromatography with a head space sampler using the following conditions. Measure peak area of each solvent in test solution and standard solution (Isopropyl Alcohol, Ethyl acetate, Isobutyl alcohol, Methyl Alcohol and Methyl ethyl ketone). Following standard addition method, plot the relationship between addition weight of solvent of each standard solution on a horizontal axis, and each peak area on a vertical axis. Calculate weight of each solvent of sample by the distance between the node of correlation line and horizontal axis, and the starting point.

Standard solution A, B, and C : Prepare standard solution A of methanol isopropanol, isobutanol, ethyl acetate and methyl ethyl ketone by weighing accurately 0.2g of each solvent into a 50ml volumetric flask containing approx 20 ml of water, then adding water to volume. Pipette accurately 5 ml and 10 ml of standard solution, dilute to 20 ml with water respectively, and each of them is standard solution B and C.

Operation Condition

Column : HP-1 or its equivalent

Detector : Hydrogen Flame Ionization Detector (FID)

Temperature at injection hole: 110°C

Column Temperature : 40°C

Carrier gas : Nitrogen

Headspace sampler condition

Heat temperature : 80°C

Heat time : 40 minutes

(B) Propylene Glycol : Accurately weigh 1 g of sample into a 10 ml volumetric flask, and add 0.1 ml of internal standard solution. Dissolve and make to volume with pyridine. Take 0.5 ml of sample in a centrifugation tube, and add 0.25 ml of hexamethyldisilazane and 0.1 ml of trimethylchlorosilane. After sealing the tube, shake it vigorously, let stand for 30 min at room temperature, then centrifuge. The supernatant is used as test Solution. The test solution proceed as gas chromatography with operation conditions below and calculate the concentration of Propylene Glycol from calibration curve by internal standard method

Internal standard solution : Weigh 0.025 g of ethylene glycol and add pyridine to make 50ml.

Standard solution : Accurately weigh 0.025 g of Propylene Glycol and add pyridine to make 50 ml. Take 40, 200, 500, and 1,000 μ l of this solution into 10 ml volumetric flask respectively. Add 0.1 ml of internal standard solution to each volumetric flask and make exactly 10 ml with pyridine. Prepare each standard solution in the same manner as test solution.

Calibration Curve Preparation : Standard solutions of 4 different concentration proceed by gas chromatography under operation conditions below and prepare calibration curve.

Operation Condition

Column : HP-1(30m \times 0.32mm, 0.25 μ m) or its equivalent

Detector : Hydrogen Flame Ionization Detector (FID)

Temperature at injection hole: 230°C

Amount of injection : 1 μ l

Type of injection : splitless

Column Temperature : Hold for 5 min at 60°C and then 40°C to 250°C at 20°C/min, and hold for 5 min at 250°C.

Carrier gas : helium

Flow rate : Adjust flow rate so that Propylene Glycol derivatives is kept about 8 minutes

(7) Dimethyl Sulfoxide(sucrose acetate isobutylate is excluded) : 5 g of Sucrose Esters of Fatty Acids is precisely weighed and dissolved in tetrahydrofuran to make 25ml, test solution. Test solution proceeds gas chromatography under operation conditions

below and measure the content of Dimethyl sulfoxide from calibration curve., its content should not be more than 2.0 ppm.

Standard solution : 0.1g of Dimethyl sulfoxide is precisely weighed and dissolved in tetrahydrofuran to make exactly 100 ml, undiluted standard solution. Each of 0.5, 1, 2, and 5 ml of undiluted standard solution is respectively measured and make exactly 50 ml with tetrahydrofuran, standard solution.

Calibration Curve Preparation : Different concentration of 4 standard solutions proceed gas chromatography under operation conditions below and prepare calibration curve.

Operation Condition

Column : HP-FFAP or its equivalent

Detector : Flame Photometric Detector (FPD)

Temperature at injection hole: 210°C

Amount of injection : 3 μ l

Type of injection : splitless

Column Temperature : 150~170°C

Carrier gas : Nitrogen

Flow rate : flow rate is adjusted so that Propylene Glycol derivatives is kept about 8 minutes

(8) Free Sucrose : Accurately weigh about 2 g of Sucrose Esters of Fatty Acids, add 40 ml of n-butanol, dissolve while warming on a water bath, extract twice with 20 ml of sodium chloride solution (1→20) each time, combine the extracts. add 2 ml of diluted hydrochloric acid, and heat in a water bath for 30 minutes. Cool, add 2~3 drops of phenolphthalein solution, neutralize with 1 N sodium hydroxide solution, and add water to make 100 ml. Use this solution as the sample solution. Take 20 ml of this solution, add 20 ml of Bertrand's solution A and 20 ml of Bertrand's solution B, boil gently for 3 minutes, and allow to stand to precipitate cuprous oxide (at this time, the color of the supernatant changes to deep blue). Filter the supernatant through a glass filter, wash the precipitate in the flask with hot water until the washings are no longer alkaline, and filter the washings through the glass filter (taking care not to allow cuprous oxide to be exposed to air). Dissolve the precipitate in the glass filter in 20 ml of Bertrand's solution C into Erlenmeyer flask or other suitable containers. Filter the solution through the above glass filter, wash with water, combine the filtrate and the washings, and titrate with Bertrand's solution D. Calculate the amount of copper from the consumed volume, determine the amount of invert sugar from Bertrand's Table, and calculate the content of free sucrose by the following formula. Its content should not be more than 5%.

$$\text{Content of free sucrose (\%)} = \frac{\text{Weight of the invert sugar (mg)} \times 0.95 \times 5}{\text{Weight of the sample (mg)}} \times 100$$

Quantitative Table for Sugars

sugar (mg)	equivalent weight for eQach sugar (mg)					sugar (mg)	equivalent weight for eQach sugar (mg)				
	invert sugar	glucose	galactose	maltose	lactose		invert sugar	glucose	galactose	maltose	lactose
10	20.6	20.4	19.3	11.2	14.4	26	51.7	51.5	48.9	28.9	36.6
11	22.6	22.4	21.2	12.3	15.8	27	53.6	53.4	50.7	30.0	38.0
12	24.6	24.3	23.0	13.4	17.2	28	55.5	55.3	52.5	31.3	39.4
13	26.5	26.3	24.9	14.5	18.6	29	57.4	57.2	54.4	32.2	40.7
14	28.5	28.3	26.7	15.6	20.0	30	59.3	59.1	56.2	33.3	42.1
15	30.5	30.2	28.6	16.7	21.4	31	61.1	60.9	58.0	34.4	43.4
16	32.5	32.2	30.5	17.8	22.8	32	63.0	62.8	59.0	35.5	44.8
17	34.5	34.2	32.3	18.9	24.2	33	64.8	64.6	61.5	36.5	46.1
18	36.4	36.2	34.2	20.0	25.6	34	66.7	66.5	63.3	37.6	47.4
19	38.4	38.1	36.0	21.1	27.0	35	68.5	68.3	65.0	38.7	48.7
20	40.4	40.1	37.0	22.2	28.4	36	70.3	70.1	66.8	39.8	50.1
21	42.3	42.0	39.7	23.3	29.8	37	72.2	72.0	68.6	40.9	51.4
22	44.2	43.9	41.6	24.4	31.1	38	74.0	73.8	70.4	41.9	52.7
23	46.1	45.8	43.4	25.5	32.5	39	75.9	75.7	72.1	43.0	54.1
24	48.0	47.7	45.2	26.6	33.9	40	77.7	77.5	73.9	44.1	55.4
25	49.8	49.6	47.0	27.7	35.2	41	79.5	79.3	75.6	45.2	56.7

sugar (mg)	equivalent weight for eQach sugar (mg)					sugar (mg)	equivalent weight for eQach sugar (mg)				
	invert sugar	glucose	galactose	maltose	lactose		invert sugar	glucose	galactose	maltose	lactose
42	81.2	81.1	77.4	46.3	58.0	72	132.4	133.1	128.3	78.6	96.9
43	83.0	82.9	79.1	47.4	59.3	73	134.0	134.7	130.0	79.7	98.0
44	84.8	84.7	80.8	48.5	60.6	74	135.6	136.3	131.5	80.8	99.1
45	86.5	86.4	82.5	49.5	61.9	75	137.2	137.9	133.1	81.8	100.4
46	88.3	88.2	84.3	50.6	63.3	76	138.9	139.6	134.8	82.9	101.7
47	90.1	90.0	86.0	51.7	64.6	77	140.5	141.2	136.4	84.0	102.9
48	91.9	91.8	87.7	52.8	65.9	78	142.1	142.8	138.0	85.1	104.2
49	93.6	93.6	89.5	53.9	67.2	79	143.7	144.5	139.7	86.1	105.4
50	95.4	95.4	91.2	55.0	68.5	80	145.3	146.1	141.3	87.2	106.7
51	97.1	97.1	92.6	56.1	69.8	81	146.9	147.7	142.9	88.3	107.9
52	98.9	98.9	94.6	57.1	71.1	82	148.5	149.3	144.6	89.4	109.2
53	100.6	100.6	96.3	58.2	72.4	83	150.0	150.9	146.2	90.4	110.4
54	102.2	102.3	98.0	59.3	73.7	84	151.6	152.5	147.8	91.5	111.7
55	104.0	104.1	99.7	60.3	74.9	85	153.2	154.0	149.4	92.6	112.9
56	105.7	105.8	101.5	61.4	76.2	86	154.8	155.6	151.1	93.7	114.1
57	107.4	107.6	103.2	62.5	77.5	87	156.4	157.2	152.7	94.8	115.4
58	109.2	109.3	104.9	63.5	78.8	88	157.9	158.8	154.3	95.8	116.6
59	110.9	111.1	106.6	64.6	80.1	89	159.5	160.4	156.0	96.9	117.9
60	112.6	112.8	108.3	65.7	81.4	90	161.1	162.0	157.6	98.0	119.1
61	114.3	114.5	110.0	66.8	82.7	91	162.6	163.6	159.2	99.0	120.3
62	115.9	116.2	111.6	67.9	83.9	92	164.2	165.2	160.8	100.1	121.6
63	117.6	117.9	113.3	68.9	85.2	93	165.7	166.7	162.4	101.1	122.8
64	119.2	119.6	115.0	70.0	86.5	94	167.3	168.3	164.0	102.0	124.0
65	120.9	121.3	116.6	71.1	87.7	95	168.8	169.9	165.6	103.2	125.1
66	122.6	123.0	118.3	72.2	89.0	96	170.3	171.5	167.2	104.2	126.5
67	124.2	124.7	120.0	73.3	90.3	97	171.9	173.1	168.8	105.3	127.7
68	125.9	126.4	121.7	74.3	91.6	98	173.4	174.6	170.4	106.3	128.9
69	127.5	128.1	123.3	75.4	92.8	99	175.0	176.2	172.0	107.4	130.2
70	129.2	129.8	125.0	76.5	94.1	100	176.5	177.8	173.6	108.4	131.4
71	130.8	131.4	126.6	77.6	95.4						

(9) Dimethylformamide : 2 g of Sucrose Esters of Fatty Acids dissolve in tetrahydrofuran to make exactly 20ml. Test solution proceeds by gas chromatography under operation conditions below and calculate the concentration of Dimethylformamide from calibration curve. The concentration should not be more than 1.0 ppm.

Standard solution : Accurately weigh 0.1g of dimethylformamide dissolve in tetrahydrofuran to make 100 ml. Accurately pipette 1 ml of this solution and make 100 ml with tetrahydrofuran, stock standard solution. Take each of 0.5, 1, and 2 ml of stock standard solution respectively and make exactly 100 ml with tetrahydrofuran, standard solution.

Calibration Curve Preparation : 3 standard solutions proceed gas chromatography under operation conditions below and prepare calibration curve.

Operation Condition

Column : HP-FFAP or its equivalent

Detector : Nitrogen Phosphours Detector (NPD)

Temperature at injection hole: 180°C

Amount of injection : 1 μ l

Type of injection : splitless

Column Temperature : Keeping at 40°C for 2 minutes, it is raised as the rate of 20°C /minutes by 160°C, keep at 160°C for 2 minutes

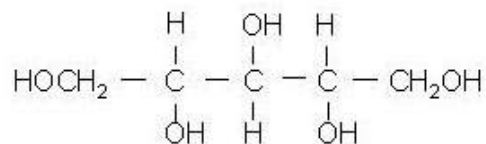
Carrier gas : Helium

Water Content Approximately 500 mg of Sucrose Esters of Fatty Acids is precisely weighed and tested by the back titration method in water content determination (Karl-Fischer Method). The water content should not be more than 4%. However, Sucrose Esters of Fatty Acids transfer into a dried titration flask, where 10 ml of Karl-Fischer methyl alcohol is added and Karl-Fischer solution (approximately 10 ml excess) is added. It is sealed and stir-mixed for 20 minutes. It is titrated with water-methyl alcohol standard solution while stirring vigorously. Separately, a blank test is carried out.

Residue on Ignition When thermogravimetric analysis is done with 1 g of Sucrose Esters of Fatty Acids, the amount of residues should not be more than 2%.

204. Xylitol

1,2,3,4,5 - Pentahydroxypentane



Chemical Formula $\text{C}_5\text{H}_{12}\text{O}_5$

Molecular Weight 152.15

Compositional Specifications of Xylitol

Content Xylitol, when calculated on the dried basis, should contain within a range of 98.5~101.0% xylitol ($\text{C}_5\text{H}_{12}\text{O}_5$).

Description Xylitol is white crystal or crystalline powder.

Identification (1) When Xylitol proceed as directed under (1) potassium bromide disk method in Infrared Spectrophotometry, the maximum absorption should appear at the same wavelength as a xylitol standard. If there is any difference, both the sample and the standard are dissolved in an appropriate solvent. After solvent is dried, the same procedure is repeated with the solid material.

(2) 5 g of Xylitol is dissolved in 10 ml mixture of hydrochloric acid : formalin (1:1). The resulting solution is reacted for 2 hours at 50°C. Then 25 ml of ethyl alcohol is added. The resulting precipitates are filtered. These are recrystallized twice with ethyl alcohol. After drying for 2 hours at 105°C, melting point is measured. It should be within a range of 195~201°C.

Purity (1) Arsenic : 0.25 g of Xylitol transfer into a 500 ml flask for decomposition. After adding 5 ml of sulfuric acid and 5 ml of nitric acid, the flask is slowly heated. 2~3 ml of nitric acid is added at a time and the flask is heated until the liquid becomes colorless~pale yellow. After cooling, 15 ml of saturated ammonium hydroxide is added to the flask, which is then heated and concentrated to 2~3 ml until white smoke is generated. The resulting concentrate is neutralized with ammonia water or ammonia solution. This test solution is tested by Arsenic Limit Test. The detected amount of lead should not be more than 4 ppm.

(2) Lead : When 5.0 g of Xylitol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

- (3) Nickel : When 5.0 g of Xylitol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (4) Other Polyvalence Alcohol : L-arabinitol, galactitol, and mannitol, and sorbitol are quantitatively analyzed following the same procedure as in xylitol. The content of the total polyvalence alcohols is calculated using the following equation and should not be more than 2%.

$$\text{Content (\%)} = 100 \times \frac{Ws \times Ru}{Wu \times Rs}$$

Ws : Weight of all polyvalence alcohol standards (mg)

Wu : Weight of sample (mg) (as dehydrated form)

Ru : Peak area ratio of polyvalence alcohol derivatives vs. erythritol derivatives in test solution.

Rs : Peak area ratio of polyvalence alcohol derivatives vs. erythritol derivatives in standard solution.

- (5) Reduced Sugars : Approximately 500 mg of Xylitol is precisely weighed into a 10 ml Erlenmeyer flask with 2 ml of water. Use this solution as the test Solution. Separately, 2 ml of glucose solution (0.5 mg/ml) is added to another Erlenmeyer flask. 1 ml each of Fehling solution A and B is added to each Erlenmeyer flask, respectively. Both solution are boiled and then cooled. Test Solution should be less turbid than glucose solution, also should show reddish brown precipitates (Not more than 0.2%).

Water Content Water content of Xylitol is determined by water determination (Karl-Fisher Titration) and should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with precisely weighed 10 g of Xylitol, the amount of residue should not be more than 0.1%.

Assay 5 g of Xylitol, precisely weighed, dissolve in water to make 100 ml (Test A Solution). Separately, 4.9 g of xylitol standard and 25 mg each of L-arabinitol, galactitol, mannitol and sorbitol, accurately weighed, transfer into a 100 ml volumetric flask, and add water to make 100 ml. Respectively (Standard A Solution). 1 ml each of Test A Solution and Standard A Solution transfer into a round bottom flask, respectively. 1 ml of internal standard solution (500 mg of erythritol is dissolved in 25 ml of water) added to each flask. Each is then evaporated to dryness using a vacuum evaporator at 60°C in a water bath. 1 ml of pyridine and 1 ml of anhydrous acetic acid are added to each flask, where a reflux condenser is attached. Both are

completely acetylated by boiling. Use this solution as the test solution and standard solution. 1 µl of each Test Solution and Standard Solution is injected into gas chromatography. The content of xylitol (%) is calculated from the following equation.

$$\text{Content of xylitol (\%)} = 100 \times \frac{W_s \times R_u}{W_u \times R_s}$$

Ws : Weight of xylitol standard (mg)

Wu : Weight of sample (mg) (as dehydrated form)

Ru : Peak area ratio of xylitol derivatives vs. erythritol derivatives in test solution.

Rs : Peak area ratio of xylitol derivatives vs. erythritol derivatives in standard solution.

Operation Conditions

- Column : A stainless tube with inner diameter of 2 mm and length of 2 m
- Column Filler : Chromosorb W HP coated with 3% OV 225
- Detector : (Hydrogen) Flame Ionization Detector (FID)
- Temperature at injection hole : 250°C
- Column Temperature : 200°C
- Detector Temperature : 250°C
- Carrier gas and flow rate : Nitrogen, 30 ml per minute
- Retention time : Retention time for internal standard (erythritol) is 3.3 minutes.
Relative retention time (1 minute for erythritol) for each component is approximately 2.77 for L-arabinitol, 3.9 for xylitol, 6.96 for galactitol, 7.63 for mannitol, and 8.43 for sorbitol.

205. Iron, Electrolytic

Compositional Specifications of Electrolytic Iron

Content Electrolytic Iron should contain not less than 97.0% of Iron (Fe).

Description Electrolytic Iron is grayish black powder without gloss.

Identification A solution of Electrolytic Iron in dilute sulfuric acid responds to test of ferrous salt in Identification.

Purity (1) Acid Insoluble Substances : When Electrolytic Iron is tested according to Purity (1) for [Reduced Iron], the amount should not be more than 2 mg.

(2) Arsenic : Water is added to the remaining solution obtained in Acid Insoluble substances Test so that the total volume becomes 100 ml. 25 ml of the resulting solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(3) Lead : 1.0 g of Electrolytic Iron is weighed and transferred into 50 ml flask. Add 10 ml of 9 N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid-sodium iodide solution and 5 ml of trioctyl phosphine oxide solution and shake it to mix for 30 seconds. Add keep it to separate the layer and again add water so that organic layer reaches to neck part of flask. After shaking to mix it, keep it to separate the layer. This organic solvent layer is used as test solution. Separately, take 10 ml of lead standard solution and make it precisely to 100 ml. Take 2 ml of this solution and transfer into 50 ml flask. And operate under condition as test solution method, this solution is used as reference solution. When it is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, absorbance(luminous intensity) of test solution should not be more than absorbance(luminous intensity) of reference solution.(not be more than 2.0 ppm.)

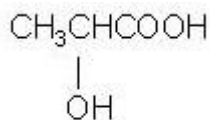
Ascorbic acid-sodium iodide solution : 10 g of ascorbic acid and 19.3 g sodium iodide are dissolved in water to make to 100 ml.

Trioctyl phosphine oxide solution : 5 g of trioctyl phosphine oxide is dissolved in methyl isobutyl ketone to make to 100 ml.

(4) Mercury : Proceed as directed under Purity (4) in [Reduced Iron]. 2 ml of mercury standard solution(for reduced iron) is taken and processed by the same procedure as the test sample (Not more than 2 ppm).

Assay Proceed as directed under Assay in [Reduced Iron].

206. Lactic Acid



Definition Lactic Acid is a mixture of lactic acid and anhydrous lactic acid.

Compositional Specifications of Lactic Acid

Content Lactic Acid should contain not less than the 40.0% of lactic acid ($\text{C}_3\text{H}_6\text{O}_3 = 90.08$) and 95~105% of the indicate content.

Description Lactic Acid occurs as a white to light yellow solid or is a colorless to light yellow, clear syrupy liquid. It is odorless or has a slight or no unpleasant odor. It has an acid taste.

Identification (1) Lactic Acid solution (1→10) is acidic.

(2) Lactic Acid responds to the test for Lactate in identification.

Purity (1) Clarity and Color of Solution : Concentrate the Lactic Acid to 80% concentration. Take 10 g of the solution, add 12 ml of ether, and mix. The solution is clear, or passes the following test. Filter the solution mixed with ether through a glass filter (1G3), wash the residue three times with 10 ml of ether each time, then once with 10 ml of acetone, dry the residue together with the filter under reduced pressure at 50°C for 14 hours. The amount of the residue is not more than 0.07 g.

(2) Citric Acid, Oxalic Acid, Tartaric Acid, and Phosphoric Acid : When Lactic Acid (corresponding to 0.8 g of Lactic Acid) is dissolved in 10 ml of water, where 40 ml of potassium hydroxide solution is added and boiled for 2 minutes, it should not turn turbid

(3) Sulfate : When Lactic Acid (correspond in to 0.8 g of Lactic Acid) is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N sulfuric acid.

(4) Cyanide : Weigh Lactic Acid (corresponding to 0.8 g of Lactic Acid), and dissolve in water to make 100 ml. Take 10 ml of this solution. transfer into a Nestler tube, add 1 drop of phenolphthalein solution, and add sodium hydroxide solution (1→10) until the color of the solution changes to pink. Add 1.5 ml of sodium hydroxide solution (1→10) and water to make 20 ml, and heat in a water bath for 10 minutes. Cool, neutralize with diluted acetic acid (1→20), and after the pink color of the solution disappears, add 1 drop. Add 10 ml of phosphate buffer (pH 6.8) and 0.25 ml of chloroamine T, stopper tightly, shake gently, allow to stand for 3~5 minutes, add 15 ml of pyridine-pyrazolone solution and water to make 50 ml, and allow to stand

- at about 25°C for 30 minutes. The color of the solution does not change to blue.
- (5) Arsenic : When Lactic Acid (corresponding to 0.4 g of Lactic Acid) is mixed with 5 ml of water, and add water to make 10 ml. Take 5 ml of this solution and test by Arsenic Limit Test and its content should not be more than 4 ppm.
- (6) Lead : When 5.0 g of Lactic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (7) Mercury : When Lactic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (8) Iron : Lactic Acid (corresponding to 0.8 g of lactic acid) transfer into a Nestler Tube, and dissolve in 6 ml of dilute nitric acid (1→10) and 10 ml of water, add water to make 25 ml. Use this solution as the test Solution. 50 mg of ammonium persulfate and 5 ml of ammonium thiocyanate solution (2→25) are added to Test Solution. The resulting color should not be deeper than that of a solution prepared by treating 1 ml of iron standard solution by the same procedure as the Test Solution.
- (9) Chlorides : Accurately weigh a portion of sample equivalent to about 5 g of lactic acid, dissolve in 50ml of water, and neutralize to litmus with sodium hydroxide solution. (1 in 4). Add 2 ml of potassium chromate TS and titrate with 0.1N silver nitrate to the first appearance of a red tinge, its content should not be more than 0.2%.

1 ml of 0.1N silver nitrate solution = 3.545mg Cl

- (10) Readily Carbonizable Substances : Weigh Lactic Acid (corresponding to 2 g of lactic acid) adjust to 15°C, gradually superimpose on top of 5 ml sulfuric acid pre-adjusted to 15°C, and keep at 15°C. Even if a band is formed at the interface within 15 minutes, its color should not change to dark gray.
- (11) Volatile Fatty Acid : Lactic Acid (corresponding to 2 g of lactic acid), where water is added to bring the volume to 5 ml, if necessary, is heated in a water bath, it should not generate an odor of lactic acid.
- (12) Methanol : To Lactic Acid (corresponding to 4 g of lactic acid), add 8 ml of water and 5 g of calcium carbonate, distill the solution, take about 5 ml of the initial distillate, and add water to make 100 ml. Use this solution as the test solution. Measure 1.0 ml of the test solution, add 0.1 ml of phosphoric acid (1→20) and 0.2 ml of potassium permanganate solution (1→300), allow to stand for 10 minutes, add 0.4 ml of anhydrous sodium sulfite solution (1→5) and 3 ml of sulfuric

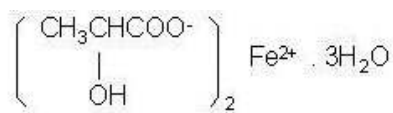
acid, then add 0.2 ml of chromotropic acid solution. The color of the solution is not darker than that of the following reference solution. Measure 1.0 ml of methanol, add water to make 100 ml, measure 1.0 ml of this solution, and add water to make 100 ml. Use this solution as the solution.

Residue on Ignition When thermogravimetric analysis is done with Lactic Acid, the residues should not be more than 0.1%.

Assay Accurately weigh 3 g of Lactic Acid, add 40 ml of 1 N sodium hydroxide solution, heat in a water bath for 10 minutes, and titrate the excess alkali with 1 N sulfuric acid while hot (indicator : 1~2 drops of phenolphthalein solution). Perform a blank test in the same manner.

1 ml of 1 N sodium hydroxide = 90.08 mg of $C_3H_6O_3$

207. Ferrous Lactate



Chemical Formula $\text{C}_6\text{H}_{10}\text{O}_6\text{Fe} \cdot 3\text{H}_2\text{O}$

Molecular Weight 288.04

Compositional Specifications of Ferrous Lactate

Content Ferrous Lactate should contain within a range of 15.5~20.0% of iron (Fe = 55.85).

Description Ferrous Lactate is greenish white~yellow crystalline powder or lump with characteristic scent and slightly sweet taste of iron

Identification (1) 0.5 g of Ferrous Lactate is heat-treated for 1 hour at 450~550°C. The resulting residue is dissolved in 3 ml of diluted hydrochloric acid (1→2). This solution responds to test of ferric salt in Identification.

(2) Ferrous Lactate responds to test of Lactate Salt in Identification.

Purity (1) Clarity and Color of Solution : When of 1 g of Ferrous Lactate is dissolved in 20 ml of water by heating in a water bath, the solution almost clear.

(2) Chloride : When 0.1 g of Ferrous Lactate is tested by Chloride Limit Test, Its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.

(3) Sulfate : 0.2 g of Ferrous Lactate is dissolved in 5 ml of water. The total volume is brought up to 10 ml with water. 2 ml of this solution is tested by Sulfate Limit Test salt. The amount of sulfate salt should correspond to 0.4 ml of 0.01 N sulfuric acid

(4) Arsenic : To 0.5 g of Ferrous Lactate, add water to make 25 ml and add 1 ml of sulfuric acid and 10 ml of sulfurous acid. The resulting solution is concentrated to approximately 2 ml by evaporation. The concentrate is diluted to 10 ml with water. 5 ml of the resulting solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(5) Lead : When 5.0 g of Ferrous Lactate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(6) Cadmium : When 5.0 g of Ferrous Lactate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content

should not be more than 1.0 ppm.

(7) Mercury : When Ferrous Lactate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(8) Ferric Iron: 5 g of Ferrous Lactate, accurately weighed, transfer into a 250 ml glaze stoppered flask, dissolve in 100 ml of water and 10ml of hydrochloric acid. Add 3 g of potassium iodide, shake well, and allow to stand in the dark for 5 min. Titrate liberated iodine with 0.1N sodium thiosulfate, using starch TS as the indicator, then the content should not be more than 0.6%.

1ml of 0.1 N Sodium thiosulfate solution = 5.585mg Fe(III)

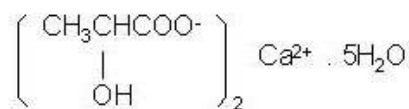
(9) Readily Carbonizable Substances and Butyrate : 0.5 g powder of Ferrous Lactate is mixed with 1 ml of sulfuric acid, it should not be colored immediately and should not generate the odor of fatty acid.

Loss on Drying When Ferrous Lactate is dried using vacuum (approx. 700mmHg) at 100°C, the weight loss should not be more than 18%.

Assay Approximately 1 g of Ferrous Lactate is precisely weighed and carbonized by slowly heating. 1 ml of nitric acid is added and evaporated to dryness, where care must be taken to prevent splashing. After further heat treatment, 10 ml of diluted hydrochloric acid (1→2) to the residue and the mixture is boiled until insoluble substances almost disappear. To this solution, 20 ml of water is added and then filtered. Insoluble residue is rinsed with water and the rinse water is added to the filtrate. The total volume of the filtrate is then brought up to 100 ml by adding water. 25 ml of the resulting solution is transferred into a flask with a stopper. After adding 2 g potassium iodide to the flask, The flask is sealed and set-aside for 15 minutes at a dark place. 100 ml of water is added and free iodine is titrated with 0.1 N sodium thiosulfate (indicator: starch solution). A blank test is done following the same procedure.

1 ml of 0.1 N sodium thiosulfate = 5.585 mg Fe

208. Calcium Lactate



Chemical Formula $\text{C}_6\text{H}_{10}\text{O}_6\text{Ca} \cdot 5\text{H}_2\text{O}$

Molecular Weight 308.31

Compositional Specifications of Calcium Lactate

Content Calcium Lactate, when calculated on the dried basis, should contain within a range of 98.0~101.0% of calcium lactate ($\text{C}_6\text{H}_{10}\text{O}_6\text{Ca} = 218.23$).

Description Calcium Lactate occurs as white powder or granules. It is odorless or has a slight, characteristic odor.

Identification Calcium Lactate solution (1→20) responds to the tests for Calcium Salt and Lactate.

Purity (1) Clarity and Color of Solution : Weigh 1 g of Calcium Lactate, add 20 ml of water, and dissolve while heating in a water bath. This solution is colorless and clear.

(2) pH : Weigh 1 g of Calcium Lactate, add 20 ml of water, dissolve while heating in a water bath, and cool. pH of this solution should be within a range of 6.0~8.0

(3) Arsenic : 0.5 g of Calcium Lactate is dissolved in 10 ml of water, where 1 ml of sulfuric acid and 10 ml of sulfurous acid are added. It is concentrated by evaporation, which is diluted to 10 ml with water. 5 ml of this solution is tested by Arsenic Limit Test and its content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Calcium Lactate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Mercury : When Calcium Lactate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Fluoride : 1 g of Calcium Lactate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 30 ppm.

(7) Alkali Metals and Magnesium : 1.0 g of Calcium Lactate dissolve in about 40 ml of water, add 0.5 g of ammonium chloride, and boil. Add about 20 ml of ammonium oxalate solution, heat in a water bath for 1 hour, cool, add water to make 100 ml,

and filter. Measure 50 ml of the filtrate, add 0.5 ml of sulfuric acid, evaporate to dryness, ignite to constant weight, and weigh the residue. The amount of residue should not be more than 5 mg.

(8) Volatile Fatty Acid : To 0.5 g of Calcium Lactate, 1 ml of sulfuric acid is added.

When it is heated in a water bath, an odor of fatty acid should not be generated.

Loss on Drying When Calcium Lactate is dried for 4 hours at 120°C, the loss should not be more than 30%.

Assay Dissolve 1g of Calcium Lactate, precisely dried and accurately weighed, in 20 ml of dilute hydrochloric acid, where water is added to make 100 ml solution. Take 10 ml of this solution and test by Assay for [Calcium Hydroxide]

1 ml of 0.05 M EDTA = 10.91 mg of $\text{C}_6\text{H}_{10}\text{O}_6\text{Ca}$

209. Sodium Phosphate, Tribasic

Chemical Formula Na_3PO_4

Molecular Weight 163.94

Definition Tribasic Sodium Phosphate has two forms, crystalline and anhydrous, which is named tribasic sodium phosphate (crystalline) and tribasic sodium phosphate (anhydrous), respectively.

Compositional Specifications of Sodium Phosphate, Tribasic

Content Tribasic Sodium Phosphate, when calculated on the dried basis, should contain within a range of 97.0~103.0% of tribasic sodium phosphate ($\text{Na}_3\text{PO}_4 = 163.94$).

Description Crystalline form of Tribasic Sodium Phosphate is colorless~white crystallite or crystalline powder. Anhydrous form of Tribasic Sodium Phosphate is white powder or granule.

Identification Tribasic Sodium Phosphate solution (1→20) responds to test of Sodium Salt reactions (A), (B) and Phosphate reaction in Identification.

Purity Crystalline form is dried for 2 hours at 120°C and 5 hours at 200°C prior to the following tests.

- (1) Water Insoluble Substances : 10 g of Tribasic Sodium Phosphate is tested according to Purity (1) for 「Sodium Acid Pyrophosphate」, the content should not be more than 0.2%.
- (2) pH : pH of an aqueous solution (1→100) of Tribasic Sodium Phosphate is measured using a glass electrode method. Its should be within a range of 11.5~12.5.
- (3) Arsenic : 0.25 g of Tribasic Sodium Phosphate is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.
- (4) Lead : Tribasic Sodium Phosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.
- (5) Cadmium : Tribasic Sodium Phosphate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.
- (6) Mercury : When Tribasic Sodium Phosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Fluoride : 1 g of Tribasic Sodium Phosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When crystalline form of Tribasic Sodium Phosphate is dried for 2

hours at 120°C and further dried for 5 hours at 200°C, the loss should not be more than 58.0%. When anhydrous form is dried for 5 hours at 200°C, the loss should not be more than 5%.

Assay Dissolve 2 g of Tribasic Sodium Phosphate, previously dried and accurately weighed, in 50 ml of water. The solution is kept at 15°C and titrated with 1 N hydrochloric acid (Indicator : 3~4 drops of Methyl Orange · Xylene Cyanol FF solution).

1 ml of 1 N hydrochloric acid = 81.97 mg Na_3PO_4

210. Potassium Phosphate, Tribasic

Chemical Formula $\text{K}_3\text{PO}_4 \cdot 0 \sim 3\text{H}_2\text{O}$

Compositional Specifications of Potassium Phosphate, Tribasic

Content When Tribasic Potassium Phosphate is heat-treated and analyzed quantitatively analyzed, should contain not less than 97.0% Tribasic potassium phosphate ($\text{K}_3\text{PO}_4 = 212.28$).

Description Tribasic Potassium Phosphate is colorless~white crystallite or lump, or white powder.

Identification (1) Potassium Phosphate, Tribasic solution (1→20) is alkaline.

(2) Potassium Phosphate, Tribasic solution (1→20) responds to test of potassium salts and Phosphate in Identification.

Purity (1) Water Insoluble substances : Potassium Phosphate, Tribasic proceed as directed under Purity (1) in 「Trisodium Phosphate」. The content of water insoluble substances should not be more than 0.2%.

(2) pH : 1 g of Potassium Phosphate, Tribasic is dissolved in 100 ml of water. pH of this solution should be within a range of 11.5~12.5.

(3) Arsenic : 0.25 g of Potassium Phosphate, Tribasic is dissolved in 5 ml of water. This solution is tested by Arsenic Limit Test, it should not be more than 4 ppm.

(4) Lead : Potassium Phosphate, Tribasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(5) Cadmium : Potassium Phosphate, Tribasic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(6) Mercury : When Potassium Phosphate, Tribasic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Fluoride : 1 g of Potassium Phosphate, Tribasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Ignition When Potassium Phosphate, Tribasic is first dried at 120°C and further heat-treated at 300~400°C for 1 hour, weight loss should not be more than 23%.

Assay Approximately 2 g of Potassium Phosphate, Tribasic, previously heat treatment and accurately weighed, dissolve in 50 ml of water. The solution is kept at 15°C and

titrated with 1N hydrochloric acid (Indicator : 3~4 drops of Methyl Orange · Xylene Cyanol FF solution).

$$1 \text{ ml of } 1 \text{ N hydrochloric acid} = 106.13 \text{ mg K}_3\text{PO}_4$$

211. Calcium Phosphate, Tribasic

Calcium Hydroxyapatite

Chemical Formula $\text{Ca}_3(\text{PO}_4)_2$

Molecular Weight 310.18

Compositional Specifications of Calcium Phosphate, Tribasic

Content Calcium Phosphate, Tribasic, when calculated on the dried basis, should contain not less than 90.0% of tribasic calcium phosphate $[\text{Ca}_3(\text{PO}_4)_2]$.

Description Calcium Phosphate, Tribasic is odorless and tasteless white powder.

Identification (1) Calcium Phosphate, Tribasic turns yellow by wetting with silver nitrate solution.

(2) To 0.1 g of Calcium Phosphate, Tribasic, add 5 ml of acetic acid, and boil, cool, and filter. To filtrate, add 5 ml of ammonium hydroxide solution, white precipitates are formed.

Purity (1) Arsenic : 0.25 g of Calcium Phosphate, Tribasic is dissolved in 5 ml of dilute hydrochloric acid. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Lead : Calcium Phosphate, Tribasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(3) Cadmium : Calcium Phosphate, Tribasic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(4) Mercury : When Calcium Phosphate, Tribasic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Fluoride : 1 g of Calcium Phosphate, Tribasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 50 ppm.

Loss on Drying

When Calcium Phosphate, Tribasic is dried for 3 hours at 200°C, the loss should not be more than 10%.

Assay

200 mg of Calcium Phosphate, Tribasic, precisely weighed, dissolve in 25 ml water and 10 ml dilute hydrochloric acid. It is filtered, if necessary, and the residue is dissolved by adding 1 ml of dilute hydrochloric acid. The solution is kept at 50°C, where 75 ml of ammonium molybdate solution is added and stirred occasionally for 30 minutes. Precipitates are washed with 30~40 ml of water 1~2 times. Precipitates are

transferred on to a filter paper and washed with potassium nitrate solution (1→1000) until the final rinse solution does not show acidity as determined with a litmus paper. Precipitates and filter paper is transferred into a container. 40 ml of 1 N sodium hydroxide solution is added and stirred until the precipitates are dissolved. Excess alkali is titrated with 1 N sulfuric acid.

1 ml of 1 N sodium hydroxide solution = 6.743 mg $\text{Ca}_3(\text{PO}_4)_2$

212. Sodium Phosphate, Dibasic

Chemical Formula Na_2HPO_4

Molecular Weight 141.96

Definition Sodium Phosphate, Dibasic has two forms, crystalline (2~12 hydrated) and anhydrous, which is named dibasic sodium phosphate (crystalline) and dibasic sodium phosphate (anhydrous), respectively.

Compositional Specifications of Sodium Phosphate, Dibasic

Content Sodium Phosphate, Dibasic, when calculated on the dried basis, should contain not less than 98.0% of dibasic sodium phosphate ($\text{Na}_2\text{HPO}_4 = 141.96$).

Description Crystalline form of Sodium Phosphate, Dibasic is colorless~white crystallite or crystalline lump. Anhydrous form is white powder or granule.

Identification Sodium Phosphate, Dibasic solution (1→20) responds to test of sodium salts(A), (B) and Phosphate in Identification.

Purity Crystalline form is dried for 3 hours at 40°C and 4 hours at 120°C prior to test.

- (1) Water Insoluble substances : Sodium Phosphate, Dibasic is tested by Purity (1) [Sodium Phosphate, Tribasic] and the content of water insoluble substances should not be more than 0.2%.
- (2) pH : pH of Sodium Phosphate, Dibasic solution (1→100) is measured using a glass electrode and should be within a range of 9.0~9.6.
- (3) Arsenic : 0.25 g of Sodium Phosphate, Dibasic is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.
- (4) Lead : Sodium Phosphate, Dibasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.
- (5) Cadmium : Sodium Phosphate, Dibasic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.
- (6) Mercury : When Sodium Phosphate, Dibasic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Fluoride : 1 g of Sodium Phosphate, Dibasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When crystalline form of Sodium Phosphate, Dibasic is dried for 3 hours at 40°C and further dried for 4 hours at 120°C, the loss should not be more than 61.0%. When anhydrous form is dried for 4 hours at 120°C, the loss should not be more than 2%.

Assay Dissolve 3 g of Sodium Phosphate, Dibasic, previously dried and accurately weighed, in 50 ml of water. The solution is kept at 15°C and titrated with 1 N hydrochloric acid (indicator : 3~4 drops of Methyl Orange · Xylene Cyanol FF solution).

1 ml of 1 N hydrochloric acid = 141.96 mg Na_2HPO_4

213. Ammonium Phosphate, Dibasic

Chemical Formula $(\text{NH}_4)_2\text{HPO}_4$

Molecular Weight 132.06

Compositional Specifications of Ammonium Phosphate, Dibasic

Content Ammonium Phosphate, Dibasic should contain within a range of 96.0~102.0% of dibasic ammonium phosphate $[(\text{NH}_4)_2\text{HPO}_4]$.

Description Ammonium Phosphate, Dibasic is colorless~white crystallite or white crystalline powder.

Identification Ammonium Phosphate, Dibasic responds to test of Ammonium Salts and Phosphate in Identification.

Purity (1) pH : pH of Ammonium Phosphate, Dibasic solution (1→100) is measured using a glass electrode and should be within a range of 7.6~8.4.

(2) Arsenic : 0.25 g of Ammonium Phosphate, Dibasic is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(3) Lead : Ammonium Phosphate, Dibasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(4) Fluoride : 1 g of Ammonium Phosphate, Dibasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Assay Approximately 2 g of Ammonium Phosphate, Dibasic, accurately weighed, and dissolve in 50 ml of water. The solution is kept at 15°C and titrated with 1 N hydrochloric acid (indicator : 3~4 drops of Methyl Orange · Xylene Cyanol FF solution).

$$1 \text{ ml of } 1 \text{ N hydrochloric acid} = 132.1 \text{ mg } (\text{NH}_4)_2\text{HPO}_4$$

214. Potassium Phosphate, Dibasic

Chemical Formula K_2HPO_4

Molecular Weight 174.18

Compositional Specifications of Potassium Phosphate, Dibasic

Content Potassium Phosphate, Dibasic, when calculated on the dried basis, should contain not less than 98.0% of dibasic potassium phosphate (K_2HPO_4).

Description Potassium Phosphate, Dibasic is white powder, crystal, or lump.

Identification (1) Potassium Phosphate, Dibasic, solution (1→20) adding 1 drop of phenolphthalein solution turns red.

(2) Potassium Phosphate, Dibasic solution (1→20) responds to test of potassium salts and Phosphate in Identification.

Purity (1) Water Insoluble Substances : 10 g of Potassium Phosphate, Dibasic is tested for water insoluble substances by Purity (1) for 「Sodium Acid Pyrophosphate」. The content of water insoluble substances should not be more than 0.2%.

(2) pH : An aqueous solution (1→100) of Potassium Phosphate, Dibasic should have pH of 8.7~9.3.

(3) Arsenic : 0.25 g of Potassium Phosphate, Dibasic is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : Potassium Phosphate, Dibasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(5) Cadmium : Potassium Phosphate, Dibasic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(6) Mercury : When Potassium Phosphate, Dibasic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Fluoride : 1 g of Potassium Phosphate, Dibasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When Potassium Phosphate, Dibasic is dried for 4 hours at 105°C, the loss should not be more than 2.0%.

Assay Dissolve 3 g of Potassium Phosphate, Dibasic, previously dried and accurately weighed, in 50 ml of water. The solution is kept at 15°C and titrated with 1 N

hydrochloric acid (indicator : 3~4 drops of Methyl Orange · Xylene Cyanol FF solution).

$$1 \text{ ml of } 1 \text{ N hydrochloric acid} = 174.2 \text{ mg K}_2\text{HPO}_4$$

215. Calcium Phosphate, Dibasic

Chemical Formula $\text{CaHPO}_4 \cdot 0 \sim 2\text{H}_2\text{O}$

Compositional Specifications of Calcium Phosphate, Dibasic

Content Calcium Phosphate, Dibasic, when calculated on the dried basis, should contain within a range of 98.0~103.0% dibasic calcium phosphate ($\text{CaHPO}_4 = 136.06$)

Description Calcium Phosphate, Dibasic is odorless and tasteless white crystalline powder or powder.

Identification (1) Calcium Phosphate, Dibasic turns yellow by wetting with silver nitrate solution.

(2) 5 ml of acetic acid is added to 0.1 g of Calcium Phosphate, Dibasic, which is then boiled, cooled, and filtered. The filtrate adding 5 ml of ammonium hydroxide solution, white precipitates are formed.

Purity (1) Arsenic : 0.25 g of Calcium Phosphate, Dibasic is dissolved in 5 ml of dilute hydrochloric acid. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Lead : Calcium Phosphate, Dibasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(3) Cadmium : Calcium Phosphate, Dibasic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(4) Mercury : When Calcium Phosphate, Dibasic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Fluoride : 1 g of Calcium Phosphate, Dibasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When Calcium Phosphate, Dibasic is dried for 3 hours at 200°C, the loss should not be more than 22%.

Assay Dissolve 0.3 g of Calcium Phosphate, Dibasic, precisely dried and accurately weighed, in 10 ml of dilute hydrochloric acid. Water is added to bring the total volume to 120 ml. It is then quantitatively analyzed following the Assay for 「Calcium Phosphate, Monobasic」.

1 ml of 0.1 N potassium permanganate = 6.803 mg of CaHPO_4

216. Sodium Phosphate, Monobasic

Chemical Formula $\text{NaH}_2\text{PO}_4 \cdot n\text{H}_2\text{O}$ ($n = 0, 1, 2$)

Molecular Weight dihydrated : 159.01, hydrated : 138.00, Anhydrous : 119.98

Definition Sodium Phosphate, Monobasic has two forms, crystalline (hydrate, dihydrate) and anhydrous, which is named monobasic sodium phosphate (crystalline) and monobasic sodium phosphate (anhydrous).

Compositional Specifications of Sodium Phosphate, Monobasic

Content Sodium Phosphate, Monobasic should contain not less than 97.0% of monobasic sodium phosphate ($\text{NaH}_2\text{PO}_4 = 119.98$), when calculated on the dried basis,

Description Crystalline form of Monobasic Sodium Phosphate is colorless~white crystallite or crystalline powder. Anhydrous form of Monobasic Sodium Phosphate is white powder or granule.

Identification Sodium Phosphate, Monobasic solution (1→20) responds to test of sodium salt and Phosphate in Identification.

Purity Crystalline form is dried for 16 hours at 40°C and 4 hours at 120°C prior to test.

- (1) pH : pH of Sodium Phosphate, Monobasic solution (1→100) should be within a range of 4.2~4.6 by glass electrode method.
- (2) Arsenic : 0.25 g of Sodium Phosphate, Monobasic is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.
- (3) Lead : Sodium Phosphate, Monobasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.
- (4) Cadmium : Sodium Phosphate, Monobasic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.
- (5) Mercury : When Sodium Phosphate, Monobasic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (6) Fluoride : 1 g of Sodium Phosphate, Monobasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.
- (7) Free Acid and Sodium Phosphate, Dibasic : 2 g of Sodium Phosphate, Monobasic is dissolved in 40 ml of water. When the solution is neutralized with 1 N sodium hydroxide solution or 1 N sulfuric acid, the consumed amount should not be more

than 0.3 ml. (Indicator : Methyl Orange Indicator Solution).

Loss on Drying Sodium Phosphate, Monobasic is dried for 1 hour at 60°C and further dried for 4 hours at 105°. Loss on drying should be 2.0%, 15.0%, and 25.0% or less for anhydrous, 1 hydrated, and 2 hydrated form, respectively.

Assay Dissolve 3 g of Sodium Phosphate, Monobasic, previously dried and accurately weighed, in 30 ml of water. 5g of sodium chloride is added, which is dissolved by shaking. While the solution is kept at 15°C, it is titrated with 1 N sodium hydroxide solution (Indicator : 3~4 drops of thymol blue solution)

1 ml of 1 N sodium hydroxide solution = 119.98 mg NaH_2PO_4

217. Ammonium Phosphate, Monobasic

Chemical Formula $\text{NH}_4\text{H}_2\text{PO}_4$

Molecular Weight 115.03

Compositional Specifications of Ammonium Phosphate, Monobasic

Content Ammonium Phosphate, Monobasic should contain within a range of 96.0~102.0% of Ammonium Phosphate, Monobasic ($\text{NH}_4\text{H}_2\text{PO}_4$).

Description Monobasic Ammonium Phosphate is colorless~white crystallite, crystalline powder or granule.

Identification Ammonium Phosphate, Monobasic responds to test of Ammonium Salt and Phosphate in Identification.

Purity (1) pH : Ammonium Phosphate, Monobasic solution (1→100) is measured using a glass electrode and pH should be within a range of 4.3~5.0.

(2) Arsenic : 0.25 g of Ammonium Phosphate, Monobasic is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(3) Lead : Ammonium Phosphate, Monobasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(4) Fluoride : 1 g of Ammonium Phosphate, Monobasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Assay Dissolve 3 g of Ammonium Phosphate, Monobasic, previously dried and accurately weighed, in 30 ml of water. 5 g of sodium chloride is added, which is dissolved by shaking. While the solution is kept at 15°C, it is titrated with 1 N sodium hydroxide solution (Indicator : 3~4 drops of thymol blue solution)

1 ml of 1 N sodium hydroxide solution = 115.0 mg $\text{NH}_4\text{H}_2\text{PO}_4$

218. Potassium Phosphate, Monobasic

Chemical Formula KH_2PO_4

Molecular Weight 136.09

Compositional Specifications of Potassium Phosphate, Monobasic

Content Potassium Phosphate, Monobasic, when calculated on the dried basis, should contain not less than 98.0% of monobasic potassium phosphate (KH_2PO_4).

Description Potassium Phosphate, Monobasic is colorless crystallite or white granule or crystalline powder.

Identification (1) Potassium Phosphate, Monobasic solution (1→20) is acidic.

(2) Potassium Phosphate, Monobasic solution (1→20) responds to test of Potassium Salt and Phosphate in Identification.

Purity (1) Water Insoluble Substances : 10 g of Potassium Phosphate, Monobasic is tested by Purity (1) for 「Sodium Acid Pyrophosphate」. The content of water insoluble substances should not be more than 0.2%.

(2) pH : pH of Potassium Phosphate, Monobasic solution (1→100) should be within a range of 4.2~4.7.

(3) Arsenic : 0.25 g of Potassium Phosphate, Monobasic is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : Potassium Phosphate, Monobasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(5) Cadmium : Potassium Phosphate, Monobasic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(6) Mercury : When Potassium Phosphate, Monobasic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Fluoride : 1 g of Potassium Phosphate, Monobasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When Potassium Phosphate, Monobasic is dried for 4 hours at 105°C, the loss should not be more than 2.0%.

Assay Dissolve 3 g of Potassium Phosphate, Monobasic, previously dried and accurately weighed, in 30 ml of water. 5 g of sodium chloride is added, which is dissolved by

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shaking. While the solution is kept at 15°C, it is titrated with 1 N sodium hydroxide solution (Indicator : 3~4 drops of thymol blue solution)

1 ml of 1 N sodium hydroxide solution = 136.1 mg KH_2PO_4

219. Calcium Phosphate, Monobasic

Chemical Formula $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$ ($n=0$ or 1)

Molecular Weight Anhydrous : 234.05, Hydrate : 252.07

Compositional Specifications of Calcium Phosphate, Monobasic]

Content Anhydrous and hydrate of Calcium Phosphate, Monobasic should contain 16.8%~18.3% and 15.9~17.7% as calcium, after drying or heat-treating.

Description Calcium Phosphate, Monobasic is hygroscopic white crystal, granule, or powder.

Identification (1) Calcium Phosphate, Monobasic turns yellow by wetting with silver nitrate solution.

(2) To 0.1 g of Calcium Phosphate, Monobasic, add 20 ml of water and shake, and filter. Add 5 ml of ammonium hydroxide solution, white precipitates are formed.

Purity (1) Arsenic : 0.25 g of Calcium Phosphate, Monobasic is dissolved in 5 ml of dilute hydrochloric acid. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Lead : Calcium Phosphate, Monobasic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(3) Cadmium : Calcium Phosphate, Monobasic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(4) Mercury : When Calcium Phosphate, Monobasic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Fluoride : 1 g of Calcium Phosphate, Monobasic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When hydrated form of Calcium Phosphate, Monobasic is dried for 3 hours at 60°C, the loss should not be more than 1%.

Loss on Ignition When thermogravimetric analysis is done with anhydrous form of Calcium Phosphate, Monobasic at 800°C for 30 minutes, weight loss should not be more than 14.0~15.5%.

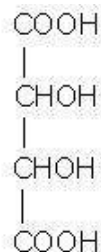
Assay Dissolve 475 mg of Calcium Phosphate, Monobasic, precisely dried or heat-treated and accurately weighed, in 10 ml of hydrochloric acid. After adding a few drops of methyl orange, the solution is boiled for 5 minutes and hydrochloric acid or water is added to adjust pH while boiling. 2 drops of methylred and 30 ml of ammonium hydroxide solution are added and mixed. 6 N ammonia solution and water

are added until the pink color disappears. The resulting liquid is heated in a water bath and cooled in air until the precipitates are settled down. The supernatant is filtered through a glass filter, which is repeated 3 times. Rinse water is filtered and the beaker is rinsed with 10 ml of cold water (20°C or below) twice, which is also filtered. 100 ml of water and 50 ml of cold dilute sulfuric acid (1→6) are added to the filtrate, which is then titrated with 0.1 N potassium permanganate.

1 ml of 0.1 N potassium permanganate = 2.004 mg Ca

220. DL-Tartaric Acid

dl-Tartaric Acid



Chemical Formula $\text{C}_4\text{H}_6\text{O}_6$

Molecular Weight 150.09

Compositional Specifications of DL-Tartaric Acid

Content DL-Tartaric Acid, when calculated on the dried basis, should contain not less than 99.5% of DL-tartaric acid ($\text{C}_4\text{H}_6\text{O}_6$).

Description DL-Tartaric Acid occurs as colorless crystals or white crystalline powder. It is odorless and has an acid taste.

Identification (1) DL-Tartaric Acid solution (1→10) has no optical rotation.

(2) Proceed as directed under Identification (2), (3), and (4) in L-Tartaric acid.

Purity (1) Melting Point : Melting point of DL-Tartaric Acid should be within a range of 200~206°C

(2) Sulfate : Proceed as directed under Purity (2) in [L-Tartaric Acid].

(3) Arsenic : Proceed as directed under Purity (4) in [L-Tartaric Acid].

(4) Lead : When 5.0 g of DL-Tartaric Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Readily Oxidizable Substances : Dissolve 1.0 g of DL-Tartaric Acid in 25 ml of water and 25 ml of diluted sulfuric acid. Add 4.0 ml of 0.1 N potassium permanganate, keeping the solution at 20°C. The pink color of the solution does not disappear within 3 minutes.

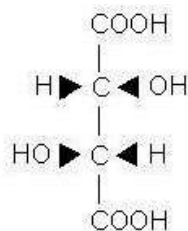
Loss on Drying When DL-Tartaric Acid is dried for 3 hours in a vacuum desiccator (silica gel), the loss should not be more than 0.5%.

Residue on Ignition Proceed as directed under Residues on Ignition in [L-Tartaric Acid].

Assay Proceed as directed under Assay in [L-Tartaric Acid].

221. L-Tartaric Acid

d-Tartaric Acid

Chemical Formula $\text{C}_4\text{H}_6\text{O}_6$

Molecular Weight 150.09

Compositional Specifications of L-Tartaric Acid

Content L-Tartaric Acid, when calculated on the dried basis, should contain not less than 99.7% of L-tartaric acid ($\text{C}_4\text{H}_6\text{O}_6$).

Description L-Tartaric Acid occurs as colorless and transparency crystals or as a white, fine crystalline powder. It is odorless and has an acid taste.

Identification (1) L-Tartaric Acid solution (1→10) is dextrorotatory.

(2) When L-Tartaric Acid is slowly heated, an odor that is similar to burning sucrose is generated.

(3) L-Tartaric Acid solution (1→10) is acidic.

(4) L-Tartaric Acid responds to the test for Tartrate in Identification.

Purity (1) Specific Rotation : Dissolve 2 g of L-Tartaric Acid, previously dried and accurately weighed in water to make 10 ml. Optical rotation of this solution should be within a range of $[\alpha]_D^{25} = +12.0 \sim +13.0^\circ$

(2) Sulfate : When 0.5 g of L-Tartaric Acid is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.

(3) Oxalate : Dissolve 1.0 g of L-Tartaric Acid in 10 ml of water, and add 2 ml of calcium chloride solution. No turbidity appears.

(4) Arsenic : 0.25 g of L-Tartaric Acid transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at $450 \sim 550^\circ\text{C}$. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat-treated at $450 \sim 550^\circ\text{C}$. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(5) Lead : When 5.0 g of L-Tartaric Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(6) Mercury : When L-Tartaric Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm

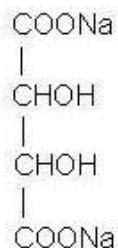
Loss on Drying When L-Tartaric Acid is dried in a desiccator (silica gel) for 3 hours, the loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of L-Tartaric Acid, the amount of residues should not be more than 0.1%.

Assay Dissolve about 1.5 g of L-Tartaric Acid, previously dried and accurately weighed in water to make exactly 250 ml. Take 25 ml of this solution, and titrate with 0.1 N sodium hydroxide (indicator : 2~3 drops of phenolphthalein solution).

$$1 \text{ ml of } 0.1 \text{ N sodium hydroxide} = 7.504 \text{ mg of } \text{C}_4\text{H}_6\text{O}_6$$

222. Disodium DL-Tartrate



Chemical Formula $\text{C}_4\text{H}_4\text{O}_6\text{Na}_2$

Molecular Weight 194.06

Compositional Specifications of Disodium DL-Tartrate

Content Disodium DL-Tartrate, when calculated on the dried basis, should contain not less than 98.5% of disodium DL-tartrate ($\text{C}_4\text{H}_4\text{O}_6\text{Na}_2$).

Description Disodium DL-Tartrate occurs as colorless crystals or as a white crystalline powder.

Identification (1) Disodium DL-Tartrate solution (1→10) has no optical rotation.

(2) Proceed as directed under Identification for [L-Sodium Tartarate].

Purity (1) Clarity and Color of Solution, Acidity, and Alkalinity Sulfate : Proceed as directed under Purity (1), (3), (4) in [L-Sodium Tartarate].

(2) Readily oxidizable substances : Weigh 2.0 g of Disodium DL-Tartrate, dissolve in 20 ml of water and 30 ml of diluted sulfuric acid (1→20), and add 4.0 ml of 0.1 N potassium permanganate while keeping the temperature at 20°C. The pink color of the solution does not disappear within 3 minutes.

(3) Arsenic : Proceed as directed under Purity (6) in [L-Sodium Tartarate] (Not more than 4 ppm).

(4) Heavy Metals : 2 g of Disodium DL-Tartrate transfer into a quartz or porcelain crucible and carbonize by heating mildly. After cooling, add 2 ml of nitric acid and 5 drops of sulfuric acid, it is heated until white smoke disappears, which is then reduced to ash by further heating at 450~550°C. After cooling, 2 ml of hydrochloric acid is added, which is then evaporated to dryness in a water bath. 3 drops of hydrochloric acid and 10 ml of hot water are added to the resulting residue, which is then heated for 2 minutes. After cooling, 1 drop of phenolphthalein indicator solution is added, then ammonia solution is added until the color of the solution becomes pale red. The resulting solution is transferred into a Nestler cylinder by rinsing with water. 50 ml of test solution is prepared by adding 2 ml of diluted acetic acid (1→20) and water. When this solution tested by Heavy Metal Limit Test,

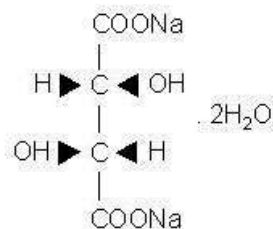
the content should not be more than 20 ppm. Color standard solution is prepared by the following procedure. 2 ml of nitric acid, 5 drops of sulfuric acid, and 2 ml of hydrochloric acid are added and evaporated to dryness in a crucible that is made of the same material used for test solution preparation. 3 drops of hydrochloric acid are added to the residue, which is then transferred into another Nestler cylinder as described above. Finally, 2 ml of lead standard solution, 2 ml of diluted acetic acid (1→20), and add water to make 50 ml.

Loss on Drying When Disodium DL-Tartrate is dried for 4 hours at 105°C, the loss should not be more than 0.5%.

Assay Proceed as directed under Assay in [L-Sodium Tartarate].

223. Disodium L-Tartrate

Disodium d-Tartrate

Chemical Formula $\text{C}_4\text{H}_4\text{O}_6\text{Na}_2 \cdot 2\text{H}_2\text{O}$

Molecular Weight 230.09

Compositional Specifications of Disodium L-Tartrate

Content Disodium L-Tartrate, when calculated on the dried basis, should contain not less than 99.0% of disodium L-tartrate ($\text{C}_4\text{H}_4\text{O}_6\text{Na}_2 = 194.06$).

Description Disodium L-Tartrate occurs as colorless crystals or as a white crystalline powder.

Identification (1) An aqueous solution (1→10) is dextrorotatory.

(2) Disodium L-Tartrate responds to the tests for Sodium Salt and Tartrate.

Purity (1) Clarity and Color of Solution : 1.0 g of Disodium L-Tartrate is dissolved in 20 ml of water. This solution should be almost clear.

(2) Specific rotation : Approximately 5 g of Disodium L-Tartrate is precisely weighed and dissolved in water to make 50 ml. Optical rotation of this solution is measured and it should be within a range of, $[\alpha]_D^{20} = +25.0 \sim +27.5^\circ$

(3) pH : pH of Disodium L-Tartrate solution (1→20) should be within a range of 7.0~9.0.

(4) Sulfate : When 1 g of Disodium L-Tartrate is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.

(5) Oxalate : 1.0 g of Disodium L-Tartrate dissolve in 10 ml of water and add 2 ml of calcium chloride solution (2→25). The solution should not turn turbid.

(6) Arsenic : 0.25 g of Disodium L-Tartrate is dissolved in 5 ml of water. This Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(7) Lead : When 5.0 g of Disodium L-Tartrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(8) Mercury : When Disodium L-Tartrate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

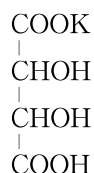
Loss on Drying When Disodium L-Tartrate is dried for 3 hours at 150°C, the weight loss should be within a range of 14~17%.

Assay Accurately weigh about 0.2 g of Disodium L-Tartrate, previously dried, add 3 ml of formic acid, dissolve by warming, add 50 ml of glacial acetic acid for nonaqueous titration, and titrate with 0.1 N perchloric acid (indicator : 1 ml of crystal violet-glacial acetic acid solution). The end point is until the color of the solution changes from purple through blue to green. Perform a blank test in the same manner.

1 ml of 0.1 N perchloric acid = 9.703 mg of $\text{C}_4\text{H}_4\text{O}_6\text{Na}_2\text{O}_6$

224. Potassium DL-Bitartrate

Potassium Hydrogen DL-Tartrate



Chemical Formula $\text{C}_4\text{H}_5\text{O}_6\text{K}$

Molecular Weight 188.18

Compositional Specifications of Potassium DL-Bitartrate

Content Potassium DL-Bitartrate, when calculated on the dried basis, should contain within a range of 99.0~101.0% of potassium DL-bitartrate ($\text{C}_4\text{H}_5\text{O}_6\text{K}$).

Description Potassium DL-Bitartrate occurs as colorless crystals or as a white crystalline powder, having a cool, acid taste.

Identification (1) Dissolve 1 g of Potassium DL-Bitartrate in 10 ml of ammonia solution. The solution has no optical activity.

(2) Proceed as directed under Identification (2) and (3) in Potassium L-Bitarate.

Purity (1) Clarity and Color of Solution, Sulfate, Ammonium salt : Proceed as directed under Purity (1), (3), and (4) for [Potassium L-Bitartarate].

(2) Arsenic : Proceed as directed under Purity (5) for [Potassium L-Bitartarate].

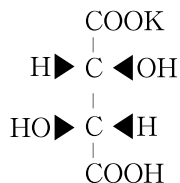
(3) Heavy Metals : Proceed as directed under Purity (6) for [Potassium L-Bitartarate].

(4) Readily Oxidizable Substances : Weigh 2.0 g of Potassium DL-Bitartrate, dissolve in 20 ml of water and 30 ml of diluted sulfuric acid. keep the temperature at 20°C, and add 4.0 ml of 0.1 N potassium permanganate. The pink color of the solution does not disappear within 3 minutes.

Loss on Drying When Potassium DL-Bitartrate is dried for 3 hours at 105°C, the weight loss should not be more than 0.5%.

Assay Proceed as directed under Assay for [Potassium L-Bitartarate].

225. Potassium L-Bitartrate



Chemical Formula $\text{C}_4\text{H}_5\text{O}_6\text{K}$

Molecular Weight 188.18

Compositional Specifications of Potassium L-Bitartrate

Content Potassium L-Bitartrate, when calculated on the dried basis, should contain within a range of 99.0~101.0% of potassium L-bitartrate ($\text{C}_4\text{H}_5\text{O}_6\text{K}$).

Description Potassium L-Bitartrate occurs as colorless crystals or as a white crystalline powder, having a cool, acid taste.

Identification (1) Dissolve 1 g of Potassium L-Bitartrate in 10 ml of ammonia solution. The solution is dextrorotatory.

(2) Heat gradually 0.5 g of Potassium L-Bitartrate. A burning sucrose-like odor is evolved, and carbonization occurs. To the residue, add 5 ml of water, and stir well. The solution is alkaline. Neutralize the solution with diluted hydrochloric acid, and filter. The solution responds to the test for Potassium Salt.

(3) Potassium L-Bitartrate responds to the test for Tartrate in Identification.

Purity (1) Clarity and Color of Solution : 0.5 g of Potassium L-Bitartrate is dissolved. 3 ml of ammonia solution. It is Colorless and almost clear.

(2) Specific Rotation : After drying for 3 hours at 105°C , approximately 5g of Potassium L-Bitartrate is precisely weighed, which is dissolved in 10 ml of ammonia solution and water so that the total volume becomes 50 ml. Optical rotation of this solution should be within a range of $[\alpha]_D^{20} = +32.5 \sim +35.5^\circ$

(3) Sulfate : 0.5 g of Potassium L-Bitartrate is dissolved in a warm mixture of 2 ml hydrochloric acid and 30 ml of water. After cooling, the solution is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 2 ml of 0.01 N sulfuric acid.

(4) Ammonium Salt : Weigh 0.5 g of Potassium L-Bitartrate, add 5 ml of sodium hydroxide solution, and heat. No odor of ammonia is evolved.

(5) Arsenic : 0.25 g of Potassium L-Bitartrate is dissolved in 10 ml of water and cooled. This Test Solution is tested by Arsenic Limit Test and it should not be

more than 4 ppm.

- (6) Heavy Metals : 1 g of Potassium L-Bitartrate transfer into a quartz or porcelain crucible and carbonize by heating mildly. After adding 2 ml of nitric acid and 5 drops of sulfuric acid, it is heated until white smoke disappears, which is then reduced to ash by further heating at 450~550°C. After cooling, 2 ml of hydrochloric acid is added, which is then evaporated to dryness in a water bath. 3 drops of hydrochloric acid and 10 ml of hot water are added to the resulting residue, which is then heated for 2 minutes. After cooling, 1 drop of phenolphthalein indicator solution is added, then ammonia solution is added until the color of the solution becomes pale red. The resulting solution is transferred into a Nestler cylinder by rinsing with water. Adding 2 ml of diluted acetic acid (1→20) and water to make 50 ml. When this solution tested by Heavy Metal Limit Test, the content should not be more than 20 ppm. Color standard solution is prepared by the following procedure. 2 ml of nitric acid, 5 drops of sulfuric acid, and 2 ml of hydrochloric acid are added and evaporated to dryness in a crucible that is made of the same material used for test solution preparation. 3 drops of hydrochloric acid are added to the residue, which is then transferred into another Nestler cylinder as described above. Finally, 2 ml of lead standard solution, 2 ml of diluted acetic acid (1→20), and water are added to bring the total volume to 50 ml.

Loss on Drying When Potassium L-Bitartrate is dried for 3 hours at 105°C, the loss should not be more than 0.5%.

Assay Dissolve 0.4 g of Potassium L-Bitartrate, previously dried and accurately weighed in 20 ml of hot water, and titrate with 0.1 N sodium hydroxide while hot (indicator : 2~3 drops of phenolphthalein solution).

1 ml of 0.1 N sodium hydroxide = 18.82 mg of $C_4H_5O_6K$

226. Fatty Acids

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

227. Aliphatic Aldehydes

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

228. Aliphatic Alcohols

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

229. Aliphatic Hydrocarbons

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

230. Sodium Nitrate

Chemical Formula NaNO_3

Molecular Weight 85.00

Compositional Specifications of Sodium Nitrate

Content Sodium Nitrate, when calculated on the dried basis, should contain not less than 99.0% of sodium nitrate (NaNO_3).

Description Sodium Nitrate occurs as colorless crystals or as a white crystalline powder. It is odorless and has a slightly salty taste.

Identification Sodium Nitrate responds to the tests for Sodium Salt and Nitrate in Identification.

Purity (1) Clarity and Color of Solution : Proceed as directed under Purity (1) for [Potassium Nitrate].

(2) Arsenic : Proceed as directed under Purity (3) for [Potassium Nitrate].

(3) Lead : Accurately weigh 5.0 g of Sodium Nitrate into a 150 ml beaker, add 30 ml of water. Add hydrochloric acid in small portion to the solution until the solid is dissolved thoroughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to bring the total volume to 100 ml. Add sodium hydroxide solution(1→4) or hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of nitric acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of nitric acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

(4) Mercury : When Sodium Nitrate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Nitrite : Accurately weigh about 1 g of Sodium Nitrate, dissolve in water to make 100 ml. Take 20ml of this solution into a 100ml volumetric flask and add water to

make 80 ml and add 10ml of sulfanilamide solution and mix. After 3 min add 1ml of coupling reagent, dilute to mark with water, mix and let stand for 15min. Measure the absorbance of the solution against water of 540nm using 10mm cuvettes. Read on the standard curve the amount of nitrite corresponding to the actual absorbance. Then the content should not be more than 30 ppm.

$$\text{Nitrite(ppm)} = \frac{A \times 5}{W}$$

A : content of nitrite calculated from calibration curve (μg)

W : weight of sample(g)

Calibration Curve Preparation : Pipette into 100ml volumetric flasks 0.5, 1.0, 2.0 and 5.0ml of nitrite standard (corresponding to 0.25, 0.5, 1.0 and 2.5 μg of nitrite) and dilute to about 80ml with water. Add to each of the flask. 10ml of sulfanilamide solution and mix. After 3 min add 1ml of coupling reagent, dilute to mark with water, mix and let stand for 15 min. Measure the absorbance of the solution against water at 540 nm using 10mm cuvettes. Draw a standard curve with absorbance as function of amount of nitrite.

Sulfanilamide solution : Dissolve 2 g of sulfanilamide in 1000 ml dilute hydrochloric acid TS

Coupling reagent : Dissolve 0.2 g of N-1-naphthylethylenediamine dihydrochloride in water and dilute to make 100 ml.

Standard solution : Accurately weigh 0.75 g of sodium nitrite and dissolve in water and dilute to make 1000 ml. Dilute 10 ml of this solution to 100 ml with water. Finally dilute 10 ml of this preparation to 1000 ml with water.

(6) Chloride : When 0.1 g of Sodium Nitrate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.6 ml of 0.01 N hydrochloric acid.

Loss on Drying When Sodium Nitrate is dried for 4 hours at 105°C, the loss should not be more than 1%.

Assay Proceed as directed under Assay for [Potassium Nitrate].

1 ml of 0.1 N sulfuric acid = 8.500 mg of NaNO_3 .

231. Potassium Nitrate

Chemical Formula KNO_3

Molecular Weight 101.11

Compositional Specifications of Potassium Nitrate

Content Potassium Nitrate, when calculated on the dried basis, should contain not less than 99.0% of potassium nitrate (KNO_3).

Description Potassium Nitrate occurs as colorless and pillared crystals or as a white crystalline powder. It is odorless and has a salty and refreshing taste.

Identification Potassium Nitrate responds to the tests for Potassium Salt and Nitrate in Identification.

Purity (1) Clarity and Color of Solution : 1 g of Potassium Nitrate is dissolved 10 ml of water. It is colorless and clear.

(2) Chloride : When 0.5 g of Potassium Nitrate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N sulfuric acid.

(3) Arsenic : 2.5 g of Potassium Nitrate dissolve in 10 ml of water, add 5 ml of sulfuric acid. and heat until white fumes are concentrated to 2 ml, added water to make 50 ml. 5 ml of this solution added 1 ml of sulfuric acid heat until white fumes are evolved, cool, and added 5 ml of water. This solution is tested by Arsenic Limit Test and its content should not be more than 4 ppm.

(4) Lead : Accurately weigh 5.0 g of Potassium Nitrate into a 150 ml beaker, add 30 ml of water. Add Hydrochloric acid in small portion to the solution until the solid is dissolved throughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to bring the total volume to 100 ml. Add Sodium Hydroxide Solution(1→4) or Hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

(5) Mercury : When Potassium Nitrate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Nitrite : 1 g of Potassium Nitrate, precisely weighed, dissolve in water to make 100 ml. Take 20 ml of this solution, transfer into a 100 ml flask and add water to make 80 ml. Add 10 ml of sulfanilamide solution and mix. After 3 minutes, 1 ml of coupling solution is added, water is added to make 100 ml, and mixed well. Allow the solution to stand for 15 minutes and measure absorbance at a wavelength of 540 nm. Calculate the content of Nitrite by calibration curve and following formula and it should not be more than 20 ppm.

$$\text{Nitrite(ppm)} = \frac{A \times 5}{W}$$

A : content of nitrite calculated from calibration curve (μg)

W : weight of sample(g)

Calibration Curve Preparation : 0, 5, 10, 20, and 50 ml (0, 2.5, 5, 10, and 25 μg as nitrite) of standard solution is weighed into a 100 ml flask respectively, water is added to make 80 ml for each. 10 ml of sulfanilamide solution is added and mixed. After 3 minutes, 1 ml of coupling solution is added for each, water is added to make 100 ml, and mixed well. Allow the solution to stand for 15 minutes, measure absorbance at a wavelength of 540 nm, and prepare calibration.

Sulfanilamide solution : 2 g of Sulfanilamide is dissolved in diluted hychloric acid to make 1000 ml.

Coupling souldion : 0.2 g of N-1-naphthylethylenediamine dihydrochloride is dissolved in water to make 100 ml.

Standard solution : 0.75 g of sodium nitrite 0.75g is precisely weighed and dissolved in water to make 1000 ml. 10 ml of this solution is measured to bring 100 ml, and again 10 ml of this solution is measured to bring 1000 ml.

Loss on Drying When Potassium Nitrate is dried for 4 hours at 105°C, the loss should not be more than 1%.

Assay Accurately weigh about 0.4 g of Potassium Nitrate, previously dried, transfer into a 500 ml round-bottom flask and dissolve in about 300 ml of water. Add 3 g of powdered Devarda's alloy and 15 ml of sodium hydroxide solution (2→5). Connect the

flask immediately with the distilling apparatus, which is previously equipped with a splash preventing device and a condenser and is connected with the receiver containing 50 ml of 0.1 N sulfuric acid, exactly measured. Allow to stand for 2 hours, and distill until about 250 ml of the distillate is produced. Titrate the excess acid with 0.1 N sodium hydroxide (indicator : 3 drops of methyl red-methylene blue mixture solution). Perform a blank test in the same manner.

1 ml of 0.1 N sulfuric acid = 10.11 mg of KNO_3

232. Sodium Hypochlorite

Chemical Formula NaClO

Molecular Weight 74.45

Definition This item is active ingredient containing Sodium Hypochlorite and includes acquiring saline solution by electrolysis.

Compositional Specifications of Sodium Hypochlorite

Content Sodium Hypochlorite should be contain not less than 4.0% of available chlorine. Acquirin saline solution by electrolysis should contain not less than 100ppm.

Description Sodium Hypochlorite is a colorless to light green-yellow liquid having an odor of chlorine.

Identification (1) When Sodium Hypochlorite is tested by Flame Coloration Test, it shows yellow.

(2) When diluted hydrochloric acid is added to Sodium Hypochlorite, gas is generated.

(3) Dip a red litmus paper in Sodium Hypochlorite. The color of the litmus paper changes to blue, and then fades.

Assay Accurately weigh about 3 g of Sodium Hypochlorite, add 50 ml of water, 2 g of potassium iodine and 10 ml of diluted acetic acid. Titrate the liberated iodine with 0.1 N sodium thiosulfate (indicator : starch solution). Separately, perform a blank test in the same manner, and make any necessary correction. However, pipette 10 ml of sodium hypochlorite water into a beaker, which is prepared by preparation equipment of sodium hypochlorite. Add 50 ml of water, 1 g of potassium iodide and 10 ml of acetic acid. Titrate free iodine with 0.01 N sodium thiosulfate.

1 ml of 0.1 N sodium thiosulfate = 3.546 mg of Cl

233. Sodium Hydrosulfite

Chemical Formula $\text{Na}_2\text{S}_2\text{O}_4$

Molecular Weight 174.11

Compositional Specifications of Sodium Hydrosulfite

Content Sodium Hydrosulfite should contain not less than 85.0% of sodium hydrosulfite ($\text{Na}_2\text{S}_2\text{O}_4$).

Description Sodium Hydrosulfite occurs as a white to gray-white crystalline powder. It is odorless or has a slight odor of sulfur dioxide.

Identification (1) To 10 ml of Sodium Hydrosulfite solution (1→100), add 1 ml of cupric sulfate solution. A gray-black color develops.

(2) To 10 ml of Sodium Hydrosulfite solution (1→100), add 1 ml of potassium permanganate solution. The color of the solution disappears.

(3) Sodium Hydrosulfite responds to the test for Sodium Salt (A) and (B) in Identification.

Purity (1) Clarity and Color of Solution : To 10 ml of formalin, add 10 ml of water, and neutralize with sodium hydroxide solution. Take 10 ml of the solution, weigh 0.5 g of Sodium Hydrosulfite, dissolve in the solution, and allow to stand for 5 minutes. The solution should not be more than slightly turbid.

(2) Arsenic : Weigh 2.5 g of Sodium Hydrosulfite, and dissolve in water to make 25 ml. Measure 5 ml of this solution, add 1 ml of sulfuric acid, evaporate to about 2 ml, and add water to make 10 ml. Use 5 ml of this solution as the test solution. The content should not be more than 4.0 ppm as As_2O_3 .

(3) Lead : Sodium Hydrosulfite is tested by Purity (2) for Sodium Metaphosphate(not more than 2 ppm).

(4) Zinc : Take 5 ml of the solution A prepared in (3) above, add 0.1 ml of ammonia solution, filter, add water to make 20 ml, add 5 ml of diluted hydrochloric acid and 0.1 ml of freshly prepared potassium ferrocyanide solution, and allow to stand for 15 minutes. The solution is not more turbid than the following reference solution. To prepare reference solution, measure 8 ml of Zinc Standard Solution, transfer into a Nestler tube, add water to make 20 ml. add 5 ml of diluted hydrochloric acid and 0.1 ml of freshly prepared potassium ferrocyanide solution, add water, and allow to stand for 15 minutes.

(5) Disodium Ethylenediaminetetraacetate : Weigh 0.5 g of Sodium Hydrosulfite, dissolve in 5 ml of water, add 2 ml of 0.5% potassium chromate solution and 2 ml

of arsenic trioxide solution. and heat in a water bath for 2 minutes. No purple color develops.

- (6) Formic acid : To 10 ml of Sodium Hydrosulfite solution(1→1,000), add 5 ml of diluted hydrochloric acid (1→2), and add about 0.3 g of magnesium dust in small portions. After effervescence is almost no longer evolved, cover with a watch glass, and allow to stand for 2 hours. Measure 1 ml of this solution, add 2 ml of sulfuric acid and 0.5 ml of chromotropic acid solution, and heat in a water bath for 10 minutes. The color of the solution is not darker than that of the following reference solution. The reference solution is acquired by separately measuring 1 ml of diluted formaldehyde standard solution instead of sample and preparing in the same manner as sample.

Assay Add 10 ml of water to 10 ml of formalin, and neutralize with sodium hydroxide solution. To this solution, add about 2 g of Sodium Hydrosulfite, accurately weighed, and dissolve in water to make exactly 500 ml. Take 25 ml of this solution, adjust the pH to 1.1~1.5 with diluted hydrochloric acid (1→10), and titrate with 0.1 N iodine solution for sodium hydrosulfite (indicator : starch solution).

$$1 \text{ ml of } 0.1 \text{ N iodine solution} = 4.353 \text{ mg of Na}_2\text{S}_2\text{O}_4$$

234. Sodium Iron Chlorophyllin

Compositional Specifications of Sodium Iron Chlorophyllin

Description Sodium Iron Chlorophyllin occurs as a green-black powder. It is odorless or has a slight, characteristic odor.

Identification (1) Add 5 ml of diluted hydrochloric acid to ignition residue, dissolve in a water bath, add water to make 10 ml, make it weakly alkaline with ammonia solution. add 10 ml of hydrogen sulfide solution, allow to stand for 30 minutes, and filter. Perform the following tests for the filtrate and the residue on the filter paper.

- ① To the filtrate, add 1 ml of diluted hydrochloric acid. and perform Flame Coloration Test. The color of the flame is yellow.
- ② Dissolve the residue on the filter paper with 2 ml of diluted nitric acid. add water to make 5 ml, and add 2~3 drops of ammonium thiocyanate solution. A red color develops.

(2) 0.1 g of Sodium Iron Chlorophyllin, add water to make 1000 ml. Take 10 ml of this solution, add phosphate buffer (pH 7.5) to make 100 ml, and measure the absorbance. The solution exhibits absorption maxima at wavelengths of 397~399 nm and 654~656 nm. When the absorbances at the absorption maxima are expressed as A1 and A2, respectively, A1/A2 should not be more than 9.5.

Purity (1) pH : 1 g of Sodium Iron Chlorophyllin, dissolved in 100 ml of water. pH of this solution is 9.5~11.0.

(2) Specific Absorbance : Accurately weigh about 0.1 g of Sodium Iron Chlorophyllin, dissolve in water to make exactly 1000 ml. Take 1 ml of this solution add phosphate buffer (pH 7.5) to make exactly 100 ml, measure the absorbance quickly at the absorption maximum near a wavelength of 398 nm, and calculate on the dried basis.

$$E_{1cm}^{1\%} = \text{Not less than 400}$$

Avoid direct sunlight during the procedure. and use light-resistant containers.

(3) Arsenic : Proceed as directed under Purity (3) in [Sodium Copper Chlorophyllin] (not more than 4 ppm).

Loss on Drying When Sodium Iron Chlorophyllin is dried for 2 hours at 105°C, the loss should not be more than 5.0%.

235. Acetic Acid

Compositional Specifications of Acetic Acid

Content Acetic Acid should contain within a range of 29.0~31.0% of acetic acid ($C_2H_4O_2 = 60.05$).

Description Acetic Acid is a colorless and clear liquid having a characteristic pungent odor and an acid taste.

Identification (1) Acetic Acid is strongly acidic.

(2) Acetic Acid responds to the test for Acetate in Identification.

Purity (1) Arsenic : 0.25 g of Acetic Acid transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Heavy Metals : 3 ml of Acetic Acid is tested by Heavy Metal Limit Test. Its content should not be more than 10 ppm. In this case, 3 ml of lead standard solution is used for a color standard. Lead : When 5.0 g of Acetic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 0.5 ppm.

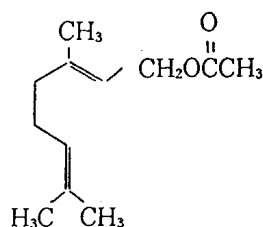
(3) Readily Oxidizable Substances : To 20 ml of Acetic Acid, add 0.3 ml of 0.1 N potassium permanganate. The color of the solution does not disappear within 30 minutes.

(4) Residue on Evaporation : Proceed as directed under Purity (5) in [Glacial Acetic Acid].

Assay Accurately weigh about 3 g of Acetic Acid, add 15 ml of water. Titrate with 1 N sodium hydroxide (indicator : 2 drops of phenolphthalein solution).

1 ml of 1 N sodium hydroxide solution = 60.05 mg of $C_2H_4O_2$

236. Geranyl Acetate



Chemical Formula $C_{12}H_{20}O_2$

Molecular Weight 196.29

Compositional Specifications of Geranyl Acetate

Content Geranyl Acetate should contain not less than 90.0% of geranyl acetate ($C_{12}H_{20}O_2$).

Description Geranyl Acetate is a colorless to light yellow, transparent liquid with a characteristic odor.

Identification To 1 ml of Geranyl Acetate, add 5 ml of 10% alcoholic solution of potassium solution, and heat in a water bath. The characteristic odor disappears, and an odor of geraniol is evolved. Cool, and add 2 ml of diluted hydrochloric acid and 2 ml of water. The solution responds to the test for Acetate (C) in Identification.

Purity (1) Specific Gravity : Specific gravity of Geranyl Acetate should be within a range of 0.900~0.914

(2) Refractive Index : Refractive Index n_D^{20} of Geranyl Acetate should be within a range of 1.458~1.464

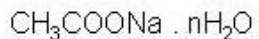
(3) Clarity and Color of Solution : When 1 ml of Geranyl Acetate is dissolved in 8 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Geranyl Acetate is tested by Acid Value in Flavoring Substance Test. The content should not be more than 1.

Assay Accurately weigh about 1 g of Geranyl Acetate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 98.15 mg of $C_{12}H_{20}O_2$

237. Sodium Acetate



Chemical Formula $\text{C}_2\text{H}_3\text{NaO}_2 \cdot n\text{H}_2\text{O}$ ($n = 3$ or 0)

Molecular Weight trihydrate : 136.08, anhydrous : 82.03

Definition Sodium Acetate occurs as crystals (trihydrate) called Sodium Acetate (crystal) and Anhydrous called Sodium Acetate (Anhydrous).

Compositional Specifications of Sodium Acetate

Content Sodium Acetate, when calculated on the dried basis, should contain not less than 98.5% of sodium acetate ($\text{C}_2\text{H}_3\text{NaO}_2 = 82.03$).

Description Sodium Acetate (crystal) occurs as colorless, transparent crystals or as a white crystalline powder. Sodium Acetate (Anhydrous) occurs as white crystalline powder or lumps. They are odorless.

Identification (1) Heat the Sodium Acetate gradually. It fuses, then decomposes. and an odor of acetone is evolved. The aqueous solution of the residue is alkaline.

(2) Sodium Acetate responds to the tests for Sodium Salt and Acetate in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Sodium Acetate is dissolved in 20 ml of water, the solution should be colorless and clear.

(2) Free Acid and Free Alkali : Weigh 2 g of Sodium Acetate (crystal) or 1.2 g of Sodium Acetate (Anhydrous). and dissolve in 20 ml of freshly boiled and cooled water. Add 2 drops of phenolphthalein solution, keep the solution at 10°C , and perform the following test

① If the solution is colorless, add 0.1 ml of 0.1 N sodium hydroxide. A red color develops.

② If the solution is red, add 0.1 ml of 0.1 N hydrochloric acid. The color disappears.

(3) Arsenic : When 0.25 g of Sodium Acetate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Sodium Acetate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Mercury : When Sodium Acetate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

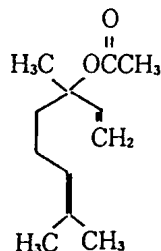
Loss on Drying When Sodium Acetate is dried for 4 hours at 120°C , the weigh loss

should be within a range of 36~42% and 2% or lower for crystalline form and anhydrous form, respectively.

Assay Accurately weigh about 0.2 g of Sodium Acetate, previously dried, dissolve in 40 ml of acetic acid, and titrate with 0.1 N perchloric acid. The end point is usually confirmed by using a potentiometer. When an indicator (indicator : 1 ml of crystal violet acetic acid solution) is used, titrate until the color of the solution changes from purple through blue to green. Perform a blank test in the same manner, and make any necessary correction.

1 ml of 0.1 N perchloric acid = 8.203 mg of $\text{C}_2\text{H}_3\text{NaO}_2$

238. Linalyl Acetate



Chemical Formula $C_{12}H_{20}O_2$

Molecular Weight 196.29

Compositional Specifications of Linalyl Acetate

Content Linalyl Acetate should contain not less than 90.0% of linalyl acetate ($C_{12}H_{20}O_2$).

Description Linalyl Acetate is a colorless to light yellow, transparent liquid having a characteristic odor.

Identification To 1 ml of Linalyl Acetate, add 5 ml of 10% alcoholic solution of potassium hydroxide solution, and heat in a water bath. The characteristic odor disappears, and an odor of linalool is evolved. Cool, and add 12 ml of water and 2 ml of diluted hydrochloric acid (1→3). The solution responds to the test for Acetate (3) in Identification.

Purity (1) Specific Gravity : Specific gravity of Linalyl Acetate should be within a range of 0.895~0.914

(2) Refractive Index : Refractive Index n_D^{20} of Linalyl Acetate should be within a range of 1.449~1.457

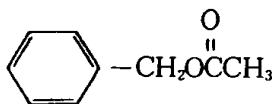
(3) Clarity and Color of Solution : When 1 ml of Linalyl Acetate is dissolved in 5 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Linalyl Acetate is tested by Acid Value in Flavoring Substance Test. The content should not be more than 1.

Assay Accurately weigh about 1 g of Linalyl Acetate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 98.14 mg of $C_{12}H_{20}O_2$

239. Benzyl Acetate



Chemical Formula $C_9H_{10}O_2$

Molecular Weight 150.18

Compositional Specifications of Benzyl Acetate

Content Linalyl Acetate should contain not less than 98.0% of benzyl acetate ($C_9H_{10}O_2$).

Description Linalyl Acetate is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Benzyl Acetate, add 5 ml of 10% alcoholic solution of potassium hydroxide. Warm in hot water for 20 minutes. The characteristic odor disappears. Cool, and add 8 ml of water and 1 ml of diluted hydrochloric acid. The solution responds to the test for Acetate (C) in Identification.

Purity (1) Specific Gravity : Specific gravity of Benzyl Acetate should be within a range of 1.052~1.056

(2) Refractive Index : Refractive Index n_D^{20} of Benzyl Acetate should be within a range of 1.501~1.504

(3) Clarity and Color of Solution : When 1 ml of Linalyl Acetate is dissolved in 5 ml of 60% alcohol, the solution should be clear.

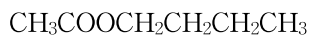
(4) Acid Value : Acid value of Linalyl Acetate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

(5) Chloride : When Linalyl Acetate is tested by Copper Mesh Test Method in Halogenated Compounds for Flavoring, it should be appropriate.

Assay Accurately weigh about 0.8 g of Benzyl Acetate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 75.09 mg of $C_9H_{10}O_2$

240. Butyl Acetate



Chemical Formula $\text{C}_6\text{H}_{12}\text{O}_2$

Molecular Weight 116.16

Compositional Specifications of Butyl Acetate

Content Butyl Acetate should contain not less than 98.0% of butyl acetate ($\text{C}_6\text{H}_{12}\text{O}_2$).

Description Butyl Acetate is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Butyl Acetate, add 5 ml of 10% alcoholic solution of potassium hydroxide. Heat in a water bath. The characteristic odor disappears, and an odor of n-butanol is evolved. Cool, and add 10 ml of water and 0.5 ml of diluted hydrochloric acid (1→3). The solution responds to the test for Acetate (C) in Identification.

Purity (1) Specific Gravity : Specific gravity of Butyl Acetate should be within a range of 0.876~0.880

(2) Refractive Index : Refractive Index n_D^{20} of Butyl Acetate should be within a range of 1.393~1.395

(3) Clarity and Color of Solution : When 2 ml of Butyl Acetate is dissolved in 4 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Butyl Acetate is tested by Acid Value in Flavoring Substance Test. The content should not be more than 1.

Assay Accurately weigh about 0.5 g of Butyl Acetate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 58.08 mg of $\text{C}_6\text{H}_{12}\text{O}_2$

241. Polyvinyl Acetate

Definition Polyvinyl Acetate is a polymer of vinyl acetate.

Compositional Specifications of Polyvinyl Acetate

Description Polyvinyl Acetate occurs as colorless to light yellow granules or glassy lumps.

Identification Dissolve 1 g of Polyvinyl Acetate in 5 ml of benzene, and proceed as directed under (5) Thin Film Method in Infrared Spectrophotometry. The solution exhibits absorbances at about $1,725\text{ cm}^{-1}$, $1,230\text{ cm}^{-1}$, $1,015\text{ cm}^{-1}$, 937 cm^{-1} . and 785 cm^{-1} .

Purity (1) Free Acids : Accurately weigh about 2 g of Polyvinyl Acetate, add 50 ml of methanol, and dissolve by shaking occasionally. Add 10 ml of water, and titrate with 0.1 N sodium hydroxide (indicator : 4~5 drops of phenolphthalein solution). Perform a blank test, and make any necessary correction. Calculate the amount of free acids as acetic acid (CH_3COOH) by the following formula. The content should not be more than 0.05%.

Content of free acids (%) =

$$\frac{\text{Consumed amount of 0.1N sodiumhydroxide (ml)} \times 60}{\text{Weight of the sample (g)} \times 10 \times 1,000} \times 100$$

(2) Arsenic : 0.25 g of Polyvinyl Acetate transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at $450 \sim 550^\circ\text{C}$. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at $450 \sim 550^\circ\text{C}$. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(3) Lead : When 5.0 g of Polyvinyl Acetate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 3.0 ppm.

(4) Polyvinyl Acetate : Finely crush the sample. Accurately weigh 2.5 g of the sample into 25ml volumetric flask, and dissolve in toluene to make 25 ml, test solution. The test solution proceed gas chromatography under operation conditions below and measure the amount of polyvinyl acetate from calibration curve. Its content should not be more than 5 ppm.

Standard solution : Accurately weigh 0.05 g of polyvinyl acetate into a 50ml

volumetric flask and dilute to 50 ml with toluene. Accurately pipette 0.01, 0.03, 0.1, 0.3, and 1ml of this stock solution into each flask to make 100 ml, standard solution.

Standard Curve Preparation : Standard solutions of 5 different concentration proceed gas chromatography under operation conditions below and prepare standard curve.

Operation Condition

Column : HP-1(30m×0.32mm, 0.25 μ m) or its equivalent

Detector : Hydrogen Flame Ionization Detector (FID)

Temperature at injection hole: 150°C

Amount of injection : 1 μ l

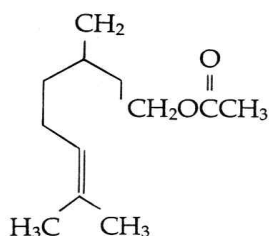
Column Temperature : Keeping at 100°C for 8 minutes, it is raised as the rate of 20°C/minutes by 250°C, keep at 250°C for 5 minutes

Carrier gas : helium

Loss on Drying When Polyvinyl Acetate is dried at 80°C for 3 hours under a reduced pressure, the should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of Polyvinyl Acetate, the residues should not be more than 0.05%.

242. Citronellyl Acetate



Chemical Formula $C_{12}H_{22}O_2$

Molecular Weight 198.30

Compositional Specifications of Citronellyl Acetate

Content Citronellyl Acetate should contain not less than 92.0% of Citronellyl acetate ($C_{12}H_{22}O_2$).

Description Citronellyl Acetate is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Citronellyl Acetate, add 5 ml of 10% alcoholic solution of potassium hydroxide solution, and heat in a water bath for 10 minutes. The characteristic odor disappears, and an odor of citronellol is evolved. Cool, and add 2 ml of water and 2 ml of diluted hydrochloric acid. The solution responds to the test for Acetate (C) in Identification.

Purity (1) Specific Gravity : Specific gravity of Citronellyl Acetate should be within a range of 0.883~0.893.

(2) Refractive Index : Refractive Index n_D^{20} of Citronellyl Acetate should be within a range of 1.440~1.450.

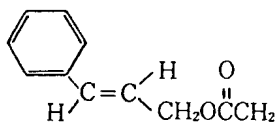
(3) Clarity and Color of Solution : When 1 ml of Citronellyl Acetate is dissolved in 9 ml of 70% alcohol, the solution should be clear.

(4) Acid value : Acid value of Citronellyl Acetate is tested by Acid Value in Flavoring Substance Test. The content should not be more than 1.

Assay Accurately weigh about 1.4 g of Citronellyl Acetate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 99.15 mg of $C_{12}H_{22}O_2$

243. Cinnamyl Acetate



Chemical Formula $C_{12}H_{12}O_2$

Molecular Weight 176.22

Compositional Specifications of Cinnamyl Acetate

Content Cinnamyl Acetate should contain not less than 98.0% of cinnamyl acetate ($C_{12}H_{12}O_2$).

Description Cinnamyl Acetate is a colorless or slightly yellowish, transparent liquid having a characteristic odor.

Identification To 1 ml of Cinnamyl Acetate, add 5 ml of 10% alcoholic solution of potassium hydroxide. Equip with a reflux condenser, and heat in a water bath for 30 minutes. The characteristic odor disappears. Cool, and add 5 ml of water and 1.2 ml of diluted hydrochloric acid. The solution responds to the test for Acetate (C) in Identification.

Purity (1) Specific Gravity : Specific gravity of Cinnamyl Acetate should be within a range of 1.047~1.051.

(2) Refractive Index : Refractive Index n_D^{20} of Cinnamyl Acetate should be within a range of 1.539~1.543.

(3) Clarity and Color of Solution : When 1 ml of Cinnamyl Acetate is dissolved in 5 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Cinnamyl Acetate is tested by Acid Value in Flavoring Substance Test. The content should not be more than 3.

Assay Accurately weigh about 1 g of Cinnamyl Acetate, and proceed as directed under Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 88.11 mg of $C_{12}H_{12}O_2$

244. Ethyl Acetate



Chemical Formula $\text{C}_4\text{H}_8\text{O}_2$

Molecular Weight 88.11

Compositional Specifications of Ethyl Acetate

Content Ethyl Acetate should contain not less than 99.0% of ethyl acetate ($\text{C}_4\text{H}_8\text{O}_2$).

Description Ethyl Acetate is a colorless, transparent liquid having a fruity odor.

Identification (1) To 1 ml of Ethyl Acetate, add 5 ml of sodium hydroxide solution (1 → 4), and heat in a water bath while shaking. The fruity odor disappears. Acidify this solution with diluted sulfuric acid, and heat again in a water bath while shaking. An odor of acetic acid is evolved.

(2) To 1 ml of Ethyl Acetate, add 25 ml of sodium hydroxide solution, heat in a water bath for 5 minutes. Cool, neutralize with diluted hydrochloric acid, and add 5 drops of ferric chloride solution. A deep red color develops.

Purity (1) Specific Gravity : Specific gravity of Ethyl Acetate should be within a range of 0.897~0.906.

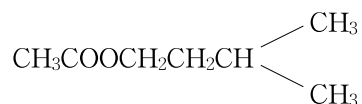
(2) Refractive Index : Refractive Index n_D^{20} of Ethyl Acetate should be within a range of 1.370~1.375

(3) Acid value : Weigh 20 g of Ethyl Acetate, and proceed as directed under Acid Value in Flavoring Substances Tests. The content should not be more than 0.1.

Assay Transfer 10 ml of ethanol into a 100-ml flask, and Accurately weigh. Add about 1 g of Ethyl Acetate to the above flask, and Accurately weigh again. Add 40 ml of 0.5 N alcoholic solution of potassium hydroxide, exactly measured, equip with a reflux condenser, heat in a water bath at $80 \pm 2^\circ\text{C}$ for 20 minutes. Cool, and titrate the excess alkali with 0.5 N hydrochloric acid (indicator : 2~3 drops of phenolphthalein solution). Perform a blank test in the same manner.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 44.06 mg of $\text{C}_4\text{H}_8\text{O}_2$

245. Isoamyl Acetate

Chemical Formula $\text{C}_7\text{H}_{14}\text{O}_2$

Molecular Weight 130.19

Compositional Specifications of Isoamyl Acetate

Content Isoamyl Acetate should contain not less than 95.0% of isoamyl acetate ($\text{C}_7\text{H}_{14}\text{O}_2$).

Description Isoamyl Acetate is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Isoamyl Acetate, add 5 ml of 10% alcoholic solution of potassium hydroxide, and heat in a water bath while shaking. The characteristic odor disappears, and an odor of isoamyl alcohol is evolved. Cool, and add 10 ml of water and 0.5 ml of diluted hydrochloric acid. The solution responds to the test for Acetate (C) in Identification.

Purity (1) Specific Gravity : Specific gravity of Isoamyl Acetate should be within a range of 0.868~0.878.

(2) Refractive Index : Refractive Index n_D^{20} of Isoamyl Acetate should be within a range of 1.400~1.404.

(3) Clarity and Color of Solution : When 1 ml of Isoamyl Acetate is dissolved in 3 ml of 60% alcohol, the solution should be clear.

(4) Acid value : Acid value of Isoamyl Acetate is tested by Acid Value in Flavoring Substance Test. The content should not be more than 1.

Assay Accurately weigh about 0.5 g of Isoamyl Acetate, and proceed as directed under Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 65.09 mg of $\text{C}_7\text{H}_{14}\text{O}_2$

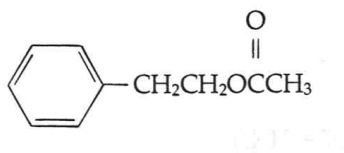
246. Starch Acetate

Designation canceled

Date of Cancellation : 6. 2 '97 (Notification No. 1997 31)

247. Phenylethyl Acetate

Phenylethyl Acetate

Chemical Formula $C_{10}H_{12}O_2$

Molecular Weight 164.20

Compositional Specifications of Phenethyl Acetate

Content Phenylethyl Acetate should contain not less than 98.0% of Phenylethyl acetate ($C_{10}H_{12}O_2$).

Description Phenylethyl Acetate is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Phenylethyl Acetate, add 5 ml of 10% alcoholic solution of potassium hydroxide, equip with a reflux condenser, and heat in a water bath for 20 minutes. The characteristic odor disappears. Cool, and add 8 ml of water and 1 ml of diluted hydrochloric acid. The solution responds to the test for Acetate (C) in Identification.

Purity (1) Specific Gravity : Specific gravity of Phenylethyl Acetate should be within a range of 1.030~1.034.

(2) Refractive Index : Refractive Index n_D^{20} of Phenylethyl Acetate should be within a range of 1.497~1.501.

(3) Clarity and Color of Solution : When 1 ml of Phenylethyl Acetate is dissolved in 2 ml of 70% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Phenylethyl Acetate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 1 g of Phenylethyl Acetate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 82.10 mg of $C_{10}H_{12}O_2$

248. Thioalcohols

Designation canceled

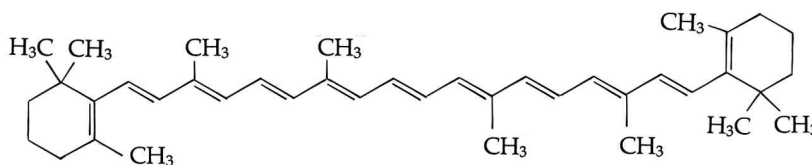
Date of Cancellation : 12. 14 '05 (Notification No. 2005-77)

249. Thioether

Designation canceled

Date of Cancellation : 12. 14 '05 (Notification No. 2005-77)

250. β-Carotene



Chemical Formula $C_{40}H_{56}$

Molecular Weight 536.89

Compositional Specifications of β-Carotene

Content When β-carotene is dried, the loss should not be more than 96.0% of β-carotene ($C_{40}H_{56}$)

Description β-carotene occurs as red-purple to dark red crystals or crystalline powder, having a slight, characteristic odor and taste.

Identification (1) β-carotene in cyclohexane solution (1→400) does not have an optical rotation.

(2) To 0.5 ml of a solution of β-Carotene in chloroform (1→250), add 1,000 ml of cyclohexane. The solution exhibits absorbance maxima at wavelengths of 455~457 nm and 482~484 nm.

(3) Dissolve 10 mg of β-Carotene in 10 ml of chloroform, which is orange in color, add 1 ml of antimony trichloride solution. A green~blue color develops.

Purity (1) Melting Point : Melting point in sealed tube under reduced pressure should be within a range of 176~183°C (decomposition)

(2) Clarity and Color of Solution : When 0.1 ml of β-carotene is dissolved in 10 ml of chloroform, the solution should be clear.

(3) Arsenic : 0.25 g of β-carotene transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : When 5.0 g of β-carotene is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Absorption Ratio : Accurately weigh about 40 mg of β-carotene previously dried,

dissolve in 10 ml of chloroform, and add cyclohexane to make exactly 100 ml. Measure exactly 5 ml of this solution, add cyclohexane to make exactly 100 ml, and use this solution as the test solution. Measure exactly 10 ml of the test solution, add cyclohexane to make exactly 100 ml, and use this solution as the diluted test solution. Measure absorbances A1 and A2 of the test solution at wavelengths of 340 nm and 362 nm, respectively, and absorbances A3, A4, and A5 of the diluted test solution wavelengths of 434 nm, 455 nm, and 483 nm, respectively. A2/ A1 is not less than 1.00, (A4×10)/A1 is not less than 15.0, A4/ A3 is 1.30~1.60, and A4/ A5 is 1.05~1.25.

Loss on Drying When β -carotene is dried for 4 hours in a vacuum desiccator (silica gel), the loss should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of β -carotene, the residues should not be more than 0.1%.

Assay Measure absorbance A at the absorption maximum at a wavelength of 455~457 nm for the diluted test solution used in Purity (5), and calculate the content of β -carotene by the following formula

$$\text{Content of } \beta\text{-carotene (\%)} = \frac{A}{2,450} \times \frac{200,000}{\text{Weight of sample (mg)}} \times 100$$

Storage Standards of β -carotene

Place in a light-resistant, hermetic container, replace the air with inert gas, and store.

251. Carmines

Definition Carmine is aluminum or calcium-aluminumlake, which is generated by a reaction between aluminum hydroxide and Dactylopiuss (Carminic acid, $C_{22}H_{20}O_{13}$). Dactylopius s is a female coccus cacti which is parasitic on cactus (*Nopalea coccinellifera*).

Compositional Specifications of Carmine

Content Carmine, when calculated on the dried basis, should be contain not less than 50.0% as carminic acid ($C_{22}H_{20}O_{13} = 492.39$).

Description Carmine is red~dark red piece, powder, or paste with weak characteristic scent.

Identification To 333 mg of Carmine, add 44 ml of water, 0.15 ml of sodium hydroxide solution (1→10) and 0.2 ml of ammonia water, it is dissolved by heating. Add water to make 500 ml. 10 ml of this solution is diluted to 250 ml with water. The resulting solution shows maximum absorption at 520 nm and 550 nm. Absorption at 520 nm should not be more than 0.3. Water is used as a reference.

Purity

- (1) Arsenic : 0.66 g of Carmine transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 1.3 ppm.
- (2) Lead : When 5.0 g of Carmine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
- (3) Cadmium : When 5.0 g of Carmine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (4) Mercury : When Carmine is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (5) Protein : When Carmine proceed as directed under Kjeldahl Method in Nitrogen Determination, its content should not be more than 25% (protein coefficients 6.25)
- (6) Salmonella : When Carmine is tested by Salmonella bacillus test of General Test Methods in food codes, it should be negative (-).

Ash 1 g of Carmine tested by Ash Test Method, the amount of ash should not be more than 12%.

Loss on Drying When 1 g of Carmine is dried for 3 hours at 135°C, the loss should not be more than 20%.

Assay Precisely weighed 30 mg of Carmine is dissolved in 30 ml of boiling 2 N hydrochloric acid. The solution is cooled and diluted to 1,000 ml with water (Test Solution). Absorption (A) of the Test Solution is measured with 1cm path length at a maximum absorption wavelength near 495 nm using 0.06 N hydrochloric acid as a reference. The content is calculated using the following equation. However, the weight of the sample is adjusted so that the absorption lies in a range of 0.2~0.25.

$$\text{Content of Carmine (\%)} = \frac{15A}{\text{Weight of the sample (mg)}} \times \frac{100}{0.262}$$

0.262 : absorption of carminic acid solution (15 mg/l)

252. Sodium Carboxymethylcellulose

Cellulose Gum

Carboxymethylcellulose

CMC

Sodium CMC

Compositional Specifications of Sodium Carboxymethylcellulose

Description Sodium Carboxymethylcellulose occurs as a white to light yellow powder, or granular or fibrous substance. It is odorless.

Identification (1) To 100 ml of water, add 1 g of Sodium Carboxymethylcellulose in small portions while stirring and allow to stand until it becomes a uniformly pasty solution.

① Test solution is diluted by a factor of 5 with water. 1 drop of the resulting solution is mixed with 0.5 ml of chromotropic acid solution, which is then heated for 10 minutes in a water bath. A pink-purple color develops.

② To 5 ml of the test solution, add 10 ml of acetone, and shake well. A white flocculent precipitate is formed.

③ To 5 ml of the test solution, add 5 ml of cupric sulfate solution (1→20) and shake. A pale blue flocculent precipitate is formed.

(2) Ignite 1 g of Sodium Carboxymethylcellulose at 550~600°C for 3 hours. The residue responds to the test for Sodium Salt in Identification.

Purity (1) pH : To 0.5 g of Sodium Carboxymethylcellulose, add small portion in 50 ml of water while stirring. Occasionally stir and heat it for 20 minutes at 60~70°C. Cool it down and use the supernatant as test solution. Test for pH and pH should be within a range of 6.0~8.5.

(2) Chloride : Weigh 0.1 g of Sodium Carboxymethylcellulose, add 20 ml of water and 0.5 ml of hydrogen peroxide, and heat in a water bath 30 minutes. Cool. add water to make 100 ml, and filter through a dry filter paper. measure exactly 25 ml of the filtrate as the test solution. Test by Chloride Limit Test, content should not be more than the amount that corresponds to 0.45 ml of 0.01 N sulfuric acid.

(3) Sulfate : 20 ml of the filtrate obtained in Purity (2) is tested by Sulfate Limit Test. Test by Sulfate Limit Test content should not be more than amount that correspond to 0.4 ml of 0.01 N sulfuric acid.

(4) Arsenic : 0.25 g of Sodium Carboxymethylcellulose transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by

heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(5) Lead : When 5.0 g of Sodium Carboxymethylcellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(6) Cadmium : When 5.0 g of Sodium Carboxymethylcellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(7) Mercury : When Sodium Carboxymethylcellulose is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Sodium Carboxymethylcellulose is dried for 4 hours at 105°C, the loss should not be more than 12%.

253. Calcium Carboxymethylcellulose

Compositional Specifications of Calcium Carboxymethylcellulose

Description Calcium Carboxymethylcellulose occurs as a white to pale yellow powder or fibrous substance, it is odorless.

Identification (1) To 0.1 g of Calcium Carboxymethylcellulose add 10 ml of water, stir thoroughly, and add 2 ml of sodium hydroxide solution. Shake, allow to stand for 10 minutes, and use this solution as the test solution. Proceed as directed under Identification (1) for [Sodium Carboxymethylcellulose].

(2) Dissolve 1 g of the residue on ignition of Calcium Carboxymethylcellulose in 10 ml of water and 5 ml of diluted acetic acid, and filter if necessary. Boil, cool, and neutralize with ammonia solution. The solution responds to the test for Calcium Salt.

Purity (1) Free Alkali : To 1 g of Calcium Carboxymethylcellulose, add 50 ml of freshly boiled and cooled water, shake well, and then add 2 drops of phenolphthalein solution. No pink color develops.

(2) Chloride : To 0.1 g of Calcium Carboxymethylcellulose, add 10 ml of water, stir thoroughly, and add 2 ml of sodium hydroxide solution (1→25). After shaking, allow to stand for 10 minutes, and make the solution strongly acidic with diluted nitric acid (1→10). Add 0.5 ml of hydrogen peroxide, and heat in a water bath for 30 minutes. After cooling, add water to make 100 ml, and filter through a dry filter paper. Measure exactly 20 ml of the filtrate as the test solution. When Calcium Carboxymethylcellulose is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.

(3) Sulfate : To 0.1 g of Calcium Carboxymethylcellulose, add 10 ml of water, stir thoroughly, and add 2 ml of sodium hydroxide solution (1→25). After shaking, allow to stand for 10 minutes, and make strongly acidic with diluted hydrochloric acid (1→4). Add 0.5 ml of hydrogen peroxide, and heat in a water bath for 30 minutes. Measure exactly 20 ml of the filtrate as the test solution. When Calcium Carboxymethylcellulose is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.

(4) Arsenic : Proceed as directed under Purity (4) in [Sodium Carboxymethylcellulose] (not more than 4 ppm).

(5) Heavy Metals : 1 g of Calcium Carboxymethylcellulose transfer into a quartz or porcelain crucible and carbonize by heating mildly. After cooling, add 2 ml of nitric acid and 5 drops of sulfuric acid, it is heated until white smoke disappears, which is then reduced to ash by further heating at 450~550°C. After cooling, 2 ml of

hydrochloric acid is added, which is then evaporated to dryness in a water bath. 3 drops of hydrochloric acid and 10 ml of hot water are added to the resulting residue, which is then heated for 2 minutes. After cooling, 1 drop of phenolphthalein indicator solution is added, then ammonia solution is added until the color of the solution becomes pale red. The resulting solution is transferred into a Nestler cylinder by rinsing with water. 50 ml of test solution is prepared by adding 2 ml of diluted acetic acid (1→20) and water. When this solution tested by Heavy Metal Limit Test, the content should not be more than 30 ppm. Color standard solution is prepared by the following procedure. 2 ml of nitric acid, 5 drops of sulfuric acid, and 2 ml of hydrochloric acid are added and evaporated to dryness in a crucible that is made of the same material used for test solution preparation. 3 drops of hydrochloric acid are added to the residue, which is then transferred into another Nestler cylinder as described above. Finally, 2 ml of lead standard solution, 2 ml of diluted acetic acid (1→20), and water are added to bring the total volume to 50 ml.

Loss on Drying When Calcium Carboxymethylcellulose is dried for 4 hours at 105°C, the loss should not be more than 10%.

Residue on Ignition When thermogravimetric analysis is done with 1 g of dried material, the amount of residues should be within a range of 10~20%.

254. Sodium Carboxymethyl Starch

Compositional Specifications of Sodium Carboxymethyl Starch

Description Sodium Carboxymethyl Starch occurs as a white powder. It is odorless.

Identification (1) To 5 ml of Sodium Carboxymethyl Starch solution (1→1,000), add 5 drops of diluted hydrochloric acid (1→3) and 1 drop of iodine solution, and shake. The color of the solution changes to a blue to red-purple color.

(2) To 1 ml of Sodium Carboxymethyl Starch solution (1→500), add 5 ml of chromotropic acid solution, and heat in a water bath for 10 minutes. The color of the solution changes to a purple to purple-pink color.

(3) To 5 ml of Sodium Carboxymethyl Starch solution (1→500), add 1 ml of cupric sulfate solution (1→20), and shake. A light blue precipitate is formed.

(4) Ignite 1 g of Sodium Carboxymethyl Starch. The residue responds to the test for Sodium Salt in Identification.

Purity (1) pH : Sodium Carboxymethyl Starch solution(1→50) as test solution, proceed as directed under pH Determination. It should be within a range of 6.0~8.5.

(2) Chloride : To 0.1 g of Sodium Carboxymethyl Starch, add 10 ml of water and 1 ml of nitric acid, heat in a water bath for 10 minutes, cool, and filter if necessary. Wash the residue with a small amount of water, combine the filtrate and the washings, and add water to make 100 ml. Take 25 ml of this solution and 6 ml of diluted nitric acid is added, test solution. When Sodium Carboxymethyl Starch is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

(3) Sulfate : To 0.1 g of Sodium Carboxymethyl Starch, add 10 ml of water and 1 ml of hydrochloric acid, heat in a water bath for 10 minutes, cool, and filter if necessary. Wash the residue with a small amount of water, combine the filtrate and the washings, and add water to make 50 ml. Measure exactly 10 ml of this solution and 1 ml of diluted nitric acid is added, test solution.. When Sodium Carboxymethyl Starch is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.

(4) Arsenic : Proceed as directed under Purity (4) in Sodium Carboxymethylcellulose.

(5) Lead : Sodium Carboxymethyl Starch is tested by Purity (2) for Sodium Metaphosphate(not more than 2 ppm).

Loss on Drying When Sodium Carboxymethyl Starch is dried for 4 hours at 105°C, the loss should not be more than 10%.

255. Sodium Caseinate

Compositional Specifications of Sodium Caseinate

Content Sodium Caseinate, when calculated on the dried basis, should contain within a range of 14.5~15.8% of nitrogen (N = 14.01).

Description Sodium Caseinate occurs as white to pale yellow powder, granules, or flakes. It is odorless and tasteless or has a slight, characteristic odor and taste.

Identification (1) Proceed as directed under Identification (1), (2), and (3) in Casein.

(2) The residue on ignition of Sodium Caseinate responds to the test for Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : Proceed as directed under Purity (1) in Casein.

(2) pH : Sodium Caseinate solution(1→50) should be within a range of pH 6.0~7.5 as determined by a glass electrode method.

(3) Fat : Proceed as directed under Purity (4) in Casein.

(4) Arsenic : 0.5 g of Sodium Caseinate transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 2 ppm.

(5) Lead : When 5.0 g of Sodium Caseinate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Loss on Drying When Sodium Caseinate is dried for 3 hours at 100°C, the loss should not be more than 15%.

Residue on Ignition When thermogravimetric analysis is done with approximately 1 g of dried Sodium Caseinate, the amount of residues should not be more than 6%.

Assay Accurately weigh about 0.15 g of Sodium Caseinate, previously dried, and proceed as directed under Kjeldahl Method in Nitrogen Determination.

1 ml of 0.1 N sulfuric acid = 1.401 mg of N

256. Allyl Caproate



Chemical Formula $\text{C}_9\text{H}_{16}\text{O}_2$

Molecular Weight 156.22

Compositional Specifications of Allyl Caproate

Content Allyl Caproate should contain not less than 98.0% of Allyl Caproate ($\text{C}_9\text{H}_{16}\text{O}_2$) 98.0%.

Description Allyl Caproate is colorless~pale yellow transparent liquid with a characteristic scent.

Identification To 1 ml of Allyl Caproate, add 5 ml of 10 % of alcoholic solution of KOH and heated in a water bath, its characteristic aroma disappears and an odor of allyl alcohol is produced. When this solution is acidified with dilute sulfuric acid, a scent of caproic acid is produced.

Purity (1) Specific Gravity : Specific gravity of Allyl Caproate should be within a range of 0.884~0.890.

(2) Refractive Index : Refractive Index n_D^{20} of Allyl Caproate should be within a range of 1.422~1.426.

(3) Clarity and Color of Solution : When 1 ml of Allyl Caproate is dissolved in 6 ml of 70% alcohol, the solution should be clear.

(4) Acid value : Acid value should not be more than 1 as determined by Acid Value in Flavoring Substances Test.

Assay Approximately 1g of Allyl Caproate is tested by Ester Value.

1 ml of 0.5 N alcoholic potassium hydroxide solution = 78.11mg $\text{C}_9\text{H}_{16}\text{O}_2$

257. Taurine

Chemical Formula $\text{C}_2\text{H}_7\text{NO}_3\text{S}$

Molecular Weight 125.14

Compositional Specifications of Taurine

Content Dried material should contain not less than 99.0% of Taurine ($\text{C}_2\text{H}_7\text{NO}_3\text{S} = 125.14$).

Description Taurine is colorless~white crystals, crystalline powder, or powder.

Identification (1) When 5 drops of diluted hydrochloric acid and 5 drops of sodium nitrite solution are added to 5 ml of Taurine solution (1→20), bubbles are formed and colorless gas is generated.

(2) 7.5 ml of Sodium hydroxide solution is added to 0.5 g of Taurine, which is slowly heated to evaporate and then decomposed for 2 hours at 500°C. 5 ml of water is added to the residue, where 1 drop of nitroprusside sodium solution. Then the solution violet red.

Purity (1) Clarity and Color of Solution : A solution of 0.5 g in 20 ml of water is colorless.

(2) Chloride : When 1.0 g of Taurine is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

(3) Sulfate : When 1.5 g of Taurine is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.45 ml of 0.01 N sulfuric acid.

(4) Ammonia : 0.1 g of Taurine is dissolved in 70 ml of water in a flask, where 1 g of magnesium oxide is added and a distillation apparatus is attached. To a receiving flask, 2 ml of 0.1 N hydrochloric acid is added. Tip of the condenser is submerged in the solution. It is distilled until collected the distillate up to 40 ml. 5 ml of sodium hydroxide and water are added to make 50 ml solution. When 0.5 ml of Nestle solution is added, its color should not be deeper than the color standard (Use 2 ml of ammonia standard solution, with 5 ml of sodium hydroxide solution and water to make 50 ml, and 0.5 ml of nestle solution is added. Standard solution is prepared by the same procedure).

(5) Arsenic : 1 g of Taurine transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If

carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 1 ppm.

- (6) Lead : When 5.0 g of Taurine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.
- (7) Readily Carbonizable Substances : When 0.1 g of Taurine is tested, the color should not be deeper than that of color standard S.
- (8) Coliform Group : Taurine is tested by Microbe Test Methods for [Coliform Group] in General Test Methods in Food Code. It should be contain not more than 30 per 1 g of this product.
- (9) Number of General Germs : When Taurine is tested by Total Viable Aerobic Count in General Test Method, it should not be more than 1,000 per 1 g

Loss on Drying When Taurine is dried for 2 hours at 105°C, the loss should not be more than 0.2%.

Residue on Ignition When thermogravimetric analysis is done with 1 g of Taurine, the amount of residues should not be more than 0.1%.

Assay Dissolve 0.2 g of Taurine, precisely dried and accurately weighed, in 50 ml of water, add 5 ml of formalin. It is then titrated with 0.1 N sodium hydroxide solution (indicator : 3 drops phenolphthalein solution). Separately, a blank test is carried out by the same method.

$$\text{Content (\%)} = \frac{12.514 \times (a - b)}{\text{Weight of the sample (mg)}} \times 100$$

a : Consumed amount of 0.1 N sodium hydroxide solution for the test (ml)

b : Consumed amount of 0.1 N sodium hydroxide solution for the blank test (ml)

258. Sodium Carbonate

Crystal : Carbonate Soda

Anhydrous : Soda Ash

$\text{Na}_2\text{CO}_3 \cdot n\text{H}_2\text{O}$ (n=0, 1 or 10)

Molecular Weight decahydrate 286.14

hydrate 124.00

Anhydrous 105.99

Definition Sodium Carbonate occurs as crystals (hydrate, decahydrate), and anhydrous called Sodium Carbonate (crystal) or as Anhydrous called Sodium Carbonate (Anhydrous).

Compositional Specifications of Sodium Carbonate

Content

Sodium Carbonate, when calculated on the dried basis, should be contain not less than 99.0% of sodium carbonate ($\text{Na}_2\text{CO}_3 = 105.99$).

Description Sodium Carbonate (crystal) occurs as a white crystalline power as colorless to white crystalline lumps. Sodium Carbonate (Anhydrous) occurs as white powder or granules.

Identification Sodium Carbonate responds to the tests for Sodium Salt and Carbonate in Identification.

Purity Dry Sodium Carbonate at 70°C, gradually raise the temperature to 250~300°C, and dry it until the weight becomes constant. Then test Sodium Carbonate.

- (1) Clarity and Color of Solution : 1 g of Sodium Carbonate is dissolved in 20 ml of water This is very slightly turbid.
- (2) Arsenic : 0.25 g of Sodium Carbonate is dissolved in 5 ml of water and 1 ml of hydrochloric acid is gradually added, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.
- (3) Lead : Sodium Carbonate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.
- (4) Mercury : When Sodium Carbonate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (5) Chloride : To 0.5 g of Sodium Carbonate, 6 ml of diluted nitric acid is added. It is then boiled and cooled, where water is added to bring the total volume to 100 ml. 10 ml of the resulting solution is mixed with 6 ml of nitric acid, Test Solution. When the test solution is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N hydrochloric acid.

Loss on Drying Dry Sodium Carbonate at 70°C, gradually raise the temperature to 25

0~300°C, and dry it until the weight becomes constant. The loss on drying should be 2.0% or less, 15% or less, and 55~65% for anhydrous, monohydrate and decahydrate form, respectively.

Assay Accurately weigh about 0.6 g of Sodium Carbonate, previously dried, dissolve in 50 ml of water, and titrate with 0.5 N hydrochloric acid (indicator : 3 drops of bromophenol blue solution). Near the end point, boil to expel carbon dioxide, cool, and continue the titration.

1 ml of 0.5 N hydrochloric acid = 26.497 mg of Na_2CO_3

259. Magnesium Carbonate

Compositional Specifications of Magnesium Carbonate

Content Magnesium Carbonate should contain within a range of the equivalent of 40.0~44.0% of magnesium oxide ($\text{MgO} = 40.32$).

Description Magnesium Carbonate occurs as white, bulky powder or brittle lumps.

Identification To 0.2 g of Magnesium Carbonate, add gradually 3 ml of diluted hydrochloric acid. It dissolves while effervescence occurs. Add ammonia solution to make the solution alkaline. The solution responds to the test for Magnesium Salt.

Purity (1) Clarity and Color of Solution : 1 g of Magnesium Carbonate dissolve in 10 ml of diluted hydrochloric acid (2→3), and add 10 ml of water. The solution should not be more than slightly turbid.

(2) Water Soluble Substances : To 2 g of Magnesium Carbonate, add 100 ml of freshly boiled and cooled water, boil, stirring, cool, filter, measure 50 ml of this solution evaporate to dryness in water bath, and dry the residue at 120°C for 3 hours. The amount should not be more than 10 mg.

(3) Arsenic : 0.25 g of Magnesium Carbonate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(4) Lead : Magnesium Carbonate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(5) Acid Insoluble substances : 5 g of Magnesium Carbonate is mixed with 75 ml of water, stirred, and dissolved by adding hydrochloric acid in small portion until it is not dissolved anymore. Boil for 5 minutes. The residue is filtered, washed with water until Chloride Ion is not detected, and ignited. The amount of the residue should not be more than 0.05%.

(6) Calcium Oxide : Approximately 0.6 g of Magnesium Carbonate is precisely weighed and dissolved in 35 ml of water and 6 ml of diluted hydrochloric acid (1→4), where 250 ml of water and 5 ml of tartaric acid solution (1→5). To this solution, 10 ml of triethanol amine solution (3→10) and 10 ml of potassium hydroxide solution (1→2) are added, which is then set-aside for 5 minutes. It is then titrated with 0.01 M EDTA solution(indicator : 0.1 g of 2-oxy-1-(2'-oxy-4'-sulfo-1'-naphthylazo)-3-naphthoic acid). The content of calcium oxide should not be more than 0.6%. End point is where the red color of the solution completely disappears and changes to blue. Separately a blank test is carried out.

1 ml of 0.01 M EDTA solution = 0.56 mg CaO

Assay Accurately weigh about 0.4 g of Magnesium Carbonate, dissolve in 10 ml of water and 3.5 ml of diluted hydrochloric acid (1→4), and add water to make exactly 500 ml. Measure exactly 25 ml of this solution, add 50 ml of water and 5 ml of ammonia ammonium chloride buffer (pH 10.7), and titrate with 0.01 M EDTA (indicator : 0.04 g of a homogeneously ground mixture of 0.1 g of Eriochrome black T and 10 g of sodium chloride). Separately, perform a blank test in the same manner, make any necessary correction, and calculate the consumed volume as a ml. Take the consumed volume of 0.01 M EDTA obtained in Purity (5) as b ml, and calculate the content by the following formula

$$\text{Content of Magnesium Oxide (MgO)(\%)} = \frac{(a - 0.07b) \times 0.8060}{\text{Weight of the sample (g)}}$$

260. Sodium Bicarbonate

Sodium Hydrogen Carbonate

Bicarbonate Soda

Chemical Formula NaHCO_3

Molecular Weight 84.01

Compositional Specifications of Sodium Bicarbonate

Content Sodium Bicarbonate, when calculated on the dried basis, should be contain not less than 99.0% of sodium bicarbonate (NaHCO_3).

Description Sodium Bicarbonate occurs as white crystalline powder or crystalline lumps.

Identification Sodium Bicarbonate responds to the tests for Sodium Salt and Bicarbonate in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Sodium Bicarbonate is dissolved in 20 ml of water, the solution should be clear.

(2) Carbonate : To 1 g of Sodium Bicarbonate, add carefully 20 ml of freshly boiled and cooled water, and dissolve while shaking horizontally at 15°C or below. Add 2.0 ml of 0.1 N hydrochloric acid, and add 2 drops of phenolphthalein solution. No pink color develops immediately.

(3) Ammonium Salt : When 1 g of Sodium Bicarbonate heat, no odor of ammonia is evolved.

(4) Arsenic : 0.25 g of Sodium Bicarbonate is dissolved in 5 ml of water and 2 ml of hydrochloric acid is gradually added, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(5) Lead : Sodium Bicarbonate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(6) Mercury : When Sodium Bicarbonate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Chloride : Weigh 0.5 g of Sodium Bicarbonate, add 5 ml of diluted nitric acid, boil, cool and add 6 ml of diluted nitric acid, Test Solution. This Test Solution is tested by Chloride Limit Test and its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

Loss on Drying When Sodium Bicarbonate is dried for 4 hours in a vacuum desiccator (silica gel), the loss should not be more than 0.25%.

Assay Accurately weigh about 3 g of Sodium Bicarbonate, previously dried, dissolve in 25 ml of water, and titrate with 1 N sulfuric acid (indicator : 3 drops of bromophenol

blue solution). Near the end point, boil to expel carbon dioxide, cool, and continue the titration.

1 ml of 1 N sulfuric acid = 84.01 mg of NaHCO_3

261. Ammonium Bicarbonate

Ammonium Hydrogen Carbonate

Chemical Formula NH_4HCO_3

Molecular Weight 79.06

Compositional Specifications of Ammonium Bicarbonate

Content Ammonium Bicarbonate should not be less than 20.0 and more than 30.0% of ammonia ($\text{NH}_3 = 17.03$).

Description Ammonium Bicarbonate occurs as white or translucent crystals, crystalline powder, or lumps, having an odor of ammonia.

Identification Ammonium Bicarbonate responds to the tests for Ammonium Salt and (A) Bicarbonate in Identification.

Purity (1) Clarity and Color of Solution : When 2 g of Ammonium Bicarbonate dissolved in 20 ml of water, the solution should be almost clear.

(2) Arsenic : 0.25 g of Ammonium Bicarbonate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(3) Lead : Ammonium Bicarbonate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(4) Mercury : When Ammonium Bicarbonate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Sulfate : When 4 g of Ammonium Bicarbonate is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.25 ml of 0.01 N sulfuric acid(not more than 0.003%).

(6) Residue on Evaporation : 20 g of Ammonium Bicarbonate is weighed into a platinum crucible, 50 ml of water is added, mixed, and evaporated to dryness in a water bath. It is dried for 30 minutes at 105°C , and cooled in desiccator and weighed. The amount should not be more than 10 mg. (not more than 0.05%)

(7) Chloride : When 2 g of Ammonium Bicarbonate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.

Residue on Ignition When thermogravimetric analysis is done with approximately 10 g of Ammonium Bicarbonate, the amount of residues should not be more than 0.01%.

Assay Proceed as directed under Assay in [Ammonium Carbonate].

262. Ammonium Carbonate

Compositional Specifications of Ammonium Carbonate

Content Ammonium Carbonate should contain within a range of 30.0~34.0% of ammonia ($\text{NH}_3 = 17.03$).

Description Ammonium Carbonate occurs as white or translucent crystals, crystalline powder, or lumps, having an odor of ammonia.

Identification Ammonium Carbonate responds to the tests for Ammonium Salt and Carbonate in Identification.

Purity (1) Clarity and Color of Solution : When 2 g of Ammonium Carbonate is dissolved in 20 ml of water, the solution should be almost clear.

(2) Arsenic : 0.25 g of Ammonium Carbonate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(3) Lead : Ammonium Carbonate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(4) Mercury : When Ammonium Carbonate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Sulfate : When 4 g of Ammonium Carbonate is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.25 ml of 0.01 N sulfuric acid. (not more than 0.003%)

(6) Residue on Evaporation : 20 g of Ammonium Carbonate is weighed into a platinum crucible, 50 ml of water is added, mixed, and evaporated to dryness in a water bath. It is dried for 30 minutes at 105°C , and cooled in desiccator and weighed. The amount should not be more than 10 mg. (not more than 0.05%)

(7) Chloride : When 2 g of Ammonium Carbonate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.15 ml of 0.01 N hydrochloric acid. (not more than 0.003%)

Residue on Ignition When thermogravimetric analysis is done with 10 g of Ammonium Carbonate, the amount of residues should not be more than 0.01%.

Assay Accurately weigh a flask with a ground-glass stopper containing about 30 ml of water, add about 2.5 g of Ammonium Carbonate, and weigh again accurately. Transfer into a 250 ml volumetric flask, and add water to make exactly 250 ml. Measure exactly 25 ml of this solution, and add gradually 50 ml of 0.1 N

hydrochloric acid, exactly measured. Titrate the excess hydrochloric acid with 0.1 N sodium hydroxide (indicator : 4~5 drops of bromophenol blue solution).

$$1 \text{ ml of } 0.1 \text{ N hydrochloric acid} = 1.703 \text{ mg NH}_3$$

263. Potassium Carbonate, Anhydrous

Chemical Formula K_2CO_3

Molecular Weight 138.21

Compositional Specifications of Potassium Carbonate

Content Potassium Carbonate (Anhydrous), when calculated on the dried basis, should be contain not less than 99.0% of potassium carbonate (K_2CO_3).

Description Potassium Carbonate (Anhydrous) occurs as white powder or granules.

Identification Potassium Carbonate solution (1→10) responds to the tests for Potassium salt and Carbonate in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Potassium Carbonate (Anhydrous) is dissolved in 20 ml of water, the solution should be colorless and almost clear.

(2) Chloride : Weigh 0.2 g of Potassium Carbonate (Anhydrous), add 6 ml of diluted nitric acid, boil, cool and add 6 ml of diluted nitric acid, Test Solution. This Test Solution is tested by Chloride Limit Test and its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

(3) Arsenic : 1 g of Potassium Carbonate (Anhydrous) is dissolved in 10 ml of water, where 2 ml of hydrochloric acid is slowly added. Water is added to make 20 ml solution. 5 ml this solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(4) Lead : Potassium Carbonate (Anhydrous) is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(5) Mercury : When Potassium Carbonate (Anhydrous) is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Potassium Carbonate, Anhydrous is dried for 4 hours at 180°C, the weight loss should not be more than 1%.

Assay Accurately weigh about 1 g of Potassium Carbonate Anhydrous, previously dried, dissolved in 25 ml of water, and titrate with 0.5 N sulfuric acid (indicator : 3 drops of bromophenol blue solution). Boil near the end point to expel carbon dioxide, cool, and continue the titration.

$$1 \text{ ml of } 0.5 \text{ N sulfuric acid} = 34.55 \text{ mg of } \text{K}_2\text{CO}_3$$

264. Calcium Carbonate

Chemical Formula CaCO_3

Molecular Weight 100.09

Compositional Specifications of Calcium Carbonate

Content Calcium Carbonate, when calculated on the dried basis, should contain not less than 98.0 % of calcium carbonate (CaCO_3).

Description Calcium Carbonate occurs as a fine white powder. It is odorless.

Identification To 1 g of Calcium Carbonate, add 10 ml of water and 7 ml of diluted acetic acid. It effervesces and dissolves. This solution, after being boiled and neutralized with ammonia solution, it responds to test of Calcium Salt in Identification.

Purity (1) Hydrochloric Acid-Insoluble Substances : To 5.0 g of Calcium Carbonate, add 10 ml of water, and add drop wise gradually 12 ml of hydrochloric acid while stirring, and add water to make 200 ml. Filter through a filter paper for quantitative analysis, wash thoroughly the residue on the filter paper with boiling water until the washings do not respond to the test by Chloride Limit Test, incinerate together with the filter paper, and weigh the residue. The content should not be more than 10 mg.

(2) Free Alkali : To 3.0 g of Calcium Carbonate, add 30 ml of freshly boiled and cooled water, shake for 3 minutes, and filter the solution. Measure 20 ml of the filtrate, and add 2 drops of phenolphthalein solution. Even if a pink color becomes, it disappears when 0.2 ml of 0.1 N hydrochloric acid is added.

(3) Arsenic : 0.25 g of Calcium Carbonate is dissolved in 5 ml of water, use as Test Solution. This Test Solution proceed as directed under Arsenic and it should not be more than 4 ppm.

(4) Lead : Calcium Carbonate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 3.0 ppm.

(5) Cadmium : Calcium Carbonate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(6) Fluoride : 1 g of Calcium Carbonate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 50 ppm.

(7) Alkali Metals and Magnesium : Weigh 1.0 g of Calcium Carbonate, dissolve by gradually adding 30 ml of 1 N diluted hydrochloric acid, expel carbon dioxide while boiling. Cool, neutralize with ammonia solution, add 60 ml of ammonium oxalate solution, and heat in a water bath for 1 hour. Cool, add water to make 100 ml, stir

thoroughly, filter, measure 50 ml of the filtrate, add 0.5 ml of sulfuric acid, evaporate to dryness, and ignite to constant weight, and weigh the residue. Its content should not be more than 5 mg.

- (8) Barium : Weigh 1.0 g of Calcium Carbonate, dissolve in 8 ml of diluted hydrochloric acid, add water to make 20 ml. Add 2 g of sodium acetate, 1 ml of diluted acetic acid and 0.5 ml of potassium chromate solution to the test solution, and allow to stand for 15 minutes. The solution is not more turbid than the reference solution. To 0.30 ml of Barium Standard Solution, add water to make 20 ml.(→ The turbidity should be not more than the turbidity of the solution obtained as adding water to 0.3 ml barium standard solution, make 20 ml(not more than 0.03%)

Loss on Drying When Calcium Carbonate is dried for 4 hours at 200°C, the weight loss should not be more than 2%.

Assay Accurately weigh about 1 g of Calcium Carbonate, previously dried, gradually dissolve in 10 ml of diluted hydrochloric acid, gradually added, add water to make exactly 100 ml. Proceed as directed under Assay in Calcium Hydroxide

$$1 \text{ ml of } 0.05 \text{ M EDTA} = 5.004 \text{ mg of CaCO}_3$$

265. *tert*-ButylhydroquinoneMono-*tert*-Butylhydroquinone

TBHQ

Chemical Formula $C_{10}H_{14}O_2$

Molecular Weight 166.22

Compositional Specifications of *tert*-Butylhydroquinone**Content** *tert*-Butylhydroquinone should contain not less than 99.0% ($C_{10}H_{14}O_2$).**Description** *tert*-Butylhydroquinone: Mono-*tert*-Butylhydroquinone is white crystalline solid with characteristic scent. It is soluble in alcohol and ether but insoluble in water.**Identification** Several mg of *tert*-Butylhydroquinone is dissolved in 1 ml of methyl alcohol. When a few drops of 25% dimethylamine solution is added, this solution becomes red.**Purity** (1) Arsenic : 0.25 g of *tert*-Butylhydroquinone proceed as directed under Purity

(1) in [Guar Gum], the content should not be more than 4 ppm.

(2) Lead : When 5.0 g of *tert*-Butylhydroquinone is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.(3) Melting Point : Melting point of *tert*-Butylhydroquinone should be within range of 126.5~128.5°C.(4) *tert*-Butyl-*p*-Benzonquinone : When proceed as directed under the following procedure, the content should not be more than 0.2%.

◦ Apparatus and Equipment : 0.4 mm calcium fluoride liquid cell and Double Beam Infrared Spectrophotometer.

◦ Preparation of Standard Solution : 10 mg of *tert*-Butylhydroquinone: Mono *tert* Butylhydroquinone is precisely weighed and dissolved in small amount of carbon tetrachloride, which is then diluted to make 10 ml.◦ Preparation of Test Solution : *tert*-Butylhydroquinone is ground to fine powder with homogenizer prior to use. 1 g of the ground powder is precisely weighed into a 10 ml volumetric flask and filled with carbon tetrachloride. The solution is then extracted for 5 minutes and filtered with Millipore filter membrane (UHWP01300) or its equivalent, as the Test Solution.**Test Operation** : Carbon tetrachloride transfer into a reference cell and Standard Solution transfer into a sample cell. Infrared spectrum is recorded in wave numbers of 1,600~1,775 cm^{-1} . A baseline is drawn at 1,612~1,750 cm^{-1} of this spectrum and

the pure absorption of the Standard Solution(*A_s*) is obtained at 1,659 cm⁻¹. The pure absorption of the Test Solution (*A_u*) is obtained by the same method. The amount of *tert*-Butylhydroquinone is calculated from the following equation.

$$\text{Content of } \textit{tert}\text{-Butylhydroquinone (\%)} = 100 \times \frac{A_u}{A_s} \times \frac{W_s}{W_u}$$

W_s : weight of standard material (mg)

W_u : weight of sample (mg)

- (5) Toluene : 2 g of *tert*-Butylhydroquinone is precisely weighed and dissolved in 10 ml of octyl alcohol, as the Test Solution. 5 µl of each Test Solution and Standard Solution, (prepared as below) is injected into gas chromatography. The content of toluene should not be more than 0.0025%.

Preparation of Standard Solution : 25 mg of toluene is precisely weighed and dissolved in octylalcohol, which is then diluted to make 50 ml. To 10 ml of this solution, octylalcohol is added to make 100 ml.

Operation Conditions

- Column : 3.18 mm x 3.66 m stainless tube
- Column Filler : 60~80 mesh Diatoport S or its equivalent porous support material for gas chromatography is coated with 10% silicon SE-3
- Detector : Hydrogen Flame Ionization Detector (FID)
- Temperature at injection hole : 275°C
- Column Temperature : Temperature is raised from 70°C to 280°C at a rate of 15°C per minute and held at 280°C.
- Detector Temperature : 300°C
- Carrier gas and flow rate : Helium or nitrogen, 50 ml per minute or the flow rate is adjusted so that toluene comes out in approximately 3 minutes.

$$\text{Amount of toluene (\%)} = \frac{\text{Peak Height of } S_a}{\text{Peak Height of } S_t} \times \frac{\text{Concentration of } S_t (w/v\%)}{\text{Concentration of } S_a (w/v\%)} \times 100$$

- (6) UV Absorption : 1 g of L-ascorbic acid is dissolved in 200 ml of 50% ethyl alcohol, which is then transferred into a 500 ml separatory funnel (S-1). Approximately 50 g of *tert*-Butylhydroquinone is added to the separatory funnel and dissolved in the solution by shaking. 50 ml of iso-octane is added and extracted for 3 minutes. After settling for 3 minutes, the lower aqueous phase layer is transferred into another 500 ml separatory funnel (S-2). 50 ml of iso-octane is added and

extracted again. The lower aqueous phase layer is transferred into another 500 ml separatory funnel (S-3). This solution is again extracted with 50 ml of iso-octane and the aqueous phase layer is discarded. Each iso-octane extract (S-1, S-2, S-3) is mixed with 100 ml of 0.5% ascorbic acid solution in ethyl alcohol · water (ethyl alcohol : water = 25:75), shaken for 1 minute, and extracted. After settling, the lower aqueous layer is discarded. This extraction is repeated again. This iso-octane solution is extracted twice with 100 ml of ethyl alcohol · water (ethyl alcohol : water = 5:95) and aqueous layer is discarded. Finally, iso-octane solution is washed twice with 100 ml of water each and wash water is discarded. Separately, a chromatography column is filled with 100 g of anhydrous sodium sulfate and the column is washed with 75 ml of iso-octane and the iso-octane is discarded. Iso-octane solution in S-1 is passed through the column and collected in a 500 ml distillation flask. The funnel S-1 is washed with iso-octane solution in S-2. Then the solution is passed through the column and collected in the same distillation flask. The funnel S-2 and S-1 are washed serially with iso-octane solution in S-3. Then the solution is passed through the column and collected in the same distillation flask. S-3, S-2, and S-1 are washed serially with 25 ml of iso-octane twice. This is again passed through the column and collected in the same distillation flask and the column is removed. Add two glass balls and 2 ml hexadecane to a 500 ml distillation flask containing iso-octane residue solution and connect it to an appropriate vacuum distillation apparatus. While the distillation flask is immersed in a water bath, iso-octane is distilled from the solution under 1/3 of atmospheric pressure. When the iso-octane solvent is no longer collected in the solvent receptor, cancel decompression and wash the inner wall of the distillation apparatus from the top with 5 ml of iso-octane. This is again distilled within 1 minute under 1/3 atmospheric pressure. When the distillation is almost complete, this procedure is repeated with 5 ml of iso-octane. Using iso-octane, the residue in the distillation flask is transferred into a 10 ml volumetric flask, which is filled with iso-octane and shaken, use as Test Solution. Using reference solution is prepared with iso-octane, following the same procedures the sample, absorption spectrum is obtained in a wavelength range of 250 nm~400 nm using silica gel cell with 5 cm path length. Maximum absorption for test solution and reference solution at (a) 280~289 nm, (b) 290~299 nm, (c) 300~359 nm, (d) 360~400 nm is measured. Maximum absorption per 1 cm path length is obtained by subtracting absorption of the reference solution from absorption of the test solution. The difference should not exceed (a) 0.15, (b) 0.12, (c) 0.08, (d) 0.02, respectively.

(7) 2,5-di-*tert*-butylhydroquinone and hydroquinone : When proceed as directed under the method, the content of 2,5-di-tertiarybutylhydroquinone and hydroquinone should not be more than 0.2% and 0.1% respectively.

- Preparation of Standard Solution : Approximately 50 mg of hydroquinone, 2,5-di-*tert*-butylhydroquinone and methyl benzoate(internal standard) is accurately weighed and dissolved in pyridine and to make 50 ml, respectively.
- Preparation of Standard Solution for Calibration Curve and Calibration Curve : 0.5, 1.0, 2.0, 3.0 ml of hydroquinone standard solution is taken into each of 10 ml volumetric flasks, respectively. 2 ml of methyl benzoate internal standard solution is added to each flask, which is then to make 10 ml with pyridine. Separately, standard solutions of 2,5-di-tertiarybutylhydroquinone for calibration curve are prepared by the same procedure and Trimethylsilyl derivative of the calibration curve solution prepared as follows. 9 drops of the calibration curve solution are added to a 2 ml serum vial and a cap is placed. The pressure of the vial is reduced with a 50 ml gas syringe. 250 μ l of N,O-bis-trimethylsilyl acetamide is added to the vial, which is then heated for 10 minutes at 80°C. 10 μ l of each test solution for the calibration curve is injected into gas chromatography twice. A calibration curve is prepared by using a concentration ratio of hydroquinone vs. internal standard as a horizontal axis and a reaction (peak) ratio of hydroquinone vs. internal standard as a vertical axis. Separately, a calibration curve for 2,5-di-tertiarybutylhydroquinone following the same procedure.
- Preparation of Test Solution : Approximately 1 g of *tert*-Butylhydroquinone : Mono-*tert*-Butylhydroquinone is accurately weighed into a 10 ml volumetric flask. 2 ml of methyl benzoate internal standard solution is added to the flask, and to make 10 ml with pyridine. Trimethylsilyl derivative is prepared as described for the Standard Solution above. 10 μ l of this solution is injected into gas chromatography twice. Keeping time (in minutes) for methyl benzoate, trimethylsilyl derivative of hydroquinone, trimethylsilyl derivative of *tert*-butylhydroquinone, and trimethylsilyl derivative of 2,5-di-*tert*-butylhydroquinone is 2.5, 5.5, 7.3, and 8.4, respectively. Each peak area is measured, which is used to calculate the reaction ratio of hydroquinone and 2,5-di-*tert*-butylhydroquinone vs. internal standard. The concentration of hydroquinone and 2,5-di-*tert*- butylhydroquinone vs. internal standard is calculated from the calibration curve. Finally the contents (%) of hydroquinone and 2,5-di-*tert*- butylhydroquinone are calculated from the following equation

Operation Conditions

- Column : 6.35 mm × 0.6 m stainless tube
- Column Filler : 60~80 mesh Diatoport S or its equivalent porous support material for gas chromatography is coated with 20% silicon SE-30
- Detector : Thermal conductivity Detector (TCD)
- Temperature at injection hole : 300°C
- Column Temperature : Temperature is raised from 100°C to 270°C at a rate of 1 5°C per minute and held at 270°C.
- Detector Temperature : 300°C
- Carrier gas and flow rate : Helium or nitrogen, 100 ml per minute.

$$A = Y \times I \times \frac{10}{S}$$

A : The content of hydroquinone or 2,5-di-tertiarybutylhydroquinone in the sample

Y : The concentration ratio of hydroquinone or 2,8-di-tertiarybutylhydroquinone vs. internal standard material, which is obtained from horizontal axis of the calibration curve.

I : The amount of internal standard material in Test Solution (w/v%)

S : weight of sample (g)

Assay

Approximately 170 mg of *tert*-butylhydroquinone, previously powdered and precisely weighed, dissolve in 10 ml of methyl alcohol and 150 ml of water, 1 ml of 1 N sulfuric acid, and 4 drops of diphenylamine solution (300 mg of sodium p-diphenyl amine sulfonate is dissolved in 100 ml of 0.1 N sulfuric acid.) . The resulting solution is titrated with 0.1 N cerium (II) sulfate solution. The end point is where the solution color becomes yellow to reddish violet. The amount of 0.1 N cerium (II) sulfate solution consumed in ml is V. The content of C₁₀H₁₄O₂ (%) in the sample is calculated from the following equation.

$$\text{Content(\%)} = \frac{(V - 0.1\text{ml}) \times 0.8311}{\text{weight of sample (g)}} - (\text{hydroquinone(\%)} \times 1.51) \\ - (2,5\text{-di-tertiarybutylhydroquinone (\%)} \times 0.75)$$

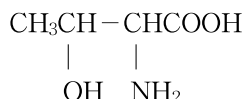
0.1 ml : The amount of cerium (II) sulfate solution (in ml) consumed by the primary oxide of tertiarybutylhydroquinone that is commonly found in sample.

266. Terpene Hydrocarbons

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

267. DL-Threonine



Chemical Formula $\text{C}_4\text{H}_9\text{O}_3\text{N}$

Molecular Weight 119.12

Compositional Specifications of DL-Threonine

Content DL-Threonine, when calculated on the dried basis, should contain within a range of 98.0~102.0% of DL-threonine ($\text{C}_4\text{H}_9\text{O}_3\text{N}$).

Description DL-Threonine occurs as white crystals or crystalline powder. It is odorless and has a slightly sweet taste.

Identification (1) DL-Threonine solution (1→25) has no optical rotation.

(2) To 5 ml of DL-Threonine solution (1→10), add 5 ml of potassium periodate and heat. A gas with an odor of ammonia is evolved, and it becomes the color of a red litmus paper wetted with water to blue.

(3) To 5 ml of DL-Threonine solution (1→1000), add 1 ml of ninhydrin solution. and heat for 3 minutes. A purple color becomes.

Purity (1) Clarity and Color of Solution : When 1 g of DL-Threonine dissolved in 20 ml of water, the solution is colorless and clear.

(2) pH : When DL-Threonine proceed as directed under glass electrode method, pH of an aqueous solution (1→20) should be within a range of 5.0~6.5.

(3) Arsenic : To 0.25 g of DL-Threonine is dissolved in 10 ml of water, use as Test Solution When the test solution proceed as directed under Arsenic. it should be appropriate and not more than 4 ppm.

(4) Lead : When 5.0 g of DL-Threonine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(5) Allothreonine and Other Amino Acids : Weigh 0.1 g of DL-Threonine, and dissolve in water to make 50 ml. Use this solution as the test solution. Measure 0.005 ml of the test solution and proceed as directed under Paper Chromatography Method 1, using n-butanol, methyl ethyl ketone, ammonia solution, water mixture (5:3:1:1) as the developing solvent. Only one spot is observed. In the case, for the filter paper. use a No.2 filter paper for chromatography and stop the development when the developing solvent rises about 30 cm. Air-dry the filter paper and then dry at 100°C for 20 minutes, spray with a solution of 0.2% ninhydrin n-butanol, dry at 100°C for 5 minutes, and observe in daylight. Without using a reference solution.

(6) Chloride : When 0.5 g of DL-Threonine proceed as directed under chloride, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

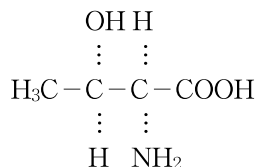
Loss on Drying When DL-Threonine is dried for 3 hours at 105°C, the weight loss should not be more than 0.2%.

Residue on Ignition When thermogravimetric analysis is done with DL-Threonine, the amount of residues should not be more than 0.1%.

Assay Proceed as directed under Assay in [Glycine]

1 ml of 0.1 N perchloric acid = 11.91 mg of $C_4H_9NO_3$

268. L-Threonine



Chemical Formula $\text{C}_4\text{H}_9\text{O}_3\text{N}$

Molecular Weight 119.12

Compositional Specifications of L-Threonine

Content L-Threonine, when calculated on the dried basis, should contain within a range of 98.0~102.0% of L-threonine ($\text{C}_4\text{H}_9\text{O}_3\text{N}$)

Description L-Threonine occurs as white crystals or crystalline powder. It is odorless and has a slightly sweet taste.

Identification (1) L-Threonine solution (1→25) has levorotatory.

(2) Proceed as directed under Identification and (2) and (3) in [DL-Threonine].

Purity (1) Clarity and Color of Solution : When 1 g of L-Threonine dissolved in 20 ml of water, the solution is colorless and clear.

(2) pH : When L-Threonine proceed as directed under glass electrode method, pH of an aqueous solution (1→20) should be within a range of 5.0~6.5.

(3) Specific rotation : After drying for 3 hours at 105°C, approximately 3 g of L-Threonine is precisely weighed, which is dissolved in water to make 50 ml. Optical rotation of this solution should be within a range of $[\alpha]_D^{20} = -26 \sim -29^\circ$

(4) Arsenic : To 0.25 g of L-Threonine, add in 5 ml of water, and this solution is tested by Arsenic Limit Test. The content of arsenic should not be more than 4 ppm.

(5) Lead : When 5.0 g of L-Threonine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(6) Allothreonine and other Amino Acids : Proceed as directed under Purity (5) in [DL-Threonine].

(7) Chloride : Proceed as directed under Purity (6) in [DL-Threonine].

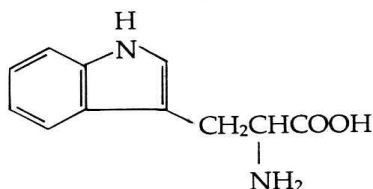
Loss on Drying When DL-Threonine is dried for 3 hours at 105°C, the weight loss should not be more than 0.2%.

Residue on Ignition When thermogravimetric analysis is done with DL-Threonine, the amount of residues should not be more than 0.1%.

Assay Proceed as directed under Assay in [DL- Threonine].

1 ml of 0.1 N Perchloric acid = 11.91 mg of $\text{C}_4\text{H}_9\text{NO}_3$

269. DL-Tryptophan



Chemical Formula $C_{11}H_{12}O_2N_2$

Molecular Weight 204.23

Compositional Specifications of DL-Tryptophan

Content DL-Tryptophan, when calculated on the dried basis, should contain within a range of 98.0~102.0% of DL-tryptophan ($C_{11}H_{12}O_2N_2$).

Description DL-Tryptophan occurs as white to yellowish-white crystals or crystalline, powder. It is odorless or has a slight odor and has a slightly sweet taste.

Identification (1) DL-Tryptophan solution (1→500) has no optical rotation.

(2) To 0.1 g of DL-Tryptophan, add 50 ml of water, and dissolve while heating. After cooling, to 10 ml of the solution, add 5 ml of p-dimethylaminobenzaldehyde solution and 2 ml of diluted hydrochloric acid, and heat in a water bath for 5 minutes. A red-purple to blue-purple color becomes.

(3) To 5 ml of DL-Tryptophan solution (1→1,000) add 1 ml of ninhydrin solution (1→1,000), and heat for 3 minutes. A purple color becomes.

Purity (1) Clarity and Color of Solution : Weigh 0.5 g of DL-Tryptophan, and dissolve in 10 ml of 0.5N sodium hydroxide solution. The solution is almost clear, and its color is not darker than that of Color standard Solution C.

(2) pH : When DL-Tryptophan proceed as directed under glass electrode method, pH of an aqueous solution (1→50) should be within a range of 5.5~7.0

(3) Arsenic : 0.25 g of DL-Tryptophan is dissolved in 3 ml of 1 N hydrochloric acid and 2 ml of water, use as Test Solution. This Test Solution proceed as directed under Arsenic and it should be appropriate and not more than 4 ppm.

(4) Lead : When 5.0 g of DL-Tryptophan is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(5) Chloride : When 0.5 g of DL-Tryptophan proceed as directed under chloride, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

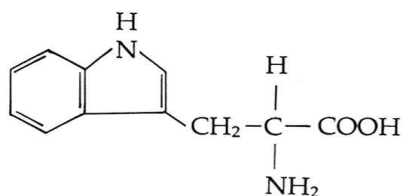
Loss on Drying When DL-Tryptophan is dried for 3 hours at 105°C, the weight loss should not be more than 0.3%

Residue on Ignition When thermogravimetric analysis is done with approximately 1 g of DL-Tryptophan, the amount of residues should not be more than 0.1%.

Assay Approximately 0.3 g of DL-Tryptophan, previously dried and accurately weighed, dissolve in 50 ml of glacial acetic acid by heating. After cooling, titrated with 0.1 N perchloric acid solution (indicator : 10 drops of α -naphtholbenzene solution). The end point is where the brown color of the solution becomes green.

1 ml of 0.1 N perchloric acid = 20.42 mg of $C_{11}H_{12}O_2N_2$

270. L-Tryptophan



Chemical Formula $C_{11}H_{12}O_2N_2$

Molecular Weight 204.23

Compositional Specifications of L-Tryptophan

Content L-Tryptophan, when calculated on the dried basis, should contain within a range of 98.0~102.0% of L-tryptophan ($C_{11}H_{12}O_2N_2$).

Description L-Tryptophan as white to yellowish-white crystals or crystalline powder. It is odorless or has a slight odor and has a slightly bitter taste.

Identification (1) L-Tryptophan solution is levorotatory. Add sodium hydroxide solution (1→5) to make the solution alkaline. The solution becomes dextrorotatory.

(2) Proceed as directed under Identification (2) and (3) in [DL-Tryptophan].

Purity (1) Clarity and Color of Solution : Weigh 0.5 g of L-Tryptophan, and dissolve in 10 ml of 0.5N sodium hydroxide solution. The solution is almost clear, and its color is not darker than that of Color standard Solution C.

(2) pH : When L-Tryptophan proceed as directed under glass electrode method, pH of an aqueous solution (1→100) should be within a range of 5.5~7.0

(3) Specific Rotation : L-Tryptophan is dried for 3 hours at 105°C. Approximately 0.5 g is precisely weighed and dissolved in 40 ml of water by heating. After cooling, water is added to make 50 ml solution. Optical rotation should be within a range of $[\alpha]_D^{20} = -30 \sim -33^\circ$

(4) Arsenic : Proceed as directed under Purity (3) in [DL-Tryptophan].

(5) Lead : When 5.0 g of L-Tryptophan is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(6) Chloride : Proceed as directed under Purity (5) in [DL-Tryptophan].

Loss on Drying When L-Tryptophan is dried for 3 hours at 105°C, the weight loss should not be more than 0.3%.

Residue on Ignition When thermogravimetric analysis is done with approximately 1 g of

L-Tryptophan, the amount of residues should not be more than 0.1%.

Assay Approximately 0.3 g of L-Tryptophan, previously dried and accurately weighed, dissolve in 50 ml of glacial acetic acid by heating. After cooling, titrated with 0.1 N perchloric acid solution (indicator : 10 drops of α -naphtholbenzene solution). The end point is where the brown color of the solution becomes green.

1 ml of 0.1 N perchloric acid = 20.42 mg of $C_{11}H_{12}O_2N_2$

271. L-Tyrosine

L- β -(p-Hydroxyphenyl)alanine

Chemical Formula $\text{C}_9\text{H}_{11}\text{NO}_3$

Molecular Weight 181.19

Compositional Specifications of L-Tyrosine

Content L- Tyrosine, when calculated on the dried basis, should contain within a range of 98.0~102.0% of L-Tyrosine ($\text{C}_9\text{H}_{11}\text{NO}_3$).

Description L-Tyrosine is white crystallite or crystalline powder. It is odorless and tasteless.

Identification (1) To 5 ml saturated L-Tyrosine solution, add 1 ml of ninhydrin solution (1 \rightarrow 50). When this solution is heated for 3 minutes in a water bath, it becomes bluish violet color.

(2) When 5 ml of saturated L-Tyrosine solution is mixed with 1 ml of ferrous chloride solution, which is then heated, solution becomes dark red color.

Purity (1) Clarity and Color of Solution : When 1 g of L-Tyrosine dissolved in 20 ml of 1 N hydrochloric acid, the solution is colorless and almost clear.

(2) pH : pH of saturated L-Tyrosine solution should be within a range of 5.0~6.5.

(3) Specific Rotation : Approximately 5 g of L-Tyrosine is precisely weighed and dissolved in 1 N hydrochloric acid, to make 100 ml. Optical rotation of L-Tyrosine is measured and converted into a dried form. It should be within a range of $[\alpha]_D^{20} = -10.5 \sim -12.5^\circ$

(4) Chloride : When 0.07 g of L-Tyrosine proceed as directed under chloride, its content should not more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.

(5) Arsenic : 0.25 g of L-Tyrosine transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1 \rightarrow 50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When proceed as directed under arsenic with this test solution, it should be appropriate and not more than 4 ppm.

(6) Lead : When 5.0 g of L-Tyrosine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content

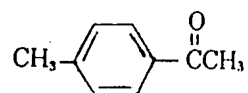
should not be more than 5.0 ppm.

Loss on Drying When L-Tyrosine is dried for 3 hours at 105°C, the weight loss should not be more than 0.3%.

Residue on Ignition When thermogravimetric analysis is done with L-Tyrosine, the amount of residues should not be more than 0.1%.

Assay Approximately 0.3 g of L-Tyrosine is precisely weighed and dissolved in 3 ml of formic acid, where 50 ml of glacial acetic acid for non-aqueous titration is added. It is then titrated with 0.1 N perchloric acid (indicator : 1 ml Crystal violet glacial acetic acid solution). End point is where the violet color of the solution becomes through blue then to green. Separately, a blank test is carried out by the same procedure

1 ml of 0.1 N Perchloric acid = 18.119 mg $\text{C}_9\text{H}_{11}\text{NO}_3$

272. *p*-Methyl Acetophenone

Chemical Formula $\text{C}_9\text{H}_{10}\text{O}$

Molecular Weight 134.18

Compositional Specifications of *p*-Methyl Acetophenone

Content *p*-Methyl acetophenone should contain not less than 98.0% *p*-Methyl acetophenone ($\text{C}_9\text{H}_{10}\text{O}$).

Description *p*-Methyl acetophenone is transparent white~pale yellow liquid with characteristic scent.

Identification *p*-Methyl acetophenone is proceed as directed under Liquid Film Method (4) in Infrared Spectrophotometry. There should be absorption bands at $1,680\text{ cm}^{-1}$, $1,605\text{ cm}^{-1}$, $1,358\text{ cm}^{-1}$, $1,268\text{ cm}^{-1}$, and 815 cm^{-1} .

Purity (1) Specific Gravity : Specific gravity of *p*-Methyl acetophenone should be within a range of 1.001~1.004.

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of *p*-Methyl acetophenone should be within a range of 1.532~1.535.

(3) Clarity and Color of Solution : To 1 ml *p*-Methyl acetophenone dissolved in 10 ml of 50% alcohol, the solution should be clear.

(4) Chloride : When *p*-Methyl acetophenone is proceed as directed under Copper Screen Method in Halogenated Compounds in Flavoring Substances Test, it should be appropriate.

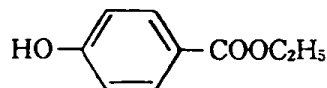
Assay Approximately 1 g of *p*-Methyl acetophenone is precisely weighed and proceed as directed under Method 2, Hydroxylamine Method, Determination of Aldehydes and Ketones in Flavoring Substances Test. However, heat treatment is done for 1 hour.

1 ml of 0.5 N hydrochloric acid = 67.07 mg $\text{C}_9\text{H}_{10}\text{O}$

273. Butyl-*p*-Hydroxybenzoate

○ Designed Cancellation

The date of cancellation : 1.2.09(Notification No. 2009-1).

274. Ethyl *p*-Hydroxybenzoate

Chemical Formula $C_9H_{10}O_3$

Molecular Weight 166.18

Compositional Specifications of Ethyl *p*-Hydroxybenzoate

Content Ethyl *p*-Hydroxybenzoate, when calculated on the dried basis, should contain not less than 99.0% of ethyl *p*-Hydroxybenzoate ($C_9H_{10}O_3$).

Description Ethyl *p*-Hydroxybenzoate occurs as colorless crystals or as a white crystalline powder. It is odorless.

Identification (1) To 0.5 g of Ethyl *p*-Hydroxybenzoate, add 10 ml of sodium hydroxide, boil about 30 minutes, evaporate to about 5 ml, and cool. Acidify this solution with diluted sulfuric acid and wash formed precipitates with water. Dry it for 1 hour at 105°C, and the melting point is 213~217°C.

(2) To 0.05 g of Ethyl *p*-Hydroxybenzoate, add 2 drops of acetic acid and 5 drops of sulfuric acid. After heating for 5 minutes, the solution generates a smell of ethyl acetate.

Purity (1) Melting Point : Melting point of Ethyl *p*-Hydroxybenzoate should be within a range of 115~118°C

(2) Free Acids : To 0.75 g of Ethyl *p*-Hydroxybenzoate, add 15 ml of water and heated for 1 minutes in effervescent water bath and cooled. The filtrate is acidic or neutral. To 10 ml of filtrate, 0.2 ml of 0.1N sodium hydroxide and 2 drops of methyl red solution are added. A yellow color develops.

(3) Sulfate : To 1 g of Ethyl *p*-Hydroxybenzoate, add 100 ml of hot water, mix by shaking, heat for 5 minutes and cool. Water is added to make 100 ml. To 40 ml of filtrate, 1 ml of diluted hydrochloric acid is added, test solution. When this test solution proceeds as directed under sulfate, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N sulfuric acid.

(4) Arsenic : 0.25 g of Ethyl *p*-Hydroxybenzoate transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic

- Limit Test is carried out with this test solution, it should not be more than 4 ppm.
- (5) Lead : When 5.0 g of Ethyl *p*-Hydroxybenzoate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Mercury : When Ethyl *p*-Hydroxybenzoate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) *p*-Hydroxybenzoic Acid and Salicylic Acid : Accurately weigh 0.5g of Ethyl *p*-Hydroxybenzoate and dissolve in 30ml of ether and add 20 ml of Sodium hydrogen carbonate solution (1 in 100), shake and separate the water layer. Wash the water layer with two 20 ml portions of add 5 ml of dilute sulfuric acid and 30 ml of ether, and shake. Separate the ether layer, and shake with about 10 ml of water. Filter the ether layer, and wash the vessel and the filter with a small amount of ether. Combine the washings and the filtrate, evaporate ether on a water bath, and dry the residue over sulfuric acid to constant weight. The weight of sulfuric acid to constant weight. The weight of the residue should not exceed 5mg. Dissolve any residue in 25ml of water, heat to 70°C, filter, and add a few drops of dilute ferric chloride TS. No violet to reddish violet colour should be produced.

Loss on Drying When Ethyl *p*-Hydroxybenzoate is dried for 2 hours at 80°C, the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with approximately 5 g of Ethyl *p*-Hydroxybenzoate, the amount of residues should not be more than 0.05%.

Assay 2 g of Ethyl-*p*-Hydroxybenzoate, precisely weighed, add 40 ml of 1 N sodium hydroxide solution and boil for 30 minutes and cool. Titrate the excess alkali with 1 N sulfuric acid (indicator : 5 drops of bromthymol blue test solution). The color of end point is the color which appears by adding same indicator to buffer solution of pH 6.5. Separately, perform a blank test in the same manner.

1 ml of 1 N sodium hydroxide = 166.2 mg of C₉H₁₀O₃

275. Isobutyl *p*-Hydroxybenzoate

○ Designed Cancellation

The date of cancellation : 1.2.09(Notification No. 2009-1).

276. Isopropyl *p*-Hydroxybenzoate

○ Designed Cancellation

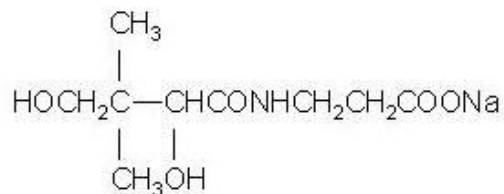
The date of cancellation : 1.2.09(Notification No. 2009-1).

277. Propyl *p*-Hydroxybenzoate

Designation canceled

Date of Cancellation : 6. 24 2008 (Notification No. 2008-34)

278. Sodium Pantothenate



Chemical Formula $\text{C}_9\text{H}_{16}\text{O}_5\text{NNa}$

Molecular Weight 241.22

Compositional Specifications of Sodium Pantothenate

Content Sodium Pantothenate, when calculated on the dried basis, should contain within a range of 5.6~6.0% of nitrogen (N = 14.01) and 9.3~9.7% of sodium (Na = 22.94).

Description Sodium Pantothenate is odorless white crystalline powder or powder with slightly sour taste.

Identification (1) Proceed as directed under Identification (1) and (2) in [Calcium Pantothenate].

(2) Sodium Pantothenate solution (1→20) responds to test of Sodium Salt in Identification.

Purity (1) pH : pH of Sodium Pantothenate solution (2→10) should be within a range of 9.0~10.0.

(2) Specific Rotation : Approximately 1.25 g of Sodium Pantothenate (previously dried for 24 hours in a vacuum desiccator (silica gel) and weighed, dissolve in 25 ml of water. Optical rotation of Sodium Pantothenate should be within a range of $[\alpha]_D^{20} = +25 \sim +28.5^\circ$

(3) Arsenic : Proceed as directed under Purity (3) in [Calcium Pantothenate], the content should not be more than 4 ppm.

(4) Lead : Sodium Pantothenate is tested by Purity (2) for Sodium Metaphosphate (not more than 2.0 ppm).

(5) Calcium : 1 g of Sodium Pantothenate is dissolved in 10 ml of water, where 0.5 ml of diluted acetic acid and 0.5 ml of ammonium oxalate solution are added, precipitate should not form.

(6) Alkaloid : Proceed as directed under Purity (5) in [Calcium Pantothenate]

Loss on Drying When Sodium Pantothenate is dried for 24 hours in a vacuum desiccator (silica gel), weight loss should not be more than 5%.

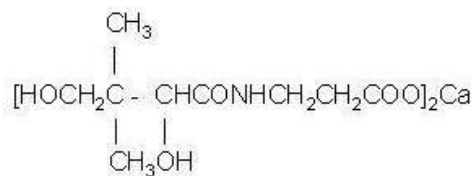
Assay (1) Nitrogen : 50 mg of Sodium Pantothenate, precisely dried and accurately

weighed, proceed as directed under Semi-micro Kjeldahl Method in Nitrogen Determination Method.

- (2) Sodium : Dissolve 0.6 g of Sodium Pantothenate, precisely dried and accurately weighed, in 50 ml of acetic acid. It is then titrated with 0.1 N perchloric acid (indicator : 1 ml Crystal violet glacial acetic acid solution). End point is where the violet color of the solution becomes through blue then to green. Separately, a blank test is carried out by the same procedure.

$$1 \text{ ml of } 0.1 \text{ N Perchloric acid} = 2.30 \text{ mg Na}$$

279. Calcium Pantothenate



Chemical Formula $\text{C}_{18}\text{H}_{32}\text{O}_{10}\text{N}_2\text{Ca}$

Molecular Weight 476.55

Compositional Specifications of Calcium Pantothenate

Content Calcium Pantothenat, when calculated on the dried basis, should contain within a range of 5.7~6.0% of nitrogen (N = 14.01) and 8.2~8.6% of calcium (Ca = 40.08).

Description Calcium Pantothenat occurs as a white powder. It is odorless and has a slightly bitter taste.

Identification (1) To 50 mg of Calcium Pantothenate, add 5 ml of sodium hydroxide solution and 1 drop of cupric sulfate solution, the solution becomes blue-purple color.

(2) To 50 mg of Calcium Pantothenate, add 5 ml of sodium hydroxide solution, and boil for 1 minute. Cool, and add 2 ml of diluted hydrochloric acid and 2 drops of ferric chloride Solution, the solution becomes a dark yellow color.

(3) Calcium Pantothenate solution (1→20) responds to test of Calcium Salt in Identification.

Purity (1) pH : pH of Calcium Pantothenate solution (2→10) should be within a range of 7.0~9.0.

(2) Specific rotation : Approximately 1.25 g of Calcium Pantothenate, previously dried for 3 hours at 105°C and precisely weighed, dissolve in 25 ml of water. Optical rotation of Calcium Pantothenate should be within a range of $[\alpha]_D^{20} = +25 \sim +28.5^\circ$

(3) Arsenic : To 0.25 g of Calcium Pantothenate, add 5 ml of water and proceed as directed under Arsenic and it should be appropriate and the content should not be more than 4 ppm.

(4) Heavy Metals : 1 g of Calcium Pantothenate is dissolved in 2 ml of diluted acetic acid and approximately 30 ml of water, use the Test Solution. This Test Solution proceed as directed under heavy metals and its content should not be more than 20 ppm.

(5) Alkaloid : Weigh 50 mg of Calcium Pantothenate, dissolve in 5 ml of water, and add 0.5 ml of ammonium molybdate solution and 0.5 ml of diluted phosphoric acid (1

→10), white turbidity should not appear.

Loss on Drying When Calcium Pantothenate is dried for 3 hours at 105°C, the weight loss should not be more than 5%.

Assay (1) Nitrogen : Accurately weigh about 50 mg of Calcium Pantothenate, proceed as directed under Semi-micro Kjeldahl Method under Nitrogen Determination, and calculate on the dried basis.

(2) Calcium : Approximately 0.5 g of Calcium Pantothenate, previously dried and precisely weighed, dissolve in 80 ml of water, add 15 ml of 0.05 M EDTA solution, 15 ml of sodium hydroxide solution (1→10) and approximately 0.1 g of 2-oxy-1-(2'-oxy-4'-sulfo-1'-naphthylazo)-3-naphthoic acid. It is then titrated with 0.05 M EDTA solution. End point is where the red color of the solution completely disappears and becomes to blue.

1 ml of 0.05 M EDTA solution = 2.004 mg Ca

280. Phenols

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

281. Phenolic Ether

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

282. DL-Phenylalanine



Chemical Formula $\text{C}_9\text{H}_{11}\text{NO}_2$

Molecular Weight 165.19

Compositional Specifications of DL-Phenylalanine

Content DL-Phenylalanine, when calculated on the dried basis, should contain within a range of 98.5~101.5% of DL-Phenylalanine ($\text{C}_9\text{H}_{11}\text{NO}_2$).

Description DL-Phenylalanine is white crystalline platelet. It is odorless.

Identification (1) To 5 ml of DL-Phenylalanine solution (1→1,000), add 1 ml of ninhydrine standard solution and heat it, this solution becomes violet.

(2) To 5 ml of DL-Phenylalanine solution (1→1,000), add a few drops of potassium bichromate solution and heat. Then characteristic scent is generated.

(3) To 10 mg of DL-Phenylalanine, add 0.5 g of potassium nitrate and 2 ml of sulfuric acid, and heat for 20 minutes in a water bath. After cooling, 2 ml of hydroxylamine solution is added and the solution is kept for 10 minutes in an ice bath. 10 ml of sodium hydroxide solution is added immediately and the solution is set-aside. The solution becomes violet.

Purity (1) Lead : When 5.0 g of DL-Phenylalanine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

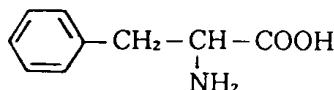
Loss on Drying When DL-Phenylalanine is dried for 2 hours at 105°C, the weight loss should not be more than 0.2%.

Residue on Ignition When thermogravimetric analysis is done with 1 g of DL-Phenylalanine, the amount of residue should not be more than 0.3%.

Assay Approximately 0.5 g of DL-Phenylalanine, previously dried for 2 hours at 105°C, is precisely weighed, dissolve in 70 ml of formic acid (for non-aqueous titration). This solution is titrated with 0.1 N perchloric acid solution (indicator : 2 drops of crystal violet buffered in glacial acetic acid). At the end point, the solution becomes from pale violet to blue, then to green. Separately, a blank test is carried out by the same procedure.

1 ml of 0.1 N perchloric acid solution = 16.52 mg $\text{C}_9\text{H}_{11}\text{NO}_2$

283. L-Phenylalanine



Chemical Formula $\text{C}_9\text{H}_{11}\text{O}_2\text{N}$

Molecular Weight 165.19

Compositional Specifications of L-Phenylalanine

Content L-Phenylalanine, when calculated on the dried basis, should contain within a range of 98.5~102.0% of L-phenylalanine ($\text{C}_9\text{H}_{11}\text{O}_2\text{N}$).

Description L-Phenylalanine occurs as white crystals or crystalline powder and has a slightly bitter taste.

Identification (1) To 5 ml of L-Phenylalanine solution (1→1000), add 1 ml of potassium dichromate solution (1→1000). Upon heating the solution, characteristic scent is generated.

(2) To 5 ml of L-Phenylalanine solution (1→1,000), add 1 ml of ninhydrin solution (1→1,000), and heat for 3 minutes. A purple color becomes.

(3) To 10 mg of L-Phenylalanine, add 0.5 g of potassium nitrate and 2 ml of sulfuric acid. heat in a water bath for 20 minutes. After cooling, add 5 ml of hydroxylamine hydrochloride solution (1→10), set aside in ice water for 10 minutes. Add 8 ml of 40% sodium hydroxide solution, and set aside. A red-purple color becomes.

Purity (1) Clarity and Color of Solution : When 1 g of L-Phenylalanine is dissolved in 100 ml of water, the solution should be colorless and almost clear.

(2) pH : When proceed as directed under glass electrode method, pH of L-Phenylalanine solution (1→100) should be within a range of 5.4~6.0

(3) Specific Rotation : Approximately 1 g of L-Phenylalanine is, previously dried for 3 hours at 105°C and precisely weighed, dissolve in 50 ml of water. Optical rotation of this solution should be within a range of $[\alpha]_D^{20} = -33.0 \sim -35.2^\circ$

(4) Arsenic : 0.25 g of L-Phenylalanine dissolve in 10 ml of 2 N hydrochloric acid, proceed as directed under Arsenic. It's content should not be more than 4 ppm.

(5) Lead : When 5.0 g of L-Phenylalanine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(6) Chloride : When 0.5 g of L-Phenylalanine proceed as directed under chloride, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N

hydrochloric acid.

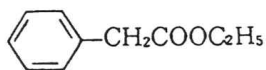
Loss on Drying When L-Phenylalanine is dried for 3 hours at 105°C, the weight loss should not be more than 0.3%.

Residue on Ignition When thermogravimetric analysis is done with L-Phenylalanine, the residue should not be more than 0.1%.

Assay 0.3 g of L-Phenylalanine, previously dried and accurately weighed, proceed as directed under Assay in DL-Alanine.

1 ml of 0.1 N perchloric acid = 16.52 mg of $\text{C}_9\text{H}_{11}\text{O}_2\text{N}$

284. Ethyl Phenylacetate



Chemical Formula $C_{10}H_{12}O_2$

Molecular Weight 164.20

Compositional Specifications of Ethyl Phenylacetate

Content Ethyl phenylacetate should contain not less than 98.0% of ethyl phenylacetate ($C_{10}H_{12}O_2$).

Description Ethyl phenylacetate is a colorless, transparent liquid having a characteristic odor.

Identification To 2 ml of Ethyl Phenylacetate, add 10 ml of 10% potassium hydroxide solution. equip with a reflux condenser, and boil gently for 1 hour. The characteristic odor disappears. Distill the solution, and remove about 4 ml of the initial distillate. Acidify the residual solution with diluted hydrochloric acid and cool. Crystals are deposited. Collect the crystals by filtration, wash with water, and recrystallize from boiling water. The melting point is approximately 76°C.

Purity (1) Specific Gravity : Specific gravity of Ethyl Phenylacetate should be within a range of 1.027~1.032

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Ethyl Phenylacetate should be within a range of 1.496~1.500

(3) Clarity and Color of Solution : When 1 ml of Ethyl Phenylacetate is dissolved in 2 ml of 70% alcohol, the solution should be clear.

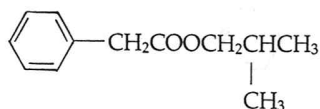
(4) Acid Value : Acid value of Ethyl Phenylacetate proceed as directed under Acid Value in Flavoring Substance Test. It should not be more than 1.

(5) Chlorinated Compounds : When Ethyl Phenylacetate proceed as directed under Copper Mesh Test Method in Halogenated Compounds for Flavoring, it should be appropriate.

Assay Accurately weigh about 1 g of Ethyl Phenylacetate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 82.10 mg of $C_{10}H_{12}O_2$

285. Isobutyl Phenylacetate



Chemical Formula $C_{12}H_{16}O_2$

Molecular Weight 192.23

Compositional Specifications of Isobutyl Phenylacetate

Content Isobutyl phenylacetate should contain not less than 98.0% of isobutyl phenylacetate ($C_{12}H_{16}O_2$)

Description Isobutyl phenylacetate is a colorless, transparent liquid having a characteristic odor.

Identification (1) To 2 ml of Isobutyl Phenylacetate, add 10 ml of 10% alcoholic solution of potassium hydroxide, equip with a reflux condenser, and boil gently in a water bath for 1 hour. Add 10 ml of water, distill, and take about 1.5 ml of the initial distillate. The solution is clear, and an odor of isobutanol is generated.

(2) Acidify the residual solution in (1) with diluted hydrochloric acid. Crystals are deposited. Collect the crystals by filtration, wash with water, and recrystallize from boiling water. The melting point is 76°C .

Purity (1) Specific Gravity : Specific gravity of Isobutyl Phenylacetate should be within a range of 0.984~0.988.

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Isobutyl Phenylacetate should be within a range of 1.486~1.488.

(3) Clarity and Color of Solution : When 1 ml of Isobutyl Phenylacetate is dissolved in 3 ml of 80% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Isobutyl Phenylacetate proceed as directed under Acid Value in Flavoring Substance Test. It should not be more than 1.

(5) Chlorinated Compounds : When Isobutyl Phenylacetate proceed as directed under Copper Mesh Test Method in Halogenated Compounds for Flavoring, it should be appropriate.

Assay Accurately weigh about 1.5 g of Isobutyl Phenylacetate and proceed as directed under Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 96.13 mg of $C_{12}H_{16}O_2$

286. Polydextrose

Definition Randomly bonded condensation polymer of glucose with some sorbitol end-groups, and with citric acid or phosphoric acid residues attached to the polymer by mono diester bonds. Polydextrose may be neutralized with alkali and decolorized and deionized for further purification. It may be partly reduced by hydrogenation.

Compositional Specifications of Polydextrose

Content Polydextrose, when calculated on the dried basis(excluded ash), should contain not less than 90.0% of the polymer.

Description Polydextrose is white~pale brown amorphous powder, which is readily soluble in water.

Identification (1) To Polydextrose solution (1→10), add 4 drops of 5% phenol solution and 15 drops of sulfuric acid. The solution becomes dark yellow~orange color.
 (2) To 10 ml of Polydextrose solution (1→10), add 1.0 ml of acetone and stir vigorously, it should stay clear.
 (3) To the Test Solution (2), add 2.0 ml of acetone and vigorously stir. The solution shows severe milky turbidity.
 (4) To 1 ml of Polydextrose solution (1→50), and 4 ml of alkaline cupric citrate . After boiling vigorously for 2~4 minutes, it is settled and cooled, then supernatant becomes blue-green color.

Purity (1) pH : When Polydextrose proceed as directed under glass electrode method, pH of Poyldextrose solution (1→10) should not be less than 2.5.
 (2) Monomer : 20 mg of Polydextrose is precisely weighed into a vial with a cap. 1 ml of octadecane solution, 1 ml of pyridine, and 0.5 ml of N-trimethyl silyl imidazole are added to the vial, which is then capped. The vial is sonicated for 60 minutes at 70°C use the Test Solution. Separately, 1 ml of standard solution, 1 ml of octadecane, 0.5 ml of N-trimethyl silyl imidazole are processed with the same procedure as the Test Solution use the Reaction Standard Solution. Same amounts of the Reaction Standard Solution and the Test Solution are injected into gas chromatography. The content of each monomer is calculated from the following equation. The content of 1,6-anhydro-D-glucose should not be more than 4.0% and the content of sorbitol and D-glucose combined should not be more than 6.0%. An average value should be obtained by injecting the Reaction Standard Solution twice.

$$\text{Content (\%)} = \frac{R \times W_s}{R_s \times W}$$

W : Weight of the sample (mg) (as a dehydrated form without ash)

Ws : Weight of each standard material (mg)

R : Peak area ratio of each monomer vs. octadecane in Test Solution

Rs : Average peak area ratio of each monomer vs. octadecane in Reaction Standard Solution

Operation Conditions

- Column : A glass or stainless tube with inner diameter of 2 mm and length of 2.5 m
- Column Filler : 100~120 mesh Gas Chrom Q coated with 3% OV-1
- Detector : (Hydrogen) Flame Ionization Detector (FID)
- Temperature at injection hole: 210°C
- Column Temperature : 175°C
- Detector Temperature : 230°C
- Carrier gas and flow rate : Nitrogen, 30 ml per minute

The elution order of the monomers is 1,6-anhydro-D-glucose(levoglucosan), n-octadecane α-D-glucose, D-sorbitol, and β-D-glucose.

Solution

- Standard Solution : 100 ml pyridine solution of each (precisely weighed) 50 mg α-D-glucose, 50 mg β-D-glucose, 40 mg anhydrous-D-sorbitol, 35mg 1,6-anhydro-D-glucose 35mg.
 - Octadecane solution : 100 ml pyridine solution of precisely weighed 50 mg of octecane.
- (3) 5-Hydroxy Methylfurfural (HMF) : 1 g of Polydextrose is precisely weighed into a 100 ml volumetric flask, which is filled with water use the Test Solution. Using water as a reference, absorbance at 283 nm with 1 cm path length is measure. The content of 5-hydroxy methylfurfural is calculated using the following equation. The content (as a dehydrated form excluding ash) should not be more than 0.1%. However, the neutralized form should not be more than 0.05%.

$$\text{5-hydroxy methylfurfural (\%)} = \frac{0.749 \times A}{C}$$

A : Absorbance of Test Solution

C : Concentration of Test Solution (mg/ml) (as a dehydrated form excluding ash)

- (4) Arsenic : 0.25 g of Polydextrose transfer into a flask for decomposition. After adding 5 ml of sulfuric acid and 5 ml of nitric acid, the flask is slowly heated. 2~3 ml of nitric acid is added at a time and the flask is heated until the liquid becomes colorless~pale yellow. After cooling, 15 ml of saturated ammonium hydroxide is

added to the flask, which is then heated and concentrated to 2~3ml until thick white smoke is generated. The resulting concentrate is neutralized with ammonia water or ammonia solution use the Test solution. This test solution proceed as directed under arsenic. Standard color reference is prepared with 1 ml of arsenic standard solution following the same procedure as the test solution. The detected amount of lead should not be more than 4 ppm.

- (5) Molecular Weight Limit : 4 g of Polydextrose is dissolved in 0.2 M phosphate buffer solution (pH 6.8) to make 100 ml. 4 g of each dextran standard T 70 (molecular weight 74,300), T 40 (molecular weight 40,600) and T 10 (molecular weight 9,400) is dissolved in 0.2 M phosphate buffer solution (pH 6.8) and the total volume is make to 100 ml, respectively, use the Standard Solutions. A calibration curve is prepared with 50 μ l of each standard solution following the operation conditions below. From the calibration curve, an elution time (t) for a molecular weight of 22,000 is obtained. Separately, 50 μ l of Test Solution is injected and eluted. Under t, the height of any peak should not exceed 2% of the height of the major peak.

Peration Conditions

- Detector : Differential refractometer (RI Detector)
- Column : TSK-GEL-G 3000 PW, 7.5 mm \times 600 mm stainless steal tube
- Column Temperature : Room temperature
- Mobile Phase : 0.2 M Phosphate buffer solution (pH 6.8)
- Flow Rate : 1.0 ml/min
- Measurement : 2×10^{-5} RIUFS

Solution

- 0.2 M phosphate buffer solution (pH 6.8)
- Solution 1 : 27.218 g of potassium phosphate, monobasic is dissolved in water and to make total volume 1 l.
- Solution 2 : 71.6 g of potassium phosphate, monobasic is dissolved in water and to make total volume 1 l.

Solution 1 is added to Solution 2 while mixing until pH becomes 6.8.

- (6) Lead : 16 g of Polydextrose is slowly carbonized by heating, which is reduced ash by further heat treatment at a temperature below 500°C. Carefully 20 ml of diluted nitric acid is added to the ash, which is then gently boiled for 5 minutes. It is then filtered (if necessary), the residue is washed with water, which is then added to the filtrate. Water is added so that total volume of this solution to make 50 ml. This test solution proceed as directed under lead. The detected amount of lead should not be more than 0.5 ppm.

(7) Nickel : When 5.0 g of Polydextrose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm. (limited to the form under hydrogen reduction)

Residue on Ignition When thermogravimetric analysis is done with 2 g of Polydextrose, the amount of residue should not be more than 0.3%. However, the neutralized form should not be more than 2.0%.

Water Content Water content of Polydextrose proceed as directed under back titration method in water determination (Karl-Fisher Titration) and should not be more than 4.0%.

Assay 250 mg of Polydextrose transfer into a 250 ml volumetric flask and the flask is filled. 10 ml of the solution is diluted to 250 ml. 2 ml each of the resulting solution is taken into three 8 ml vials. 0.12 ml of phenol solution (8→10) is added to each vial and gently mixed. Then 5 ml of sulfuric acid is quickly added and shaken vigorously with a cap in place (should ware rubber gloves and use safety shield). Each vial is set-aside for 45 minutes at normal temperature and absorption is measured at 490 nm with 1 cm path length. Separately, a calibration curve is prepared by following the same procedure as above with 2 ml each of glucose standard solution and prepare a standard curve of concentration. The content of polymer (P) is calculated from the following equation. Separately, a reference solution is prepared by following the same procedure as the test solution with 2 ml of water, 0.12 ml of phenol solution (8→10), and 5 ml of sulfuric acid.

$$P = 1.05[100 \times \frac{A-Y}{S \times C}] - P_g - 1.11P_1$$

A : Average absorption of the Test Solution

Y : Intercept (y axis) in the standard curve

S : Slope of absorption vs. glucose concentration (g/ml) in the standard curve(S is approximately 0.02)

C : Concentration of the test solution (g/ml) (converted to dehydrated form excluding ash.)

P_g, P₁ : Contents of glucose and 1,6-anhydro-D-glucos as measured by monomer test.

Solution

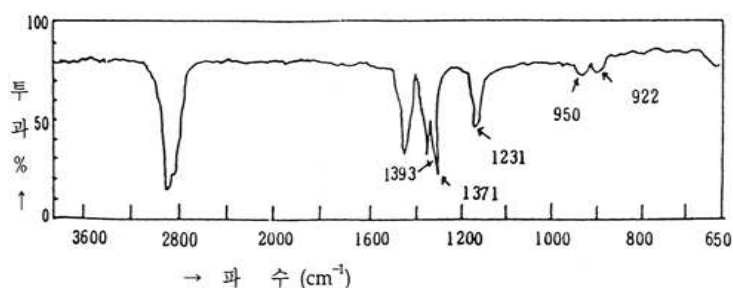
◦ Glucose Standard Solution : 100 mg of α-D-glucose is precisely weighed, dissolved in water, and diluted to 500 ml (200 µg/ml). This is further diluted to 50 µg/ml, 40 µg/ml, 20 µg/ml, 10 µg/ml, and 5 µg/ml.

287. Polybutene

Compositional Specifications of Polybutene

Description Polybutene is a colorless to pale yellow, viscous liquid. It is odorless or has a slight, characteristic odor, and tasteless.

Identification (1) Approximately 1 g of polybutene is dissolved in 5 ml of n-hexane. 2~3 drops of this solution are applied to a window plate on an area of 2.5×1cm proceed as directed under Thin Film Method in Infrared Spectroscopy. A characteristic absorption band at wavelengths ($\pm 0.5\%$) shown in the following Figure.



(2) 0.5 g of polybutene is dissolved in 5 ml of n-hexane. When 2 drops of bromine solution are added to this solution, the color of the solution immediately disappears.

(3) When polybutene is slowly heated, an odor of burning pine resin is generated.

Purity (1) Clarity and Color of Solution : When 0.4 g of polybutene is dissolved in 5 ml n-hexane, the solution should be clear.

(2) Chlorinated compounds : 0.5 g of polybutene transfer into a platinum porcelain, where 0.7 g of calcium carbonate is mixed. The content is reduced to ash by gently heating. After cooling, the residue is dissolved in 20 ml of diluted nitric acid, which is then filtered. Filtrate proceed as directed under Purity (2) in [Benzoic Acid].

(3) Arsenic : Proceed as directed under Purity (2) in Vinyl Acetate Resin and its content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Polybutene is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Low Molecular Weight Polymer : Accurately weigh about 10 g of Polybutene and add 10 ml of methanol. Equip with a reflux condenser, heat in a water bath for 1 hour while shaking occasionally, and allow to stand in a dark place for 1 hour.

Transfer the supernatant to an evaporating dish, which is weighed prior to use, dry almost completely at about 50°C, and dry in a vacuum desiccator (sulfuric acid) for 15~20 hours, the content should not be more than 0.4%

Residue on Ignition When thermogravimetric analysis is done with 5 g of Polybutene, the residue should not be more than 0.05%.

288. Polyvinyl Polypyrrolidone

Compositional Specifications of Polyvinyl Polypyrrolidone

Description Polyvinyl Polypyrrolidone is white~grayish white hygroscopic powder with slight scent. It is insoluble in water or ordinary organic solvents.

Identification To 1 g of Polyvinyl Polypyrrolidone, add 10 ml of water and 0.1 ml of iodine solution and shake for 30 seconds, the suspension decolorizes. Add 1 ml of starch solution and shake, the suspension should not become blue.

Purity (1) pH : When 1 g of Polyvinyl Polypyrrolidone, add water to make 100 ml, pH of the solution should be within a range of 5.0~11.0.

(2) Water Solubles : Approximately 25.0 g of Polyvinyl Polypyrrolidone is precisely weighed into a distillation flask. 225 ml of water is added and a reflux condenser is attached to the flask. While mixing with a stirrer, the flask is heated for 20 hours. After cooling, the suspension is transferred into a 250 ml volumetric flask, set-aside for 15 minutes and the supernatant is centrifuged for 1 hour at 12,000 rpm. The resulting supernatant is filtered through a membrane filter with 0.45 μm pore size. 50 ml of filtrate is precisely taken onto a glass evaporation dish, which is weighed prior to use. Then the filtrate is evaporated to dryness and further dried for 3 hours at 90°C. It is then cooled in a desiccator and precisely weighed. The content of residue should not be more than 1.5%.

(3) Nitrogen : 100 mg of Polyvinyl Polypyrrolidone transferred into a flask for decomposition. Add 1 g of potassium sulfate and copper sulfate mixture (10:1), inner wall of the flask, and wash with small amount of water. Add 7 ml of sulfuric acid and shake, and slowly add 1 ml of 30% hydrogen peroxide. Then the content is decomposed by heating until it becomes transparent and blue. After the decomposition is over, the liquid is cooled, where 20 ml of water is added use the Test Solution. The Test Solution is quantitatively analyzed for nitrogen. The content of nitrogen should be within a range of 11.0~12.8%.

(4) Lead : When 5.0 g of Polyvinyl Polypyrrolidone is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Zinc : When 5.0 g of Polyvinyl Polypyrrolidone is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 25 ppm.

(6) N-Vinyl Pyrrolidone : Accurately weigh 4 g of the sample, add 30 ml of water, and stir it for 15 minutes. Transfer the solution into a centrifuge tube and wash the

residue with 20 ml of water. Combine the washings and the filtrate, and centrifuge it. Filter supernatant with glass filter (1G4 or its equivalent), wash the residue 50 ml of water and, combine it to the filtrate. Add 0.5 g of sodium acetate, mix and begin titrating with 0.1N iodine. When the iodine colour no longer fades, add additional 3 ml of the titrate, and allow the solution to stand for 10 minutes. Titrate the excess iodine with 0.1 N sodium thiosulfate solution, and the consumed amount of 0.1N iodine solution should not access 0.72 ml. Separately, a blank test is carried out. (not more than 0.1%)

1 ml of 0.1 N iodine solution = 5.56mg of N-vinyl pyrrolidone

(7) Unsaturated Matter : To 4 g of Polyvinyl Polypyrrolidone, add 30 ml of water and stirrer for 15 minutes. This is filtered through a glass filter into a 250 ml Erlenmeyer flask. Residue on the filter is washed with 100 ml of water and the rinse water is added to the filtrate. 0.5 g of sodium acetate is added to the resulting solution, which is then titrated with 0.1 N iodine solution until the color doesn't get lighter. After adding 3 ml of 0.1 N iodine solution is added, the solution is set-aside for 10 minutes. Excess iodine is titrated with 0.1 N sodium thiosulfate solution (indicator : starch solution). Separately, a blank test is carried out following the same procedure and the content is calculated by the following equation. The content of unsaturated matter should not be more than 0.1%.

$$\text{Content of unsaturated matter (\%)} = \left[\frac{(b-a) \times N \times 0.0555}{\text{Weight of sample (mg)}} \right] \times 100$$

a : Consumed amount of 0.1 N sodium thiosulfate for the test solution (ml)

b : Consumed amount of 0.1 N sodium thiosulfate for the blank test (ml)

N : Normality of 0.1 N sodium thiosulfate solution

Water Content Water content of Polyvinyl Polypyrrolidone is determined by water determination (Karl-Fisher Titration) and should not be more than 6%.

Residue on Ignition Residue on ignition of Polyvinyl Polypyrrolidone should not be more than 0.4%.

289. Polysorbate 20

Polyoxyethylene(20) Sorbitan Monolaurate

Definition Polysorbate 20 is a partial ester mixture of sorbitol and anhydrous sorbitol with lauric acid, where approximately 20 M of ethylene oxide is bonded to 1 M each of sorbitol, mono or dihydrated form of sorbitol via condensation reaction.

Compositional Specifications of Polysorbate 20

Content Polysorbate 20, when calculated on the dried basis(anhydrous), should contain 70.0 ~74.0% oxyethylene (C_2H_4O), which corresponds 97.3~103.0% polysorbate 20.

Description Polysorbate 20 is yellow~yellowish brown liquid with slight characteristic scent and unpleasant bitter taste.

Identification To 5 ml of Polysorbate 20(1→20), add 5 ml of sodium hydroxide solution and boil for several minutes and cool. When the solution is acidified with dilute acid, it turns white and turbid.

Purity (1) Acid Value : Approximately 10 g of Polysorbate 20 is accurately weighed and dissolved in 125 ml of toluene · isopropyl alcohol mixture (1:1), which is neutralized until it becomes pink with 2 ml of phenolphthalein solution prior to use (heated if necessary). Acid value is calculated from the following equation and should not be more than 2.

(2) Arsenic : 0.25 g of Polysorbate 20 is tested according to Purity (1) for [Guar Gum] (not more than 4 ppm).

(3) Lead : When 5.0 g of Polysorbate 20 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Cadmium : When 5.0 g of Polysorbate 20 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(5) Mercury : When Polysorbate 20 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) 1,4-Dioxane : To 0.5 g of Polysorbate 20 and 0.1 g of defoamer(containing silicone), add 10 ml of water and diffuse with ultrasonic waves, test solution. Transfer this solution into 25 ml of frit sparger, hold the temperature of container at 50°C, and analyze with Purge and Trap and Gas chromatograph. Separately, to the solution, which 2.5μg of 1,4-Dioxane is contained in 10 ml of water, add 0.1 g of defoamer, standard solution. Analyze the standard solutin in the same manner as the sample. (not more than 5.0 ppm)

Operation Condition

Purge and Trap

Trap : Vorcarb 3000 or its equivalent

Purge time : 11 minutes

Desorption temperature and time : 250°C, 4 minutes

Cryo focus temperature : -150°C

Bake temperature and time : 260°C, 10 minutes

Gas chromatography

Column : HP-FFAP(60m × 0.32μm) or its equivalent

Detector : (Hydrogen) Flame Ionization Detector (FID)

Column Temperature : held at 70°C for 5 minutes and is raised to 180°C at a rate of 5°C per minute

Temperature at injection hole : 200°C

Detector Temperature : 250°C

Carrier gas and flow rate : Nitrogen, 0.9 m per minute

- (7) Hydroxyl Value : Approximately 3 g of Polysorbate 20 is accurately weighed into a 250 ml flask with a stopper. Add 5 ml of pyridine·anhydrous acetic acid mixture (3:1), a reflux condenser is attached. It is then heated for 1 hour in a water bath. 10 ml of water is added through the condenser and it is heated again for 10 minutes. After cooling, 15 ml of n-butyl alcohol is added through the condenser, the condenser is removed, and inner wall of the flask is washed with 10 ml of n-butyl alcohol. 1 ml of phenolphthalein solution is added to the flask and the solution is titrated with 0.5 N alcoholic solution of potassium hydroxide. The consumed amount of alcoholic solution is S. Separately, 5 ml of pyridine·anhydrous acetic acid is treated as same as the test solution and the consumed amount of alcoholic solution is B. To correct for free acid, approximately 10 g of Polysorbate 20 is accurately weighed and dissolved in 10 ml of pyridine. After adding 1 ml of phenolphthalein solution, the solution is titrated with 0.5 N alcoholic solution of potassium hydroxide. The consumed amount of alcoholic solution is A. Hydroxyl value, that is calculated by the following equation, should be within a range of 96~108.

$$\text{Hydroxyl Value} = \frac{[B + (WA/C) - S] \times 28.05}{W}$$

W : Amount of sample used in acetylation (g)

C : Amount of sample used for quantitative analysis of free acid (g)

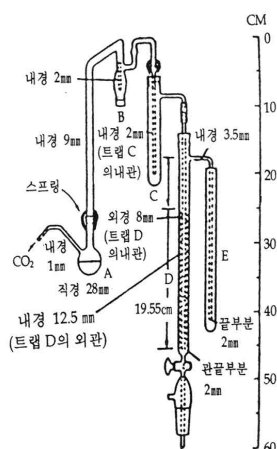
(8) Saponification Value : Accurately weigh 8 g of Polysorbate 20 into a 250 ml flask and add 50 ml of 0.5 N alcoholic solution of potassium hydroxide. This solution is used as Test solution. When this test solution is proceeded as directed under Saponification Value in Fats Test. The solution is heated to boil and red color reappears. It is titrated again until the color disappears. Saponification value is calculated by the following equation and should be within a range of 40~50.

(9) Lauric Acid : Approximately 25 g of Polysorbate 20 is accurately weighed into a 500 ml flask with a stopper and add 250 ml of alcohol and 7.5 g of potassium hydroxide. A condenser is attached and the solution is refluxed for 1~2 hours in a water bath. The resulting solution is transferred into a 800 ml beaker. The flask is washed with 100 ml of water and the wash water is added to the beaker. Alcohol is completely removed by evaporating in a water bath while water is added to supplement the alcohol that is removed. The solution is neutralized with diluted sulfuric acid (1→2) and 10% of the consumed amount is added. The resulting solution is heated while stirring until the fatty acid layer is separated. The fatty acid layer is transferred into a 500 ml separatory funnel with a stopcock. This was washed 3~4 times with 20 ml of hot water. Wash water is added to the previous aqueous saponified solution. This aqueous solution is extracted 3 times with approximately 50 ml of petroleum ether. Extracted phase is added to the fatty acid layer. This is evaporated to dryness in a container that is previously weighed. The amount of lauric acid should be within a range of 15~17%. The acid value of lauric acid is tested by the Acid Value in Flavoring Substances Test and should be within a range of 250~275.

Water Content Water content of Polysorbate 20 is determined by back titration method in water determination (Karl-Fisher Titration) and should not be more than 3%.

Residue on Ignition When thermogravimetric analysis is done with 5 g of Polysorbate 20, the amount of residue should not be more than 0.25%.

Assay Experimental apparatus is described below.



(1) Experiment Apparatus

A : Distillation flask with a stem through which CO_2 is passed.

B : A trap connected to air condenser (with red phosphorous suspension)

C : Absorption tube (with silver nitrate solution to absorb ethyl iodide)

D : Absorption tube (a spiral glass tube with a diameter of 1.75 mm. 8.5 mm height per 1 revolution. A stopcock is attached at the bottom.)

E : Trap (with potassium iodide to capture bromine that is pushed out by CO_2)

(2) Solution

Hydroiodic Acid : Hydrogen iodide with the highest purity is dissolved in alkoxyl.

Silver nitrate solution : 15 g of silver nitrate is dissolved in 50 ml of water and 400 ml alcohol and a few drops of nitric acid are added.

(3) Experimental Method : 60 mg of red phosphorous is suspended in 100 ml. Trap

(B) is filled with enough red phosphorous suspension so that the insertion tube is immersed in the suspension. 10 ml of silver nitrate solution, 15 ml of bromine-bromide solution, 10 ml of potassium iodide solution (1→10) are added to absorption tube (C), absorption tube (D), and trap (E). Approximately 65 mg of Polysorbate 20 is accurately weighed into a reaction flask (A) and 10 ml of hydroiodic acid and glass balls. A condenser is connected and CO_2 is bubbled through at a rate of 1 bubble per second. The flask is heated at $140\sim 145^\circ\text{C}$ in an oil bath at least for 40 minutes. The flask is heated until the reflux in the condenser becomes clear and the supernatant in the tube with silver nitrate solution becomes clear. Before the reaction is complete, olefin is removed by heating the absorption tube (C) $50\sim 60^\circ\text{C}$ for 5 minutes in a water bath. After the reaction is complete, the absorption tubes (D) and (C) are removed in this order and CO_2 connection tube and oil bath are removed. 150 ml of water and 10 ml of potassium

iodide solution (1→10) are added to a 500 ml flask, which is then connected to the absorption tube (D). Bromine · bromide solution in the absorption tube (D) is flowed into the flask and the tube and the spiral tube are washed with water. Potassium iodide solution in the trap (E) is transferred into the flask and the tube is washed with water. A stopper is placed on the flask, which is set-aside for 5 minutes. 5 ml of dilute sulfuric acid is added to the flask and the solution is immediately titrated with 0.05 N sodium thiosulfate solution (indicator : starch solution). Separately, a blank test is carried out and the content of oxyethylene as ethylene is calculated by the following equation.

$$\text{Content of oxyethylene (\%)} = \frac{[(B-S) \times N \times 2.203]}{\text{Weight of sample (g)}}$$

B : Consumed amount of 0.05 N sodium thiosulfate solution in blank test (ml)

S : Consumed amount of 0.05 N sodium thiosulfate solution in test with sample (ml)

N : Normality of sodium thiosulfate solution

Silver nitrate solution in the absorption tube (C) is transferred into another flask and the tube is washed with water. 150 ml of water is added to the solution, which is then boiled. After cooling, the solution is titrated with 0.05 N ammonium thiocyanate (indicator : 3 ml of ferric ammonium sulfate solution). Separately, a blank test is carried out in the same manner and the content (%) of oxyethylene ($-\text{CH}_2\text{CH}_2\text{O}-$) as ethylene iodide ($\text{C}_2\text{H}_5\text{I}$) is calculated by the following equation.

$$\text{Content of oxyethylene group (\%)} = \frac{[(B'-S') \times N' \times 4.405]}{\text{Weight of sample (g)}}$$

B' : Consumed amount of 0.05 N ammonium thiocyanate solution in blank test (ml)

S' : Consumed amount of 0.05 N ammonium thiocyanate solution in test with sample

N' : Normality of ammonium thiocyanate solution

The sum of these values is the content of oxyethylene group in the sample.

290. Polysorbate 60

Polyoxyethylene(20) Sorbitan Monostearate

Definition Polysorbate 60 is a partial ester mixture of sorbitol and anhydrous sorbitol with stearic acid and palmitic acid, where approximately 20 M of ethylene oxide is bonded to 1 M each of sorbitol, mono or polyhydrated form of sorbitol via condensation reaction.

Compositional Specifications of Polysorbate 60

Content Polysorbate 60, when calculated on the dried basis(anhydrous), should contain 65.0~69.5% oxyethylene (C_2H_4O), which corresponds 97.3~103.0% polysorbate 60.

Description Polysorbate 60 is yellow~orange yellow fluidic liquid or gel with slight characteristic scent and unpleasant and slightly bitter taste.

Identification (1) to 5 ml of Polysorbate 60 solution (1→20)m, add 5 ml of sodium hydroxide solution and boil for several minutes and cool. When the solution is acidified with dilute hydrochloric acid, it turns turbid with white color.

(2) A mixture of Polysorbate 60 : water (60:40) forms gel at temperature of 25°C or lower.

Purity (1) Acid value : Acid value of Polysorbate 60 proceed as directed under Purity (1) for [Polysorbate 20]. It should not be more than 2.

(2) Arsenic : 0.25 g of Polysorbate 60 proceed as directed under Purity (1) in [Guar Gum] (not more than 4 ppm).

(3) Lead : When 5.0 g of Polysorbate 60 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Cadmium : When 5.0 g of Polysorbate 60 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(5) Mercury : When Polysorbate 60 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) 1,4 Dioxan : Proceed as directed under Purity (6) in [Polysorbate 20], and its content should not be more than 5.0 ppm.

(7) Hydroxyl Value : Hydroxyl value is obtained by following the Purity (7) for [Polysorbate 20] and should be within a range of 81~96.

(8) Saponification Value : Saponification value is obtained by following the Purity (8) for [Polysorbate 20] and should be within a range of 44~55.

(9) Stearic Acid and Palmitic Acid : The content is obtained by following the Purity

(9) for [Polysorbate 20] and should be within a range of 21.5~26.0%. The acid value of stearic acid and palmitic acid, as obtained by the Acid Value Test in Flavoring Substances Test, should be within a range of 200~212. Solidification Temperature should not be less than 52°C.

Water Content Water content of Polysorbate 60 is determined by back titration method in water determination (Karl-Fisher Titration) and should not be more than 3%.

Residue on Ignition When thermogravimetric analysis is done with 5 g of Polysorbate 60, the amount of residue should not be more than 0.25%.

Assay Proceed as directed under Assay of [Polysorbate 20].

291. Polysorbate 65

Polyoxyethylene (20) Sorbitan Tristearate

Definition Polysorbate 65 is a partial ester mixture of sorbitol and anhydrous sorbitol with stearic acid and palmitic acid, where approximately 20 M of ethylene oxide is bonded to 1 M each of sorbitol, mono or dihydrated form of sorbitol via condensation reaction.

Compositional Specifications of Polysorbate 65

Content Polysorbate 65, when calculated on the dried basis(anhydrous), should contain 46.0~50.0% oxyethylene (C_2H_4O), which corresponds 96.0~104.0% polysorbate 65.

Description Polysorbate 65 is yellowish brown solid with slight characteristic scent and unpleasant and slightly bitter taste.

Identification To 5 ml of Polysorbate 65 solution (1→20), 5 ml of sodium hydroxide solution and boil for several minutes and cool. When the solution is acidified with dilute hydrochloric acid, it turns turbid with white color.

Purity (1) Acid Value : Acid value of Polysorbate 65 proceed as directed under Purity

(1) in [Polysorbate 20]. It should not be more than 2.

(2) Arsenic : 0.25 g of Polysorbate 65 proceed as directed under Purity (1) in [Guar Gum] (not more than 4 ppm).

(3) Lead : When 5.0 g of Polysorbate 65 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Cadmium : When 5.0 g of Polysorbate 65 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(5) Mercury : When Polysorbate 65 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) 1,4 Dioxan : proceed as directed under Purity (4) in [Polysorbate 20], and its content should not be more than 5.0 ppm.

(7) Hydroxyl Value : Hydroxyl value of Polysorbate 65 proceed as directed under Purity (5) for [Polysorbate 20] and should be within a range of 40~60.

(8) Saponification Value : Saponification value of Polysorbate 65 proceed as directed under Purity (6) in [Polysorbate 20] and should be within a range of 88~98.

(9) Stearic Acid and Palmitic Acid : Proceed as directed under Purity (7) for [Polysorbate 20]. It should be within a range of 42~44%. The acid value of stearic

acid and palmitic acid, as obtained by the Acid Value Test in Flavoring Substances Test, should be within a range of 200~212. Solidification Temperature should not less than 52°C.

Water Content Water content of Polysorbate 65 is determined by back titration method in water determination (Karl-Fisher Titration) and should not be more than 3%.

Residue on Ignition When thermogravimetric analysis is done with 5 g of Polysorbate 65, the amount of residue should not be more than 0.25%.

Assay Proceed as directed under Assay in [Polysorbate 20].

292. Polysorbate 80

Polyoxyethylene(20) Sorbitan Monooleate

Definition Polysorbate 80 is a partial ester mixture of sorbitol and anhydrous sorbitol with oleic acid, where approximately 20 M of ethylene oxide is bonded to 1 M each of sorbitol, mono or dihydrated form of sorbitol via condensation reaction.

Compositional Specifications of Polysorbate 80

Content Polysorbate 80, when calculated on the dried basis(anhydrous), should contain 65.0 ~69.5% oxyethylene (C_2H_4O), which corresponds 96.5~103.5% polysorbate 80.

Description Polysorbate 80 is yellow~orange yellow fluidic liquid or gel with slight characteristic scent and unpleasant and slightly bitter taste.

Identification (1) To 5 ml of Polysorbate 80 solution (1→20), add 5 ml of sodium hydroxide solution and boil for several minutes and cool. When the solution is acidified with dilute hydrochloric acid, it turns turbid with white color.

(2) To 5 ml of Polysorbate 80 solution (1→20), add bromine solution, then bromine' color disappears.

(3) A mixture of Polysorbate 80 : water (60:40) forms gel at temperature of 25°C or lower.

Purity (1) Acid Value : Acid value of Polysorbate 80 proceed as directed under Purity (1) in [Polysorbate 20] and should not be more than 2.

(2) Arsenic : 0.25 g of Polysorbate 80 proceed as directed under Purity (1) in [Guar Gum] (not more than 4 ppm).

(3) Lead : When 5.0 g of Polysorbate 80 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Cadmium : When 5.0 g of Polysorbate 80 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(5) Mercury : When Polysorbate 80 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) 1,4 Dioxan : Proceed as directed under Purity (6) in [Polysorbate 20], and its content should not be more than 5.0 ppm.

(7) Hydroxyl Value : Hydroxyl value of Polysorbate 80 proceed as directed under Purity (5) in [Polysorbate 20] and should be within a range of 65~80.

(8) Saponification Value : Saponification value of Polysorbate 80 proceed as directed under Purity (6) in [Polysorbate 20] and should be within a range of 45~55.

(9) Oleic Acid : Proceed as directed under Purity (7) for [Polysorbate 20]. It should be within a range of 22~24%. The acid value of oleic acid, as obtained by the Acid Value Test in Flavoring Substances Test, should be within a range of 196~206. Iodine value, as obtained by the following method, should be within a range of 80~92.

Iodine Value : Approximately 0.3 g of Polysorbate 80 is accurately weighed into a 500-ml Erlenmeyer flask with a stopper and 20 ml of carbon tetrachloride is added to dissolve the material. After adding 25 ml of Weiss solution, a stopper is placed and the flask is set-aside for 30 minutes in a dark place. 20 ml of potassium iodide solution and 100 ml (previously boiled and cooled) are added to the flask. The excess iodine is titrated with 0.1 N sodium thiosulfate solution. Sodium thiosulfate solution is added drop wise until yellow color disappears. Starch solution is added and the titration is continued until the blue color disappears completely. Near the end point, the flask is vigorously shaken with a stopper. Separately, a blank test is carried out by the same procedure.

$$\text{Iodine Value} = \frac{[(B-S) \times 1.269]}{\text{Weight of sample (g)}}$$

B : Consumed amount of 0.1 N sodium thiosulfate solution in the blank test (ml)

S : Consumed amount of 0.1 N sodium thiosulfate solution in the test for sample (ml)

Water Content Water content of Polysorbate 80 is determined by back titration method in water determination (Karl-Fisher Titration) and should not be more than 3%.

Residue on Ignition When thermogravimetric analysis is done with 5 g of Polysorbate 80, the amount of residue should not be more than 0.25%.

Assay Proceed as directed under Assay of [Polysorbate 20].

293. Sodium Polyacrylate

Compositional Specifications of Sodium Polyacrylate

Description Sodium Polyacrylate occurs as a white powder. It is odorless.

Identification To 0.2 g of Sodium Polyacrylate, add 100 ml of water by shaking, Test Solution. This solution is tested as follows.

- (1) When 1 ml of calcium chloride solution is stirred into 10 ml of Test Solution, white precipitate is formed immediately.
- (2) To 10 ml of Test Solution, add 1ml of magnesium sulfate solution, and shake. A white precipitate is formed.
- (3) To 10 ml of Test Solution, 1 ml of cobalt chloride solution (1→25) followed by 2~3 drops of ammonium chloride solution are added, pale red precipitate is generated. When the precipitate is dried, it turns violet.
- (4) The residue on ignition of Sodium Polyacrylate responds to the test for Sodium Salt in Identification.

Purity (1) Free Alkali : To 0.2 g of Sodium Polyacrylate, add 60 ml of water and dissolve while shaking well, add 3 ml of calcium chloride solution and heat in a water bath for about 20 minutes, cool, and filter. Wash the residue on the filter paper with water, combine the filtrate and the washings, and add water to make 100 ml. Use this solution as solution A. Measure 50 ml of solution A, and add 2 drops of phenolphthalein solution. No pink color develops.

- (2) Sulfate : When 1 ml of dilute hydrochloric acid is added to 20 ml of Purity in (1), which is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.
- (3) Arsenic : Proceed as directed under (1) Purity in [Guar Gum].
- (4) Lead : Sodium Polyacrylate is tested by Purity (2) for Sodium Metaphosphate(not more than 2.0 ppm).
- (5) Residual Monomers : Accurately weigh about 1 g of Sodium Polyacrylate, transfer into a 300 ml iodine bottle, add 100 ml of water, and dissolve by allowing to stand for about 24 hours while shaking occasionally. Add 10 ml of potassium bromate potassium bromide solution, accurately measured, shake well, add quickly about 10 ml of hydrochloric acid, immediately stopper tightly, shake well, transfer about 20 ml of potassium iodide solution into the top of the iodine bottle, and allow to stand in a dark place for 20 minutes. Loosen the stopper to allow the potassium iodide solution to flow into the solution, immediately stopper tightly, shake well, and titrate with 0.1 N sodium thiosulfate (indicator : starch solution). Perform a blank test in the same

manner, and calculate the content by the following formula. Not more than 1%.

$$\text{Content of residual monomer(\%)} = \frac{[0.0047 \times (a - b)]}{\text{Weight of sample (g)}} \times 100$$

a = volume (ml) of 0.1 N sodium thiosulfate consumed in the blank test,

b = volume (ml) of 0.1 N sodium thiosulfate consumed in this test.

- (6) **Low Molecular Weight Polymers** : Accurately weigh about 2 g of Sodium Polyacrylate, add 200 ml of water, and dissolve by setting it aside for 24 hours while shaking occasionally. Add 50 ml of hydrochloric acid while stirring, warm in a water bath at 40°C for 30 minutes while stirring, and allow to stand for 24 hours. Filter the solution, add 1 drop of phenolphthalein solution to the filtrate, add so hydroxide solution (2→5) until the color of the filtrate changes to a slightly pink color, and add drop wise diluted hydrochloric acid (1→30) until the pink color disappears. Add 200 ml of water, add drop wise 25 ml of calcium chloride solution while stirring, and warm in a water bath at about 40°C for 30 minutes while stirring. Filter this solution with suction through the above glass filter, wash the residue 3 times with about 10 ml of water each time, dry at 105°C for 3 hours, allow to cool in a desiccator, Accurately weigh, and calculate the content by the following formula. Not more than 5%.

Content of low molecular weight polymers (%) =

$$\frac{[(\text{Weight of the residue (g)} \times 1.0324)]}{\text{Weight of sample (g)}} \times 100$$

Loss on Drying When Sodium Polyacrylate is dried for 4 hours at 105°C, loss should not be more than 10%.

Residue on Ignition Sodium Polyacrylate is dried for 4 hours at 105°C. When thermogravimetric analysis is done with 1 g of Sodium Polyacrylate, the amount of residues should not be more than 76%

294. Polyisobutylene

Butyl Rubber

Definition Polyisobutylene is a polymer of isobutylene. It may contain not more than 2% of total polymer unit derived from isoprene.

Compositional Specifications of Polyisobutylene

Description Polyisobutylene occurs as a colorless to light yellow elastic rubbery semi-solid or viscous substance. It is odorless or has a slight, characteristic odor, and is tasteless.

Identification Dissolve about 1 g of polyisobutylene in 5 ml of n-hexane and proceed as directed under the Thin Film Method in Infrared Spectrophotometry. Absorptions are observed at about $1,393\text{ cm}^{-1}$, $1,230\text{ cm}^{-1}$, 950 cm^{-1} , 920 cm^{-1} .

Purity (1) Clarity and Color of Solution : Weigh 0.5 g of Polyisobutylene. add 5 ml of n-hexane, and dissolve while heating in a water bath at 80°C . It has Slightly turbid.

(2) Chlorinated Compounds : 0.5 g of Polyisobutylene transfer into a porcelain crucible, where 0.7 g of calcium carbonate. It is reduced to ash by gently heating. After cooling, residue is dissolved in 20 ml of dilute nitric acid and filtered. The filtrate is tested by Purity (2) for [Benzoic Acid].

(3) Arsenic : Proceed as directed under Purity (2) for [Vinyl Acetate Resin] (not more than 4 ppm).

(4) Heavy Metals : 2 g of Polyisobutylene transfer into a quartz or porcelain crucible and carbonize by heating mildly. After cooling, add 2 ml of nitric acid and 5 drops of sulfuric acid, it is heated until white smoke disappears, which is then reduced to ash by further heating at $450\sim 550^{\circ}\text{C}$. After cooling, 2 ml of hydrochloric acid is added, which is then evaporated to dryness in a water bath. 3 drops of hydrochloric acid and 10 ml of hot water are added to the resulting residue, which is then heated for 2 minutes. After cooling, 1 drop of phenolphthalein indicator solution is added, then ammonia solution is added until the color of the solution becomes pale red. The resulting solution is transferred into a Nestler cylinder by rinsing with water. 50 ml of test solution is prepared by adding 2 ml of diluted acetic acid (1 \rightarrow 20) and water. When this solution tested by Heavy Metal Limit Test, the content should not be more than 10 ppm. Color standard solution is prepared by the following procedure. 2 ml of nitric acid, 5 drops of sulfuric acid, and 2 ml of hydrochloric acid are added and evaporated to dryness in a crucible that is made of the same material used for test solution preparation. 3 drops of hydrochloric acid are added to the residue,

which is then transferred into another Nestler cylinder as described above. Finally, 2 ml of lead standard solution, 2 ml of diluted acetic acid (1→20), and water are added to bring the total volume to 50 ml.

- (5) Low Molecular Weight Polymer : Accurately weigh about 10 g of Polyisobutylene, add 40 ml of benzene, equip with a reflux condenser, and dissolve while heating on a water bath and shaking occasionally. Cool, add 40 ml of methanol, shake well, and allow to stand in a cold place for 1 hour. Transfer the supernatant to a flask, distill under reduced pressure at about 50°C and dry in a vacuum desiccator for 15~20 hours. Weigh the residue. Not more than 1.2%.
- (6) Total Unsaturated Substances : Accurately weigh 0.5 g of Polyisobutylene, transfer into a 500 ml flask containing 100 ml of carbon tetrachloride, stopper tightly the flask, and allow to stand overnight to dissolve completely. Add 5 ml of trichloroacetic acid-carbon tetrachloride solution (1→5), and add 20 ml of iodine-carbon tetrachloride solution and 20 ml of a solution of mercuric acetate in diluted acetic acid (3→100). Stopper tightly the flask and mix thoroughly by shaking vigorously. Allow to stand in a dark place for exactly 30 minutes, add 75 ml of potassium iodide solution (3→40), and shake vigorously for 2 minutes. Remove the stopper, wash the liquid on the wall into the flask with distilled water, and immediately titrate with 0.1 N sodium thiosulfate (indicator : starch solution). Perform a blank test in the same manner, and make any necessary correction. Calculate the total amount of unsaturated substances by the following formula. The amount is not more than 2.0%.

$$\text{Total amount of unsaturated substances (\%)} = \frac{[1.87 \times (a - b) \times N]}{\text{Weight of sample (g)}}$$

a : volume (ml) of 0.1 N sodium thiosulfate consumed in the blank test,

b : volume (ml) of 0.1 N sodium thiosulfate in this test.

N : normality of 0.1 N sodium thiosulfate solution

Residue on Ignition When thermogravimetric analysis is done with 2 g of Polyisobutylene, the residue should not be more than 0.1%.

295. Sodium Polyphosphate

Compositional Specifications of Sodium Polyphosphate

Content Sodium Polyphosphate, when calculated on the dried basis, should contain within a range of the equivalent of 53.0~80.0% of phosphorus pentaoxide ($P_2O_5 = 141.95$).

Description Sodium Polyphosphate occurs as a white powder or as colorless to white glassy fragments or lumps.

Identification (1) 0.1 g of Sodium Polyphosphate solution is dissolved in 10 ml of water, add diluted acetic acid to make weakly acidic, and add 1 ml of silver nitrate solution. A white precipitate is formed.

(2) Sodium Polyphosphate solution (1→20) responds to the test for Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : Weigh 1.0 g of powdered Sodium Polyphosphate, add 20 ml of water, heat, and dissolve. It has Colorless and very slightly turbid.

(2) Chloride : When 0.1 g of Sodium Polyphosphate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.6 ml of 0.01 N hydrochloric acid.

(3) Sulfate : Weigh 0.50 g of powdered Sodium Polyphosphate, add 30 ml of water and 2 ml of diluted hydrochloric acid, dissolve while boiling for 1 minute, cool. This solution is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.

(4) Orthophosphate : Weigh 1.0 g of powdered Sodium Polyphosphate, and add 2~3 drops of silver nitrate solution. No brilliant yellow color develops.

(5) Arsenic : 0.5 g of Sodium Polyphosphate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 2 ppm.

(6) Lead : Sodium Polyphosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(7) Cadmium : Sodium Polyphosphate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(8) Mercury : When Sodium Polyphosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(9) Fluoride : 1 g of Sodium Polyphosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When Sodium Polyphosphate is dried for 4 hours at 110°C, the weight loss should not be more than 5%.

Assay Proceed as directed under Assay for [Sodium Metaphosphate].

296. Potassium Polyphosphate

Compositional Specifications of Potassium Polyphosphate

Content Potassium Polyphosphate when calculated on the dried basis, should contain within a range of 43.0~76.0% of phosphorus pentaoxide ($P_2O_5 = 141.95$).

Description Potassium Polyphosphate occurs as white fibrous crystals or powder, or as colorless to white glassy flakes or lumps.

Identification (1) Potassium Polyphosphate responds to yields pale violet by the test for Flame Coloring Test.

(2) Dissolve 0.1 g of Potassium Polyphosphate and 0.4 g of sodium acetate in 10 ml of water, add diluted acetic acid to make slightly acidic, and add 3 ml of silver nitrate solution. A white precipitate is formed.

Purity (1) Clarity and Color of Solution : 1.0 g of Potassium Polyphosphate, add 4 g of sodium acetate, dissolved in 100 ml water. This solution should be colorless and slightly turbid.

(2) Chloride : When 0.1 g of Potassium Polyphosphate is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N sulfuric acid.

(3) Sulfate : Weigh 0.1 g of Potassium Polyphosphate, and add 30 ml of water and 2 ml of diluted hydrochloric acid. Dissolve while boiling for 1 minute, cool, and add water to make 50 ml. This solution is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.

(4) Orthophosphate : Weigh 1.0 g of Potassium Polyphosphate, and add 2~3 drops of silver nitrate solution. No brilliant yellow color develops.

(5) Arsenic : To 0.5 g of Potassium Polyphosphate, add 5 ml of water. This Solution is tested by Arsenic Limit Test and it should not be more than 2 ppm.

(6) Lead : Potassium Polyphosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(7) Cadmium : Potassium Polyphosphate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(8) Mercury : When Potassium Polyphosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(9) Fluoride : 1 g of Potassium Polyphosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

Loss on Drying When Potassium Polyphosphate is dried for 4 hours at 110°C, the

weight loss should not be more than 5%.

Assay To 0.5 g of Potassium Polyphosphate, previously dried and accurately weighed, add 25 ml of nitric acid and 60 ml of water, boiled for 30 minutes and cooled, and water is added to make 100 ml solution. 20 ml of this solution is mixed with 15 ml of magnesia solution, which is neutralized with ammonia water. Additional 15 ml of ammonia water is added and the solution is set-aside for 4 hours. Precipitate is filtered and washed with ammonia (1→4) until the filtrate does not show a reaction of chloride. It is then heat-treated until the weight becomes constant. It is then weighed as $\text{Mg}_2\text{P}_2\text{O}_7$.

$$\text{P}_2\text{O}_5 \text{ Content (\%)} = \frac{\text{Weight of } \text{Mg}_2\text{P}_2\text{O}_7(\text{mg}) \times 0.6379 \times 5}{\text{Weight of sample (mg)}} \times 100$$

297. Bleaching Powder

○ Designed Cancellation

The date of cancellation : 11.12.10(Notification No. 2010-82).

298. Furfural and its derivative

○ Designed Cancellation

The date of cancellation : 12.14.05(Notification No. 2005-77).

299. Fumaric Acid

Chemical Formula $C_4H_4O_4$

Molecular Weight 116.07

Compositional Specifications of Fumaric Acid

Content Fumaric Acid should contain not less than 99.0% of fumaric acid ($C_4H_4O_4$).

Description Fumaric Acid occurs as a white crystalline powder. It is odorless and has a characteristic acid taste.

Identification (1) Heat Fumaric Acid. It sublimes.

(2) Place 50 mg of Fumaric Acid into a test tube, add 2~3 mg of resorcinol and 1 ml of sulfuric acid. shake, heat at 120~130°C for 5 hours, cool, and add water to make 5 ml. While cooling this solution, add drop wise sodium hydroxide solution (2→5) to make it alkaline, and add water to make 10 ml. A green-blue fluorescence appears under ultraviolet light.

(3) To 0.5 g of Fumaric Acid. add 10 ml of water, dissolve by boiling, and add 2~3 drops of bromine solution while hot. The color of the solution disappears.

(4) Dry Fumaric Acid at 105°C for 3 hours. The melting point is 287~302°C (in sealed tube, decomposition).

Purity (1) Clarity and Color of Solution : 0.5 g of Fumaric Acid, dissolved in 10 ml of sodium hydroxide solution. This solution should colorless and clear.

(2) Sulfate : Weigh 1 g of Fumaric Acid, add 30 ml of water, shake, add 1 drop of phenolphthalein solution, and add drop wise ammonia solution until the color of the solution changes to a slightly pink color. Not more than 0.2 ml of 0.01 N as SO_4 .

(3) Arsenic : Weigh 0.25 g of Fumaric Acid, add 10 ml of water, dissolve by heating, and cool. Procedure Perform the test, using 10 ml of acidic stannous chloride solution and 3 g of arsenic-free zinc. (Not more than 4 ppm)

(4) Lead : When 5.0 g of Fumaric Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Mercury : When Fumaric Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Residue on Ignition When thermogravimetric analysis is done with Fumaric Acid, the residue should not be more than 0.05%.

Assay Accurately weigh about 1 g of Fumaric Acid, and dissolve in water to make exactly 250 ml. Measure exactly 25 ml of this solution, and titrate with 0.1 N sodium

hydroxide (indicator : 2 drops of phenolphthalein solution).

1 ml of 0.1 N sodium hydroxide = 5.804 mg of $\text{C}_4\text{H}_4\text{O}_4$

300. Monosodium Fumarate



Chemical Formula $\text{C}_4\text{H}_3\text{O}_4\text{Na}$

Molecular Weight 138.06

Compositional Specifications of Fumarate

Content Monosodium Fumarate when calculated on the dried basis, should contain within a range of 98.0~102.0% of monosodium fumarate ($\text{C}_4\text{H}_3\text{O}_4\text{Na}$)

Description Monosodium Fumarate occurs as a white crystalline powder. It is odorless and has a characteristic acid taste.

Identification (1) Proceed as directed under Identification (2) and (3) in Fumaric Acid.
(2) Monosodium Fumarate responds to the test for Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : Weigh 0.5 g of Monosodium Fumarate, add 10 ml of water, and shake to dissolve while warming at 40°C for 10 minutes. It is Colorless, clear.

(2) pH : When Monosodium Fumarate solution (1→30) proceed as directed under glass electrode method, it should be within a range of 3~4.

(3) Sulfate : Proceed as directed under Purity (2) in Fumaric Acid.

(4) Arsenic : Weigh 0.25 g of Monosodium Fumarate, add 10 ml of water, dissolve by heating, and cool. Procedure Perform the test, using 10 ml of acidic stannous chloride solution and 3 g of arsenic-free zinc. Standard color is processed in the same manner as sample. (Not more than 4 ppm)

(5) Lead : Monosodium Fumarate is tested by Purity (2) for Sodium Metaphosphate(not more than 2.0 ppm).

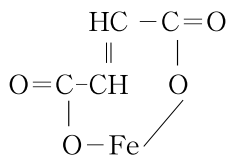
Loss on Drying When Monosodium Fumarate is dried for 4 hours at 120°C, the weight loss should not be more than 0.5%.

Residue on Ignition Monosodium Fumarate, previously dried, proceed as directed under thermogravimetric analysis, the residue should be within a range of 50.5~52.5%.

Assay Accurately weigh about 0.3 g of Monosodium Fumarate, previously dried, dissolve in 30 ml of water, and titrate with 0.1 N sodium hydroxide (indicators : 2 drops of phenolphthalein solution).

1 ml of 0.1 N sodium hydroxide = 13.81 mg of $\text{C}_4\text{H}_3\text{O}_4\text{Na}$

301. Ferrous Fumarate



Chemical Formula $\text{C}_4\text{H}_2\text{FeO}_4$

Molecular Weight 169.90

[Content Specifications of Ferrous Fumarate]

Content Ferrous Fumarate should contain within a range of 97.0~101.0% of ferrous fumarate ($\text{C}_4\text{H}_2\text{FeO}_4$).

Description Ferrous Fumarate is scentless orange red~reddish brown.

Identification (1) To 1.5 g of Ferrous Fumarate, add 25 ml of hydrochloric acid(1→2) and water to make 50 ml, and heat to dissolve the solid. After cooling, the solution is filtered through a glass filter. The precipitates are washed with diluted hydrochloric acid (3→100) and dried at 105°C. The filtrate is used in Identification (2). 40 mg of the dried precipitate is dissolved in 3 ml of water and 7 ml of 1 N sodium hydroxide solution. The solution is stirred until the solid is completely dissolved. Diluted hydrochloric acid is added to the solution until it turns acidic as determined with litmus paper. 1 g of p-nitrobenzyl bromide and 10 ml of alcohol are added to the solution, which is then refluxed for 2 hours. After cooling, it is filtered and the precipitates are washed with twice with small amount of alcohol and water mixture (2:1) and again twice with small amount of water. It is recrystallized in hot alcohol and dried at 105°C. The melting point should be approximately 152°C. (2) Test solution above (1) responds to the test for Ferric Salt in Identification.

Purity (1) Arsenic : 1 g of Ferrous Fumarate is dissolved in 10 ml of water and 10 ml of sulfuric acid. The solid material is dissolved by heating. After cooling, 30 ml is added to the solution, which is filtered and collected in a 100 ml flask. The precipitates are washed with water and the wash water is added to the filtrate. The total volume of the filtrate is brought up to 100 ml by adding water. 25 ml of the resulting solution is tested by Arsenic Limit Test. The content of arsenic should not be more than 4 ppm.

(2) Ferrous : 2 g of Ferrous Fumarate transfer into a 250 ml Erlenmeyer flask with a stopper and add 25 ml and 4 ml of hydrochloric acid are added to the flask, which is heated on a hot plate until the solid material dissolves completely. A stopper is

placed and the flask is set-aside to be cooled to room temperature. 3 g of potassium iodide is added and the stopper is placed. The flask is set-aside for 5 minutes in a dark place. After adding 75 ml of water to the solution, which is then titrated with 0.1 N sodium thiosulfate solution using starch solution as an indicator. The consumption of sodium thiosulfate solution should not be more than 7.16 ml.

- (3) Lead : 1.0 g of Ferrous Fumarate is weighed and transferred into 50 ml flask. Add 10 ml of 9 N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid-sodium iodide solution and 5 ml of trioctyl phosphine oxide solution and shake it to mix for 30 seconds. Add keep it to separate the layer and again add water so that organic layer reaches to neck part of flask. After shaking to mix it, keep it to separate the layer. This organic solvent layer is used as test solution. Separately, take 10 ml of lead standard solution and make it precisely to 100 ml. Take 2 ml of this solution and transfer into 50 ml flask. And operate under condition as test solution method, this solution is used as reference solution. When it is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, absorbance(luminous intensity) of test solution should not be more than absorbance(luminous intensity) of reference solution.(not be more than 2.0 ppm.)

Ascorbic acid-sodium iodide solution : 10 g of ascorbic acid and 19.3 g sodium iodide are dissolved in water to make to 100 ml.

Trioctyl phosphine oxide solution : 5 g of trioctyl phosphine oxide is dissolved in methyl isobutyl ketone to make to 100 ml.

- (4) Mercury : 1 g of Ferrous Fumarate is dissolved in 30 ml of dilute nitric acid by heating in a water bath. After cooling to room temperature, the solution is filtered through a No. 589 filter paper (or its equivalent). Filter paper is washed with diluted nitric acid and again with water. 20 ml of sodium citrate solution and 1 ml of hydroxylamine hydrochloride solution are added to the filtrate. Ammonia water is added to the solution until pH reaches 1.8 using a pH meter. This solution is transferred into a separatory funnel and extracted twice with 5 ml each of dithizone solution. It is then extracted with 5 ml of chloroform and aqueous layer is removed. This extract is added to the previous extract. Chloroform layer is removed from the mixed extract by mixing and shaking with 10 ml of diluted hydrochloric acid (1→2). 3 ml of chloroform is added again to completely remove dithizone from the acid solution. To this solution, 0.1 ml of 0.05 M EDTA solution and 2 ml of 6 N acetic acid are added and mixed well. 5 ml of ammonia water is slowly added to the resulting solution, which is then transferred into a beaker. With ammonia solution, pH is adjusted to 1.8. This solution is transferred into a separatory funnel again and 5 ml of

dithizone solution for extraction is added and well mixed by shaking (Test Solution). The color of Test Solution should not be deeper than that of Color Reference Solution (Nor more than 3 ppm). The Color Reference Solution is prepared by following the same procedure with 3 ml of mercury standard solution, 30 ml of diluted nitric acid, 5 ml of sodium citrate solution, and 1 ml of hydroxylamine hydrochloride.

Solution

- Dithizone solution for dilution extraction : 5 ml of dithizone solution for dilution extraction (Lead Limit Test : Dithizone Method) is mixed with 25 ml of chloroform. This is prepared just before use.
 - Sodium Citrate Solution : 250 g of sodium citrate (2 hydrated) is dissolved in 1,000 ml of water.
 - Mercury Standard Solution : 135.4 mg of mercury chloride is precisely weighed and dissolved in 1 N sulfuric acid (total volume 100 ml). 5 ml of this solution is diluted to 500 ml with 1 N sulfuric acid. Again 10 ml of this solution is further diluted to 100 ml with 1 N sulfuric acid. 1 ml of the final solution contains 1 μ g of HG.
- (5) Sulfate: 1 g of Ferrous Fumarate transfer into a 250 ml beaker and add water to make 100 ml, and heat in a water bath. Hydrochloric acid (approximately 2 ml) is added until the solid is completely dissolved. The solution filter if necessary and add water to make 100 ml. After the solution is heated to boil, 10 ml of barium chloride solution is added, which is then heated for 2 hours in a water bath and set-aside over night. The precipitates are filtered and washed with hot water. The filter paper along with the precipitates transfer into a crucible with a known weight and reduced to ash at 600°C. The crucible is then weighed. The amount of sulfate salts (as SO₄) should not be more than 0.2%. 1 mg of the residue corresponds to 0.412 mg of SO₄.

Loss on Drying When Ferrous Fumarate is dried for 16 hours at 105°C, the loss should not be more than 1%.

Assay Approximately 500 mg of Ferrous Fumarate is accurately weighed into a 500 ml Erlenmeyer flask and 25 ml of diluted hydrochloric acid (2→5) is added, which is heated to boil. A solution of 5.6 g stannous chloride in 50 ml of diluted hydrochloride solution (3→10) is added. When yellow color appears, 2 ml more is added. After cooling to room temperature, 8 ml of mercury chloride solution is added and the solution is set-aside for 5 minutes. 200 ml of water and 25 ml of diluted sulfuric acid (1→2), 4 ml phosphoric acid are added (Test Solution). After adding o-phenanthroline

solution, the Test Solution is titrated with 0.1 N cerium II sulfate.

$$1 \text{ ml of } 0.1 \text{ N cerium II sulfate} = 16.99 \text{ mg } \text{C}_4\text{H}_2\text{FeO}_4$$

302. Sodium Propionate



Chemical Formula $\text{C}_3\text{H}_5\text{O}_2\text{Na}$

Molecular Weight 96.06

Compositional Specifications of Sodium Propionate

Content Sodium Propionate, when calculated on the dried basis, should contain not less than 99.0% of sodium propionate ($\text{C}_3\text{H}_5\text{O}_2\text{Na}$).

Description Sodium Propionate occurs as white crystals, crystalline powder, or granules. It is odorless or has a slight, characteristic odor.

Identification (1) Proceed as directed under Identification (1) in Calcium Propionate.

(2) Sodium Propionate responds to the test for Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : 1 g of Sodium Propionate, dissolved in 20 ml of water. This solution should be colorless and slightly turbid.

(2) Free Acid and Free Alkali : 2 g of Sodium Propionate is dissolved in 20 ml of freshly boiled and cooled water. When 2 drops of phenolphthalein solution and 0.3 ml of 0.1 N hydrochloric acid are added, it becomes colorless. When 0.6 ml of 0.1 N sodium hydroxide solution is added to the solution, it becomes red.

(3) Arsenic : 0.25 g of Sodium Propionate is dissolved in 5 ml of water, test solution. Proceed as directly under arsenic test, the content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Sodium Propionate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(5) Iron : When 5.0 g of Sodium Propionate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 50 ppm.

(6) Mercury : When Sodium Propionate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Sodium Propionate is dried for 1 hour at 105°C, the weight loss should not be more than 5%.

Assay Accurately weigh about 200 mg of Sodium Propionate, previously dried, dissolve in 50 ml of acetic acid for nonaqueous titration, and warm if necessary. Titrate with 0.1 N perchloric acid (indicator : 1 drop of crystal violet-acetic acid solution). Perform

a blank test in the same manner, and make any necessary correction.

1 ml of 0.1 N perchloric acid = 9.606 mg of $\text{C}_3\text{H}_5\text{O}_2\text{Na}$

303. Benzyl Propionate



Chemical Formula $C_{10}H_{12}O_2$

Molecular Weight 164.20

Compositional Specifications of Benzyl Propionate

Content Benzyl Propionate should contain not less than 98.0% of benzyl propionate ($C_{10}H_{12}O_2$).

Description Benzyl Propionate is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Benzyl Propionate, add 5 ml of ethanolic 10% potassium hydroxide solution. Warm in hot water for 20 minutes. The characteristic odor disappears. Cool, and acidify with diluted sulfuric acid. An odor of propionic acid is evolved.

Purity (1) Specific Gravity : Specific gravity of Benzyl Propionate should be within a range of 1.032~1.036

(2) Refractive Index : Refractive Index n_D^{20} of Benzyl Propionate should be within a range of 1.496~1.500

(3) Clarity and Color of Solution : 1 ml of Benzyl Propionate dissolve in 3 ml of 70%v/v ethanol. This solution should be Clear.

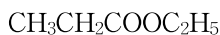
(4) Acid Value : Acid value of Benzyl Propionate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

(5) Chlorinated Compounds : Proceed as directed under Copper Mesh Method in Halogen Tests in Flavoring Substances Tests.

Assay Accurately weigh about 1 g of Benzyl Propionate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 82.10 mg of $C_{10}H_{12}O_2$

304. Ethyl Propionate



Chemical Formula $\text{C}_5\text{H}_{10}\text{O}_2$

Molecular Weight 102.13

Compositional Specifications of Ethyl Propionate

Content Ethyl Propionate should contain not less than 97.0% of ethyl propionate ($\text{C}_5\text{H}_{10}\text{O}_2$).

Description Ethyl Propionate is a colorless, transparent liquid having a characteristic odor.

Identification To 1 ml of Ethyl Propionate, add 5 ml of ethanolic 10% potassium hydroxide solution, and heat in hot water. The characteristic odor disappears. Cool, and acidify with diluted sulfuric acid. An odor of propionic acid is evolved.

Purity (1) Specific Gravity : Specific gravity of Ethyl Propionate should be within a range of 0.890~0.893

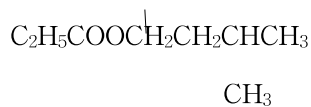
(2) Refractive Index : Refractive Index n_D^{20} of Ethyl Propionate should be within a range of 1.383~1.385

(3) Clarity and Color of Solution : 1 ml of Ethyl Propionate, dissolved in 3 ml of 50%v/v ethanol. This solution should be Clear.

(4) Acid Value : Acid value of Ethyl Propionate is tested by Acid Value in Flavoring Substance Test. It should not be more than 2.

Assay Accurately weigh about 1 g of Ethyl Propionate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 51.07 mg of $\text{C}_5\text{H}_{10}\text{O}_2$

305. Isoamyl PropionateChemical Formula $\text{C}_8\text{H}_{16}\text{O}_2$

Molecular Weight 144.22

Compositional Specifications of Isoamyl Propionate

Content Isoamyl Propionate should contain not less than 98.0% of isoamyl propionate($\text{C}_8\text{H}_{16}\text{O}_2$).

Description Isoamyl Propionate is a colorless to light yellow, transparent liquid having a characteristic odor.

Identification To 1 ml of Isoamyl Propionate, add 5 ml of ethanolic 10% potassium hydroxide solution, and heat in a water bath while shaking. The characteristic odor disappears, and an odor of isoamyl alcohol is evolved. Cool, and acidify with diluted sulfuric acid. An odor of propionic acid is evolved.

Purity (1) Specific Gravity : Specific gravity of Isoamyl Propionate should be within a range of 0.868~0.872

(2) Refractive Index : Refractive Index n_D^{20} of Isoamyl Propionate should be within a range of 1.404~1.408

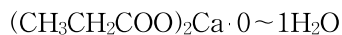
(3) Clarity and Color of Solution : 1 ml of Isoamyl Propionate, dissolved in 4 ml of 70% ethanol. This solution should be Clear.

(4) Acid value : Acid value of Isoamyl Propionate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 0.7 g of Isoamyl Propionate, and proceed as directed under Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 72.11 mg of $\text{C}_8\text{H}_{16}\text{O}_2$

306. Calcium Propionate



Chemical Formula $\text{C}_6\text{H}_{10}\text{O}_4\text{Ca} \cdot 0 \sim 1\text{H}_2\text{O}$

Compositional Specifications of Calcium Propionate

Content Calcium Propionate, when calculated on the dried basis, should contain not less than 98.0% of calcium propionate ($\text{C}_6\text{H}_{10}\text{O}_4\text{Ca} = 186.23$).

Description Calcium Propionate occurs as white crystals, powder or granules. It is odorless or has a slight, characteristic odor.

Identification (1) 0.5 g of Calcium Propionate, dissolved in 5 ml of water. When 5 ml of dilute sulfuric acid is added to a this solution, heat, a characteristic odor is generated.

(2) Calcium Propionate responds to the test for Calcium Salt.

Purity (1) Water-Insoluble Substances : To 10 g of Calcium Propionate, add 100 ml of water, and allow to stand for 1 hour while shaking occasionally. Filter the insoluble substances through a glass filter (IG4), wash with 30 ml of water, and dry at 180°C for 4 hours, and weigh the residue. Not more than 20mg.

(2) Free Acid and Free Alkali : Weigh 2.0 g of Calcium Propionate, dissolve in 20 ml of freshly boiled and cooled water, and add 2 drops of phenolphthalein solution, test solution. Proceed as directed under Purity (2) in Sodium Propionate.

(3) Arsenic : 0.25 g of Calcium Propionate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Calcium Propionate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(5) Iron : When 5.0 g of Calcium Propionate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 50 ppm.

(6) Mercury : When Calcium Propionate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Fluorides : 1.0 g of Calcium Propionate is weighed into a beaker, and dissolved in 10 ml of hydrochloric acid (1→10). Then the solution is heated for 1 minute, transferred into a PE beaker, and immediately cooled down in open air. 15 ml of trisodium citrate solution (1→4) and 10 ml of Disodium Ethylenediaminetetraacetate solution (1→40) are added and mixed by shaking. hydrochloric acid (1→10) or

sodium hydroxide solution (2→5) are added to bring the pH 5.4~5.6, where water is added to bring the total volume to 100ml, Test Solution. 50 ml of test solution transfer into a PE beaker. Then measure electric potential by using fluorine electrode and the obtained content of fluorine from calibration curve should not be more than 10 ppm.

Standard Solution : 2.210 g of sodium fluoride, which is previously dried for 4 hours at 200°C, is accurately weighed into a PE beaker and dissolved in 200 ml of water. Then add water to bring the total volume to 1,000ml and preserve it in a PE beaker. Measure exactly 5 ml of this solution into a measuring flask, and add water to bring the total volume to 1,000 ml. (1 ml of this solution contains 5 μ g of fluorine.)

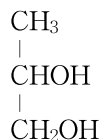
Calibration Curve Preparation : Separately, 1, 2, 3, 5, 10, and 15 ml of standard solution is weighed into a PE beaker, and 15 ml of Trisodium Citrate Solution (1→4) and 10 ml of Disodium Ethylenediaminetetraacetate solution (1→40) are added and mixed. To this solution, Hydrochloric acid (1→10) or Sodium Hydroxide Solution (2→5) are added to bring the pH 5.4~5.6, where water is added to bring the total volume to 100ml, separately. Each of 50 ml of the solution transfer into a PE beaker. Then measure electric potential by using fluorine electrode and prepare calibration curve with the log of fluorine concentration.

Loss on Drying When Calcium Propionate is dried for 2 hours at 120°C, the weight loss should not be more than 9.5%.

Assay Accurately weigh about 1 g of Calcium Propionate, previously dried, and dissolve in water to make exactly 100 ml. Take 25 ml of this solution, add 75 ml of water and 15 ml of 0.1% sodium hydroxide solution, and allow to stand for about 1 minute. 0.1 g of 2-oxy-1-(2'-oxy-4'-sulfo-1-naphtylazo)-2- naphthoic acid is added to the resulting solution, which is immediately titrated with 0.05 M EDTA solution. At the end point, the red color completely disappears and the solution turns blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA} = 9.312 \text{ mg of } \text{C}_6\text{H}_{10}\text{O}_4\text{Ca}$$

307. Propylene Glycol



Chemical Formula $\text{C}_3\text{H}_8\text{O}_2$

Molecular Weight 76.10

Compositional Specifications of Propylene Glycol

Content Propylene Glycol should contain not less than 98.0% of propylene glycol ($\text{C}_3\text{H}_8\text{O}_2$).

Description Propylene Glycol is a colorless, clear, viscous liquid. It is odorless and has a slightly bitter-sweet taste.

Identification (1) When thin plate chromatography is carried out with 5 μl of a solution of Propylene Glycol in methyl alcohol (1 \rightarrow 10) using a mixture of methyl alcohol and propylene glycol (10:1) as a reference solution and n-butyl alcohol methyl alcohol chloroform (5:3:2) as a developing solvent. A yellow spot is observed at the position as the reference. In this case, silica gel for thin layer chromatography (with phosphor) that is dried for 1 hour at 110°C is used as a porous support material. It is developed until the solvent front reaches approximately 15 cm from the starting point. It is then dried in air, heated for 10 minutes to remove solvent, and colorized by spraying thymol sulfuric acid solution and drying for 20 minutes at 110°C.

(2) To 1 ml of Propylene Glycol, add 0.5 g of potassium hydrogen sulfate, and heat. A fruity odor is evolved.

Purity (1) Specific Gravity : Specific gravity of Propylene Glycol should be within a range of 1.036~1.040

(2) Boiling Point : Boiling Point of Propylene Glycol should be within a range at 185~189°C.

(3) Free Acid : To 50 ml of water, add 1 ml of phenolphthalein solution, add sodium hydroxide solution (1 \rightarrow 2,500) until the pink color of the solution persists for 30 seconds, add 10 ml of Propylene Glycol, mix, and add 0.20 ml of 0.1 N sodium hydroxide. A pink color persists for not less than 30 seconds.

(4) Arsenic : Water is added to 10 g of Propylene Glycol to bring the total volume to 200 ml. 5 ml of the resulting solution is tested by Arsenic Limit Test. The content should not exceed 4 ppm.

- (5) Lead : When 5.0 g of Propylene Glycol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Water Content Water content of Propylene Glycol as determined by water content determination method (Karl-Fischer Method) should not be more than 0.2%.

Residue on Ignition When thermogravimetric analysis is done with 10 g of Propylene Glycol, the residue should not be more than 0.07%.

Assay Accurately weigh about 1 g of Propylene Glycol. and add water to make exactly 250 ml. Take 10 ml of this solution, transfer into a flask with a ground-class stopper. add 10 ml of sodium metaperiodate solution (1→40), accurately measured. add 4 ml of diluted sulfuric acid (1→2). shake well, and allow to stand for 40 minutes. Weigh 5 g of potassium iodide to the solution. add, immediately stopper tightly, shake well, allow to stand in a dark place for 5 minutes, and titrate with 0.1 N sodium thiosulfate (indicator : starch solution). Perform a blank test in the same manner.

$$1 \text{ ml of } 0.1 \text{ N sodium thiosulfate solution} = 3.8048 \text{ mg } \text{C}_3\text{H}_8\text{O}_2$$

308. Propylene Glycol Esters of Fatty Acids

Compositional Specifications of Propylene Glycol Esters of Fatty Acids

Description Propylene Glycol Esters of Fatty Acids occur as white to light yellow-brown powders, flakes, granules, waxy lumps, or are white to light yellow-brown, viscous liquids. They are odorless or have a slight, characteristic odor.

Identification (1) 100 ml of alcoholic solution of KOH is added to 10 g of Propylene Glycol Esters of Fatty Acids, which is heated for 1 hour in a water bath with a reflux condenser. Most of alcohol is then distilled out. After cooling, 50 ml of dilute hydrochloric acid is added to precipitate fatty acids. Fatty acids are removed by extracting twice with 50 ml each of petroleum ether. The solution is extracted 10 times with 30 ml each of ether. Extracts are combined and dehydrated with anhydrous sodium sulfate. Ether is evaporated out in a water bath. 0.3 g of the residue is again distilled in 3 ml of pyridine and 2.1 g of triphenylchloromethane in a water bath using a reflux condenser. After cooling, 60 ml of warm acetone is added to dissolve solid. 0.06 g of activated carbon is added and mixed, which is filtered. Filtrate is concentrated to one half of the initial volume in a water bath. It is then stored in a refrigerator. Crystals formed are collected and dried for 3 hours at 105°C. Melting point is 173~179°C.

(2) To 0.1 g of Propylene Glycol Esters of Fatty Acids, add 2 ml of ethanol, dissolve while warming, add 5 ml of diluted sulfuric acid, heat in a water bath for 30 minutes, and cool. Oil drops or white to yellow-white solids are formed. Separate the oil drops or solids, add 3 ml of ether, and shake. They dissolve.

Purity (1) Acid Value : Approximately 5 g of Propylene Glycol Esters of Fatty Acids is precisely weighed and heated and dissolved in 100 ml of alcohol, test solution. When this test solution is proceeded as directed under Acid Value in Fats Test, the value should not be more than 4.

(2) Arsenic : 0.25 g of Propylene Glycol Esters of Fatty Acids transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(3) Polyoxyethylene : To 1 g of the sample, add 20 ml of water, heat, mix well, and

cool it down. Add 10 ml of ammonium thiocyanate-nitric acid cobalt test solution, shake, and mix it well. Again, add 10 ml of chloroform, mix well, and allow to stand. Then the chloroform layer should not turn blue.

- (4) Lead : When 5.0 g of Propylene Glycol Esters of Fatty Acids is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (5) Cadmium : When 5.0 g of Propylene Glycol Esters of Fatty Acids is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Mercury : When Propylene Glycol Esters is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Residue on Ignition When thermogravimetric analysis is done with 1 g of Propylene Glycol Esters of Fatty Acids, the residue should not be more than 1.5%.

309. Sodium Pyrophosphate

Chemical Formula $\text{Na}_4\text{P}_2\text{O}_7 \cdot n\text{H}_2\text{O}$ ($n = 0$ or 10)

Molecular Weight anhydrous : 265.90, decahydrate : 446.09

Definition Sodium Pyrophosphate occurs as crystals (decahydrate) called Sodium Pyrophosphate (crystal) and as anhydrous called Sodium Pyrophosphate (anhydrous).

Compositional Specifications of Sodium Pyrophosphate

Content Sodium Pyrophosphate, when calculated on the dried basis, should contain not less than 95.0% of tetrasodium pyrophosphate ($\text{Na}_4\text{P}_2\text{O}_7 = 265.90$).

Description Sodium Pyrophosphate (crystal) occurs as colorless to white crystals or as a white crystalline powder. Sodium Pyrophosphate (anhydrous) occurs as white powder, granules or lumps.

Identification (1) 0.1 g of Sodium Pyrophosphate is dissolved in 10 ml of water, which is weakly acidified with dilute acetic acid. When silver nitrate solution is added to this solution, white precipitates are formed.

(2) Sodium Pyrophosphate solution (1→20) responds to test of Sodium Salt in Identification.

Purity Perform the test of Sodium Pyrophosphate, previously dried at 105°C for 4 hours

(1) Water Insoluble Substances : 10 g of Sodium Pyrophosphate is tested by Purity

(1) for [Acidic Sodium Pyrophosphate], its content should not be more than 0.2%.

(2) pH : When Sodium Pyrophosphate solution proceed as directed under glass electrode method, pH of the solution (1→100) should be within a range of 9.9~10.7.

(3) Arsenic : 0.25 g of Sodium Pyrophosphate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm .

(4) Lead : Sodium Pyrophosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」 , its content should not be more than 4.0 ppm.

(5) Cadmium : Sodium Pyrophosphate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」 , its content should not be more than 1.0 ppm.

(6) Mercury : When Sodium Pyrophosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Fluoride : 1 g of Sodium Pyrophosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」 , its content should not be more than 10 ppm.

Loss on Drying Sodium Pyrophosphate is dried for 4 hours at 105°C. It is then heat treated for 30 minutes at 550°C. The loss should not be more than 0.5% for

anhydrous form and 38.0~42.0% for decahydrate form.

Assay After heat treatment, approximately 500 mg of Sodium Pyrophosphate is transfer into a 400 ml beaker, add 100 ml of water. pH of the solution is adjusted to 3.8 using a pH meter. 50 ml of zinc sulfate solution (1→8) [125 g of $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ 125 g is dissolved in water to make 1,000 ml solution. pH is adjusted to 3.8] is mixed. After 2 minutes, Free acid is titrated with 0.1 N sodium hydroxide until pH become 3.8 again. However, after sodium hydroxide solution is added, the precipitated zinc hydroxide should be placed quietly to allow for melting again around the end point.

1 ml of 0.1 N sodium hydroxide solution = 13.30 mg $\text{Na}_4\text{P}_2\text{O}_7$

310. Potassium Pyrophosphate

Chemical Formula $K_4P_2O_7$

Molecular Weight 330.35

Compositional Specifications of Potassium Pyrophosphate

Content Potassium Pyrophosphate, when calculated on the dried basis, should contain not less than 95.0% of potassium pyrophosphate ($K_4P_2O_7$).

Description Potassium Pyrophosphate occurs as colorless to white crystalline powder or lumps, or as a white powder. It is hygroscopic.

Identification (1) Dissolve 0.1 g of Potassium Pyrophosphate in 10 ml of water and 2 ~3 drops of nitric acid, and add 1 ml of silver nitrate solution. A white precipitate is formed.

(2) 1 g of Potassium Pyrophosphate is dissolved in 20 ml of water and filtered. The filtrate responds to test of potassium salt.

Purity (1) Water Insoluble substances : 10 g of Potassium Pyrophosphate is tested by Purity (1) for 「Acidic Sodium Pyrophosphate」 and its content should not be more than 0.2% .

(2) Clarity and Color of Solution : 1 g of Potassium Pyrophosphate is dissolved in 100 ml of water. pH of this solution is pH 10.0~10.7.

(3) Arsenic : 0.5 g of Potassium Pyrophosphate is dissolved in 5 ml of water, Test Solution. This Test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.

(4) Lead : Potassium Pyrophosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」 , its content should not be more than 4.0 ppm.

(5) Cadmium : Potassium Pyrophosphate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」 , its content should not be more than 1.0 ppm.

(6) Mercury : When Potassium Pyrophosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Fluoride : 1 g of Potassium Pyrophosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」 , its content should not be more than 10 ppm.

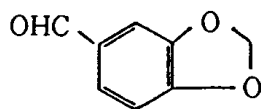
Loss on Drying When Potassium Pyrophosphate is dried for 4 hours at 105°C and strongly heated for 30 minutes at 550°, the weight loss should not be more than 2.0%.

Assay Approximately 600 mg of Potassium Pyrophosphate is dissolved in 100 ml of water. pH of the solution is adjusted to 3.8 with hydrochloric acid, where 50 ml of

zinc sulfate solution [125 g of 7-hydrated zinc sulfate is dissolved in water to bring the total volume to 1,000 ml. It is filtered and its pH is adjusted to 3.8] is added. After 2 minutes, pH is adjusted to 3.8 by titrating free acids with 0.1 N sodium hydroxide solution. However, near the end point, precipitated zinc hydroxide should be redissolved after adding sodium hydroxide solution.

1 ml of 0.1 N sodium hydroxide solution = 16.52 mg $\text{K}_4\text{P}_2\text{O}_7$

311. Piperonal



Chemical Formula $C_8H_6O_3$

Molecular Weight 150.13

Compositional Specifications of Piperonal

Content Piperonal, when calculated on the dried basis, should contain not less than 99.0% of piperonal ($C_8H_6O_3$).

Description Piperonal occurs as white crystals or lumps, having a characteristic odor.

Identification (1) Dissolve 0.1 g of Piperonal in 2 ml of sulfuric acid, and add 2 drops of a solution of resorcin in alcohol (1→20). A dark red color develops.

(2) Melt 1 g of Piperonal while warming, add 5 ml of sodium hydrogen sulfite solution, and heat in a water bath while shaking. White crystalline lumps are formed.

Purity (1) Melting Point : Melting point of Piperonal should be within a range of 36.0~37.5°C

(2) Clarity and Color of Solution : 1 g of Piperonal, dissolved in 4 ml of 70%v/v ethanol. This solution should be Clear.

(3) Arsenic : 0.25 g of Piperonal transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Piperonal is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 10 ppm.

Loss on Drying When Piperonal is dried for 4 hours in a vacuum desiccator(silica gel), the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with Piperonal, the

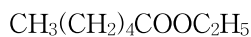
residue should not be more than 0.05%.

Assay Accurately weigh about 1 g of Piperonal, previously dried, and proceed as directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure, allow the mixture to stand for 15 minutes before titrating.

1 ml of 0.5 N hydrochloric acid = 75.07 mg of $\text{C}_8\text{H}_6\text{O}_3$

312. Ethyl Hexanoate

Ethyl Caproate



Chemical Formula $\text{C}_8\text{H}_{16}\text{O}_2$

Molecular Weight 144.21

Compositional Specifications of Ethyl Hexanoate

Content Ethyl Hexanoate should contain not less than 98.0% of ethyl hexanoate ($\text{C}_8\text{H}_{16}\text{O}_2$).

Description Ethyl Hexanoate is a colorless to light yellow, transparent liquid having a characteristic odor.

Identification To 1 ml of Ethyl Hexanoate, add 5 ml of alcoholic 10% potassium hydroxide solution, and heat in a water bath while shaking. The characteristic odor disappears. Cool, and acidify with diluted sulfuric acid. An odor of hexanoic acid is evolved.

Purity (1) Specific Gravity : Specific gravity of Ethyl Hexanoate should be within a range of 0.871~0.875

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Ethyl Hexanoate should be within a range of 1.406~1.409

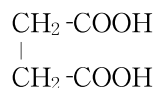
(3) Clarity and Color of Solution : When 1 ml of Ethyl Hexanoate is dissolved in 3 ml of 70% alcohol, the solution be almost clear.

(4) Acid value : Acid value of Ethyl Hexanoate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

Assay Accurately weigh about 0.7 g of Ethyl Hexanoate, and proceed as directed under Ester Content in Flavoring Substances Tests.

1 ml of 0.5 N alcoholic solution of potassium hydroxide = 72.11 mg of $\text{C}_8\text{H}_{16}\text{O}_2$

313. Succinic Acid



Chemical Formula $\text{C}_4\text{H}_6\text{O}_4$

Molecular Weight 118.09

Compositional Specifications of Succinic Acid

Content Succinic Acid should contain not less than 99.0% of succinic acid ($\text{C}_4\text{H}_6\text{O}_4$).

Description Succinic Acid occurs as colorless to white crystals or as a white crystalline powder. It is odorless and has a characteristic acid taste.

Identification Succinic Acid responds to test of Succinic Acid salt in Identification.

Purity (1) Melting Point : Melting point of Succinic Acid should be within a range of 185~190°C

(2) Lead : When 5.0 g of Succinic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(3) Mercury : When Succinic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(4) Readily Oxidizable Substances : Weigh 1 g of Succinic Acid, dissolve in 25 ml of water and 25 ml of diluted sulfuric acid. Add 4 ml of 0.1 N potassium permanganate, keep 20°C. The color of the solution does not disappear within 3 minutes.

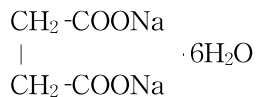
(5) Arsenic : When 0.25 g of Succinic Acid is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

Residue on Ignition When thermogravimetric analysis is done with 5 g of Succinic Acid, the residue should not be more than 0.025%.

Assay Accurately weigh about 1 g of Succinic Acid, and dissolve in water to make exactly 250 ml. Take 25 ml of this solution, and titrate with 0.1 N sodium hydroxide (indicator : 2~3 drops of phenolphthalein solution)

1 ml of 0.1 N sodium hydroxide = 5.904 mg of $\text{C}_4\text{H}_6\text{O}_4$

314. Disodium Succinate



Chemical Formula $\text{C}_4\text{H}_4\text{O}_4\text{Na}_2 \cdot 6\text{H}_2\text{O}$

Molecular Weight 270.15

Compositional Specifications of Disodium Succinate

Content Disodium Succinate, when calculated on the dried basis, should contain within a range of 98.0~101.0% of disodium succinate ($\text{C}_4\text{H}_4\text{O}_4\text{Na}_2 = 162.08$).

Description Disodium Succinate occurs as colorless to white crystals or as a white powder. It is odorless and has a characteristic taste.

Identification (1) Disodium Succinate responds to the test of Succinic Acid salt in Identification.

(2) Disodium Succinate responds to the test of Sodium Salt in Identification.

Purity (1) pH : pH of Disodium Succinate solution (1→20) should be within a range of 7.0~9.0.

(2) Sulfate : Weigh 1 g of Disodium Succinate, dissolve in 30 ml of water and neutralize with 1 % hydrochloric acid. Add 1 ml of dilute hydrochloric acid, Test Solution. Test Solution is tested by Sulfate Limit Test. Its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.

(3) Arsenic : When 0.25 g of Disodium Succinate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : Disodium Succinate is tested by Purity (2) for Sodium Metaphosphate(not more than 2.0 ppm).

(5) Readily Oxidizable Substances : Weigh 2 g of Disodium Succinate, dissolve in 20 ml of water and 30 ml of diluted sulfuric acid, Add 4 ml of 0.1 N potassium permanganate, keep 20°C. The color of the solution does not disappear within 3 minutes.

Loss on Drying When Disodium Succinate is dried for 2 hours at 120°C, the weight loss should be within a range of 37.0~41.0%.

Assay Accurately weigh about 0.15 g of Disodium Succinate, previously dried, dissolve in 30 ml of acetic acid for nonaqueous titration, and titrate with 0.1 N perchloric acid (indicator : 1 ml of crystal violet-acetic acid solution) until the color of the solution

changes from purple through blue to green. Separately, perform a blank test in the same manner.

1 ml of 0.1 N perchloric acid = 8.103 mg of $\text{C}_4\text{H}_4\text{Na}_2\text{O}_4$

315. Iron, Reduced

[Content Specifications of Reduced Iron

Content Iron, Reduced should contain not less than 96.0% of Iron (Fe).

Description Iron, Reduced is scentless black gray powder without gloss.

Identification A solution of Iron, Reduced in dilute sulfuric acid responds to test of ferrous reaction in Identification.

Purity (1) Acid Insoluble Substances : 1 g of Iron, Reduced is dissolved in 25 ml of dilute sulfuric acid, which is heated until the evolution of hydrogen gas stops. It is then filtered and the residue is washed with water until the reaction of sulfate salts stops. The residue is heated at 105°C until the weight becomes constant. The amount of the residue should not be more than 12.5 mg.

(2) Arsenic : To the remaining solution obtained in Acid Insoluble substances Test and add water to make 100 ml. Take 12.5 ml of this solution is tested by Arsenic Limit Test and it should not be more than 8 ppm.

(3) Lead : 1.0 g of Iron, Reduced is weighed and transferred into 50 ml flask. Add 10 ml of 9 N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid-sodium iodide solution and 5 ml of trioctyl phosphine oxide solution and shake it to mix for 30 seconds. Add keep it to separate the layer and again add water so that organic layer reaches to neck part of flask. After shaking to mix it, keep it to separate the layer. This organic solvent layer is used as test solution. Separately, take 10 ml of lead standard solution and make it precisely to 100 ml. Take 2 ml of this solution and transfer into 50 ml flask. And operate under condition as test solution method, this solution is used as reference solution. When it is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, absorbance(luminous intensity) of test solution should not be more than absorbance(luminous intensity) of reference solution.(not be more than 2.0 ppm.)

Ascorbic acid-sodium iodide solution : 10 g of ascorbic acid and 19.3 g sodium iodide are dissolved in water to make to 100 ml.

Trioctyl phosphine oxide solution : 5 g of trioctyl phosphine oxide is dissolved in methyl isobutyl ketone to make to 100 ml.

(4) Mercury : 1 g of Iron, Reduced is dissolved in 30 ml of dilute sulfuric acid and 1ml of potassium permanganate solution (3→50) is added (Test Solution). Hydroxylamine hydrochloride solution (1→5) is added until the purple color of potassium permanganate in the Test Solution disappears and manganese dioxide precipitates disappear. Then water is added to bring the total volume to 100 ml

(Test Solution). Using the Test Solution, the procedure in atomic spectrophotometry is followed. Test solution is added into a test bottle of atomic absorption spectrophotometer and 10 ml of stannous chloride solution is added. It is connected immediately to the atomic absorption spectrophotometer and a diaphragm pump is turned on to circulate the air. When the signal in the recorder rises suddenly and becomes constant, the absorption is measured. The absorption of the Test Solution should not be higher than that of the Standard Solution (not be more than 5 ppm). Atomic absorption of the mercury standard is measured by following the same procedure with 5 ml of mercury Standard Solution (for reduced iron).

Lamp : Mercury Hollow Cathode Lamp

Wavelength : 253.7 nm

Assay Approximately 0.2 g of Iron, Reduced, precisely weighed, transfer into a 300 ml Erlenmeyer flask, add 50 ml of diluted sulfuric acid. A Bunsen valve stopper is placed and iron is completely dissolved by heating in a water bath. After cooling, 50 ml of water (freshly boiled and cooled) and 2 drops of o-phenanthroline solution are added, which is then titrated with 0.1 N cerium II sulfate solution until pale blue color appears. Separately, a blank test is carried out following the same procedure.

1 ml of 0.1 N cerium II sulfate = 5.585 mg Fe

316. Sulfuric Acid

Chemical Formula H_2SO_4

Molecular Weight 98.08

Compositional Specifications of Sulfuric Acid

Content Sulfuric Acid should contain not less than 94.0% of sulfuric acid (H_2SO_4).

Description Sulfuric Acid is a colorless or slightly brownish, transparent or almost transparent, viscous liquid.

Identification (1) Sulfuric Acid solution (1→100) is strongly acidic.

(2) Sulfuric Acid solution (1→100) responds to the test of Sulfate Limit Test in Identification.

Purity (1) Chloride : When 2 g of Sulfuric Acid is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

(2) Nitrate : Weigh 5 g of Sulfuric Acid, add gradually to 8 ml of water, add 1 ml of a solution of brucine in sulfuric acid (1→500) and sulfuric acid to make 25 ml. shake well, and warm at about 80°C for 10 minutes. This solution as the test solution. Measure 0.5 ml of Nitrate Standard Solution, add 8 ml of water, add 5 ml of sulfuric acid gradually. add 1 ml of a solution of brucine in sulfuric acid (1→500) and sulfuric acid to make 25 ml. shake well, and warm at about 80°C for 10 minutes. This solution as the reference solution. The color of the test solution is not darker than that of the reference solution.

(3) Arsenic : When 0.25 g of Sulfuric Acid is dissolved in about 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : Accurately weigh 5.0 g of Sulfuric Acid, where water is added to make 25 ml, is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Mercury : When Sulfuric Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Selenium : 0.3 g of Sulfuric Acid, precisely weighed, transfer into a 150 ml beaker, where 25 ml of 4 N hydrochloric acid is put. Mix, heat until it boils, heat for 15 minutes in a water bath, add 25 ml of water, and cool, test solution. For reference solution, 2 ml of standard solution is weighed into a beaker and titrated with 50 ml of 2N hydrochloric acid. 50 ml of 2N hydrochloric acid is used for blank test

solution. 5 ml of ammonia water is carefully added to test solution, reference solution, and blank test solution. After cooling, adjust pH of each solution 1.8~2.2 with using ammonia water(1→2). To each solution, 0.2 g of Hydroxylamine Hydrochloride is added, carefully shaken, and dissolved. Then 2,3-Diamino Naphthalene solution is added, mixed, set aside for 100 minutes. Each solution transfer to separatory funnel, wash with 10 ml of water, add, and extract with 5 ml of cyclohexene. The aqueous layer is discarded, cyclohexene layer is centrifuged to remove slight amount of water. When absorption is analyzed at a wavelength of 380nm, the absorption of Test Solution should not be higher than that of the Standard Solution (Not more than 20 ppm).

Standard solution : Dilute Selenium standard solution or selling standard solution to 3 ppm with water.

2,3-Diamino naphthalene solution : Dissolve 0.1 g of 2,3-Diamino naphthalene solution and 0.5 g of hydroxylamine hydrochloride in 0.1N hydrochloric acid to make 100 ml.

(7) Iron : To 5.0 g of Sulfuric acid, add water to make 25 ml, test solution. When the solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 20 ppm.

(8) Readily Oxidizable Substances : Weigh 8 g of Sulfuric Acid, add to 10 ml of water while cooling. and add 0.1 ml of 0.1 N potassium permanganate. The pink color of the solution does not disappear within 5 minutes.

(9) Reducing substances : Weigh 8 g of Sulfuric Acid, add to 50 ml of iced water and carefully titrate. Add 0.1 ml of 0.1 N potassium permanganate. The pink color of the solution should not disappear within 5 minutes. (not more than 40 ppm as sulfur dioxide)

Residue on Ignition The residue should not be more than 1 mg when placing 5 g sulfuric acid on platinum or quartz dish, evaporating it under water and igniting it at 450~550°C until being same weight.

Assay Accurately weigh about 2 g of Sulfuric Acid. add to 50 ml of water. After cooling, add water to make exactly 100 ml, Take 25 ml of this solution, and titrate with 0.5 N sodium hydroxide (indicator : 1~2 drops of bromothymol blue solution).

1 ml of 0.5 N sodium hydroxide = 24.52 mg of H_2SO_4

317. Sodium Sulfate

Chemical Formula $\text{Na}_2\text{SO}_4 \cdot n\text{H}_2\text{O}$ ($n=0$ or 10)

Molecular Weight anhydrous 142.04, decahydrate 322.19

Definition Sodium Sulfate occurs anhydrous or contains 10 molecules of water of crystallization, each call sodium sulfate (crystal) and Sodium Sulfate (anhydrous).

Compositional Specifications of Sodium Sulfate

Content Sodium Sulfate, when calculated on the dried basis, should contain not less than 99.0% of sodium sulfate ($\text{Na}_2\text{SO}_4 = 142.05$).

Description Sodium Sulfate (crystal) occurs as colorless crystals or as a white crystalline powder. Sodium Sulfate (anhydrous) occurs as a white powder.

Identification Sodium Sulfate responds to the tests of Sodium Salt and Sulfate in Identification.

Purity Perform on test Sodium Sulfate, previously dried for 4 hours at 105°C .

- (1) Clarity and Color of Solution : When 1 g of Sodium Sulfate is dissolved in 10 ml of water, the solution should be colorless and not more than clear.
- (2) Chloride : When 1 g of Sodium Sulfate is dissolved in 100 ml of water and to 10 ml of the resulting solution, 6 ml of diluted nitric acid is added, test solution. The solution tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.
- (3) Arsenic : When 0.33 g of Sodium Sulfate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 3 ppm.
- (4) Lead : Sodium Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.
- (5) Mercury : When Sodium Sulfate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (6) Selenium : 0.2 g of Sodium Sulfate is precisely weighed and is tested by purity (6) for 「Sulfuric acid」, its content should not be more than 30 ppm.

Loss on Drying When Sodium Sulfate is dried for 4 hours at 105°C , the weigh loss should be within a range of 51~57%, and anhydrous should be not more than 1.0%.

Assay Accurately weigh about 0.4 g of Sodium Sulfate, previously dried, dissolve in 200 ml of water, add 1 ml of hydrochloric acid, boil, and add gradually 30 ml of barium chloride solution. Heat this solution in a water bath for 1 hour, cool, and filter through a filter paper for quantitative analysis. Wash the residue on the filter paper

with warm water until the washings do not respond to the test by Chloride Limit Test. Dry the residue with the filter paper. ignite to constant weight, and Accurately weigh as Barium Sulfate.

$$\text{Content of sodium sulfate (\%)} = \frac{\text{Weight of } BaSO_4(g) \times 0.6086}{\text{Weight of the sample (g)}} \times 100$$

318. Cupric Sulfate

Chemical Formula $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

Molecular Weight 249.69

Compositional Specifications of Cupric Sulfate

Content Cupric Sulfate should contain within a range of 98.5~104.5% of cupric sulfate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$).

Description Cupric Sulfate occurs as blue crystals or granules or as a deep blue crystalline powder.

Identification Cupric Sulfate responds to the tests for Cupric Salt and Sulfate in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Cupric Sulfate is dissolved in 20 ml of water, the solution should be almost clear.

(2) Free Acid : Weigh 1 g of Cupric Sulfate, dissolve in 20 ml of water, and add 2 drops of methyl orange solution. A green color develops.

(3) Arsenic : Weigh 0.25 g of Cupric Sulfate, and dissolve in 5 ml of water. Add 2 ml of acetic acid and 1.5 g of potassium iodide, allow to stand for 5 minutes add 0.2 g of L-ascorbic acid, and dissolve. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Cupric Sulfate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 10 ppm.

(5) Alkali Metals and Alkali Earth Metals : Weigh 6 g of Cupric Sulfate, dissolve in 150 ml of water, add 3 ml of sulfuric acid, and pass through hydrogen sulfide while warming to about 70°C until the solution is saturated. Cool, add water to make 280 ml, and filter. To the filtrate, add water to make 300 ml. Measure 100 ml of this solution, evaporate to dryness on a sand bath, ignite at 450~550°C to constant weight, and weigh the residue. The amount of residue should not be more than 4 mg.

Assay Accurately weigh about 0.7 g of Cupric Sulfate, transfer into a flask with ground-glass stopper, dissolve in about 100 ml of water, add 2 ml of acetic acid and 5 g potassium iodide, immediately stopper tightly, and allow to stand in a dark place for 5 minutes. Titrate this solution with 0.1 N sodium thiosulfate until the color of the solution change to light yellow color, dissolve 2 g of ammonium thiocyanate, add 3 ml of starch solution, and titrate again with 0.1 N sodium thiosulfate until the color

of the solution changes to an opaque color. Perform a blank test in the same manner, and make any necessary correction.

$$1 \text{ ml of } 0.1 \text{ N sodium thiosulfate} = 24.97 \text{ mg of } \text{CuSO}_4 \cdot 5\text{H}_2\text{O}$$

319. Magnesium Sulfate

Chemical Formula $\text{MgSO}_4 \cdot n\text{H}_2\text{O}$ ($n=7$ or 3)

Molecular Weight heptahydrate : 246.50, trihydrate : 174.41

Compositional Specifications of Magnesium Sulfate

Content Magnesium Sulfate, when calculated on the dried basis by ignite, should contain not less than 99.0% of magnesium sulfate ($\text{MgSO}_4 = 120.39$).

Description Heptahydrate of Magnesium Sulfate is a colorless, column-shaped or needle-shaped crystal with salty and bitter taste, and trihydrate is white powder with salty and bitter taste.

Identification Magnesium Sulfate responds to the tests for Magnesium Salt and Sulfate in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Magnesium Sulfate is dissolved in 10 ml of water, the heptahydrate is colorless and should not be more than clear, and the trihydrate is colorless and should be slightly turbid or less.

(2) Chloride : When 1 g of Magnesium Sulfate is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid.

(3) Arsenic : When 0.25 g of Magnesium Sulfate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : Magnesium Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(5) Selenium : 0.2 g of Magnesium Sulfate is precisely weighed and is tested by purity (6) for 「Sulfuric acid」, its content should not be more than 30 ppm.

(6) Iron : When the test solution in (4) Purity is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 20 ppm.

Loss on Ignition When Magnesium Sulfate is dried for 2 hours at 100°C and ignite at $300\sim 400^\circ\text{C}$ to constant weight, the weigh loss should be within a range of 40.0~52.0% for heptahydrate and 25.0~35.0% for trihydrate.

Assay Accurately weigh about 0.6 g of Magnesium Sulfate, previously ignited, and dissolve in 2 ml of diluted hydrochloric acid (1→4) and water to make exactly 100 ml. Measure exactly 25 ml of this solution, add 50 ml of water and 5 ml of ammonia-ammonium chloride buffer (pH 10.7), and titrate with 0.05 M EDTA solution

(indicator : 5 drops of Eriochrome black T solution) until the red-purple color of the solution changes to blue. Separately, perform a blank test in the same manner.

1 ml of 0.05 M EDTA solution = 6.018 mg of MgSO_4

320. Zinc Sulfate

Chemical Formula $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$

Molecular Weight 287.54

Compositional Specifications of Zinc Sulfate

Content Zinc Sulfate, when calculated on the dried basis(anhydrous), should contain not less than 98.0 % of zinc sulfate($\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$).

Description Zinc Sulfate occurs as colorless needles, granules, or white crystalline powder. it is odorless.

Identification Zinc Sulfate solution (1→20) responds to the tests of Zinc Salt and Sulfate in Identification.

Purity (1) Free acid : Zinc Sulfate solution (1→20) add 1 drop of methyl orange solution. The color of the solution does not change to pink

(2) Alkali Metal and Alkali-Earth Metals : Weigh 2 g of Zinc Sulfate, transfer to a 200 ml flask, dissolve in 150 ml of water, and add ammonium sulfide until the precipitate is no longer formed. Add water to make 200 ml, and filter through a dry filter paper. Discard the initial filtrate. take 100 ml of the subsequent filtrate, evaporate to dryness, ignite to constant weight, and weigh the residue. It is then heat treated until the weight becomes constant. The content should not be more than 0.5%.

(3) Arsenic : When 0.25 g of Sulfuric Acid is dissolved in 5 ml of water and test by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : Zinc Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(5) Cadmium : Zinc Sulfate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(6) Mercury : When Zinc Sulfate is tested by Mercury Limit Test, its content should not be more than 5.0 ppm.

Water Content Precisely weigh 0.1 g of Zinc Sulfate. When it is tested by the direct titration method in water content determination (Karl-Fischer Method), the water content should not be more than 43.5%.

Assay Accurately weigh about 300 mg of Zinc Sulfate, add 100 ml of water, add 5 ml of ammonia-ammonium chloride buffer, and titrate with 0.05 M EDTA (indicator : 0.1

ml of Eriochrome black T solution) until the color of the solution changes to blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA} = 8.073 \text{ mg of } \text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$$

321. Aluminium Ammonium Sulfate

Crystal : Ammonium Alum

Dried : Burnt Ammonium Alum

Chemical Formula $\text{AlNH}_4(\text{SO}_4)_2 \cdot 0 \sim 12\text{H}_2\text{O}$

Definition Aluminum Ammonium Sulfate occurs as crystals (dodecahydrate) called Aluminum Ammonium Sulfate and a dried substance called Aluminum Ammonium Sulfate (dried).

Compositional Specifications of Aluminum Ammonium Sulfate

Content Aluminum Ammonium Sulfate, when calculated on the dried basis at 200°C for 4 hours, should contain not less than 96.5% of aluminum ammonium sulfate $[\text{AlNH}_4(\text{SO}_4)_2]$.

Description Aluminum Ammonium Sulfate occurs as colorless to white crystals, powder, flakes, granules, or lumps. It is odorless and has an astringent taste.

Identification Aluminum Ammonium Sulfate solution (1→50) responds to all tests for Aluminum Salt, Ammonium Salt, and Sulfate (1) and (2) in Identification.

Purity (1) Clarity and Color of Solution or water-insoluble substances : Proceed as directed under Purity (1) in [Aluminum Potassium Sulfate].

(2) Arsenic : Proceed as directed under Purity (2) in [Aluminum Potassium Sulfate]. (not more than 4 ppm).

(3) Lead : Aluminum Ammonium Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 3.0 ppm.

(4) Mercury : When Aluminum Ammonium Sulfate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Selenium : 0.2 g of Aluminum Ammonium Sulfate is precisely weighed and is tested by purity (6) for 「Sulfuric acid」, its content should not be more than 30 ppm.

(6) Fluoride : 1 g of Aluminum Ammonium Sulfate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 30 ppm.

(7) Alkali metals and alkali earth metals : Weigh 1 g of Aluminum Ammonium Sulfate, dissolve in 100 ml of water, and add sufficient amount of ammonia solution to make it alkaline. (indicator : methyl red solution). Boil until the precipitate of aluminum is no longer formed and filter it. The filtrate is evaporated to dryness and ignited, the amount of residue should not be more than 5 mg.

(8) Iron : 0.054 g of Aluminum Ammonium Sulfate, previously dried for 4 hours at

200°C, dissolve in 6 ml of nitric acid(1→10) and water to make 20 ml. After adding 0.05 mg of ammonium peroxydisulfate and 5 ml ammonium thiocyanate solution(2→25), shake and mix, and 15 ml of n-butyl alcohol is added and mixed by shaking. The color of n-butyl alcohol layer should not be deeper than that of the color standard solution. The color standard solution is prepared by using 1 ml of iron standard solution with adding 6 ml of nitric acid(1→10) and water to make 20 ml, following the same procedure as the sample.

Assay Proceed as directed under Assay for [Aluminum Potassium Sulfate]

$$1 \text{ ml of } 0.01 \text{ M EDTA} = 2.371 \text{ mg of } \text{AlNH}_4(\text{SO}_4)_2$$

322. Aluminum Potassium Sulfate

Crystal: Potassium Alum or Alum

Desiccated: Burnt Alum

Chemical Formula $\text{AlK}(\text{SO}_4)_2 \cdot 0 \sim 12\text{H}_2\text{O}$

Definition Aluminum Potassium Sulfate occurs as crystals (dodecahydrate) called Aluminum Potassium Sulfate and a dried substance called Aluminum Potassium Sulfate (dried).

Compositional Specifications of Aluminum Potassium Sulfate

Content Aluminum Potassium Sulfate, when calculated on the dried basis for 4 hours at 200°C, should contain not less than 96.5% of aluminum potassium disulfate $[\text{AlK}(\text{SO}_4)_2]$

Description Aluminum Potassium Sulfate occurs as colorless to white crystals, powder, flakes, granules, or lumps. It is odorless and has an astringent taste.

Identification (1) The aqueous solution of Aluminum Potassium Sulfate (1→20) responds to all tests for Aluminum Salt(1) and Sulfate (1) and (3) in Identification.
(2) Aluminum Potassium Sulfate solution (1→20) responds to the tests for Potassium Salt (1) in Identification.

Purity (1) Clarity and Color of Solution or water-insoluble substances : To 1 g of crystals of Aluminum Potassium Sulfate, 10 ml of water is added and dissolved. Weigh 2 g of the dried substance, and add 200 ml of water. Heat for 10 minutes, cool, and filter through a glass filter (IG4), previously dried at 105°C for 30 minutes and accurately weighed after cooling. Wash the insoluble residue with 100 ml of water, and dry at 105°C for 2 hours together with the glass filter, and weigh the insoluble substances. The content should not be more than 40 mg (Water-insoluble substances : Not more than 2.0% (anhydrous)).
(2) Arsenic : Aluminum Potassium Sulfate is dried for 4 hours at 200°C. 0.25 g of Aluminum Potassium Sulfate is dissolved in 5 ml of water, This solution as the test Solution. This test Solution is tested by Arsenic Limit Test and it should not be more than 4 ppm.
(3) Lead : Aluminum Potassium Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 5.0 ppm.
(4) Mercury : When Aluminum Potassium Sulfate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
(5) Selenium : 0.2 g of Aluminum Potassium Sulfate is precisely weighed and is

tested by purity (6) for 「Sulfuric acid」, its content should not be more than 30 ppm.

(6) Fluoride : 1 g of Aluminum Potassium Sulfate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 30 ppm.

(7) Iron : 0.054 g of Aluminum Potassium Sulfate, previously dried for 4 hours at 20 °C, dissolve in 6 ml of nitric acid(1→10) and water to make 20 ml. Add 0.05 mg of ammonium peroxydisulfate and 5 ml ammonium thiocyanate solution(2→25), shake and mix, and 15 ml of n-butyl alcohol is added and mixed by shaking. The color of n-butyl alcohol layer should not be deeper than that of the color standard solution. The color standard solution is prepared by using 1 ml of iron standard solution with adding 6 ml of nitric acid(1→10) and water to make 20 ml, following the same procedure as the sample.

Assay Accurately weigh about 0.8 g of powdered Aluminum Potassium Sulfate, previously dried at 200°C for 4 hours, add 100 ml of water, dissolve by heating a water bath and shaking. filter, and wash the insoluble residue thoroughly with water. Combine the filtrate and the washings, add water to make exactly 200 ml. Measure exactly 25 ml of this solution, add exactly 50 ml of 0.01 M EDTA, and heat to boiling. Cool. add 7 ml of sodium acetate solution and 85 ml of absolute ethanol, and titrate the excess EDTA with 0.01 M zinc acetate (indicator : 3 drops of xylenol orange solution) until the yellow color of the solution changes to red.

$$1 \text{ ml of } 0.01 \text{ EDTA} = 2.582 \text{ mg of } \text{AlK}(\text{SO}_4)_2$$

323. Ammonium Sulfate

Chemical Formula $(\text{NH}_4)_2\text{SO}_4$

Molecular Weight 132.15

Compositional Specifications of Ammonium Sulfate

Content Ammonium Sulfate, when calculated on the dried basis, should contain not less than 99.0% of ammonium sulfate $[(\text{NH}_4)_2\text{SO}_4]$.

Description Ammonium Sulfate occurs as colorless crystals or white lumps.

Identification Ammonium Sulfate responds to the tests for Ammonium Salt and Sulfate in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Ammonium Sulfate is dissolved in 20 ml of water, the solution should be colorless and almost clear.

(2) Arsenic : 0.25 g of Ammonium Sulfate transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(3) Lead : Ammonium Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 5.0 ppm.

(4) Selenium : 0.2 g of Ammonium Sulfate is precisely weighed and is tested by purity (6) for 「Sulfuric acid」, its content should not be more than 30 ppm.

Loss on Drying When Ammonium Sulfate is dried for 3 hours at 130°C the loss should not be more than 1%.

Residue on Ignition When thermogravimetric analysis is done with Ammonium Sulfate, the residue should not be more than 0.25%.

Assay Accurately weigh about 3 g of Ammonium Sulfate, and dissolve in water to make exactly 250 ml. Take 25 ml of this solution, add 10 ml of sodium hydroxide solution (2→5), and immediately equip with a distilling apparatus equipped with a condenser and connected to a receiver containing 40 ml of 0.2 N sulfuric acid, exactly measured. Heat to distill ammonia into sulfuric acid, and titrate the excess sulfuric

acid with 0.2 N sodium hydroxide (indicator : 3 drops of methyl red solution).

1 ml of 0.2 N sulfuric acid = 13.22 mg of $(\text{NH}_4)_2\text{SO}_4$

324. Ferrous Sulfate

Chemical Formula FeSO_4

Definition Ferrous Sulfate Occurs as crystals (heptahydrate) called Ferrous Sulfate (crystal) and a dried substance (hydrated to sesquihydrate) called Ferrous Sulfate (dried).

Compositional Specifications of Ferrous Sulfate

Content Ferrous Sulfate (crystal) should contain within a range of 99.5~104.5% of ferrous sulfate heptahydrate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O} = 278.02$) and Ferrous Sulfate (dried) should contain within a range of 86.0~89.0% of ferrous sulfate ($\text{FeSO}_4 = 151.91$).

Description Ferrous Sulfate (crystal) occurs as whitish green crystals or crystalline powder. Ferrous Sulfate (dried) occurs as a gray~white powder.

Identification Ferrous Sulfate solution (1→100) responds to the tests for Ferrous Salt and Sulfate in Identification.

Purity (1) pH : pH of a solution of 1 g of Ferrous Sulfate (crystal) in 10 ml of water should be not less than 3.7.

(2) Arsenic : When 0.25 g of Ferrous Sulfate is dissolved in 5 ml of water and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(3) Lead : Accurately weigh 1.0 g of Ferrous Sulfate into a 50 ml flask, where 10 ml of 9N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid -sodium iodide solution, and 5 ml of trioctylphosphineoxid solution are added. Shake and mix it for 30 seconds, allow it to stand, and separate the layer. Again add water to set organic layer to the neck of the flask. Shake, mix, and set aside to separate the layer. The organic solvent layer is used as test solution. Separately, accurately measure 10 ml of lead standard solution to 100 ml, Accurately measure 2 ml of this solution into a 50 ml flask, and proceed in the same manner as test solution. When the test solution and reference solution are tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Ascorbic acid -sodium iodide solution: 10 g of ascorbic acid and 19.3g of sodium iodide solution are dissolved in water to make 100 ml.

Trioctylphosphineoxid solution : 5g of trioctylphosphineoxid is dissolved in methyl isobutyl ketone to make 100 ml.

(4) Mercury : When Ferrous Sulfate is tested by Mercury Limit Test, its content

should not be more than 1.0 ppm.

Assay Accurately weigh about 0.5 g of Ferrous Sulfate, dissolve in a mixture of 25 ml of diluted sulfuric acid (1→25) and 25 ml of freshly boiled and cooled water, and titrate with 0.1 N potassium permanganate.

◦ Ferrous Sulfate (crystal) : 1 ml of 0.1 N potassium permanganate = 27.802 mg of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

◦ Ferrous Sulfate (dried) : 1 ml of 0.1 N potassium permanganate = 15.191 mg of FeSO_4

325. Calcium Sulfate

Chemical Formula $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

Molecular Weight 172.27

Compositional Specifications of Calcium Sulfate

Content Calcium Sulfate should contain within a range of 98.0~105.0% of calcium sulfate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$).

Description Calcium Sulfate occurs as a white crystalline powder.

Identification To 1 g of Calcium Sulfate, add 100 ml of water, shake well, and filter. The filtrate responds to the tests for Calcium Salt and Sulfate in Identification.

- Purity**
- (1) Clarity and Color of Solution : Weigh 0.2 g of Calcium Sulfate, add 10 ml of diluted hydrochloric acid, and dissolve while heating. The turbidity of test solution should not be more than almost clear.
 - (2) Free Alkali : Weigh 0.5 g of Calcium Sulfate, add 100 ml of water, shake, filter, measure 10 ml of the filtrate, and add 1 drop of phenolphthalein solution. No pink color develops.
 - (3) Chloride : Weigh 0.2 g of Calcium Sulfate, add 20 ml of water, shake well, filter, and measure 5 ml of the filtrate. 6 ml of diluted nitric acid is added, test solution. The solution tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.
 - (4) Carbonate : Weigh 0.5 g of Calcium Sulfate, add 5 ml of diluted hydrochloric acid. No effervescence occurs.
 - (5) Arsenic : Weigh 1 g of Calcium Sulfate, add 30 ml of water and 6 ml of hydrochloric acid, dissolve while heating on a water bath, cool, and add water to make exactly 40 ml. 10 ml of which is test solution. Test Solution is tested by Arsenic Limit Test and the content should not be more than 4 ppm.
 - (6) Lead : Calcium Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.
 - (7) Mercury : When Calcium Sulfate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
 - (8) Selenium : 0.2 g of Calcium Sulfate is precisely weighed and is tested by purity (6) for 「Sulfuric acid」, its content should not be more than 30 ppm.
 - (9) Fluoride : 1 g of Calcium Sulfate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 30 ppm.

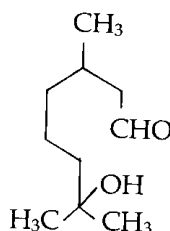
Loss on Ignition The loss on ignition of Calcium Sulfate should be within a range of

18~24%

Assay Accurately weigh about 1 g of Calcium Sulfate, add 40 ml of diluted hydrochloric acid, dissolve while heating on a water bath, cool, and add water to make exactly 100 ml. Proceed as directed under Calcium Salt Determination, using this solution as the test solution.

1 ml of 0.05 M EDTA = 8.609 mg of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

326. Hydroxycitronellal



Chemical Formula $C_{10}H_{20}O_2$

Molecular Weight 172.27

Compositional Specifications of Hydroxycitronellal

Content Hydroxycitronellal should contain not less than 95.0% of hydroxycitronellal ($C_{10}H_{20}O_2$).

Description Hydroxycitronellal is a colorless to light yellow, transparent liquid having a characteristic odor.

Identification To 1 ml of Hydroxycitronellal, add 5 ml of sodium hydrogen sulfite solution, and shake, It evolves heat and dissolves. Cool, and crystalline lumps are formed.

Purity (1) Specific Gravity : Specific gravity of Hydroxycitronellal should be within a range of 0.918~0.923

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Hydroxycitronellal should be within a range of 1.447~1.450

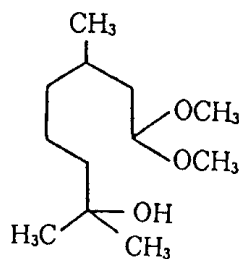
(3) Clarity and Color of Solution : When 1 ml of Hydroxycitronellal is dissolved in 1 ml of 50% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Hydroxycitronellal is tested by Acid Value in Flavoring Substance Test. It should not be more than 5.

Assay Accurately weigh about 1 g of Hydroxycitronellal and proceed as directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. In the procedure, allow the mixture to stand for 1 hour before titrating.

1 ml of 0.5 N hydrochloric acid = 86.13 mg of $C_{10}H_{20}O_2$

327. Hydroxycitronellal Dimethylacetal



Chemical Formula $C_{12}H_{26}O_3$

Molecular Weight 218.34

Compositional Specifications of Hydroxycitronellal Dimethylacetal

Content Hydroxycitronellal Dimethylacetal should contain not less than 95.0% of hydroxycitronellal dimethylacetal ($C_{12}H_{26}O_3$).

Description Hydroxycitronellal Dimethylacetal is a colorless or slightly yellowish, transparent liquid having a characteristic odor.

Identification To 1 ml of Hydroxycitronellal Dimethylacetal, add 1 ml of alcohol and 1 ml of 0.5 N sulfuric acid, and heat in a water bath for about 3 minutes while shaking. An odor of hydroxycitronellal is evolved.

Purity (1) Specific Gravity : Specific gravity of Hydroxycitronellal Dimethylacetal should be within a range of 0.925~0.930.

(2) Refractive Index : Refractive Index $[n]_D^{20}$ of Hydroxycitronellal Dimethylacetal should be within a range of 1.441~1.444.

(3) Clarity and Color of Solution : When 1 ml of Hydroxycitronellal Dimethylacetal is dissolved in 2 ml of 50% alcohol, the solution should be clear.

(4) Acid Value : Acid value of Hydroxycitronellal Dimethylacetal is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.

(5) Hydroxycitronellal : Accurately weigh about 5 g of Hydroxycitronellal Dimethylacetal, and proceed as directed under Method 2 in Aldehyde and Ketone Content in Flavoring Substances Tests. The volume of consumed 0.5 N hydrochloric acid per 1 g of the sample should not be more than 3 %. In the procedure, allow the mixture to stand for 1 hour before titrating.

Assay Accurately weigh about 1.5 g of Hydroxycitronellal Dimethylacetal and proceed as directed under Method 1 in Aldehyde and Ketone Content in favoring Substances Tests. In the procedure, boil the mixture for 5 minutes before titrating. Calculate the content by the following formula:

$$\text{Content (\%)} = \frac{(a-b) \times 109.17}{1,000} \times 100$$

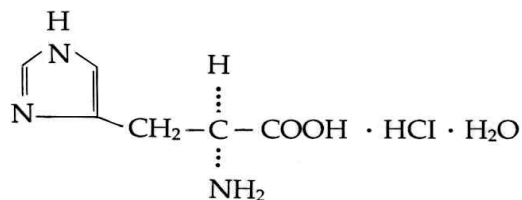
- a : Volume (ml) of consumed 0.5 N alcoholic solution of potassium hydroxide per 1 g of the sample,
- b : Volume (ml) of consumed 0.5N hydrochloric acid per 1 g of the sample obtained in purity (5).

328. Hydroxypropyl Distarch Phosphate

Designation cancelled

Date of Cancellation : '97. 6. 2 (Notification No. 1997-31)

329. L-Histidine Monohydrochloride



Chemical Formula $\text{C}_6\text{H}_9\text{O}_2\text{N}_3 \cdot \text{HCl} \cdot \text{H}_2\text{O}$

Molecular Weight 209.64

Compositional Specifications of L-Histidine Monohydrochloride

Content L-Histidine Monohydrochloride, when calculated on the dried basis, should contain within a range of 98.0~101.0% of L-histidine monohydrochloride ($\text{C}_6\text{H}_9\text{O}_2\text{N}_3 \cdot \text{HCl} \cdot \text{H}_2\text{O}$).

Description L-Histidine Monohydrochloride occurs as white crystals or crystalline powder. It is odorless and has a bitter and slightly acid taste.

Identification (1) Make L-Histidine Monohydrochloride solution (1→10) alkaline with sodium hydroxide solution (1→4). The solution is levorotatory. Acidify with hydrochloric acid. It turns dextrorotatory.

(2) To 5 ml of L-Histidine Monohydrochloride solution (1→1,000), add 1 ml of ninhydrin solution (1→1,000), and heat for 3 minutes. A purple color develops.

(3) L-Histidine Monohydrochloride responds to the test by Chloride Limit Test (2) in Identification.

(4) To 5 ml of L-Histidine Monohydrochloride solution (1→100), add 2 ml of bromine solution. The color of the solution changes to yellow. Heat gently. The solution becomes colorless, then changes to red-brown in color, and finally a blackish precipitate is formed.

Purity (1) Clarity and Color of Solution : When 1 g of L-Histidine Monohydrochloride is dissolved in 10 ml of water, the solution should be colorless and almost clear.

(2) pH : pH of L-Histidine Monohydrochloride solution (1→10) should be within a range of 3.5~4.5 as determined by glass electrode method.

(3) Specific Rotation : Approximately 5.5 g, previously dried for 3 hours at 98~100°C and precisely weighed, dissolve in 6 N hydrochloric acid to make 50 ml. Optical rotation of this solution should be within a range of $[\alpha]_D^{20} = +8.5 \sim +10.5^\circ$

(4) Arsenic : 0.25 g of L-Histidine Monohydrochloride is dissolved in 5 ml of water. This solution as the test solution. Test Solution is tested by Arsenic Limit Test and the content should not be more than 4 ppm.

(5) Heavy Metals : 2 g of L-Histidine Monohydrochloride is dissolved in 2 ml of

dilute acetic acid and 20 ml of water. This solution as the test solution. Test Solution is tested by Heavy Metal Limit Test and the content should not be more than 10 ppm.

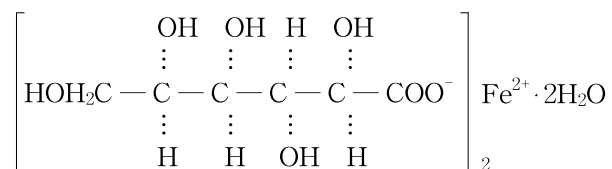
Loss on Drying When L-Histidine Monohydrochloride is dried for 3 hours at 98~100°C, the weight loss should not be more than 0.3%.

Residue on Ignition When thermogravimetric analysis is done with L-Histidine Monohydrochloride, the residue should not be more than 0.1%.

Assay Accurately weigh about 0.2 g of L-Histidine Monohydrochloride, previously dried, tested by Assay for [L-lysine Monohydrochloride]

1 ml of 0.1 N perchloric acid = 10.48 mg of $\text{C}_6\text{H}_9\text{O}_2\text{N}_3 \cdot \text{HCl} \cdot \text{H}_2\text{O}$

330. Ferrous Gluconate



Chemical Formula $\text{C}_{12}\text{H}_{22}\text{FeO}_{14} \cdot 2\text{H}_2\text{O}$

Molecular Weight 482.17

Compositional Specifications of Ferrous Gluconate

Content Ferrous Gluconate, when calculated on the dried basis, should contain not less than 95.0% of anhydrous ferrous gluconate ($\text{C}_{12}\text{H}_{22}\text{FeO}_{14}$).

Description Ferrous Gluconate occurs as yellow-gray to green-yellow powder or granules, having a slight, characteristic odor.

Identification (1) To 5 ml of warm Ferrous Gluconate solution (1→10), add 0.7 ml of glacial acetic acid and 1 ml of freshly distilled phenylhydrazine. It is heated in a water bath for 30 minutes and cooled. When the inner wall is rubbed with a glass rod, crystals are precipitated. These crystals are collected and dissolved in 10 ml of hot water, where activated carbon is added. After mixing by shaking, it is filtered. After cooling, the inner wall is rubbed with a glass rod to precipitate crystals. The melting point of the dried crystals should be within a range of 192~202°C.

(2) Ferrous Gluconate solution (1→20) responds to the test for Ferrous Salt in Identification.

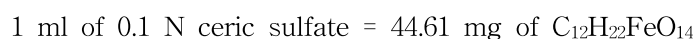
Purity (1) Arsenic : 0.25 g of Ferrous Gluconate transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Ferric : 5 g of Ferrous Gluconate transfer into a 250-ml Erlen Meyer flask with a stopper, where 100 ml of water and 10 ml of hydrochloric acid are added. 3 g of potassium iodide is added to the solution and the stopper is placed on the flask, which is then set aside for 5 minutes in a dark place. It is then titrated with 0.1 N sodium thiosulfate solution using starch solution as an indicator. The consumption of

- the solution should not be more than 18 ml (not more than 2.0% as Fe^{3+}).
- (3) Lead : When 5.0 g of Ferrous Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (4) Cadmium : When 5.0 g of Ferrous Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (5) Mercury : When Ferrous Gluconate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (6) Oxalate : Weigh 1 g of Ferrous Gluconate, dissolve in 10 ml of water and 2 ml of hydrochloric acid, transfer into a separating funnel, and perform extraction twice with 50 ml and 20 ml of ether. Combine the extracts. add 10 ml of water, evaporate the ether on a water bath, and add 1 drop of 36% acetic acid and 1 ml of calcium acetate solution (1→20). No turbidity appears within 5 minutes.
- (7) Reducing Sugar : Weigh 0.5 g of Ferrous Gluconate, add 10 ml of water, dissolve by warming, add 1 ml of ammonia solution, pass hydrogen sulfide through the solution, allow to stand for 30 minutes, and filter. Wash the residue on the filter paper twice with 5 ml of water each time, combine the filtrate and the washings, neutralize with hydrochloric acid, and add 2 ml of diluted hydrochloric acid. Concentrate the solution to about 10 ml. cool, add 5 ml of anhydrous sodium carbonate solution and 20 ml of water, filter, and add water to the filtrate to make 100 ml. To 5 ml of this solution, add 2 ml of Fehling solution, and boil for 1 minute. A yellow to red precipitate is not formed immediately.

Loss on Drying When Ferrous Gluconate is dried for 4 hours at 105°C , the weight loss should be within a range of 6.5~10%.

Assay Accurately weigh about 1.5 g of Ferrous Gluconate, previously dried. dissolve in 75 ml of water and 15 ml of diluted sulfuric acid. and add 250 mg of zinc dust. Allow to stand for 20 minutes, filter through a Gooch crucible with thin layer previously prepared of zinc dust, wash the residue with 10 ml of diluted sulfuric acid and then with 10 ml of water, combine the filtrate and the washings, add 2 drops of o-phenanthroline solution, and titrate immediately with 0.1 N ceric sulfate. Separately, perform a blank test in the same manner.



331. Copper Chlorophyll

Compositional Specifications of Copper Chlorophyll

Description Copper Chlorophyll occurs as blue-black to green-black powder, flakes, lumps, or viscous substances, having a characteristic odor.

Identification (1) Proceed as directed under (ii) of Identification (1) in Sodium Copper Chlorophyllin.

(2) Dissolve 10 mg of Copper Chlorophyll in 50 ml of ether, add 2 ml of a solution of sodium hydroxide in methanol (1→100), and shake. Equip with a reflux condenser, and heat on a water bath for 30 minutes. Cool, perform extraction 35 times with 10 ml of water each time, combine the extracts, add phosphate buffer (pH 7.5) to make 200 ml, and measure the absorbance of this solution. The solution exhibits absorption maxima at wavelengths of 403~407 nm and 630~640 nm. Taking the absorbances at the absorption maxima as A_1 and A_2 , respectively, A_1/A_2 should not be more than 4.01.

Purity (1) Specific Absorbance : Accurately weigh about 0.1 g of Copper Chlorophyll, dissolve in 50 ml of ether, add 10 ml of a solution of sodium hydroxide in methanol (2→100), and shake. Equip with a reflux condenser, and heat on a water bath for 30 minutes. Cool, perform extraction four times with 20 ml of water each time, combine the extracts, and add water to make exactly 100 ml. Filter this solution, measure exactly 5.0 ml of the filtrate, add phosphate buffer (pH 7.5) to make exactly 100 ml. Quickly measure absorbance. When the absorbance at the maximum absorption band near 405 nm and its value is converted into that of a dried form, $E_{1cm}^{1\%} = 62.0$ or higher. For this procedure avoid direct sunlight, and use a light-resistant container.

(2) Inorganic Copper Salt : Weigh 1 g of Copper Chlorophyll, and dissolve in 60 ml of acetone. Procedure Proceed as directed under Purity (8) in Sodium Copper Chlorophyll. (Not more than 300 µg/g as Cu)

(3) Arsenic : 0.25 g of Copper Chlorophyll transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with a small amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

- (4) Lead : When 5.0 g of Copper Chlorophyll is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
- (5) Cadmium : When 5.0 g of Copper Chlorophyll is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (6) Mercury : When Copper Chlorophyll is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (8) Residual Solvent : When Copper Chlorophyll is tested by Purity (5) for [Paprika Extract Pigments],

Acetone]	Not more than 50 ppm(individual or total if combined)
Methyl alcohol		
Ethyl alcohol		
Isopropyl alcohol		
Hexane		
Methylene Chloride		Not more than 10 ppm

- (8) Chlorophyllin Salt : Weigh 1 g of Copper Chlorophyll, dissolve in 30 ml of ether, add 20 ml of water, and shake. After standing, filter the water layer through a filter paper moistened with water. The filtrate is colorless.

Loss on Drying When Copper Chlorophyll is dried for 2 hours at 105°C, the weight loss should not be more than 3%.

332. Potassium Copper Chlorophyllin

[Content Specifications of Potassium Copper Chlorophyllin]

Content Potassium Copper Chlorophyllin, when calculated on the dried basis at 100°C for 1 hour, should contain not less than 95.0% of total copper chlorophyllin.

Description Potassium Copper Chlorophyllin is dark green~blue, black powder or dark green liquid.

Identification (1) The residue after thermogravimetric analysis using 1 g of Potassium Copper Chlorophyllin is dissolved in 10 ml of dilute hydrochloric acid by heating in a water bath. If the solution is not clear, it is filtered. 10 ml of water is added (Test Solution). The following tests are carried out with the Test Solution.

(A) When 5 ml of the Test Solution turns alkaline by adding ammonia solution, it shows blue color.

(B) When 0.5 ml of diethyldithio sodium carbamate solution (1→1,000) is added to 5 ml of the Test Solution, it forms brown precipitates.

(2) Test Solution in (1) responds to test of potassium salts in Identification.

(3) Approximately 0.1 g of Potassium Copper Chlorophyllin add water to make 1,000 ml. Take 10 ml of this solution is further diluted to 100 ml with phosphate buffer solution (pH 7.5). Using this solution, absorption is measured and the maximum absorption (converted to anhydrous form) near 405 nm should not be less than $[E]_{1cm}^{1\%} = 540$.

Purity (1) Arsenic : 0.25 g of Potassium Copper Chlorophyllin transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Lead : When 5.0 g of Potassium Copper Chlorophyllin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(3) Cadmium : When 5.0 g of Potassium Copper Chlorophyllin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When Potassium Copper Chlorophyllin is tested by Mercury Limit Test,

- its content should not be more than 1.0 ppm.
- (5) Inorganic Copper Salts : Proceed as directed under Purity (8) for [Sodium Copper Chlorophyllin]. However, Test Solution is prepared with 1 g of Potassium Copper Chlorophyllin in 60 ml water. (Not more than 200 µg/g as Cu)
- (6) Total Copper : 0.1 g of Potassium Copper Chlorophyllin, precisely weighed, transfer into a porcelain crucible. It is then heat-treated at a temperature below 50 0°C until carbon is removed. 1~2 drops of sulfuric acid is added to the residue, which is then reduced to ash. 5 ml of 10%(w/w) hydrochloric acid is added to the residue three times to the ash. It is then heated to dissolve the ash and filtered through a filter paper. The filtrate is cooled and the total volume is brought up to 100 ml with water (Test Solution). Test Solution is analyzed with atomic absorption spectrophotometer to obtain total copper. The content should not be more than 8% of the total Copper Chlorophyllin.
- (7) Alkaline Pigments : 5 ml of 0.5% aqueous solution of Potassium Copper Chlorophyllin transfer into a test tube. Add 1 ml of 1 N hydrochloric acid and 5 ml of ether, and well mixed, and set-aside. The ether layer should not be darker than pale green.
- (8) Residual Solvent : When Potassium Copper Chlorophyllin is tested by Purity (5) for [Paprika Extract Pigments],

Acetone]	Not more than 50 ppm(individual or total if combined)
Methyl alcohol		
Ethyl alcohol		
Isopropyl alcohol		
Hexane		
Methylene Chloride	—	Not more than 10 ppm

Assay Dissolve 1 g of Potassium Copper Chlorophyllin, previously dried at 100°C for 1 hour and accurately weighed in 20 ml of phosphate buffer solution (pH 7.5), which is diluted to 1,000 ml with water. 10 ml of this solution is further diluted to 100 ml with phosphate buffer solution (pH 7.5) (Test Solution). The content is calculated from the following equation using absorption A of the Test Solution at the maximum absorption near 403~406 nm wavelength with 1 cm path length.

$$\text{Content (\%)} = \frac{A \times 10^4}{565 \times \text{Weight of sample (g)}}$$

565 : Specific Optical Density of Potassium Copper Chlorophyllin ($[E]_{1cm}^{1\%}$)

333. Sodium Metabisulfite

Sodium Pyrosulfite

Chemical Formula $\text{Na}_2\text{S}_2\text{O}_5$

Molecular Weight 190.11

Compositional Specifications of Sodium Metabisulfite

Content Sodium Metabisulfite should contain not less than 95.0% of sodium metabisulfite ($\text{Na}_2\text{S}_2\text{O}_5$).

Description Sodium Metabisulfite is white crystallite or crystalline powder with odor of sulfur dioxide.

Identification Sodium Metabisulfite responds to test of bisulfite and sodium salts in Identification.

Purity (1) Clarity and Color of Solution : When 1 g of Sodium Metabisulfite is dissolved in 10 ml of water, the turbidity of the solution should be slightly turbid or better.

(2) pH : pH of Sodium Metabisulfite solution (1→10) should be within a range of 4.0~4.5.

(3) Thiosulfate : When 10% of Sodium Metabisulfite solution is acidified with sulfuric acid or hydrochloric acid, the solution should be transparent.

(4) Arsenic : 0.25 g of Sodium Metabisulfite, precisely weighed, transfer into a 150 ml beaker, add 10 ml of water, and 10 ml of nitric acid and 5 ml of sulfuric acid, and evaporate to 5 ml in a steam bath. The resulting concentrate is heated on a hot plate until a white smoke of sulfuric acid evolves. After cooling, 10 ml of water is used to wash down the splashed material on the beaker wall. It is then heated again on a hot plate until a white smoke of sulfuric acid evolves. This process is repeated again. Water is added to bring the total volume to 10 ml, Test Solution. When Test Solution is tested by Arsenic Limit Test, the content should not be more than 4 ppm.

(5) Lead : Sodium Metabisulfite is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(6) Mercury : When Sodium Metabisulfite is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Iron : When 5.0 g of Sodium Metabisulfite is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 10 ppm.

(8) Selenium : 2.0 g of Sodium Metabisulfite, precisely weighed, transfer into a 50 ml beaker, add 10 ml of water and 5 ml of hydrochloric acid and boil to remove sulfur dioxide, Test Solution. Separately, 1.0 g of Sodium Metabisulfite is precisely weighed into a beaker, where 0.5 ml of selenium standard solution is added. Then a reference solution is prepared by the same manner as for test solution. 2 g of hydrazin sulfate is added into each beaker, heated and dissolved. After setting for 5 minutes, the resulting solution is transferred into a Nestler cylinder with adding water to make 50 ml. The red color of this test solution should not be deeper than that of reference solution. (Not more than 5 ppm)

Assay Approximately 0.2 g of Sodium Metabisulfite, precisely weighed, transfer into a flask with a stopper filled with 50 ml of 0.1 N iodine solution. It is then dissolved. The stopper is placed and the flask is set-aside for 5 minutes. After 1 ml of hydrochloric acid is added, the excess iodine is titrated with 0.1 N sodium thiosulfate solution (indicator : starch solution).

1 ml of 0.1 N iodine solution = 4.753 mg of $\text{Na}_2\text{S}_2\text{O}_5$

334. Sodium Methoxide

Chemical Formula CH_3ONa

Molecular Weight 54.02

Compositional Specifications of Sodium Methoxide

Content Sodium Methoxide should contain not less than 95.0% of sodium methoxide (CH_3ONa).

Description Sodium Methoxide occurs as a white, hygroscopic, fine power.

Identification (1) Sodium Methoxide solution (1→100) is alkaline.

(2) To 1 drop of Sodium Methoxide solution (1→100), add 0.1 ml of diluted sulfuric acid (1→20) and 0.2 ml of potassium permanganate solution (1→300), and allow to stand for 5 minutes. Add 0.2 ml of anhydrous sodium sulfite solution (1→4) and 3 ml of sulfuric acid, and then add 0.2 ml of chromotropic acid solution. A red-purple to purple color develops.

(3) Sodium Methoxide responds to the test for Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : Weigh 5 g of Sodium Methoxide, and dissolve in freshly boiled and cooled water to make 100 ml. Test Solution Measure 20 ml of the sample solution, add 30 ml of freshly boiled and cooled water, the turbidity of the solution should be slightly turbid or better.

(2) Arsenic : Take 5 ml of the solution prepared in (1) above, neutralize gradually with diluted hydrochloric acid (1→4), and evaporate to dryness on a water bath. Dissolve the residue with 5 ml of water. The test solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(3) Lead : When 5.0 g of Sodium Methoxide is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(4) Mercury : When Sodium Methoxide is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Sodium Carbonate : Proceed as directed under Assay (3). (Not more than 0.5% as Na_2CO_3)

(6) Sodium Hydroxide : Proceed as directed under Assay (4). (Not more than 2.0% as NaOH)

Assay (1) Weigh quickly and accurately about 0.5 g of Sodium Methoxide. using a titration flask for Karl Fischer method, immediately add 10 ml of salicylic acid methanol solution, stopper tightly, dissolve, cool, and proceed as directed un (1)

Direct Titration in Water Determination (Karl Fischer Method). Perform a blank test on 10 ml of salicylic acid methanol solution in the same manner, and calculate the sum (A) of the contents of sodium hydroxide and sodium carbonate as sodium hydroxide (NaOH) by the following formula :

$$A (\%) = \frac{(a-b) \times f \times 2.222}{\text{Weight of the sample (g)} \times 1,000} \times 100$$

a = Volume (ml) of Karl Fischer solution consumed in this test,

b = Volume (ml) of Karl Fischer solution consumed in the blank test,

f = Weight (mg) of water corresponding to 1 ml of Karl Fischer solution.

Salicylic acid methanol solution: 10 g of salicylic acid is dissolved in 100 ml of methanol solution for Karl Fischer. Prepare prior to use.

(2) Weigh quickly and accurately about 2 g of Sodium Methoxide, using an Erlenmeyer flask with a ground-glass stopper, immediately and gently dissolve in about 50 ml of freshly boiled and cooled water. add 10 ml of barium chloride solution (3→25), stopper, allow to stand for 5 minutes, and titrate with 1 N hydrochloric acid (indicator : 2 drops of phenolphthalein solution). Calculate the sum (B) of the contents of sodium methoxide and sodium hydroxide as sodium methoxide (CH₃ONa) by the following formula:

$$B (\%) = \frac{0.054 \times \text{Volume of 1N hydrochloric acid consumed (ml)}}{\text{Weight of the sample (g)}} \times 100$$

(3) Add 1 ml of 1N hydrochloric acid to the solution after titration in (2) above, boil gently for about 5 minutes. cool, and titrate the excess acid with 0.1N sodium hydroxide. Calculate the content (C) of sodium carbonate (Na₂CO₃) by the following formula

$$C (\%) = \frac{0.053 [1 - \text{Volume of 0.1N hydrochloric acid consumed (ml)} \times 0.1]}{\text{Weight of the sample (g)}} \times 100$$

(4) Calculate the content (D) of sodium hydroxide (NaOH) by the following formula

$$D(\%) = A - (C \times 0.377)$$

(5) Calculate the content (E) of sodium methoxide (CH₃ONa) by the following formula

$$E(\%) = B - (D \times 1.350)$$

Storage Standards of Sodium Methoxide

Store in a hermetic container.

335. Modified Hop Extract

Definition Fruits of mulberry hop(*Humulus lupulus L.*) are ground and extracted with hexane or carbon dioxide. The extract is isomerized, reduced by adding hydrogen or sodium borohydride, and purified.

Compositional Specifications of Modified Hop Extract

Description Modified Hop Extract is yellow~yellowish green~yellowish brown liquid or paste. Or it is yellowish brown~reddish brown liquid containing reddish brown~dark brown paste with characteristic scent.

Identification Modified Hop Extract is dissolved in 0.012 N alkaline solution of methyl alcohol. The concentration is adjusted so that absorption at 253 nm is 0.6~0.9. Modified Hop Extract has the maximum absorption band near 253 nm and no absorption band at 325~330 nm.

◦ 0.012 N alkaline solution of methyl alcohol : 12 ml of 1 N sodium hydroxide solution is diluted to with methyl alcohol to 1 L.

Purity (1) Arsenic : 0.25 g of Modified Hop Extract transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(2) Lead : When 5.0 g of Modified Hop Extract is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 10 ppm.

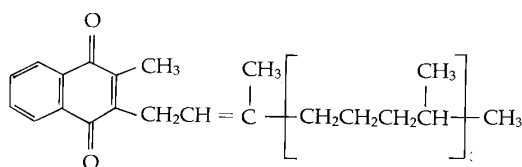
(3) Boron : 2 g of Modified Hop Extract transfer into a 500 ml flask for decomposition. 20 ml of water and 30 ml of nitric acid are added to the flask and mixed well, which is then heated gently. After cooling, 10 ml of sulfuric acid is added. By adding 2~3 ml of nitric acid at a time, the solution is heated until the liquid becomes colorless~pale yellow. This liquid is then cooled and 75 ml of water and 25 ml of saturated ammonium hydroxide solution are added. It is heated until white smoke appears. It is cooled and water is added so that the total volume is brought up to 50 ml (Test Solution). Separately, a blank test carried out following the same procedure to correct the Test Solution. The content of boron in boron standard solution, Test Solution, and blank test solution are obtained by ICP method

in Test Method of Harmful Metals in General Test Methods in Food Codes. The content of boron in Test Solution should not be more than 310 ppm (limited to cases where Modified Hop Extract is reduced by sodium boron hydride).

- (4) Hexane : Modified Hop Extract is tested by Purity (5) for [Paprika Extract Pigments]. The content of hexane should not be more than 25 ppm (limited to cases where hexane is used as extraction solvent)

336. Phylloquinone

Phytonadione



Chemical Formula $C_{31}H_{46}O_2$

Molecular Weight 450.71

Compositional Specifications of Phylloquinone

Content Phylloquinone should contain within a range of 97.0~102.0% of phylloquinone ($C_{31}H_{46}O_2$).

Description Phylloquinone is transparent sticky yellow~orange yellow liquid.

Identification (1) UV absorption spectrum of a solution of Phylloquinone in iso-octane (1→100,000) should be identical as the same absorption spectrum of a phylloquinone standard.

(2) Dissolve 50 mg of Phylloquinone in 10 ml of alcohol and add 1 ml of 10% potassium hydroxide alcoholic solution. It turns blue. When it is set-aside, the color changes from blue to violet and to brown.

(3) Dissolve 50 mg of Phylloquinone in 10 ml mixture of methyl alcohol:alcohol (1:1)(Test Solution). 0.75 g of sodium hydrosulfite is dissolved in 2 ml of warm water. When this solution is added to the Test Solution and shaken vigorously, the yellow color disappears.

Purity (1) Refractive Index : Refractive Index $[n]_D^{20}$ of Phylloquinone should be within a range of 1.525~1.529.

(2) Clarity and Color of Solution : When 1.0 g of Phylloquinone is dissolved in 10 ml of iso-octane, the solution should be clear and yellow.

(3) Absorption Ratio : Absorption (A_1 , A_2 , and A_3) of iso-octane solution of Phylloquinone (1→100,000) is measured at 248.5 nm, 253.5 nm, and 269.5 nm, respectively. A_2/A_1 and A_2/A_3 should be within a range of 0.69~0.73 and 0.74~0.78, respectively. Absorption (A_4 and A_5) of iso-octane solution of Phylloquinone(1→100,000) is measured at 284.5 nm and 326.0 nm, respectively. A_4/A_5 should be within a range of 0.28~0.34.

- (4) Lead : When 5.0 g of Phylloquinone is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (5) Menadione : To 20 mg of Phylloquinone, add 0.5 ml of mixture of alcohol and water (1:1) and add 1 drop of 1-phenyl-3-methyl-5-pyrazolon in alcohol and 1 drop of ammonia water, which is set-aside for 2 hours. The solution should not turn bluish violet.

Assay 0.1 g of Phylloquinone is precisely weighed into a 100 ml volumetric flask and add iso-octane to make 100 ml. Take 10 ml of this solution, add iso-octane to make 100 ml. Take 10 ml of the resulting solution, add iso-octane to make 100 ml (Test Solution). Separately, a Standard Solution is prepared using approximately 0.1 g (precisely weighed) of phylloquinone standard by following the same procedure as above. Maximum absorption near 248.5 nm is measured for Test Solution and Standard Solution with 1 cm path length using iso-octane as a reference. The content is calculated by the following equation.

$$\text{Content (\%)} = \frac{A_u}{A_s} \times \frac{W_s}{W_u} \times 100$$

Au : Absorption of Test Solution

As : Absorption of Standard Solution

Ws : Weight of standard material (g)

Wu : Weight of sample (g)

Storage Standards of Phylloquinone

Phylloquinone should be preserved in a sealed, Light-resistant container.

337. Magnesium Oxide

Chemical Formula MgO

Molecular Weight 40.30

Compositional Specifications of Magnesium Oxide

Content Magnesium Oxide, when calculated on the dried basis by ignite, should contain not less than 96.0% of magnesium oxide (MgO).

Description Magnesium Oxide occurs as a white or whitish, bulky powder. Identification Dissolve 1 g of Magnesium Oxide in 25 ml of diluted hydrochloric acid (1→3). The solution responds to the test for Magnesium Salt.

Purity (1) Water-Soluble Substances : To 2.0 g of Magnesium Oxide, add 100 ml of water, heat in a water bath for 5 minutes. and immediately filter. Cool, measure 25 ml of the filtrate, evaporate to dryness in a water bath, and dry at 105°C for 1 hour. Weigh the residue. its content should not be more than 2.0%.

(2) Free Alkali : Take 50 ml of the filtrate of (1), add 2 drops of methyl red solution, and add 2.0 ml of 0.1 N sulfuric acid. The red color of the solution does not disappear.

(3) Arsenic : When 0.25 g of Magnesium Oxide is dissolved in 5 ml of Dihydrochloric acid (1→4) and the solution is tested by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : Magnesium Oxide is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(5) Calcium Oxide : Take 50 ml of solution A prepared in Assay below, and add water to make 300 ml. Add 0.6 ml of tartaric acid (1→5), then 10 ml of triethanol amine (3→10) and 10 ml of potassium hydroxide solution (1→2). Allow to stand for 1 minute, titrate with 0.01 M EDTA, using a micro-burette (indicator: 0.1 g of 2-oxy-1-(2'-oxy-4'-sulfo-1'-naphthylazo)-3-naphthoesan solution), and express the consumed volume as B ml. The end point is observed when the red-purple color of the solution completely disappears and the solution becomes blue. (Not more than 1.5%)

$$\text{Content of Calcium oxide (CaO) (\%)} = \frac{B(\text{ml}) \times 0.5608}{\text{Weight of the sample (g)}}$$

Loss on Drying When Magnesium Oxide is dried at 800 ~ 825°C, the loss should not be more than 5%.

Assay Accurately weigh about 0.5 g of Magnesium Oxide, previously ignited, add 5 ml

of water, 10 ml of hydrochloric acid and 10 ml of perchloric acid, cover with a watch glass, and heat gradually. After thick white fumes are evolved, heat for another 10 minutes. Cool, add about 50 ml of hot water and 5 ml of diluted hydrochloric acid (1 → 2), heat slightly, and immediately filter through a filter paper for quantitative analysis, and add water to the filtrate to make exactly 500 ml. Take this solution as solution A. Measure exactly 10 ml of solution A, add water to make 100 ml, add 5 ml of ammonia-ammonium chloride buffer and 2 drops of Eriochrome black T solution, immediately titrate with 0.01 M EDTA until the red color of the solution changes to blue, and determine the consumed volume as A ml. Using B ml of the consumed volume obtained in Purity (6), calculate the content by the following for

$$\text{Content of magnesium oxide (MgO) (\%)} = \frac{(A - 0.2B) \times 2.0152}{\text{Weight of the sample (g)}}$$

338. Choline Chloride

(2-Hydroxyethyl)trimethylammonium Chloride



Chemical Formula $\text{C}_5\text{H}_{14}\text{ClNO}$

Molecular Weight 139.62

Compositional Specifications of Choline Chloride

Content Choline Chloride, , when calculated on the dried basis(anhydrous), should contain within a range of 98.0%~100.5% of choline chloride ($\text{C}_5\text{H}_{14}\text{ClNO}$).

Description Choline Chloride is colorless~white crystallite or white crystalline powder or crystalline powder with characteristic scent.

Identification (1) 0.5 g of Choline Chloride dissolve in 2 ml of water, and add 3 ml of sodium hydroxide solution and heat. It generates a smell of trimethyl amine.

(2) When 0.5 g of Choline Chloride dissolve in 2 ml of iodine solution, reddish brown precipitates are formed immediately. 5 ml of sodium hydroxide solution is added to dissolve the precipitates. Then the solution turns clear yellow. Upon heating, yellow precipitates are formed Producing a smell of iodoform.

(3) To 1 ml of Choline Chloride solution (1→100), add 2 ml of potassium ferrocyanide solution (1→100) and 2 ml of cobalt chloride solution, it turns green immediately.

◦ Cobalt Chloride Solution : 2 g of cobalt chloride (6 hydrated) is dissolved in 1ml of hydrochloric acid and sufficient water, which is diluted to 100 ml with water.

(4) Choline Chloride solution (1→20) responds to test of Chloride in Identification.

Purity (1) Lead : When 5.0 g of Choline Chloride is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0ppm.

(2) 1,4-Dioxane : To 0.5 g of Choline Chloride and 0.1 g of defoamer(containing silicone), add 10 ml of water and diffuse with ultrasonic waves, test solution. Transfer this solution into 25 ml of frit sparger, hold the temperature of container at 50℃, and analyze with Purge and Trap and Gas chromatograph. Separately, to the solution, which 2.5μg of 1,4-Dioxane is contained in 10 ml of water, add 0.1 g of defoamer, standard solution. Analyze the standard solutin in the same manner as the sample. (not more than 5.0 ppm)

Operation Condition

Purge and Trap

Trap : Vorcarb 3000 or its equivalent

Purge time : 11 minutes

Desorption temperature and time : 250°C, 4 minutes

Cryo focus temperature : -150°C

Bake temperature and time : 260°C, 10 minutes

Gas chromatography

Column : HP-FFAP(60m × 0.32µm) or its equivalent

Detector : (Hydrogen) Flame Ionization Detector (FID)

Column Temperature : held at 70°C for 5 minutes and is raised to 180°C at a rate of 5°C per minute

Temperature at injection hole : 200°C

Detector Temperature : 250°C

Carrier gas and flow rate : Nitrogen, 0.9 m per minute

Water Content Water content of Choline Chloride is determined by water determination (Karl-Fisher Method) and should not be more than 0.5%.

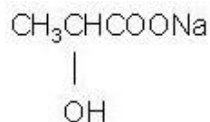
Residue on Ignition When thermogravimetric analysis is done with 4 g of Choline Chloride the amount of residue should not be more than 0.05%.

Assay Approximately 0.3 g of Choline Chloride is precisely weighed into a 250 ml Erlenmeyer flask. 50 ml of glacial acetic acid is added to the flask, which is then heated in a water bath until the solid dissolves completely. After cooling, 10 ml of mercury acetate for nonaqueous titration and 2 drops of crystal violet glacial acetic acid solution are added to the solution, which is then titrated with 0.1 N perchloric acid solution. At the end point, the solution turns green. Separately, a blank test is carried out by the same procedure.

1 ml of 0.1 N perchloric acid solution = 13.96 mg $C_5H_{14}ClNO$

339. Sodium Lactate

Sodium Lactate Solution



Chemical Formula $\text{C}_3\text{H}_5\text{NaO}_3$

Molecular Weight 112.06

Compositional Specifications of Sodium Lactate

Content Sodium Lactate should contain not less than 50.0% of sodium lactate ($\text{C}_3\text{H}_5\text{NaO}_3$) and 98.0~102.0% of the declared content.

Description Sodium Lactate is a colorless, clear, syrupy liquid. It is odorless or has a slight, characteristic odor.

Identification Sodium Lactate responds to the tests for Sodium Salt and Lactate in Identification.

Purity (1) pH : pH of Sodium Lactate should be within a range of 5.0~9.0

(2) Citric acid, Oxalic acid, Tartaric acid, and Phosphoric acid : 5 ml of Sodium Lactate is diluted to 50 ml with freshly boiled and cooled water. pH of 4 ml of this solution is adjusted to 7.3~7.7 with 6 N ammonium hydroxide solution or 3 N hydrochloric acid, if necessary. When 1 ml of calcium chloride solution is added and boiled for 5 minutes in a water bath, it should not turn turbid.

(3) Sulfate : Weigh the amount of Sodium Lactate corresponding to 4.0 g of sodium lactate and the content should not be more than amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.

(4) Cyanide : Weigh the amount of Sodium Lactate corresponding to 20 g of Sodium Lactate and transfer into a 100 ml of flask, where water is added to bring the total volume to 100 ml (Test Solution). Separately, 10 ml of sodium hydroxide solution transfer into a 100 ml flask, where 100 mg of potassium cyanide is added. 0.1 N sodium hydroxide solution is added to bring the total volume to 100 ml. Precisely 10 ml of this solution transfer into a 1,000 ml flask, which is then filled to 1,000 ml with 0.1 N sodium hydroxide solution (cyanide standard solution, which contains 10 µg per 1 ml.). 10 ml of Test Solution transfer into a 50 ml beaker, while 0.1 ml of cyanide standard solution and 10 ml of water are placed in another 50 ml beaker. These beakers are placed in an ice bath and pH of the solutions are adjusted to 9~10 with 20% sodium hydroxide solution. To avoid over heating, 20% sodium

hydroxide solution is slowly added while stirring. After settling for 3 minutes, pH of the solutions are adjusted to 5~6 with 10% phosphoric acid using a pH meter. These solutions are transferred into 100 ml separatory funnels containing 25 ml of cold water. Beakers and electrodes of pH meter are washed with a few ml of cold water into the separatory funnels. 2 ml of bromine solution is added and the funnel is capped with a stopper and then mixed. 2 ml of 2% sodium arsenic solution is added and then the funnel is capped and then mixed. 10 ml each of n-butyl alcohol is added to each transparent solution, a stopper is placed, and the solution is mixed. Finally, 5 ml mixture of p-phenylenediamine·pyridine is added, mixed, and set aside for 15 minutes. Aqueous phase is removed and alcoholic phase is filtered through a filter paper. When absorbance of each Test and Standard solution is measured at 480 nm using 1 cm path length. Absorbance of Test Solution should not be bigger than that of Standard Solution.

Solutions

- p-phenylenediamine·pyridine mixed solution : 200 mg of p-phenylenediamine hydrochloric acid is completely dissolved in 100 ml of water by heating. After cooling, the solution is settled to precipitate. The supernatant is used to prepare mixed solution. 128 ml of pyridine is dissolved in 365 ml of water, where 10 ml of hydrochloric acid is added and mixed. 30 ml of p-phenylenediamine solution is added to the resulting solution, which is settled for 24 hours before use. When this mixed solution is stored in a brown bottle, it is stable for 3 weeks.
- (5) Arsenic : Weigh the amount of Sodium Lactate corresponding to 0.77 g of sodium lactate and add water to make 10 ml. Test Solution should not be more than 1.3 ppm.
- (6) Lead : When 5.0 g of Sodium Lactate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (7) Mercury : When Sodium Lactate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (8) Chloride : Weigh the amount of Sodium Lactate corresponding to 0.5 g of Sodium Lactate and the content should not be more than amount that corresponds to 0.7 ml of 0.01 N hydrochloric acid.
- (9) Methanol and Methyl ester : 40 g of Sodium Lactate transfer into a round bottom flask, where 10 ml of water is added followed by carefully adding 30 ml of 5 N potassium hydroxide solution. It is then distilled with a condenser. 10 ml of alcohol is previously added to the collecting vessel of the condenser. It is distilled until

approximately 95 ml is collected. Water is added to bring the total volume to 100 ml (Test Solution). Separately, a standard solution is prepared so that it contains 10 mg of methyl alcohol in 100 ml of diluted alcohol (1→10). 10 ml each of Test and Standard Solution is transferred into a 25 ml flask, respectively. 5 ml each of potassium permanganate·phosphoric acid solution is added, mixed, and set aside for 15 minutes, where 2 ml each of oxalic acid·sulfuric acid solution is added and stirred with a glass rod until it becomes clear. 5 ml of puccine sulfite solution is added and water is added to bring the total volume to 25 ml. After 2 hours, absorbances of Test and Standard Solutions near the maximum absorption band near 575 nm are measured using water as a reference and 1cm path length. The absorbance of Test Solution should not be bigger than that of Standard Solution.

Solutions

- Potassium permanganate·Phosphoric acid solution : 3 g of potassium permanganate is added to a mixture of 15 ml of phosphoric acid and 70 ml of water. Water is added to bring the total volume to 100 ml.
 - Oxalic acid·Sulfuric acid solution : 50 ml of sulfuric acid is carefully added to 50 ml of water. After cooling, 5 g of oxalic acid is added and mixed until it dissolves.
- (10) Sugars : When 5 drops of Sodium Lactate is added to 10 ml of hot Fehling's solution, red precipitates should not be formed.

Assay Weigh precisely the amount of Sodium Lactate corresponding to 0.3 g of Sodium Lactate and place in a flask. Add 60 ml of mixture of anhydrous acetic acid·glacial acetic acid (1:4) and mix that. After settling for 20 minutes, it is titrated with 0.1 N perchloric acid solution (indicator : 1 ml of crystal violet · glacial acetic acid solution). The end point is where the color of the solution changes from blue to green. Separately, a blank test is carried out in the same manner.

1 ml of 0.1 N perchloric acid solution 1 ml = 11.21 mg $\text{C}_3\text{H}_5\text{NaO}_3$

340. Manganese Sulfate

Chemical Formula $\text{MnSO}_4 \cdot \text{H}_2\text{O}$

Molecular Weight 169.01

Compositional Specifications of Manganese Sulfate

Content Manganese Sulfate should contain within a range of 98.0~102.0% of manganese sulfate ($\text{MnSO}_4 \cdot \text{H}_2\text{O}$).

Description Manganese Sulfate is odorless pale red granule or powder.

Identification (1) When ammonium sulfide solution is added to Manganese Sulfate solution (1→10), orange red precipitates are formed. When acetic acid is added, the precipitates redissolve.

(2) Manganese Sulfate solution (1→10) respond to test of sulfate reaction in Identification.

Purity (1) Arsenic : Dissolve 1 g of Manganese Sulfate in 25 ml of water and test by Arsenic Limit Test (Not more than 4 ppm).

(2) Lead : Manganese Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

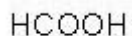
(3) Selenium : Dissolve 1 g of Manganese Sulfate in 100 ml of water (Test Solution). It is then tested by Cold Vapor Type of Atomic Absorption Spectrophotometry. The absorbance should not be bigger than that of Standard Solution, which is prepared by diluting 3 ml of selenium standard solution to 100 ml with water. (Not more than 30 ppm)

Loss on Ignition When Manganese Sulfate is heat treated at 400~500° until the weight becomes constant, the weigh loss should be within a range of 10~13%.

Assay 4 g of Manganese Sulfate is precisely weighed and dissolved in water to make 250 ml. 10 ml of hydrochloric acid hydroxylamine solution (1→10), 25 ml of 0.05 M EDTA solution, 25 ml of ammonia·ammonium chloride buffer solution, and 5 drops of eriochrome T black solution are added to 25 ml of this solution. While heating at 55~65°C, the solution is titrated with 0.05 M EDTA solution until it turns blue.

1 ml of 0.05 M EDTA = 8.450 mg of $\text{MnSO}_4 \cdot \text{H}_2\text{O}$

341. Formic Acid



Chemical Formula CH_2O_2

Molecular Weight 46.03

Compositional Specifications of Formic Acid

Content Formic Acid should not contain less than 85.0% of formic acid (CH_2O_2).

Description Formic Acid is colorless corrosive liquid with characteristic pungent smell.

Identification To 5 ml of Formic Acid, add 2 ml of mercury chloride solution and heat. White crystalline precipitates of mercurous chloride are formed.

Purity (1) Acetic Acid : To 1 ml (approximately 1.2 g) of Formic Acid, add water and to make 100 ml. Take 50 ml of this solution, transfer into a 250 ml distillation flask, and add 5 g of yellow mercury(II) oxide. A reflux condenser is attached and the mixture is boiled for 2 hours while stirring. After cooling, the mixture is filtered and the residue is washed with 25 ml of water. Wash water is added to the filtrate, which is then titrated with 0.02 N sodium hydroxide solution using phenolphthalein solution as an indicator. The consumed amount of sodium hydroxide solution should not be more than 2.0 ml.

(2) Dilution Test : When 1 unit of Formic Acid is diluted with 3 units of water, it should not become turbid within 1 hour.

(3) Sulfate: To 2.4 g of Formic Acid, add 10 mg of sodium carbonate, and evaporate to dryness on water bath. The residue is tested by Sulfate Limit Test Salts. The amount of sulfates should be equal to or less than the amount that corresponds to 0.2 ml of 0.01 N sulfuric acid.

(4) Lead : When 5.0 g of Formic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Assay 15 ml of water is added to a Erlenmeyer flask with a stopper, which is weighed. 1.5 ml of Formic Acid is added to the flask, which is then weighed again. This solution is diluted to 50 ml with water. The resulting solution is titrated with 15 ml of water 1 N sodium hydroxide solution (indicator : phenolphthalein solution).

$$1 \text{ ml of } 1 \text{ N sodium hydroxide solution} = 46.03 \text{ mg } \text{CH}_2\text{O}_2$$

342. Gluconic Acid

Gluconic Acid Solution

Definition Gluconic Acid is gluconic acid and glucono- δ -lactone solution.

Compositional Specifications of Gluconic Acid

Content Gluconic Acid should contain within a range of the equivalent of 50.0~52.0% of Gluconic Acid ($C_6H_{12}O_7 = 196.16$).

Description Gluconic Acid is a colorless to light yellow, clear syrupy liquid. It is odorless or has a slight odor, and has an acid taste.

Identification (1) When 1 drop of ferric chloride solution is added to 1 ml of Gluconic Acid solution (1 \rightarrow 25), a deep yellow color becomes.

(2) 4 ml of water is added to 1 ml of Gluconic Acid and proceed as directed under Identification (3) in Glucono- δ -Lactone.

Purity (1) Chloride : 0.5 g of Gluconic Acid proceed as directed under Chloride Limit Test. It should not be more than amount that corresponds to 0.5 ml of 0.01 N hydrochloric acid.

(2) Sulfate : 1 g of Gluconic Acid proceed as directed under Sulfate Limit Test. It should not be more than amount that corresponds to 0.5 ml of 0.01 N hydrochloric acid.

(3) Arsenic : 0.25 g of Gluconic Acid is dissolved in water to make 10 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

(4) Lead : When 5.0 g of Gluconic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(5) Mercury : When Gluconic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Sucrose or Reducing Sugar : To 1 g of Gluconic acid, add 10 ml of water and 2 ml of dilute hydrochloric acid and heat for 2 minutes. After cooling, 5 ml of sodium carbonate solution is added to the resulting solution, and cooled. which is then heated for 1 minutes in a water bath and cooled, immediately, orange yellow~red precipitates should not be formed.

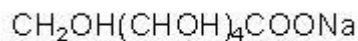
Residue on Ignition When thermogravimetric analysis is done with 5 g of Gluconic Acid, the residue should not be more than 0.10%.

Assay Accurately weigh about 1 g of Gluconic Acid, add 30 ml of water and 40 ml of 0.1 N sodium hydroxide, shake, allow to stand for 20 minutes, and titrate the excess alkali with 0.1 N sulfuric acid (indicator : 3 drops of phenolphthalein solution).

Separately, a blank test is carried out by the same procedure.

1 ml of 0.1 N sodium hydroxide = 19.616 mg of $\text{C}_6\text{H}_{12}\text{O}_7$

343. Sodium Gluconate



Chemical Formula $\text{C}_6\text{H}_{11}\text{NaO}_7$

Molecular Weight 218.14

[Content Specifications of Sodium Gluconate]

Content Sodium Gluconate should contain within a range of 98.0~102.0% of sodium gluconate ($\text{C}_6\text{H}_{11}\text{NaO}_7$).

Description Sodium Gluconate is white~yellowish brown platelet or powder.

Identification (1) Sodium Gluconate solution (1→20) responds to test of Sodium Salts in Identification.

(2) 0.7 ml of glacial acetic acid and 1 ml of freshly distilled phenyl hydrazine are added to 5 ml of warm aqueous solution (1→10), which is then heated for 30 minutes in a water bath and cooled. When inner wall is scraped with a glass rod, crystallites are precipitated.

Purity (1) Lead : When 5.0 g of Sodium Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(2) Reduced Materials : Approximately 1 g of Sodium Gluconate is weighed into a 250 ml Erlenmeyer flask. 10 ml of water is added to dissolve the solid and 25 ml of alkaline copper citrate solution. A small beaker is placed on top of the flask, which is heated for precisely 5 minutes. It is then rapidly cooled to room temperature. To this solution, 25 ml of diluted acetic acid (1→10), 10 ml of 0.1N iodine solution, 10 ml of dilute hydrochloric acid, and 3 ml of starch solution are added. The resulting solution is titrated with 0.1 N sodium thiosulfate solution until the blue color disappears. The content of reduced materials should not be more than 0.5%.

$$\text{Content of Reduced Materials (as glucose) (\%)} = \frac{(V_1N_1 - V_2N_2) \times 27}{\text{Weight of Sample (mg)}} \times 100$$

V_1 : Consumed amount of 0.1 N iodine solution (ml)

N_1 : Normality of 0.1 N iodine solution

V_2 : Consumed amount of 0.1 N sodium thiosulfate solution (ml)

N_2 : Normality of 0.1 N sodium thiosulfate solution

27 : Experimental corresponding amount for D-glucose

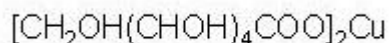
Assay Approximately 150 mg of Sodium Gluconate is weighed and dissolved in 75 ml of glacial acetic acid by heating. After cooling, quinaldine red solution is added. The

resulting solution is titrated with 0.1 N perchloric acid solution. The end point is where the color of the liquid disappears.

1 ml of 0.1 N perchloric acid solution = 21.81 mg $\text{C}_6\text{H}_{11}\text{NaO}_7$

◦ Quinaldine red solution : 100 mg of quinaldine red ($\text{C}_{21}\text{H}_{23}\text{IN}_2 = 430.33$) is dissolved in glacial acetic acid. Total volume of the solution is brought up to 100 ml with glacial acetic acid.

344. Copper Gluconate



Chemical Formula $\text{C}_{12}\text{H}_{22}\text{CuO}_{14}$

Molecular Weight 453.84

Compositional Specifications of Copper Gluconate

Content Copper Gluconate should contain within a range of 98.0~102.0% of copper gluconate ($\text{C}_{12}\text{H}_{22}\text{CuO}_{14}$).

Description Copper Gluconate occurs as a light blue powder.

Identification (1) Copper Gluconate solution (1→20) responds to test of Cupric Salts in Identification.

(2) Proceed as directed under Identification (2) for [Sodium Gluconate].

Purity (1) Lead : When 5.0 g of Copper Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(2) Reducing Materials : Approximately 1 g of Sodium Gluconate is weighed into a 250 ml Erlenmeyer flask. 10 ml of water is added to dissolve the solid and 25 ml of alkaline copper citrate solution. A small beaker is placed on top of the flask, which is gently heated for precisely 5 minutes. It is then rapidly cooled to room temperature. To this solution, 25 ml of diluted acetic acid (1→10), 10 ml of 0.1 N iodine solution, 10 ml of dilute hydrochloric acid, and 3 ml of starch solution are added. The resulting solution is titrated with 0.1N sodium thiosulfate solution until the blue color disappears. The content of reduced materials should not be more than 1.0%.

$$\text{Content of reducing matter (as glucose) (\%)} = \frac{(V_1N_1 - V_2N_2) \times 27}{\text{Weight of Sample (mg)}} \times 100$$

V_1 : Consumed amount of 0.1 N iodine solution (ml)

N_1 : Normality of 0.1 N iodine solution

V_2 : Consumed amount of 0.1 N sodium thiosulfate solution (ml)

N_2 : Normality of 0.1 N sodium thiosulfate solution

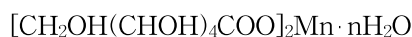
27 : Experimental corresponding amount for D-glucose

Assay Accurately weigh about 1.5 g of Copper Gluconate, transfer into a 250 ml Erlenmeyer flask, dissolve in 100 ml of water, add 2 ml of acetic acid and 5 g of potassium iodide, shake well. Titrate this solution with 0.1 N sodium thiosulfate until the color of the solution becomes to a yellow color, dissolve 2 g of ammonium

thiocyanate, and titrate again until the color of the solution becomes to an opaque color. (Indicator : Starch solution)

1 ml of 0.1 N sodium thiosulfate = 45.38 mg of $\text{C}_{12}\text{H}_{22}\text{CuO}_{14}$

345. Manganese Gluconate



Chemical Formula $\text{C}_{12}\text{H}_{22}\text{MnO}_{14} \cdot n\text{H}_2\text{O}$ ($n=2$ or 0)

Molecular Weight dihydrate : 481.27, anhydrous : 445.24

Compositional Specifications of Manganese Gluconate

Content Manganese Gluconate, when calculated on the dried basis(anhydrous), should contain within a range of 98.0~102.0% of manganese gluconate ($\text{C}_{12}\text{H}_{22}\text{MnO}_{14}$).

Description Manganese Gluconate is pale red powder.

Identification (1) When ammonium sulfate solution is added to Manganese Gluconate solution (1→20) , orange precipitates are formed. These precipitates is dissolved in acetic acid.

(2) Proceed as directed under Identification (2) for [Sodium Gluconate].

Purity (1) Lead : When 5.0 g of Manganese Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(2) Arsenic : 0.25 g of Manganese Gluconate is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

(3) Reduced Materials : Approximately 1 g of Manganese Gluconate is weighed into a 250 ml Erlenmeyer flask. 10 ml of water is added to dissolve the solid and 25 ml of alkaline copper citrate solution. A small beaker is placed on top of the flask, which is heated for precisely 5 minutes. It is then rapidly cooled to room temperature. To this solution, 25 ml of dilute acetic acid (1→10), 10 ml of 0.1 N iodine solution, 10 ml of dilute hydrochloric acid, and 3 ml of starch solution are added. The resulting solution is titrated with 0.1 N sodium thiosulfate solution until the blue color disappears. The content of reduced materials should not be more than 1.0%.

$$\text{Content of Reduced Materials (as glucose) (\%)} = \frac{(V_1N_1 - V_2N_2) \times 27}{\text{Weight of Sample (mg)}} \times 100$$

V_1 : Consumed amount of 0.1 N iodine solution (ml)

N_1 : Normality of 0.1 N iodine solution

V_2 : Consumed amount of 0.1 N sodium thiosulfate solution (ml)

N_2 : Normality of 0.1 N sodium thiosulfate solution

27 : Experimental corresponding amount for D-glucose

Water Content Water content of Manganese Gluconate is determined by water determination (Karl-Fisher Method) and should not be more than 3.0~9.0% and 6.0~9.0% for anhydrous and dihydrated, respectively. Test Solution should be kept for 30 minutes at 50°C prior to titration.

Assay Approximately 0.7 g of Manganese Gluconate, accurately weighed, dissolved in 50 ml of water and add 1 g of ascorbic acid, 10 ml of ammonia ammonium chloride buffer solution, and 5 drops of Eriochrom black solution, which is titrated with 0.05 M EDTA solution until the color becomes deep blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA solution} = 22.26 \text{ mg } \text{C}_{12}\text{H}_{22}\text{MnO}_4$$

346. Zinc Gluconate



Chemical Formula $\text{C}_{12}\text{H}_{22}\text{O}_{14}\text{Zn} \cdot n\text{H}_2\text{O}$ ($n=0\sim3$)

Molecular Weight 455.69

Compositional Specifications of Zinc Gluconate

Content If Zinc Gluconate, when calculated on the dried basis(anhydrous), it should contain 97.0~102.0% of zinc gluconate ($\text{C}_{12}\text{H}_{22}\text{O}_{14}\text{Zn}$).

Description Zinc Gluconate occurs as white crystalline powder or granules.

Identification (1) Zinc Gluconate solution (1→10) responds to the test for Zinc Salt in Identification.

(2) Proceed as directed under Identification (2) for [Sodium Gluconate].

Purity (1) Cadmium : When 5.0 g of Zinc Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(2) Chloride : When 0.3 g of Zinc Gluconate is tested by Chloride Limit Test, the content should not be more than the amount that corresponds to 0.42 ml of 0.01 N hydrochloric acid.

(3) Sulfate : When 0.49 g of Zinc Gluconate is tested by Sulfate Limit Test, the content should not be more than the amount that corresponds to 0.5 ml of 0.01 N sulfuric acid.

(4) Lead : When 5.0 g of Manganese Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Arsenic : 0.25 g of Manganese Gluconate is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

(6) Reducing Matter : Approximately 1 g of Zinc Gluconate is weighed into a 250 ml Erlenmeyer flask. 10 ml of water is added to dissolve the solid and 25 ml of alkaline copper citrate solution. A small beaker is placed on top of the flask, which is heated for precisely 5 minutes. It is then rapidly cooled to room temperature. To this solution, 25 ml of diluted acetic acid (1→10), 10 ml of 0.1 N iodine solution, 10 ml of dilute hydrochloric acid, and 3 ml of starch solution are added. The resulting solution is titrated with 0.1 N sodium thiosulfate solution until the blue color disappears. The content of reduced materials should not be more than 1.0%.

$$\text{Content of Reducing Matter (as glucose) (\%)} = \frac{(V_1N_1 - V_2N_2) \times 27}{\text{Weight of Sample (mg)}} \times 100$$

V_1 : Consumed amount of 0.1 N iodine solution (ml)

N_1 : Normality of 0.1 N iodine solution

V_2 : Consumed amount of 0.1 N sodium thiosulfate solution (ml)

N_2 : Normality of 0.1 N sodium thiosulfate solution

27 : Experimental corresponding amount for D-glucose

Water Content Water content of Zinc Gluconate as determined by water content determination method (Karl-Fischer Method) should not be more than 11.6%.

Assay Accurately weigh about 0.7 g of Zinc Gluconate, add 100 ml of water, dissolve while warming if necessary, add 5 ml of ammonia-ammonium chloride solution, and 0.1 ml of Eriochrom black solution are added to the solution, which is titrated with 0.05 M EDTA solution until the color becomes blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA} = 22.784 \text{ mg of } \text{C}_{12}\text{H}_{22}\text{O}_{14}\text{Zn}$$

347. L-Glutamic Acid**Glutamic Acid**

Chemical Formula $\text{C}_5\text{H}_9\text{NO}_4$

Molecular Weight 147.13

Compositional Specifications of L-Glutamic Acid

Content If L-Glutamic Acid, when calculated on the dried basis(anhydrous), it should contain 98.5~101.5% of L-glutamic acid ($\text{C}_5\text{H}_9\text{NO}_4$).

Description L-Glutamic Acid is odorless white crystalline powder.

Identification (1) 0.15 g of L-Glutamic Acid dissolve in a mixture of 4 ml of water and 1 ml of sodium hydroxide solution, and add 1 ml of ninhydrine solution (0.2→100). and 0.1 g of sodium acetate. When it is heated for 10 minutes in a water bath, the solution becomes dark bluish violet.

(2) 1 g of L-Glutamic Acid suspended in 9 ml of water. When 5.6 ml of 1 N hydrochloric acid or 6.8 ml of 1 N sodium hydroxide solution is added, it is completely dissolved.

Purity (1) Specific Rotation : 10 g of L-Glutamic Acid, precisely dried and accurately weighed, dissolve in 2 N hydrochloric acid to make 100 ml and its optical rotation should be within a range of $[\alpha]_D^{20} = +31.5 \sim +32.5^\circ$

(2) Lead : When 5.0 g of L-Glutamic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(3) Arsenic : 0.25 g of L-Glutamic Acid transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Pyrrolidone Carboxylic Acid : Dissolve 1g of L-Glutamic Acid in 100 ml of water, test solution. Separately, 1 g of pyrrolidone carboxylic acid dissolve in water, reference solution. Drop 1μl of test solution and reference solution on Thin Layer

Plate prepared by using silica gel for thin-layer chromatography and develop about 10cm by using n-butanol: glacial acetic acid : water mixture (2:1:1) as developing solvent. Thin Layer Plate is dried at 80°C for 30 minutes . Spray color developing solution to it and heat it for at 80°C for 10 minutes. Pyrrolidone carboxylic acid spot in test solution should not be observed at the same position as reference solution.

Color Developing solution : To 1g of Ninhydrin and 3m/ of acetic acid, n-butanol is added to bring the total volume to 100 ml.

Loss on Drying When L-Glutamic Acid is dried for 3 hours at 105°, the loss should not be more than 0.1%.

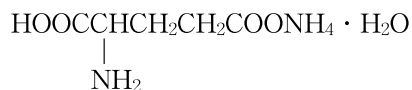
Residue on Ignition When thermogravimetric analysis is done with L-Glutamic Acid, the residue should not be more than 0.3%.

Assay Proceed as directed under Assay in [L-Sodium Glutamate].

1 ml of 0.1 N perchloric acid = 14.71 mg of $C_5H_9NO_4$

348. Monoammonium L-Glutamate

Monoammonium Glutamate



Chemical Formula $\text{C}_5\text{H}_{12}\text{N}_2\text{O}_4 \cdot \text{H}_2\text{O}$

Molecular Weight 182.18

[Content Specifications of Monoammonium L-Glutamate]

Content If Monoammonium L-Glutamate, when calculated on the dried basis, should contain 98.5~101.5% of L-ammonium glutamate ($\text{C}_5\text{H}_{12}\text{N}_2\text{O}_4 \cdot \text{H}_2\text{O}$).

Description Monoammonium L-Glutamate is white crystalline scentless powder.

Identification (1) To 1 ml Monoammonium L-Glutamate solution (1→30), add 1 ml of ninhydrine solution (0.2→100) and 0.1 g sodium acetate. Upon heating for 10 minutes in a water bath, this solution becomes deep bluish violet.

(2) To 10 ml of Monoammonium L-Glutamate solution (1→10) add 5.6 ml of 1 N hydrochloric acid, white crystalline precipitates of glutamic acid are formed. The precipitates are dissolved when 6 ml of 1 N hydrochloric acid is added and stirred.

(3) An aqueous solution (1→10) of Monoammonium L-Glutamate responds to test of Ammonium Salts in Identification.

Purity (1) Specific Rotation : 10 g of Monoammonium L-Glutamate, precisely weighed, dissolve in 2 N hydrochloric acid to make 100 ml. Optical rotation of this solution is measured. When it is converted into a dehydrated form, it should be within a range of $[\alpha]_D^{20} = +25.4 \sim +26.4^\circ$

(2) Lead : When 5.0 g of Monoammonium L-Glutamate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(3) Pyrrolidone Carboxylic Acid : 1g of Monosodium L-Glutamate is weighed and dissolved in 100 ml of water, test solution. Separately, 1 g of pyrrolidone carboxylic acid is weighed and dissolved in water, reference solution. Drop 1μl of test solution and reference solution on Thin Layer Plate prepared by using silica gel for thin-layer chromatography and develop about 10cm by using n-butanol: glacial acetic acid : water mixture (2:1:1) as developing solvent. Thin Layer Plate is dried at 80°C for 30 minutes . Spray color developing solution to it and heat it for at 80°C for 10 minutes. Pyrrolidone carboxylic acid spot in test solution should not be

observed at the same position as reference solution.

Color Developing solution : To 1g of Ninhydrin and 3ml of acetic acid, n-butanol is added to bring the total volume to 100 ml.

Loss on Drying When Monoammonium L-Glutamate is dried for 4 hours at 50°C, the loss should not be more than 0.5%.

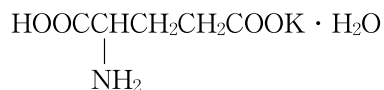
Residue on Ignition When thermogravimetric analysis is done with 1 g of Monoammonium L-Glutamate, the amount of residue should not be more than 0.1%.

Assay Proceed as directed under Assay in [L-Sodium Glutamate].

1 ml of 0.1 N perchloric acid solution = 9.109 mg $\text{C}_5\text{H}_{12}\text{N}_2\text{O}_4 \cdot \text{H}_2\text{O}$

349. Monopotassium L-Glutamate

Monopotassium Glutamate

Chemical Formula $\text{C}_5\text{H}_8\text{KNO}_4 \cdot \text{H}_2\text{O}$

Molecular Weight 203.24

Compositional Specifications of Monopotassium L-Glutamate

Content Monopotassium L-Glutamate, when calculated on the dried basis, should not contain less than 99.0% of Monopotassium L-Glutamate ($\text{C}_5\text{H}_8\text{KNO}_4 \cdot \text{H}_2\text{O}$).

Description Monopotassium L-Glutamate occurs as white odorless crystalline powder.

Identification (1) Procedure as directed under Identification (1) in L-Monoammonium Glutamate.

(2) Procedure as directed under Identification (2) in L-Monoammonium Glutamate.

(3) Monopotassium L-Glutamate solution (1→10) responds to the test for Potassium Salts in Identification

Purity (1) Specific Rotation : Approximately 10 g of Monopotassium L-Glutamate dissolve in 2N hydrochloric acid to make 100 ml. Optical rotation of the solution is measured. When it is translated to dried material, $[\alpha]_D^{20} = +22.5 \sim +24.0^\circ$

(2) Lead : When 5.0 g of Monopotassium L-Glutamate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(3) pH : pH of Monopotassium L-Glutamate solution (1→50) should be within a range of 6.7~7.3.

(4) Chloride : When 0.07 g of Monopotassium L-Glutamate is tested by Chloride Limit Test, the amount should correspond to 0.4 ml of 0.01 N hydrochloric acid.

(5) Pyrrolidone Carboxylic Acid : 1g of Monopotassium L-Glutamate is weighed and dissolved in 100 ml of water, test solution. Separately, 1 g of pyrrolidone carboxylic acid is weighed and dissolved in water, reference solution. Drop 1μl of test solution and reference solution on Thin Layer Plate prepared by using silica gel for thin-layer chromatography and develop about 10cm by using n-butanol: glacial acetic acid : water mixture (2:1:1) as developing solvent. Thin Layer Plate is dried at 80°C for 30 minutes . Spray color developing solution to it and heat it for at 80°C for 10 minutes. Pyrrolidone carboxylic acid spot in test solution should not be

observed at the same position as reference solution.

Color Developing solution : To 1g of Ninhydrin and 3ml of acetic acid, n-butanol is added to bring the total volume to 100 ml.

Loss on Drying When Monopotassium L-Glutamate is dried for 5 hours at 80°C, the loss should not be more than 0.2%.

Assay Proceed as directed under Assay in [L-Sodium Glutamate]

1 ml of 0.1 N perchloric acid = 10.16 mg of $\text{C}_5\text{H}_8\text{NKO}_4 \cdot \text{H}_2\text{O}$

350. Potassium Glycerophosphate

Chemical Formula $\text{C}_3\text{H}_7\text{K}_2\text{O}_6\text{P} \cdot 3\text{H}_2\text{O}$

Molecular Weight 302.30

Compositional Specifications of Potassium Glycerophosphate

Content Potassium Glycerophosphate (trihydrate) should not contain less than 80.0% of potassium glycerophosphate ($\text{C}_3\text{H}_7\text{K}_2\text{O}_6\text{P}$) and Potassium Glycerophosphate solution (50~75% concentration) should contain within a range of 95.0~105.0% of the specified content of potassium glycerophosphate ($\text{C}_3\text{H}_7\text{K}_2\text{O}_6\text{P}$).

Description Potassium Glycerophosphate (trihydrate) is gluey liquid with pale yellow color. Solution of 50~75% concentration is gluey liquid with colorless~pale yellow color.

Identification (1) Potassium Glycerophosphate solution (1→10) responds to test of Potassium Salts in Identification.

(2) When 0.1 g of Potassium Glycerophosphate is heated with 0.5 g of potassium hydrogen sulfate, pungent vapor of aclorein is generated.

Purity (1) Lead : When 5.0 g of Potassium Glycerophosphate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 4 ppm.

Assay Potassium Glycerophosphate is precisely weighed so that the amount corresponds to 4 g of potassium glycerophosphate ($\text{C}_3\text{H}_7\text{K}_2\text{O}_6\text{P}$). It is then dissolved in 30 ml of water and titrated with 0.5 N hydrochloric acid (indicator : methyl orange indicator solution).

1 ml of 0.5 N hydrochloric acid solution = 124.13 mg $\text{C}_3\text{H}_7\text{K}_2\text{O}_6\text{P}$

351. Calcium Glycerophosphate

Chemical Formula $\text{C}_3\text{H}_7\text{CaO}_6\text{P}$

Molecular Weight 210.14

Compositional Specifications of Calcium Glycerophosphate

Content Calcium Glycerophosphate, when calculated on the dried basis, should contain within a range of 98.0~100.5% of calcium glycerophosphate ($\text{C}_3\text{H}_7\text{CaO}_6\text{P}$).

Description Calcium Glycerophosphate occurs as a white powder. It is odorless, tasteless, and slightly absorptive.

Identification Saturated Calcium Glycerophosphate solution responds to test by Calcium Salts in Identification.

Purity (1) Alkalinity : To Calcium Glycerophosphate solution (1→60), 3 drops of phenolphthalein are added. It is then neutralized with 0.1 N sulfuric acid. The consumption should not be more than 1.5 ml.

(2) Lead : When 5.0 g of Calcium Glycerophosphate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 4 ppm.

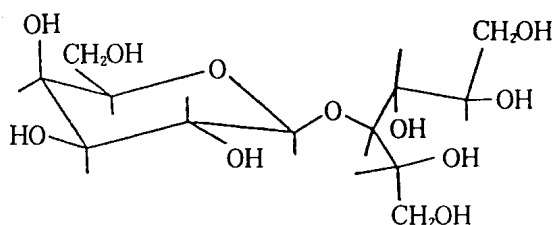
Loss on Drying When Calcium Glycerophosphate is dried for 4 hours at 150°C, the weight loss should not be more than 12.0%.

Assay 2 g of Calcium Glycerophosphate, previously dried for 4 hours at 150°C and accurately weighed, dissolve in 100 ml of water and 5 ml of dilute hydrochloric acid, and add water to make 250 ml, thoroughly mix. Precisely weigh 50 ml of this solution, 50 ml of water is added to it. Approximately 30 ml of 0.05M EDTA solution is added while stirring, 15 ml of sodium hydroxide and 0.3 g of hydroxynaphthylblue are added and mixed well. The solution is titrated with 0.05 M EDTA solution. The end point is where the red color completely disappear and it turns blue.

$$1\text{ml of } 0.05\text{M EDTA} = 10.51\text{mg } \text{C}_3\text{H}_7\text{CaO}_6\text{P}$$

352. Lactitol

Lactit



Chemical Formula $C_{12}H_{24}O_{11}$

Molecular Weight 344.32

Compositional Specifications of Lactitol

Content Lactitol, , when calculated on the dried basis(anhydrous), should contain within a range of 95.0~102.0% of lactitol ($C_{12}H_{24}O_{11}$).

Description Lactitol is scentless crystalline powder or colorless liquid. It is odorless and has sweet taste.

Identification (1) Lactitol is readily soluble in water.

(2) When Lactitol is quantitatively analyzed, it shows the peaks at the identical positions as the lactitol standards.

Purity (1) Specific Rotation : Approximately 10 g of Lactitol is precisely weighed and dissolved in water so that the total volume becomes 100 ml. Optical rotation of this solution is measured and converted to a dehydrated form, it should be within a range of $[\alpha]_D^{20} = +13 \sim +15^\circ$

(2) Chloride : When 10 g (amount that is converted to dehydrated form) of Lactitol is tested by Chloride Limit Test, the content should not be more than the amount that corresponds to 3.0 ml of 0.01 N hydrochloric acid.

(3) Sulfate : When 10 g (amount that is converted to dehydrated form) of Lactitol is tested by Sulfate Limit Test, the content should not be more than the amount that corresponds to 4.0 ml of 0.01 N sulfuric acid.

(4) Arsenic : 0.39 g (amount that is converted to dehydrated form) of Lactitol is dissolved in 20 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 2.6 ppm.

(5) Lead : When 5.0 g of Lactitol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content

should not be more than 1.0 ppm.

- (6) Nickel : When 10 g (amount that is converted to dehydrated form) of Lactitol is tested according to Purity (6) for [D-Maltitol], the content should not be more than 2 ppm.
- (7) Reduced Sugars : 15 g of Lactitol (amount that is converted to dehydrated form) is dissolved in 25 ml of water in an Erlenmeyer flask. Then 25 ml of copper solution is added. The solution is heated so that it boils within 2 minutes. It is then boiled for exactly 10 minutes and cooled immediately in running water. After 5 minutes, 3 g of potassium iodide is added and the solution is acidified by 20 ml of 25% hydrochloric acid. The flask is shaken until bubbling stops. Remaining bubbles are removed by adding 2~3 drops of ether. 1 ml of starch solution is added to the above solution, which is then titrated with 0.1 N sodium thiosulfate solution. The consumed amount (ml) of 0.1 N sodium thiosulfate solution is S. Separately, a blank test is carried out with 25 ml of copper solution and 25 ml of water following the same procedure. The consumed amount (ml) of 0.1 N sodium thiosulfate solution is B. Using the difference in consumption (B-S), a reduction equivalent as lactic acid can be obtained from the following table. It should not be more than 0.2%.

0.1 N sodium thiosulfate solution (ml)	Lactic Acid (mg)
1	3.6
2	7.3
3	11.0
4	14.7
5	18.4
6	22.1
7	25.8
8	29.5
9	33.2
10	37.0
11	40.8
12	44.6
13	48.4
14	52.2
15	56.0
16	59.9
17	63.8
18	67.7
19	71.7
20	75.7
21	79.8
22	83.9
23	88.0

- Copper Solution : 338 g of sodium carbonate (10 hydrated) is dissolved in 300~400 ml of warm water. Then a solution of 50 g of citric acid in 500 ml water is added. Again a solution of 25 g of iron free cupric sulfate (5 hydrate) in 100 ml water is added. Water is added to bring the total volume to 1l. This solution is set-aside for 2~3 days and the clear supernatant is collected for use by tilting the container. The solution is sealed and stored.
- (8) Other polyvalence alcohols : 40 g of Lactitol is precisely weighed and quantitatively analyzed. The content of polyvalence alcohols (as converted to dehydrated form) should not be more than 2.5%. The content of by-products in sample such as galactitol, mannitol, sorbitol, ribitol, erythritol, and other poly alcohols is obtained as follows. The areas of peaks from lactitol to sorbitol are added up and the content is calculated as lactitol.

$$\text{Content of polyvalence alcohols (\%)} = \frac{W_s \times R_u}{W_u \times R_s} \times 100$$

W_s : Amount of lactitol standard (g)

W_u : Amount of sample(g)

R_u : Sum of peak areas of polyvalence alcohols in Test Solution

R_s : Peak area of lactitol in Standard Solution

Water Content Water content of Lactitol is determined by water determination (Karl-Fisher Method) and should not be more than 10.5%, not more than 31 % for liquid form.

Residue on Ignition When thermogravimetric analysis is done with precisely weighed 2 g of Lactitol (amount that is converted dehydrated form), the amount of residue should not be more than 0.1%.

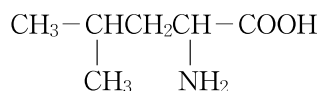
Assay 40 g of Lactitol, precisely weighed, dissolve in water to make 100 ml (Test Solution). Separately, 40 g of lactitol standard, 400 mg each of sorbitol standard, and mannitol standard are precisely weighed and dissolved in water. The total volume is brought up to 100 ml with water (Standard Solution). 10 μ l of each Test Solution and Standard Solution is injected into liquid chromatography using the following operation conditions. The content (%) of lactitol is calculated by the following equation. The order of peak detection on the chromatogram is lactitol, ribitol, erythritol, mannitol, galactitol, and sorbitol.

$$\text{Content of lactitol (\%)} = \frac{\text{Weight of standard (g)}}{\text{Weight of sample (g)}} \times \frac{\text{Lactitol peak area in test solution}}{\text{Lactitol peak area in standard solution}} \times 100$$

Operation Conditions

- Detector : Differential refractometer (RI Detector)
- Column : Aminex HPX 87C (calcium form) or its equivalent
- Column Temperature : 85°C
- Mobile Phase : Water
- Flow Rate : 0.6 ml/min

353. L-Leucine



Chemical Formula $\text{C}_6\text{H}_{13}\text{NO}_2$

Molecular Weight 131.17

Compositional Specifications of L-Leucine

Content L-Leucine should contain within a range of 98.5~101.5% L-leusine ($\text{C}_6\text{H}_{13}\text{NO}_2$) after dried.

Description L-Leucine is white glossy thin platelet or crystalline powder.

Identification L-Leucine sublimes at 150°C .

Purity (1) Specific Rotation : 4 g of L-Leucine is precisely weighed and dissolved in 6 N hydrochloric acid. The total volume is brought up to 100 ml. Optical rotation of this solution is measured. When it is converted into a dehydrated form, it should be within a range of $[\alpha]_D^{20} = +14.5 \sim +16.5^\circ$

(2) Lead : When 5.0 g of L-Leucine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(3) Arsenic : 0.25 g of L-Leucine is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

Loss on Drying When L-Leucine is dried for 3 hours at 105°C , the loss should not be more than 0.2%.

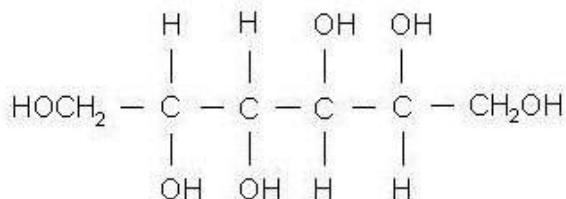
Residue on Ignition Residue on ignition of L-Leusine should not be more than 0.1%.

Assay Dissolve 0.4 g of L-Leusine, precisely dried and accurately weighed, in 3 ml of formic acid and 50 ml of glacial acetic acid. This solution is titrated with 0.1 N perchloric acid solution (indicator : 2 drops of crystal violet buffered in glacial acetic acid). At the end point, the solution turns bluish green. Separately, a blank experiment is done following the same procedure.

1 ml of 0.1 N perchloric acid solution = 13.12 mg $\text{C}_6\text{H}_{13}\text{NO}_2$

354. D-Mannitol

D-Mannite

Chemical Formula $\text{C}_6\text{H}_{14}\text{O}_6$

Molecular Weight 182.2

Compositional Specifications of D-Mannitol

Content D-Mannitol, when calculated on the dried basis, should contain within a range of 96.0~102.0% of D-mannitol ($\text{C}_6\text{H}_{14}\text{O}_6$).

Description D-Mannitol occurs as white crystals or powder. It is odorless and has a sweet taste.

Identification (1) D-Mannitol is soluble in water, slightly soluble in alcohol, and insoluble in chloroform and ether.

(2) Melting point of D-Mannitol should be within a range of 165~169°C.

(3) When D-Mannitol is tested by Assay, it should show the peak at the same position as mannitol standard.

(4) 1 ml of ferric chloride solution transfer into a Nestler tube, where 5 drops of saturated solution of D-Mannitol, Test Solution. Separately, a reference solution is prepared using 5 drops of water instead of the saturated solution. When 5 drops each of 5 N sodium hydroxide solution are added to both solutions, Test Solution yields a yellow precipitate while Reference Solution yields a brown precipitate. When both tubes are shaken vigorously, Test Solution becomes transparent but the brown color in Reference Solution persists. When more 5 N sodium hydroxide solution is added, no precipitate is observed in Test Solution but more precipitates are formed for Reference Solution.

Purity (1) Specific Rotation : Approximately 2.0 g of D-Mannitol and approximately 2.6 g of sodium borate are dissolved in 20 ml of water which is preheated to 30°C. It is then continuously stirred for 15~30 minutes without heating. When the solution becomes transparent, water is added to bring the volume to 25 ml. Optical rotation of the resulting solution should be within a range of $[\alpha]_D^{20} = +23 \sim +25^\circ$

- (2) pH : To 10 ml of D-Mannitol solution (1→10), 0.5 ml of saturated potassium chloride solution is added. pH of the resulting solution should be within a range of 5.0~8.0.
- (3) Chloride : 10 g of D-Mannitol is tested by Chloride Limit Test. The content should not be more than the amount that corresponds to 2.0 ml of 0.01 N hydrochloric acid.
- (4) Arsenic : When 0.25 g of D-Mannitol is dissolved in 5 ml of water. When this solution is tested by Arsenic Limit Test, it should not be more than 4 ppm.
- (5) Sulfate : When 10 g of D-Mannitol is tested by Sulfate Limit Test, the amount that corresponds to 2 ml of sulfuric acid.
- (6) Lead : When 5.0 g of D-Mannitol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (7) Nickel : When 5.0 g of D-Mannitol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (8) Reducing Sugar : Approximately 7 g of D-Mannitol is precisely weighed and tested by following the procedure in Purity (1) for [D-Maltitol]. The content of cupric acid should not be more than 50 mg.
- (9) Total Sugar : 2.1 g of D-Mannitol is precisely weighed into a round bottom flask, where 40 ml of 0.1 N hydrochloric acid is added. A reflux condenser is attached to the flask. It is then heated for 4 hours in a water bath and cooled. The resulting solution is transferred into a 400 ml beaker. The round bottom flask is washed with 10 ml of water, which is added to the beaker. The solution is then neutralized with 6 N sodium hydroxide solution, where 50 ml of Fehling solution. The produced cupric oxide is filtered using a glass filter which is previously weighed. The precipitate is washed with hot water, alcohol, and ether. It is then dried for 30 minutes at 100°C. It is again washed with 10 ml each of hot water, alcohol, and ether. It is again dried for 1 hour at 100°C. The weight of cupric oxide should not be more than 50 mg.

Loss on Drying When D-Mannitol is dried for 4 hours at 105°C, the weight loss should not be more than 0.3%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of D-Mannitol, the residue should not be more than 0.1%.

Assay 1.5 g of D-Mannitol is accurately weighed, to which water is added to make 100 ml. This solution is filtered with 0.45 μ m paper to make the test solution.

Separately, 0.5, 1.0, 1.5 g and 2.0 g of mannitol standard is weighed, to which water is added to make 100 ml and filtered with 0.45 μm paper to make the standard solution.

Test operation : inject the test solution and 20 μl standard solutions, each to liquid chromatography to calculate peak areas. Prepare standard curve with each peak area of 4 concentration of standard solutions(g/100ml), and calculate the concentration of Mannitol(g/100ml) in test solution from standard curve. Then calculate the content of Mannitol by the following equation.

$$\text{Content of D-mannitol (C}_6\text{H}_{14}\text{O}_6\text{) (\%)} = \frac{A \times 100}{\text{Weight of sample (mg)}}$$

Operating conditions

- Column : Aminex HPX 87C(calcium form) or its equivalent
- Detector : Differential refractometer. (RI Detector)
- Column temperature : 85°C
- Mobile phase : Water.
- Flow rate : 0.5 ml/min.

355. Maltitol Syrup

Hydrogenated Glucose Syrup

Definition Maltitol Syrup is a maltitol mixture which contains sorbitol, hydrogenated oligosaccharide, and polysaccharide.

Compositional Specifications of Maltitol Syrup

Content Maltitol Syrup, when calculated on the dried basis(anhydrous), should contain more than 99% of hydrogenated sugars, and more than 50% of maltitol.

Description Maltitol Syrup is colorless transparent gluey liquid or white crystalline lump. Maltitol Syrup has no scent but sweet taste.

Identification (1) Maltitol Syrup is readily soluble in water and slightly soluble in alcohol.

(2) 25~50 mg of Maltitol Syrup is dissolved in 20 ml of water (Test Solution). Test Solution is tested by the procedure Test (4) for [D-Maltitol] in Identification.

Purity (1) Reduced Sugars : Approximately 7 g of Maltitol Syrup is precisely weighed and tested by Purity (1) for [D-Maltitol]. The content should not be more than 50 mg.

(2) Chloride : When 10 g of Maltitol Syrup is tested by Chloride Limit Test, the content should not be more than the amount that corresponds to 1.5 ml of 0.01 N hydrochloric acid.

(3) Sulfate : When 10 g of Maltitol Syrup is tested by Sulfate Limit Test, the content should not be more than the amount that corresponds to 2 ml of 0.01 N sulfuric acid.

(4) Lead : When 5.0 g of Maltitol Syrup is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(5) Nickel : When 5.0 g of Maltitol Syrup is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Water Content Water content of Maltitol Syrup is determined by water determination (Karl-Fisher Method) and should not be more than 31%.

Residue on Ignition When thermogravimetric analysis is done with 3 g of Maltitol Syrup, the amount of residue should not be more than 0.1%.

Assay (1) Content of total the hydrogenated saccharides (%)

$$= \frac{100 [Water (\%) + Residue\ on\ Ignition (\%) + Reduced\ saccharide (\%)]}{100 - water (\%)} \times 100$$

$$\ast \text{ Reduced saccharide} = \frac{\text{Weight of dried copperoxides (mg)}}{\text{Weight of sample (mg)}} \times 100$$

(2) Maltitol : About 1 g of Maltitol Syrup is accurately weighed, to which water is added to make 50 ml. This solution is filtered with 0.45 μm paper to make the test solution. 20 μl each of the standard and test solutions are injected in liquid chromatography and the content of maltitol is determined by the following formula

Content of Maltitol (%)

$$= \frac{\text{Sample weight of the standar(dcalculatedonthedriedbasis (anhydrous)) (g)}}{\text{Samplef weight off the test body(calculatedonthedriedbasis (anhydrous))(g)}} f \times \frac{\text{Peak area of the test solution (g)}}{\text{Peak area of the standard solutoin (g)}} \times 100$$

Operation condition

- Column : Aminex HPX 87 (calcium type) or its equivalent
- Detector: Differential Refractometer (RI detector)
- Column temperature : 85°C
- Moving phase : water
- Flow speed : 0.5 ml/min
- Solution : 0.5 g of the maltitol standard is weighed accurately to put in 50 ml volumetric flask and water is added to make 50 ml (10 mg/ml).

356. Calcium Oxide

Lime

Chemical Formula CaO

Molecular Weight 56.08

Compositional Specifications of Calcium Oxide

Content After being heat-treated, Calcium Oxide is quantitatively analyzed. It should not contain less than 95.0~100.5% of calcium oxide (CaO).

Description Calcium Oxide is white~grayish white hard lump, granule, or powder.

Identification 20 ml of water is added to 1 g of Calcium Oxide. Acetic acid is added until it dissolves. The resulting solution responds to test of calcium salts in Identification.

Purity (1) Acid Insoluble substances : 100 ml of water is added to 5 g of Calcium Oxide. It is dissolved by adding (drop wise) sufficient amount of hydrochloric acid. The solution is heated and then cooled. If necessary, hydrochloric acid is added until the solution becomes distinctly acidic. It is then filtered through a porcelain filter that is previously weighed. The residue is washed with water until the wash water doesn't show the reaction of chlorides. After drying for 1 hour at 105°C , the content should not be more than 1.0%.

(2) Alkali or Magnesium : 0.5 g of Calcium Oxide is dissolved in 30 ml of water and 15 ml of dilute hydrochloric acid, which is boiled for 1 minute. 40 ml of oxalic acid solution is immediately added to the solution, which is shaken vigorously. 2 drops of methyl red solution are added. The resulting solution is neutralized with ammonia solution until calcium is completely precipitated. It is then heated for 1 hour in a water bath. After cooling, the total volume is brought up to 10 ml with water, which is then filtered. 0.5 ml of sulfuric acid is added to 50 ml of the filtrate, which is evaporated to dryness. The residue is heat-treated in a platinum crucible at $800 \pm 25^{\circ}\text{C}$ until the weight becomes constant. The content should not be more than 1.5%.

(3) Fluoride : 1 g of Calcium Oxide is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 30 ppm.

(4) Arsenic : 0.25 g of Calcium Oxide is dissolved in 15 ml of dilute hydrochloric acid. When test by Arsenic Limit Test is carried out with this test solution (not more than 4 ppm).

(5) Barium : 1.5g of Calcium Oxide add 10ml of water and 15 ml of dilute hydrochloric acid solution, add water to make 30ml and filter. Take 20ml of the filtrate add 2g of sodium acetate, 1ml of dilute acetic acid TS and 0.5ml of

potassium chromate TS and allow to stand for 15min. The turbidity of the solution is not greater than that of a control prepared by adding water to 0.3ml of barium standard solution to make 20ml, adding 2g of sodium acetate, 1ml of dilute acetic TS and 0.5ml of potassium chromate TS and allowing to stand for 15 min. (not more than 0.03%)

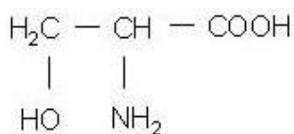
- (6) Lead : Calcium Oxide is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

Loss on Ignition Precisely weighed 1 g of Calcium Oxide is heat-treated at $1,100 \pm 50^{\circ}\text{C}$ until the weight becomes constant, the weight loss should not be more than 10.0%.

Assay 1 g of Calcium Oxide is heated until the weight becomes constant, which is then precisely weighed and dissolved in 20 ml of dilute hydrochloric acid. After cooling, the solution is diluted to 500 ml with water. 50 ml of water is added to 50 ml of the resulting solution, where 30 ml of 0.05 M EDTA solution is added while stirring. 15 ml of sodium hydroxide solution and 0.3 g of hydroxy naphthol blue hydroxynaphtholblue ($\text{C}_{20}\text{H}_{12}\text{O}_{11}\text{S}_3\text{Na}_2$) are added to the resulting solution, which is then titrated with 0.05 M EDTA solution. The end point is where the red color of the solution disappears completely and the solution turns blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA} = 2.804 \text{ mg CaO}$$

357. L-Serine



Chemical Formula $\text{C}_3\text{H}_7\text{NO}_3$

Molecular Weight 105.09

Compositional Specifications of L-Serine

Content L-Serine, when calculated on the dried basis, should contain within a range of 98.5~101.5% of L-serine ($\text{C}_3\text{H}_7\text{NO}_3$).

Description L-Serine is scentless white crystalline powder with sweet taste.

Identification (1) When 1 ml of ninhydrine solution (0.2→100) is added to 5 ml L-Serine of Serine (1→1,000), the solution becomes reddish violet~violet.

(2) Approximately 0.5 g of L-Serine is dissolved in 10 ml of water, where 0.2 g of periodic acid is added. Upon heating, an odor of formaldehyde is generated.

Purity (1) Specific Rotation : 10 g of pre-dried L-Serine is precisely weighed, which is dissolved in 2 N hydrochloric acid so that the total volume becomes 100 ml. Optical rotation of the solution should be within a range of $[\alpha]_D^{20} = +13.6 \sim +16.0^\circ$

(2) Lead : When 5.0 g of L-Serine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(3) Arsenic : 0.25 g of L-Serine is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

(4) Chloride: When 0.07 g of L-Serine is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.(Not be more than 0.1%)

Loss on Drying When L-Serine is dried at 105°C for 3 hours, loss should not be more than 0.3%.

Residue on Ignition Residue after ignition should not be more than 0.1%.

Assay Approximately 0.2 g is precisely weighed and dissolved in 3 ml of formic acid and 50 ml of glacial acetic acid. This solution is titrated with 0.1 N perchloric acid solution (indicator : 2 drops of crystal violet buffered in glacial acetic acid). At the end point, the solution turns to greenish blue. Separately, a blank test is done

following the same procedure.

1 ml of 0.1 N perchloric acid solution = 10.51 mg $\text{C}_3\text{H}_7\text{NO}_3$

358. Sodium Sesquicarbonate

Chemical Formula $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$

Molecular Weight 226.03

Compositional Specifications of Sodium Sesquicarbonate

Content Sodium Sesquicarbonate should contain within a range of 35.0~38.6% of sodium hydrogencarbonate (NaHCO_3) and 46.4~50.0% of sodium carbonate (Na_2CO_3).

Description Sodium Sesquicarbonate is white crystallite, crumb, or crystalline powder.

Identification Sodium Sesquicarbonate solution (1→10) of Sodium Sesquicarbonate responds to test of Carbonate Salts and Sodium Salts in Identification.

Purity (1) Lead : Sodium Sesquicarbonate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(2) Arsenic : 0.25 g of Sodium Sesquicarbonate is dissolved in 5 ml of water and 2 ml of dilute hydrochloric acid is slowly added, test solution. When test by Arsenic Limit Test is carried out with this test solution, its content should not be more than 4 ppm.

(3) Mercury : When Sodium Sesquicarbonate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(4) Iron : 0.5 g of Sodium Sesquicarbonate is dissolved in 10 ml of dilute hydrochloric acid. Water is added to this solution to bring the total volume to 50 ml. 40 mg of ammonium persulfate and 10 ml of ammonium thiocyanate solution (2→25) are added to the solution. The resulting color should not be deeper than the reference color (Not more than 0.002%).

(5) Sodium Chloride : Approximately 10 g of Sodium Sesquicarbonate is precisely weighed and dissolved in 50 ml of water. The solution is acidified slightly by adding nitric acid. 1 ml of ferric ammonium sulfate solution (8→100) and 1 ml of 0.05 N ammonium thiocyanate solution are added to the solution, which is titrated with 0.05 N silver nitrate solution until the red color disappears. The solution is back titrated with 0.05 N ammonium thiocyanate solution until it turns pale red (Not more than 0.5%). The total consumed amount of 0.05 N ammonium thiocyanate solution is subtracted from the consumed amount of 0.05 N silver nitrate solution.

1 ml of 0.05 N silver nitrate solution = 2.922 mg sodium chloride

Water Content Water content is calculated by subtracting the contents of sodium hydrogen carbonate(%), sodium carbonate(%), and sodium chloride(%) from 100%. Water content should be within a range of 13.8~16.7%.

Assay (1) Sodium Hydrogen carbonate : Approximately 3 g of Sodium Sesquicarbonate is precisely weighed into a 600 ml beaker with 50 ml of 0.5 N sodium hydroxide solution. It is then dissolved in 150 ml of carbon dioxide free water. 200 ml of 0.48 M barium chloride (pH 8.0) is added to the beaker while stirring. The solution is titrated with 0.5 N hydrochloric acid until pH is maintained at 8.8 for 1 minute. Separately, a blank test is carried out with 2.1 g of first grade sodium carbonate standard.

$$\text{Content (\%)} = \frac{(B-S) \times 42.00}{\text{Weight of Sample (mg)}} \times 100$$

S : Consumed amount of 0.5 N hydrochloric acid for Test Solution (ml)

B : Consumed amount of 0.5 N hydrochloric acid for blank test with 2.1 g of first grade sodium carbonate standard (ml)

(2) Sodium Carbonate : Total alkalinity (as sodium oxide, Na₂O) of the sample is measured. Approximately 4.2 g of Sodium Sesquicarbonate is precisely weighed and dissolved in 100 ml of water. Methyl orange solution is added and the solution is shaken vigorously. The solution is then titrated with 1N sulfuric acid. The consumed amount (ml) of sulfuric acid is S.

Content (%) =

$$[\text{Content of Sodium Oxide (\%)} - (\text{content of sodium hydrogen carbonate (\%)} \times 0.3689)] \times 1.7099$$

1.7099 : Conversion factor of sodium oxide to sodium carbonate

$$\text{Content of sodium oxide (\%)} = \frac{S \times 30.99}{\text{Weight of Sample (mg)}} \times 100$$

359. Magnesium Hydroxide

Chemical Formula $\text{Mg}(\text{OH})_2$

Molecular Weight 58.32

Compositional Specifications of Magnesium Hydroxide

Content Magnesium Hydroxide, when calculated on the dried basis, should contain within a range of 95.0~100.5% magnesium hydroxide $[\text{Mg}(\text{OH})_2]$

Description Magnesium Hydroxide is voluminous white powder.

Identification Dilute hydrochloric acid is added to an aqueous solution (1→20) of Magnesium Hydroxide. The resulting solution responds to test of magnesium salts in Identification.

Purity (1) Free Alkali and Soluble Salts : 2 g of Magnesium Hydroxide is added to 100 ml of water, which is heated for 5 minutes in a water bath and immediately filtered. After cooling, 50 ml of the filtrate is titrated with 0.1 N sulfuric acid . The consumed amount of 0.1 N sulfuric acid should not exceed 2 ml (indicator : methyl red solution). 25 ml of the filtrate is evaporated to dryness in a water bath and dried for 3 hours at 105°C. The amount of the residue should not be more than 10 mg.

(2) Lead : Magnesium Hydroxide is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」 , its content should not be more than 2.0 ppm.

(3) Arsenic : 0.25 g of Magnesium Hydroxide is dissolved in 5 ml of dilute hydrochloric acid(1→4). When test by Arsenic Limit Test is carried out with this test solution, its content should not be more than 4 ppm.

(4) Calcium Oxide : Approximately 0.5 g of Magnesium Hydroxide is precisely weighed and dissolved in a mixture of 3 ml sulfuric acid and 22 ml water. After adding 50 ml of alcohol, the solution is set-aside over night. If necessary, the solution is heated to 50°C to dissolve magnesium sulfate crystals. A glass filter is previously washed with dilute sulfuric acid, water, and alcohol, heated to dry, and weighed. The solution is then filtered through the glass filter, which is washed with a mixture of 2 N sulfuric acid • alcohol (1:2). The glass filter is heated at 450 ± 2 °C until the weight becomes constant. It is then cooled in a desiccator and weighed. The amount of calcium sulfate is obtained and the content is calculated from the following equation. The content should not be more than 1%.

$$\text{Content of calcium oxide (\%)} = \frac{\text{Weight of calcium sulfate (mg)} \times 0.4119}{\text{Weight of Sample (mg)}}$$

Loss on Drying

When Magnesium Hydroxide is dried for 2 hours at 105°C, the loss should not be more than 2.0%.

Loss on Ignition 0.5 g of Magnesium Hydroxide is slowly heat-treated to $800 \pm 25^\circ\text{C}$ in a platinum crucible until the weight becomes constant, the weight loss should be within a range of 30.0~33.0%.

Assay Magnesium Hydroxide is dried for 2 hours at 105°C prior to use. 0.4 g is precisely weighed and dissolved in 25 ml of 1 N sulfuric acid. After adding methyl red solution, the excess acid is titrated with 1 N sodium hydroxide solution. The amount of consumed sulfuric acid is subtracted by the amount of sulfuric acid corresponding to calcium oxide in the sample. This value is the amount of magnesium hydroxide.

$$1 \text{ ml of } 1 \text{ N sulfuric acid} = 28.04 \text{ mg CaO}$$

$$1 \text{ ml of } 1 \text{ N sulfuric acid} = 29.16 \text{ mg Mg(OH)}_2$$

360. Ammonium Hydroxide

Strong Ammonia Solution

Stronger Ammonium Water

Chemical Formula NH_4OH

Molecular Weight 35.05

Compositional Specifications of Ammonium Hydroxide

Content Ammonium Hydroxide should contain within a range of 27.0~30.0% of ammonia ($\text{NH}_3 = 17.03$).

Description Ammonium Hydroxide is colorless transparent liquid with characteristic pungent odor.

Identification When Ammonium Hydroxide is approached with a glass rod wetted with hydrochloric acid, thick white smoke is generated.

Purity (1) Lead : When 5.0 g of Ammonium Hydroxide is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(2) Arsenic : 0.25 g of Magnesium Hydroxide is dissolved in 5 ml of water, dilute hydrochloric acid(1→4) is added, and neutralized, test solution. When test by Arsenic Limit Test is carried out with this test solution, its content should not be more than 4 ppm.

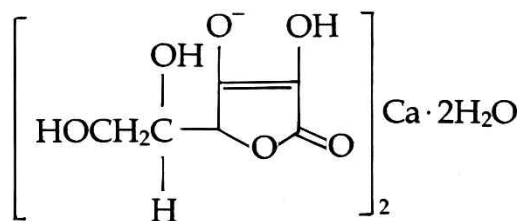
(3) Residue on Evaporation : 11 ml of (approximately 10 g) Ammonium Hydroxide is evaporated on a platinum or porcelain dish (previously weighed) and dried for 1 hour at 105°C. The residue should not be more than 0.02%.

(4) Readily oxidizing material : When 6 ml of water, slightly excess amount of dilute sulfuric acid, and 0.1 ml of 0.1 N potassium permanganate are added to 4 ml of Ammonium Hydroxide, pale red color in the solution should not disappear within 10 minutes

Assay 35 ml of 1 N sulfuric acid transfer into a flask, which is sealed with a stopper. This additive is cooled below 10°C. Using a 10 ml graduated pipette, cooled ammonia is drawn from the bottom if possible. Outer wall of the pipette is wiped clean and first few ml are discarded. 2 ml of ammonia is added to the flask. At this time, at least 1 ml should be left in the pipette. The flask is capped with a stopper and mixed. It is weighed again to obtain the amount of the sample. Excess acid is then titrated with 1 N sodium hydroxide solution. (indicator : 1~2 drops of methyl red solution).

1 ml of 1 N sulfuric acid = 17.03 mg NH_3

361. Calcium Ascorbate



Chemical Formula $\text{C}_{12}\text{H}_{14}\text{CaO}_{12} \cdot 2\text{H}_2\text{O}$

Molecular Weight 426.34

Compositional Specifications of Calcium Ascorbate

Content Calcium Ascorbate should contain within a range of 98.0~100.5% of calcium ascorbate.

Description Calcium Ascorbate is scentless white~pale yellow crystalline powder.

Identification Calcium Ascorbate solution (1→10) responds to test of calcium salts in Identification. Upon adding a solution of dichlorophenol indophenol sodium (0.1→100), the color disappears.

Purity (1) Specific Rotation : 1 g of Calcium Ascorbate, precisely weighed, dissolve in water to make 20 ml. Optical rotation of this solution should be within a range of $[\alpha_D^{20}] = +95 \sim +97^\circ$

(2) Hydroxide Salt : 1 g of Calcium Ascorbate dissolve in 10 ml of water. 2 drops of glacial acetic acid and 5 ml of calcium acetate solution (1→10) are added to the solution, which is set-aside for 5 minutes. The solution should stay clear.

(3) Fluoride : 1 g of Calcium Ascorbate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.

(4) Arsenic: Proceed as directed under Purity (1) of [Guar Gum] (Not more than 4 ppm).

(5) Lead : When 5.0 g of Calcium Ascorbate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

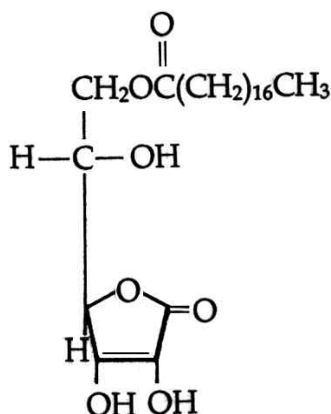
(6) Mercury : When Calcium Ascorbate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Assay Approximately 0.3 g of Calcium Ascorbate is precisely weighed and dissolved in 50 ml of water, which is immediately titrated with 0.1N iodine solution. The end

point is where pale yellow color persists for 30 seconds.

$$1 \text{ ml of } 0.1 \text{ N iodine solution} = 10.66 \text{ mg } \text{C}_{12}\text{H}_{14}\text{CaO}_{12} \cdot 2\text{H}_2\text{O}$$

362. L-Ascorbyl Stearate



Chemical Formula $C_{24}H_{42}O_7$

Molecular Weight 442.59

Compositional Specifications of L-Ascorbyl Stearate

Content L-Ascorbyl Stearate should contain not less than 95.0% of L-ascorbyl stearate ($C_{24}H_{42}O_7$).

Description L-Ascorbyl Stearate occurs as a white to yellowish white powder.

Identification (1) To 0.1 g of L-Ascorbyl Stearate, add 100 ml of sodium lauryl sulfate-propylene glycol solution, and dissolve by warming. Cool, and add drop wise iodine solution to 5 ml of this solution until a slightly yellow color develops. Add each 1 drop of cupric sulfate solution (1→1,000) and pyrrole, and warm at 50~60°C for 5 minutes. A blue to blue-green color develops.

◦ Sodium lauryl sulfate-propylene glycol solution : 1 g of sodium lauryl sulfate is dissolved in 80 ml of water and propylene glycol is added. And then mix.

(2) To 10 ml of a solution of L-Ascorbyl Stearate in ethanol (1→100), add 1 or 2 drops of sodium 2, 6-dichlorophenolindophenol solution. The color of the solution becomes to blue and disappears immediately.

Purity (1) Melting Point : Melting point of L-Ascorbyl Stearate should be within a range of 114~119°C.

(2) Arsenic : 0.25 g of L-Ascorbyl Stearate transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then ethanol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric

acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(3) Lead : When 5.0 g of L-Ascorbyl Stearate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Mercury : When L-Ascorbyl Stearate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When L-Ascorbyl Stearate is dried in a vacuum drying for 1 hour at 56~60°C, weight loss should not be more than 2.0%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of L-Ascorbyl Stearate, the residue should not be more than 0.1%.

Assay Accurately weigh about 0.2 g of L-Ascorbyl Stearate. add 30 ml of ethanol, and dissolve by warming if necessary. Add 15 ml of metaphosphoric acid solution (1→5) and 10 ml of sulfuric acid (1→2). Add 10 ml of potassium iodate solution, exactly measured, shake well, and allow to stand for 10 minutes in a dark place. Add 10 ml of potassium iodide solution and 100 ml of water, and allow to stand for 5 minutes in a dark place. Titrate the liberated iodine with 0.1 N sodium thiosulfate (indicator : 10 ml of starch solution). Perform a blank test in the same manner.

1 ml of 0.1 N sodium thiosulfate = 22.130 mg of $C_{24}H_{42}O_7$

363. Ammonium Alginate

Chemical Formula $(C_6H_7O_6NH_4)_n$

Molecular Weight measured equivalent (average) : 217.00

Compositional Specifications of Ammonium Alginate

Content Ammonium Alginate, when calculated on the dried basis, should contain 18~21% carbon dioxide (CO₂). This corresponds to 88.7~103.6% ammonium alginate.

Description Ammonium Alginate is almost scentless tasteless white~pale yellow fiber, grain, granule, or powder.

Identification (1) When 1 ml of calcium chloride solution is added to 5 ml aqueous solution (1→100) of Ammonium Alginate, voluminous gelatinous precipitates are formed.

(2) When 1 ml of dilute acid is added to 10 ml of Test Solution in (1), heavy gelatinous precipitates are formed.

(3) Proceed as directed under Identification (3) for [Alginic Acid].

(4) Approximately 1 g of Ammonium Alginate transfer into a test tube. Upon mixing with 5 ml of sodium hydroxide solution, smell of ammonia is generated.

Purity

(1) Arsenic : Proceed as directed under Purity (1) for [Guar Gum] (Not more than 4 ppm).

(2) Lead : When 5.0 g of Ammonium Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(3) Cadmium : When 5.0 g of Ammonium Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When Ammonium Alginate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Total Viable Aerobic Count : When Ammonium Alginate is tested by Microbe Test Methods for Total Viable Aerobic Count (Number of General Germs) in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 5,000 per 1 g

(6) E. coli : When Ammonium Alginate is tested by Microbe Test Methods for E. coli in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).

(7) Salmonella : When Ammonium Alginate is tested by Microbe Test Methods for Salmonella in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).

(8) Fungi : When Ammonium Alginate is tested by Microbe Test Methods for Fungi in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 500 per 1 g

Ash Ammonium Alginate, previously dried, tested by Ash for 「Alginate, the amount of ash should not be more than 4.0%.

Loss on Drying When 3 g of Ammonium Alginate is dried for 4 hours at 105°C, the loss should not be more than 15.0%.

Assay Approximately 0.25 g of Ammonium Alginate is precisely weighed and analyzed by the procedure in Content Analysis for [Xanthan Gum].

1 ml of 0.25 N sodium hydroxide solution = 27.12 mg ammonium alginate
(Equivalent Value : 217.00)

364. Potassium Alginate

Chemical Formula $(C_6H_7O_6K)_n$

Molecular Weight measured equivalent (average) : 238.00

Compositional Specifications of Potassium Alginate

Content If Potassium Alginate, when calculated on the dried basis, should contain 16.5 ~19.5% carbon dioxide (CO₂), which corresponds to 89.2~105.5% potassium alginate.

Description Potassium Alginate is almost scentless tasteless white~pale yellow fiber, grain, granule, or powder.

Identification (1) Proceed as directed under Identification (1) for [Ammonium Alginate]

(2) Proceed as directed under Identification (2) for [Ammonium Alginate].

(3) Proceed as directed under Identification (3) for [Alginic Acid].

Purity (1) Arsenic : Proceed as directed under Purity (1) for [Guar Gum] (Not more than 4 ppm).

(2) Lead : When 5.0 g of Potassium Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(3) Cadmium : When 5.0 g of Potassium Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When Potassium Alginate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Total Viable Aerobic Count : When Potassium Alginate is tested by Microbe Test Methods for Total Viable Aerobic Count (Number of General Germs) in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 5,000 per 1 g

(6) E. coli : When Potassium Alginate is tested by Microbe Test Methods for E. coli in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).

(7) Salmonella : When Potassium Alginate is tested by Microbe Test Methods for Salmonella in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).

(8) Fungi : When Potassium Alginate is tested by Microbe Test Methods for Fungi in

General Test Method in 「Standards and Specifications for Foods」, it should not be more than 500 per 1 g

Loss on Drying When 3 g of Potassium Alginate is dried for 4 hours at 105°C, the loss should not be more than 15.0%.

Assay Approximately 0.25 g of Potassium Alginate is precisely weighed and analyzed by the procedure in Content Analysis for [Xanthan Gum].

1 ml of 0.25 N sodium hydroxide solution = 28.75 mg Potassium alginate
(Equivalent Value : 238.00)

365. Calcium Alginate

Chemical Formula $[(C_6H_7O_6)_2Ca]_n$

Molecular Weight measured equivalent (average) : 219.00

Compositional Specifications of Calcium Alginate

Content Calcium Alginate, when calculated on the dried basis, should contain within a range of 18~21% of carbon dioxide (CO₂), which corresponds to 89.6~104.5% of calcium alginate.

Description Calcium Alginate is almost scentless tasteless white~pale yellow fiber, grain, granule, or powder.

Identification Proceed as directed under Identification (3) for [Alginic Acid].

Purity (1) Arsenic : Proceed as directed under Purity (1) for [Guar Gum] (Not more than 4 ppm).

(2) Lead : When 5.0 g of Calcium Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(3) Cadmium : When 5.0 g of Calcium Alginate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When Calcium Alginate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Total Viable Aerobic Count : When Calcium Alginate is tested by Microbe Test Methods for Total Viable Aerobic Count (Number of General Germs) in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 5,000 per 1 g

(6) E. coli : When Calcium Alginate is tested by Microbe Test Methods for E. coli in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).

(7) Salmonella : When Calcium Alginate is tested by Microbe Test Methods for Salmonella in General Test Method 「Standards and Specifications for Foods」, it should be negative (-).

(8) Fungi : When Calcium Alginate is tested by Microbe Test Methods for Fungi in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 500 per 1 g

Loss on Drying When 3 g of Calcium Alginate is dried for 4 hours at 105°C, the loss

should not be more than 15%.

Assay Approximately 0.25 of Calcium Alginate is precisely weighed and analyzed by the procedure in Content Analysis for [Xanthan Gum].

1 ml of 0.25 N sodium hydroxide solution = 27.38 mg calcium alginate
(Equivalent Value : 219.00)

366. L-Alanine

Chemical Formula $\text{C}_3\text{H}_7\text{NO}_2$

Molecular Weight 89.09

Compositional Specifications of L-Alanine

Content If L-Alanine, when calculated on the dried basis, should contain 98.5~101.5% L-alanine ($\text{C}_3\text{H}_7\text{NO}_2$).

Description L-Alanine is white scentless sweet crystalline powder.

Identification (1) 1 ml of ninhydrine solution (0.2→100) is added to 5 ml of L-Alanine solution (1→1,000). Upon heating for 3 minutes in a water bath, this solution becomes violet.

(2) 0.2 g of L-Alanine is dissolved in 10 ml of water and 0.1 g of potassium permanganate is added. Upon boiling, smell of acetaldehyde is generated.

Purity (1) Specific Rotation : 10 g of L-Alanine, previously dried, is dissolved in 6 N hydrochloric acid, where the total volume of the solutions 100 ml. Optical density of this solution should be within a range of $[\alpha]_D^{20} = +13.5 \sim +15.5^\circ$

(2) Lead : When 5.0 g of L-Alanine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(3) Arsenic : 0.25 g of L-Alanine is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

(4) Chloride: When 0.07 g of L-Alanine is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.(Not be more than 0.1%)

Loss on Drying When L-Alanine is dried for 3 hours at 105°C, the loss should not be more than 0.3%.

Residue on Ignition Residue on ignition of L-Alanine should not be more than 0.2%.

Assay Proceed as directed under Assay of [L-Serine]

1 ml of 0.1 N perchloric acid solution = 8.909 mg $\text{C}_3\text{H}_7\text{NO}_2$

367. Oxystearin

Definition Oxystearin is a mixture of partially oxidized stearic acid and glyceride of other fatty acids.

Compositional Specifications of Oxystearin

Description Oxystearin is yellowish brown~pale brown fatty or waxy material.

Purity (1) Acid value : Approximately 8 g of Oxystearin is precisely weighed is dissolved in 125 ml mixture of iso-propyl alcohol and toluene (1:1), which is heated if necessary. After adding 2 ml of phenolphthalein solution, the solution is titrated with 0.1 N potassium hydroxide solution. Acid value is calculated by the following equation and it should not be more than 15.

(2) Lead : When 5.0 g of Oxystearin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

(3) Hydroxyl Value : Approximately 3 g of Oxystearin is accurately weighed into a 250 ml flask with a stopper. Add 5 ml of pyridine·anhydrous acetic acid mixture (3:1), a reflux condenser is attached. It is then heated for 1 hour in a water bath. 10 ml of water is added through the condenser and it is heated again for 10 minutes. After cooling, 15 ml of n-butyl alcohol is added through the condenser, the condenser is removed, and inner wall of the flask is washed with 10 ml of n-butyl alcohol. 1 ml of phenolphthalein solution is added to the flask and the solution is titrated with 0.5 N alcoholic solution of potassium hydroxide. The consumed amount of alcoholic solution is S. Separately, 5 ml of pyridine·anhydrous acetic acid is treated as same as the test solution and the consumed amount of alcoholic solution is B. To correct for free acid, approximately 10 g of Polysorbate 20 is accurately weighed and dissolved in 10 ml of pyridine. After adding 1 ml of phenolphthalein solution, the solution is titrated with 0.5 N alcoholic solution of potassium hydroxide. The consumed amount of alcoholic solution is A. Hydroxyl value, that is calculated by the following equation, should be within a range of 96~108.

$$\text{Hydroxyl Value} = \frac{[B + (WA/C) - S] \times 28.05}{W}$$

W : Amount of sample used in acetylation (g)

C : Amount of sample used for quantitative analysis of free acid (g)

(4) Iodine Value : Approximately 0.3 g of Oxystearin is accurately weighed into a 500-ml Erlenmeyer flask with a stopper and 20 ml of carbon tetrachloride is added

to dissolve the material. After adding 25 ml of Weiss solution, a stopper is placed and the flask is set-aside for 30 minutes in a dark place. 20 ml of potassium iodide solution and 100 ml (previously boiled and cooled) are added to the flask. The excess iodine is titrated with 0.1 N sodium thiosulfate solution. Sodium thiosulfate solution is added drop wise until yellow color disappears. Starch solution is added and the titration is continued until the blue color disappears completely. Near the end point, the flask is vigorously shaken with a stopper. Separately, a blank test is carried out by the same procedure.

$$\text{Iodine Value} = \frac{[(B-S) \times 1.269]}{\text{Weight of sample (g)}}$$

B : Consumed amount of 0.1 N sodium thiosulfate solution in the blank test (ml)

S : Consumed amount of 0.1 N sodium thiosulfate solution in the test for sample (ml)

- (5) Refractive Index : Refractive Index n_D^{48} should be within a range of 1.465~1.467.
- (6) Saponification Value : 3 g of Oxystearin is precisely weighed into a flask, where 25 ml of 0.5 N alcoholic solution of potassium hydroxide is added. After attaching a reflux condenser, the solution is saponified for 1 hour, test solution. The test solution is proceeded as directed under saponification value in Fats Test. The saponification value of the solution should be within a range of 225 - 240.
- (7) Unsaponifiabiles : Oxystearin is tested by Purity (8) for [Carnauba Wax]. The content should not be more than 0.8%.

368. Sodium Diacetate

Chemical Formula $\text{C}_4\text{H}_7\text{NaO}_4 \cdot n\text{H}_2\text{O}$

Molecular Weight dehydrated form : 142.09

Compositional Specifications of Sodium Diacetate

Content Sodium Diacetate, when calculated on the dried basis(anhydrous), should contain 39.0~41.0% of free acetic acid and 58.0~60.0% of sodium acetate.

Description Sodium Diacetate is white hygroscopic crystalline solid with a scent of acetic acid.

Identification Sodium Diacetate solution (1→10) responds to test of acetates and sodium salts in Identification.

Purity (1) Lead : When 5.0 g of Sodium Diacetate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(2) Arsenic : 0.25 g of Sodium Diacetate is dissolved in 5 ml of water, test solution. When test by Arsenic Limit Test is carried out with this test solution, its content should not be more than 4 ppm.

(3) Mercury : When Sodium Diacetate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(4) Readily Oxidizable Matters (as formic acid) : 1 g of Sodium Diacetate is dissolved in 50 ml of water. After adding 10 ml of dilute sulfuric acid, it is then heated at 80 ~90°C. This hot solution is titrated with 0.1 N potassium permanganate solution until the pale red color persists for at least 15 seconds. The content of readily oxidizables should not be more than 0.2%.

1 ml of 0.1 N potassium permanganate solution = 2.301 mg CH_2O_2

Water Content Water content of Sodium Diacetate is determined by water determination (Karl-Fisher Method) and should not be more than 2.0%.

Assay (1) Free Acetic Acid : Approximately 4 g of Sodium Diacetate is precisely weighed and dissolved in 50 ml of water. After adding phenolphthalein solution, it is titrated with 1 N sodium hydroxide solution.

1 ml of 1 N sodium hydroxide solution = 60.05 mg CH_3COOH

(2) Sodium Acetate : Approximately 0.5 g is precisely weighed and dissolved in 50 ml

of glacial acetic acid. This solution is titrated with 0.1 N perchloric acid solution (indicator : 1 ml of crystal violet solution in glacial acetic acid). At the end point, the solution turns from violet to blue, then to green. Separately, perform a blank test in the same manner.

$$1 \text{ ml of } 0.1 \text{ N perchloric acid} = 8.203 \text{ mg CH}_3\text{COONa}$$

369. Itaconic Acid

Compositional Specifications of Itaconic Acid

Content Itaconic Acid, when calculated on the dried basis, should contain not less than 98.0% of itaconic acid ($C_5H_6O_4 = 130.10$).

Description Itaconic Acid is scentless colorless transparent crystal, granule, lump, or white crystalline powder or powder. It has an acidic taste.

Identification (1) Itaconic Acid solution (1→20) is acidic.

(2) To 0.05 g of Itaconic Acid add 0.01 N of sulfuric acid to make 100 ml. Separately, 100 ml of Standard Solution is prepared by adding 0.05 g of itaconic acid in 0.01 N of sulfuric acid. Liquid chromatography is carried out with both solutions under the following operation conditions. Retention time of the main peak of Test Solution should be identical to that of Standard Solution.

Operation Conditions

- Detector : UV absorption photometer (measured at wavelength 210 nm) -Column Filler : Sulfonated polystyrene gel with 6 μ m particle diameter
- Column Tube : Stainless steel tube (SUS316) with 8 mm inner diameter, 30 cm length
- Column Temperature : 60°C
- Mobile Phase : 0.01 N Sulfuric acid
- Flow Rate : 1 ml/min
- Amount of solution injected : 20 μ l

Purity (1) Chloride : 0.5 g of Itaconic Acid is tested by Chloride Limit Test. The content should not be more than the amount that correspond to 0.1 ml of 0.01 N hydrochloric acid.

(2) Sulfate : 0.5 g of Itaconic Acid is dissolved in 30 ml of water and 2 ml of dilute hydrochloric acid by boiling for 1 minute. After cooling, the solution is tested by Sulfate Limit Test. The content should not be more than amount that correspond to 0.1 ml of 0.01 N hydrochloric acid.

(3) Arsenic : 0.25 g is dissolved in 5 ml by heating if necessary. This solution is tested by Arsenic Limit Test and the content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Itaconic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Loss on Drying When 2 g of Itaconic Acid is dried for 2 hours at 100°C, the loss

should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of Itaconic Acid, the amount of residue should not be more than 0.1%.

Assay 2 g of Itaconic Acid, precisely weighed, add water to make 250 ml. Take 25 ml of this solution and titrate with 0.1 N sodium hydroxide solution (indicator : 2~3 drops of phenolphthalein).

1 ml of 0.1 N sodium hydroxide solution = 6.505 mg $C_5H_6O_4$

370. Magnesium Phosphate, Tribasic

Trimagnesium Phosphate

Chemical Formula $\text{Mg}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$

Molecular Weight Dehydrated Form : 262.86

Compositional Specifications of Magnesium Phosphate, Tribasic

Content Trimagnesium Phosphate which is converted to a heat-treated material should contain not less than 98.0% tribasic magnesium phosphate $[\text{Mg}_3(\text{PO}_4)_2]$.

Description Trimagnesium Phosphate is scentless tasteless white crystalline powder.

Identification (1) 0.2 g of Trimagnesium Phosphate is dissolved in 10 ml of dilute nitric acid. The solution should show the reaction (B) in Identification for Phosphates.

(2) 0.1 g of Trimagnesium Phosphate is dissolved in 0.7 ml of dilute acetic acid and 20 ml of water. 1 ml of ferric chloride solution is added to the solution, which is settled for 5 minutes and filtered. The filtrate responds to test of magnesium salts in Identification.

Purity (1) Fluoride : 1 g of Trimagnesium Phosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 5 ppm.

(2) Arsenic : 0.25 g of Trimagnesium Phosphate is dissolved in 10 ml of dilute hydrochloric acid. This solution is tested by Arsenic Limit Test and the content should not be more than 4 ppm.

(3) Lead : Trimagnesium Phosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

Loss on Ignition 1 g of Trimagnesium Phosphate is heat-treated at 425°C until the weight becomes constant, the weight loss should be within a range of 15.0~23.0%, 20.0~27.0%, and 30.0~37.0% for 4 hydrate, 5 hydrate, and 8 hydrate.

Assay Approximately 0.2 g of Trimagnesium Phosphate is precisely weighed and dissolved in a mixture of 25 ml water and 10 ml dilute nitric acid. While keeping the solution at 50°C, 75 ml of ammonium molybdate solution is added while stirring occasionally and kept for 30 minutes. The resulting solution is set-aside for 16 hours or over night at room temperature. The resulting precipitates are washed 1~2 times with water(30~40 ml) and filtered. The precipitates and filter paper are washed with potassium nitrate solution (1→100) until the filtrate does not show acidity as determined with a litmus paper. The precipitates are dissolved completely in 50 ml of

1 N sodium hydroxide solution by stirring. After adding 3 drops of phenolphthalein solution to the resulting solution, it is titrated with excess amount of 1 N sodium hydroxide solution.

$$1 \text{ ml of } 1 \text{ N sodium hydroxide solution} = 5.714 \text{ mg } \text{Mg}_3(\text{PO}_4)_2$$

371. Magnesium Phosphate, Dibasic

Dimagnesium Phosphate

Chemical Formula $\text{MgHPO}_4 \cdot 3\text{H}_2\text{O}$

Molecular Weight 174.33

Compositional Specifications of Magnesium Phosphate, Dibasic

Content Dimagnesium Phosphate is heat-treated and analyzed quantitatively. It should contain not less than 96.0% of magnesium pyrophosphate ($\text{Mg}_2\text{P}_2\text{O}_7$).

Description Dimagnesium Phosphate is scentless white crystalline powder.

Identification Proceed as directed under Identification for [Magnesium Phosphate, Tribasic].

Purity (1) Fluoride : 1 g of Dimagnesium Phosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.
 (2) Arsenic : 0.25 g of Dimagnesium Phosphate is dissolved in 5 ml of dilute hydrochloric acid, which is tested by Arsenic Limit Test.(Not more than 4 ppm).
 (3) Lead : Dimagnesium Phosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.
 (4) Cadmium : Dimagnesium Phosphate is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.
 (5) Mercury : When Dimagnesium Phosphate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Ignition When Dimagnesium Phosphate is heat-treated at 775~825°C until the weight becomes constant, the weight loss should be within a range of 15.0~36.0% .

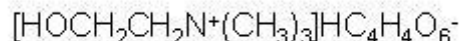
Assay After heat-treating, 0.5 g of Dimagnesium Phosphate is precisely weighed and dissolved in a mixture of 50 ml water and 2 ml hydrochloric acid by heating. After cooling, the solution is diluted to 100 ml with water. 50 ml of the resulting solution is transferred into a 400 ml beaker and 100 ml of water is added, which is heated at 55~60°C. 15 ml of 0.1M EDTA solution is added and pH of the solution is adjusted to 10. After adding 10 ml of ammonia·ammonium chloride buffer solution, it is titrated with 0.1 M EDTA solution. The end point is where the color of the solution becomes to bluish violet from red. (Indicator : 12 drops of Eriochrome black solution).

$$\text{Content (\%)} = \frac{2 \times 11.13 \times V}{\text{Weight of Sample (mg)}} \times 100$$

V : Consumed amount of 0.1 M EDTA solution (ml)

372. Choline Bitartrate

(2-Hydroxyethyl)trimethylammonium Bitartrate



Chemical Formula $\text{C}_9\text{H}_{19}\text{NO}_7$

Molecular Weight 253.25

Compositional Specifications of Choline Bitartrate

Content Choline Bitartrate, when calculated on the dried basis(anhydrous), should contain not less than 98.0% of choline bitartrate ($\text{C}_9\text{H}_{19}\text{NO}_7$).

Description Choline Bitartrate is white hygroscopic crystalline powder with sour taste.

Identification Proceed as directed under Identification for [Choline Chloride].

Purity (1) Lead : When 5.0 g of Choline Bitartrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2 ppm.

(2) 1, 4-Dioxane : To 0.5 g of Choline Bitartrate and 0.1 g of defoamer(containing silicone), add 10 ml of water and diffuse with ultrasonic waves, test solution. Transfer this solution into 25 ml of frit sparger, hold the temperature of container at 50°C, and analyze with Purge and Trap and Gas chromatograph. Separately, to the solution, which 2.5µg of 1,4-Dioxane is contained in 10 ml of water, add 0.1 g of defoamer, standard solution. Analyze the standard solutin in the same manner as the sample. (not more than 5.0 ppm)

Operation Condition

Purge and Trap

Trap : Vorcarb 3000 or its equivalent

Purge time : 11 minutes

Desorption temperature and time : 250°C, 4 minutes

Cryo focus temperature : -150°C

Bake temperature and time : 260°C, 10 minutes

Gas chromatography

Column : HP-FFAP(60m × 0.32µm) or its equivalent

Detector : (Hydrogen) Flame Ionization Detector (FID)

Column Temperature : held at 70°C for 5 minutes and is raised to 180°C at a rate of 5°C per minute

Temperature at injection hole : 200°C

Detector Temperature : 250°C

Carrier gas and flow rate : Nitrogen, 0.9 m per minute

Water Content Choline Bitartrate is dried in a vacuum desiccator (phosphorous pentoxide) for 4 hours. The water content should not be more than 0.1%.

Residue on Ignition When thermogravimetric analysis is done with 2 g of Choline Bitartrate, the amount of residue should not be more than 0.1%.

Assay Approximately 0.5 g of Choline Bitartrate is precisely weighed into a 250 ml Erlenmeyer flask. After adding 50 ml of glacial acetic acid, it is completely dissolved by heating in a water bath. After cooling, the solution is titrated with 0.1 N perchloric acid solution (Indicator : 2 drops of crystal violet solution in glacial acetic acid). The end point is where the color of the solution becomes green. Separately, perform a blank test in the same manner.

1 ml of 0.1 N perchloric acid solution = 25.36 mg $C_9H_{19}NO_7$

373. Calcium Acetate

Chemical Formula $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$

Molecular Weight 158.17

Compositional Specifications of Calcium Acetate

Content Calcium Acetate, when calculated on the dried basis(anhydrous), should contain within a range of 99.0~100.5% of calcium acetate $[\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2]$.

Description Calcium Acetate is scentless white powder.

Identification Calcium Acetate solution (1→10) responds to test of calcium salts and acetate salts in Identification.

Purity (1) Chlorides : When 0.5g of Calcium Acetate is tested by Chloride Limit Test, the content should not be more than the amount that correspond to 0.7 ml of 0.01 N hydrochloric acid.

(2) Sulfates : When 0.24 g of Calcium Acetate is tested by Sulfate Limit Test, the content should not be more than the amount that correspond to 0.5 ml of 0.01 N hydrochloric acid.

(3) Fluoride : 1 g of Calcium Acetate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 50 ppm.

(4) Lead : When 5.0 g of Calcium Acetate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Arsenic : 0.25 g of Calcium Acetate is dissolved in 5 ml of water, which is tested by Arsenic Limit Test.(Not more than 4ppm).

(6) Mercury : When Calcium Acetate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Water Content Water content of Calcium Acetate is determined by water determination (Karl-Fisher Method) and the content should not be more than 7.0%.

Assay Approximately 0.3 g of Calcium Acetate is dissolved in 150 ml of water which contains 2 ml of dilute hydrochloric acid. While stirring, 30 ml of 0.05 M EDTA solution is added. 15 ml of sodium hydroxide solution and 0.3 g of hydroxy naphthol blue hydroxynaphtholblue ($\text{C}_{20}\text{H}_{12}\text{O}_{11}\text{S}_3\text{Na}_2$) are added to the solution, which is titrated with 0.05 M EDTA solution. The end point is where the red color disappears completely and the color becomes blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA solution} = 7.909 \text{ mg } \text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$$

374. Potassium Bicarbonate

Chemical Formula KHCO_3

Molecular Weight 100.12

Compositional Specifications of Potassium Bicarbonate

Content Potassium Bicarbonate, when calculated on the dried basis, should contain within a range of 99.0~101.5% of potassium bicarbonate (KHCO_3).

Description Potassium Bicarbonate is colorless transparent crystalline or white platelet powder.

Identification Potassium Bicarbonate solution (1→10) responds to test of potassium salts and bicarbonates in Identification.

Purity (1) Lead : Potassium Bicarbonate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(2) Arsenic : 0.25 g of Potassium Bicarbonate is dissolved in 10 ml of water, which is tested by Arsenic Limit Test.(Not more than 4 ppm).

(3) Mercury : When Potassium Bicarbonate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(4) Carbonates : 1 g of Potassium Bicarbonate is dissolved in 20 ml of water at temperature of 5°C or lower without shaking. After adding 2 ml of 0.1 N hydrochloric acid and 2 drops of phenolphthalein solution, the color of the solution should not be deeper than pale red.

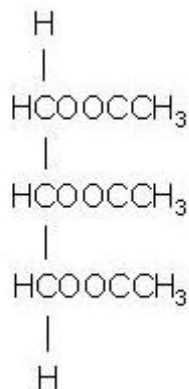
Loss on Drying When Potassium Bicarbonate is dried for 4 hours in a desiccator (silica gel), the loss should not be more than 0.25%.

Assay Approximately 4 g of Potassium Bicarbonate is precisely weighed and dissolved in 100 ml of water. After adding 2 drops of methyl red solution, the solution is titrated with 1 N hydrochloric acid while stirring until the color turns pale red. Near the end point, the solution is boiled and then cooled. Titration is continued until the color of the solution doesn't become pale.

$$1 \text{ ml of } 1 \text{ N hydrochloric acid} = 100.1 \text{ mg } \text{KHCO}_3$$

375. Triacetin

Glyceryl Triacetate

Chemical Formula $\text{C}_9\text{H}_{14}\text{O}_6$

Molecular Weight 218.21

Compositional Specifications of Triacetin**Content** Triacetin should contain not less than 98.5% of triacetin ($\text{C}_9\text{H}_{14}\text{O}_6$).**Description** Triacetin is colorless liquid with slight fluidity. It has a slight fatty scent and bitter taste.**Identification** (1) A few drops of Triacetin is taken into a test tube and approximately 0.5 g of potassium hydrogen sulfate is added. Upon heating, irritating vapor of aclorein is generated.

(2) A solution obtained in the Assay responds to test of acetates in Identification.

Purity (1) Specific Gravity : Specific gravity should be within a range of 1.154~1.158.(2) Refractive Index : Refractive Index n_D^{25} of Triacetin should be within a range of 1.429~1.431.

(3) Acid Value : Approximately 25 g of Triacetin is precisely weighed. After adding 50 ml of toluene and 2 drops of thymol blue, the solution is titrated with 0.02 N sodium methoxide-toluene solution until the pale red color persists for 30 seconds. The consumed amount should not be more than 1.0 ml.

(4) Unsaturated matter : To 10 ml of Triacetin, bromine solution in carbon tetrachloride (1→100) is drop-wise added until the solution turns yellow. When this solution is then set-aside for 18 hours in a dark place, any precipitates should not form.

(5) Lead : When 5.0 g of Triacetin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be

more than 2.0 ppm.

- (6) Arsenic : 0.25 g of Triacetin is dissolved in 5 ml of water, which is tested by Arsenic Limit Test.(Not more than 4 ppm).

Water Content Water content of Triacetin is determined by water determination (Karl-Fisher Method) and should not be more than 0.2%.

Assay Approximately 1 g of Triacetin is precisely weighed into a pressurizable bottle. 25 ml of 1 N potassium hydroxide solution and 15 ml of isopropyl alcohol are added and a cap is placed. Then the bottle is immersed in a water bath so that the solution level is below the water level, which is then heated for 1 hour at $98 \pm 2^\circ\text{C}$. After cooling, the excess alkali is titrated with 0.5 N sulfuric acid (indicator : 6~8 drops of phenolphthalein solution). Separately, a blank test is carried out

$$1 \text{ ml of } 0.5 \text{ N sulfuric acid} = 36.37 \text{ mg } \text{C}_9\text{H}_{14}\text{O}_6$$

376. Propionic Acid

Chemical Formula $\text{C}_3\text{H}_6\text{O}_2$

Molecular Weight 74.08

Compositional Specifications of Propionic Acid

Content Propionic Acid, when calculated on the dried basis, should contain within a range of 99.5~100.5% of propionic acid ($\text{C}_3\text{H}_6\text{O}_2$).

Description Propionic Acid is an oily, clear liquid having a characteristic odor.

Purity (1) Specific Gravity : Specific gravity should be within a range of 0.993~0.997

(2) Distillation Range : When Propionic Acid is tested for boiling point and amount of distillate, 95%(v/v) or more should be extracted at 138.5~142.5°C.

(3) Lead : When 5.0 g of Propionic Acid is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Arsenic : 0.25 g of Propionic Acid transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(5) Mercury : When Propionic Acid is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(6) Aldehyde (as propionic aldehyde) : 10 ml of Propionic Acid is transferred into a Erlenmeyer flask with a ground-glass stopper, containing 50 ml of water and 10 ml of sodium hydrogen sulfite solution (1→80). Shake vigorously, allow to stand for 30 minutes and titrate with 0.1 N iodine until the color of the solution becomes to yellow-brown. The consumed volume is not more than 1.75 ml. Separately, perform a blank test in the same manner.

(7) Readily Oxidizable substances (as formic acid) : 15 g of sodium hydroxide is dissolved in 50 ml of water and cooled. 6 ml of Bromine is added while stirring and water is added to make 2,000 ml. 25 ml of this solution is transferred into the Erlenmeyer flask with a stopper with 100 ml of water. 10 ml of sodium acetate solution(1→5) and 10 ml of hydrochloric acid are added and allow to stand for 15

minutes. 5 ml of potassium iodide solution(1→4) and 10 ml of hydrochloric acid are added to this solution, and titrated with 0.1N sodium thiosulfate solution until the brown color immediately disappear. The consumed amount should not be more than 2.2 ml. Separately, perform a blank test in the same manner.

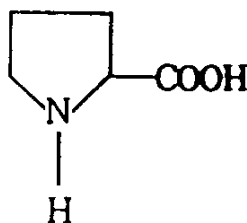
- (8) Residue on Evaporation : 0.01% and lower after evaporating the 100 ml propionic acid and drying it at 105°C for half an hour or until being weighted.

Water Content When Propionic Acid is tested by Water Determination Method (Karl-Fischer Method), the content should not be more than 0.15%.

Assay Accurately weigh about 1.5 g of Propionic Acid, dissolve in 100 ml of freshly boiled and cooled water, and titrate with 0.5 N sodium hydroxide (indicator : 2 drops of phenolphthalein solution).

$$1 \text{ ml of } 1 \text{ N sodium hydroxide} = 37.04 \text{ mg of } \text{C}_3\text{H}_6\text{O}_2$$

377. L-Proline



Chemical Formula $C_5H_9NO_2$

Molecular Weight 115.13

Compositional Specifications of L-Proline

Content L-Proline, when calculate on the dried basis, the content should contain within a range of 98.5~101.5% of L-proline ($C_5H_9NO_2$).

Description L-Proline is scentless white crystallite or crystalline powder with a slightly sweet taste.

Identification When 1 ml of ninhydrine solution (0.2→100) is added to 5 ml of L-Proline solution (1→1,000), this solution becomes yellow.

Purity (1) Specific Rotation : 4 g of pre-dried L-Proline is precisely weighed and dissolved in water so that the total volume becomes 100 ml. The polarity of this solution should be within a range of $[\alpha]_D^{20} = -84.0 \sim -86.3^\circ$

(2) Lead : When 5.0 g of L-Proline is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5ppm.

(3) Arsenic : 0.25 g of L-Proline is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

(4) Chloride: When 0.07 g of L-Proline is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.(Not be more than 0.1%)

Loss on Drying After drying for 3 hours at 105°C, the loss weight should not be more than 0.3%.

Residue on Ignition Residue after ignition should not be more than 0.1%.

Assay Dissolve about 0.22 g of L-Proline, previously dried and accurately weighed in 3 ml of formic acid and 50 ml of glacial acetic acid. The solution is titrated with 0.1 N perchloric acid solution (indicator : 2 drops of crystal violet solution in glacial acetic acid). The end point is where the color of the solution turns bluish green.

Separately, a blank test is carried out by following the same procedure.

$$1 \text{ ml of } 0.1 \text{ N perchloric acid solution} = 11.51 \text{ mg } \text{C}_5\text{H}_9\text{NO}_2$$

378. Ferric Pyrophosphate

Iron Pyrophosphate

Chemical Formula $\text{Fe}_4(\text{P}_2\text{O}_7)_3 \cdot n\text{H}_2\text{O}$

Molecular Weight 745.22

Compositional Specifications of Ferric Pyrophosphate

Content Ferric Pyrophosphate should contain within a range of 24.0~26.0% of iron(Fe).

Description Ferric Pyrophosphate occurs as a yellow to yellow-brown powder. It is odorless.

Identification When an excess amount of sodium hydroxide solution is added to a solution 0.5 g of Ferric Pyrophosphate in 5 ml of dilute hydrochloric acid (1→2), reddish brown precipitates are formed. After settling for several minutes, it is filtered. The first filtrate is discarded. 1 drop of bromine phenol blue solution is added to 5 ml of clear solution. It is then titrated with 1 N hydrochloric acid until it becomes green. When 10 ml of zinc sulfate solution (1→8) is added to the resulting solution and its pH is adjusted to 3.8, white precipitates are formed.

Purity (1) Arsenic : 0.25 g of Ferric Pyrophosphate is dissolved in 5 ml of dilute hydrochloric acid (1→2), which is tested by Arsenic Limit Test. (Not more than 4 ppm).

(2) Lead : 1.0 g of Ferric Pyrophosphate is weighed and transferred into 50 ml flask. Add 10 ml of 9 N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid-sodium iodide solution and 5 ml of trioctyl phosphine oxide solution and shake it to mix for 30 seconds. Add keep it to separate the layer and again add water so that organic layer reaches to neck part of flask. After shaking to mix it, keep it to separate the layer. This organic solvent layer is used as test solution. Separately, take 10 ml of lead standard solution and make it precisely to 100 ml. Take 2 ml of this solution and transfer into 50 ml flask. And operate under condition as test solution method, this solution is used as reference solution. When it is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, absorbance(luminous intensity) of test solution should not be more than absorbance(luminous intensity) of reference solution.(not be more than 2.0 ppm.)

Ascorbic acid-sodium iodide solution : 10 g of ascorbic acid and 19.3 g sodium iodide are dissolved in water to make to 100 ml.

Trioctyl phosphine oxide solution : 5 g of trioctyl phosphine oxide is dissolved in methyl isobutyl ketone to make to 100 ml.

(3) Mercury : Proceed as directed under Purity (4) in [Reducing Iron]. In this case, 3 ml of iron standard solution (for reducing iron) is used and the same procedure is followed. Test Solution is followed (Not more than 3 ppm).

Loss on Ignition When Ferric Pyrophosphate is heat treated for 1 hour at 800°C, the weight loss should not be more than 20.0%.

Assay 3.5 g of Ferric Pyrophosphate is precisely weighed and dissolved in 75 ml of dilute hydrochloric acid (1→2), which is then boiled for 5 minutes. After cooling, dilute hydrochloric acid (1→2) is added to bring the total volume to 100 ml. And then 100 ml of dilute hydrochloric acid (1→2) is added 25 ml of resulting solution. This solution is again boiled for 5 minutes. While boiling and stirring, stannous chloride solution is drop-wise added until iron is reduced and yellow color disappears. 2 more drops of stannous chloride solution are added to the solution, where approximately 50 ml of water is added. It is then cooled to room temperature. 15 ml of saturated solution of mercury chloride is added while stirring vigorously. After setting aside for 5 minutes, add 15 ml of sulfuric acid · phosphoric acid mixture, which is prepared by slowly adding 75 ml of sulfuric acid to 300 ml of water and cooled. 75 ml of phosphoric acid is added, where water is added to bring the total volume to 500 ml. After adding 0.5 ml of barium diphenylaminsulfonate solution, it is titrated with 0.1 N potassium bichromate solution until it turns reddish violet.

1 ml of 0.1 N potassium bichromate solution = 5.585 mg of Fe

379. Sodium Ferric Pyrophosphate

Sodium Iron Pyrophosphate

Chemical Formula $\text{Na}_8\text{Fe}_4(\text{P}_2\text{O}_7)_5 \cdot n\text{H}_2\text{O}$

Molecular Weight dehydrated form : 1277.02

Compositional Specifications of Sodium Ferric Pyrophosphate

Content Sodium Ferric Pyrophosphate should contain within a range of 14.5~16.0% of iron (Fe).

Description Sodium Ferric Pyrophosphate is scentless white~yellowish brown powder.

Identification 0.5 g of Sodium Ferric Pyrophosphate is dissolved in 5 ml of dilute hydrochloric acid (1→2). When excess sodium hydroxide solution is added, reddish brown precipitates are formed. This is stirred for several minutes and filtered. The small amount of the initial filtrate is discarded. 1 drop of bromophenol blue solutions added to 5 ml of the clear filtrate. When 1 N hydrochloric acid is added drop-wise, the filtrate turns green, where 10 ml of zinc sulfate solution (1→8) is added. Upon adjusting pH to 3.8, white precipitates are formed.

Purity (1) Fluoride : 1 g of Sodium Ferric Pyrophosphate is precisely weighed and tested by Purity (3) for [Calcium Oxide]. The total consumed amount of sodium fluoride should not exceed 2.5 ml (Not more than 0.005%).

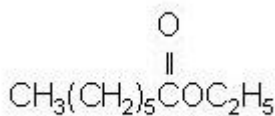
(2) Lead : 1.0 g of Sodium Ferric Pyrophosphate is weighed and transferred into 50 ml flask. Add 10 ml of 9 N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid-sodium iodide solution and 5 ml of trioctyl phosphine oxide solution and shake it to mix for 30 seconds. Add keep it to separate the layer and again add water so that organic layer reaches to neck part of flask. After shaking to mix it, keep it to separate the layer. This organic solvent layer is used as test solution. Separately, take 10 ml of lead standard solution and make it precisely to 100 ml. Take 2 ml of this solution and transfer into 50 ml flask. And operate under condition as test solution method, this solution is used as reference solution. When it is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, absorbance(luminous intensity) of test solution should not be more than absorbance(luminous intensity) of reference solution.(not be more than 2.0 ppm.)
Ascorbic acid-sodium iodide solution : 10 g of ascorbic acid and 19.3 g sodium iodide are dissolved in water to make to 100 ml.

Trioctyl phosphine oxide solution : 5 g of trioctyl phosphine oxide is dissolved in methyl isobutyl ketone to make to 100 ml.

(3) Mercury : Proceed as directed under Purity (4) for [Reduced Iron]. However, the same procedure is followed with 3 ml of mercury standard solution (for reduced solution) (Not more than 3 ppm).

Loss on Ignition When thermogravimetric analysis is done at 800°C for 1 hour, loss weight should not be more than 8.0%.

Assay Proceed as directed under Assay of [Ferric Pyrophosphate].

380. Ethyl HeptanoateChemical Formula $\text{C}_9\text{H}_{18}\text{O}_2$

Molecular Weight 158.24

Compositional Specifications of Ethyl Heptanoate**Content** Ethyl Heptanoate contains no less than 98.0% of ethyl heptanoate ($\text{C}_9\text{H}_{18}\text{O}_2$).**Description** Ethyl Heptanoate is a colorless to light yellow, transparent liquid having a wine-like odor.**Identification** To 1 ml of Ethyl Heptanoate, add 5 ml of ethanolic 10% potassium hydroxide solution, and heat in a water bath while shaking. The wine-like odor disappears. Cool, and acidify with diluted sulfuric acid (1→20). An odor of heptanoic acid is evolved.**Purity** (1) Specific Gravity : Specific gravity should be within a range of 0.869~0.874
(2) Refractive Index : Refractive Index $[\alpha]_D^{20}$ should be within a range of 1.411~1.416
(3) Clarity and Color of Solution : 1 ml of Ethyl Heptanoate dissolved in 5 ml of 70% v/v ethanol. This solution should be clear.
(4) Acid value : Acid value of Ethyl Heptanoate is tested by Acid Value in Flavoring Substance Test. It should not be more than 1.0.**Assay** Accurately weigh about 0.8 g of Ethyl Heptanoate, and proceed as directed under Ester Value and Ester Content in Flavoring Substances Tests.1 ml of 0.5 N alcoholic solution of potassium hydroxide = 79.12 mg of $\text{C}_9\text{H}_{18}\text{O}_2$

381. Potassium Sulfate

Chemical Formula K_2SO_4

Molecular Weight 174.26

Compositional Specifications of Potassium Sulfate

Content Potassium Sulfate should contain within a range of 99.0~100.5% of potassium sulfate (K_2SO_4).

Description Potassium Sulfate is colorless~white crystallite or crystalline powder with bitter taste.

Identification Potassium Sulfate solution (1→10) responds to test of potassium salts in Identification.

Purity (1) Lead : Potassium Sulfate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 2.0 ppm.

(2) Arsenic : 0.25 g of Potassium Sulfate is dissolved in 10 ml of water, which is tested by Arsenic Limit Test, then its content should not be more than 4 ppm.

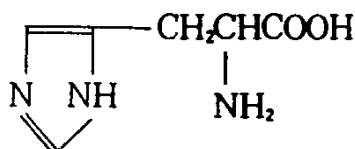
(3) Mercury : When Potassium Sulfate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(4) Selenium : 1 g of Potassium Sulfate is dissolved in 100 ml (Test Solution). The Test Solution is analyzed with Cold Vapor Type of atomic absorption spectrophotometer. The absorption should not be higher than that of the Standard Solution (Not more than 30 ppm). The Standard Solution is prepared by diluting 3 ml of selenium standard solution to 100 ml with water.

Assay Approximately 0.5 g of Potassium Sulfate is precisely weighed and dissolved in 200 ml of water. After adding 1 ml of hydrochloric acid, the solution is boiled. While stirring continuously, 8~9 ml of barium chloride solution is slowly added. The resulting solution is heated for 1 hour in a water bath. After cooling, the solution is filtered through a quantitative filter paper. The precipitates are washed until the filtrate doesn't show the reaction of chlorides. The precipitates are then carbonized carefully and heat-treated at $800 \pm 25^\circ\text{C}$ until the weight becomes constant. It is then weighed as barium sulfate.

$$\text{Content (\%)} = \frac{\text{Weight of barium sulfate (g)} \times 0.7466}{\text{Weight of Sample (g)}} \times 100$$

382. L-Histidine



Chemical Formula $C_6H_9N_3O_2$

Molecular Weight 155.16

Compositional Specifications of L-Histidine

Content L-Histidine, when calculated on the dried basis, should contain within a range of 98.5~101.5% of L-histidine ($C_6H_9N_3O_2$).

Description L-Histidine is scentless white crystallite or crystalline powder with a slightly bitter taste.

Identification When 2 ml of bromine solution is added to 5 ml of an aqueous solution (1→100) of L-Histidine, the color of the solution turns yellow. Upon heating gently, the solution becomes colorless then reddish brown. Finally, dark gray precipitates are formed.

Purity (1) Specific Rotation : 11 g of pre-dried material is precisely weighed and dissolved in 6 N hydrochloric acid so that the total volume becomes 100 ml. The polarity of this solution should be within a range of $[\alpha]_D^{20} = +12.0 \sim +14.0^\circ$

(2) Lead : When 5.0 g of L-Histidine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5 ppm.

(3) Arsenic : 0.25 g of L-Histidine is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

(4) Chloride: When 0.07 g of L-Histidine is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid. (Not be more than 0.1%)

Loss on Drying When L-Histidine is dried for 3 hours at 105°C, the loss should not be more than 0.2%.

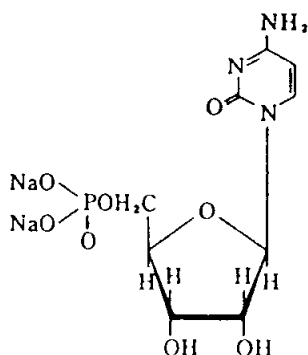
Residue on Ignition Residue on ignition of L-Histidine should not be more than 0.2%.

Assay Dissolve about 0.15 g of L-histidine, previously dried and accurately weighed in 3 ml of formic acid and 50 ml of glacial acetic acid. This solution is titrated with 0.1 N perchloric acid solution (indicator : 2 drops of crystal violet solution in glacial acetic acid). At the end point, the color of the solution turns from brown to green.

Separately, a blank experiment is done following the same procedure.

1 ml of 0.1 N perchloric acid solution = 15.52 mg $\text{C}_6\text{H}_{13}\text{NO}_2$

383. Disodium 5'-Cytidylate



Chemical Formula $\text{C}_9\text{H}_{12}\text{N}_3\text{Na}_2\text{O}_8\text{P}$

Molecular Weight 367.16

Compositional Specifications of Disodium 5'-Cytidylate

Content When Disodium 5'-Cytidylate, when calculated on the dried basis, should contain within a range of 97.0~102.0% of disodium 5'-cytidylate ($\text{C}_9\text{H}_{12}\text{N}_3\text{Na}_2\text{O}_8\text{P}$).

Description Disodium 5'-Cytidylate occurs as colorless to white crystals or as a white crystalline powder, having a slight, characteristic taste.

Identification (1) Dissolve 20 mg of Disodium 5'-Cytidylate in 100 ml of 0.01N hydrochloric acid (1→1,000) and 0.01 N hydrochloric is added to 10 ml of this solution to make 100 ml. The solution exhibits an absorption maximum at a wavelength of 279 ± 2 nm.

(2) To 3 ml of Disodium 5'-Cytidylate solution (3→10,000), add 1 ml of hydrochloric acid and 1 ml of bromine solution, heat in a water bath for 30 minutes, remove the bromine by blowing with air, add 0.2 ml of a solution of orcinol in ethanol (1→10), then add 3 ml of a solution of ferric ammonium sulfate in diluted hydrochloric acid (1→1,000), and heat in a water bath for 20 minutes. A green color becomes.

(3) To 5 ml of Disodium 5'-Cytidylate solution (1→20), add 2 ml of magnesia solution. No precipitate is formed. Then, add 7 ml of nitric acid, boil for 10 minutes and neutralize with sodium hydroxide solution (1→25). The solution responds to the test for Phosphate (2).

(4) Disodium 5'-Cytidylate responds to test of Sodium Salts in Identification.

Purity (1) Clarity and Color of Solution : When 0.5 g of Disodium 5'-Cytidylate is dissolved in 10 ml of water, the solution should be Colorless and almost clear.

(2) pH : pH of Disodium 5'-Cytidylate solution (1→20) should be within a range of 8.0~9.5 as determined by glass electrode method.

(3) Arsenic : 0.25 g of Disodium 5'-Cytidylate is dissolved in 5 ml of water, which is

- tested by Arsenic Limit Test. (Not more than 4 ppm).
- (4) Lead : Disodium 5'-Cytidylate is tested by Purity (2) for Sodium Metaphosphate(not more than 2.0 ppm).
- (5) Absorption Ratio : Measure absorbances A1, A2, and A3 of 0.01N hydrochloric acid solution of Disodium 5'-Cytidylate(1→50,000) at wavelengths of 250 nm, 260 nm, and 280 nm, respectively. A1/A2 is 0.40~0.52, and A3/A2 is 1.85~2.20.
- (6) Other decomposed substances of ribonucleic acids : Proceed as directed under Purity (6) for [5-Disodium Guanylate]

Water Content Water content of approximately 0.15 g of Disodium 5'-Cytidylate as determined by water content determination method should not be more than 26.0%. In this case, sample transfer into a dried titration flask, where 10 ml of Karl-Fisher methyl alcohol is added. A certain amount of Karl-Fisher solution is added so that there is an excess of approximately 10 ml. Then the flask is capped and shaken for 20 minutes. It is titrated with water-methyl alcohol standard solution. Separately, a blank test is carried out by following the same procedure.

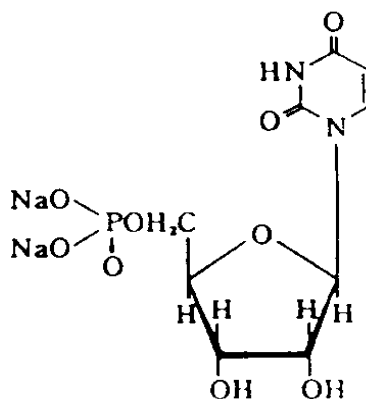
Assay Accurately weigh about 500 mg of Disodium 5'-Cytidylate, and dissolve in 0.01 N hydrochloric acid to make exactly 1,000 ml. Measure 10 ml of this solution, and add 0.01 N hydrochloric acid to make exactly 250 ml. Use this solution as the test solution. With reference solution, 0.01N hydrochloric acid, measure absorbance A of the test solution at a wavelength of 280 nm, and calculate the content by the following formula

Content of disodium 5'-cytidylate ($C_9H_{12}N_3Na_2O_8P$) (%)

$$= \frac{500}{\text{Weight of sample (mg)}} \times \frac{144.6 \times A}{100 - \text{water content (\%)}} \times 100$$

384. Disodium 5'-Uridylate

Sodium 5'-Undylate

Chemical Formula $\text{C}_9\text{H}_{11}\text{N}_2\text{Na}_2\text{O}_9\text{P}$

Molecular Weight 368.15

Compositional Specifications of Disodium 5'-Uridylate

Content When Disodium 5'-Uridylate, when calculated on the dried basis, should contain within a range of 97.0~102.0% of disodium 5'-uridylate ($\text{C}_9\text{H}_{11}\text{N}_2\text{Na}_2\text{O}_9\text{P}$).

Description Disodium 5'-Uridylate occurs as colorless to white crystals or as a white crystalline powder, having a slight, characteristic taste.

Identification (1) Dissolve 20 mg of Disodium 5'-Uridylate in 100 ml of 0.01 N hydrochloric acid and 0.01 N hydrochloric is added to 10 ml of this solution to make 100 ml. The solution exhibits an absorption maximum at a wavelength of 262 ± 2 nm.

(2) To 3 ml of Disodium 5'-Uridylate solution (3→10,000), add 1 ml of hydrochloric acid and 1 ml of bromine solution, heat on a water bath for 30 minutes, remove the bromine by blowing with air, and add 0.2 ml of a solution of orcinol in ethanol (1→10). To this solution, add 3 ml of a solution of ferric ammonium sulfate in hydrochloric acid (1→1,000), and heat in a water bath for 20 minutes. A green color becomes.

(3) To 5 ml of Disodium 5'-Uridylate solution (1→20), add 2 ml of magnesia solution. No precipitate is formed. Then add 7 ml of nitric acid, boil for 10 minutes, and neutralize with sodium hydroxide solution (1→25). The solution responds to the test for Phosphate (2).

(4) Disodium 5'-Uridylate responds to test of Sodium Salt in Identification.

Purity (1) Clarity and Color of Solution : When 0.5 g of Disodium 5'-Uridylate dissolved in 10 ml of water, the solution should be Colorless and almost clear.

(2) pH : pH of Disodium 5'-Uridylate solution (1→20) should be within a range of 7.0~8.5 as determined by glass electrode method.

(3) Arsenic : 0.25 g of Disodium 5'-Uridylate is dissolved in 5 ml of water, which is tested by Arsenic Limit Test. (Not more than 4 ppm).

(4) Lead : Disodium 5'-Uridylate is tested by Purity (2) for Sodium Metaphosphate(not more than 2.0 ppm).

(5) Absorption Ratio : Weigh 20 mg of Disodium 5'-Uridylate, and dissolve in diluted hydrochloric acid (1→1,000) to make 1,000 ml. Measure absorbances A₁, A₂, and A₃ of 0.01N hydrochloric acid solution of Disodium 5'-Cytidylate(1→50,000) at wavelengths of 250 nm, 260 nm, and 280 nm, respectively. A₁/A₂ is 0.7~0.78, and A₃/A₂ is 0.34~0.42.

(6) Other decomposed substances of ribonucleic acids : Measure 1 μ l of the solution of Disodium 5'-Uridylate (0.1→10) as the test solution. Perform Thin-Layer Chromatography, using an ethanol ethylene glycol monomethyl ether-diluted hydrochloric acid (1→10) mixture (2:2:1) as the developing solvent. Only one spot is observed. For the thin layer plate, use microcrystalline cellulose for thin-layer chromatography dried at 60~80°C for 20 minutes as the support. Stop the development when the solvent front rises 10 cm above the original line, air-dry, and observe under ultraviolet light (about 250 nm wavelength) in a dark place. However, reference solution is not used.

Water Content Water content of approximately 0.15 g of Disodium 5'-Uridylate as determined by water content determination method (Karl-Fischer Method) should not be more than 26%. In this case, sample transfer into a dried titration flask, where 10 ml of Karl-Fisher methyl alcohol is added. A certain amount of Karl-Fisher solution is added so that there is an excess of approximately 10 ml. Then the flask is capped and shaken for 20 minutes. It is titrated with water-methyl alcohol standard solution. Separately, a blank test is carried out by following the same procedure.

Assay Accurately weigh about 500 mg of Disodium 5'-Uridylate, dissolve in 0.01 N hydrochloric acid to make 1,000 ml, measure 10 ml of this solution, and add 0.01 N hydrochloric acid to make 250 ml. Use this solution as the test solution. Measure absorbance A of the test solution at a wavelength of 260 nm, and calculate the content by the following formula:

Content of disodium 5'-uridyate ($\text{C}_9\text{H}_{11}\text{N}_2\text{Na}_2\text{O}_9\text{P}$)

$$= \frac{500}{\text{Weight of sample (mg)}} \times \frac{185.9 \times A}{100 - \text{water content (\%)}} \times 100$$

385. Isopropyl Alcohol

2-Propanol

Isopropanol

Chemical Formula $\text{C}_3\text{H}_8\text{O}$

Molecular Weight 60.10

Compositional Specifications of Isopropyl Alcohol

Content Isopropyl Alcohol should contain not less than 99.7% of isopropyl alcohol ($\text{C}_3\text{H}_8\text{O}$).

Description Isopropyl Alcohol is colorless transparent flammable liquid with a characteristic scent and slightly bitter taste.

Identification 3 ml of water and 1 ml of mercury (II) sulfate solution are added to 2 ml of Isopropyl Alcohol. When the solution is warmed, white~yellow precipitates are formed.

Purity (1) Solubility : 10 ml of Isopropyl Alcohol is mixed with 40 ml of water. This solution should be as clear as the same amount of water after 1 hour.

(2) Acid Value (as acetic acid) : 2 drops of phenolphthalein is added to 100 ml of water, where 0.01 N sodium hydroxide solution is added until pale red color persists for 30 seconds. Then 50 ml (approximately 39 g) of Isopropyl Alcohol is added and mixed with the above solution. The resulting solution is titrated with 0.01 N sodium hydroxide solution until pale red color reappears. The consumption of 0.01 N sodium hydroxide solution should not be more than 0.7 ml.

(3) Lead : When 5.0 g of Isopropyl Alcohol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1 ppm.

(4) Distillation Range : When Isopropyl Alcohol is tested for boiling point and amount of distillate, 95%(v/v) or more should be extracted at 81.3~83.3°C.

(5) Residue on Evaporations : 125 ml (approximately 100 g) of Isopropyl Alcohol is dried in a water bath and is further dried for 30 minutes at 105°C. The weight of the residue after cooling should not be more than 10 ppm.

(6) Matters that reduce permanganates : 50 ml of Isopropyl Alcohol transfer into a 50 ml cylinder with a stopper. After adding 0.25 ml of 0.1 N potassium permanganate solution, it is set aside for 10 minutes. Pale red color should not disappear completely.

(7) Specific Gravity : Specific gravity of Isopropyl Alcohol should be within a range of 0.784~0.788

(8) Refractive Index : Refractive Index n_D^{20} of Isopropyl Alcohol should be within a range of 1.374~1.380

Water Content Water content of Isopropyl Alcohol is determined by water determination (Karl-Fisher Method) and should not be more than 0.2%.

Assay Approximately 500 mg of Isopropyl Alcohol is precisely weighed and 50 ml of water is added. 10 ml of this solution is diluted to 100 ml with water (Test Stock Solution). Separately, 500 mg of isopropyl alcohol standard is precisely weighed and diluted as the Test Solution (Standard Stock Solution). 4 ml each of Test Stock Solution and Standard Stock Solution is taken into 100 ml volumetric flask. 4 ml of internal standard solution (Approximately 500 mg of tert-butyl alcohol is precisely weighed and water is added to bring the total volume to 50 ml. 10 ml of this solution is further diluted to 100 ml with water.) is added to each flask. Then the volume of each flask is brought up to 100 ml with water (Test Solution and Standard Solution). 1 μl of each Test Solution and Standard Solution is injected into gas chromatography, and the content (%) of isopropyl alcohol is obtained from the following equation.

$$\text{Content of isopropyl alcohol (\%)} = \frac{W_s \times R_u}{W_u \times R_s} \times 100$$

W_s : Weight of isopropyl alcohol standard (mg)

W_u : Weight of sample (mg)

R_u : Ratio of isopropyl alcohol peak against tert-butyl alcohol peak in Test Solution

R_s : Ratio of isopropyl alcohol peak against tert-butyl alcohol peak in Standard Solution

Operation Conditions

- Column : A glass or stainless tube with inner diameter of 2 mm and length of 2 m
- Column Filler : Chromosorb W-HP coated with 3% OV - 225
- Detector : Hydrogen Flame Ionization Detector (FID)
- Temperature at injection hole: 250°C
- Column Temperature : 200°C
- Detector Temperature : 250°C
- Carrier gas and flow rate : Nitrogen, 30 ml per minute

386. Magnesium Silicate

Synthetic Magnesium Silicate

Definition

Magnesium Silicate is a compound magnesium silicate of $\text{SiO}_2 : \text{MgO}$ with a approximate mole ratio of 2 : 5.

Compositional Specifications of Magnesium Silicate

Content When Magnesium Silicate is converted to a heat treated material, it should contain not less than 15.5% of magnesium oxide (MgO) and not less than 67.0% of silicon dioxide (SiO_2).

Description Magnesium Silicate is scentless tasteless white fine powder.

Identification (1) 500 mg of Magnesium Silicate is dissolved in 10 ml of 2.7 N hydrochloric acid, which is then filtered. The filtrate is neutralized with 6 N ammonium hydroxide solution as determined by litmus paper. The resulting solution responds to test of magnesium salt in Identification

(2) Small amount of ammonium sodium phosphate is heated and melted to a bead on a platinum ring with a burner. This hot transparent bead is mixed with Magnesium Silicate and melted again. During cooling, opaque bead with a network structure appears and anhydrous silicate swells.

Purity (1) pH : pH of Magnesium Silicate solution should be within a range of 7.0~10.8.

(2) Fluoride : 1 g of Magnesium Silicate is precisely weighed into a beaker and dissolved by adding 10 ml of 1 N hydrochloric acid. It is then boiled for 1 minute. The solution is transferred into a PE beaker and quickly cooled. 15 ml of sodium citrate solution(1→4) and 10 ml of EDTA solution(1→40) are added, shaken, and mixed. pH of the solution is adjusted to 5.4~5.6 by adding hydrochloric acid(1→10) or sodium hydroxide solution(2→5). The total volume of the solution is brought up to 100 ml by adding water (Test Solution). 50 ml of the Test Solution is transferred into a PE beaker. Electric potential is measured using fluorine electrode . Fluoride concentration ($\mu\text{g}/100\text{ml}$) is measured from a standard curve and it should not be more than 10 ppm.

Standard Solution : 2.210 g of sodium fluoride, which is previously dried for 4 hours at 200°C , is accurately weighed into a PE beaker and dissolved in 200 ml of water. Then add water to bring the total volume to 1,000ml and preserve it in a PE beaker. Measure exactly 5 ml of this solution into a measuring flask, and add water to bring the total volume to 1,000 ml. (1 ml of this solution contains $5\mu\text{g}$ of fluorine.)

Calibration Curve Preparation : Separately, 1, 2, 3, 5, 10, and 15 ml of standard solution is weighed into a PE beaker, and 15 ml of Trisodium Citrate Solution (1→4) and 10 ml of Disodium Ethylenediaminetetraacetate solution (1→40) are added and mixed. To this solution, Hydrochloric acid (1→10) or Sodium Hydroxide Solution (2→5) are added to bring the pH 5.4~5.6, where water is added to bring the total volume to 100ml, separately. Each of 50 ml of the solution transfer into a PE beaker. Then measure electric potential by using fluorine electrode and prepare calibration curve with the log of fluorine concentration.

(3) Soluble Salts : 150 ml of water is added to 10 g of Magnesium Silicate, which is heated for 15 minutes in a water bath. After cooling, water is added to bring the total volume to 150 ml. This mixture is settled for 15 minutes and filtered. 25 ml of water is added to 75 ml of the filtrate. 50 ml of the resulting solution is evaporated to dryness in a water bath. The residue is heat treated until the weight becomes constant. The residue should not exceed 75 mg (Not more than 3.0%).

(4) Free Alkali : When 2 drops of phenolphthalein solution is added to 20 ml of the filtrate in (3), it turns pale red. This solution is titrated with 0.1 N hydrochloric acid, the consumed amount of hydrochloric acid should not exceed 2.5 ml (Not more than 1% as NaOH).

(5) Arsenic : 10 g of Magnesium Silicate is weighed into a 250 ml flask. 50 ml of 0.5 N hydrochloric acid is added and the flask is covered with a watch glass and slowly heated until the liquid boils. After boiling for another 30 minutes, it is cooled and settled. The supernatant is filtered through No.3 Whatman filter paper or its equivalent. Insoluble substances and beaker are washed with three times with 10 ml of hot water, which is then passed through the previous filter paper. After cooling, the filtrate is diluted to 100 ml with water (Test Solution). 10 ml of the Test Solution is diluted to 35 ml with water. The resulting solution is tested by Arsenic Limit Test. The content should not be more than 4 ppm.

(6) Lead : The test solution in (5) Purity is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

(7) Mercury : When Magnesium Silicate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm

Loss on Drying When Magnesium Silicate is dried for 2 hours at 105°C, the loss should not be more than 15%.

Loss on Ignition Magnesium Silicate is dried for 2 hours at 105°C and precisely weighed 1 g is analyzed by thermogravimetry at 900~1,000°C for 2

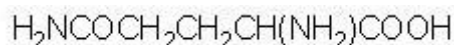
hours. Weight loss should not be more than 15%.

Assay (1) Magnesium Oxide : Approximately 1.5 g of Magnesium Silicate is precisely weighed into a 250 ml Erlenmeyer flask. 50 ml of 1 N sulfuric acid is added to the flask, which is heated for 1 hour in a water bath. After cooling, methyl orange solution is added and the excess amount of acid is titrated with 1 N sodium hydroxide solution.

1 ml of 1 N sulfuric acid = 20.15 mg MgO

(2) Silicon Dioxide : Approximately 700 mg of Magnesium Silicate is precisely weighed into a 150 ml beaker. 20 ml of 1 N sulfuric acid is added to the beaker, which is then heated for 1 hour 30 minutes in a water bath. After cooling, the supernatant is filtered through a ash-free filter paper, which is washed slowly three times with hot water. 25 ml of water is added to the residue, which is heated for 15 minutes in a water bath. This is filtered and washed sufficiently with hot water. The filter paper with residue transfer into a platinum crucible and carbonized. It is then heat treated for 30 minutes. After cooling, the residue is weighed. The residue is wetted with small amount of water. After adding 6 ml of hydrofluoric acid and 3 drops of sulfuric acid, it is then evaporated to dryness. The resulting residue is heat treated for 5 minutes. After cooling, the remaining residue is weighed.

387. L-Glutamine



Chemical Formula $\text{C}_5\text{H}_{10}\text{N}_2\text{O}_3$

Molecular Weight 146.15

Compositional Specifications of L-Glutamine

Content L-glutamine, when calculated on the dried basis, should contain within a range of 98.5~101.5% L-glutamine ($\text{C}_5\text{H}_{10}\text{N}_2\text{O}_3$).

Description L-glutamine is scentless white crystallite or crystalline powder with a slight sweet taste.

Identification 1 ml of ninhydrine standard solution is added to 5 ml aqueous solution of L-glutamine (1→1,000). Upon heating for 3 minutes in a water bath, this solution turns violet.

Purity (1) Specific Rotation : 4 g of pre-dried material is precisely weighed and dissolved in water (total volume 100 ml). The polarity of this solution should be within a range of $[\alpha]_D^{20} = +6.3 \sim +7.3^\circ$

(2) Lead : When 5.0 g of L-Glutamine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5 ppm.

(3) Arsenic : 0.25 g of L-Glutamine is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

(4) Chloride: When 0.07 g of L-Glutamine is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.(Not be more than 0.1%)

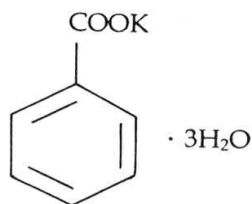
Loss on Drying When L-glutamine is dried for 3 hours at 105°C, the loss should not be more than 0.3%.

Residue on Ignition Residue after ignition should not be more than 0.1%.

Assay Accurately weighed about 0.5 g of L-glutamine, and proceed as directed under Assay of [L-Sodium Glutamate].

1 ml of 0.1 N perchloric acid solution = 14.62 mg $\text{C}_5\text{H}_{10}\text{N}_2\text{O}_3$

388. Potassium Benzoate



Chemical Formula $\text{C}_7\text{H}_5\text{KO}_2 \cdot 3\text{H}_2\text{O}$

Molecular Weight 214.27

Compositional Specifications of Potassium Benzoate

Content Potassium Benzoate, when calculated on the dried basis, should contain not less than 99.0% of potassium benzoate ($\text{C}_7\text{H}_5\text{KO}_2$).

Description Potassium Benzoate is scentless white grain, crumb, or crystalline powder.

Identification Potassium Benzoate responds to test of Benzoate or Potassium Salts in Identification.

Purity (1) Melting Point : 2% aqueous solution of Potassium Benzoate is acidified with dilute hydrochloric acid. Precipitates are filtered, washed with water, and dried for 4 hours at 105°C . The melting point should be within a range of $121.5\sim 123.5^\circ\text{C}$.

(2) Free Acid and Free Alkali : 2 g of Potassium Benzoate is precisely weighed and dissolved in 20 ml of hot water. After adding 2~3 drops of phenolphthalein solution, the solution is titrated with 0.1 N sodium hydroxide solution or 0.1 N of hydrochloric acid. The consumed amount of the solution should not exceed 0.5 ml.

(3) Chlorinated Compounds : 0.25 g of potassium benzoate is dissolved in 10 ml of water, which is acidified with nitric acid. The precipitates are filtered, mixed with 0.5 g potassium carbonate, and dried. The mixture is then heat treated for approximately 10 minutes at 600°C . After cooling, the residue is dissolved in 20 ml of dilute nitric acid and filtered. 0.5 ml of 0.1 N silver nitrate is added to the filtrate (Test Solution). Separately, water is added to a mixture of 0.5 ml of 0.1 N silver nitrate solution and 0.5 ml of 0.01 N hydrochloric acid so that the concentration is the same as in Test Solution. This solution as the reference solution. Turbidity of the Test Solution should be equal to or less than that of the Reference Solution.

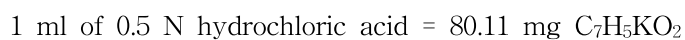
(4) Arsenic : 0.25 g of potassium benzoate transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at $450\sim 550^\circ\text{C}$. If carbonaceous substance persists, it is wetted with minute amount of

nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

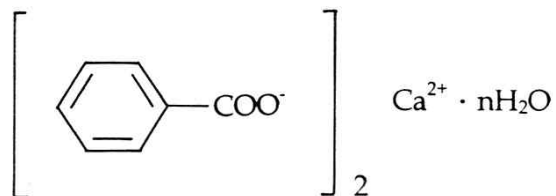
- (5) Lead : When 5.0 g of potassium benzoate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (6) Mercury : When potassium benzoate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (7) Readily Oxidizable Matters : Add 1.5 ml of sulfuric acid to 100 ml of water, add drop wise 0.1 N potassium benzoate while boiling until the pink color persists for 30 seconds. Weigh 1 g of Sodium Benzoate, and dissolve in the solution. Titrate with 0.1 N potassium permanganate at about 70°C until the pink color persists for 15 seconds. The amount should not be more than 0.5 ml.
- (8) Readily Carbonizable Substances : When 0.5 g of potassium benzoate is tested for Readily Carbonizable Substances, its color should not be darker than the color standard solution Q.

Loss on Drying When Potassium Benzoate is dried for 4 hours at 105°C, the loss should not be more than 26.5%.

Assay 2.5~3 g of Potassium Benzoate, precisely dried at 105°C until the weight becomes constant. and accurately weighed, dissolve in 50 ml of water. The solution is neutralized with 0.1 N hydrochloric acid (using phenolphthalein solution as an indicator, if necessary). 50 ml of ether and 3~5 drops of bromophenol blue solution are added. While shaking so that ether layer and aqueous layer are well mixed, the mixture is titrated with 0.5 N hydrochloric acid. The aqueous layer is separated out and the ether layer is washed with 10 ml of water. Wash water is added the previous aqueous layer. With 20 ml of ether, the aqueous phase is titrated again by the same procedure.



389. Calcium Benzoate



Chemical Formula $\text{C}_{14}\text{H}_{10}\text{CaO}_4 \cdot n\text{H}_2\text{O}$ ($n = 0, 1, \text{ or } 3$)

Molecular Weight trihydrate : 336.36 hydrate
: 300.32
anhydrous : 282.31

Compositional Specifications of Calcium Benzoate

Content Calcium Benzoate, when calculated on the dried basis, should be contain not less than 99.0% of calcium benzoate ($\text{C}_{14}\text{H}_{10}\text{CaO}_4$).

Description Calcium Benzoate is colorless~white crystal or powder.

- Identification** (1) Melting Point : 2% aqueous solution of Calcium Benzoate is acidified with dilute hydrochloric acid. Precipitates are filtered, washed with water, and dried for 4 hours at 105°C . The melting point should be within a range of $121.5\sim 123.5^\circ\text{C}$.
- (2) Water Insoluble substances : 10 g of Calcium Benzoate is dissolved in 100 ml of hot water and filtered through a crucible type glass filter (1G4) that is previously weighed. Insoluble substances are washed with hot water and dried along with the filter for 2 hours at 105°C . After cooling in a desiccator, the filter with insoluble substances is weighed. The content of water insoluble substances should not be more than 0.3%.
- (3) Free Acid and Free Alkali : 2 g of Calcium Benzoate is precisely weighed and dissolved in 20 ml of hot water. After adding 2~3 drops of phenolphthalein solution, the solution is titrated with 0.1 N sodium hydroxide solution or 0.1 N of hydrochloric acid. The consumed amount of the solution should not be more than 0.5 ml.
- (4) Chlorinated Compounds : 0.25 g of Calcium Benzoate is dissolved in 10 ml of water, which is acidified with nitric acid. The precipitates are filtered, mixed with 0.5 g potassium carbonate, and dried. The mixture is then heat treated for approximately 10 minutes at 600°C . After cooling, the residue is dissolved in 20 ml of diluted nitric acid and filtered. 0.5 ml of 0.1 N silver nitrate is added to the

filtrate (Test Solution). Separately, water is added to a mixture of 0.5 ml of 0.1 N silver nitrate solution and 0.5 ml of 0.01 N hydrochloric acid so that the concentration is the same as in Test Solution (Reference Solution). Turbidity of the Test Solution should not be more than that of the Reference Solution.

- (5) Fluoride : 1 g of Calcium Benzoate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 10 ppm.
- (6) Arsenic : 0.25 g of Calcium Benzoate transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.
- (7) Lead : When 5.0 g of Calcium Benzoate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (8) Mercury : When Calcium Benzoate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (9) Readily Oxidizable Matters : Add 1.5 ml of sulfuric acid to 100 ml of water, while boiling, add drop wise 0.1 N potassium benzoate while boiling until the pink color persists for 30 seconds. Weigh 1 g of Calcium Benzoate, and dissolve in the solution. Titrate with 0.1 N potassium permanganate at about 70°C until the pink color persists for 15 seconds. The amount should not be more than 0.5 ml.

Loss on Drying When Calcium Benzoate is dried at 105°C until the weight becomes constant, the loss should not be more than 17.5%.

Assay Dissolve 0.6 g of Calcium Benzoate, previously dried and accurately weighed in 20 ml of water and 2 ml of diluted hydrochloric acid, which is diluted to 100 ml with water. Approximately 30 ml of 0.05 M EDTA solution is added while shaking well. After adding 15 ml of sodium hydroxide solution and 0.25 g of hydroxy naphthol blue, the solution is titrated with 0.05 M EDTA solution.

$$1 \text{ ml of } 0.05 \text{ M EDTA solution} = 14.116 \text{ mg } \text{C}_{14}\text{H}_{10}\text{CaO}_4$$

390. Potassium Gluconate



Chemical Formula $\text{C}_6\text{H}_{11}\text{KO}_7$, $\text{C}_6\text{H}_{11}\text{KO}_7 \cdot \text{H}_2\text{O}$

Molecular Weight anhydrous : 234.25, hydrate : 252.26

Compositional Specifications of Potassium Gluconate

Content When Potassium Gluconate, when calculated on the dried basis(anhydrous), should contain within a range of 97.0~103.0% of potassium gluconate ($\text{C}_6\text{H}_{11}\text{KO}_7$).

Description Potassium Gluconate is scentless white~yellowish white granule or crystalline powder.

Identification (1) Potassium Gluconate solution (1→20) responds to test of potassium salts in Identification.

(2) 5 ml of Potassium Gluconate solution (1→10) is tested by (3) Identification for [glucono-δ-lactone].

Purity (1) pH : pH of Potassium Gluconate solution (1→10) is measured by glass electrode method and should be within a range of 7.3~8.5.

(2) Arsenic : 10 ml solution containing 0.5 g of Potassium Gluconate is tested by Arsenic Limit Test. The content should not be more than 4 ppm.

(3) Lead : When 5.0 g of Potassium Gluconate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(4) Reducing Matter : Approximately 1 g of Potassium Gluconate is weighed into a 250 ml Erlenmeyer flask. 10 ml of water is added to dissolve the solid and 25 ml of alkaline copper citrate solution. A small beaker is placed on top of the flask, which is heated for precisely 5 minutes. It is then rapidly cooled to room temperature. To this solution, 25 ml of diluted acetic acid (1→10), 10 ml of 0.1 N iodine solution, 10 ml of dilute hydrochloric acid, and 3 ml of starch solution are added. The resulting solution is titrated with 0.1 N sodium thiosulfate solution until the blue color disappears. The content of reduced materials should not be more than 0.5%.

$$\text{Reducing Matter Content (as glucose)(\%)} = \frac{(V_1N_1 - V_2N_2) \times 27}{\text{Weight of sample(mg)}} \times 100$$

V_1 : Consumed amount of 0.1 N iodine solution (ml)

N_1 : Normality of 0.1 N iodine solution

V_2 : Consumed amount of 0.1 N sodium thiosulfate solution (ml)

N_2 : Normality of 0.1 N sodium thiosulfate solution

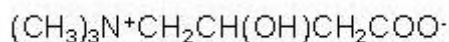
27 : Experimental corresponding amount for D-glucose

Loss on Drying When Potassium Gluconate is dried for 5 hours at 105°C, the loss should not be more than 3.0% and 6.0~7.5% for a dehydrated form and hydrate, respectively.

Assay Proceed as directed under Assay of 「Sodium Gluconate.

1 mL of 0.1 N perchloric acid solution = 23.24 mg $C_6H_{11}KO_7$

391. L-Carnitine



Chemical Formula $\text{C}_7\text{H}_{15}\text{NO}_3$

Molecular Weight 161.20

Compositional Specifications of L-Carnitine

Content L-Carnitine, when calculated on the dried basis(anhydrous), should contain within a range of 97.0~103.0% L-carnitine ($\text{C}_7\text{H}_{15}\text{NO}_3$).

Description L-Carnitine is white or pale yellow crystalline powder with unique scent.

Identification Infrared absorption spectrum of L-Carnitine is obtained following the procedure in B. (1) Potassium Bromide Disk Method in Infrared Spectrophotometry. It should be show the same spectrum of the standard material.

Purity (1) Sodium : 2 g of L-Carnitine transfer into a 100 ml volumetric flask. After adding 5 ml of nitric acid, it is well mixed and the volume is brought up to 100 ml with water (Test Solution). Using atomic absorption spectrophotometer, the Test Solution and sodium standard solution are analyzed to measure the sodium content in the sample. The content should not be more than 0.1%.

(2) Specific Rotation : Approximately 10 g of L-Carnitine is precisely weighed, which is dissolved in water so that the total volume to make 100 ml. Optical rotation of the solution is measured. When it is translated to dried material, $[\alpha]_D^{20} = -29 \sim -32^\circ$

(3) pH : When pH of L-Carnitine solution (1→20) is measured using glass electrode method, it should be within a range of 5.5~9.5.

(4) Chloride : 0.13 g of L-Carnitine is dissolved in 100 ml of water. To 20 ml of this solution, 6 ml of diluted nitric acid is added (Test Solution). This test solution is tested by Chloride Limit Test. This Test Solution is tested by Chloride Limit Test and its content should not be more than the amount that corresponds to 0.3 ml of 0.01 N hydrochloric acid.

(5) Lead : When 5.0 g of L-Carnitine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1 ppm.

(6) Potassium : 2 g of L-Carnitine transfer into a 100 mL volumetric flask. After adding 5 ml of nitric acid, it is well mixed and the volume is brought up to 100 ml with water (Test Solution). Using atomic absorption spectrophotometer, the Test Solution and sodium standard solution are analyzed to measure the potassium

content in the sample. The content should not be more than 0.2%.

Water Content Water content of L-Carnitine is determined by water determination (Karl-Fisher Titration) and should not be more than 4.0%.

Residue on Ignition When thermogravimetric analysis is done with precisely weighed 2 g of L-Carnitine, the amount of residue should not be more than 0.5%.

Assay Approximately 0.1 g of L-Carnitine is precisely weighed and dissolved in 3 ml of formic acid and 50 ml of glacial acetic acid (for non aqueous titration). This solution is titrated with 0.1 N perchloric acid solution (indicator : crystal violet·glacial acetic acid solution). At the endpoint, the color of the solution turns from violet, to blue, and finally to green. Separately, a blank experiment is done following the same procedure.

1 mL of 0.1 N perchloric acid solution = 16.12 mg $C_7H_{15}NO_3$

392. Methyl *p*-Hydroxybenzoate

Chemical Formula $\text{C}_8\text{H}_8\text{O}_3$

Molecular Weight 152.15

Compositional Specifications of Methyl *p*-Hydroxybenzoate

Content Methyl *p*-Hydroxybenzoate, when calculated on the dried basis, should be contain not less than 99.0% methyl *p*-hydroxybenzoate ($\text{C}_8\text{H}_8\text{O}_3$).

Description Methyl *p*-Hydroxybenzoate is colorless crystal or white crystalline powder with slight or no scent

Identification To 0.5 g of Methyl *p*-Hydroxybenzoate, add 10 ml of sodium hydroxide, boil about 30 minutes, evaporate to about 5 ml, and cool. Acidify this solution with diluted sulfuric acid and wash formed precipitates with water. Dry it for 1 hour at 105°C, and the melting point is 213~217°C.

Purity (1) Melting Point : Melting point of Methyl *p*-Hydroxybenzoate should be within a range of 125~128°C.

(2) Free Acid : 15 ml of water is added to 0.75 g of Methyl *p*-Hydroxybenzoate and heated for 1 minutes in effervescent water bath and cooled. The filtrate is acidic or neutral. To 10 ml of filtrate, 0.2 ml of 0.1N sodium hydroxide and 2 drops of methyl red solution are added. A yellow color develops.

(3) Arsenic : 0.25 g of Methyl *p*-Hydroxybenzoate transfer into a platinum, quartz, or porcelain crucible. 10 ml of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(4) Lead : When 5.0 g of Methyl *p*-Hydroxybenzoate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) *p*-Hydroxybenzoate and salicylic acid : 0.5g of Methyl *p*-Hydroxybenzoate is dissolved in 30ml of ether, and 20 ml of Sodium Bicarbonate(1→100) is added and mixed. Separate the water layer. The water layer is washed with 20 ml each of ether twice, and 5ml of diluted sulfuric acid and 30 ml of ether are added. Separate the ether layer and wash with 10 ml of water. Filter ether layer, wash the container

of the solution and mix it in the solution. Evaporate the ether of the solution to dryness in a water bath. Dry the residue in sulfuric desiccator until the weight becomes constant. Then the content should be 5 mg or less. The constant residues are dissolved in water, heated to 70°C, and filtered. When diluted Ferric Chloride Solution is added to the solution, it should not be appeared red ~ dark red color.

Loss on Drying When Methyl *p*-Hydroxybenzoate dried for 5 hours in a desiccator (silica gel), the loss should not be more than 0.5%.

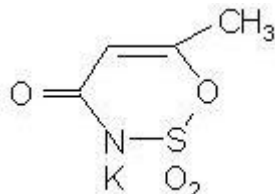
Residue on Ignition When thermogravimetric analysis is done with precisely weighed 2 g of Methyl *p*-Hydroxybenzoate , the amount of residue should not be more than 0.05%.

Assay 40 ml of 1 N sodium hydroxide solution is added to precisely weighed 2 g of Methyl *p*-Hydroxybenzoate, boiled for 30 minutes and cooled. Titrate the excess alkali with 1 N sulfuric acid (indicator : 5 drops of bromthymol blue solution). The color of end point is the color which appears by adding same indicator to buffer solution of pH 6.5. Separately, perform a blank test in the same manner.

$$1 \text{ ml of } 1 \text{ N sodium hydroxide solution} = 152.2 \text{ mg } \text{C}_8\text{H}_8\text{O}_3$$

393. Acesulfame Potassium

Acesulfame K



Chemical Formula $\text{C}_4\text{H}_4\text{KNO}_4\text{S}$

Molecular Weight 201.24

Compositional Specifications of Acesulfame Potassium

Content Acesulfame Potassium, when calculated on the dried basis, should contain within a range of 99.0~101.0% of acesulfame potassium ($\text{C}_4\text{H}_4\text{KNO}_4\text{S}$).

Description Acesulfame Potassium is scentless white crystalline powder with strong sweet taste.

Identification (1) A solution of 10 mg of Acesulfame Potassium in 1,000 ml of water shows a maximum absorption band in a wavelength range of 225~229 nm.

(2) Acesulfame Potassium responds to test of potassium salts in Identification.

(3) 0.2 g of Acesulfame Potassium is dissolved in 2 ml of acetic acid (30→100) and 2 ml of water. Upon adding a few drops of sodium cobalt nitrite solution, yellow precipitates are formed.

Purity (1) Fluoride : Fluoride : 1 g of Acesulfame Potassium is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 3 ppm.

(2) Lead : When 5.0 g of Acesulfame Potassium is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(3) Other UV absorbing matters : 1 g of Acesulfame Potassium is precisely weighed and dissolved in water so that the total volume to make 100 ml (Test Solution). 20 μl of this Test Solution is injected into a liquid chromatography using the following operation conditions. When other peaks appear within three times of the retention time of the main peak, the Test Solution is further diluted with water (50,000 times). With 20 μl of this diluted solution, the same test is repeated. The sum of peak areas (for the Test Solution) of all the peaks (excluding the main peak) that appear within three times of the retention time of the main peak should not be bigger than the area of the main peak measured with the diluted solution (50,000

times). (not more than 20 ppm as acesulfame potassium).

Operation Conditions

-Detector : UV 227 nm

-Column : 3~5 μ m ODS(4.6 mm \times 250 mm) or its equivalent

-Mobile Phase : A mixture of acetonitrile : 0.01 mol/l tetrabutyl ammonium hydrogen sulfate (40 : 60)

-Flow Rate : 1 ml/min

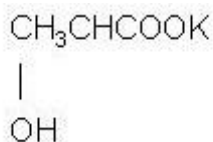
10 mg of each material is weighed and dissolved in water (total volume 1,000 ml). 20 μ l of this solution is injected into liquid chromatography following the above procedure. 20 μ l of this solution is injected into liquid chromatography following the above procedure. The column should be able to separate Acesulfame Potassium and 「ethyl p-hydroxybenzoate」.

Loss on Drying When Acesulfame Potassium is dried for 2 hours at 105°C, the loss should not be more than 1.0%.

Assay Dissolve about 0.15 g of Acesulfame Potassium, previously dried and accurately weighed in 50 ml of acetic acid. This solution is titrated with 0.1 N perchloric acid solution (indicator : 1 ml of crystal violet·glacial acetic acid solution). At the end point, the bluish green color of the solution persists for 30 seconds or longer. Separately, a blank experiment is carried out following the same procedure for correction.

1 ml of 0.1 N perchloric acid solution = 20.12 mg $\text{C}_4\text{H}_4\text{KNO}_4\text{S}$

394. Potassium Lactate



Chemical Formula $\text{C}_3\text{H}_5\text{KO}_3$

Molecular Weight 128.17

Compositional Specifications of Potassium Lactate

Content Potassium Lactate contains 60.0% of potassium lactate ($\text{C}_3\text{H}_5\text{KO}_3$) and 95.0~110.0% of its indicated content.

Description Potassium Lactate is colorless clear syrup-like liquid. It may or may not have slight characteristic scent.

Identification (1) Potassium Lactate responds to test of potassium salt in Identification.

(2) Ash of Potassium Lactate is alkaline. When acid is added, it foams.

(3) When 5 ml of catechol solution in sulfuric acid (1→100) is added to 2 ml of Potassium Lactate, the contact area turns deep red.

Purity (1) Lead : When 5.0 g of Potassium Lactate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(2) Mercury : When Potassium Lactate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(3) Arsenic : An amount, that corresponds to 0.3 g calcium lactate, of Potassium Lactate is dissolved in 10 ml of water. 1 ml of sulfuric acid and 10 ml of sulfurous acid are added to this solution, which is concentrated by evaporating to approximately 2 ml. Water is added to bring the total volume to 10 ml (Test Solution). When 5 ml of this Test Solution is tested by Arsenic Limit Test, the content should not be more than 4 ppm.

(4) Acid value : An amount, that corresponds to 0.6 g calcium lactate, of Potassium Lactate is dissolved in 20 ml of water. 3 drops of phenolphthalein solution is added to this solution, which is titrated with 0.1 N sodium hydroxide solution. The consumed amount should not be more than 0.2 ml.

(5) Reducing Matter : When Potassium Lactate is added to Fehling solution, the solution should not be under go any changes.

Assay An amount, that corresponds to 0.6 g calcium lactate, of Potassium Lactate is

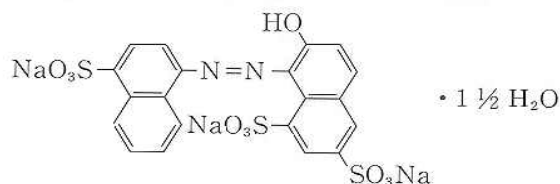
precisely weighed into a flask. 60 ml of anhydrous acetic acid and glacial acetic acid mixture (1:4) is added to the flask and mixed. After settling for 20 minutes, it is titrated with 0.1 N perchloric acid solution (indicator : 1 ml of crystal violet·glacial acetic acid). At the end point, the color of the solution changes from blue to green. Separately, a blank test is carried out following the same procedure

1 ml of 0.1 N perchloric acid solution = 12.82 mg $\text{C}_3\text{H}_5\text{KO}_3$

395. Food Red No.102

New Coccine

Ponceau 4R

Chemical Formula $\text{C}_{20}\text{H}_{11}\text{N}_2\text{Na}_3\text{O}_{10}\text{S}_3 \cdot 1\frac{1}{2}\text{H}_2\text{O}$

Molecular Weight 631.51

Compositional Specifications of Food Red No.102

Content Food Red No.102 should contain not less than 85.0% of the trisodium salt of 7-hydroxy-8-(4-sulfonaphthylazo)-1,3-naphthalenedisulfonic acid, sesquihydrate ($\text{C}_{20}\text{H}_{11}\text{N}_2\text{Na}_3\text{O}_{10}\text{S}_3 \cdot 1\frac{1}{2}\text{H}_2\text{O}$).

Description Food Red No.102 occurs as red to dark red powder or granules. It is odorless.

Identification (1) A solution of 0.1 g of Food Red No.102 in 100 ml of water is red in color.

(2) A solution of 0.1 g of Food Red No.102 in 10 ml of sulfuric acid is reddish violet. When 2~3 drops of this solution is added to 5 ml of water, a yellow~red color develops.

(3) 0.1 g of Food Red No.102 is dissolved in 100 ml solution of ammonium acetate (3→2,000). When 1 ml of this solution is diluted to 100 ml with ammonium acetate solution (3→2,000), it shows a maximum absorption band at 508 ± 2 nm.

Purity (1) Water-insoluble substances : When Food Red No.102 proceed as directed under Water Insoluble Substances in the Coloring Matter Test, the content should not be more than 0.2%.

(2) Chloride and Sulfate : When Food Red No.102 proceed as directed under Chlorides and Sulfates in the Coloring Matter Test, the total content should not be more than 8.0%.

(3) Arsenic : When Food Red No.102 proceed as directed under Arsenic in the Coloring Matter Test, the content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Food Red No.102 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content

should not be more than 2.0 ppm.

(5) Cadmium : When 5.0 g of Food Red No.102 is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(6) Mercury : When Food Red No.102 is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(7) Other coloring matters : Proceed as directed under Purity (9) in Food Green No.3.

(8) Unreacted Raw Material and Reaction Intermediate : To 100 mg of Food Red No.102 is dissolved in ammonium acetate solution (1.54→1000) to make 100 ml as the Test Solution. Separately, 10 mg each of 4-aminobenzenesulfonic acid, 7-hydroxy-1,3-naphthalenedisulfonic acid disodium salt, 3-hydroxy-2,7-naphthalenedisulfonic acid disodium salt, 6-hydroxy-2-naphthalenedisulfonic acid monosodium salt, 6,6'-oxybis[2-naphthalenesulfonic acid disodium salt], and disodium salt of 4,4'-(Diaz amino)-dibenzensulfonic acid (each was dried for 24 hours in a vacuum desiccator) is dissolved in ammonium acetate solution (1.54→1000) to make 100 ml of Standard Solution, respectively. By following the procedure in F. Unreacted Raw Material and Reaction Intermediate in Coloring Matter Tests under the following operation conditions, the contents of 4-amino-1-naphthalenesulfonic acid monosodium salt, 7-hydroxy-1,3-naphthalenedisulfonic acid disodium salt, 3-hydroxy-2,7-naphthalenedisulfonic acid disodium salt, 6-hydroxy-2-naphthalenesulfonic acid monosodium salt, and 7-hydroxy-1,3,6-naphthalenetrisulfonic acid trisodium salt should not be more than 0.5%.

Operation Conditions

-Detector: Visible Absorption Detector (wave length 238 nm)

-Carrier Phase : A - Ammonium acetate solution (1.54→1000)

B - Acetonitrile

- After keeping Solution A for 5 minutes,

Solution A : Solution B(100:0) \rightarrow Solution A: Solution B (70:30) 50 minutes

(9) Unsulfonated Primary Aromatic Amines : When Food Red No.102 is tested by following the procedure in G. Unsulfonated Primary Aromatic Amines in Coloring Matter Tests, the content should not be more than 0.01%.

Loss on Drying When Food Red No.102 is dried for 6 hours at 135°C, the weight loss should not be more than 10.0%.

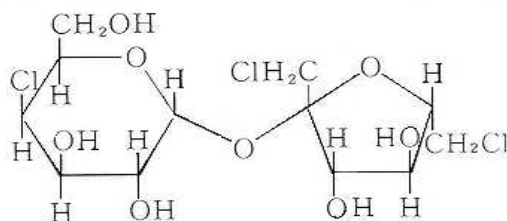
Assay Accurately weigh about 1.7 g of Food Red No.102, and dissolve in water to make 250 ml. Measure exactly 50 ml of this solution, use it as the test solution, and proceed as directed under Titanium Trichloride Method (A) of Assay in Coloring

Matter Tests.

1 ml of 0.1 N titanium trichloride = 15.788 mg of $\text{C}_{20}\text{H}_{11}\text{N}_2\text{Na}_3\text{O}_{10}\text{S}_3 \cdot 1\frac{1}{2}\text{H}_2\text{O}$

396. Sucralose

4,1',6'-Trichlorogalactosucrose

Chemical Formula $C_{12}H_{19}Cl_3O_8$

Molecular Weight 397.64

Compositional Specifications of Sucralose

Content Sucralose, when calculated on the dried basis(anhydrous), should contain within a range of 98.0~102.0% of sucralose ($C_{12}H_{19}Cl_3O_8$).

Description Sucralose is scentless white~pale grayish white crystalline powder with strong sweet taste. It is readily soluble in water, methyl alcohol, and ethyl alcohol but hardly soluble in ethyl acetate.

Identification (1) When Sucralose is tested according to (1) potassium bromide disk method in Infrared Spectrophotometry, the maximum absorption should be appear at the same wavelength as a sucralose standard.

(2) 1.0 g of Sucralose is dissolved in 10 ml of methyl alcohol (Test Solution). Using sodium chloride solution (1→20) · acetonitrile mixture (7:3) as a developing solution, 5 μ l of the Test Solution is analyzed with thin layer chromatography. A spot appears at ratio of front (R_f) of 0.4~0.6. Here, silylated silica gel with octadecyl group is used as porous support material for the thin layer plate. Developing is stopped when the solvent front reaches approximately 15 cm and the solvent is evaporated with wind. Then, 15% sulfuric acid·methyl alcohol solution is sprayed. The spot is colorized by heating for 10 minutes at 125°C.

Purity (1) Specific Rotation : 1.0 g of Sucralose is precisely weighed and dissolved in water (total volume 10 ml). Optical rotation of the solution is measured. When it is translated to a dehydrated form, $[\alpha]_D^{20} = +84.0 \sim +87.5^\circ$

(2) Lead : When 5.0 g of Sucralose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(3) Arsenic : 0.5 g of Sucralose is dissolved in 10 ml of water. When this solution is

- tested by Arsenic Limit Test, the content should not be more than 4 ppm.
- (4) Chlorinated Disaccharides : 1.0 g of Sucralose is dissolved in 10 ml of methyl alcohol (Test Solution). 0.5 ml of Test Solution is diluted to 100 ml with methyl alcohol (Reference Solution). 5 µl of each Test and Reference Solution is analyzed by thin layer chromatography following Identification (2). Test solution should show spots only where Reference Solution show spots. In case where Test Solution show other spots, they should not be darker than the spots for Reference Solution (Not more than 0.5%).
- (5) Chlorinated Monosaccharides : 2.5 g of Sucralose is dissolved in methyl alcohol so that the total volume is precisely 10 ml (Test Solution). Separately, 10 g of D-mannitol is precisely weighed and dissolved in water so that the total volume is 100 ml (Reference Solution (A)). 10 g of D-mannitol and 40 mg of fructose are precisely weighed and dissolved in water so that the total volume is 100 ml (Reference Solution (B)). 1 µl of each solution is drop-wise added and dried on to a silica gel thin layer plate. This operation is repeated 4 times. After spraying p-anisidinephthalic acid solution, the thin layer plate is heated for 10 minutes at 98~102°C to colorize the spots. Spots for Test Solution should not be darker than those for Reference Solution (B) (not more than 0.16%). If there are any spots in Reference Solution (A), this procedure is repeated.

Solution

- p-anisidinephthalic acid solution : 1.23 g p-anisidine and 1.66 g phthalic acid are dissolved in methyl alcohol (total volume 100 ml). The solution is stored in a Light-resistant container in a cool place.
- (6) Triphenyl Phosphine Oxide : Approximately 100 mg of Sucralose is precisely weighed and dissolved in acetonitrile·water mixture (67:33) so that the total volume is 10 ml (Test Solution). Separately, 100 mg of triphenyl phosphine oxide is precisely weighed and dissolved in acetonitrile·water mixture (67:33) so that the total volume is 10 ml. 1 ml of this solution is diluted to 100 ml with acetonitrile · water mixture (67:33) (Standard Solution). 25 µl of each solution is injected into a liquid chromatography using the following operation conditions and the content of triphenylphosphineoxide (mg/kg) is obtained. The content should not be more than 150 mg/kg.

$$\text{Content of triphenyl phosphine oxide (C}_{18}\text{H}_{15}\text{OP) (mg/kg)} = \frac{At}{As} \times \frac{10,000}{W}$$

At : Peak area in Test Solution

As : Peak area in Standard Solution

W : Weight of the sample (mg)

Operation Conditions

- Detector : UV 220 nm
- Column : Rad Pak C₁₈(inner diameter 8 mm, length 15 cm) or its equivalent
- Column Temperature : 40°C
- Mobile Phase : Acetonitrile·water mixture(67 : 33)
- Flow Rate : 1.5 ml/min

(7) Methyl Alcohol : Approximately 2.0 g of Sucralose is precisely weighed and dissolved in water so that the total volume is 10 ml (Test Solution). Separately, 2 ml of methyl alcohol is precisely weighed and dissolved in water so that the total volume is 100 ml. 1 ml of this solution is diluted to 100 ml with water (Standard Solution). 1 µl of each solution is injected into a gas chromatography using the following operation conditions and the content of methyl alcohol (%) is obtained. The content should not be more than 0.1%.

$$\text{Content of Methyl Alcohol (\%)} = \frac{St \times Cs \times Vt}{As \times Wt}$$

St : Peak area of Test Solution

Cs : Concentration of methyl alcohol in Standard Solution (%)

Vt : Used amount of Test Solution for the test (ml)

As : Peak area of Standard Solution

W : Weight of the sample (g)

Operation Conditions

- Column : A glass tube with inner diameter of 2~4 mm and length of 2 m
- Column Filler : 80~100 mesh coated with Porapak P.S. or its equivalent
- Detector : (Hydrogen) Flame Ionization Detector (FID)
- Temperature at injection hole : 200°C
- Column Temperature : constant temperature in a range of 140~160°C
- Detector Temperature : 250°C
- Carrier gas and flow rate : Nitrogen or Helium, 20 ml/min

Water Content Water content in approximately 1 g of Sucralose is determined by water determination (Karl-Fisher Titration) and should not be more than 2.0%.

Residue on Ignition When thermogravimetric analysis is done, the amount of residue should not be more than 0.7%.

Assay Approximately 1 g of Sucralose is precisely weighed and dissolved in acetonitrile · water mixture (15:85) so that the total volume of the solution is 100 ml. This solution is filtered through a 0.45 µm filter (Test Solution). Separately,

approximately 1,000 mg of sucralose standard is precisely weighed and dissolved in acetonitrile-water mixture (15:85) so that the total volume of the solution is 100 ml (Standard Solution). 20 µl of each Standard Solution and Test Solution is injected into liquid chromatography using the following operation conditions. The content (%) of sucralose is obtained from the following equation.

$$\text{Content of sucralose (\%)} = \frac{At \times Ws}{As \times Wt} \times 100$$

At : Peak area of Test Solution

As : Peak area of Standard Solution

Wt : Weight of the sample (mg)

Ws : Weight of standard (mg)

Operation Conditions

- Detector : UV 190 nm or Differential refractometer (RI Detector)
- Column : Rad Pak C₁₈(inner diameter 8 mm, length 10 cm) or its equivalent
- Column Temperature : room temperature
- Mobile Phase : acetonitrile-water mixture (15:85)
- Flow Rate : 1.5 ml/min

397. Nitrous Oxide

Nitrogen Oxide

Dinitrogen Monoxide

Chemical Formula N_2O

Molecular Weight 44.01

Compositional Specifications of Nitrous Oxide

Content Nitrous Oxide should be contain not less than 97.0% of Nitrous Oxide.

Description Nitrous Oxide is colorless, tasteless, and scentless gas.

Identification Upon contact with extinguished piece of wood, it creates a violent flame.

Purity Weigh of sample should be converted into a volume at 20°C and 760 mmHg.

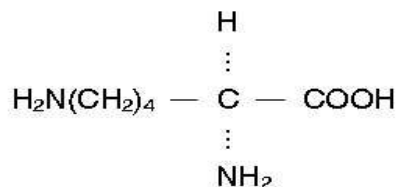
- (1) Carbon Monoxide : When 1050 ± 50 ml of Nitrous Oxide is passed through a CO detection tube at a specified flow rate, the change in the tube should be nor more than 10 ppm per volume.
- (2) Nitrogen Oxide : When 550 ± 50 ml of Nitrous Oxide is passed through a NO-NO₂ detection tube at a specified flow rate, the change in the tube should not be more than 1 ppm per volume.
- (3) Nitrogen Dioxide : While preventing frosts formation on the tube to ensure complete vaporization, 550 ± 50 ml of Nitrous Oxide is passed through a NO-NO₂ detection tube at a specified flow rate. The change in the tube should not be more than 1 ppm per volume.
- (4) Halogen : When 1050 ± 50 ml of Nitrous Oxide is passed through a Cl detection tube at a specified flow rate, the change in the tube should not be more than 1 ppm per volume.
- (5) Arsenic and Phosphorus : Using a porous gas distributing head(pore size 60~100 μ m) with a glass tube (packed with cotton, which is wetted with lead acetate solution) 10 l of Nitrous Oxide is bubbled through 5 ml of a mixed solution of diethylthiocarbamate silver quinoline solution at the rate of 1.0L per minute. The color of the solution should not be change.
 - Diethylthiocarbamate silver quinoline solution : 50 mg of finely powdered silver nitrate is dissolved in 100 ml of quinoline, where 0.2 g of diethylthiocarbamate is added. This solution is prepared just before use.

Assay Nitrous Oxide is drawn into a syringe from a polyvinyl chloride tubes from a gas with drawing valve. It is then injected into a gas chromatography and tested. By comparing with air-helium gas standard, the amount of air reduced from 100, which is obtained as volume should not be less than 97.0%.

Operation Condition

- Column : a glass or stainless tube with inner diameter of 4 mm and length 6 m
- Column Filler : porous glass which can separate nitrogen and oxygen from NO or its equivalent
- Detector : thermal conductivity detector (TCD)
- Carrier gas : helium

398. L-Lysine



Chemical Formula $\text{C}_6\text{H}_{14}\text{N}_2\text{O}_2$

Molecular Weight 146.19

Compositional Specifications of L-Lysine

Content L-Lysine, when calculated on the dried basis(anhydrous), should contain within a range of 97.0~103.0% of L-lysine ($\text{C}_6\text{H}_{14}\text{N}_2\text{O}_2$).

Description L-Lysine is white crystallite or crystalline powder with characteristic scent and taste.

Identification (1) 1 ml of ninhydrine solution (1→50) is added to 5 ml aqueous solution of L-Lysine (1→1,000). Upon heating for 3 minutes in a water bath, this solution turns reddish violet.

(2) L-Lysine solution is alkaline.

Purity (1) Clarity and Color of Solution : A solution of 1.0 g of L-Lysine in 40 ml of 1 N hydrochloric acid should be colorless and almost clear (or better).

(2) Specific Rotation : Precisely weighed 2 g of L-Lysine is dissolved in 6 N hydrochloric acid, where the total volume of the solution is 100 ml. Optical rotation of the solution is measured. When it is translated to dried material, specific rotation $[\alpha]_D^{20} = +23.3 \sim +29.3^\circ$

(3) Chlorides : When 0.07 g of L-Lysine is tested by Chloride Limit Test, the detected amount should not be more than the amount that corresponds to 0.2 ml of 0.01 N hydrochloric acid.

(4) Arsenic : 0.25 g of L-Lysine is dissolved in 5 ml of water. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.

(5) Lead : When 5.0 g of L-Lysine is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

Water Content Water content in precisely weighed 0.2 g of L-Lysine is determined by back titration method in water determination (Karl-Fisher Titration) and should not

be more than 8.0%.

Residue on Ignition When thermogravimetric analysis is done, the amount of residue should not be more than 0.2%.

Assay Approximately 0.2 g is precisely weighed and dissolved in 3 ml of formic acid, where 50 ml of glacial acetic acid (for non-aqueous titration) is added. This solution is titrated with 0.1 N perchloric acid solution (indicator : 1 ml of crystal violet buffered in glacial acetic acid). At the end point, the solution turns from violet to blue, then to green. Separately, a blank experiment is done following the same procedure.

1 ml of 0.1 N perchloric acid solution = 7.310 mg $\text{C}_6\text{H}_{14}\text{N}_2\text{O}_2$

399. Sodium Aluminium Phosphate, Acidic

SALP

Chemical Formula $\text{NaAl}_3\text{H}_{14}(\text{PO}_4)_8 \cdot n\text{H}_2\text{O}$, $\text{Na}_3\text{Al}_2\text{H}_{15}(\text{PO}_4)_8$

Molecular Weight 949.88, 897.82

Compositional Specifications of Sodium Aluminum Phosphate, Acidic

Content Sodium Aluminum Phosphate, Acidic should contain not less than 95.0% of sodium aluminum phosphate, acidic [$\text{NaAl}_3\text{H}_{14}(\text{PO}_4)_8 \cdot n\text{H}_2\text{O}$ or $\text{Na}_3\text{Al}_2\text{H}_{15}(\text{PO}_4)_8$].

Description Sodium Aluminum Phosphate, Acidic is scentless white powder.

Identification (1) Sodium Aluminum Phosphate, Acidic is insoluble in water but soluble in hydrochloric acid.

(2) Sodium Aluminum Phosphate solution, Acidic (1→10) is acidic as determined with a litmus paper.

(3) A solution of 1 g of Sodium Aluminum Phosphate, Acidic in 10 ml of diluted hydrochloric acid (1→2) responds to tests of aluminum, sodium, and Phosphate in Identification.

Purity (1) Fluoride : 1 g of Sodium Aluminum Phosphate, Acidic is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 30 ppm.

(2) Arsenic : 1.0 g is dissolved in 10 ml of diluted hydrochloric acid (1→2) and water is added to bring the total volume to 25 ml (Test Solution). This Test Solution is tested by Arsenic Limit Test and the content should not be more than 4 ppm.

(3) Lead : Sodium Aluminum Phosphate, Acidic is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

(4) Cadmium : Sodium Aluminum Phosphate, Acidic is precisely weighed and is tested by purity (3) for 「Sodium Metaphosphate」, its content should not be more than 1.0 ppm.

(5) Mercury : When Sodium Aluminum Phosphate, Acidic is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Ignition When Sodium Aluminum Phosphate, Acidic is heat treated at 700~800°C for 2 hours, the weight loss should be within a range of 19.5~21.0% for $\text{NaAl}_3\text{H}_{14}(\text{PO}_4)_8 \cdot 4\text{H}_2\text{O}$ and 15.0~16.0% for $\text{Na}_3\text{Al}_2\text{H}_{15}(\text{PO}_4)_8$.

Assay Approximately 2.5 g of Sodium Aluminum Phosphate, Acidic is precisely weighed and dissolved in 15 ml of hydrochloric acid, which is boiled for 5 minutes in

a water bath. After cooling, the total volume of the solution is brought up to 250 ml with water. After adding phenolphthalein solution to 10 ml of the resulting solution, it is neutralized with ammonia solution. Diluted hydrochloric acid (1→2) is added until the precipitates dissolve. The total volume is brought up to 100 ml with water, which is heated to 70~80°C. 10 ml of 8-hydroxyquinoline solution and sufficient ammonium acetate solution are added until yellow precipitates are formed, where additional 30 ml of ammonium acetate solution is added. The precipitates are again boiled for 30 minutes at 70°C in a water bath. It is then filtered through a glass filter that is previously weighed. The precipitates on the filter are washed hot water, then dried for 2 hours at 105°C, and weighed. 1 mg of precipitates corresponds to $\text{NaAl}_3\text{H}_{14}(\text{PO}_4)_8 \cdot 4\text{H}_2\text{O}$ 0.689 mg and $\text{Na}_3\text{Al}_2\text{H}_{15}(\text{PO}_4)_8$ 0.977 mg.

◦ 8-hydroxyquinoline solution : 5 g of 8- hydroxyquinoline is dissolved in ethyl alcohol (total volume 100 ml)

400. Basic Sodium Aluminum Phosphate

Kasal

Compositional Specifications of Basic Sodium Aluminum Phosphate

Content When Basic Sodium Aluminum Phosphate is converted into a heat treated form, it should contain within a range of 9.5~12.5% aluminum oxide (Al_2O_3).

Description Basic Sodium Aluminum Phosphate is scentless white powder.

Identification (1) Basic Sodium Aluminum Phosphate dissolves in hydrochloric acid.

(2) A solution of 1 g of Basic Sodium Aluminum Phosphate in 10 ml diluted hydrochloric acid (1→2) responds to test of aluminum salt and phosphate in Identification.

Purity (1) Fluoride : 1 g of Basic Sodium Aluminum Phosphate is precisely weighed and is tested by purity (8) for 「Calcium Citrate」, its content should not be more than 30 ppm.

(2) Arsenic : 1.0 g of Basic Sodium Aluminum Phosphate is dissolved in 10 ml of diluted hydrochloric acid (1→2), where water is added to bring the total volume to 25 ml (Test Solution). This Test Solution is tested by Arsenic Limit Test (not more than 4 ppm).

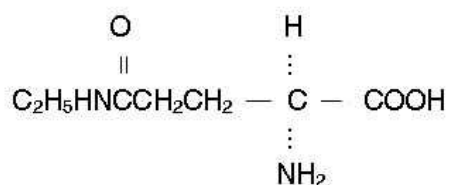
(3) Lead : Basic Sodium Aluminum Phosphate is precisely weighed and is tested by purity (2) for 「Sodium Metaphosphate」, its content should not be more than 4.0 ppm.

Loss on Ignition When thermogravimetric analysis is done at 700~800°C for 2 hours, weight loss should not be more than 9.0%.

Assay Approximately 2.5 g of Basic Sodium Aluminum Phosphate is precisely weighed and dissolved in 15 ml of hydrochloric acid, which is boiled for 5 minutes in a water bath. After cooling, the total volume of the solution is brought up to 250 ml with water. After adding phenolphthalein solution to 10 ml of the resulting solution, it is neutralized with ammonia solution. Diluted hydrochloric acid (1→2) is added until the precipitates dissolve. The total volume is brought up to 100 ml with water, which is heated to 70~80°C. 10 ml of 8-hydroxyquinoline solution and sufficient ammonium acetate solution are added until yellow precipitates are formed, where additional 30 ml of ammonium acetate solution is added. The precipitates are again boiled for 30 minutes at 70°C in a water bath. It is then filtered through a glass filter that is previously weighed. The precipitates on the filter are washed with hot water, then dried for 2 hours at 105°C, and weighed. 1 mg of precipitates corresponds to aluminum oxide (Al_2O_3) 0.111 mg.

- 8-hydroxyquinoline solution : 5 g of 8-hydroxyquinoline is dissolved in ethyl alcohol to make 100 ml.

401. L-Theanine



Chemical Formula $\text{C}_7\text{H}_{14}\text{N}_2\text{O}_3$

Molecular Weight 174.20

Compositional Specifications of L-Theanine

Content L-Theanine, when calculated on the dried basis, should contain within a range of 98.0~102.0% of L-theanine ($\text{C}_7\text{H}_{14}\text{N}_2\text{O}_3$).

Description L-Theanine occurs as a white crystalline powder. It is odorless and has a slightly characteristic and sweet taste.

Identification (1) To 5 ml of L-Theanine solution (1→1.000), add 1 ml of ninhydrin solution (1→1.000), and heat for 3 minutes. A purple color develops.

(2) Dissolve about 1 g of L-Theanine in 10 ml of diluted hydrochloric acid (1→2), equip with a reflux condenser, heat on a water bath for 6 hours, and add water to make 20 ml. Transfer 5 ml of this solution into a test tube, and add 2 g of sodium hydroxide. Suspend a red litmus paper moistened with water in the test tube, cover the mouth of the test tube, and heat in a water bath for 5 minutes. The color of the litmus paper changes to blue.

Purity (1) Clarity and Color of Solution : When 1 g of L-Theanine (Anhydrous) is dissolved in 20 ml of water, the solution should be colorless and almost clear.

(2) Specific rotation : Approximately 2.5 g of L-Theanine is precisely weighed, which is dissolved in water so that the total volume to make 50 ml. Optical rotation of the solution is measured. When it is translated to dried material, $[\alpha]_D^{20} = +7.7 \sim +8.5^\circ$

(3) pH : Approximately 1 g of L-Theanine is dissolved in water so that volume to make 100 ml. It should be within a range of 5.0~6.0.

(4) Chloride : When 0.5 g of L-Theanine is tested by Chloride Limit Test, the detected amount should not be more than the amount that corresponds to 0.30 ml of 0.01 N hydrochloric acid.

(5) Arsenic : 0.25 g of L-Theanine is dissolved in 5 ml of water. When this solution is tested by Arsenic Limit Test, the content should not be more than 4 ppm.

(6) Lead : When 5.0 g of L-Theanine is tested by Atomic Absorption

Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

Loss on Drying When L-Theanine is dried 3 hours at 105°C, the weight loss should not be more than 0.5%.

Residue on Ignition When thermogravimetric analysis is done with L-Theanine, the residue should not be more than 0.2%.

Assay Approximately 0.35 g is precisely weighed and dissolved in 3 ml of formic acid, where 50 ml of glacial acetic acid (for non-aqueous titration) is added. This solution is titrated with 0.1 N perchloric acid solution (indicator : 1 ml of crystal violet buffered in glacial acetic acid). At the end point, the solution turns from violet to blue, then to green. Separately, a blank experiment is done following the same procedure.

1 ml of 0.1 N perchloric acid = 17.420 mg of $C_7H_{14}N_2O_3$

402. Hydroxypropylmethylcellulose

Compositional Specifications of Hydroxypropylmethylcellulose

Content Hydroxypropylmethylcellulose, when calculated on the dried basis, should contain within a range of 19.0~30.0% methoxyl group ($-\text{OCH}_3$: 31.04) and 3.0~12.0% hydroxypropoxyl group ($-\text{OCH}_2\text{CHOHCH}_2$: 75.09).

Description Hydroxypropylmethylcellulose is scentless white~yellow fibrous powder or granule.

Identification (1) When an aqueous solution (0.1→100) of Hydroxypropylmethylcellulose is shaken vigorously, it generates layer of foams.

(2) When 5 ml of an aqueous solution (0.5→100) of Hydroxypropylmethyl cellulose is added to 5 ml of 5% copper sulfate or aluminum sulfate solution, it should not be form precipitates.

Purity (1) pH : Approximately 1 g of Hydroxypropylmethylcellulose is dissolved in water so that volume to make 100 ml. It should be within a range of 5.0~8.0.

(2) Propylenechlorohydrine : Weigh 1g of the sample into a centrifue tube and record weight to the nearest 0.18. Quantitatively add 5.0ml diethyl ether to the sample and sonicates for 10minutes. Centrifuge the smaple to separate the mixture. Remove a portion of the diethyl ether extract for CTC analysis. Separately, accurately weigh 0.1 g of propylene chlorohydrin(Aldrich 292087, the mixture of 70% 1-Chloro-2-propanol and 25% 2-Chloro-1- propanol), bring to a final volume of 100ml with diethyl ether. Perform serial dilutions (in diethyl ether) of stack standard to achieve a working calibration rane of 6-25 ng /ml. Inject 1 μ l of both test and standard solutions into gas chromatography with following operation condition. Standard calibration curve is obtained from the peak area against the concentration (ng/ml) of the each standard solution. Measure peak area of Propylenechlorohydrine in test solution, calculate the content of Propylenechlorohydrine from prepared calibration curve, and its content should not be more than 0.1 ppm.

Operation Condition

Capillary Column : DB-WAX(30m×0.53mm, 1 μ m) or its equivalent

Detector : Electron Capture Detector(ECD)

Temperature at injection hole : 200℃

Column Temperature : held at 35℃ for 7 minutes, raised to 200℃ at a rate of 8℃ per minute and held at 200℃ for 5 minutes.

Detector Temperature : 230℃

Carrier gas : Nitrogen or helium

Flow rate : Adjust retention time about 11.7 minutes for 1-chloro-2-propanol, and about 12.5 minutes for 2-chloro-1-propanol

- (3) Lead : When 5.0 g of Hydroxypropylmethylcellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (4) Cadmium : When 5.0 g of Hydroxypropylmethylcellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.
- (5) Mercury : When Hydroxypropylmethylcellulose is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Hydroxypropylmethylcellulose is dried for 3 hours at 105°C, the loss should not be more than 10%.

Residue on Ignition Residue after ignition should not be more than 1.5% when viscosity is 50 cps or higher and not more than 3.0% when viscosity is 50 cps or less. Viscosity is measured according to Purity (1) of 「Methylcellulose」.

Assay Approximately 65 mg of Hydroxypropylmethylcellulose is precisely weighed into a bottle for decomposition (5 ml glass bottle that has a stopper with pressure lining). 65 mg of adipic acid, 2.0 ml of internal standard solution, and 2.0 ml of hydroiodic acid (must be handled carefully) are added to the bottle and a stopper is placed, which is precisely weighed. The bottle is shaken for 30 seconds, heated for 20 minutes at 150°C, carefully shaken, and heated for 40 minutes again. After cooling for 45 minutes, the weight is precisely weighed. If the weight loss is less than 10 mg, the supernatant is used as Test Solution. Separately, 65 mg of adipic acid, 2.0 ml of internal standard solution, and 2 ml of hydroiodic acid are added to a bottle for decomposition. After placing a stopper, it is weighed precisely. 15 µl of isopropyl iodide is added and weighed precisely. Using the same procedure, 45 µl of methyl iodide is added and weighed. After shaking the bottle for 30 seconds, the supernatant is used as Standard Solution. 1 µl of each solution is injected into a gas chromatography and the contents (%) of methoxyl group and hydroxypropoxyl group are obtained using the following equation.

$$\text{Content of methoxyl group(\%)} = \frac{Q_{Ta}}{Q_{Sa}} \times \frac{W_{Sa}}{\text{Weight of sample (mg)}} \times 21.86$$

$$\text{Content of methoxyl group(\%)} = \frac{Q_{Tb}}{Q_{Sb}} \times \frac{W_{Sb}}{\text{Weight of sample (mg)}} \times 44.17$$

W_{Sa} : The amount of methyl iodide in Standard Solution (mg)

W_{Sb} : The amount of isopropyl iodide in Standard Solution (mg)

Q_{Sa} , Q_{Sb} : Peak area ratios of methyl iodide and isopropyl iodide vs. internal standard in Standard Solution

Q_{Ta} , Q_{Tb} : Peak area ratios of methyl iodide and isopropyl iodide vs. internal standard in Test Solution

Operation Conditions

- Column : Diatomite for gas chromatography (Chromosorb WHP or its equivalent) coated with 10% methyl silicone oil or its equivalent
- Detector : Thermal Conductivity Detector (TCD) or (Hydrogen) Flame Ionization Detector (FID)
- Temperature at injection hole: 200°C
- Column Temperature : 50°C
- Detector Temperature : 200°C
- Carrier gas : Nitrogen or Helium
- Retention Time : In the order of methyl iodide, isopropyl iodide, and toluene
 - Internal Standard Solution : 0.25 g of toluene is precisely weighed and dissolved in o-xylene (total volume 50 ml)

403. Calcium Stearate

Definition Calcium Stearate is a mixture of calcium salts of stearic acid and palmitic acid.

Compositional Specifications of Calcium Stearate

Content Calcium Stearate, when calculated on the dried basis, should contain within a range of 9.0~10.5% of calcium oxide (CaO).

Description Calcium Stearate is white~yellow powder or slightly glossy crystalline solid or semi solid.

Identification 1 g of Calcium Stearate is dissolved in 25 ml of water and 5 ml of hydrochloric acid, which is then heated. After cooling, a fatty acid layer is separated as supernatant. The lower aqueous layer is evaporated to dryness. The solution residue responds to test of calcium salt in Identification Method.

Purity (1) Free Fatty Acids : Approximately 7 g of Calcium Stearate is precisely weighed into a 250 ml Erlenmeyer Flask, where 75 ml of neutralized warm alcohol and 2 ml of phenolphthalein solution are added. It is then titrated with 0.25 N sodium hydroxide solution until the red color persists for 30 seconds. The content of free fatty acids (as stearic acid) is obtained using the following equation and should not be more than 3.0%.

$$\text{Free Fatty Acids} = \frac{V \times 0.25 \times 28.45}{\text{Weight of the sample (g)}}$$

V : Consumed volume (ml) of 0.25 N sodium hydroxide solution

- (2) Arsenic : 0.25 g of Calcium Stearate is tested by Purity (2) for 「Glycerin Fatty Acid Ester」 (not more than 4 ppm).
- (3) Lead : When 5.0 g of Calcium Stearate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1 ppm.
- (4) Unsaponifiable : 5 g of Calcium Stearate is precisely weighed into a 250 ml round bottom flask, where 50 ml of 0.5 N potassium hydroxide solution is added and refluxed for 1 hour with a reflux condenser. After heating is finished, 100 ml of water is added through the condenser and the flask is shaken. After cooling, the content is transferred into a separatory funnel with a stop cock. The flask is washed with ether several times (approximately 100 ml), which is added to the funnel. The funnel is shaken vigorously for 1 minute and then settled to separate two phases completely. The supernatant ether layer is collected in a 500 ml

separatory funnel with a stop cock. The aqueous layer is again extracted twice with 100 ml of ether. These extracts are added to the first extract. The combined extracts are washed with 25 ml of 10% alcohol. This procedure is repeated until the aqueous layer doesn't get colorized by phenolphthalein solution. When this is accomplished, aqueous phase is discarded and the ether extract is transferred into a pre-weighed beaker. With 10 ml of ether, the funnel is washed, which is added to the beaker. Ether layer is evaporated to dryness in a water bath, which is then dried at 103°C for 15 minute duration at a time until the weight becomes constant. (If the weight doesn't become constant after 3 trial, the sample might have been contaminated.) Then the residue is cooled in a desiccator and weighed. The residue is dissolved in 4 ml of ether. 20 ml of pre-neutralized alcohol(indicator : sodium hydroxide) is added to the solution. The resulting solution is titrated with 0.1N alcoholic solution of potassium hydroxide until a pale red color persists. The content of unsaponifiables is obtained from the following equation and the content should not be more than 2.0%.

$$\text{Unsaponifiables} = \frac{[\text{Residue (g)} - 0.281 \times V \times 0.1]}{\text{Weight of the sample (g)}} \times 100$$

V : Consumed amount of 0.1 N potassium hydroxide solution (ml)

Loss on Drying When Calcium Stearate is dried for 3 hours at 105°C, the loss should not be more than 4.0%.

Assay Approximately 1.2 g of Calcium Stearate is precisely weighed, where 50 ml of 0.1 N hydrochloric acid. It is then boiled for 30 minutes while replenishing water occasionally. After cooling, it is filtrated. The residue is washed with water until the filtrate is no longer acidic. This wash water is added to the previous filtrate, which is then titrated with 1 N sodium hydroxide solution. The resulting solution is neutralized (Test Solution). 30 ml of 0.05 M EDTA solution, 15 ml of 1 N sodiumhydroxide solution, and 0.3 g of hydroxynaphtolblue hydroxynaphtholblue (indicator : $\text{C}_{20}\text{H}_{12}\text{O}_{11}\text{S}_3\text{Na}_2$) are added to the Test Solution, which is then titrated with 0.05 M EDTA solution until the solution turns blue.

$$1 \text{ ml of } 0.05 \text{ M EDTA solution} = 2.804 \text{ mg CaO}$$

404. Calcium silicate

Definition Calcium silicate is hydrated or dehydrated silicate which consists of CaO and SiO₂.

Compositional Specifications of Calcium Silicate

Content Calcium silicate, when calculated on the dried basis, should contain within a range of 50.0~95.0% silicon dioxide (SiO₂) and 3.0~35.0% calcium oxide (CaO).

Description Calcium silicate is strongly hygroscopic white~grayish white powder.

Identification (1) 500 mg of Calcium silicate is dissolved in 10 ml of 2.7 N hydrochloric acid, which is then filtered. The filtrate is neutralized with 6 N ammonium hydroxide solution as determined with a litmus paper. The resulting solution responds to test of calcium salt in Identification.

(2) Proceed as directed under Identification (2) for 「Magnesium Silicate」.

Purity (1) Fluoride : 1 g of Calcium silicate is precisely weighed into a beaker and dissolved by adding 10 ml of 1 N hydrochloric acid. It is then boiled for 1 minute. The solution is transferred into a PE beaker and quickly cooled. 15 ml of sodium citrate solution(1→4) and 10 ml of EDTA solution(1→40) are added, shaken, and mixed. pH of the solution is adjusted to 5.4~5.6 by adding hydrochloric acid(1→10) or sodium hydroxide solution(2→5). The total volume of the solution is brought up to 100 ml by adding water (Test Solution). 50 ml of the Test Solution is transferred into a PE beaker. Electric potential is measured using fluorine electrode. Fluoride concentration (μg/100ml) is measured from a standard curve and it should not be more than 50 ppm.

Standard Solution : 2.210 g of sodium fluoride, which is previously dried for 4 hours at 200°C, is accurately weighed into a PE beaker and dissolved in 200 ml of water. Then add water to bring the total volume to 1,000ml and preserve it in a PE beaker. Measure exactly 5 ml of this solution into a measuring flask, and add water to bring the total volume to 1,000 ml. (1 ml of this solution contains 5μg of fluorine.)

Calibration Curve Preparation : Separately, 1, 2, 3, 5, 10, and 15 ml of standard solution is weighed into a PE beaker, and 15 ml of Trisodium Citrate Solution (1→4) and 10 ml of Disodium Ethylenediaminetetraacetate solution (1→40) are added and mixed. To this solution, Hydrochloric acid (1→10) or Sodium Hydroxide Solution (2→5) are added to bring the pH 5.4~5.6, where water is added to bring the total volume to 100ml, separately. Each of 50 ml of the solution transfer into a PE beaker. Then measure electric potential by using fluorine electrode and prepare calibration curve with the log of fluorine concentration.

(2) Arsenic : 10 g of Calcium silicate is weighed into a 250 ml flask. 50 ml of 0.5 N hydrochloric acid is added and the flask is covered with a watch glass and slowly heated until the liquid boils. After boiling for another 30 minutes, it is cooled and settled. The supernatant is filtered through No.3 Whatman filter paper or its equivalent. Insoluble substances and beaker are washed with three times with 10 ml of hot water, which is then passed through the previous filter paper. After cooling, the filtrate is diluted to 100 ml with water (Test Solution). 10 ml of the Test Solution is diluted to 35 ml with water. The resulting solution is tested by Arsenic Limit Test. The content should not be more than 4 ppm.

(3) Lead : Accurately weigh 5.0 g of Sodium Silicoaluminate into a 150 ml beaker, add 30 ml of water. Add Hydrochloric acid in small portion to the solution until the solid is dissolved thoroughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to bring the total volume to 100 ml. Add Sodium Hydroxide Solution(1→4) or Hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in water to make 100 ml. Filter it when using.

Loss on Drying When Calcium silicate is dried for 2 hours at 105°C, the loss should not be more than 10%.

Loss on Ignition When Calcium silicate is first dried at 105°C for 2 hours and precisely weighed 1 g is further heat treated at 900°C, weight loss should not be more than 5~14%.

Assay (1) Silicon Dioxide : Approximately 400 mg of Calcium silicate is precisely weighed into a beaker, where 5 ml of water and 10 ml of perchloric acid are added. The mixture is heated until perchloric acid evaporates and white smoke appears. The beaker is covered with a watch glass and heated for additional 15 minutes. 30 ml of water is added to the above mixture, which is then cooled. The residue is slowly washed three times with hot water. The filter paper with residue

transfer into a platinum crucible and carbonized. Then it is further heat treated and cooled. Appropriate amount of sulfuric acid is added to the crucible, which is then heat treated at 1,300°C. It is then weighed after cooling. The residue is wetted with 5 drops of sulfuric acid, where 15 ml of hydrofluoric acid is added. The crucible is then slowly heated to remove acids completely and heat treated at 1,000°C or higher until the weight becomes constant. It is then cooled in a desiccator and weighed. The weight loss is the amount of silicon dioxide.

- (2) Calcium Oxide : The filtrate in Assay (1) is neutralized with 1 N sodium hydroxide solution, where 30 ml of 0.05 M EDTA solution is added. 15 ml of 1 N sodium hydroxide solution and 0.3 g of hydroxy naphthol blue solution are added to this solution, which is titrated with 0.05 M sodium EDTA solution. At the end point, the solution turns blue.

1 ml of 0.05 M sodium EDTA solution = 2.804 mg CaO

- hydroxy naphthol blue solution : 0.3 g is dissolved in 100 ml of water, where 10 ml of 1 N sodium hydroxide solution, 1 ml of calcium chloride solution (1→200), and water is added to bring the total volume to 165 ml. Finally 1 ml of 0.05 M sodium EDTA solution is added.

405. Calcium Sorbate

Chemical Formula $C_{12}H_{14}CaO_4$

Molecular Weight 262.32

Compositional Specifications of Calcium Sorbate

Content Calcium Sorbate, when calculated on the dried basis, should contain within a range of 98.0~102.0% calcium sorbate ($C_{12}H_{14}CaO_4$).

Description Calcium Sorbate is white fine crystalline powder.

Identification (1) 1 g of Calcium Sorbate is heat treated at 800°C. After cooling, it is mixed well in 10 ml of water and dissolved by adding anhydrous acetic acid, which is then filtered. The filtrate responds to test of calcium salt in Identification.

(2) 0.2 g of Calcium Sorbate is dissolved in 5 ml of methanol, where 0.1 ml of 1 N sodium hydroxide solution is added. The mixture is then dissolved in 95 ml of water. When a few drops of bromine solution are added and shaken, the color of solution disappears immediately.

Purity (1) Fluoride : 1 g of Calcium Sorbate is precisely weighed into a beaker and dissolved by adding 10 ml of 1 N hydrochloric acid. It is then boiled for 1 minute. The solution is transferred into a PE beaker and quickly cooled. 15 ml of sodium citrate solution(1→4) and 10 ml of EDTA solution(1→40) are added, shaken, and mixed. pH of the solution is adjusted to 5.4~5.6 by adding hydrochloric acid(1→10) or sodium hydroxide solution(2→5). The total volume of the solution is brought up to 100 ml by adding water (Test Solution). 50 ml of the Test Solution is transferred into a PE beaker. Electric potential is measured using fluorine electrode . Fluoride concentration ($\mu\text{g}/100\text{ml}$) is measured from a standard curve and it should not be more than 10 ppm.

Standard Solution : 2.210 g of Fluorine Natrium → sodium fluoride, which is previously dried for 4 hours at 200°C, is accurately weighed into a PE beaker and dissolved in 200 ml of water. Then add water to bring the total volume to 1,000ml and preserve it in a PE beaker. Measure exactly 5 ml of this solution into a measuring flask, and add water to bring the total volume to 1,000 ml. (1 ml of this solution contains 5 μg of fluorine.)

Calibration Curve Preparation : Separately, 1, 2, 3, 5, 10, and 15 ml of standard solution is weighed into a PE beaker, and 15 ml of Trisodium Citrate Solution (1→4) and 10 ml of Disodium Ethylenediaminetetraacetate solution (1→40) are added and mixed. To this solution, Hydrochloric acid (1→10) or Sodium Hydroxide Solution (2→

- 5) are added to bring the pH 5.4~5.6, where water is added to bring the total volume to 100ml, separately. Each of 50 ml of the solution transfer into a PE beaker. Then measure electric potential by using fluorine electrode and prepare calibration curve with the log of fluorine concentration.
- (2) Lead : When 5.0 g of Calcium Sorbate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (3) Mercury : When Calcium Sorbate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (4) Arsenic : 0.25 g of Calcium Sorbate is dissolved in 5 ml of water (Test Solution). This Test Solution is tested by Arsenic Limit Test and the content should not be more than 4 ppm.
- (5) Aldehyde : To 3.0g of Calcium Sorbate, 450 ml of water is added The pH of this solution is adjusted to 4 using Hydrochloric acid. Then water is added to make 500 ml and filtered, test solution. Separately, water is added to 2.5ml of 37% formaldehyde solution to make 1,000ml. 3 ml of this solution is precisely measured and water is added to make 500 ml, reference solution. To 5 ml of each of test solution and reference solution, 2.5 ml of puccine sulfite solution is added. Then set aside the solution for 15~30 minutes. The color of test solution should not be deeper than that of reference solution. (not more than 0.1% as formaldehyde).

Loss on Drying When Calcium Sorbate is dried for 3 hours at 105°C, the loss should not be more than 3.0%.

Assay

Dissolve 0.25 g of Calcium Sorbate, previously dried and accurately weighed in 35 ml of glacial acetic acid (for non-aqueous titration) and 4 ml of anhydrous acetic acid by heating in a water bath. After cooling, this solution is titrated with 0.1 N perchloric acid (indicator : 2 drops of crystal violet solution). At the end point, the solution turns green.

0.1 N perchloric acid solution 1 ml = 13.12 mg $C_{12}H_{14}CaO_4$

406. Methylethylcellulose

Compositional Specifications of Methylethylcellulose

Content Methylethylcellulose, when calculated on the dried basis, should contains 3.5~6.5% methoxyl group ($-\text{OCH}_3$: 31.04) and 14.5~19.0% ethoxyl group ($-\text{OCH}_2\text{CH}_3$: 45.06)

Description Methylethylcellulose is scentless hygroscopic white~ivory white fibrous solid or powder.

Identification (1) When an aqueous solution (0.1→100) of Methylethylcellulose is shaken vigorously, a foamy layer is formed.

(2) When 5 ml of 5% copper sulfate solution or aluminum sulfate solution is added to 5 ml of aqueous solution (0.5→100), it should not be form white precipitates.

Purity (1) Arsenic : Proceed as directed under Purity (2) in Glycerin Fatty Acid Ester (The content should not be more than 4 ppm).

(2) Lead : When 5.0 g of Methylethylcellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(3) Cadmium : When 5.0 g of Methylethylcellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When Methylethylcellulose is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Methylethylcellulose is dried at 105°C, weight loss should not be more than 15% for fibrous phase and 10% or less for powder phase.

Residue on Ignition Residue after ignition should not be more than 0.6%.

Assay Approximately 65 mg of Methylethylcellulose is precisely weighed into a bottle for decomposition (5 ml glass bottle with pressure stopper). 65 mg of adipic acid, 2.0 ml of internal standard solution, and 2.0 ml of hydroiodic acid (must be handled carefully) are added to the bottle, which is precisely weighed. The bottle is shaken for 30 seconds, heated for 20 minutes at 150°C, carefully shaken, and heated for 40 minutes again. After cooling for 45 minutes, the weight is precisely weighed. If the weight loss is less than 10 mg, the supernatant is used as Test Solution. Separately, 65 mg of adipic acid, 2.0 ml of internal standard solution, 2 ml of hydroiodic acid are added to a bottle for decomposition. After placing a stopper, it is weighed precisely. 15 μl of ethyl iodide is added and weighed precisely. Using the same procedure, 45 μl of methyl iodide is added and weighed. After shaking the bottle for 30 seconds, the

supernatant is used as Standard Solution. 1 μ l of each solution is injected into a gas chromatography and the contents (%) of methoxyl group and hydroxypropoxyl group are obtained using the following equation.

$$\text{Content of methoxyl group(\%)} = \frac{Q_{Ta}}{Q_{Sa}} \times \frac{W_{Sa}}{\text{Weight of sample (mg)}} \times 21.86$$

$$\text{Content of methoxyl group(\%)} = \frac{Q_{Tb}}{Q_{Sb}} \times \frac{W_{Sb}}{\text{Weight of sample (mg)}} \times 28.89$$

W_{Sa} : The amount of methyl iodide in Standard Solution (mg)

W_{Sb} : The amount of ethyl iodide in Standard Solution (mg)

Q_{Sa} , Q_{Sb} : Peak area ratios of methyl iodide and ethyl iodide vs. internal standard in Standard Solution

Q_{Ta} , Q_{Tb} : Peak area ratios of methyl iodide and ethyl iodide vs. internal standard in Test Solution

Operation Conditions

- Column : Diatomite for gas chromatography (Chromosorb WHP or its equivalent) coated with 10% methyl silicone oil or its equivalent
- Detector : Thermal Conductivity Detector (TCD) or (Hydrogen) Flame Ionization Detector (FID)
- Temperature at injection hole: 200°C
- Column Temperature : 50°C
- Detector Temperature : 200°C
- Carrier gas : Helium or Nitrogen
- Internal Standard Solution : 0.25 g of toluene is precisely weighed and dissolved in o-xylene (total volume 50 ml).

407. Polyvinyl Pyrrolidone

Povidone

Compositional Specifications of Polyvinyl Pyrrolidone

Description Polyvinyl Pyrrolidone is white~yellowish brown powder.

Identification (1) When 20 ml of 1 N hydrochloric acid and 5 ml potassium bichromate solution are added to 10 ml of an aqueous solution (1→50) of Polyvinyl Pyrrolidone, orange colored precipitates are formed.

(2) 75 mg of cobalt nitrate and 0.3 g of ammonium thiocyanate are dissolved in 2 ml of water, which is mixed with 5 ml aqueous solution (1→50) of Polyvinyl Pyrrolidone. When the resulting solution is acidified with dilute hydrochloric acid, pale blue precipitates are formed.

Purity (1) pH : A suspension of 5 g of Polyvinyl Pyrrolidone in 100 ml of water should have a pH range of 3.0~5.0

(2) Lead : When 5.0 g of Polyvinyl Pyrrolidone is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(3) Aldehyde : 10 g of Polyvinyl Pyrrolidone is precisely weighed and dissolved in 300 ml of water, where 80 ml of 25% sulfuric acid is added. The solution is transferred into a 1000 ml round bottom flask. It is then extracted for 45 minutes with a reflux condenser. It is then distilled 100 ml with 20 ml of 1 N hydroxylamine chloride salt solution whose pH is adjusted to 3.1. It is then titrated with 0.1 N sodium hydroxide solution to pH 3.1 using a pH meter. Separately, a blank test is carried out.

1 ml of 0.1 N of sodium hydroxide solution = 4.405 mg C_2H_4O

(4) Hydrazine : 2.5 g of Polyvinyl Pyrrolidone transfer into a 50 ml centrifuge tube and dissolved in 25 ml of water, where 500 μ l of salicylaldehyde solution in methanol (1→20) and shaken. The tube is heated for 15 minutes at 60°C in a water bath. After cooling, 2.0 ml of toluene is added to the tube, which is shaken vigorously for 2 minutes and then centrifuged. The supernatant is collected (Test Solution). 10 μ l of each of Test Solution and previously prepared salicylaldazine standard solution is spotted on thin layer chromatography plate. The plate is absorbed with silica gel that is silanized with dimethylsilane. Using a mixture of methanol : water (2:1) as a Mobile Phase, it is developed to 3/4 position and dried in air, which is then observed under 365 nm UV light. The spot of Test Solution

- should not be darker than that of Standard Solution (not more than 1 ppm).
- Salicyl Aldazine Standard Solution : 300 mg of hydrazine sulfate is dissolved in 5 ml of water, where 1 ml of anhydrous acetic acid and freshly prepared 20% salicyl aldehyde solution in isopropyl alcohol. It is then set aside until yellow precipitates are formed. This is then extracted with 15 ml of methyl chloride. Methylene chloride is completely removed by evaporation. A mixture of warm toluene and methanol (60:40) is added to the precipitates, which is then cooled to recrystallize. It is then filtered and dried under vacuum. Melting point should be within a range of 213~219°C and the difference in temperature between beginning and end of melting should not be exceed 1°C. The Standard Solution contains 9.38 µg/ml of toluene.
- (5) Relative Viscosity : Approximately 1 g of dried material is precisely weighed and dissolved in 50 ml of water and the total volume is brought to 100 ml with water. After settling for 1 hour, it is filtered (Test Solution). An Abbe viscometer is previously cleaned, dried and maintained at $25 \pm 0.2^\circ\text{C}$ in a water bath. 10 ml of the Test Solution transfer into the viscometer, heated for 10 minutes in a water bath. The upper layer of the Test Solution is gently sucked into the capillary exactly above the upper scale mark. After relieving suction, when the meniscus of the Test Solution reaches the upper scale mark, the flow time through the capillary is clocked. Time taken for the Solution to travel from the upper scale mark to the lower scale mark is measured. This procedure is repeated three times and an average value (to one decimal point) is calculated. If the range of time measured exceeds 0.3 second, the viscometer is cleanly washed and the experiment is repeated with 10 ml of Test Solution. A blank test is carried out with water. Relative viscosity is calculated by dividing the time for Test Solution by the time for blank test [1.188~1.325 (molecular weight about 40,000), 3.225~5.662 (molecular weight about 360,000)].
- (6) Monomer : Approximately 4 g is precisely weighed into a flask with a stopper and dissolved in 30 ml of water. While mixing with 0.5 g of sodium acetate, the solution is titrated with 0.1 N iodine solution. When the color of the iodine doesn't change, 3.0 ml of iodine solution is added. After setting aside for 5~10 minutes, the excess iodine is titrated with 0.1 N sodium thiosulfate solution (indicator : starch solution). A blank test is carried out with the same amount of 0.1 N iodine solution.

1 ml of Iodine solution 0.1 N = 5.56 mg $\text{C}_6\text{H}_9\text{NO}$

- (7) Nitrogen : 0.1 g of Polyvinyl Pyrrolidone is added to a flask for decomposition. After adding 1 g of potassium sulfate and copper sulfate mixture (1:1), inner wall of

the flask is washed with small amount of water. 7 ml of sulfuric acid is added. While shaking, 1 ml of 30% hydrogen peroxide is slowly added. Then the content is decomposed by heating until it becomes transparent blue liquid. After the decomposition is over, the liquid is cooled, where 20 ml of water is added (Test Solution). The Test Solution is quantitatively analyzed for nitrogen. The content of nitrogen should be within a range of 12.2 ~ 13.0%.

Water Content Water content of Polyvinyl Pyrrolidone is determined by water determination (Karl-Fisher Titration) and should not be more than 5.0%.

408. Ethyl Cellulose

Modified Cellulose

Compositional Specifications of Ethyl Cellulose

Content Ethyl Cellulose, when calculated on the dried basis, should contain within a range of 44.0~50.0% of the ethoxyl functional ($-\text{OCH}_2\text{CH}_3$).

Description Ethyl Cellulose is a white to brown powder.

Identification (1) Ethyl Cellulose does not dissolved in propane-1,2-diol, and glycerol, but does dissolved in various ratios of organic solvents according to the content of ethoxyl functional. If the content of ethyl cellulose is not more than 46~48% of the ethoxyl functional, Ethyl Cellulose dissolves in aromatic hydrocarbon ethanol mixtures, methyl acetate, chloroform, or tetrahydrofuran. If the content is 46~48% or not less than of the ethoxyl functional, Ethyl Cellulose dissolves in ethanol, methanol, toluene, chloroform, or methyl acetate.

(2) If 5 g of Ethyl Cellulose is dissolved in 95 g of the toluene-ethanol mixture (80:20, W/W), the solution is clear and a pale yellow liquid is generated. If a small amount of this liquids taken and evaporated on a glass plate, a thick, infrangible, combustible, transparent film remains.

Purity (1) Arsenic : When Ethyl Cellulose proceed as directed under purity (1) in [Guar gum], the content should not be more than 4 ppm.

(2) Lead: When 5.0 g of Ethyl Cellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(3) Cadmium : When 5.0 g of Ethyl Cellulose is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

(4) Mercury : When Ethyl Cellulose is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

(5) Viscosity : Those where the viscosity is marked to be not more than 10 cps are 80.0~120.0% of the marked amount, and those is marked to be not less than 10 cps are 90.0~110.0% of the marked amount. Ethyl cellulose that contains not more than 46~48% of the ethoxyl functional is prepared with the toluene-alcohol mixture (60:40, w/w) and ethyl cellulose that contain not less than 46~48% of the ethoxyl functional with the toluene-alcohol mixture (80:20, w/w) in the following test. 5.0 g of Ethyl cellulose is taken and dried previously at 105°C for 2 hours, and then the weight is measured. It is put with 95±5 g of a proper solvent in a bottle, which is

shaken until it is completely dissolved. Its viscosity is measured at $25 \pm 1^\circ\text{C}$.

Loss on Drying When Ethyl cellulose is dried at 105°C for 2 hours, the weight loss should not be more than 3%.

Residue on Ignition When 1 g of Ethyl cellulose is accurately weighed and strongly heated at $800 \pm 25^\circ\text{C}$, the weight loss should not be more than 0.4%.

Assay About 50 mg of Ethyl cellulose is weighed and put in a 5 ml-vial equipped with a pressure tight septum closure, and 65 mg of adipic acid, 2.0 ml of the inner standard solution, and 2.0 ml of hydrogen iodide are added, the vial is stoppered, and its weight is then accurately measured. The bottle is shaken for 30 sec for mixing, and heated at 150°C for 20 minutes using a heater. Then the vials shaken for mixing again and heated for 40 minutes and cooled for 45 minutes, and the weight is again accurately measured. When the weight loss is not more than 10 mg, the supernatant is use the test solution. Separately, 65 mg of adipic acid, 2.0 ml of the inner standard solution, and 2.0 ml of hydrogen iodide are put in another pressure tight vial, which is then stoppered, and the weight is measured accurately. 15 μl of ethyl iodide is added and the weigh is measured again accurately. After the bottle is shaken for 30 sec, the supernatant is use the standard solution. 1 μl each of the test solutions and standard solutions is injected to gas chromatograph and the content of the ethoxyl functional is obtained using the following equation.

$$\text{Content of the ethoxyl functional (\%)} = \frac{Q_{Ta}}{Q_{Sa}} \times \frac{W_{Sa}}{\text{Weight of Sample (mg)}} \times 28.89$$

W_{Sa} : Amount (mg) of ethyl iodide in the standard solution

Q_{Sa} : The ratio of the peak area of ethyl iodide to that of the inner standard material in the standard solution

Q_{Ta} : The ratio of the peak area of ethyl iodide to that of the inner standard material in the test solution

Operation Conditions

- Column : diatomaceous earth (Chromosorb WHP or its equivalent) for gas chromatography covered with 10% methyl silicon oil or its equivalent
- Detector : Thermal Conductivity Detector or Flame Ionization Detector
- Inlet Temperature : 200°C
- Column Temperature : 50°C
- Detector Temperature : 200°C
- Carrier Gas : Helium or nitrogen

◦ Inner Standard Solution : 0.25 g of toluene is weighed accurately and o-xylene is added to make 50 ml.

409. Potassium Ferrocyanide

Chemical Formula $\text{K}_4\text{Fe}(\text{CN})_6 \cdot 3\text{H}_2\text{O}$

Molecular Weight 422.39

Compositional Specifications of Potassium Ferrocyanide

Content When Potassium ferrocyanide is quantified, it should contain not less than 99.0% of potassium ferrocyanide ($\text{K}_4\text{Fe}(\text{CN})_6 \cdot 3\text{H}_2\text{O}$)

Description Potassium ferrocyanide is a white crystal or crystalline powder.

Identification (1) When 1 ml of ferric chloride is added to 10 ml of Potassium ferrocyanide (1→100), a dark blue precipitate is formed.

(2) Potassium ferrocyanide responds to test of potassium salt in the identification method.

Purity (1) Cyanide : 10 mg of copper sulfate is dissolved in 8 ml of water and 2 ml of ammonium solution. A filtering paper is dipped into this solution, to which hydrogen sulfide is then added. When 1 drop of the aqueous solution of Potassium ferrocyanide (1→100) is dropped on the filtering paper that turned brown, white rings should not appear.

(2) Ferrocyanide : 10 mg of Potassium ferrocyanide is dissolved in 10 ml of water and added 1 drop of this solution. When a few drops of 2 N acetic acid and that is saturated with benzidine and 1 drop of 1% lead nitrate are added, blue precipitates or color should not formed.

(3) Lead : Accurately weigh 5.0 g of Potassium ferrocyanide into a 150 ml beaker, add 30 ml of water. Add Hydrochloric acid in small portion to the solution until the solid is dissolved thoroughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to bring the total volume to 100 ml. Add Sodium Hydroxide Solution(1→4) or Hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in

water to make 100 ml. Filter it when using.

(4) Chloride : When 0.11 g of Potassium ferrocyanide is tested by Chloride Limit Test, the detected amount should not be more than the amount that corresponds to 0.6 ml of 0.01 N hydrochloric acid.(not more than 0.2%)

(5) Sulfate : When 0.2 g of Potassium ferrocyanide is tested by Sulfate Limit Test, the detected amount should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid. (not more than 0.1%)

Water Content Water content of Potassium ferrocyanide is determined by water determination (Karl-Fisher Titration) and should not be more than 1.0%.

Assay About 1.0 mg of Potassium ferrocyanide is weighed accurately, dissolved in 200 ml of water, and 10 ml of sulfuric acid is added. Then the solution is titrated with 0.02 N potassium permanganate until the red color lasts for 30 secs.

0.02 N potassium permanganate 1 ml = 42.24 mg of $\text{K}_4\text{Fe}(\text{CN})_6 \cdot 3\text{H}_2\text{O}$

410. Sodium Ferrocyanide

Chemical Formula $\text{Na}_4\text{Fe}(\text{CN})_6 \cdot 10\text{H}_2\text{O}$

Molecular Weight 484.06

Compositional Specifications of Sodium Ferrocyanide

Content When Sodium ferrocyanide is quantified, it should contain not less than 99.0% of sodium ferrocyanide ($\text{Na}_4\text{Fe}(\text{CN})_6 \cdot 10\text{H}_2\text{O}$).

Description Sodium ferrocyanide is a yellow crystal or crystalline powder.

Identification (1) When 1 ml of ferric chloride is added to 10 ml of sodium ferrocyanide (1→100), a dark blue precipitate are formed.

(2) Sodium ferrocyanide responds to test of sodium salt in the identification method.

Purity (1) Cyanide : 10 mg of copper sulfate is dissolved in 8 ml of water and 2 ml of ammonium solution. A filtering paper is dipped into this solution, to which hydrogen sulfide is then added. When 1 drop of the aqueous solution of this additive (1→100) is dropped on the filtering paper that turned brown, white rings should not appear.

(2) Ferrocyanide : 10 mg of sodium ferrocyanide is dissolved in 10 ml of water. When a few drops of 2 N acetic acid that is saturated with benzidine and 1 drop of 1% lead nitrate are added to 1 drop of this solution, blue precipitates or color should not formed.

(3) Lead : Accurately weigh 5.0 g of sodium ferrocyanide into a 150 ml beaker, add 30 ml of water. Add Hydrochloric acid in small portion to the solution until the solid is dissolved throughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to bring the total volume to 100 ml. Add Sodium Hydroxide Solution(1→4) or Hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in

water to make 100 ml. Filter it when using.

(4) Chloride : When 0.11 g of sodium ferrocyanide is tested by Chloride Limit Test, the detected amount should not be more than the amount that corresponds to 0.6 ml of 0.01 N hydrochloric acid.(not more than 0.2%)

(5) Sulfate : When 0.2 g of sodium ferrocyanide is tested by Sulfate Limit Test, the detected amount should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid. (not more than 0.1%)

Water Content Water content of sodium ferrocyanide is determined by water determination (Karl-Fisher Titration) and should not be more than 1.0%.

Assay About 1.0 mg of sodium ferrocyanide is weighed accurately, dissolved in 200 ml of water, and 10 ml of sulfuric acid is added. Then the solution is titrated with 0.02 N potassium permanganate until the red color lasts for 30 secs.

1 ml of 0.02 N potassium permanganate = 48.41 mg of $\text{Na}_4\text{Fe}(\text{CN})_6 \cdot 10\text{H}_2\text{O}$

411. Calcium Ferrocyanide

Chemical Formula $\text{Ca}_2\text{Fe}(\text{CN})_6 \cdot 12\text{H}_2\text{O}$

Molecular Weight 508.29

Compositional Specifications of Calcium Ferrocyanide

Content When calcium ferrocyanide is quantified, it should contain not less than 99.0% of calcium ferrocyanide ($\text{Ca}_2\text{Fe}(\text{CN})_6 \cdot 12\text{H}_2\text{O}$)

Description Calcium ferrocyanide is a yellow crystal or crystalline powder.

Identification (1) When 1 ml of ferric chloride is added to 10 ml of calcium ferrocyanide (1→100), a dark blue precipitate are formed.

(2) Calcium ferrocyanide responds to test of calcium salt in the identification method.

Purity (1) Cyanide : 10 mg of copper sulfate is dissolved in 8 ml of water and 2 ml of ammonium solution. A filtering paper is dipped into this solution, to which hydrogen sulfide is then added. When 1 drop of the aqueous solution of this additive (1→100) is dropped on the filtering paper that turned brown, white rings should not appear.

(2) Ferrocyanide : 10 mg of sodium ferrocyanide is dissolved in 10 ml of water and added 1 drop of this solution. When a few drops of 2 N acetic acid and that is saturated with benzidine and 1 drop of 1% lead nitrate are added, blue precipitates or color should not formed.

(3) Lead : Accurately weigh 5.0 g of calcium ferrocyanide into a 150 ml beaker, add 30 ml of water. Add Hydrochloric acid in small portion to the solution until the solid is dissolved throughly and add 1 ml of hydrochloric acid. Heat this solution for approximately 5 minutes and cool down. Add water to bring the total volume to 100 ml. Add Sodium Hydroxide Solution(1→4) or Hydrochloric acid(1→4) so that pH becomes 2~4. Transfer this solution into 250 ml separatory funnel, where water is added to make 200 ml. Then add 2 ml of 2% APDC solution and shake to mix. Extract the solution 2 times with 20 ml each of chloroform, which is evaporated to dryness in a water bath. Add 3 ml of Nitric Acid to the residue and heat it until nearly evaporated. To this solution, add 0.5 ml of Nitric Acid and 10 ml of water, concentrate it until the final solution becomes 3~5 ml, and add water to make 10 ml, test solution. When the test solution is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.

2% APDC Solution : 2.0 g of Ammonium Pyrolidine Dithiocarbamate is dissolved in

water to make 100 ml. Filter it when using.

(4) Chloride : When 0.11 g of calcium ferrocyanide is tested by Chloride Limit Test, the detected amount should not be more than the amount that corresponds to 0.6 ml of 0.01 N hydrochloric acid.(not more than 0.2%)

(5) Sulfate : When 0.2 g of calcium ferrocyanide is tested by Sulfate Limit Test, the detected amount should not be more than the amount that corresponds to 0.4 ml of 0.01 N hydrochloric acid. (not more than 0.1%)

Water Content Water content of calcium ferrocyanide is determined by water determination (Karl-Fisher Titration) and should not be more than 1.0%.

Assay About 1.0 mg of calcium ferrocyanide is weighed accurately, dissolved in 200 ml of water, and 10 ml of sulfuric acid is added. Then the solution is titrated with 0.02 N potassium permanganate until the red color lasts for 30 secs.

0.02 N potassium permanganate 1 ml = 50.83 mg of $\text{Ca}_2\text{Fe}(\text{CN})_6 \cdot 12\text{H}_2\text{O}$

412. Polyglycitol Syrup

Hydrogenated starch hydrolysate, Polyglucitol

Definition Polyglycitol Syrup is a mixture of sorbitol, maltitol, maltotritol, and hydrogenated saccharide

Compositional Specifications of Polyglycitol Syrup

Content In Polyglycitol Syrup, sorbitol occupies not less than 95% of the peak area of sorbitol and glucose, maltitol does not less than 95% of the peak area of maltitol and maltose. Sorbitol and maltitol contain not more than respectively 50% of the total content.

Description Polyglycitol Syrup is a colorless, odorless, transparent, viscous liquid or white crystalline lump.

Identification (1) Polyglycitol Syrup dissolved well in water and slightly in alcohol.

(2) 50 mg of Polyglycitol Syrup is dissolved in 20 ml of water to make the test solution. Proceed as directed under (4) Identification in [D-maltitol]

(3) To 5 g of Polyglycitol Syrup, add 7 ml of methanol, 1 ml of benzaldehyde and 1 ml of hydrochloric acid and mix them with agitation until crystals appear. The crystals are filtered and then dissolved in 20 ml of boiling water containing 1 g of sodium bicarbonate, and filtered. The resulting solution is cooled until crystals appear. They are filtered again and washed with 5 ml of 50% methanol. The melting point of the dried crystal should be within a range of 173~179°C.

Purity (1) Reduced saccharides : About 7 g of Polyglycitol Syrup is weighed accurately and proceed as directed under purity (1) in [D-maltitol], the weight of copper oxide should not be more than 50 mg.

(2) Chloride : When 10 g of Polyglycitol Syrup the chloride proceed as directed under chloride, it is content should not be more than the amount that corresponds to 1.5 ml of 0.01 N hydrochloric acid.

(3) Sulfates : When 10 g of Polyglycitol Syrup the chloride proceed as directed under Sulfate, it is content should not be more than the amount that corresponds to 2.0 ml of 0.01 N hydrochloric acid.

(4) Lead : When 5.0 g of Polyglycitol Syrup is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1 ppm.

(5) Nickel : When proceed as directed under purity (1) in [D-maltitol] with 10 g of Polyglycitol Syrup, the content should not be more than 2 ppm.

Loss on Drying When Polyglycitol Syrup is dried at 105°C for 4 hours, the reduction

of a dried sample should not be more than 15% and that of a liquid sample should not be more than 50%.

Residue on Ignition When proceed as directed under Residue on Ignition with 3 g of Polyglycitol Syrup, the content should not be more than 0.1%.

Assay 0.1 g of Polyglycitol Syrup is accurately weighed and water is added to make 100 ml. The resulting solution is filtered with 0.45 µm paper to make the test solution. Separately, 0.1 g each of the sorbitol standard, the dextrose standard, the maltitol standard and the maltose standard are weighed accurately, water is added to make 100 ml, use the standard solution. 20 µl each of the standard and test solutions are injected in liquid chromatography in the following conditions, and according to the following formulae, the contents of sorbitol, dextrose, maltitol, and maltose are obtained using the following equation.

Contents (%) of Sorbitol, Dextrose, Maltitol, and Maltose =

$$\frac{\text{Weight(g) of the standards sample}}{\text{Weight(g) of Sample}} \times \frac{\text{Peak area of the testsolution}}{\text{Peak area of the standard solution}} \times 100$$

Operation Condition

- Column : Phenomenex Rezex or its equivalent
- Detector : Differential Refractometer (RI detector)
- Column temperature : 80°C
- Moving phase : water
- Flow speed : 0.5 ml/min

413. Manganese Chloride

Chemical Formula $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$

Molecular Weight 197.19

Compositional Specifications of Manganese Chloride

Content Manganese Chloride should contain within a range of 98.0~102.0% of Manganese Chloride ($\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$).

Description Manganese Chloride occurs as a pink translucent crystal having an irregular form.

Identification (1) Manganese Chloride solution (1→20) yield with ammonium sulfide solution a salmon-colored precipitate that is dissolved in acetic acid.

(2) Manganese Chloride solution (1→20) responds to the test by Chloride Limit Test.

Purity (1) pH: pH of Manganese Chloride solution (1→20), measured by glass electrode method, should be within a range of 4.0~6.0.

(2) Insoluble Matter: Approximately 20 g of Manganese Chloride is precisely weighed, dissolved in 200ml of water, and allowed to stand on a steam bath. This solution is filtered through a tared sintered-glass crucible, washed thoroughly with hot water, and dried at 105°C for 1 hour. The weight should not be more than 0.005%.

(3) Substances Not Precipitated by Sulfide: 2 g of Manganese Chloride is dissolved in about 90 ml of water. After 4 ml of ammonium hydroxide is added, this solution is heated to 80°C and passed through hydrogen sulfide to completely precipitate the manganese. This solution is diluted to 100 ml, mixed, and allowed the precipitate to settle. The supernatant liquid is filtered, and 50 ml of the filtrate is evaporated to dryness in a tared platinum dish. 0.5 ml of sulfuric acid is added and ignited to constant weight. The weight should not be more than 0.2 %.

(4) Iron: 2 g of Manganese Chloride is dissolved in 20 ml of water. 1 ml of hydrochloric acid is added and diluted to 50 ml with water. 40 mg of ammonium persulfate and 3 ml of ammonium thiocyanate solution is added. Any red or pink color does not exceed that produced by 1 ml of iron standard solution (10 µg Fe) in an equal volume of a solution containing the quantities of the reagents used in the test (not more than 5 ppm).

(5) Sulfate Salts: 10 g of Manganese Chloride is dissolved in 100 ml of water. 1 ml of 2.7 N hydrochloric acid is added and filtered. After the solution is heated to boil, 10 ml of barium chloride solution is added, which is allowed to stand overnight. The precipitates are filtered, placed in a tared crucible, ignited at 600°C, and weighed. The

amount of sulfate salts (as SO_4) should not be more than 0.005%. 1 mg of the residue corresponds to 0.412 mg of SO_4 .

- (6) Lead : When 5.0 g of Manganese Chloride is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 4 ppm.

Assay Approximately 4 g of Manganese Chloride is precisely weighed and dissolved in water to make 250 ml solution. 25 mL of this solution is mixed with 10 mL of hydroxyamine hydrochloride (1→10), 25 ml of 0.05 M disodium EDTA, 25 ml of ammonia-ammonium chloride buffer solution, and 5 drops of eriochrome black solution. Heat This solution is heated to 55~65°C and titrated from the buret to a blue end point with 0.05 M disodium EDTA.

1 ml of 0.05 M disodium EDTA = 9.896 mg of $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$

414. Manganese Citrate

Chemical Formula $\text{C}_{12}\text{H}_{10}\text{Mn}_3\text{O}_{14} \cdot 10\text{H}_2\text{O}$

Molecular Weight 723.17

Compositional Specifications of Manganese Citrate

Content Manganese Citrate, when calculated on the dried basis, should contain within a range of 96.5~104.8% of Manganese Citrate ($\text{C}_{12}\text{H}_{10}\text{Mn}_3\text{O}_{14} \cdot 10\text{H}_2\text{O}$).

Description Manganese Citrate occurs as a white to pale pink granule or powder.

Identification (1) Manganese Citrate solution (1→20) yield with ammonium sulfide solution a salmon-colored precipitate that is dissolved in acetic acid.

(2) Manganese Citrate solution responds to the test for citrate.

Purity (1) Sulfate : 10 g of Manganese Citrate is dissolved in 200 ml of water. Excess amount of hydrochloric acid is added and acidified (indicator: Methyl Red). After the solution is heated to boil, 10 ml of barium chloride solution is added, which is allowed to stand on a steam bath for 2 hour. The precipitates are filtered through a tared glass crucible, ignited at 600°C, and weighed. The amount of sulfate salts (as SO_4) should not be more than 0.02%. 1 mg of the residue corresponds to 0.412 mg

(2) Lead : Manganese Citrate is precisely weighed and is tested by purity

(3) Arsenic : 0.25 g of Manganese Citrate is dissolved in water to make 5 ml, which is tested by Arsenic Limit Test (not more than 4 ppm).

Loss on Drying When Manganese Citrate is dried for 16 hour at 105°C under vacuum, the loss should be within a range of 23~26%.

Assay Approximately 0.35 g of Manganese Citrate is precisely weighed and dissolved in 100 ml of water and 1 ml of dilute hydrochloric acid, followed by heating at 75~80°C. 25 ml of 0.5 M disodium EDTA is added to this solution. pH, if necessary, is adjusted to 10.0±0.2, and 10 ml of ammonia-ammonium chloride buffer solution and 8 drops of eriochrome black solution are added. This solution is titrated with 0.05 M disodium EDTA until a blue end point is persisted for 3 minutes.

1 ml of 0.05 M disodium EDTA = 9.05 mg of $\text{C}_{12}\text{H}_{10}\text{Mn}_3\text{O}_{14}$

415. Ferric Chloride

Chemical Formular $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$

Molecular Weight 270.30

Compositional Specifications of Ferric Chloride

Content Ferric Chloride should contain within a range of 98.5~102.0% of Ferric Chloride ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$).

Description Ferric Chloride occurs as yellowish brown crystals or lumps with hygroscopic properties.

Identification Ferric Chloride responds to the tests by Chloride Limit Test and Ferric salts.

- Purity**
- (1) Clarity and Color of Solution: 1 g of Ferric Chloride is dissolved with 10 ml of hydrochloric acid (1→100) through heating. The turbidity of resulting solution should show slightly low level of turbid or better.
 - (2) Free acid: 2 g of Ferric Chloride is dissolve with 5 ml of water. There is no sign of vapor when glass rod dipped with ammonia is brought near to this solution.
 - (3) Nitrate: 5 g of Ferric Chloride is dissolve in 25 ml of water and heated to boil. Then 25 ml of ammonia is added. After cooling, mark this mixture to 100 ml with water and filter. Consider the filtrate as the test solution. Add 5ml of water, 0.1 ml of Indigocarmine, and 10ml of sulfuric acid to 5 ml of test solution. The solution should remain blue more than 5 minutes.
 - (4) Sulfate: Add 3ml of anhydrous sodium carbonate solution (1→8) to 20ml of test solution (3) and evaporate to dryness in the steam bath. Heat the content with a low flame of burner until there is no sign of the white vapor. After cooling, add 10ml of water and 3ml of hydrochloric acid (1→4) to the content and evaporate to dryness it in the steam bath. Dissolve the content with 0.3ml of hydrochloric acid (1→4) and water. Make 50ml of solution with water and tested by Sulfate Limit Test. Its content should not be more than the amount that corresponds to 0.4 ml of 0.01 N sulfuric acid.
 - (5) Lead : 1.0 g of Ferric Chloride is weighed and trasnferred into 50 ml flask. Add 10 ml of 9 N hydrochloric acid, 10 ml of water, 20 ml of ascorbic acid-sodium iodide solution and 5 ml of trioctyl phosphine oxide solution and shake it to mix for 30 seconds. Add keep it to separate the layer and again add water so that organic layer reaches to neck part of flask. After shaking to mix it, keep it to separate the layer. This organic solvent layer is used as test solution. Seperately, take 10 ml of

lead standard solution and make it precisely to 100 ml. Take 2 ml of this solution and transfer into 50 ml flask. And operate under condition as test solution method, this solution is used as reference solution. When it is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, absorbance(luminous intensity) of test solution should not be more than absorbance(luminous intensity) of reference solution.(not be more than 2.0 ppm.)

Ascorbic acid-sodium iodide solution : 10 g of ascorbic acid and 19.3 g sodium iodide are dissolved in water to make to 100 ml.

Trioctyl phosphine oxide solution : 5 g of trioctyl phosphine oxide is dissolved in methyl isobutyl ketone to make to 100 ml.

- (6) Zinc: 20 ml of the test solution prepared in (3) above is neutralized by hydrochloric acid and then make 30ml with water. Add 3 ml of diluted hydrochloric acid and 0.2 ml of potassium ferrocyanide (1→10), and allow to stand for 15 minutes. The solution should not be more turbid than the following reference solution. To prepare reference solution, measure 3ml of zinc standard solution, and add water to make 30ml. Add 3ml of diluted hydrochloric acid and 0.2 ml of potassium ferrocyanide (1→10) to this solution, and allow to stand 15 minutes. (not more than 30 ppm as Zinc)
- (7) Arsenic: Prepare the test solution by dissolving 0.5g of Ferric Chloride to 20 ml of water then apply 0.2 g of L-ascorbic acid. The arsenic test result for the test solution should be adequate. Separately, the standard solution is prepared with 2ml standard arsenic solution with additions of 20ml water and 0.2 g of L-Ascorbic acid. And then repeat the same testing procedure as mentioned above. (not more than 4 ppm)
- (8) Free chloride: 2g of Ferric Chloride is dissolved in 5 ml of water. After heating, the filter paper treated with the starch iodide zinc solution should not turn blue.

Assay 0.6 g of Ferric Chloride is precisely weighed and transferred into a flask with a ground-glass stopper along with 50 ml of water as a solvent. 3 ml of hydrochloric acid and 3g of potassium iodide are added. The stopper is placed on the flask, which is set-aside for 15 minutes in a dark place. Then the contents are titrated with 0.1N sodium thiosulfate solution (indicator: starch solution). Separately, a blank test is carried out by the same procedure.

$$1 \text{ ml of } 0.1 \text{ N sodium thiosulfate} = 27.030\text{mg } \text{FeCl}_3 \cdot 6\text{H}_2\text{O}$$

416. Sodium Lauryl Sulfate

Definition Sodium Lauryl Sulfate is a mixture of sodium alkylsulfates consisting chiefly of sodium lauryl sulfate $[\text{CH}_3(\text{CH}_2)_{10}\text{CH}_2\text{OSO}_3\text{Na}]$.

Compositional Specifications of Sodium Lauryl Sulfate

Content Sodium Lauryl Sulfate should contain no less than 59.0% of total alcohols.

Description Sodium Lauryl Sulfate occurs as white or light yellow crystals having a slightly characteristic odor.

Identification (1) Sodium Lauryl Sulfate solution (1→10) responds to the test for Sodium Salt.

(2) Sodium Lauryl Sulfate solution (1→10) responds to the test by Sulfate Limit Test after acidification with hydrochloric acid and boiling gently for 20 min.

Purity (1) Alkalinity: 1.0 g of Sodium Lauryl Sulfate is dissolved in 100 mL of water, where phenol red solution is added. This solution is titrated with 0.1 N hydrochloric acid. The consumption should not be more than 0.5 mL.

(2) The content of Sodium Chloride and Sodium Sulfate : When the test proceed as directly under Sodium Chloride and Sodium Sulfate, the content of Combined Sodium Chloride and Sodium Sulfate should not be more than 8.0% when tested by following tests.

① Sodium chloride: Dissolve about 5 g, precisely weighed, in 50 mL of water. If necessary, neutralize the solution with dilute nitric acid, add 2 mL of potassium chromate solution, and titrate with 0.1 N silver nitrate. Perform blank test with the same method.

1 mL of 0.1 N silver nitrate = 5.844 mg of NaCl

② Sodium sulfate: Dissolve about 1 g, accurately weighed, in 10 mL of water, heat the mixture, and stir until completely dissolved. Add 100 mL of alcohol to the hot solution and digest at a temperature just below the boiling point for 2 h. Filter while hot through a sintered-glass filter crucible (G4), and wash the precipitate with 100 mL of hot alcohol. Dissolve the precipitate in the crucible by washing with about 150 mL of water, collecting the washing in a beaker. Acidify with 10 mL of hydrochloric acid, heat to boiling, add 25 mL of barium chloride solution, and allow to stand overnight. Collect the precipitate of barium sulfate on a suitable tared, porous-bottom porcelain filter crucible, wash until free from chloride, dry, and ignite to constant weight at 800°C

Weight of sodium sulfate (%) = $\frac{\text{The weight of barium sulfate (g)} \times 0.6086}{\text{weight of sample (g)}} \times 100$

(3) Unsulfated alcohols: Dissolve approximately 10 g of Sodium Lauryl Sulfate, precisely weighed, in 100 ml of water, and add 100 ml of alcohol. Transfer the solution to a separator, and extract with three 50 ml portions of solvent hexane. If an emulsion forms, add sodium chloride to promote separation of the two layers. Wash the combined solvent hexane extracts with three 50 ml portions of water, and dry with anhydrous sodium sulfate. Evaporate hexane on a steam bath until odor is no longer perceptible, when calculated on the dried basis at 105°C for 30 minutes and weighed, the amount should not be more than 4.0 %.

(4) Lead : When 5.0 g of Sodium Lauryl Sulfate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5 ppm.

Assay 150 ml of water and 50 ml of hydrochloric acid are added to 5 g of precisely weighed Sodium Lauryl Sulfate, which is boiled for approximately 4 hours with a reflux condenser. After cooling, it is extracted twice with 75 ml each of ether. Ether extracts are combined and washed with water. Ether is removed by evaporation in a water bath. The residue is dried at 105°C for 30 minutes and weighed. The residue represents the total alcohols.

417. Sodium Metasilicate

Chemical Formula $\text{Na}_2\text{O} \cdot \text{SiO}_2 \cdot n\text{H}_2\text{O}$

Molecular Weight, anhydrous 122.06
pentahydrate 212.06

Definition Sodium Metasilicate is an anhydrous or hydrous (pentahydrate) silicate having a 1:1 molar ratio of Na_2O to SiO_2 .

Compositional Specifications of Sodium Metasilicate

Content Sodium Metasilicate should contain within a range of 90.0 ~ 110.0% as indicated the percent, each, of SiO_2 and Na_2O .

Description Sodium Meatsilicate occurs as a white granular material.

Identification (1) Place a drop of Sodium Meatsilicate solution (2→100) on a spot plate. Add to this 1 drop of 4 M sodium hydroxide and 1 drop of a solution prepared by dissolving 0.5 g of ammonium molybdate in 10 mL of water, followed by the addition of 3 mL of sulfuric acid. A deep-yellow color indicates the presence of silicate.

(2) Dip a clean nichrome wire into Sodium Meatsilicate solution (2→100) and place the wire in the flame of a Bunsen burner. A bright-yellow color indicates the presence of sodium.

Purity (1) Heavy metals: Transfer 10 g of Sodium Metasilicate to a 250-mL beaker, add 50 mL of 0.5 N hydrochloric acid, cover with a watch glass, and heat slowly to boiling. Boil gently for 15 min, cool, and let the undissolved material settle. Decant the supernatant liquid through Whatman No. 4 (or an equivalent) filter paper. Wash the slurry and beaker with four 10-mL portions of hot water, decanting each washing through the filter into the flask. Cool the filtrate, dilute with water to 100 mL, and mix to obtain the sample solution. Take 20 mL of the sample solution, add 1 drop of phenolphthalein solution, neutralize with ammonia solution and add 2 mL of dilute acetic acid. When performed heavy metal test with this solution, the quantity should not be more than 10 ppm.

Loss on Drying Dry at 105°C for 2 hour. It should not be more than 2.0% for the anhydrous and 42.0% for the pentahydrate.

Loss on Ignition Dry at 105°C for 2 hour and ignite about 1 g, precisely weighed, at 1000°C for 2 hour. It should not be more than 0.5% for the anhydrous and be between 40.5% and 42.5% for the pentahydrate.

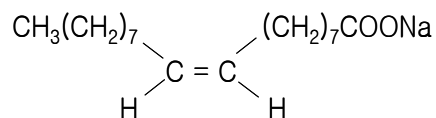
Assay (1) Silicon Dioxide: In a beaker, acidify 1 g of Sodium Metasilicate, precisely

weighed, with 5 mL of hydrochloric acid, and evaporate to dryness on a steam bath. Repeat the treatment with an additional 5 mL of hydrochloric acid, mix the residue with 1 mL of hydrochloric acid and 20 mL of water, and heat for 1.5 hr on a steam bath. Cool, filter through an ashless filter paper, and wash the paper and the residue thoroughly with hot water. Transfer the filter paper to a platinum crucible and dry at 105°C for 2 hr. Gradually increase the heat to burn away the paper, ignite the crucible and its contents to constant weight at 1000°C, cool in a desiccator, and weigh. Moisten the ignited residue with few drops of water, add 15 mL of hydrofluoric acid and 5 drops of sulfuric acid (1:3), and heat the crucible gradually until all of the acid is driven off. Ignite the residue to constant weight at 1000°C, cool the crucible in a desiccator, and weigh. The loss in weight is equivalent to the weight of SiO₂ in the sample taken.

- (2) Sodium Oxide: Disperse 500 mg of Sodium Metasilicate, precisely weighed, in 150 mL of water, and heat on a steam bath. Cool and add 2 to 3 drops of phenolphthalein solution and 100 mL of 0.1 N sulfuric acid. Titrate an excess acid with 0.1 N sodium hydroxide. Subtract the volume of 0.1 N sodium hydroxide from the volume of 0.1 N sulfuric acid.

$$1 \text{ mL of } 0.1 \text{ N sulfuric acid} = 3.099 \text{ mg Na}_2\text{O}$$

418. Sodium Oleate



Chemical Formula $\text{C}_{18}\text{H}_{33}\text{NaO}_2$

Molecular Weight 304.45

Description Sodium Oleate occurs as a white ~ yellow powder or a pale yellowish brown chunk or lump with characteristic odor and taste.

Identification (1) Thoroughly, mix 50 ml of Sodium Oleate (2->50) in an aqueous solution with 5ml of sulfuric acid (1->2) and filter this mixture with pre-water wetted filter paper. Continue wash the residue until there is no acid indicated by the methyl orange indicator. Filter the remaining residue with a dry filter paper. Place 2-3 drops of the filtrate and 1ml of sulfuric acid in a small test tube. Brown lining is expected to show on the contact surface of both. Dissolve 1-3 drops of the filtrate with 3-4ml of acetic acid (1->4) and add 1 drop of chromium trioxide acetate solution (1->10) then slowly add 10~30 drops of sulfuric acid which would show a dark purple color.

(2) The residue on ignition of Sodium Oleate responds to the test for Sodium Salt.

Purity (1) Clarity and Color of Solution: When 0.5g of Sodium Oleate is dissolved in 20ml of water, the solution should be almost clear.

(2) Free Alkali: Precisely weigh 5g of Sodium Oleate powder and add 100ml of neutralized alcohol then heat this solution to dissolve. Filter insoluble substances and rinse the residue until it has no color with 40°C neutralized alcohol. Collect the filtrate and rinse solution. After cooling, titrate the solution with 0.05N sulfuric acid and its consumed amount is regarded as the a ml. Rinse the residue 5 times with 10ml of hot water and collect all the solutions in a beaker. Add 3 drops of Bromophenol blue solution and titrate it with 0.05N sulfuric acid. The consumed amount of 0.05N sulfuric acid is regarded as the b ml. When calculated by the following equation, the content of free alkali should not be more than 0.5%

Content of Free Alkali (%) = $[0.0040 * a + 0.0053 * b] / \text{Weight of sample (g)} * 100$

(3) Arsenic: Completely dissolve 5g of Sodium Oleate into 30ml of hot water and add 6ml of sulfuric acid (1->20) to precipitate the fatty acid then discard it by the ether.

Mark up the remaining solution to 50ml with water. Regard 5ml of this solution as the test solution and conduct the arsenic test. The test result should be in adequate level. However, for the standard solution, dissolve 10ml of standard Arsenic solution to 30ml of water and 6ml of sulfuric acid (1->20) and mark up the volume to 50ml using water. Apply same conditions and test as the test solution above to 10ml of this standard solution. (Not more than 4 ppm)

(4) Lead : Sodium Oleate is tested by Purity (2) for Sodium Metaphosphate(not more than 2.0 ppm).

Residue on Ignition Residue on ignition of Sodium Oleate should be within a range of 22~25%.

419. *d*- α -Tocopheryl Acetate

Chemical Formula $C_{31}H_{52}O_3$

Molecular Weight 472.75

Compositional Specifications of *d*- α -Tocopheryl Acetate

Content *d*- α -Tocopheryl Acetate ($C_{31}H_{52}O_3$) should contain within a range of 96.0~102.0% of *d*- α -Tocopheryl Acetate.

Description *d*- α -Tocopheryl Acetate occurs as a colorless to yellow, viscous liquid. *d*- α -Tocopheryl Acetate is miscible with ether, with acetone, with chloroform, and with vegetable oils; freely soluble in ethyl alcohol; and insoluble in water.

Identification (1) Add, with swirling, 2 ml of nitric acid to 10 ml of test solution from Purity (3) specific rotation, and heat at about 75°C for 15 min. A bright-red to orange color develops.

(2) The retention time of the major peak in the chromatogram of the test solution is the same as that of the standard solution, both relative to the internal standard solution, as obtained in the Assay.

Purity (1) Acidity : Dissolve 1g of *d*- α -Tocopheryl Acetate in 25 mL of a 1:1 alcohol:ether mixture that has been neutralized to phenolphthalein with 0.1N sodium hydroxide. Add 0.5 ml of phenolphthalein, and titrate with 0.1N sodium hydroxide until the solution remains faintly pink after shaking for 30 s. The consumed amount of the titrant should not be more than 1.0 ml.

(2) Lead : Transfer 10 g of *d*- α -Tocopheryl Acetate, precisely weighed, into a crucible or a platinum dish. Add 5 ml of 25% sulfuric acid cautiously and mix well, which is then evaporated to dryness on a steam bath. Place the dish on a heating plate, preash slowly until most of sulfuric acid disappears, and then ash at 450~550°C. Repeat the above mentioned procedure when ashing is insufficient. Prepare sample blank by ashing 5 ml of 25% sulfuric acid under the same method. After ashing, add 5 ml of 1N hydrochloric acid and dry it on a steam bath. Add 1 ml of 3N hydrochloric acid and approximately 5 ml of distilled water and dissolve any residue on a steam bath. Transfer each solution quantitatively to a 10 ml volumetric flask, dilute to volume with distilled water, and mix. Dilute it if necessary. This solution is used for test solution. Separately, prepare each standard solution by adding water to 1 and 5 ml each of standard lead solution to bring the total volume to 10 ml and taking 10 ml directly from standard lead solution (1, 5, 10 ppm). When test solutions and each standard solution are tested for flame atomic absorption spectrophotometric

method according to the following operation conditions, the content of lead should not be more than 2 ppm.

Standard Lead Solution : Dissolve 10 ml of standard lead stock solution for atomic absorption spectrophotometric method (100 $\mu\text{g}/\text{ml}$), accurately taken, in 10 ml of 3N hydrochloric acid and add water to bring the total volume of 100 ml (10 $\mu\text{g}/\text{ml}$).

Operation Conditions

Gas : air-acetylene

Lamp : a lead electrodeless discharge lamp (EDL)

Wavelength: 283.3 nm

A slit-width: 0.7 nm

(3) Specific rotation

Preparation of Test Solution : Transfer an accurately weighed amount of d- α -Tocopheryl Acetate, equivalent to about 200 mg of d- α -Tocopherol, into a 150 ml round-bottom, glass-stoppered flask, and dissolve it in 25 ml of absolute alcohol. Add 20 ml of a 1:7 mixture of 2N sulfuric acid in alcohol, and reflux for 3 h, protected from sunlight. Cool, transfer into a 200 ml brown volumetric flask, dilute to volume with a 1:72 mixture of 2 N sulfuric acid in ethyl alcohol, and mix. This solution is used for test solution.

Procedure : Transfer an accurately weighed amount of the test solution, equivalent to about 100 mg of d- α -Tocopherol, into a separatory funnel, and add 200 ml of distilled water. Extract first with 75 ml of ether, then with two 25 ml portions of ether, and combine the ether extracts in another separatory funnel. Add 20 ml of a 10% solution of potassium ferricyanide in sodium hydroxide solution (1 \rightarrow 125) to the ether solution, and shake for 3 min. Wash the ether solution four times with 50 ml portions of water, discard the water phase, and dry over anhydrous sodium sulfate. Evaporate the dried ether solution on a water bath or in an atmosphere of nitrogen until 7 or 8 ml remain, and then complete the evaporation, removing the last traces of ether without the application of heat, Immediately dissolve the residue in 5 ml of isooctane, and determine the optical rotation. When specific rotation is measured, $[\alpha]_D^{20}$ should not be less than $+24^\circ$

Assay

Test Solution and Solution Preparation

Internal Standard Solution : Prepare a solution containing about 3 mg of hexadecyl hexadecanoate in each ml of n-hexane.

Preparation of Standard Solution : Dissolve about 30 mg of d- α -Tocopheryl Acetate standard, precisely weighed, in 10 ml of internal

standard solution.

Preparation of Test Solution : Dissolve about 30 mg of d- α -Tocopheryl Acetate, precisely weighed, in 10 ml of internal standard solution.

Operation Conditions

Column : HP-1(30m \times 0.32 μ m) or equivalent to this.

Detector : Flame Ionization Detector (FID)

Injector Temperature : 290°C

Column Temperature : 240~260°C

Detector Temperature : 300°C

Carrier gas : Nitrogen

System Suitability : Chromatograph a suitable number of injections of 1 mg each of d- α -Tocopherol standard and d- α -Tocopheryl Acetate standard per ml of n-hexane, as directed under calibration curve section, to ensure that the resolution [R] is not less than 1.0.

Calibration Curve : Chromatograph successive 2~5 μ l portions of standard solution until the relative response factor is constant (within a range of 2%) for three consecutive injections. Measure the areas under the major peaks occurring at relative retention times of approximately 0.60 for d- α -Tocopheryl Acetate (A_s) and 1.0 for hexadecyl hexadecanoate (A_I , solvent peak excluded), and record the values as A_s and A_I , respectively.

A relative response factor "F" for each concentration of each standard solution is obtained from the following equation.

$$F = \frac{A_s}{A_I} \times \frac{C_I}{C_s}$$

C_I : Exact concentration of internal standard solution (mg/ml)

C_s : Exact concentration of d- α -Tocopheryl Acetate standard solution (mg/ml)

Procedure : Chromatograph 2~5 μ l of test solution as described under calibration curve section. Measure the areas under the major peaks occurring at relative retention times of approximately 0.60 for d- α -Tocopheryl Acetate and 1.0 for hexadecyl hexadecanoate, and record the values as a_u and a_I , respectively. Calculate the content of d- α -Tocopheryl Acetate (mg) in the sample by the following equation.

$$\text{d-}\alpha\text{-Tocopheryl Acetate (\%)} = \frac{10C_I}{F} \times \frac{a_u}{a_I} \times \frac{100}{\text{Weight of sample (mg)}}$$

420. Magnesium Gluconate

Chemical Formula $C_{12}H_{22}MgO_{14}$, $C_{12}H_{22}MgO_{14} \cdot 2H_2O$

Molecular Weight anhydrous: 414.60, dihydrate: 450.63

Definition Magnesium Gluconate occurs as anhydrous, the dihydrate, or a mixture of both.

Compositional Specifications of Magnesium Gluconate

Content Magnesium Gluconate, when calculated on the dried basis(anhydrous), should contain within a range of 98.0~102.0% of Magnesium Gluconate ($C_{12}H_{22}MgO_{14}$)

Description Magnesium Gluconate occurs as a white to grey powder or granule. It is odorless.

Identification (1) Magnesium Gluconate solution (1→20) responds to the test for Magnesium Salt.

(2) Magnesium Gluconate is dissolved in water, heating in a water bath at 60°C if necessary, to obtain a test solution containing 10 mg/ml. 5 μ l each of test solution and reference solution are applied on thin layer chromatographic plate coated with a 0.25 mm layer of silica gel. Develop the chromatogram in a solvent system until the solvent front has moved three-fourths of the length of the plate. Remove the plate from the developing bath, dry it at 110°C for 20 min, and allow to cool. After spraying with colorizing reagent, the plate is heated at 110°C for 10 min. The principal spot obtained from the test solution should correspond in R_f value, color, and size to that obtained from the reference solution.

Reference Solution: Prepare 10 mg/ml of Magnesium Gluconate standard as described for the test solution.

Developing Solvent: Ethyl alcohol: water: ammonium hydroxide: ethyl acetate (50:30:10:10)

Colorizing reagent: Dissolve 2.5 g of ammonium molybdate in about 50 ml of 2N sulfuric acid, add 1.0 g of ceric sulfate, swirl to dissolve, and dilute with 2N sulfuric acid to make 100 ml.

Purity (1) Lead : Transfer 10 g of Magnesium Gluconate, precisely weighed, into a crucible or a platinum dish. Add 5 ml of 25% sulfuric acid cautiously and mix well, which is then evaporated to dryness on a steam bath. Place the dish on a heating plate, preash slowly until most of sulfuric acid disappears, and then ash at 450~550°C. Repeat the above mentioned procedure when ashing is insufficient. Prepare sample blank by ashing 5 ml of 25% sulfuric acid under the same method. After

ashing, add 5 ml of 1N hydrochloric acid and dry it on a steam bath. Add 1 ml of 3N hydrochloric acid and approximately 5 ml of distilled water and dissolve any residue on a steam bath. Transfer each solution quantitatively to a 10 ml volumetric flask, dilute to volume with distilled water, and mix. Dilute it if necessary. This solution is used for test solution. Separately, prepare each standard solution by adding water to 1 and 5 ml each of standard lead solution to bring the total volume to 10 ml and taking 10 ml directly from standard lead solution (1, 5, 10 ppm). When test solutions and each standard solution are tested for flame atomic absorption spectrophotometric method according to the following operation conditions, the content of lead should not be more than 2 ppm.

Standard Lead Solution : Dissolve 10 ml of standard lead stock solution for atomic absorption spectrophotometric method (100 µg/ml), accurately taken, in 10 ml of 3N hydrochloric acid and add water to bring the total volume of 100 ml (10 µg/ml).

Operation Conditions

Gas : air-acetylene

Lamp : a lead electrodeless discharge lamp (EDL)

Wavelength: 283.3 nm

A slit-width: 0.7 nm

(2) Reducing Substances : Transfer 1 g of Magnesium Gluconate, accurately weighed, into a 250 ml Erlenmeyer flask, dissolve it in 10 ml of water, add 25 ml of alkaline cupric citrate solution, and cover the flask with a small beaker. Boil gently for exactly 5 min and cool rapidly to room temperature. Add 25 ml of diluted acetic acid (1→10), 10 ml of 0.1N iodine solution, 10 ml of dilute hydrochloric acid, and 3 ml of starch solution, and titrate with 0.1N sodium thiosulfate solution until the blue color disappears. The content of reducing substances should not be more than 1.0%.

$$\text{Content of reducing substances (as glucose) (\%)} = \frac{(V_1N_1 - V_2N_2) \times 27}{\text{Weight of sample (mg)}} \times 100$$

V_1 : Volume of 0.1N iodine solution (ml)

N_1 : Normality of 0.1N iodine solution

V_2 : Volume of 0.1N sodium thiosulfate solution (ml)

N_2 : Normality of 0.1N sodium thiosulfate solution

27 : An empirically determined equivalence factor for D-glucose

(3) Water Content: Water content of Magnesium Gluconate is determined by water determination (Karl-Fischer Method) and should not be more than 3.0~12.0%. Test solution should be kept for 30 minutes to dissolve prior to titration.

Assay Dissolve 0.8 g of Magnesium Gluconate, precisely weighed, in 20 ml of water, add 5 ml of ammonia-ammonium chloride buffer and 0.1 ml of eriochrome black, and titrate with 0.05M disodium EDTA to a blue endpoint.

1 ml of 0.05 M disodium EDTA = 20.73 mg of $\text{C}_{12}\text{H}_{22}\text{MgO}_{14}$

421. *d*- α -Tocopheryl Acid Succinate

Chemical Formula $C_{33}H_{54}O_5$

Molecular Weight 530.79

Compositional Specifications of *d*- α -Tocopheryl Acid Succinate

Content *d*- α -Tocopheryl Acid Succinate ($C_{33}H_{54}O_5$) should contain within a range of 96.0~102.0% of *d*- α -Tocopheryl Acid Succinate.

Description *d*- α -Tocopheryl Acid Succinate occurs as a white to off white, crystalline powder. *d*- α -Tocopheryl Acid Succinate is miscible with chloroform, with vegetable oils, with ether, with alcohol, and with acetone; and insoluble in water.

Identification (1) Add, with swirling, 2 ml of nitric acid to 10 ml of test solution from Purity (3) specific rotation, and heat at about 75°C for 15 min. A bright-red to orange color develops.

(2) The retention time of the major peak in the chromatogram of the Test Solution is the same as that of the standard solution, both relative to the internal standard solution, as obtained in the Assay.

Purity (1) Acidity : Dissolve 1g of *d*- α -Tocopheryl Acid Succinate in 25 mL of a 1:1 alcohol:ether mixture that has been neutralized to phenolphthalein with 0.1N sodium hydroxide. Add 0.5 ml of phenolphthalein, and titrate with 0.1N sodium hydroxide until the solution remains faintly pink after shaking for 30 s. The consumed amount of the titrant should be within a range of 18.0~19.3 ml.

(2) Lead : Transfer 10 g of *d*- α -Tocopheryl Acid Succinate, precisely weighed, into a crucible or a platinum dish. Add 5 ml of 25% sulfuric acid cautiously and mix well, which is then evaporated to dryness on a steam bath. Place the dish on a heating plate, preash slowly until most of sulfuric acid disappears, and then ash at 450~550°C. Repeat the above mentioned procedure when ashing is insufficient. Prepare sample blank by ashing 5 ml of 25% sulfuric acid under the same method. After ashing, add 5 ml of 1N hydrochloric acid and dry it on a steam bath. Add 1 ml of 3N hydrochloric acid and approximately 5 ml of water and dissolve any residue on a steam bath. Transfer each solution quantitatively to a 10 ml volumetric flask, dilute to volume with water, and mix. Dilute it if necessary. This solution is used for test solution. Separately, prepare each standard solution by adding water to 1 and 5 ml each of standard lead solution to bring the total volume to 10 ml and taking 10 ml directly from standard lead solution (1, 5, 10 ppm). When test solutions and each standard solution are tested for flame atomic absorption spectrophotometric method

according to the following operation conditions, the content of lead should not be more than 2 ppm.

Standard Lead Solution : Dilute 10 ml of standard lead stock solution for atomic absorption spectrophotometric method (100 $\mu\text{g/ml}$), accurately taken, to 100 ml with water (10 $\mu\text{g/ml}$).

Operation Conditions

Gas : air-acetylene

Lamp : a lead electrodeless discharge lamp (EDL)

Wavelength: 283.3 nm

A slit-width: 0.7 nm

(3) Specific rotation

Preparation of Test Solution : Transfer an accurately weighed amount of d- α -Tocopheryl Acid Succinate, equivalent to about 200 mg of d- α -Tocopherol, into a 250 ml round-bottom, glass-stoppered flask, dissolve it in 50 mL of absolute alcohol, and reflux for 1 min. While the solution is boiling, add slowly about 1 g of potassium hydroxide pellets through the condenser to avoid overheating. Continue refluxing for 20 min, and then, without cooling, add 2 ml of hydrochloric acid, dropwise, through the condenser. (This is essential to prevent oxidative action by air while the sample is in an alkaline medium.) Cool, and transfer the contents of the flask into a 500 ml separatory funnel, rinsing the flask with 100 ml each of water and of ether and adding the rinsings to the separatory funnel. Shake vigorously, allow the layers to separate, and collect each of the two layers in separate separatory funnels. Extract the aqueous layer with two 50 ml portions of ether, and add these extracts to the main ether extract. Wash the combined ether extracts with four 100 ml portions of water, and then evaporate the solutions on a water bath or in an atmosphere of nitrogen until about 7~8 ml remain. Complete the evaporation, removing the last traces of ether at room temperature. Immediately dissolve the residue in a 1:72 mixture of 2 N sulfuric acid in ethyl alcohol to bring the total volume of 200 ml. This solution is used for the test solution.

Procedure : Transfer an accurately weighed amount of the test solution, equivalent to about 100 mg of d- α -Tocopherol, into a separatory funnel, and add 200 ml of water. Extract first with 75 ml of ether, then with two 25 ml portions of ether, and combine the ether extracts in another separatory funnel. Add 20 ml of a 10% solution of potassium ferricyanide in sodium hydroxide solution (1 \rightarrow 125) to the ether solution, and shake for 3 min. Wash the ether solution with four 50 ml

portions of water, discard the washings, and dry over anhydrous sodium sulfate. Evaporate the dried ether solution on a water bath or in an atmosphere of nitrogen until 7~8 ml remain, and then complete the evaporation, removing the last traces of ether at room temperature. Immediately dissolve the residue in 5 ml of isooctane, and determine the optical rotation. When specific rotation is measured, $[\alpha]_D^{25}$ should not be less than $+24^\circ$

Assay Test Solution and Solution Preparation

Internal Standard Solution : Prepare a solution containing about 3 mg of hexadecyl hexadecanoate in each ml of n-hexane.

Preparation of Standard Solution : Transfer about 30 mg of d- α -Tocopheryl Acid Succinate standard, precisely weighed, into an approximately 15 ml screw cap vial. Pipet 2 ml of absolute methyl alcohol, 1 ml of 2,2-dimethoxypropane, and 0.1 ml of concentrated hydrochloric acid into the vial, cap, mix well, and allow to stand in the dark for 1 h. Evaporate to dryness on a steam bath with the aid of a stream of nitrogen. Pipet 10 ml of internal standard solution into the vial, cap, and shake vigorously.

Preparation of Test Solution: Prepare as directed for the preparation of standard solution, using an precisely weighed amount of sample equivalent to about 30 mg of d- α -Tocopheryl Acid Succinate.

Operation Conditions

Column : HP-1(30m \times 0.32 μ m) or equivalent to this.

Detector : Flame Ionization Detector (FID)

Injector Temperature : 290 $^\circ$ C

Column Temperature : 260~280 $^\circ$ C isothermally

Detector Temperature : 300 $^\circ$ C

Carrier gas : Nitrogen

System suitability : Chromatograph a suitable number of injections of 1 mg each of d- α -Tocopherol standard and d- α -Tocopheryl Acid Succinate standard per ml of n-hexane, as directed under calibration curve section, to ensure that the resolution [R] is not less than 1.0.

Calibration Curve : Chromatograph successive 2~5 μ l portions of standard solution

until the relative response factor is constant (within a range of 2%) for three consecutive injections. Measure the areas under the major peaks occurring at relative retention times of approximately 1.99 for methyl α -Tocopheryl Succinate (A_s) and 1.0 for hexadecyl hexadecanoate (A_I) and record the values as A_s and A_I , respectively.

A relative response factor "F" for each concentration of each standard solution is obtained from the following equation.

$$F = \frac{A_s}{A_I} \times \frac{C_I}{C_s}$$

C_I : Exact concentration of internal standard solution (mg/ml)

C_s : Exact concentration of d- α -Tocopheryl Acid Succinate standard solution (mg/ml)

Procedure : Chromatograph 2~5 μ l of the test solution as described under calibration curve section. Measure the areas under the major peaks occurring at relative retention times of approximately 1.99 for methyl α -Tocopheryl Succinate and 1.0 for hexadecyl hexadecanoate, and record the values as a_u and a_I , respectively. Calculate the content of d- α -Tocopheryl Acid Succinate (%) in the sample by the following equation.

$$\text{d-}\alpha\text{-Tocopheryl Acid Succinate (\%)} = \frac{10C_I}{F} \times \frac{a_U}{a_I} \times \frac{100}{\text{Weight of sample (mg)}}$$

422. Magnesium L-Lactate

Magnesium di-L-lactate

Chemical Formula $\text{Mg}(\text{C}_3\text{H}_5\text{O}_3)_2 \cdot 2\text{H}_2\text{O}$

Molecular Weight 238.48

Compositional Specifications of Magnesium L-Lactate

Content Magnesium L-Lactate, when calculated on the dried basis, should contain within a range of 97.5~101.5% of Magnesium L-Lactate($\text{Mg}(\text{C}_3\text{H}_5\text{O}_3)_2$).

Description Magnesium L-Lactate occurs as white crystalline powder.

Identification (1) Magnesium L-Lactate is soluble in water when shaking for more than 30 min; and insoluble in ethanol.

(2) Magnesium L-Lactate responds to the test for Magnesium Salt and Lactate in identification.

Purity (1) Specific Rotation : After drying, approximately 5 g of Magnesium L-Lactate is precisely weighed, which is dissolved in water to bring the total volume to 100 ml. Optical rotation of this solution should be within a range of $[\alpha_D^{25}] = -7.5 \sim -8.8^\circ$

(2) Chloride : After drying, when 1 g of Magnesium L-Lactate is tested by Chloride Limit Test, its amount should not be more than the amount that corresponds to 0.3 ml of 0.01N hydrochloric acid.

(3) Arsenic: 5ml of sulfuric acid and 5ml of nitric acid are added to 1g of Magnesium L-Lactate in a 500ml flask for decomposition, which is then heated gently. Continue heating until the liquid becomes colorless~pale yellow with adding 2~3ml of nitric acid occasionally. After cooling, add 15 ml of saturated ammonium oxalate solution, heat until white smoke appears, concentrate to 2~3ml, and neutralize with ammonia water or ammonia solution. When this solution is used as test solution by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Magnesium L-Lactate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Total Viable Aerobic Count : When Magnesium L-Lactate is tested by Microbe Test Methods for Total Viable Aerobic Count (Number of General Germs) in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 1,000 per 1 g

(6) E. coli : When Magnesium L-Lactate is tested by Microbe Test Methods for E. coli in General Test Method 「Standards and Specifications for Foods」, it should

be negative (-).

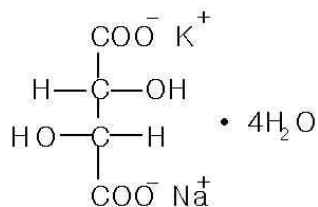
(7) Fungi : When Magnesium L-Lactate is tested by Microbe Test Methods for Fungi in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 100 per 1 g

Loss on Drying When Magnesium L-Lactate is dried at 120°C for 24 hr, the weight loss should be within a range of 14.0~17.0%.

Assay Dissolve about 0.5g of Magnesium L-Lactate, previously dried and accurately weighed, in 25ml of water. Add 5ml of ammonia-ammonium chloride buffer and 0.1ml of eriochrome black, and titrate with 0.05M EDTA solution until the solution is blue in color.

1 ml of 0.05M EDTA solution = 10.12 mg $\text{Mg}(\text{C}_3\text{H}_5\text{O}_3)_2$

423. Potassium Sodium L-Tartrate



Chemical Formula $\text{C}_4\text{H}_4\text{KNaO}_6 \cdot 4\text{H}_2\text{O}$

Molecular Weight 282.23

Compositional Specifications of Potassium Sodium L-Tartrate

Content Potassium Sodium L-Tartrate, when calculated on the dried basis, should contains no less than 99.0% of Potassium Sodium L-Tartrate($\text{C}_4\text{H}_4\text{KNaO}_6$)

Description Potassium Sodium L-Tartrate occurs as colorless crystals or as a white crystal, crystalline powder.

Identification (1) 1 g of Potassium Sodium L-Tartrate is soluble in 1 ml of water; and insoluble in ethanol.

(2) Potassium Sodium L-Tartrate responds to the test for Sodium Salt, Potassium Salt, and Tartrate in identification.

Purity (1) pH: When Potassium Sodium L-Tartrate proceeds as directed under glass electrode method, pH of Potassium Sodium solution (1→10) should be within a range of 6.5~7.5.

(2) Oxalic acid : When 2 ml of calcium chloride solution and several drops of dilute acetic acid are added to 10 ml of an aqueous solution (1→10) of Potassium Sodium L-Tartrate, the solution should be clear within 1 hour.

(3) Arsenic: 5ml of sulfuric acid and 5ml of nitric acid are added to 1g of Potassium Sodium L-Tartrate in a 500ml flask for decomposition, which is then heated gently. Continue heating until the liquid becomes colorless~pale yellow with adding 2~3ml of nitric acid occasionally. After cooling, add 15 ml of saturated ammonium oxalate solution, heat until white smoke appears, concentrate to 2~3ml, and neutralize with ammonia water or ammonia solution. When this solution is used as test solution by Arsenic Limit Test, its content should not be more than 4 ppm.

(4) Lead : When 5.0 g of Potassium Sodium L-Tartrate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(5) Mercury :When Potassium Sodium L-Tartrate is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.

Loss on Drying When Potassium Sodium L-Tartrate is dried for 3 hr at 150°C, the weigh loss should be within a range of 21.0~26.0%.

Assay Dissolve 0.5g of Potassium Sodium L-Tartrate, previously dried and accurately weighed, in 50 ml of glacial acetic acid, 30 ml of 96% formic acid, and 45 ml of anhydrous acetic acid by warming until the solution is dissolved completely. Titrate with 0.1N perchloric acid solution until the solution is green in color(Indicator: crystal violet-glacial acetic acid solution). Perform blank test with the same method separately.

1 ml of 0.1N perchloric acid solution = 14.11 mg $\text{C}_4\text{H}_4\text{KNaO}_6 \cdot 4\text{H}_2\text{O}$

424. Synthetic Flavoring Substances

Definition There are synthetic flavoring substances for flavorings as follows. However, This list contains more than 2 types of the mixed substances with the methods. This methods do not produce the chemical change.

Order	General Name	Synonyms
A001	Acetal	Ethylidene diethyl acetal; acetaldehyde diethyl acetal; diethyl acetal; 1,1-Diethoxyethane; Ethylidene diethyl ether; 1,1-Diethoxyethane
A002	Acetaldehyde	Acetic aldehyde; Ethanal; Ethyl aldehyde
A003	Acetaldehyde butyl phenethyl acetal	2-Butoxy-2-phenylethoxy-ethane; 1-Butoxy-1-(2-phenylethoxy)ethane
A004	Acetaldehyde diisoamyl acetal	Butane, 1,1'-[ethylidenebis(oxy)]bis[3-methyl]-, 3-Methyl-1-[1-(3-methyl-butoxy)-ethoxy]-butane
A005	Acetaldehyde ethyl cis-3-hexenyl acetal	Ethyl cis-3-hexenyl acetal; cis-1-(ethoxyethoxy)-3-hexene; 1-Ethoxy-1-(cis-3-hexenyloxy)ethane, Leaf acetal; Leaf alcohol ethyl acetal; Acetaldehyde ethyl (Z)-3-hexenyl acetal; 1-Ethoxy-1-(3-hexenyloxy)ethane; Acetaldehyde ethyl 3-hexenyl acetal
A006	Acetaldehyde phenethyl propyl acetal	Benzene, 2-(1-propoxyethoxy)ethyl; Acetal R; pepital; 1-Phenethoxy-1-propoxy-ethane; Propyl phenethyl acetal; 2-(1-Propoxyethoxy)ethyl]benzene
A007	Acetamide	Acetic acid amide; Acetimidic acid; Ethanamide; Ethanamidic acid; Methanecarboxamide
A008	Acetanisole	Methyl 4-methoxyphenyl ketone; 4-Acetylanisole; p-Acetyl anisole; p-Methoxy-acetophenone; Navatone; 1-(4-Methoxyphenyl)ethanone; 4-Methoxyacetophenone
A009	Acetoin	Acetyl methyl carbinol; 2,3-Butanolone; Dimethylketol; 3-Hydroxy-2-butanone; γ -hydroxy- β -oxobutane; 3-Hydroxybutan-2-one; Acetoin

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Order	General Name	Synonyms
A010	Acetophenone*	Acetylbenzol; Phenyl methyl ketone; Benzoylmethide; Acetyl benzene; Hypnone; Methyl phenyl ketone; 1-Phenylethanone
A011	2-Acetoxy-3-butanone	1-Methyl-2-oxopropyl acetate; sec-Butan-3-onyl acetate; Acetoin acetate; acetyl methyl carbonyl acetate; 2-Butanon-3-yl acetate; 2-Acetoxy-3-butanone
A012	6-Acetoxydihydrotheaspirane	(2 <i>RS</i> ,5 <i>SR</i> ,6 <i>SR</i>)-2,6,10,10-Tetramethyl-1-oxaspiro[4,5]dec-6-yl acetate; 2,6,10,10-Tetramethyl-1-oxaspiro(4.5)dec-6-yl acetate
A013	4-(p-Acetoxyphenyl)-2-butanone	4-(p-Hydroxyphenyl)-2-butanone acetate; 4-(3-Oxobutyl)phenylacetate; p-(2-Acetylethyl)phenylacetate; 4-(4-Acetoxyphenyl)butan-2-one
A014	2-Acetyl-1-methylpyrrole	1-Methyl-2-acetylpyrrole; methyl 1-methylpyrrol-2-yl ketone; 1-methylpyrrol-2-yl methyl ketone; 2-acetyl-n-methyl pyrrol
A015	2-Acetyl-1-pyrroline	
A016	3-Acetyl-2,5-dimethylfuran	2,5-Dimethyl-3-acetyl furan
A017	4-Acetyl-2,5-dimethylfuran-3(2H)-one	4-Acetyl-2,5-dimethyl-3(2H)-furanone
A018	3-Acetyl-2,5-dimethylthiophene	2,5-Dimethyl-3-acetylthiophene; Ethanone, 1-(2,5-dimethyl-3-thienyl)-; 2,5-Dimethyl-3-thienyl methyl ketone
A019	4-Acetyl-2-methylpyrimidine	Ethanone, 1-(2-methyl-4-pyrimidinyl)-
A020	2-Acetyl-2-thiazoline	2-Acetyl-4,5-dihydrothiazole; acetylthiazoline-2; Acetyl thiazoline-2; 2-Acetyl-4,5-dihydrothiazole
A021	2-Acetyl-3,(5 or 6)-dimethylpyrazine	3-Acetyl-2,5-dimethylpyrazine; 2-Acetyl-3,5-dimethylpyrazine and 3-acetyl-2,5-dimethylpyrazine; 3-Acetyl-2,5-dimethylpyrazine and 3-acetyl-2,6-dimethylpyrazine mixture
A022	2-Acetyl-3,5-dimethylfuran	1-(3,5-Dimethyl-2-furanyl)ethanol; 5-Dimethyl-2-furyl methyl ketone

Order	General Name	Synonyms
A023	2-Acetyl-3-ethylpyrazine	2-Acetyl-3-ethyl-1,4-diazine; 3-Ethyl-2-pyrazinyl methyl ketone; 2-Ethyl-3-pyrazinyl methyl ketone
A024	2-Acetyl-3-methylpyrazine	Ethanone, 1-(3-Methylpyrazinyl)-; 1-(3-Methylpyrazinyl)ethan-1-one; 2-Methyl-3-acetylpyrazine; 3-Acetyl-2-methylpyrazine; Ketone, methyl 3-methylpyrazinyl; 2-Acetyl-3-methyl-1,4-diazine
A025	2-Acetyl-5-methylfuran	Ethanone, 1-(5-Methyl-2-furanyl)-; 1-(5-Methyl-2-furyl)ethanone; Methyl 5-methyl-2-furyl ketone; 1-(3-Methyl-2-furyl)ethanone
A026	4-Acetyl-6-tert-butyl-1,1-dimethylindan	Celestolide; Crysolide; Ethanone, 1-[6-1,1-Dimethylethyl)-2,3-dihydro-1,1-dimethyl- 1H-indane; 4-Acetyl-6-(1,1-dimethylethyl)-1,1-dimethylindane; 4-Acetyl-6-tert-butyl-1,1-dimethylindane; Celestolide; 4-Acetyl-1,1-dimethyl-6-tert-butylindane
A027	3-(Acetylmercapto)hexyl acetate	3-Acethylthiohexyl acetate; 3-Acetylthiohexyl ethanoate
A028	2-Acetylpyrazine	Acetylpyrazine; Methylpyrazinyl ketone; 2-Acetylpyrazine
A029	acetylpyridine	2-Acetylpyridine; Methyl-2-pyridyl ketone; 2-Acetopyridine
A030	3-Acetylpyridine	Methyl pyridyl ketone; Methyl β -pyridyl ketone; 1-(3-Pyridinyl)ethanone; β -Acetylpyridine; Methyl-3-pyridyl ketone
A031	2-Acetylthiazole	2-Thiazolyl methyl ketone; Methyl-2-thiazolyl ketone; 5-Acetyl thiazole; methyl-5- thiazolyl ketone; 1-(Thiazol-2-yl)ethan-1-one; Ethanone, 1-(2-thiazolyl)-; 2-Thiazolyl methyl ketone
A032	Aconitic acid	2-Carboxyglutaconic acid; 1,2,3-Propenetricarboxylic acid; Achilleic acid; Citridic acid; equisetic acid; 1-Propene-1,2,3-tricarboxylic acid; Prop-1-ene-1,2,3-tricarboxylic acid; Aconitic acid
A033	Adenosine monophosphate	Adenosine 5'-monophosphate sodium salt; ; Mono- or Disodium adenylate
A034	Aldehyde C ₁₆	Ethyl methylphenylglycidate; Ethyl α,β -epoxy- β -methyl-hydrocinnamate; Ethyl

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Order	General Name	Synonyms
		α,β epoxy- β -methylphenyl propionate; Ethyl 2,3-epoxy-3-phenyl-butanoate; 3-Methyl-3-phenyl glycidic acid ethyl ester; Ethyl 2,3-epoxy-3-methyl-3-phenylpropionate; Ethyl 2,3-epoxy-3-phenylbutyrate; Ethyl 3-methyl-3-phenylglycidate
A035	Allyl 10-undecenoate	2-Propenyl 10-undecenoate; Allyl hendecenoate; Allyl undecylenate; allyl undecylenoate; Allyl 10-undecylenate
A036	Allyl 2-ethylbutyrate	2-Propenyl furan-2-ethylbutanoate; 2-Propenyl 2-ethylbutyrate; Allyl 2-ethylbutanoate; 2-Propenyl 2-ethylbutanoate
A037	Allyl 2-furoate	Allyl furan-2-carboxylate; Allyl pyromucate; 2-Furancarboxylic acid; 2-Propenyl ester; 2-Propenyl 2-furoate; 2-Propenyl furan-2-carboxylate
A038	Allyl α -ionone	Allyl ionone; Allyl cyclocitryllideneacetone; Butenyl α -cyclocitrylidenemethyl ketone; α -Cyclocitrylidenemethyl butenyl ketone; 1-(2,6,6-Trimethyl-2-cyclohexen-1-yl)-1,6-heptadiene-3-one; α -Allylionone
A039	Allyl anthranilate	2-Propenyl anthranilate; 2-Propenyl 2-aminobenzoate; Allyl 2-aminobenzoate; Allyl o-aminobenzoate; Vinyl carbinyl anthranilate
A040	Allyl butyrate	Butenoic acid, 2-propenylester; 2-Propen-1-yl butenoate, 2-Propenyl butyrate; Allyl butanoate; Allyl-n-butyrate; Vinyl carbinyl butyrate
A041	Allyl cinnamate	Vinyl carbinyl cinnamate; Cinnamic acid, allyl ester; 2-propen-1-yl 3-phenyl-2-propenoate; Allyl 3-phenylpropenoate; Allyl β -phenylacrylate; propenyl cinnamate; 2-Propenyl 3-phenyl-2-propenoate; Allyl- β -phenylacrylate; Propenyl cinnamate
A042	Allyl crotonate	2-Butenoic acid, 2-propenyl ester; Crotonic acid, allyl ester

Order	General Name	Synonyms
A043	Allyl cyclohexaneacetate	Allyl cyclohexylacetate; 2-Propenyl cyclohexaneacetate; 2-Propen-1-yl cyclohexaneacetate
A044	Allyl cyclohexanebutyrate	Allyl 4-cyclohexylbutyrate; 2-Propen-1-yl cyclohexanebutyrate; Allyl hexahydrophenylbutyrate; Allyl cyclohexyl-n-butyrate, 2-propenyl 4-cyclohexylbutyrate
A045	Allyl cyclohexanehexanoate	Allyl 6-cyclohexanehexanoate; 2-Propen-1-yl cyclohexanecaproate; allyl hexahydrophenylhexanoate, 2-propenyl 6-cyclohexanehexanoate; Allyl cyclohexylcaproate; Allyl cyclohexylcaproate; Allyl 3-cyclohexylhexanoate; Allyl cyclohexanecaproate
A046	Allyl cyclohexanepropionate*	Allyl cyclohexylpropionate; Allyl 3-cyclohexylpropionate; Allyl β-cyclohexylpropionate; 2-propen-1-yl cyclohexanepropionate; Allyl hexahydrophenylpropionate
A047	Allyl cyclohexanevalerate	Allyl 5-cyclohexylpentanoate; Allyl cyclohexanepentanoate; 2-Propen-1-yl cyclohexanevalerate; 2-Propen-1-yl cyclohexanepentanoate; Allyl hexahydrophenylvalerate; Allyl cyclohexylvalerate; 2-Propenyl 5-cyclohexanepentanoate
A048	Allyl disulfide	Diallyl disulfide; 2-Propenyl disulphide
A049	Allyl heptanoate	Allyl enanthate; Allyl heptylate; Allyl heptoate; Allyl oenanthate; 2-Propenyl heptanoate
A050	Allyl hexanoate*	Allyl caproate; Allyl capronate; 2-Propenyl hexanoate
A051	Allyl isothiocyanate*	2-Propenyl isothiocyanate; Allyl thiocarbonimide; Allyl isosulfocyanate; Allinat(H&R); 3-Isothiocyanatopropene; Isothiocyanic acid, allyl ester
A052	Allyl isovalerate	Allyl isovalerianate; Allyl isopentanoate; 2-Propenyl 3-methylbutanoate; 2-Propenyl isovalerate; 2-propenyl isopentanoate; Allyl 3-methylbutanoate

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Order	General Name	Synonyms
A053	Allyl mercaptan	Allyl sulfhydrate; Allylthiol; 2-Propene-1-thiol; 2-Propene-1-thiol
A054	Allyl methyl disulfide	Methyl allyl disulfide; Methyl allyl disulphide
A055	Allyl methyl trisulfide	Methyl allyl trisulfide; Methyl allyl trisulphide
A056	Allyl nonanoate	2-Propenyl nonanoate; Allyl nonylate; 2-Propenyl pelargonate; Allyl pelargonate
A057	Allyl octanoate	2-Propenyl octylate; 2-Propenyl octanoate; Allyl caprylate; Allyl octylate
A058	Allyl phenoxyacetate	2-propenyl phenoxyacetate; Acetic acid, phenoxy, allyl ester; Acetate PA
A059	Allyl phenylacetate	Acetic acid, phenyl, allyl ester, 2-propenyl phenylacetate; Allyl α -toluate
A060	Allyl propionate	2-Propenyl propanoate; Allyl propanoate
A061	Allyl propyl disulfide	Disulfide, 2-propenyl propyl; Disulfide, allyl propyl; 2-Propenyl propyl disulfide, 4,5-dithia-1-octene; Propyl allyl disulfide
A062	Allyl sorbate	2-Propenyl 2,4-hexadienoate; Allyl-2,4-hexadienoate, 2-propenyl sorbate; Allyl hexa-2,4-dienoate
A063	Allyl sulfide	2-Propenyl sulfide; Diallyl sulfide; Thioallyl ether; 2-Propenyl sulfide,3,3'-thiobispropene; 2-Propenyl sulphide
A064	Allyl thiohexanoate	Hexanethioic acid, S-2-propenyl ester
A065	Allyl thiopropionate	Thioallyl ester, Propionic acid; Thioacrylic ester, thiopropionic acid, allyl ester
A066	Allyl tiglate	Allyl 2-methylcrotonate; Allyl-trans-2,3-dimethylacrylate; Allyl-trans-2-methyl-2-butenate; 2-propenyl tiglate
A067	Allyl valerate	Pentanoic acid, 2-propenyl ester; Valeric acid, allyl ester; Allyl pentanoate
A068	4-Allyl-2,6-dimethoxyphenol	4-Allylsyringol; 6-Methoxy eugenol; Phenol, 2,6-dimethoxy-4-(2-propenyl)-; 4-Methoxyeugenol
A069	4-Allylphenol	Phenol, 4-(2-propenyl)-; Chavicol; Phenol, <i>p</i> -allyl; 3-(<i>p</i> -Hydroxyphenyl)-1-propene; <i>p</i> -Hydroxyallylbenzene; <i>p</i> -Allylphenol

Order	General Name	Synonyms
A070	1-Amino-2-propanol	Isopropanolamine; (RS)-1-Amino-2-propanol; DL-1-Amino-2-propanol; α -Aminoisopropyl alcohol; β -Aminoisoproanol; 1-Amino-2-hydroxypropane; 1-Methyl-2-aminoethanol; 2-Hydroxy-1-methylethanol; 2-Hydroxy-1-propylamine threamine
A071	2-Aminoacetophenone	1-Acetyl-2-aminobenzene; o-Acetylaniline; 2-Acethylalanine; 2-Acethylphenylamine; o-Aminoacetophenone; o-Aminoacetylbenzene; 2-Aminophenyl methyl ketone; o-Aminophenyl methyl ketone; Methyl 2-aminophenyl ketone
A072	Ammonium isovalerate	Isovaleric acid, ammonium salt; Ammonium isovalerianate; Ammonium 3-methylbutanoate; Butanoic acid, 3-methyl-, ammonium salt
A073	Amonium sulfide	Diammonium sulfide; Ammonium monosulfide
A074	Amyl 2-furoate	Amyl furan-2-carboxylate; Furancarboxylic acid, pentyl ester; Pentyl furan-2-carboxylate; Pentyl-2-furoate; 2-Furoic acid; n-Pentyl furan-2-carboxylate
A075	Amyl alcohol	n-Butyl carbinol; 1-Pentanol; pentyl alcohol
A076	N-Amyl butyrate	Amyl butanoate; Pentyl butanoate; Pentyl butylrate; Amyl butyrate
A077	N-Amyl formate	Amyl formate; Amyl methanoate; n-Pentyl methanoate; Pentyl formate
A078	N-Amyl heptanoate	Pentyl heptanoate; Amyl heptanoate; Amyl heptylate; Amyl heptoate; Amyl oenanthate,
A079	N-Amyl hexanoate	Amyl caproate; Amyl hexylate; pentyl hexanoate; n-Pentyl hexanoate; Amyl hexanoate; Pentyl caproate
A080	Amyl methyl disulfide	Disulfide,methyl pentyl; 1-Methyldisulfanylpentane; 2,3-Dithiaoctane
A081	N-Amyl octanoate	Pentyl octylate; Amyl caprylate; Amyl octylate; pentyl octanoate; n-Pentyl octylate; Amyl octanoate

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Order	General Name	Synonyms
A082	2-Amyl-(5 or 6)-keto-1,4-dioxane	2-Pentyl-5 or 6-keto-1,4-dioxane; 1,4-Dioxan-2-one, 5(or 6)-pentyl-5(or 6)-pentyl-1,4-dioxan-2-one; 5(or 6)-Pentyl-1,4-dioxan-2-one; 5-Pentyl-1,4-dioxan-2-one
A083	α -Amylcinnamaldehyde*	Buxine; α -Pentyl- β -phenylacrolein; Flomine; Jasmine aldehyde; Floxine; Jasmonal; flosal; Amyl cinnamal; Amyl cinnamic aldehyde; α -Amyl- β -phenyl-acrolein; 2-Benzylidene heptanal; α -Pentyl-cinnamaldehyde; α -Amylcinnamaldehyde
A084	α -Amylcinnamaldehyde dimethyl acetal	α -n-Amylcinnamal, dimethyl acetal; α -Pentylcinnamaldehyde, dimethyl acetal; α -n-Amyl- β -phenylacroleindimethylacetal; 1,1-Dimethoxy-2-amyl-3-phenyl-2-propene; 1,1-Dimethoxy-2-benzylidene-heptane; (2-(Dimethoxymethyl)-1-heptenyl)benzene, α -amyl- β -phenylacrolein dimethyl acetal; 1,1-Dimethoxy-2-benzylideneheptane; α -Pentylcinnamaldehyde dimethyl acetal
A085	α -Amylcinnamyl acetate	Ammyl cinnamyl acetate; Acetic acid, α -amylcinnamyl ester; α -n-Amyl- β -phenylacryl acetate; Floxin acetate; α -Pentylcinnamyl acetate; 2-(Phenylmethylene)heptyl acetate
A086	α -Amylcinnamyl alcohol	2-Benzylideneheptanol; n-Amyl cinnamic alcohol; 2-Amyl-3-phenyl-2-propen-1-ol; 2-Benzylidene-heptanol; α -Pentylcinnamyl alcohol; 2-Phenyl-3-phenylprop-2-en-1-ol
A087	α -Amylcinnamyl formate	α -n-Amyl- β -phenylacryl formate; α -Pentylcinnamyl formate; 2-(Phenylmethylene)heptyl formate; α -Amyl- β -phenylacryl formate; α -n-Amyl-phenylacryl formate
A088	α -Amylcinnamyl isovalerate	α -Amylcinnamyl isovalerianate; α -n-Amyl- β -phenylacryl 3-methylbutanoate; α -n-Amyl- β -phenylacryl isovalerate; Floxin isovalerate; α -Pentylcinnamyl isovalerate; 2-(Phenylmethylene)heptyl isovalerate; α -Amyl- β -phenylacryl

Order	General Name	Synonyms
A089	trans-Anethole	isovalerate; α -Amylcinnamyl 3-methylbutyrate; Isovalerate trans-Methoxy-4(1-propenyl benzene; Anise camphor; 1-Methoxy-4-propenylbenzene; estragole iso; 1-Propene, 1-(4-methoxyphenyl); p-Methoxy- α -phenylpropene; Isoestragole; 1-Methoxy-4-propenyl benzene; p-Methoxypropenyl benzene; p-Propenyl anisole; p-Propenylphenyl methyl ether; 4-Methoxy-1-propenylbenzene; p-Methoxy- α -phenylpropene
A090	O-Anisaldehyde*	Benxaldehyde, 2-methoxy; 2-Anisaldehyde; 2-Methoxybenzaldehyde; 2-Methoxybenzenecarboxaldehyde; 2-Methoxyphenylformaldehyde; O-Formylanisole; O-Methoxybenzaldehyde; Salicylaldehyde methyl ether
A091	Anisole	Phenyl methyl ether; Benzene, methoxy; Methoxybenzene; Methyl phenyl ether
A092	Anisyl acetate	Benzyl alcohol, p-methoxy, acetate; Anisyl alcohol, acetate; 4-Methoxybenzyl acetate; cassi ketone; p-Anisyl acetate; p-Methoxybenzyl acetate; 1-Methoxy-4-acetoxymethylbenzene; Benzenemethanol, 4-methoxy-, acetate
A093	Anisyl alcohol	Benzyl alcohol, p-methoxy; Anise alcohol; p-Anisyl alcohol; Anisic alcohol; p-Methoxybenzyl alcohol; 4-Methoxybenzyl alcohol
A094	Anisyl butyrate	Butyric acid, p-methoxybenzyl ester; Butanoic acid, p-methoxybenzyl ester; Benzyl alcohol, p-methoxy, butyrate; p-Anisyl butyrate; p-Methoxybenzyl butyrate; 4-Methoxybenzyl butanoate; Anisyl butanoate
A095	Anisyl formate	p-methoxybenzyl alcohol, formate; Anisyl methanoate; 4-methoxybenzyl formate; p-Methoxybenzyl methanoate; Anisyl alcohol, formate; p-Anisyl formate; p-Methoxybenzyl formate; Benzenemethanol, 4-methoxy-, formate
A096	Anisyl phenylacetate	Anisyl α -toluate; Benzenacetic acid, (4-methoxyphenyl)methyl ester; p-Methoxybenzyl phenylacetate; Phenylacetic acid p-methoxybenzyl ester;

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Order	General Name	Synonyms
		4-Methoxybenzyl phenylacetate, Anisyl α-toluene
A097	Anisyl propionate	Benzyl alcohol p-methoxy, propionate; Propionic acid, p-methoxybenzyl ester; p-Anisyl propionate; p-Methoxybenzyl propionate; 4-Methoxybenzyl propanoate; Anisyl propanoate; Benzenemethanol; 4-Methoxy-, propionate
A098	Acetol acetate	2-Propanone, 1-hydroxy-, acetate; Acetonyl acetate; Acetoxyacetone; Acetoxypropanone; Acetylmethyl acetate; O-Acetylacetol; 1-Acetoxy-2-propanone; 1-Acetoxyacetone; 1-Hydroxy-2-propanone acetate; 2-Oxopropyl acetate; 1-(Acetyloxy)-2-propanone; acetoxy-2-propanone
A099	Amyl propionate	Propanoic acid, pentyl ester; Propionic acid, pentyl ester; n-Pentyl propionate; Pentyl propanate; Pentyl propionate; n-Pentyl propanoate; Amyl propanoate; N-Amyl n-propionate; pentyl propanoate
A100	Amyl isothiocyanate	Pentyl isothiocyanate; n-Amyl isothiocyanate; Pentane, 1-isothiocyanato-; 1-Isouthiocyanatopentane
A101	4-Acetylpyridine	Ketone, methyl 4-pyridyl; Methyl 4-pyridyl ketone; 4-Pyridyl methyl ketone; Pyridine, 4-acetyl-; γ-Acetylpyridine; 1-(4-Pyridinyl)ethanone
A102	Amyl benzoate	n-Pentyl benzoate; Pentyl benzoate; Benzoic acid, amyl ester; n-amyl benzoate
A103	Amyl salicylate	Benzoic acid, 2-hydroxy-, pentyl ester; Salicylic acid, pentyl ester; Pentyl salicylate; Amylester kyseliny salicylove; N-Amyl salicylate; Salicylic acid, amyl ester
A104	Amyl valerate	Valeric acid, pentyl ester; Amyl valerianate; Pentyl pentanoate; Pentyl valerate; 1-Pentyl n-valerate; n-Pentyl valerate; Pentyl ester of pentanoic acid; N-Amyl N-valerate
A105	Amyl cinnamate	2-Propenoic acid, 3-phenyl-, pentyl ester; Cinnamic acid, pentyl ester; Pentyl cinnamate; Pentyl (2E)-3-phenyl-2-propenoate; n-amyl cinnamate

Order	General Name	Synonyms
A106	Amyl decanoate	Pentyl decanoate
A107	Amyl lactate	Lactic acid, pentyl ester; Pentyl 2-hydroxypropanoate; Pentyl lactate
A108	Allyl methyl sulfide	1-Propene, 3-(methylthio)-; Methyl allyl sulfide; 3-(Methylthio)propene; 3-(Methylsulfanyl)-1-propene; 3-(methylthio)-1-propene; methyl 2-propenyl sulfide; Methylallyl sulphide; Sulfide, allyl methyl
A109	Amyl isovalerate	Butanoic acid, 3-methyl-, pentyl ester; Isovaleric acid, pentyl ester; Pentyl 3-methylbutyrate; 1-Pentyl isovalerate; Pentyl 3-methylbutanoate; Pentyl isovalerate; N-amyl isovalerate
A110	Allyl propyl sulfide	2-propenyl propyl sulfide; 4-thia-1-heptene
A111	Allyl prop-1-enyl disulfide	
A112	Allyl propyl trisulfide	Trisulfide, allyl propyl
A113	Acetaldehyde di-cis-3-hexenyl acetal	acetaldehyde hexenyl acetal
A114	Amyl 2-methyl butyrate	N-Amyl 2-methyl butyrate; Pentyl 2-methylbutanoate; n-amyl 2-methylbutanoate; pentyl 2-methylbutyrate; Butanoic acid, 2-methyl-, pentyl ester
A115	5-Acetyl-2,3-dihydro-1,4-thiazine	acetyl dihydro thiazine
A116	Acetaldehyde 1,3-octanediol acetal	
A117	Acetaldehyde hexyl isoamyl acetal	1-Hexyloxy-1-isopentyloxyethane; Acetaldehyde hexyl 3-methylbutyl acetal; hexyl oxy isopentyloxyethane; 1-Hexyloxy-1-isopentyloxyethane
B001	Benzaldehyde*	Bitter almond oil, synthetic; Benzenecarboxaldehyde, artificial; Benzenecarbonal; Benzenemethylal; Benzoic aldehyde; Benzene methylal
B002	Benzaldehyde dimethyl acetal	Dimethoxy-(phenyl)-methane; α,α -Dimethoxy toluene; (Dimethoxymethyl)benzene; 1,1-Dimethoxy phenyl methane
B003	Benzaldehyde glyceryl acetal	Benzaldehyde, cyclic acetal with glycerol; 4-Hydroxymethyl-2-phenyl-m-dioxolane; Benzalglycerin; 5-Hydroxy-2-phenyl-1,3-dioxane; Phenyl-m-dioxan-5-ol (α , α'); 2-phenyl-1,3-dioxan-5-ol (α , α'); 5-Hydroxy-2-phenyl-1,3-dioxane;

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Order	General Name	Synonyms
		4-(Hydroxymethyl)-2-phenyl-1,3-dioxolane; 2-Phenyl-5-hydroxy-1,3-dioxane; 2-Phenyl-4-hydroxymethyl-1,3-dioxolane; 4-Hydroxy methyl-2-phenyl-1,3-dioxolan
B004	Benzaldehyde propylene glycol acetal	4-Methyl-2-phenyl-1,3-dioxolane; 4-Methyl-2-phenyl -m-dioxolane; Benzaldehyde propylene glycol cyclic acetal
B005	Benzenethiol	Phenyl mercaptan; Thiophenol
B006	2-Benzofurancarboxaldehyde	2-Formylbenzofuran
B007	Benzoin	α -Hydroxy- α -phenylacetophenone; Benzoyl phenylcarbinol; 2-Hydroxy-2-phenyl- acetophenone; 2-Hydroxy-1,2-diphenylethanone
B008	Benzophenone	Diphenylmethanone; α -Oxodiphenylmethane; phenyl ketone; Benzoyl benzene; diphenyl ketone
B009	Benzothiazole	
B010	N-Benzoylanthranilic acid	2-Benzoylaminobenzoic acid; dianthramid B; Anthranilic acid, N-benzoyl-; 2-Carboxybenzanilide; N-(2-Carboxyphenyl)benzamide
B011	Benzyl 2,3-dimethylcrotonate	Benzyl 2,3-dimethyl-2-butenate; Benzyl methyl tiglate; Benzyl 2,3-dimethyl-trans-2-butenate; Benzyl 2,3-dimethyl-2-butenate
B012	Benzyl 2-methoxyethyl acetal	benzyl methoxyethyl acetal; Acetaldehyde benzyl β -methoxyethyl acetal; 1-Benzoxo-1-(2-methoxyethoxy)-ethane; 1-Benzyl-1-(β -methoxy)-ethoxyethane; Acetaldehyde benzyl 2-methoxyethyl mixed acetal; 1-Benzyl-1-(2-methoxyethoxy)ethane; Acetaldehyde benzyl methoxyethyl acetal; 1-Benzoyl-1-(2-methoxyethoxy)ethane
B013	Benzyl acetate*	Benzyl ethanoate; Acetic acid, benzyl ester

Order	General Name	Synonyms
B014	Benzyl acetoacetate	Benzyl acetyl acetate; benzyl β -ketobutyrate; benzyl 3-oxobutanoate; Benzyl 3-oxobutyrate
B015	Benzyl alcohol*	Phenylmethyl alcohol; α -Hydroxy toluene; phenyl carbinol; Phenyl methanol
B016	Benzyl benzoate	Benzoic acid, benzyl ester; Benzyl alcohol benzoic ester; Benzyl benzene carboxylate; Benzyl henylformate; Phenylmethyl benzoate
B017	Benzyl butyl ether	Butyl benzyl ether; n-Butyl benzyl ether
B018	Benzyl butyrate	Aldehyde C-19; butyric acid, benzyl ester; Benzyl butanoate; Benzyl n-butyrate; Phenylmethyl butyrate; Benzyl n-butanoate
B019	Benzyl cinnamate	Isobutyric acid, benzyl ester; Benzyl cinnamate; Benzyl 2-methyl propanoate; Benzyl 3-phenylpropenoate; Cinnamein; Benzyl β -phenylacrylate; 2-Propenoic acid, 3-phenyl, phenylmethyl ester
B020	Benzyl disulfide	α -Benzyl dithio toluene; 1,4-Diphenyl-2,3-dithiobutane; Di(phenylmethyl)disulfide; α -(benzyl dithio)toluene; 1,4-Diphenyl-1,2,3-ithiobutane; Di(phenylmethyl)disulfide
B021	Benzyl ethyl ether	Ethyl benzyl ether
B022	Benzyl formate	Benzyl methanoate; Formic acid benzyl ester; Phenylmethyl formate
B023	Benzyl hexanoate	Hexanoic acid, Phenylmethyl ester; Hexanoic acid, benzyl ester; Benzyl caproate
B024	Benzyl isobutyrate	Benzyl cinnamate; Isobutyric acid, benzyl ester; Benzyl β -phenylacrylate; Benzyl-3-phenylpropenoate; Cinnamein; Phenylmethyl isobutyrate; Pineapple aldehyde c-19; Benzyl 2-methylpropanoate
B025	Benzyl isovalerate	Benzyl isovalerianate; Benzyl isopentanoate; Benzyl 3-methyl butyrate; Benzyl 3-methylbutanoate
B026	Benzyl mercaptan	Benzylthiol; Benzenemethanethiol; Phenylmethanethiol; α -Mercaptotoluene; Benzyl hydrosulfide; Thiobenzyl alcohol; α -Toluenthiol; Benzylmercaptan

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Order	General Name	Synonyms
B027	Benzyl methyl sulfide	Methyl benzyl sulfide; α -(Methylthio)toluene; Methylthio methyl benzene
B028	Benzyl phenylacetate	Phenylacetic acid, benzyl ester; Benzyl α -toluate; Phenylmethyl phenylacetate; Benzyl-2-phenyl ethanoate
B029	Benzyl propionate *	Propionic acid, benzyl ester; Benzyl propanoate
B030	Benzyl salicylate	Salicylic acid, benzyl ester; Benzyl o-hydroxybenzoate; Benzyl 2-hydroxybenzoate; Phenylmethyl 2-hydroxybenzoate
B031	Benzyl trans-2-methyl-2-butenolate	Benzyl tiglate; Benzyl 2-methylcrotonate; Benzyl trans-2,3-dimethyl acrylate; Benzyl trans-2-methyl crotonate; Benzyl 2-methyl-trans-2-butenolate
B032	3-Benzyl-4-heptanone	Benzyl dipropyl ketone; morellone; 1-Phenyl-2-ethyl-3-hexanone; morellone
B033	Biphenyl	Phenylbenzene, diphenyl
B034	Birch tar oil	
B035	Bis(methylthio)methane	2,4-Dithiapentane; bis(methyl mercapto)methane; Formaldehyde dimethyl dithioacetal; Formaldehyde dimethyl mercaptal; Thioformaldehyde dimethyl acetal
B036	Bisabolene	1,4(8),12-Bisabolatriene; 1-Methyl-4-(1,5-dimethyl-1,4-hexadienyl)-1-cyclohexene; β -bisabolene; 1-Methyl-4-(5-methyl-1-methylene-4-hexenyl)-1-cyclohexene; γ -bisabolene; 1-Methyl-4-(1,5-dimethyl-4-hexenylidene)-1-cyclohexene; 1-Methyl-4-(1,5-dimethyl-1,4-hexadienyl)-1-cyclohexene
B037	Borneol	Baros; d-camphanol; 2-Hydroxycamphane; camphol; Endo-2-camphanol; Endo-2-bornanol; Endo-2-hydroxycamphane; 2Hydroxybornane; 1,7,7-Trimethylbicyclo(2,2,1)heptan-2-ol; 2-Bornanol; Borneo camphor; Bornyl alcohol; 2-Camphanol; Baros camphor
B038	Bornyl acetate	Borneol acetate; 2-Camphanyl acetate; l-Bornyl acetate; d-bornyl acetate; Bornyl acetic ether; Bornyl ethanoate; endo-2-bornyl acetate

Order	General Name	Synonyms
B039	L-Bornyl acetate	(1S-endo)-1,7-Trimethylbicyclo[2.2.1]heptan-2-ol acetate; Bicycol[2.2.1]heptan-2-ol, 1,7,7-trimethyl-, acetate, (1S,2R,4S)-; (-)-Bornyl acetate
B040	Bornyl butyrate	Bornyl butanoate; Butanoic acid,1,7,7-trimethylbicyclo[2.2.1]hept-2-yl ester endo; Butyric acid, 2-bornyl ester
B041	Bornyl formate	Borneol formate; d-Bornyl formate; Endo-2-bornanyl formate; 2-Camphanyl formate; l-Bornyl formate; Bornyl methanoate
B042	Bornyl isovalerate (endo-)	Bornyval; Bornyl isovalerianate; Bornyl-3-methylbutanoate; Bornyval; Bornyl 3-Methylpentanoate; Bornyl 3-methylbutyrate; Bornyl isopentanoate
B043	Bornyl valerate	Bornyl valerianate; Bornyl n-pentanoate; Bicyclo[2.2.1]heptan-2-ol, 1,7,7-trimethyl; Endo-bornyl n-pentanoate; Endo-2-bornyl valerate; Endo-2-camphanyl valerate; Bornyl pentanoate
B044	β -Bourbonene	
B045	Butan-2-ol	2-Butanol; 2-Hydroxybutane; Butylene hydrate; Methyl Ethyl carbinol; sec-Butyl alcohol
B046	Butan-3-one-2-yl butanoate	1-Methyl-2-oxopropyl butyrate; sec-Butan-3-onyl butyrate; Acetoxy butyrate
B047	2,3-Butanedithiol	2,3-Dimercaptobutane
B048	1,2-Butanedithiol	1,2-Dimercaptobutane
B049	1,3-Butanedithiol	1,3-Dimercaptobutane
B050	2-keto-4-Butanethiol	4-Mercapto-2-butanone; 4- Mercaptobutan-2-one
B051	1-Butanethiol	n-Butanethiol; n-Butyl mercaptan; Butyl mercaptan
B052	2-Butanone	Methyl ethyl ketone; Mek; Ketone C-4; Ethyl methyl ketone;
B053	(1-Buten-1-yl) methyl sulfide	But-1-enyl methyl sulphide; 1-Butenyl methyl sulfide

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Order	General Name	Synonyms
B054	Butter acids	
B055	Butter esters	
B056	Butyl 10-undecenoate	Butyl 10-hendecenoate; Butyl undecylenoate; Butylundec-10-enoate
B057	N-Butyl 2-methylbutyrate	Butyl 2-methylbutyrate; Butyl-2-methylbutanoate
B058	Butyl acetate *	Butyl ethanoate; n-butyl acetate
B059	Butyl acetoacetate	Butyl 3-ketobutyrate; Butyl 3-ketobutanoate; Butyl- β -ketobutyrate; Butyl 3-oxobutanoate, Butyl β -ketobutanoate
B060	Butyl alcohol	Propyl carbinol; 1-Butanol; n-Butyl alcohol, butan-1-ol; Butan-1-ol; Hydroxybutane
B061	Butyl anthranilate	Butyl-2-aminobenzoate; Butyl o-aminobenzoate; Nibutyl 2-aminobenzoate
B062	Butyl butyrate *	n-butyl n-Butanoate; Butyl butanoate
B063	Butyl butyryllactate	Butyl-O-butyryllactate; Lactic acid, butyl ester, butyrate; Butyl 2-butyryloxypropanoate, Butyl butyrolactate; 2-butoxy-1-methyl-2-oxoethyl butyrate; Butyl- α -butyroxyl propionate; Butyl 2-(propylcarboxy) propanoate
B064	Butyl cinnamate	n-Butyl phenylacrylate; Cinnamic acid, butyl ester; Butyl β -phenyl acrylate; Butyl 3-phenyl propenoate; Butyl 3-phenylpropenoate
B065	Butyl dec-2-enoate	Butyl 2-decenoate
B066	Butyl ethyl disulfide	1-Ethylbisulfanylbuthane, 3,4-Dithiaoctane
B067	sec-Butyl ethyl ether	2-Butyl ethyl ether (sec-); 2- Butyl ethyl ether; Ether, sec-butyl ethyl
B068	Butyl ethyl malonate	Ethyl butyl malonate, Butyl ethyl propanedioate
B069	Butyl formate	Butyl methanoate; n-Butyl methanoate
B070	Butyl heptanoate	Butyl heptoate; butyl heptylate; n-Butyl heptoate; n-Butyl heptyrate; n-Butyl

Order	General Name	Synonyms
		oenanthate; Butyl oenanthate
B071	Butyl hexanoate	Butyl caproate; Butyl carpronate; Butyl hexylate; n-Butyl hexanoate
B072	Butyl isobutyrate	Butyl 2-methylpropanoate; n-Butyl 2-methyl propanoate; Butyl-2-methylpropionate
B073	Butyl isothiocyanate	Isothiocyanic acid, butyl ester; 1-Isothiocyanatobutane; n-Butyl isothiocyanate; 4-Isothiocyanato-but-1-ene
B074	Butyl isovalerate	Butyl 3-methylbutanoate; Butyl isopentanoate; Butyl isovalerianate
B075	Butyl lactate	Butyl 2-hydroxypropanoate; Butyl α-hydroxypropionate; Butyl hydroxypropanoate
B076	Butyl laurate	n-Butyl dodecanoate; Butyl dodecanoate; Butyl laurate; Butyl dodecylate
B077	Butyl levulinate	Butyl acetylpropionate; Butyl 4-ketovalerate; Butyl γ-butyrolactone; Butyl 4-oxopentanoate; Butyl 4-oxovalerate; n-Butyl acetopropionate; n-Butyl γ-ketovallate; n-Butyl levulinate
B078	Butyl phenylacetate	Butyl α-toluate
B079	3-n-Butyl phthalide	3-Butylphthalide
B080	Butyl propionate	Butyl propanoate; n-Butyl propanoate
B081	Butyl salicylate	Butyl (2-hydroxyphenyl) formate; Benzoic acid; 2-hydroxy-; Butyl ester; n-Butyl o-hydroxybenzoate; n-Butyl salicylate; Butyl 2-hydroxybenzoate; Butyl (2-hydroxy-phenyl)-methanoate
B082	Butyl stearate	Butyl octadecanoate; Butyl octadecylate
B083	Butyl sulfide	Butylthiobutane; n-butyl sulfide; 1-1'-Thiobisbutane; Dibutyl sulfide; n-Butyl sulfide; Butylsulfide; Di-n-butyl sulphide
B084	Butyl valerate	n-Butylpentanoate; n-Butyl-n-valerianate; Butyl valerianate
B085	2-(2-Butyl)-4,5-dimethyl-3-thiazoline	2-(sec-Butyl)-4,5-dimethyl-3-thiazoline;

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Order	General Name	Synonyms
		2,5-Dihydro-4,5-dimethyl-2-(1-methylpropyl)-thiazole; 2-(1-Methylpropyl)-4,5-dimethyl-3-thiazoline; 2,5-Dihydro-4,5-dimethyl-2-but-2-yl thiazole
B086	2-(sec-Butyl)cyclohexanone	ortho-sec-Butylcyclohexanone; Freskomenthe; 2-(1-Methylpropyl)-cyclohexanone; 2-But-2-ylcyclohexanone
B087	2-Butyl-2-butenal	2-Ethylidene hexanal; 2-Ethylidenehexanal
B088	2-Butyl-5(6-keto-1,4)-dioxane	5(or 6)-Butyl-1,4-dioxane-2-one 1,4-Dioxan-2-one; 5(or 6)-Butyl-1
B089	Butylamine	1-Aminobutane; n-Butylamine
B090	sec-Butylamine	(+/-)-2-Aminobutane; (+/-)-2-Butanamine; (+/-)-2-Butylamine; (+/-)-sec-Butylamine; (RS)-sec-Butylamine; 1-Methylpropanamine; 1-Methylpropylamine; 2-Aminobutane; 2-Butylamine; Butafume; Butan-2-ylamine; dl-2-Butylamine; DL-sec-Butylamine; Tutane; But-2-ylamine
B091	α -Butylcinnamaldehyde	2-Benzylidene hexanal; Butyl cinnamic aldehyde; α -Butyl- β -phenylacrolein
B092	2-Butylfuran	
B093	3-Butylidenephthalide	Liguisticum lactone
B094	Butyraldehyde	Butyl aldehyde; Butanal; Butyric aldehyde; 1-Aminobutane; m-Butylamine ; n-Butyraldehyde; Butyric aldehyde; n-Butanal; Butan-1-al; n-Butyl aldehyde
B095	Butyramide	Butyramide; Butanimidic acid; n-Butylamide; Butanamide
B096	Butyric acid *	n-Butyric acid; Butanoic acid; Ethylacetic acid; 1-Propanecarboxylic acid
B097	2-Butyrylfuran	1-(2-Furyl)-1-butanone; 2-Furyl propyl ketone; Furyl n-propyl ketone
B098	sec-Butyl acetate	Acetic acid, sec-butyl ester; sec-Butyl alcohol acetate; Acetic acid 2-butoxy ester; dl-sec-Butyl acetate; sec-Butyl ethanoate; Acetate de butyle secondaire; 1-Methylpropyl acetate; 1-Methylpropyl ethanoate; 2-Butanol acetate; 2-Butyl acetate; Acetic acid, 1-methylpropyl este

Order	General Name	Synonyms
B099	Butane-1,3-diol	β -Butylene glycol; Methyltrimethylene glycol; 1-Methyl-1,3-propanediol; 1,3-Butylene glycol; 1,3-Dihydroxybutane; 1,3-Butandiol; 1,3-Butylenglykol; 1,3-Butanodiol; Butanediol, 1,3-; 1,3-Butanediol
B100	2-Butoxyethan-1-ol	Ethanol, 2-butoxy-; β -Butoxyethanol; Butyl cellosolve; Butyl glycol; Butyl oxitol; Ethylene glycol butyl ether; Ethylene glycol monobutyl ether; Glycol butyl ether; Glycol monobutyl ether; Monobutyl glycol ether; O-Butyl ethylene glycol; 2-Butoxy-1-ethanol; 2-Butoxyethanol; 3-Oxa-1-heptanol; Butyl 2-hydroxyethyl ether; 2-Hydroxyethyl n-butyl ether; n-Butoxyethanol; 2-n-Butoxyethanol; Ethylene glycol mono-n-butyl ether; Butoxyethanol; Butylglycol; Ethylene glycol n-butyl ether; Monobutyl ether of ethylene glycol; Butyl monoether glycol; 2-butoxyethanol ; 2-n-Butoxy-1-ethanol
B101	Butyl benzoate	n-Butyl benzoate; Benzoic acid n-butyl ester; Butyl ester of benzoic acid; Benzoic acid, butyl ester
B102	β -Bisabolene	Cyclohexene, 1-methyl-4-(5-methyl-1-methylene-4-hexenyl)-, (S)-; 1,5-Heptadiene, 6-methyl-2-(4-methyl-3-cyclohexen-1-yl)-, (S)-(-)-; 1- β -Bisabolene; (+, -)- β -Bisabolene; 1-Methyl-4-(5-methyl-1-methylene-4-hexenyl)-1-cyclohexene; (-)- β -bisabolene; 1-Methyl-4-(5-methyl-1-methylene-4-hexenyl)-(S)-cyclohexene
B103	Butane-2-thiol	sec-Butyl thioalcohol; sec-Butanethiol; sec-Butyl mercaptan; sec-Butyl thiol; Secondary butylmercaptan; 1-Methyl-1-propanethiol; 2-Butyl mercaptan; 2-Mercaptobutane; Sec-butyl hydrosulfide; 2-Butanethiol
B104	Butane-2,3-diol	Dimethylethylene glycol; 2,3-Butylene glycol; 2,3-Dihydroxybutane; D-2,3-Butane diol; 2,3-Butanediol; 2,3-Butandiol; 2,3-butanodiol
B105	Bisabola-1,12-dien-8-ol	3-Cyclohexene-1-methanol, α ,4-dimethyl- α -(4-methyl-3-pentenyl)-,

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Order	General Name	Synonyms
		(R*,R*)-; 5-Hepten-2-ol, 6-methyl-2-(4-methyl-3-cyclohexen-1-yl)-; Bisabolol; α ,4-Dimethyl- α -(4-methyl-3-pentenyl)-3-cyclohexene-1-methanol; 6-Methyl-2-(4-methyl-3-cyclohexen-1-yl)-5-hepten-2-ol; (R*,R*)- α ,4-Dimethyl- α -(4-methyl-3-pentenyl)-3-cyclohexene-1-methanol; (R*,R*)- α ,4-Dimethyl- α -(4-methyl-3-pentenyl)cyclohex-3-ene-1-methanol; Camilol; Dragosantol; Hydagen B; α -Bisabalol; α -bisabolool
B106	Benzyl methyl ether	Ether, benzyl methyl; α -Methoxytoluene; Methyl benzyl ether; Methoxymethylbenzene; α -Methylbenzyl ether;Benzene, (methoxymethyl)-
B107	Butyl 2-furoate	2-Furoic acid, butyl ester
B108	sec-Butyl formate	Formic acid, 1-methylpropyl ester; Formic acid, sec-butyl ester; sec-Butyl methanoate; s-Butyl formate
B109	Butyl octanoate	Caprylic acid n-butyl ester; n-Caprylic acid n-butyl ester; Octanoic acid, butyl ester; n-Butylcaprylate; n-Butyl n-octanoate; n-Butyl octanoate;Butyl caprylate
B110	Butyl but-2-enoate	
B111	Butyl methyl ketone	n-Butyl methyl ketone; Hexan-2-one; Methyl butyl ketone; Methyl n-butyl ketone; 2-Oxohexane; Hexanone-2; Ketone, butyl methyl;2-Hexanone
B112	But-3-en-2-ol	Methyl vinylcarbinol; 1-Buten-3-ol; 1-Methyl-2-propenol; 3 -Butene-2-ol; 3-Hydroxy-1-butene; Propenol, 1-methyl;3-Buten-2-ol
B113	Benzyl isothiocyanate	Isothiocyanic acid, benzyl ester; Benzyl mustard oil; Toluene, α -isothiocyanato-; (Isothiocyanatomethyl)benzene;Benzene, (isothiocyanatomethyl)-
B114	Benzaldehyde diethyl acetal	Benzene, (diethoxymethyl)-; Toluene, α , α -diethoxy-; Diethoxymethyl)benzene
B115	sec-Butyl butyrate	Butyric acid, sec-butyl ester; Butanoic acid, 2-butyl ester;Butanoic acid, 1-methylpropyl ester

Order	General Name	Synonyms
B116	3-Butenyl isothiocyanate	1-Butene, 4-isothiocyanato-; Isothiocyanic acid, 3-butenyl ester; 4-Isothiocyanato-1-butene; 1-butene 4-isothiocyanate
B117	Butanal diethyl acetal	Butyraldehyde, diethyl acetal; Butylaldehyde diethyl acetal; 1,1-Diethoxybutane; n-Butyraldehyde diethyl acetal
B118	sec-Butyl Isothiocyanate	Butane, 2-isothiocyanato-; Isothiocyanic acid, sec-butyl ester; 2-Isothiocyanatobutane; 2-Butyl isothiocyanate
B119	Butyl 2-methylbut-2(cis)-enoate	Butyl angelate
B120	Benzyl valerate	Valeric acid, benzyl ester; Benzyanyl; Benzyl pentanoate; Benzyl valerianate; Benzyl N-valerate; Phenylmethyl (benzyl) valerate; Phenylmethyl pentanoate; Pentanoic acid, phenylmethyl ester
B121	Butyl hex-2-enoate	
B122	Bisabola-1,8,12-triene	
B123	sec-Butyl lactate	Lactic acid, sec-butyl ester
B124	Butyl deca-2,4-dienoate	
B125	Butyl decanoate	n-Capric acid n-butyl ester; Decanoic acid, butyl ester; Butyl caprate; n-Butyl n-decanoate; n-butyl decanoate
B126	Butyl nonanoate	n-butyl nonanoate; Nonanoic acid, butyl ester
B127	Bis(1-mercaptopropyl)sulfide	Propanethiol, 1,1'-thiobis-
B128	Benzyl octyl ether	
B129	Benzyl 2-methylbutyrate	Benzyl 2-methylbutanoate; Butanoic acid, 2-methyl-, phenylmethyl ester
B130	1-Butoxy-1-ethoxyethane	Butane, 1-(1-ethoxyethoxy)-; 1-(1-Ethoxyethoxy)butane
B131	Butyl oct-2-enoate	2-Octenoic acid, butyl ester
B132	Benzyl crotonate	
B133	1-Butoxy-1-(2-methylbutoxy)ethane	

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Order	General Name	Synonyms
B134	Butyl hex-3-enoate	Butyl trans-3-hexenoate
B135	1-Butoxy-1-isopentyloxyethane	
C001	delta-Cadinene	α -, β -, γ , epsilon-Cadiene
C002	Camphene	3,3-Dimethyl-2-methylene norcamphane; 2,2-Dimethyl-3-methylene norbornane
C003	Campholene acetate	α -Campholene acetate; 1-Acetoxy-2-(2,2,3-trimethyl-3-cyclopentanyl)ethane; 3-Cyclopentene-;-ethanol; 2,2,3-Trimethyl-, acetate; 2-(2,2,3-Trimethyl-3-cyclopentenyl)ethyl acetate
C004	α -Campholenic alcohol	α -Campholenol; 3-Cyclopentene-1-ethanol; 2,2,3-Trimethyl-; 2-(2,2,3-trimethyl)-3- cyclopentene-1-ethanol; 2-(2,2,3-Trimethylcyclopent-3-enyl)ethanol; 2-(2,3,3-Trimethyl-cyclopent-3-en-1-yl)ethanol
C005	d-Camphor	Gum camphor; Formosa camphor; 2-Camphanone; 2-bornanone; 2-Keto-1,7,7-trimethylnorcamphane; 1,7,7-Trimethylbicyclo (2.2.1) 2-heptanone; Laurel camphor; d-2-Bornanone; d-2-Camphanone
C006	Capsaicin	n-(4-Hydroxy-3-methoxybenzyl)-8-methyl-6-nonenamide; trans-8-Methyl-n-vanillyl-6-nonenamide; Isodecenoic acid vanillylamide; 8-Methylnon-6-enoyl 4-hydroxy-3-methoxybenzylamide
C007	delta-3-Carene	3-Carene; Isodiprene; d-3-Carene; Car-3-ene; 4,7,7-Trimethyl-3-norcarene; 3,7,7-Trimethylbicyclo[4,1,0]hept-3-ene
C008	Carvacrol	Cymphenol; Thymol(iso); Propyl iso o-cresol; p-Cymene-2-ol; 2-p-Cymenol; 2-Hydroxy-p-cymene; Isopropyl-o-cresol; Isothymol; 2-Methyl-5-isopropyl phenol; 2-Methyl-5-(1-methylethyl)phenol, Cymenphenol; 2-Hydroxy-p-cymenol
C009	Carvacryl ethyl ether	Ethyl carvacrol; 2-Ethoxy-p-cymene; Ethyl carvacryl ether

Order	General Name	Synonyms
C010	Carveol	<i>p</i> -Mentha-6,8-dien-2-ol; 1-Methyl-4-isopropenyl-6-cyclohexen-2-ol
C011	4-Carvomenthenol	Terpineol; 4-Terpinenol; 1- <i>p</i> -Menthen-4-ol; 1-Methyl-4-isopropyl-1-cyclohexen-4-ol; Origanol
C012	Carvone	Carvol; 6,8(9)- <i>p</i> -Menthadien-2-one; 1-menthyl-4-isopropenyl-6-cyclohexen-2-one
C013	d-Carvone	<i>p</i> -Mentha-6,8-dien-2-one; Dextro-carvone; (+)-Carvone
C014	l-Carvone	<i>p</i> -Mentha-6,8-dien-2-one; Laevo-carvone; (-)-Carvone; <i>p</i> -Mentha-6,8-dien-2-one
C015	cis-Carvone oxide	1,6-Epoxy- <i>p</i> -menth-8-en-2-one.
C016	Carvone-5,6-oxide	7-Oxabicyclo[4.1.0]heptan-2-one, 1-methyl-4-(1-methylethenyl)-(1 <i>S</i> ,4 <i>R</i> ,6 <i>S</i>)-; 1,6-Epoxy- <i>p</i> -menth-8-en-2-one
C017	Carvyl acetate	<i>p</i> -Mentha-6,8-dien-2-yl acetate; Carveyl acetate
C018	Carvyl propionate	l-Carveol propionate; 1- <i>p</i> -Mentha-6,8-dien-2-yl propionate
C019	β-Caryophyllene	2-Methylene-6,10,10-trimethylbicyclo (7.2.0) undec-5-ene; Caryophyllene
C020	β-Caryophyllene alcohol	Isocaryophyllene
C021	Caryophyllene alcohol acetate	Caryophyllene acetate
C022	β-Caryophyllene oxide	Caryophyllene epoxide; 4-12,12-Trimethyl-9-methylene-5-oxatricyclo[8.2.0.04,6] dodecane
C023	Cedarwood oil alcohols	
C024	Cedarwood oil terpenes	
C025	1,4-Cineole	1,4-Epoxy- <i>p</i> -menthane
C026	Cinnamaldehyde *	Cinnamal; Cinnamic aldehyde; β-Phenylacrolein; 3-Phenylpropenal; Zimtaldehyde;

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Order	General Name	Synonyms
		Cassiaaldehyde; Benzylidene acetaldehyde; Phenylacrolein
C027	Cinnamaldehyde ethylene glycol acetal	Cinnamic aldehyde ethylene glycol acetal; Cinncloval; 2-Styryl-1,3-dioxolane; 2-styryl- <i>m</i> -dioxolane
C028	Cinnamic acid *	3-Phenylacrylic acid; benzylideneacetic acid; Benzenepropenoic acid; Cinnamylic acid; β -Phenylacrylic acid; 3-Phenylpropenoic acid; 2-Phenyl-2-propenoic acid; Benzenepropenoic acid; tert- β -Phenylacrylic acid; 3-Phenyl-2-propenoic acid
C029	Cinnamyl acetate *	3-Phenyl-2-propen-1-yl acetate; 3-Phenylallyl acetate
C030	Cinnamyl alcohol *	Zimtalcohol; Cinnamic alcohol; γ -Phenylallyl alcohol; 3-Phenyl-2-propen-1-ol; styryl carbinol
C031	Cinnamyl benzoate	
C032	Cinnamyl butyrate	3-Phenyl-2-propen-1-yl butanoate; Butyric acid, 3-Phenyl-2-propen-1-yl ester; 3-Phenylallyl butyrate; Phenyl propenyl- <i>n</i> -butyrate
C033	Cinnamyl cinnamate	3-Phenyl-2-propen-1-yl 3-phenylpropenoate; 3-Phenylallyl cinnamate; Cinnamyl β -phenyl acrylate; Cinnamyl 3-phenyl propenoate; Phenylallyl cinnamate; Styracin
C034	Cinnamyl formate	3-Phenyl -2-propen-1-yl formate; 3-Phenylallyl formate; Cinnamyl methanoate
C035	Cinnamyl isobutyrate	Cinnamyl 2-methylpropanoate; 3-Phenyl-2-propen-1-yl isobutyrate; 3-Phenyl-2-propen-1-yl 2-methylpropanoate; Cinnamyl 2-methylpropanoate
C036	Cinnamyl isovalerate	3-Phenylallyl 3-methylbutanoate; 3-Phenyl-2-propen-1-yl 3-methylbutanoate; Cinnamyl 3-methylbutanoate; Ethyl 4-hydroxy-3-methoxybenzoate; 3-Phenylallyl isovalerate; Cinnamyl-3-methylbutyrate; Cinnamyl isovalerianate
C037	Cinnamyl phenylacetate	3-Phenyl-2-propen-1-yl phenylacetate; 3-Phenylallyl phenylacetate; Cinnamyl α -toluate

Order	General Name	Synonyms
C038	Cinnamyl propionate	3-Phenyl-2-propen-1-yl propionate; 3-Phenylallyl propionate; γ -Phenylallyl propionate; 3-Phenyl-2-propenyl propanoate
C039	Citral *	Geranial; 2- <i>trans</i> -3,7-Dimethyl-2,6-octadien-1-al; 2- <i>cis</i> -3,7-Ddimethyl-2,6-octadien-1-al; 2,6-Dimethyloctadien-2,6-al-8; Neral; Lemarome; Lemarome; 3,7-Dimethyl-2,6-octadial; trans-3,7-Dimethylocta-2,6-dienal; <i>cis</i> - and trans-3,7-Dimethyl-2,6-octadial
C040	Citral diethyl acetal	Citrathal; 1,1-Diethoxy-3,7-dimethyl-2,6-octadiene; 3,7-Dimethyl-2,6-octadial diethylacetal
C041	Citral dimethyl acetal	Citrathal; 1,1-Dimethoxy-3,7-dimethyl-2,6-octadiene; 3,7-Dimethyl-2,6-octadial dimethylacetal
C042	Citral propylene glycol acetal	
C043	Citronellal *	3,7-Dimethyl-6-octenal; 3,7-Dimethyl-6-octen-1-al; Rhodinal (dextro-rotatory form)
C044	Citronellol *	<i>d</i> -Citronellol or the <i>l</i> -form <i>sec</i> Rhodinol; 3,7-Dimethyl-6-octen-1-ol; (-)-3,7-Dimethyl-6-octen-1-ol
C045	Citronelloxyacetaldehyde.	
C046	Citronellyl acetate	3,7-Dimethyl-6-octen-1-yl ethanoate; Citronellyl ethanoate; 3,7-Dimethyl-6-octen-yl acetate
C047	Citronellyl anthranilate	6-Octen-1-ol, 3,7-dimethyl-, 2-aminobenzoate
C048	Citronellyl butyrate	3,7-Dimethyl-6-octen-yl butyrate; 3,7-Dimethyl-6-octen-1-yl butanoate; Citronellyl butanoate
C049	Citronellyl formate *	3,7-Dimethyl-6-octen-1-yl methanoate; Citronellyl methanoate; 3,7-Dimethyl-6-octen-1-yl formate

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Order	General Name	Synonyms
C050	Citronellyl isobutyrate	3,7-Dimethyl-6-octen-1-yl 2-methylpropanoate; 3,7-Dimethyl-6-octen-1-yl isobutyrate; Citronellyl 2-methylpropionate
C051	Citronellyl oxyacetaldehyde	Muget aldehyde; 6,10-Dimethyl-3-oxa-9-undecenal
C052	Citronellyl phenylacetate *	Citronellyl α -toluate; 3,7-Dimethyl-6-octen-1-yl phenylacetate
C053	Citronellyl propionate	3,7-Dimethyl-6-octen-1-yl propanoate; Citronellyl propanoate; 3,7-Dimethyl-6-octen-1-yl propionate
C054	Citronellyl valerate	Citronellyl valerianate; 3,7-Dimethyl-6-octen-1-yl pentanoate; Citronellyl pentanoate; 3,7-Dimethyl-6-octen-1-yl valerate
C055	p-Cresol	1-Methyl-4-hydroxybenzene; 1-Hydroxy-4-methylbenzene; p-Cresylic acid; 4-Methylphenol; 4-Cresol; p-Hydroxytoluene; p-Methyl phenol; 4-Hydroxytoluene
C056	o-Cresol	<i>o</i> -Cresylic acid; 2-Hydroxy-1-methylbenzene; 1-Hydroxy-2-methylbenzene; <i>o</i> -Hydroxytoluene; <i>o</i> -Methylphenol; 2-Methylphenol
C057	m-Cresol	<i>m</i> -Cresylic acid; 1-Hydroxy-3-methylbenzene; 3-Hydroxytoluene; 1-Methyl-3-hydroxybenzene; 3-Methylphenol; <i>m</i> -Methylphenol; 3-Hydroxytoluene
C058	Crotonic acid	(E)-2-Butenoic acid; trans-2-Butenoic acid; But-2-enoic acid (cis and trans)
C059	Cuminaldehyde	p-Propyl iso benzaldehyde; 4-Isopropylbenzenecarboxaldehyde; 4-(1-Methylethyl)-benzaldehyde; Cumaldehyde; Cuminal; Cuminic aldehyde; p-Isopropyl benzaldehyde; 4-Isopropylbenzaldehyde
C060	Cyclamen aldehyde	α -Methyl-p-isopropylhydrocinnamaldehyde; 2-Methyl-3-(p-isopropylphenyl) propionaldehyde; Cyclamal; Cyclaviol; Cyclosal; 3-(p-Cumenyl)-2-methylpropionaldehyde
C061	Cycloheptadec-9-en-1-one	9-Cycloheptadecen-1-one; civetone; α -trans-Civettone; Citvettone;

Order	General Name	Synonyms
		cis-9-Cycloheptadecen-1-one
C062	Cyclohexanecarboxylic acid	Benzoic acid, Hexahydro; Carboxycyclohexane; Cyclohexylmethanoic acid, Hexahydrobenzoic acid
C063	Cyclohexaneethyl acetate	Cyclohexylethyl acetate; Hexahydrophenethyl acetate; 2-Cyclohexylethyl acetate; Cyclohexane ethyl acetate; Ethylcyclohexyl acetate
C064	Cyclohexanone	Anon; Hexanon; Ketoexamethylene; Nadone; Pimelic ketone; Ketoexamethylene; pimelic ketone; Sextone; Nadone; Cyclohexyl ketone
C065	Cyclohexyl acetate	Cyclohexane acetate
C066	Cyclohexyl anthranilate	Cyclohexyl 2-aminobenzoate; Cyclohexyl <i>o</i> -aminobenzoate
C067	Cyclohexyl butyrate	Cyclohexyl butanoate
C068	Cyclohexyl cinnamate	Cyclohexyl β -phenylacrylate; cyclohexyl 3-phenylpropenoate; Cyclohexyl-3-phenyl prop-2-enoate
C069	Cyclohexyl formate	Formic acid, cyclohexyl ester
C070	Cyclohexyl isovalerate	Cyclohexyl isovalerianate; Cyclohexyl isopentanoate; Cyclohexyl 3-methylbutanoate; cyclohexyl 2-methylbutanoate
C071	Cyclohexyl propionate	
C072	Cyclohexylacetic acid	Hexahydrophenylacetic acid; Cyclohexaneacetic acid
C073	Cyclohexylmethyl pyrazine	2-Pyrazinyl cyclohexyl methyl; (2-Pyrazinylmethyl)cyclohexane; (Pyrazinylmethyl)- cyclohexane; 2-Pyrazinycyclohexylmethane; 2-(cyclohexylmethyl)pyrazine
C074	Cycloionone	6,7,8,8a-Tetrahydro-2,5,5,8a-tetramethyl-5H-1-benzopyran
C075	Cyclopentanethiol	Cyclopentyl mercaptan
C076	Cyclopentanone	Adipic ketone; Dumasine; Ketocyclopentane; Ketopentamethylene;

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Order	General Name	Synonyms
		Ketocyclopentane; Ketopentamethylene; Adipic ketone; Dumasine
C077	N-Cyclopropyl-trans-2-cis-6-nonadienamide	N-Cyclopropyl-(E2,Z6)-nonadienamide; 2,6-Nonadienamide, N-cyclopropyl-, (2E,6Z)-
C078	p-Cymene	Cymol; Cymene; 4-Methyl-1-isopropylbenzene; p-Methylcumene; 1-Isopropyl-4-methylbenzene; p-Isopropyltoluene; 1-Methyl-4-isopropylbenzene; p-Methyl-isopropylbenzene; 4-Isopropyl-1-methylbenzene
C079	Cedrol	1H-3a,7-Methanoazulen-6-ol, octahydro-3,6,8,8-tetramethyl-, [3R-(3a,3aβ,6a,7β,8aα)]-; 8βH-Cedran-8-ol; α-Cedrol; (+)-Cedrol; Cedran-8-ol
C080	Cyclopentanol	Cyclopentyl alcohol; Hydroxycyclopentane
C081	Cyclohexanol	Cyclohexyl alcohol; Adronal; Adronol; Anol; Hexahydrophenol; Hexalin; Hydroxycyclohexane; Naxol; Phenol, hexahydro-; 1-Cyclohexanol; Cyclohexane, hydroxy-; Hydralin; Hydrophenol
C082	α-Cedrene	1H-3a,7-Methanoazulene, 2,3,4,7,8,8a-hexahydro-3,6,8,8-tetramethyl-, [3r-(3a,3aβ,7β,8aα)]-; Cedr-8-ene
C083	cis-Carvyl acetate	2-Cyclohexen-1-ol, 2-methyl-5-(1-methylethenyl)-, acetate, cis-; p-Mentha-6,8-dien-2-ol, acetate, cis-; Carvyl acetate Z; 5-Isopropenyl-2-methyl-2-cyclohexen-1-yl acetate; Z-carvyl acetate; cis-2-Methyl-5-(1-methylethenyl)-2-cyclohexen-1-yl acetate
C084	Coumane	1a,7b-dihydrocyclopropa[c]chromen-2(1H)-one; Cyclopropylcoumarin
C085	Carvacryl methyl ether	Carvacrol methyl ether; methyl carvacrol
C086	Carvacryl acetate	
C087	Citronellyl hexanoate	
C088	β-Cubebene	1H-Cyclopenta[1,3]cyclopropa[1,2]benzene, octahydro-7-methyl-3-methylene-4-(1-methylethyl)-, [3as-(3aa,3bb,4β,7a,7as*)]-; 1H-Cyclopenta[1,3]cyclopropa[1,2]benzene,

Order	General Name	Synonyms
		2,3,3aa,3ba,4,5,6,7-octahydro-4a-isopropyl-7β-methyl-3-methylene-; 1H-Cyclopenta[1,3]cyclopropa[1,2]benzene, octahydro-7-methyl-3-methylene-4-(1-methylethyl)-, (3aa,3ba,4a,7β,7aR*)-; 4-Isopropyl-7-methyl-3-methyleneoctahydro-1H-cyclopenta[2,3]cyclopropa[1, 2-a]benzene;β-Cuvebene
C089	8(14)-Cedrene	beta-Cedrene
C090	Citronellyl tiglate	2-Butenoic acid, 2-methyl-, 3,7-dimethyl-6-octenyl ester, (E)-; 3,7-Dimethyl-6-octenyl (2Z)-2-methyl-2-butenate; E-Citronellyl tiglate
C091	Cedrenol	1H-3a,7-Methanoazulen-5-ol, octahydro-3,8,8-trimethyl-6-methylene-; Cedr-8(15)-en-9-ol
C092	2-Cedrene	
C093	Caryophyllene alcohol	4,4,8-trimethyltricyclo[6.3.1.02,5]dodecan-1-ol
C094	Citronellyl decanoate	
C095	Citronellyl dodecanoate	
D001	Damascenone	1-(2,6,6-Trimethyl-1,3-cyclohexadienyl)-2-buten-1-one; Floriffone; β-Damascone; 4-(2,6,6-Trimethylcyclohexa-1,3-dienyl)but-2-en-4-one; β-Damascenone
D002	β-Damascone	Damasione; Dihydro floriffone b; 4-(2,6,6-Trimethylcyclohex-1-enyl)but-2-en-4-one; 1-[(2,6,6)-Trimethyl-cyclohex-1-enyl]-but-2-en-1-one; tr-1-(2,6,6-Trimethyl-1-cyclohexen-1-yl)but-2-en-1-one
D003	delta-Damascone	2-Buten-1-one, 1-(2-β-6,6-trimethyl-3-cyclohexen-1-α-yl); 1-(2,6,6-Trimethyl-3-cyclohexen-1-yl)-2-butene-1-one
D004	α-Damascone	Dihydro floriffo; 2-Buten-1-one, 1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-; 4-(2,6,6-Trimethyl-2-cyclohexenyl)-2-butene-4-one

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Order	General Name	Synonyms
D005	Trans- α -Damascone	Trans-1-2(2,6,6-trimethyl-2-cyclohexen-1-yl)but-2-en-1-one; 2-Buten-1-one, 1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-, (2E)-
D006	2,4-Ddimethyl-5-acetylthiazole	2,4-Dimethyl-5-thiazoyl methyl ketone; 5-Acetyl-2,4-dimethylthiazole; 2,4-Dimethyl-5-acetylthiazole
D007	Dec-2-enal	3-Heptylacrolein; decenaldehyde; Decylenic aldehyde; n-Decene-2-al; trans-2-Decenal; Decenaldehyde; Decenaldehyde; 3-Heptylacrolein; Decylenic aldehyde; Dec-2-enal; 2-Decen-1-al
D008	(E,E)-2,4-Decadien-1-ol	trans,trans-2,4-Decadienol; 2,4-Decanoic acid; Deca-2,4-dien-1-ol
D009	2-trans,4-trans-Decadienal	Deca-2(trans),4(trans)-dienal; Heptenyl acrolein; 2,4-Decadienal; Deca-2,4-dienal; Heptenyl acrolein; 2,3-Decadienal
D010	γ -Decalactone	4-Decanolide; 5-Hexyldihydro-2(3H)-furanone; 4-Hydroxydecanoic acid lactone; Deca-1,4-lactone; Decano-1,4-lactone; 4-Hydroxydecanoic acid, γ -lactone; 4-n-Hexyl-4-hydroxybutanoic acid lactone; γ -n-Decalactone; Decanolide-1,4; γ -n-Hexyl- γ -butyrolactone
D011	delta-Decalactone	5-Decanolide; 6-Pentyltetrahydro-2-pyrone; Deca-1,5-lactone; Decano-1,5-lactone; Decanolide-1,4; γ -n-Hexyl- γ -butyrolactone; 5-Hydroxy-decanoic acid, δ -Lactone; 5-n-Amyl-5-hydroxypentanoic acid lactone; Decanolide-1,5; Amyl-delta-valerolactone; delta-n-Amyl-delta-valerolactone
D012	Decanal *	Capraldehyde; Aldehyde C-10; Capric aldehyde; Caprinaldehyde; n-Decylaldehyde; Decylic aldehyde; Decyl aldehyde; n-Decanal
D013	Decanal dimethyl acetal	Aldehyde C-10 dimethyl acetal; Capraldehyde dimethyl acetal; Decylaldehyde dimethyl acetal; 1,1-Dimethoxy decane; 10,10-Dimethoxy decane
D014	Decanoic acid	Capric acid; Decylic acid

Order	General Name	Synonyms
D015	1-Decanol *	Nonylacarbinol; Decylic alcohol; Alcohol C-10; capric alcohol; Decyl alcohol; Nonyl carbinol; Decan-1-ol; n-Decyl alcohol
D016	3-Decanol	Ethyl heptyl carbinol; Heptyl ethyl carbinol
D017	3-Decanone	Ethyl heptyl ketone
D018	2-trans-4-trans-7-cis-Decatrienal	(2E,4E,7Z)-Decatrienal
D019	3-Decen-2-one	Heptylidene acetone; Oenanthylidene acetone ; Dec-3-en-2-one; Enanthylidene acetone
D020	1-Decen-3-ol	Heptyl ethenyl carbinol
D021	4-Decenal	(Z)-dec-4-en-1-al; Decenaldehyde, Dec-4-enal (cis)
D022	9-Decenal	
D023	9-Decenoic acid	Dec-9-enoic acid
D024	4-Decenoic acid	4-Decenoic acid
D025	5- and 6-Decenoic acid (mixture)	Dec-(5- and 6)-enoic acid; Decenoic acid; milk lactone
D026	cis-4-Decenyl acetate	4-Decen-1-ol, acetate, (Z)-dec-4-en-1-al
D027	Decyl acetate	Decyl ethanoate; Acetate C-10; Decanyl acetate; n-Decyl ethanoate; 1-Acetoxydecane; Acetic acid decyl ester; Decanol acetate
D028	Decyl butyrate	Decyl butanoate; n-Decyl butanoate; 1-Butyroxy decane
D029	Decyl propionate	Decyl propanoate; n-Decyl propanoate; 1-Propionoxy decane
D030	2-Decylfuran	Furan, 2-decyl-
D031	Dehydromenthofuro lactone	5,6-Dihydro-3,6-dimethylbenzofuran-2(4H)-one; 2(4H)-Benzofuranone,

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Order	General Name	Synonyms
		5,6-dihydro-3,6-dimethyl-, (R)-;
		3,6-Dimethyl-5,6-dihydro-2(4H)benzofuranone;
		3,6-dimethyl-4,5-dihydro-6H-benzo(b) furan-2-one
D032	Dehydrodihydroionol	4-(2,6,6-Trimethyl-1,3-cyclohexadienyl)-3-butan-2-ol;
		1,3-Cyclohexadiene-1-propanol, α -2,6,6-tetramethyl-;
		α -2,6,6-tetramethyl-1,3-cyclohexadien-1-propanol
D033	Dehydrodihydroionone	Dehydrodihydro- β -ionone; 3,4-Dehydrodihydro- β -ionone;
		4-(2,6,6-Trimethylcyclohexadien-1-yl) 2-butanone; Dehydrodihydroionone
D034	Dehydronootkatone	5,6-Dimethyl-8-isopropenyl bicyclo[4.4.0]-1,9-decadien-3-one;
		4.β.H.5.α.-eremophila-1(10),8,11-trien-2-one; 8,9-didehydronootkatone
D035	1,2-Di((1'-ethoxy)-ethoxy)propane	3,5,8,10-Tetraoxadodecane, 4,6,9-trimethyl-; Acetaldehyde ethyl propylene glycol mixed acetal; 4,6,9-Trimethyl-3,5,8,10-tetraoxadodecane
D036	Di(butan-3-one-1-yl) sulfide	Di-(3-oxobutyl)sulfide; bis(Butan-3-one-1-yl) sulfide
D037	Diacetyl	Dimethyl diketone; Biacetyl; 2,3-Butanedione; 2,3-Diketobutane; Dimethylglyoxal; Dimethylglyoxal
D038	Diallyl polysulfides	Mixture of diallyl di-, tri-, tetra-, and pentasulfides; Polysulfides, diallyl; 2-Propenylpolysulfides; allyl polysulfides
D039	Diallyl trisulfide	Allyl trisulfide; Prop-2-enyl-trithio prop-2-ene; Allyl trisulphide
D040	Dibenzyl ether	Benzyl ether; Benzyl oxide
D041	Dibutyl sebacate	Butyl sebacate; Dibutyl decanedioate; Dibutyl 1,8-octanedicarboxylate; n-Butyl sebacate
D042	4,4-Dibutyl- γ -butyrolactone	4-Butyl-4-octanolide; 5,5-Dibutyldihydro-2(3H)-furanone;
		4-Butyl-4-hydroxyoctanoic acid lactone; 4-Butyloctano-1,4-lactone;
		4-Butyl-4-hydroxyoctanoic acid, γ -lactone; Dibutyl butyrolactone;

Order	General Name	Synonyms
		4,4-Dibutyl-4-hydroxy-butyric acid, γ -lactone
D043	Dicyclohexyl disulfide	Cyclohexyl disulfide; Disulfide, dicyclohexyl
D044	Diethyl disulfide	Disulfide, diethyl; Ethyl disulfide; 3,4-dithiahexane; Ethyl disulphide; Ethyldithioethane
D045	Diethyl malate	Diethyl 2-hydroxybutanedioate; d-Ethyl malate; Diethylhydroxysuccinate; Ethyl malate
D046	Diethyl malonate	Ethyl propanedioate; Ethyl methanedicarboxylate; Ethyl malonate; Malonic ester
D047	Diethyl sebacate	Ethyl decanedioate; Diethyl decanedioate; Diethyl 1,8-octanedicarboxylate; Ethyl sebacate
D048	Diethyl succinate	Diethyl butanedioate; Diethyl ethanedicarboxylate; Ethyl succinate
D049	Diethyl sulfide	Ethyl sulfide; 1-1'-Thiobisethane; 3-Thiapentane; Diethylthioether; Ethyl monosulfide; Ethyl thioether; Ethyl thiothane; Thioethyl ether; Sulfodor; Ethane, 1,1-Thiobis-
D050	Diethyl tartrate	Diethyl 2,3-dihydroxybutanedioate; Diethyl 2,3-dihydroxysuccinate; ethyl tartrate
D051	Diethyl trisulfide	1-Ethyltrisulfanylethane, 3,4,5-Trithiaheptane
D052	Mixture of 3,6-Diethyl-1,2,4,5-tetrathiane and 3,5-diethyl-1,2,4-trithiolane	1,2,4,5-Tetrathiane, 3,6-diethyl- and 1,2,4-trithiolane, 3,5-diethyl-1,2,4-trithiolane
D053	cis-trans-3,5-Diethyl-1,2,4-trithiolane	(+/-)-cis-and trans-3,5-Diethyl-1,2,4-trithiolane
D054	3,5-Diethyl-2-methylpyrazine	Pyrazine, 3,5-diethyl-2-methyl-pyrazine; 2-Methyl-3,5-diethyl-1,4-diazine; 2,6-Diethyl-3-methylpyrazine
D055	2,5-Diethyl-3-methylpyrazine	Pyrazine, 2,5-diethyl-3-methyl-pyrazine; 2,5-Diethyl-3-methyl-1,4-diazine
D056	2,3-Diethyl-5-methylpyrazine	2-Methyl-5,6-diethylpyrazine; 2,3-Diethyl-5-methyl-1,4-diazine
D057	2,3-Diethylpyrazine	2,3-Diethyl-1,4-diazine

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Order	General Name	Synonyms
D058	2,5-Diethyltetrahydrofuran	Tetrahydrofuran, 2,5-diethyl-; Furan, 2,5-diethyltetrahydro-
D059	Difurfuryl ether	Furfuryl ether
D060	2,4-Difurfurylfuran	Furan, 2,4-bis(2-furanylmethyl)-
D061	6,7-Dihydro-2,3-dimethyl-5H-cyclopentapyrazine	5H-Cyclopentapyrazine, 6,7-dihydro-2,3-dimethyl; (5H)-2,3-dimethyl-6,7-dihydrocyclopenta(B)pyrazine
D062	5,7-Dihydro-2-methylthieno(3,4-d)pyrimidine	5,7-Dihydro-2-methylthieno[3,4d]pyridine; Thieno(3,4d)pyrimidine, 5,7-dihydro-2-methyl
D063	4,5-Dihydro-3(2H)-thiophenone	Tetrahydrothiophen-3-one; 3-Tetrahydrothiophenone; 3-thiophanone, 3-thiophane; Dihydrothiophenone
D064	Dihydro- α -ionone	2-Butanone, 4-(2,6,6-trimethyl-2-cyclohexen-1-yl; 4-(2,6,6-trimethyl-2-cyclohexen-1-yl)butan-2-one
D065	Dihydro- β -ionol	1-Cyclohexene-1-propanol, α ,2,6,6-tetramethyl-; β -Dihydroionol; 4-(2,6,6-trimethyl-1-cyclohexenyl)butan-2-ol
D066	Dihydro- β -ionone	2-Butanone, 4-(2,6,6-trimethyl-1-cyclohexen-1-yl; 4-(2,6,6-Trimethyl-1-cyclohexenyl)buten-2-one
D067	Dihydrocarveol	8- <i>p</i> -Menthen-2-ol; 6-methyl-3-Isopropenylcyclohexanol; Tuberyl alcohol
D068	Dihydrocarvone	<i>p</i> -Menth-8-en-2-one; 3-Isopropenyl-6-methylcyclohexanone; cis-Dihydrocarvone; cis-1-Dihydrocarvone; 8- <i>p</i> -menthen-2-one; cis- <i>p</i> -Menthen-8(9)-one(2); 1-Methyl-4-isopropenyl cyclohexan-2-one; Cis-Dihydrocarvone; cis-Menthen- 8(9)-one(2)
D069	Dihydrocarvyl acetate	<i>p</i> -Menth-8(9)-em-2-yl acetate; Tuberyl acetate; 1-Methyl-4-isopropenylcyclohexan-2-yl acetate; Carhydrine; 8- <i>p</i> -Menthen-2-yl; <i>p</i> -Menth-8-(9)-en-2-yl acetate;

Order	General Name	Synonyms
		6-Methyl-3-isopropenyl cyclohexyl acetate; 6-Methyl-3-(1-methylvinyl)cyclohexyl acetate; Dihydrocarveyl acetate
D070	Dihydrocoumarin	1,2-Benzodihydropyrone; Hydrocoumarin; o-Hydroxydihydrocinnamic acid lactone; 3,4-Dihydro-2h-1-benzopyran-2-one; 2-Chromanone; meliotine; Benzodihydropyrone; 3,4-Dihydrocoumarin; Hydrocoumarin; Melilotic acid lactone; 2-Oxochroman
D071	(+/-)Dihydrofarnesol	3,7,11-Trimethyl-6,10-dodecadien-1-ol, (+/-); 2,3-Dihydrofarnesol,(+/-)
D072	Dihydrojasmane	2-Pentyl-3-methyl-2-cyclopenten-1-one; 3-Methyl-2-pentylcyclopent-2-en-1-one; Dihydrojasmane; 3-Methyl-2-(n-pentanyl)-2-cyclopentene-1-one
D073	Dihydromintlactone	2(3H)-Benzofuranone, hexahydro-3,6-dimethyl; 3,6-Dimethylcyclohexylacetolactone; 2-(2-Hydroxy-4-methylcyclohexy)propionic acid γ -lactone; (+/-)-Dihydromintlactone
D074	1,10-Dihydronootkatone	Dihydronootkatone; 1,4,4a,5,6,7,8,8a-octahydro-4,4a-dimethyl-6-isopropenyl-2(1H)-naphthalenone
D075	2,5-Dihydroxy-1,4-dithiane	1,4-Dithiane-2,5-diol; Mercaptoacetaldehyde dimer; p-dithiane-2,5-diol
D076	Dihydroxyacetone	2-Propanone, 1,3-dihydroxy(monomer); 1,3-Dihydroxyacetone; α,α -Dihydroxyacetone(monomer); (Bis)hydroxymethylketone(monomer); Chromelin(monomer);1,4-Dioxan-2,5-dimethanol,2,5-dihydroxy-,trans(dimeric form)
D077	Dihydroxyacetophenone	1-(x,y-Dihydroxyphenyl) ethanone; dioxyacetophenone; 2,4-Dihydroxyacetophenone; 1-Phenyletanone, Dihydroxy derivative; Dihydroxyphenyl methyl ketone; 1-(dihydroxyphenyl)ethanone; 1-Ethanone
D078	2,4-Dihydroxybenzoic acid	β -Resorcylic acid; 4-carboxyresorcinol; β -Resorcinolic acid; p-Hydroxysalicylic acid

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Order	General Name	Synonyms
D079	Diisopentyl thiomalate	Butanedioic acid, mercapto-, bis(3-methylbutyl) ester; bis(3-Methylbutyl)-mercaptosuccinate
D080	Diisopropyl disulfide	Isopropyl disulfide; 2,5-Dimethyl-3,4-dithiahexane; bis(1-Methylethyl)disulfide; Disulfide, bis(1-methylethyl)
D081	Diisopropyl trisulfide	Bis(1-methylethyl)trisulfide; 2,6-Dimethyl-3,4,5-trithiaheptane
D082	Dimercaptomethane	Methanedithiol
D083	3,4-Dimethoxy-1-vinylbenzene	3,4-Dimethoxystyrene; 1,2-Dimethoxy-4-vinylbenzene
D084	m-Dimethoxybenzene	1,3-Dimethoxybenzene; Dimethylresorcinol; Resorcinol dimethyl ether
D085	p-Dimethoxybenzene	Dimethylbenzyl carbonyl acetate; 1,4-Dimethoxybenzene; Dimethyl hydroquinone; Hydroquinone dimethyl ether; 4-Methoxyphenyl methyl ether
D086	1,2-Dimethoxybenzene	Veratrole; o-Dimethoxybenzene; Catechol dimethyl ether
D087	N1-(2,4-Dimethoxybenzyl)-N2-(2-(pyridin-2-yl)ethyl) oxalamide	Ethanediamide, N-[(2,4-dimethoxyphenyl)methyl]-N-(2-(2-pyridinyl)ethyl)-
D088	1,1-Dimethoxyethane	Acetaldehyde dimethyl acetal; Dimethyl acetal; Ethylidene dimethyl ether
D089	2,6-Dimethoxyphenol	2-Hydroxy-1,3-dimethoxybenzene; syringol; pyrogallol dimethyl ether; Pirogallol, 1,3-dimethyl ether; Syringol
D090	1,1-Dimethoxy-trans-2-hexene	1,1-Imethoxy-E-2-hexene; 2-hexene, 1,1-dimethoxy-, (2E)-; 2-Hexene, 1,1-dimethoxy-, (E)-; (E)-2-Hexenal dimethyl acetal; trans-20-Hexenal dimethyl acetal
D091	2,4-Dimethyl anisole	1,3-Dimethyl-4-methoxybenzene; 2,4-Dimethyl-1-methoxybenzene; 1-Methoxy-2,4-dimethylbenzene; 4-methoxy-m-xylene
D092	Dimethyl anthranilate	Methyl N-methylantranilate; Dimethyl anthranilate; 2-Methylamino methyl benzoate; Methyl 2-Methylamonobenzoate; Methyl o-Methylaminobenzoate

Order	General Name	Synonyms
D093	Dimethyl benzyl carbonyl butyrate	Benzyl dimethyl carbonyl butyrate; Dmbc butyrate; 2-Benzyl-2-propyl butyrate; 1,1-Dimethyl-2-phenethyl butyrate; 2-benzyl-2-propyl butyrate; DMBC butyrate; 2-Methyl-1-phenyl-2-propyl butyrate; α,α -Dimethylphenethyl butyrate
D094	Dimethyl disulfide	Methyldisulfide; Methyl disulphide
D095	(+/-)-N,N-Dimethyl menthyl succinamide	Butanoic acid, 4-(Dimethylamino-4-oxo-, (1R,2S,5R)-5-methyl-2-(1-methylethyl)- cyclohexyl ester; Butanoic acid, 4-(dimethylamino)-4-oxo-, [1R-(1 α , 2 β , 5 α)]-5-methyl-2-(1-methylethyl)cyclohexyl ester
D096	Dimethyl methoxy furanone	2,5-Dimethyl-4-methoxy-3(2H)-furanone; 4-Methoxy-2,5-dimethyl-3(2H)-furanone; Furaneol methyl ether; Mesifurane; 4-Methoxy-2,5-dimethyl-3-furanone
D097	2,6-Dimethyl octanal	Isodecylaldehyde
D098	Dimethyl phenethyl carbonyl acetate	2-Methyl-4-phenyl-2-butyl acetate; 1,1-Dimethyl-3-phenylpropan-1-yl acetate; 1,1-Dimethyl-3-phenylpropyl acetate; Dimethyl phenethyl carbonyl acetate
D099	Dimethyl phenethyl carbonyl isobutyrate	2-Methyl-4-phenyl-2-butyl isobutyrate; 2-Methyl-4-phenyl-2-butyl 2-methylpropanoate; phenylethyl dimethyl carbonyl isobutyrate; 1,1-Dimethyl-3-phenylpropyl isobutyrate; Dimethyl phenethyl carbonyl isobutyrate
D100	Dimethyl succinate	Dimethyl butanedioate; Methyl succinate; Methyl butanedioate
D101	Dimethyl trisulfide	Methyl trisulfide; Methyl trithio methane; Methyl trisulphide
D102	2,6-(Dimethyl)thiophenol	Benzenethiol, 2,6-dimethyl-; 2,6-dimethylbenzenethiol; 2,5-xylenethiol
D103	3,5-Dimethyl-1,2,4-trithiolane	1,2,4-Trithiolane, 3,5-dimethyl-; 2,5-dimethyl-1,3,4-trithiolane; 3,5-dimethyl-1,2,4-trithiaclopentane

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Order	General Name	Synonyms
D104	3,4-Dimethyl-1,2-cyclo-pentadione	2-Hydroxy-3,4-dimethyl-2-cyclopenten-1-one
D105	3,5-Dimethyl-1,2-cyclo-pentadione	
D106	3,7-Dimethyl-1,3,6,-octatriene	β-Ocimene; Ocimene; trans-β-ocimene; 1,3,6-octatriene, 3,7-dimethyl-
D107	3,5- and 3,6-Dimethyl-1,3-dimethyl-2-isobutylpyrazine	Pyrazine, 3,5-dimethyl-3-(2-methylpropyl)- and pyrazine, 3,6-dimethyl-3-(2-methylpropyl)-; 3,5-Dimethyl-3-(2-methylpropyl)-1,4-diazine and 3,6-dimethyl-3-(2-methylpropyl)-1,4-diazine
D108	2,4-Dimethyl-1,3-dioxolane	1,3-Dioxolane, 2,4-dimethyl-; Acetaldehyde cyclic propylene glycol acetal; Propylene acetal
D109	(E,R)-3,7-Dimethyl-1,5,7-octatrien-3-ol	3,7-Dimethylocta-1,5,7-trien-3-ol; Hotrienol; Dehydrolinalool; (E)-3,7-dimethyl-1,5,7-octatrien-3-ol
D110	2,6-Dimethyl-10-methylene-2,6,11-dodecatrienal	
D111	3,7-Dimethyl-1-octanol	3,7-Dimethylcotanol; Dihydrocitronellol; Tetrahydrogeraniol
D112	2,5-Dimethyl-2,5-dihydroxy-1,4-dithiane	2,5-Dihydroxy-2,5-dimethyl-1,4-dithiane; 2,5-Dimethyl-2,5-dihydroxy-p-dithiane
D113	3,7-Dimethyl-2,6-octadien-1-yl 2-ethylbutanoate	Geranyl 2-ethyl butyrate; trans-3,7-Dimethyl-2,6-octadien-1-yl 2-ethylbutanoate; 3,7-Dimethylocta-2,6-dienyl 2-ethylbutanoate
D114	2-(3,7-Dimethyl-2,6-octadienyl)cyclopentanone	(E)-2-(3,7-Dimethyl-2,6-octadienyl)cyclopentanone; Decenylcyclopentanone; Geranylcyclopentanone
D115	4,5-Dimethyl-2-ethyl-3-thiazoline	2-Ethyl-4,5-dimethyl-3-thiazoline; 2-Ethyl-2,5-dihydro-4,5-dimethylthiazole
D116	4,5-Dimethyl-2-isobutyl-3-thiazoline	2,5-Dihydro-4,5-dimethyl-2-(2-methylpropyl) thiazole; 2-Isobutyl-4,5-dimethyl-3-thiazoline; 4,5-Dimethyl-2-(2-methylpropyl)-3-thiazoline; 3-Thiazoline, 4,5-dimethyl-2-(2-methylpropyl)-

Order	General Name	Synonyms
D117	2,4-Dimethyl-2-pentenoic acid	
D118	2,5-Dimethyl-3(2H)-furanone	3(2H)-Furanone, 2,5-dimethyl-; 2,3-Dihydro-2,5-dimethyl-3-furanone; 2,5-Dimethyl-2,3-dihydrofuran-3-one; 2,5-Dimethyl-2H-furan-3-one
D119	(+/-)-trans- and cis-4,8-Dimethyl-3,7-nonadien-2-ol	(+/-)E- and Z-4,8-Dimethyl-3,7-nonadien-2-ol; 3,7-Nonadien-2-ol, 4,8-dimethyl- (E,Z)-
D120	(E) & (Z)-4,8-Dimethyl-3,7-nonadien-2-one	Citronone
D121	(+/-)-trans- and cis-4,8-Dimethyl-3,7-nonadien-2-yl acetate	(+/-)E- and Z-4,8-Dimethyl-3,7-nonadien-2-yl; Acetate; 3,7-Nonadien-2-ol, 4,8-dimethyl-, acetate (E,Z)-
D122	2,6-Dimethyl-3-[(2-methyl-3-furyl)thio]-4-heptanone	1,3-Diisopropylacetyl 2-methyl-3-furyl sulfide; 4-Heptanone, 2,6-dimethyl-3-[(2-methyl-3-furanyl)thiol]-; 3-((2-Methyl-3-furyl)thio)-2,6-dimethyl-4-heptanone
D123	2,5-Dimethyl-3-furan thioisovalerate	2,5-Dimethyl-3-(isopentylthio)furan; S-(2,5-Dimethyl-3-furyl) 3-methylbutanethioate; S-(2,5-dimethyl-3-furyl)thioisovalerate; 2,5-Dimethyl-3-thioisovalerylfuran
D124	2,5-Dimethyl-3-furanthiol	2,5-Dimethyl-3-furylmercaptan; 2,5-Dimethyl-3-mercaptofuran
D125	2,5-Dimethyl-3-furanthiol acetate	Ethanethioic acid, S-(2,5-dimethyl-3-furanyl)ester; S-(2,5-Dimethyl-3-furyl)-ethanethioate; S-(2,5-Dimethylfuran-3-yl)ethanethioate; S-(2,5-Dimethylfur-3-yl)thioacetate; Thioacetic acid S-(2,5-dimethylfuran-3-yl)ester; 2,5-Dimethyl-3-thioacetoxymethylfuran; 3-Thioacetyl-2,5-dimethylfuran; 3-Acetylthio-2,5-dimethylfuran; 3-(Acetylthio)-2,5-dimethylfuran
D126	bis-(2,5-Dimethyl-3-furyl) disulfide	3,3(1)-Dithiobis(2,5-dimethylfuran); Furan, 3,3"-dithiolbis[2,5-dimethyl]-
D127	4,5-Dimethyl-3-hydroxy-2,5-dihydrofuran-2-one	3-Hydroxy-4,5-dimethyl-2(5H)-furanone; 3-Hydroxy-4,5-dimethylfuran-2(5H)-one; 2,3-Dimethyl-4-Hydroxy-2,5-dihydrofuran-5-one; 3-Hydroxy-4,5-dimethyl-2(5)-furanone; 2-Hydroxy-3-methyl-2-penten-4-olide; Sugar

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Order	General Name	Synonyms
		lactone; 2-Hydroxy-3-methylpent-2-en-1,4-lactone
D128	2,5-Dimethyl-3-oxo-(2H)-fur-4-yl butyrate	Butanoic acid, 4,5-Dihydro-2,5-dimethyl-4-oxo-3-furanyl ester; 4-Butyroxyl-2,5-dimethyl-3(2H)-furanone
D129	2,5-Dimethyl-3-thiofuroylfuran	S-(2,5-Dimethyl-3-furyl)thio-2-furoate; 3-Furancarbothioic acid S-(2,5-dimethyl-3-furanyl) ester
D130	1,4-Dimethyl-4-acetyl-1-cyclohexene	1-(1,4-Dimethylcyclohex-3-en-1-yl)ethan-1-one; 1,4-Dimethylcyclohex-3-enyl methyl ketone
D131	2,5-Dimethyl-4-ethoxyfuran-3(2H)-one	3(2H)-Furanone, 4-ethoxy-2,5-dimethyl-; 2,3-Dihydro-2,5-dimethyl-4-ethoxy-3-furanone; 2,5-Dimethyl-2,3-dihydro-4-ethoxyfuran-3-one; 2,5-Dimethyl-4-ethoxy-2H-furan-3-one
D132	2,6-Dimethyl-4-heptanol	Di-isobutyl carbinol; 4-Hydroxy-2,6-dimethyl heptane; Di-isobutyl carbinol
D133	2,6-Dimethyl-4-heptanone	Di-isobutyl ketone; 4-Heptanone, 2,6-dimethyl; Isobutyl ketone; isovalerone; iso-Nonanone
D134	2,2-Dimethyl-5-(1-methylpropen-1-yl)tetrahydrofuran	Citroxide; Furan, tetrahydro-2,2-dimethyl-5-(1-methyl-1-propenyl)-; Ocimen quintoxide; Tetrahydrofuran, 2,2-dimethyl-5-(1-methyl-1-propenyl)-
D135	6,10-Dimethyl-5,9-undecadien-2-one	2,6-Dimethyl-2,6-undecadien-10-one; Geranyl acetone; 5,9-Undecadien-2-one, 6,10-dimethyl-, (E); (E)-6,10-dimethylundeca-5,9-dien-2-one; α,β -Dihydropseudoionone
D136	2,6-Dimethyl-5-heptenal	2,6-Dimethylhept-5-1-al; 2,6-Dimethyl-2-hepten-7-al; Melonal
D137	2,4-Dimethyl-5-vinylthiazole	
D138	2,6-Dimethyl-6-hepten-1-ol	2,6-Dimethylhept-7-en-1-ol; α -Melonol
D139	3,7-Dimethyl-6-octenoic acid	Citronellic acid; Rhodinolic acid; Rhodinic acid

Order	General Name	Synonyms
D140	(S)-3,7-Dimethyl-7-octen-1-ol	
D141	2,4-Dimethylacetophenone	Acetyl-m-xylene; Methyl 2,4-dimethylphenyl ketone; 1-(2,4-Dimethylphenyl)ethanone
D142	2,4-Dimethylbenzaldehyde	2,4-Xylylaldehyde; 1-Formyl-2,4-dimethylbenzene
D143	2,3-Dimethylbenzofuran	Benzofuran, 2,3-dimethyl-
D144	p-α-Dimethylbenzyl alcohol	p-Tolyl methyl carbinol; Methyl-p-tolyl carbinol; 1-p-Tolyl-1-ethanol; 4-(α-Hydroxyethyl)toluene; 4-Methyl-α-phenethyl alcohol; 1-(4-Methylphenyl)ethanol, 1-p-Tolyethanol; 1-(p-Tolyl)ethan-1-ol; 4-Toluene
D145	α,α-Dimethylbenzyl isobutyrate	Phenyldimethylcarbiny l isobutyrate.
D146	(+/-)-trans- and cis-5-(2,2-Dimethylcyclopropyl)-3-methyl-2-pentenal	(+/-)E- and Z-5-(2,2-Dimethylcyclopropyl)-3-methyl-2-pentenal; 2-Pentenal, 5-(2,2-dimethylcyclopropyl)-3-methyl-(E,Z)-; Acitral
D147	4-(1,1-Dimethylethyl)phenol	p-Tert-butyl 4-tert-butylphenol; p-Tert-butylphenol, 4-Tert-butylphenol; p-Tert-butylphenol; 1-Hydroxy-4-tert-butylbenzene
D148	2,5-Dimethylfuran	Furan, 2,5-dimethyl-
D149	2,6-Dimethyloctanal	Isodecanal; Decylaldehyde(ISO); 2,6-Dimethyl octanoic aldehyde; isoaldehyde C-10; isodecylaldehyde
D150	α,α-Dimethylphenethyl acetate	Dimethyl benzyl carbiny l acetate; 2-Benzyl-2-propylate; 1,1-Dimethyl-2-phenethyl acetate; Benzyl dimethylcarbiny l acetate; Benzylpropyl acetate; 2-Benzyl-2-propyl acetate; 2-Methyl-1-phenyl-2-propyl acetate
D151	α,α-Dimethylphenethyl alcohol	Dimethylbenzyl carbinol
D152	α,α-Dimethylphenethyl butyrate	Benzyl dimethylcarbiny l butyrate
D153	α,α-Dimethylphenethyl formate	Benzyl dimethylcarbiny l formate

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Order	General Name	Synonyms
D154	N,N-Dimethylphenethylamine	Benzenemethanamine, N,N- α -trimethyl-, (R)-; Benzylamine, N,N, α -trimethyl-, L-(+)-; (+)-(R)-N,N-Dimethyl- α -phenethylamine; (+)-N,N, α -Trimethylbenzylamine; (+)-N,N-Dimethyl- α -methylbenzylamine; (R)-(+) -N,N-Dimethyl-1-phenethylamine; (R)- α -Methylbenzyl dimethylamine; (R)-Dimethyl(1-phenylethyl)amine; (R)-N,N-Dimethyl-1-phenethylamine; (R)-[1-(Dimethylamino)ethyl]benzene
D155	α,α -Dimethylphenylethyl alcohol	2-Benzyl-2-propanol; 2-Hydroxy-2-methyl-1-phenylpropane; α,α -Dimethylphenethanol; Benzyl dimethyl carbinol; Dimethyl benzyl carbinol; 1,1-Dimethyl-2-phenylethanol; 2-Methyl-1-phenyl-propanol-2; 2-Methyl-1-phenylpropan-2-ol; 2-Benzyl-2-propanol; 2-Hydroxy-2-methyl-1-phenylpropanone
D156	α,α -Dimethylphenylethyl formate	2-Benzyl-2-propyl formate; 2-Methyl-1-phenyl-2-propyl formate; Benzyl dimethylcarbinyl formate; Dimethylbenzylcarbinyl formate; α,α -Dimethylphenethyl formate
D157	2,3-Dimethylpyrazine	2,3-Dimethyl-1,4-diazine
D158	2,5-Dimethylpyrazine	2,5-Dimethylpiazine; 2,5-Dimethylparadiazine; 2,5-Dimethyl-1,4-diazine; glycoline
D159	2,6-Dimethylpyrazine	2,6-Dimethylparadiazine; 2,6-Dimethylpiazine; 2,6-Dimethyl-1,4-diazine; 2,6-Dimethyl-p-diazine
D160	2,6-Dimethylpyridine	2,6-Lutidine
D161	p- α -Dimethylstyrene	p-Propenyl iso benzene; 1-Isopropenyl-4-methylbenzene; p-Isopropenyl toluene; 1-Methyl-4-isopropenylbenzene; 2-p-Tolyl propene; 4- α -Dimethylstyrene; dehydro-p-cymene
D162	2,5-Dimethyltetrahydro-3-furyl thioacetate, cis and trans isomers	cis and trans-2,5-Dimethyltetrahydro-3-furyl thioacetate; Ethanethioic acid, S-(tetrahydro-2,5-dimethylfuran)ester;

Order	General Name	Synonyms
		S-(2,5-dimethyl)tetrahydrofuran-3-yl thioacetate
D163	2,5-Dimethyltetrahydrofuran-3-thiol, cis and trans isomers	cis & trans 2,5-Dimethyltetrahydrofuran-3-thiol; Tetrahydro-2,5-dimethylfuran-3-thiol
D164	4,5-Dimethylthiazole	
D165	2,5-Dimethylthiazole	
D166	Diphenyl ether	Phenyl ether; Diphenyl oxide
D167	1,3-Diphenyl-2-propanone	α,α -1-Diphenylacetone; Benzyl ketone; Dibenzyl ketone; α,α -Diphenylacetone
D168	Dipropyl disulfide	Propyldithiopropene; di- <i>n</i> -propyl disulfide; 1-Propyl disulfide; Propyl disulfide
D169	Dipropyl trisulfide	Propyl trisulfide; Propyl trithio propane; Propyl trisulphide
D170	Disodium succinate	Succinic acid, disodium salt; Sodium succinate; Hept-2-enoic acid; Disodium butanedioic acid
D171	1,4-Dithiane	p-Dithiane; 1,4-Dithiacyclohexane; Tetrahydro-1,4-dithiin; Diethylene disulfide
D172	2,8-Dithianon-4-ene-4-carboxaldehyde	Methialdol; 5-(Methylthio)-2-(methyl-thio) methylpent-2-en-1-al; 2-Pentenal, 5-(methyl-thio-2-[(methylthio)methyl]-2-pentenal
D173	2,2'-(Dithiodimethylene)difuran	2-Furfuryl disulfide; Methyl 2-furylmethyl disulfide; Furfuryl methyl disulfide; Bis (2-furfuryl) disulfide; difurfuryl Disulfide; Furfuryl disulfide; Difurfuryl disulfide
D174	Divanillin	[1,1 -Biphenyl]-3,3 -dicarboxaldehyde, 6,6-dihydroxy-5,5 -dimethoxy-; 3,3 -Biphenyl-dicarboxaldehyde, 6,6 -dihydroxy-5,5 -dimethoxy-; 6,6 -Dihydroxy-5,5 -dimethoxybiphenyldicarboxaldehyde; 2,2 -Dihydroxy-3,3 -dimethoxy-5,5 -diformylbiphenyl; 5,5 -Bivanillin; Dehydrodivanillin
D175	2-trans-6-cis-Dodecadienal	2,6-Dodecadienal,(E,Z)-; Dodeca-2,6-dienal
D176	trans,trans-2,4-Dodecadienal	(E,E)-2,4-dodecadienal; Dodeca-2,4-dienal

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Order	General Name	Synonyms
D177	γ -Dodecalactone	4-Dodecanolide; 5-Octyldihydro-2(3H)-furanone; Dodeca-1,4-lactone; 4-n-Octyl-4-hydroxybutanoic acid lactone; Dodecano-1,4-lactone; Dodecanolide-1; 4-Hydroxydodecanoic acid, γ -lactone; γ -Octyl- γ -butyrolactone; γ -n-Octyl- γ -n-butyrolactone; Dodecanolide-1,4
D178	delta-Dodecalactone	5-Dodecanolide; 6-Heptyltetrahydro-2-pyrone; Dodeca-1,5-lactone; Dodecanolide-1,5; Dodecano-1,5-lactone; n-Heptyl- δ -valerolactone; 5-Hydroxydodecanoic acid, δ -lactone; delta-n-Heptyl-delta-valerolactone; delta-Heptyl-delta-valerolactone; Dodecanolide-1,5
D179	trans-2-Dodecenal	2-Dodecenal; 3-Nonylacrolein; 2-Dodecenal; n-Dodecenal; Dodec-2-enal
D180	(Z)-4-Dodecenal	cis-4-Dodecenal; Tangerinal
D181	2-Dodecenoic acid	(E)-2-Decenoic acid, trans-2-Decenoic acid; 2-Decenoic acid
D182	Dodecyl isobutyrate	Dodecyl 2-methylpropanoate; Lauryl isobutyrate; Lauryl 2-methylpropanoate; Propanoic acid, 2-methyl-, dodecyl ester; Lauryl 2-methylpropionate
D183	Diethyl oxalate	Oxalic acid, diethyl ester; Diethyl ethanedioate; Ethyl oxalate; Diethyl ester kyseliny stavelove; Diethyl ester of oxalic acid; Diethyl ester, oxalic acid; Oxalic ether; Ethanedioic acid, diethyl ester
D184	Diphenylmethane	Benzene, 1,1'-methylenebis-; Methane, diphenyl-; Benzene, (phenylmethyl)-; Benzylbenzene; Ditan; Ditane; Benzene, benzyl-; Toluene, α -phenyl-; 1,1'-Dimethylenebis(benzene)
D185	Diethyl carbonate	Ethyl carbonate; Diatol; Ethoxyformic anhydride; Diaethylcarbonat; Diethyl ester of carbonic acid; Carbonic acid, diethyl ester
D186	2,4-Dimethylphenol	2,4-Xylenol; m-Xylenol; 1-Hydroxy-2,4-dimethylbenzene; 4-Hydroxy-1,3-dimethylbenzene; 4,6-Dimethylphenol; 1,3-Dimethyl-4-hydroxybenzene; 1,2,4-Xylenol; Phenol, 2,4-dimethyl-

Order	General Name	Synonyms
D187	1,1-Dipropoxyethane	Acetaldehyde, dipropyl acetal; Acetaldehyde di-n-propyl acetal; Dipropyl acetal; n-Propyl acetal; 1-(1-Propoxyethoxy)propane; Ethane, 1,1-dipropoxy; Propane, 1,1'-[ethylidenebis(oxy)]bis-
D188	2,4-Dimethylpyridine	2,4-Lutidine; α,γ -Dimethylpyridine; 2,4-Lutidene; Pyridine, 2,4-dimethyl-
D189	Dimethyl malonate	Malonic acid, dimethyl ester; Dimethyl propanedioate; Methyl malonate; Dimethyl ester of malonic acid; Propanedioic acid, dimethyl ester
D190	Dimethoxymethane	Dimethyl formal; Anesthenyl; Formal; Formaldehyde dimethyl acetal; Methoxymethyl methyl ether; Methylal; Methylene dimethyl ether; Methylene glycol dimethylether; Formaldehyde dimethyl; Methylenedioxydimethane; Formaldehyde methyl ketal; 2,4-Dioxapentane; Methyl formal; Dimethylacetal formaldehyde; Methane, dimethoxy-
D191	1,3-Diformylpropane	Glutaraldehyde; Pentanedial; Glutural; Glutardialdehyde; Glutaric acid dialdehyde; Glutaric aldehyde; Glutaric dialdehyde; 1,5-Pentanedione; Glutaraldehyd; Glutarol; Glutaclean; Sterihyde; Dioxopentane; Glutaralum; Gluteraldehyde; Pentane-1,5-dial; Potentiated acid glutaraldehyde; Glutaral; 1,5-Pentanedial
D192	Dipropyl sulfide	Propyl sulfide; Dipropyl thioether; Propyl monosulfide; 4-Thiaheptane; 1,1'-Thiobispropane; n-Propyl sulfide; di-n-Propyl sulfide; Sulfide, n-propyl-; 1-(Propylsulfanyl)propane; Propane, 1,1'-thiobis-
D193	Dodecane	Adakane 12; Bihexyl; Dihexyl; n-Dodecane min; Duodecane; n-Dodecane
D194	Dodec-1-ene	α -Dodecene; n-Dodec-1-ene; Adacene 12; α -Dodecylene; Dodecylene α -; Dodecene-1; 1-Dodecene; Tetrapropylene
D195	1,1-Diphenethoxyethane	Acetaldehyde diphenylethylacetal; (2-[1-(2-Phenylethoxy)ethoxy]ethyl)benzene; Benzene, 1,1'-[ethylidenebis(oxy-2,1-ethanediyl)]bis-; Phenylethylacetal
D196	Dimethylamine	N-Methylmethanamine; N,N-Dimethylamine; Methanamine, N-methyl-
D197	3,4-Dihydroxybenzaldehyde	Benzaldehyde, 3,4-dihydroxy-; 3,4-Dihydroxybenzenecarbonal; 1,2-Dihydroxy-4-formylbenzene; 4-Formyl-1,2-dihydroxybenzene;

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Order	General Name	Synonyms
D198	Dibutyl succinate	Protocatechualdehyde; Protocatechuic aldehyde; 4-Formyl-1,2-benzenediol Butanedioic acid, dibutyl ester; Succinic acid, dibutyl ester; Di-n-butyl succinate; Succinic acid di-n-butyl ester
D199	Diethyl maleate	Maleic acid, diethyl ester; Ethyl maleat; Diethyl (2Z)-2-butenedioate; 2-Butenedioic acid (Z)-, diethyl ester
D200	Diethyl adipate	Adipic acid, diethyl ester; Diethyl hexanedioate; Ethyl δ -carboethoxyvalerate; Ethyl adipate; Diethyl adipate; 1,6-Diethyl hexanedioate; Diethylester kyseliny adipove; Hexanedioic acid, diethyl ester
D201	Diethoxymethane	Methane, diethoxy-; Ethane, 1,1'-[methylenebis(oxy)]bis-; Diethylformal; Ethoxymethyl ethyl ether; Ethylal; Formaldehyde diethyl acetal; 1-(Ethoxymethoxy)ethane; 1,1-Diethoxy methane
D202	3,3-Dimethylbutan-2-ol	Pinacolyl alcohol; tert-Butyl Methyl carbinol; 2,2-Dimethyl-3-butanol; 3,3-Dimethyl-2-butanol; Pinacolyl alcohol-tert-butyl methylcarbinol; 2-Butanol, 3,3-dimethyl-
D203	3,4-Dimethylpyridine	3,4-Lutidine; 3,4-Lutidine; Pyridine, 3,4-dimethyl-
D204	2,3-Dimethylpyridine	2,3-Lutidine; Pyridine, 2,3-dimethyl-
D205	2,4-Dimethylhexane	Hexane, 2,4-dimethyl-
D206	2,2-Dimethylhexane	Hexane, 2,2-dimethyl-
D207	3,5-Dimethylpyridine	3,5-Lutidine; Pyridine, 3,5-dimethyl-
D208	Diethyl Fumarate	Fumaric acid, diethyl ester; Ethyl fumarate; 2-Butenedioic acid, diethyl ester, (E)-; Diethylester kyseliny fumarove; Diethyl ester of (E)-2-Butenedioic acid; Diethyl (2E)-2-butenedioate; 2-Butenedioic acid (E)-, diethyl ester
D209	Diethyl nonanedioate	Nonanedioic acid, diethyl ester; Azelaic acid, diethyl ester; Diethyl azelaate; Diethyl azelate
D210	2,5-Dimethylthiophene	Thiophene, 2,5-dimethyl-
D211	2,6-Dimethylocta-2,4,6-triene	cis-Allo-ocimene; Neo-allo-ocimene; allo-3,7-dimethyl-1,3,6-octatriene (allo-ocimene); neo-allo-3,7-dimethyl-1,3,6-octatriene

Order	General Name	Synonyms
		(neo-allo-ocimene);2,4,6-Octatriene, 2,6-dimethyl-;Allo-Ocimene;(4E,6E)-2,6-Dimethyl-2,4,6-octatriene
D212	1,1-Diethoxyheptane	Heptanal, diethyl acetal; Heptaldehyde diethyl acetal; n-Heptanal diethyl acetal;Heptane, 1,1-diethoxy-
D213	2-Decanone	Decan-2-one; Methyl octyl ketone; Methyl n-octyl ketone; Octyl methyl ketone
D214	Di-isopentyl succinate	Succinic acid, diisopentyl ester
D215	Diethyl pentanedioate	Glutaric acid, diethyl ester; Diethyl glutarate; Ethyl glutarate; Propane-1,3-dicarboxylic acid diethyl ester;Pentanedioic acid, diethyl ester
D216	1,1-Dibutoxyethane	Butane, 1,1'-[ethylidenebis(oxy)]bis-; Acetaldehyde, dibutyl acetal; Di-n-butyl acetal; Ethane, 1,1-dibutoxy-; 1,1-Di-n-butoxyethane; Dibutyl acetal; 1-(1-Butoxyethoxy)butane;6-Methyl-5,7-dioxaundecane
D217	1,1-Dimethoxyhexane	Hexane, 1,1-dimethoxy-; hexanal dimethyl acetal
D218	6,10-Dimethylundecan-2-one	Hexahydropseudoionone; Pseudoionone, hexahydro-; Tetrahydrogeranylacetone; 6,10-Dimethyl-2-undecanone;2-Undecanone, 6,10-dimethyl-
D219	1,2-Dihydrolinalool	6-Octen-3-ol, 3,7-dimethyl-; 3,7-Dimethyl-6-octen-3-ol; Dihydrolinalol
D220	2,6-Dimethyloct-6-en-3-one	
D221	Dodecyl butyrate	1-Dodecanol, butanoate; Butanoic acid, dodecyl ester;Butyric acid, dodecyl ester
D222	1,1-Diethoxypropane	Propionaldehyde, diethyl acetal; Propanaldiethylacetal;Propane, 1,1-diethoxy-
D223	1,1-Dihexyloxyethane	
D224	Decanal propyleneglycol acetal	
D225	1,1-Di-isobutoxyethane	Acetaldehyde, diisobutyl acetal; Propane, 1,1'-[ethylidenebis(oxy)]bis*2-methyl-; 1-(1-Isobutoxyethoxy)-2-methylpropane; Diisobutyl acetal; Ethane, 1,1-diisobutyloxy
D226	Dimethyl tetrasulfide	Dimethyl tetrasulphide; 1,4-Dimethyltetrasulfane;Tetrasulfide, dimethyl

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Order	General Name	Synonyms
D227	3,7-Dimethyloctanal	Tetrahydrocitrinal; Octanal, 3,7-dimethyl-
D228	Dodecan-2-one	Decyl methyl ketone; Methyl decyl ketone; Dodecanone-(2); 2-Dodecanone
D229	Dodecyl propionate	Propanoic acid, dodecyl ester
D230	2,5-Dithiahexane	1,2-Bis(methylmercapto)ethane; 1,2-Bis(methylthio)ethane; 1,2-Bis(methylsulfanyl)ethane; Ethane, 1,2-bis(methylthio)-
D231	2,3-Dihydrofarnesene	
D232	Dodecan-2-ol	Dodecanol-2; 2-Dodecanol
D233	1,1-Dipentyloxyethane	
D234	1,1-Di-isobutoxypropane	Propanal di-isobutyl acetal
D235	Dec-9-en-1-ol	ω -Decen-1-ol; Decylenic alcohol; 9-Decenol; ω -Decenol; 1-Decen-10-ol; 9-Decen-1-ol
D236	1,1-Di-isobutoxy-2-methylpropane	
D237	1,1-Di-isobutoxypentane	Valeraldehyde di-isobutyl acetal; Pentanal diisobutyl acetal
D238	1,1-Di-isobutoxy-3-methylbutane	Butane, 1,1-diisobutoxy-3-methyl-
D239	1,1-Di-(2-methylbutoxy)ethane	Acetaldehyde di(2-methylbutyl)acetal
D240	Dodecanal dimethyl acetal	1,1-Dimethoxydodecane; Dodecanal dimethyl acetal; Lauryl aldehyde dimethyl acetal; Dodecane, 1,1-dimethoxy-; Lauraldehyde, dimethyl acetal; n-Dodecanal dimethyl acetal
D241	2,6-Dimethyl-7-octen-2-ol	3,7-Dimethyl-1-octen-7-ol; Dihydromyrcenol; 2,6-Dimethyl-oct-7-en-2-ol; Mircenol, 6,10-dihydro; 7-Octen-2-ol, 2,6-dimethyl-
D242	neo-Dihydrocarveol	5-Isopropenyl-2-methylcyclohexanol; neo iso dihydrocarveol
D243	1,1-Dimethylethyl propionate	Propionic acid, tert-butyl ester; t-Butyl propanoate; t-Butyl propionate; tert-butyl propanoate; Propanoic acid, 1,1-dimethylethyl ester
D244	3,7-Dimethyloctyl acetate	1-Octanol, 3,7-dimethyl-, acetate; 3,7-Dimethyl-1-octanol, acetate; Dihydrocitronellyl acetate; 3,7-Dimethyloctanyl acetate; Tetrahydrogeranyl acetate
D245	(E)-2-Decenol	trans-2-Decen-1-ol; (2E)-2-Decen-1-ol; Dec-2-enol; 2-Decen-1-ol
D246	(+/-) cis- and trans-1,2-Dihydroperillaldehyde	(+/-)-Z- and E-1,2-Dihydroperillaldehyde; 4-Isopropenylcyclohexane-carboxaldehyde

Order	General Name	Synonyms
D247	2,6-Dimethoxy-4-vinylphenol	
D248	2,6-Dimethylocta-1,5,7-trien-3-ol	
D249	1,2-Dihydro-1,1,6-trimethylnaphthalene	Naphthalene, 1,2-dihydro-1,1,6-trimethyl-; 1,1,6-Trimethyl-1,2-dihydro-naphthalene (dehydro-ar-ionene); 1,1,6-trimethyl-1,2-dihydronaphthalene
D250	Dihydromyrcenol	
D251	2,5-Dimethyl-4-ethyloxazole	Oxazole, 4-ethyl-2,5-dimethyl-; 4-Ethyl-2,5-dimethyl-1,3-oxazole
D252	Decanal diethyl acetal	1,1-Diethoxydecane; 1,1-Bis(ethyloxy)decane; n-Decanal diethyl acetal;Decane, 1,1-diethoxy-
D253	3,3-Diethoxybutan-2-one	
D254	1,1-Diethoxyundecane	
D255	1,1-Diethoxynonane	Nonanal diethyl acetal;n-Nonanal diethyl acetal;Nonane, 1,1-diethoxy-
D256	2,5-Dimethyl-2-vinylhex-4-enal	
D257	cis-4-Decenol	cis-4-Decen-1-ol; (4Z)-4-Decen-1-ol; 4Z-decen-1-ol; (Z)-4-decenol;(Z)-4-decen-1-ol;4-Decen-1-ol, (Z)-
D258	cis-Dec-7-eno-1,4-lactone	(Z)-5-(3-Hexenyl)dihydrofuranne-2(3H)-one
D259	11-Dodecenoic acid	dodecenoic acid
D260	Di-(1-propenyl)-sulfide (mixture of isomeres)	1Propene, 1-1'-thiobis-, (Z,Z)-;(E,Z) Bis(1-propenyl)sulfide;(E,E) Bis(1-propenyl)sulfide
D261	Dec-7-eno-1,4-lactone	
D262	2,3-Dihydro-5,7-dihydroxy-2-(3-hydroxy-4-methoxyphenyl)-4H-1-benzopyran-4-one	Hesperetin; (±)-Hesperetin; (±)-5,7,3'-Trihydroxy-4'-methoxyflavanone; Eriodictyol 4'-monomethyl ether
D263	N-[2-(3,4-Dimethoxyphenyl)ethyl]-3,4-dimethoxycinnamic acid amide	Rubenamin;2-Propenamide, 3-(3,4-dimethoxyphenyl)-N-[2-(3,4-dimethoxyphenyl)ethyl]-;
D264	3,6-Dimethyl-2,3,3a,4,5,7a-hexahydrobenzofuran	3,6-Dimethyl-2,3,3a,4,5,7a-hexahydro-1-benzofuran; 3,9-Epoxy-p-Menth-1-ene
D265	1,1-Diethoxyhex-3-ene	cis-3-Hexenal diethyl acetal;3-Hexene, 1,1-diethoxy-, (Z)-;(3Z)-1,1-Diethoxy-3-hexene; (Z)-3-hexenal diethyl acetal
D266	2,6-Dimethyl-5-heptenal propyleneglycol acetal	

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Order	General Name	Synonyms
D267	2,7-Dimethylocta-5(trans),7-dieno-1,4-lactone	
D268	2,4-Dimethyl-4-nonanol	dimethyl nonanol
D269	2,4-Dimethyl-3-oxazoline	dimethyl oxazoline
D270	Dimethyl benzyl carbinyI crotonate	2-methyl-1-phenyl-2-propyl crotonate
D271	N-3,7-Dimethyl-2,6-octadienylcyclopropylcarboxamide	Cyclopropanecarboxamide, N-[(2E)-3,7-dimethyl-2,6-octadienyl]-
D272	1,4-Dioxaspiro[4.5]decan-2-one, 3,9-dimethyl-6-(1-methylethyl)-	Freshone
D273	Dimethylbenzyl carbinyI hexanoate	
E001	(+/-)-2,8-Epithio-cis-p-menthane	6-Thiabicyclo[3.2.1]octane, 4,7,7-trimethyl-, (Z)-; Zestoril; 2,8-Epithio-p-menthane
E002	4,5-Epoxy-(E)-2-decenal	3-(3-Pentyloxiran-2-yl)prop-(E)-2-enal, 2-Propenal, 3-(3-pentyloxiranyl),(2E)-
E003	Epoxyoxophorone	7-Oxabicyclo[4.1.0]heptane-2,5-dione, 1,3,3-trimethyl-; 3,5,5-Trimethyl-2,3-epoxycyclohexane-1,4-dione
E004	Epsilon-decalactone	6-Decanolide; 7-Butyl-2-oxooxacycloheptane; Deca-1,6-lactone; Decano-1,6-lactone; 6-Butylhexanolide; 7-butyl-2-oxepanone; 2-oxepanone, 7-butyl
E005	Epsilon-dodecalactone	6-Dodecanolid; 7-Hexyl-2-oxooxacycloheptane; Dodeca-1,6-lactone; Dodecano-1,6-lactone; 7-Hexyl-2-oxepanone; 2-oxepanone, 7-hexyl-
E006	Ethane-1,1-dithiol	1,1-Ethanedithiol
E007	1,2-Ethanedithiol	Dithioglycol; Ethylene mercaptan; 1,2-Dimercaptoethane; Ethylene dithioglycol; ethylenedimercaptan; Ethylene dimercaptan
E008	Ethanethioic acid,s-(2-methyl-3-furanyl) ester	3-(Acetylthio)-2-methylfuran; S-(2-methyl)-3-furyl thioacetate; 2-Methyl-3-thioacetatoxyfuran; 2-Methyl-3-furanthiol acetate

Order	General Name	Synonyms
E009	Ethanol	Ethyl alcohol; Methyl carbinol; Dehydrated alc.; Ethyl hydrate; Ethyl hydroxide
E010	1-Ethoxy-3-methyl-2-butene	Prenyl ethyl ether; Ethoxy-3-methyl-2-butene; Ethyl 3-methylbut-2-enyl ether
E011	2-Ethoxy-3-methylpyrazine	
E012	p-Ethoxybenzaldehyde	Homoanisaldehyde; 4-Ethoxybenzaldehyde
E013	o-(Ethoxymethyl)phenol	Phenol, 2-(ethoxymethyl)-; o-(ethoxymethyl)hydroxybenzene; o-hydroxybenzyl ethyl ether; α -Ethoxy-o-cresol; 2-(Ethoxymethyl)phenol
E014	2-Ethoxythiazole	2-Thiazolyl ethyl ether; Ethyl-2-thiazosyl ether
E015	Ethyl (p-tolyloxy)acetate	Vinegar naphtha; Ethyl p-cresoxy acetate; Ethyl (4-methylphenoxy)acetate; Ethyl cresoxyacetate
E016	Ethyl 10-undecenoate	Ethyl undec-10-enoate; Ethyl 10-hendecenoate; Ethyl undecylenoate
E017	Ethyl 2-(methyldithio)propionate	Ethyl α -(methyldithio)propionate
E018	Ethyl 2-(methylthio)acetate	Ethyl(methylthio)acetate, Ethyl β -(methylthio)acetate; Ethyl 2-methylthioacetate
E019	Ethyl 2,4,7-decatrienoate	Ethyl deca-2,4,7-trienoate; 2,4,7-Decatrienoic acid, ethyl ester
E020	Ethyl 2,4-dioxohexanoate	Ethyl-2,4-diketocaproate; Ethyl propionyl pyruvate; Ethyl propionylpyruvate
E021	Ethyl 2-acetyl-3-phenylpropionate	Ethyl 2-acetyldihydrocinnamate; Ethyl 2-benzylacetoacetate; Ethyl α -acetylhydroxycinnamate; Ethyl benzyl acetoacetate; Ethyl-3-oxo-2-benzylbutanoate
E022	S-Ethyl 2-acetylaminoethanethioate	(Acetylamino)ethanethioic acid, S-ethyl ester; S-ethyl 2-acetamidoethanethiolate; N-Acetylthioglycine, S-ethyl ester; N-Acetylglycinethiol ethyl ester
E023	Ethyl 2-ethyl-3-phenylpropionate	Ethyl 2-benzylbutyrate; Ethyl 2-ethyl dihydrocinnamate; Ethyl 2-ethyl-3-phenylpropanoate; Ethyl α -ethyl dihydrocinnamate; Ethyl

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Order	General Name	Synonyms
		benzylbutyrate
E024	Ethyl 2-mercaptopropionate	ethyl thioacetate; 2-Mercapto propionic acid, ethyl ester
E025	Ethyl 2-methyl-3,4-pentadienoate	ethyl 2-methylpenta-3,4-dienoate; 2,4-Pentadienoic acid, 2-methyl-ethyl ester
E026	Ethyl 2-methyl-3-pentenoate	ethyl 2-methylpent-3-enoate; 3-Pentenoic acid, 2-methyl-, ethyl ester
E027	Ethyl 2-methyl-4-pentenoate	ethyl 2-methylpent-4-enoate; 4-Pentenoic acid, 2-methyl-, ethyl ester
E028	Ethyl 2-methylbutyrate	Ethyl 2-methylbutanoate
E029	Ethyl 2-methylpentanoate	Ethyl 2-methylvalerate; Pentanoic acid, 2-methyl, ethyl ester
E030	Ethyl 2-nonynoate	Ethyl octyne carbonate; Ethyl octyne carboxylate; Ethyl non-2-ynoate; Ethyl hexyl propiolate
E031	Ethyl 3-(2-furyl)propionate	Ethyl 2-furanpropionate; Ethyl furfurylacetate; Ethyl furylpropionate;
E032	Ethyl 3-(furfurylthio)propionate	Ethyl 3-(2-furfurylthio)propionate; Ethyl β -furfuryl- α -thiopropionate; propanoic acid, 3-[(2-furanylmethyl)thio]-, ethyl ester; Ethyl β -furfuryl- α -thiopropionate
E033	Ethyl 3-(methylthio)butyrate	
E034	(+/-)Ethyl 3-acetoxy-2-methylbutyrate	Butanoic acid, 3-(acetyloxy)-2-methyl, ethyl ester; 3-Acetoxy-2-methylbutyric acid, ethyl ester
E035	Ethyl 3-hexenoate	Hydrosorbic acid, ethyl ester
E036	Ethyl 3-hydroxybutyrate	Ethyl β -hydroxybutyrate; Ethyl-3-hydroxybutanoate
E037	Ethyl 3-hydroxyhexanoate	Hexanoic acid, 3-Hydroxy-, ethyl ester, ethyl 3-hydroxycaproate
E038	(+/-)-Ethyl 3-mercaptoputyrate	3-Mercaptoputyric acid, ethyl ester
E039	Ethyl 3-mercaptopropionate	Ethyl 3-thiopropionate; Propanoic acid, 3-mercapto-, ethyl ester
E040	Ethyl 3-methylpentanoate	Ethyl 3-methylvalerate; Pentanoic acid, 3-methyl-, ethyl ester

Order	General Name	Synonyms
E041	Ethyl 3-methylthiopropionate	Ethyl- β -methylthiopropionate; ethyl methylmercaptopropionate
E042	Ethyl 3-oxohexanoate	Ethyl- β -ketohexanoate; Ethyl α -ketohexanoate; Ethyl 3-ketohexanoate; hexanoic acid, 3-oxo-, ethyl ester
E043	Ethyl 3-phenylpropionate	Ethyl dihydrocinnamate; Ethyl hydrocinnamate
E044	Ethyl 4-(acetylthio)butyrate	Butanoic acid, 4-(acetylthio)-, ethyl ester
E045	Ethyl 4-(methylthio)butyrate	Butanoic acid, 4-methylthio-, ethyl ester
E046	2-Ethyl 4-methylthiazole	Thiazole, 2-ethyl-4-methyl-
E047	Ethyl 4-phenylbutyrate	Butanoic acid, 4-phenyl, ethyl ester; Ethyl 4-phenylbutanoate; Ethyl phenylbutyrate; Ethyl- γ -phenylbutyrate
E048	Ethyl 5-(methylthio)valerate	Pentanoic acid, 5-(methylthio)-, ethyl ester
E049	Ethyl 5-hexenoate	5-Hexenoic acid, ethyl ester
E050	Ethyl acetate*	Ethyl ethanoate; Acetic ether; Vinegar naphtha
E051	Ethyl acetoacetate*	Ethyl acetyl acetate; Ethyl 3-oxobutyrate; Ethyl acetylacetate; Ethyl 3-ketobutyrate; Ethyl 3-oxobutanoate; Acetoacetic ester; Ethyl β -ketobutyrate; ethyl-3-oxobutanoate
E052	Ethyl aconitate(mixed esters)	Ethyl-2-carboxyglutamate; Ethyl 1-propene-1,2,3-tricarboxylate; Mixture of mono-di-and tri-ethyl propene-1,2,3-tricarboxylate; Triethyl aconitate
E053	Ethyl acrylate	Ethyl propeonate
E054	Ethyl anthranilate	Ethyl-2-aminobenzoate; Ethyl <i>o</i> -aminobenzoate
E055	Ethyl benzoate	Benzenecarboxylate; Ethyl benzenecarboxylate
E056	Ethyl benzoylacetate	Ethyl 3-phenyl-3-oxopropionate; Benzoyl acetic ester; ethyl β -keto- β -phenyl propionate; ethyl 3-phenyl-3-oxopropanoate
E057	Ethyl β -phenylpropionate	Ethyl 3-phenyl-2,3-epoxypropionate; ethyl α,β -epoxy- β -phenylpropionate;

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Order	General Name	Synonyms
		ethyl phenylglycidate; Ethyl α,β -epoxy- α -phenylpropionate; Ethyl 3-phenylglycidate
E058	Ethyl brassylate	Ethylene undecane dicarboxylate; Tridecanedioic acid cyclic ethylene glycol diester; Ethylene glycol brassylate, cyclic diester; Cyclo-1,13-ethylenedioxytridecan-1,13-dione; Emeressence 1150 (EMEQ); musk T (TAKA); 1,4-Dioxacycloheptadecan-5,17-dion; ethyleneglycol tridecadioic acid cyclic diester; MC-5(Soda); Ethylene brassylate
E059	Ethyl butyrate *	Ethyl butanoate; Ethyl n-butanoate; Butyric ether; Ethyl butanoate
E060	Ethyl cinnamate *	Ethyl phenylacrylate; cinnamic acid, ethyl ester; Ethyl β -phenylacrylate; ethyl-3-phenylpropenoate; Ethyl trans-cinnamate
E061	Ethyl cis-3-hexenoate	Ethyl Z-3-hexenoate; Ethyl (3Z)-hexenoate
E062	Ethyl cis-4,7-octadienoate	Ethyl octa-4,7-dienoate; Ethyl (Z)-4,7-octadienoate; 4,7-octadienoic acid, ethyl ester, (Z)-
E063	Ethyl cis-4-heptenoate	4-Heptenoic acid, ethyl ester; (Z)-Ethyl cis-hept-4-enoate; cis-4-Heptenoic acid ethyl ester
E064	Ethyl cis-4-octenoate	(Z)-ethyl oct-4-enoate; Ethyl oct-4-enoate
E065	Ethyl cyclohexanecarboxylate	Cyclohexanecarboxylic acid, ethyl ester
E066	Ethyl cyclohexanepropionate	Ethyl hexahydrophenylpropionate; Cyclohexane ethyl propionate; Ethyl-3-cyclohexyl- propanoate; Ethyl cyclohexylpropionate; Hexahydro phenylethyl propionate; Ethyl 3-cyclohexylpropionate
E067	Ethyl decanoate*	Ethyl caprinat; Ethyl caprate; Ethyl decylate
E068	Ethyl dodecanoate	Ethyl laurate; Ethyl dodecylate
E069	Ethyl formate	Ethyl methanoate; Formic ether

Order	General Name	Synonyms
E070	Ethyl furfuryl ether	Furfuryl ethyl ether; 2-(Ethoxymethyl)furan
E071	Ethyl heptanoate*	Ethyl caproate; Ethyl heptate; ethyl heptylate, Ethyl oenanthate; Oenanthic ester
E072	Ethyl hex-2-enoate	Ethyl hex-2-enoate; Ethyl (E)-2-hexenoate; 2-hexenoic acid, ethyl ester, (E)-
E073	Ethyl hexadecanoate	Ethyl cetylrate; ethyl palmitate; Hexadecanoic acid, ethyl ester
E074	Ethyl hexanoate*	Capronic ether absolute; Ethyl caproate; Ethyl capronate; ethyl hexylate
E075	Ethyl isobutyrate	Ethyl 2-methylpropanoate; Propanoic acid, 2-methyl-ethyl ester; Ethyl isobutanoate
E076	Ethyl isovalerate*	Ethyl isovalerianate; Ethyl 3-methylbutanoate; Ethyl isopentanoate; Ethyl β -methylbutyrate
E077	Ethyl lactate	Ethyl 2-hydroxypropanoate; Ethyl α -hydroxy propionate
E078	Ethyl levulinate	Ethyl 4-ketovalerate; Ethyl acetylpropanoate; Ethyl γ -ketovalerate; Ethyl-4-oxopentanoate; Ethyl 4-oxovalerate; Ethyl laevulate; Ethyl 4-oxopentanoate; Ethyl laevulinate
E079	Ethyl maltol	2-Ethyl-3-hydroxy-4h-pyran-4-one; Veltol-plus; 3-Hydroxy-2-ethyl-4-pyrone; 2-Ethyl pyromeconic acid; 3-Ethyl-2-hydroxy-4H-pyran-4-one; 2-ethyl-3-ol-4H-pyran-5-one; 2-Ethyl-3-ol-4H-pyran-4-one
E080	Ethyl methyl disulfide	Methyldisulfanylethane; 2,3-Dithiapentane
E081	Ethyl methyl-p-tolylglycidate	Ethyl 2,3-epoxy-3-methyl-3-p-tolylpropionate; Ethyl methyl-p-methylphenylglycidate; Oxiranecarboxylic acid, 3-methyl-3-(4-methylphenyl)-ethyl ester; Ethyl 3-methyl-3-(4-methylphenyl)oxiranecarboxylate; Ethyl 2,3-epoxy-3-methyl-3-ptolylpropionate

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Order	General Name	Synonyms
E082	Ethyl N-ethylantranilate	Benzoic acid, 2-(ethylamino)-, ethyl ester; Ethyl o-(ethylamino)benzoate
E083	Ethyl nitrite	Nitrous ether; spirit of nitrous ether
E084	Ethyl N-methylantranilate	Benzoic acid, 2-(methylanino)-, ethyl ester; Anthranilic acid, N-methyl-, ethyl ester; Ethyl 2-(methylanino) benzoate
E085	Ethyl nonanoate	Ethyl nonylate; Ethyl pelargonate
E086	Ethyl octadecanoate	Ethyl stearate; Octadecanoic acid, ethyl ester
E087	Ethyl octanoate*	Ethyl caprylate; Ethyl octylate
E088	Ethyl oleate	Ethyl cis-9-octadecenoate; Ethyl 9-octadecenoate
E089	Ethyl p-anisate	Ethyl p-methoxybenzoate; Ethyl 4-methoxybenzoate; Ethyl anisate
E090	Ethyl pentanoate	Ethyl valerate; Ethyl valerianate
E091	Ethyl phenylacetate*	α -Toluic acid, ethyl ester; Ethyl α -toluate; Ethyl benzeneacetate
E092	Ethyl propionate*	Ethyl propanoate; Propionic ether
E093	Ethyl propyl disulfide	1-Ethyldisulfanylpropane, 3,4-Dithiaheptane
E094	Ethyl propyl trisulfide	3,4,5-Trithiaoctane
E095	Ethyl pyruvate	Ethyl acetylformate; ethyl pyroracemate; Ethyl α -ketopropionate; Ethyl-2-oxopropanoate
E096	Ethyl r-anisate	
E097	o-Ethyl s-(2-furylmethyl) thiocarbonate	O-Ethyl s-(2-furylmethyl thiocarbonate; O-Ethyl s-(furan-2-yl methyl)thiocarbonate; O-Ethyl S-(2-furanylmethyl)thiocarbonate; O-Ethyl S-(2-furanylmethyl)carbonothioate; Ethoxy carbonyl furfurylthiol
E098	Ethyl salicylate	Salicylic ether; Sal ethyl; salicylic acid, ethyl ester; Ethyl 2-hydroxybenzoate; Ethyl o-hydroxy benzoate

Order	General Name	Synonyms
E099	Ethyl sorbate	Ethyl-2,4-hexadienoate; Ethyl hexa-2,4-dienoate; Ethyl sorbate
E100	Ethyl tetradecanoate	Ethyl myristate
E101	Ethyl thioacetate	Acetic acid, thioethyl ester; Thioacetic acid, ethyl ester, S-ethyl acetothiote; Acetic acid thio ethyl; Ethanethioic acid, S-ethyl ester
E102	Ethyl tiglate	Ethyl trans-2-methylcrotonate; Ethyl 2-methylcrotonate; Ethyl trans-2,3-dimethyl acrylate; Ethyl trans-2-methyl-2-butenate; Tiglic acid ethyl ester
E103	Ethyl trans-2, cis-4-decadienoate	Ethyldeca-2(cis),4(trans)-dienoate; Ethyl (2E,4Z)-decadienoate
E104	N-Ethyl trans-2-cis-6-nonadienamide	2,6-Nonadienamide, N-ethyl-, (2E,6Z)-
E105	Ethyl trans-2-decenoate	Ethyl dec-2-enoate; 2-Decenoic acid, ethylester, (E)-
E106	Ethyl trans-2-hexenoate	
E107	Ethyl trans-2-octenoate	Ethyl 2-octenoate; 2-Octenoic acid, ethyl ester, (E)-; Ethyl oct-2(trans)-enoate
E108	Ethyl trans-4-decenoate	Ethyl dec-4-enoate; 4-Decenoic acid, ethyl ester, (E)-
E109	Ethyl trans-butenate	Ethyl crotonate; ethyl α-crotonate; Ethyl trans-2-butenate; trans-2-butenic acid ethylester
E110	Ethyl undecanoate	Ethyl hendecanoate; ethyl undecylate; Ethyl undecanoate
E111	Ethyl vanillin*	Bourbonal; ethyl protal; 3-Ethoxyprotocatechualdehyde; Ethylprotocatechualdehyde-3-ethyl ether; 3-Ethoxy-4-hydroxybenzaldehyde
E112	Ethyl vanillin β-D-glucopyranoside	Glucoethylvanillin; 3-ethoxy-4-(β-glucopyranosyloxy)benzaldehyde
E113	Ethyl vanillin isobutyrate	2-Ethoxy-4-formylphenyl isobutyrate; 2-Ethoxy-4-formylphenyl 2-methylpropanoate
E114	Ethyl vanillin propylene glycol acetal	2-(3-Ethoxy-4-hydroxyphenyl)-4-methyl-1,3-dioxolane; 2-ethoxy-4-(4-methyl-1,3-dioxolan-2yl)phenol

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Order	General Name	Synonyms
E115	2-Ethyl(or methyl)-(3-, 5- or 6-)methoxypyrazine	2-Methyl(or ethyl)-(3,5 and 6)-methoxypyrazine; 2,5, or 6-Methoxy-3-ethylpyrazine; Mixture of 2-ethyl-3-methoxypyrazine and 2-ethyl-5-methoxypyrazine and 2-ethyl-6-methoxypyrazine and 2-methyl-3-methoxypyrazine and 2-methyl-5-methoxypyrazine and 2-methyl-6-methoxypyrazine; 3-Ethyl-(5 or 6)-methoxypyrazine, 5 or 6-Methoxy-3-ethyl-pyrazine
E116	2-Ethyl-1,3,3-trimethyl-2-norbornanol	Ethyl fenchol; 2-Ethylfenchol; 2-norbornanol, 2-ethyl-1,3,3-trimethylbicyclo[2.2.1]- heptan-2-ol
E117	2-Ethyl-1-hexanol	2-Ethylhexan-1-ol; 2-Ethyl hexyl alcohol
E118	4-Ethyl-2,6-dimethoxyphenol	4-Ethylsyringol; phenol, 4-ethyl-2,6-dimethoxy-; 2,6-Dimethoxy-4-ethylphenol
E119	3-Ethyl-2,6-dimethylpyrazine	2,6-Dimethyl-3-ethylpyrazine; 2-Ethyl-3,5-dimethylpyrazine; 3,5-Dimethyl-2-ethylpyrazine
E120	1-Ethyl-2-acetyl pyrrole	1-(n-ethylpyrrol-2-yl) ethanone; 1-Ethyl-2-acetylazole; 2-Acetyl-1-ethylpyrrole
E121	2-Ethyl-2-heptenal	2-ethyl-3-butylacrolein; 2- Ethylhept-2-enal
E122	5-Ethyl-2-hydroxy-3-methylcyclopent-2-en-1-one	1,2-cyclohexanedione; 2-Cyclopenten-1-one, 5-ethyl-2-hydroxy-3-methyl-; 5-ethyl-3-methylcyclotene
E123	3-Ethyl-2-hydroxy-4-methylcyclopent-2-en-1-one	2-Cyclopenten-1-one, 3-ethyl-2-hydroxy-4-methyl-; 3-Ethyl-2-cyclopenten-2-ol-1-one; ethylcyclopentenolone; 3-ethyl-4-methylcyclotene
E124	N-Ethyl-2-isopropyl-5-methylcyclohexane carboxamide	n-Ethyl-p-menthane-3-carboxamide; Cyclohexanecarboxamine, N-ethyl-5-methyl-2-(1-methylethyl)-; N-ethyl-p-menthane-3-
E125	5-Ethyl-2-methylpyridine	2-Methyl-5-ethylpyridine; pyridine, 5-ethyl-2-methyl-; 5-Ethyl-2-picoline
E126	2-Ethyl-3,(5 or 6)-dimethylpyrazine	3,5-Dimethyl-2-ethylpyrazine; 2,5-Dimethyl-3-ethylpyrazine; Mixture of

Order	General Name	Synonyms
		2-ethyl-3,5-dimethylpyrazine and 3-ethyl-2,5-dimethylpyrazine; 2,6-Dimethyl-3-ethylpyrazine; 2-Ethyl-3,6-dimethyl pyrazine; 3-Ethyl-2,5(6)-dimethyl pyrazine; 3,6-Dimethyl-2-ethylpyrazine
E127	5-Ethyl-3-hydroxy-4-methyl-2(5H)-furanone	2-Hydroxy-3-methyl-2-hexen-4-olide; 2,4-Dihydroxy-3-methyl-2-hexenoic acid, γ -lactone; 2-Ethyl-3-methyl-4-hydroxydihydro-2,5-furan-5-one; 2-hydroxy-3-methyl- γ -2-hexene-lactone; Ethyl Fenugreek lactone; Emoxyfuranone
E128	2-Ethyl-3-methylpyrazine	2-ethyl-3-methyl-1,4-dizine; 2-Methyl-3-ethylpyrazine
E129	2-Ethyl-4,5-dimethyloxazole	4,5-Dimethyl-2-ethyloxazole; Oxazole, 2-ethyl-4,5-dimethyl-
E130	2-Ethyl-4-hydroxy-5-methyl-3(2H)-furanone	Homofuronol (GIV); 5-Ethyl-4-hydroxy-2-methyl-3(2H)-furanone; 3(2H)-furanone, 5-ethyl-4-hydroxy-2-methyl-
E131	2-Ethyl-5-methylpyrazine	2-Methyl-5-ethylpyrazine; 2-Ethyl-5-methyl-1,4-diazine
E132	2-Ethyl-6-methylpyrazine	Pyrazine, 2-ethyl-6-methyl; 2-Methyl-6-ethylpyrazine; 6-Methyl-2-ethylpyrazine; 2-Ethyl-6-methyl-1,4-diazine
E133	Ethylamine	1-Aminoethane; Aminoethane; Monoethylamine; n-Ethylamine
E134	4-Ethylbenzaldehyde	Benzaldehyde, 4-ethyl; <i>p</i> -ethylbenzaldehyde
E135	α -Ethylbenzyl butyrate	1-Phenyl-1-propyl butyrate; Ethyl phenyl carbonyl butyrate; α -phenylpropyl butyrate; 1-Phenylpropyl butyrate; α -Ethylbenzyl butyrate
E136	2-Ethylbutyl acetate	β -Ethylbutyl acetate
E137	2-Ethylbutyraldehyde	2-Ethylbutanal; diethylacetaldehyde
E138	2-Ethylbutyric acid	2-Ethylbutyric acid; Diethylacetic acid; α -Ethylbutyric acid
E139	Ethylcyclopentenolone	3-Ethyl-2-hydroxy-2-cyclopenten-1-one; 3-Ethylcyclopentane-1,2-dione;

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		3-Ethyl-2-cyclopenten-2-ol-1-one; 2-Hydroxy-3-ethyl-2-cyclopenten-1-one; Ethyl cyclopentenolone; Ethyl cyclopentalone
E140	2-Ethylfuran	2-Ethyloxole
E141	4-Ethylguaiacol	2-Methoxy-4-ethylphenol; 1-hydroxy-2-methoxy-4-ethylbenzene; Ethyl 3(2-furyl)propionate; 4-Ethyl-2-methoxyphenol; Homocresol; 2-Methoxy-2-ethylphenol
E142	2-Ethylhexanethiol	2-Ethylhexane-1-thiol; 2-Ethylhexyl mercaptan
E143	1-Ethylhexyl tiglate	1-Ethylhexyl 2-methylcrotonate; Octen-3-yl 2-methyl-2-butenolate; 2-Butenoic acid, 2-methyl-, 1-ethylhexyl ester, (E)-; 1-Ethylhexyl 2-methyl-2-butenolate; 1-Ethylhexyl α -methylcrotonate; 3-octyl 2-methylcrotonate; 3-Octyl 2-methyl-2-butenolate; 3-Octyl tiglate; Oct-3-yl 2-methylcrotonate; Oct-3-yl tiglate
E144	(+/-)-4-Ethylactanal	Octanal, 4-ethyl; Excital
E145	4-Ethylactanoic acid	4-ethylcaprylic acid
E146	p-Ethylphenol	4-Hydroxyethylbenzene; 1-Ethyl-4-hydroxybenzene; 4-Ethylphenol
E147	2-Ethylpyrazine	2-Ethyl-1,4-diazine; Ethylpyrazine; 2-Ethyl pyrazine
E148	3-Ethylpyridine	β -Ethylpyridine; β -lutidine
E149	2-(Ethylthio)phenol	2-Ethylphenyl mercaptan; 2-Ethylbenzenethiol
E150	Eucalyptol*	Cajeputol; cineole; 1,8-epoxy-p-methane; 1,8-Cineole; 1,8-Oxido-p-menthane; 1,3,3-Trimethyl-2-oxabicyclo[2.2.2]octane
E151	Eugenol*	4-Hydroxy-3-methoxy-1-allylbenzene; eugenol acid; 2-Methoxy-4-(2-propen-1-yl) phenol; 1-Hydroxy-2-methoxy-4-propenylbenzene; 4-Allylcetanol-2-methyl ether; 2-methoxy-4-allylphenol; 4-Allylguaiacol; 4-Allyl-2-methoxyphenol;

Order	General Name	Synonyms
		1-Hydroxy-2-methoxy-4-allyl benzene; 2-Methoxy-4-prop-2-enylphenol; 1-Hydroxy-2-methoxy-4-(2-propenyl)benzene
E152	Eugenyl acetate	2-Methoxy-4-(2-propen-1-yl) phenyl acetate; 4-allyl-2-methoxyphenyl acetate; Acetyl eugenol; eugenol acetate; 2-methoxy-4-(3-propenyl)phenyl acetate; Aceteugenol; 2-Methoxy-4-phenyl acetate
E153	Eugenyl benzoate	4-Allyl-2-methoxyphenyl benzoate; benzoyl eugenol; eugenol benzoate
E154	Eugenyl formate	4-(2-propen-1-yl)-2-methoxyphenyl formate; 4-Eugenyl formate; 4-Allyl-2-methoxyphenyl formate; 4-(2-propenyl)-2-methoxyphenyl formate; Eugenol formate
E155	Eugenyl isovalerate	4-Allyl-2-methoxyphenyl isovalerate; Butanoic acid, 3-methyl-, 2-methoxy-4-(2-propenyl)phenyl ester
E156	Ethanethiol	Ethyl hydrosulfide; Ethyl mercaptan; Ethyl sulfhydrate; Ethyl thioalcohol; Mercaptoethane; Thioethanol; Thioethyl alcohol; 1-Mercaptoethane
E157	(+/-) Ethyl 2-hydroxy-2-methylbutyrate	Ethyl 2-methylactate; Butyric acid, 2-hydroxy-2-methyl-, ethyl ester; Butanoic acid, 2-hydroxy-2-methyl-, ethyl ester, (±); 2-Hydroxy-2-methylbutyric acid ethyl ester; ethyl 2-hydroxy-2-methylbutyrate ; Butyric acid, 2-hydroxy-2-met
E158	2-Ethylphenol	Phenol, o-ethyl-; o-Ethylphenol; Phlorol; 1-Ethyl-2-hydroxybenzene; 1-Hydroxy-2-ethylbenzene; Florol; Ethylphenol; Phenol, 2-ethyl-Methacrylic acid, ethyl ester; Ethyl 2-methyl-2-propenoate; Ethyl 2-methylacrylate; Ethyl methyl acrylate; Ethyl-α-methyl acrylate; 2-Methylacrylic acid, ethyl ester; 2-Methyl-2-propenoic acid ethyl ester; Ethyl 2-methacrylate; 2-Propenoic acid, 2-methyl-, ethyl ester
E159	Ethyl methacrylate	1-Butanol, 2-ethyl-; Pseudoheptyl alcohol; 2-Ethylbutyl alcohol; 3-Methylolpentane; 2-Ethylbutanol; 2-Ethylbutanol-1; sec-Hexyl alcohol; sec-Pentyl carbinol; 3-Pentyl carbinol; Ethylbutanol;
E160	2-Ethylbutan-1-ol	

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E161	2-Ethylpyridine	sec-Hexanol:2-Ethyl-1-butanol α-Ethylpyridine;Pyridine, 2-ethyl-
E162	2-Ethylhexyl acetate	2-Ethyl-1-hexanol acetate; 2-Ethyl-1-hexyl acetate; β-ethylhexyl acetate; 2-Ethylhexyl ethanoate; Acetic acid α-ethylhexyl ester; 2-Ethylhexanyl acetate; 2-Ethylhexylester kyseliny octove; Ethyl hexyl acetate; Ethyl(2)-hexyl acetate; Octyl acetate;Acetic acid, 2-ethylhexyl ester
E163	2-Ethyl hexanal	α-Ethylcaproaldehyde; Butylethylacetaldehyde; Ethylbutylacetaldehyde; 2-Ethylhexaldehyde; 2-Ethylhexylaldehyde; 3-Formylheptane; 2-Ethylcaproaldehyde; Ethylhexaldehyde; 2-Ethylcapronaldehyde α-Ethylhexanal; 2-Ethylhexan-1-al;Hexanal, 2-ethyl-
E164	2-Ethyl hexanoic acid	α-Ethylcaproic acid; α-Ethylhexanoic acid; Butylethylacetic acid; Ethylhexanoic acid; Ethylhexoic acid; 2-Butylbutanoic acid; 2-Ethylcaproic acid; 3-Heptanecarboxylic acid; Kyselina heptan-3-karboxylova; 2-Ethyl-1-hexanoic acid; 2-Ethylcapronic acid; Hexonic acid, 2-ethyl-;2-Ethylhexoic acid;Hexanoic acid, 2-ethyl-
E165	4-Ethylpyridine	Pyridine, 4-ethyl-; γ-Ethylpyridine
E166	Ethyl isothiocyanate	Isothiocyanic acid, ethyl ester; Ethyl mustard oil; Isothiocyanatoethane; Mustard oil; 1-Isothiocyanatoethane;Ethane, isothiocyanato-
E167	Ethyl linolate(Ethyl (Z,Z)-9,12-octadecadienoate)	Linoleic acid ethyl ester; 9,12-Octadecadienoic acid (Z,Z)-, ethyl ester; Ethyl cis,cis-9,12-octadecadienoate; Mandenol; Ethyl (9Z,12Z)-9,12-octadecadienoate; ethyl (Z,Z)-9,12-octadecadienoate;Ethyl linoleate
E168	Ethyl nicotinate	Nicotinic acid, ethyl ester; β-Pyridinecarboxylic acid ethyl ester;Ethyl 3-pyridinecarboxylate; Ignicut; 3-Ethoxycarbonyl)pyridine; 3-Carbethoxypyridine; Picolinic acid ethyl ester;3-Pyridinecarboxylic acid, ethyl ester
E169	Ethyl 2-furoate	2-Furoic acid, ethyl ester; Ethyl furan-2-carboxylate; Ethyl pyromucate; Ethyl 2-furancarboxylate; Furan-2-carboxylic acid ethyl ester; 2-Carboethoxyfuran;

Order	General Name	Synonyms
E170	Ethyl vanillate	Ethyl furoate; 2-Furancarboxylic acid, ethyl ester Vanillic acid, ethyl ester; 4-Hydroxy-3-methoxybenzoic acid ethyl ester; Ethyl 4-hydroxy-3-methoxybenzoate; m-Anisic acid, 4-hydroxy-, ethyl ester; 3-Methoxy-4-hydroxybenzoic acid, ethyl ester; Benzoic acid, 4-hydroxy-3-methoxy-, ethyl ester
E171	3-Ethylphenol	Phenol, 3-ethyl-; Phenol, m-ethyl-; m-Ethylphenol;
E172	Ethyl furfuracrylate	1-Ethyl-3-hydroxybenzene; 1-Hydroxy-3-ethylbenzene
E173	Ethyl 3-methylcrotonate	Crotonic acid, 3-methyl-, ethyl ester; Ethyl β,β -dimethylacrylate; Ethyl dimethylacrylate; Ethyl isopropylideneacetate; Ethyl senecioate; Ethyl 3-methyl-2-butenolate; Ethyl 3,3-dimethylacrylate; Ethyl β -methylcrotonate; Ethyl 3-methylbut-2-enoate; -Methyl-2-butenic acid, ethyl ester; 2-Butenoic acid, 3-methyl-, ethyl ester
E174	Elemol	o-Menth-8-ene-4-methanol, α,α -dimethyl-1-vinyl-, (1S,2S,4R)-(-)-; 2-(3-Isopropenyl-4-methyl-4-vinylcyclohexyl)-2-propanol; Cyclohexanemethanol, 4-ethenyl- $\alpha,\alpha,4$ -trimethyl-3-(1-methylethenyl)-, [1r-(1 α ,3 α ,4 β)]-
E175	2-Ethylthiophene	Thiophene, 2-ethyl-
E176	Ethyl 3-octenoate	3-Octenoic acid, ethyl ester; Ethyl (3E)-3-octenoate; Ethyl oct-3-enoate
E177	Ethyl linolenate	Linolenic acid, ethyl ester; Ethyl cis,cis,cis-9,12,15-octadecatrienoate; Ethyl (9Z,12Z,15Z)-9,12,15-octadecatrienoate; Ethyl α -linolenate; ethyl (Z,Z,Z)-9,12,15-octadecatrienoate; 9,12,15-Octadecatrienoic acid, ethyl ester, (Z,Z,Z)-
E178	1-Ethyl-4-methoxybenzene	Benzene, 1-ethyl-4-methoxy-; Anisole, p-ethyl-; p-Ethylanisole; 4-Ethylanisole; 1-methoxy-4-ethyl-benzene; p-Ethylanisol
E179	Ethyl (E)-2-methyl-2-pentenoate	2-Pentenoic acid, 2-methyl-, ethyl ester (2E); 2-Pentenoic acid, 2-methyl-, ethyl ester (E); Ethyl (E)-2-methyl-2-pentenoate
E180	Ethyl 4-pentenoate	Ethyl pent-4-enoate; 4-Ethoxycarbonylbut-1-ene; 4-Pentenoic acid ethyl ester

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E181	1-Ethyl-2-pyrrolicarboxaldehyde	Tea pyrrole;1-Ethyl 1H-Pyrrole-2-carboxaldehyde; 1-Ethyl-2-formylpyrrole; 1H-Pyrrole-2-carboxaldehyde, 1-ethyl-; Pyrrole-2-carboxaldehyde, 1-ethyl-; 1-Ethylpyrrole-2-aldehyde; N-Ethyl-2-formylpyrrole; N-Ethylpyrrole-2-carboxaldehyde
E182	Ethyl pent-2-enoate	
E183	Ethyl 2-phenylpropionate	
E184	1-Ethoxy-1-(2-phenylethoxy)ethane	
E185	Ethyl 2-ethylhexanoate	Ethyl 2-ethylcaproate;Ethylα-ethylhexanoate;Hexanoic acid, 2-ethyl-, ethyl ester
E186	Ethyl 2-ethylbutyrate	Butanoic acid, 2-ethyl-, ethyl ester;2-Ethyl-n-butyric acid ethyl ester
E187	Ethyl 2-acetoxypionate	
E188	1-Ethoxy-1-pentyloxybutane	
E189	2-Ethyl-4-methyl-1,3-dioxolane	1,3-Dioxolane, 2-ethyl-4-methyl-; Propanal, cyclic 1-methyl-1,2-ethanediyl acetal;1,3-Dioxolane, 2-ethyl-4-methyl, cis
E190	1-Ethoxy-4-methoxybenzene	p-Ethoxyanisole; Ethyl p-methoxyphenyl ether;Benzene, 1-ethoxy-4-methoxy-
E191	Ethyl acetoacetate propylene glycol acetal	1,3-Dioxolane-2-acetic acid, 2,4-dimethyl-, ethyl ester;Ethyl 2,4-dimethyl-1,3-dioxolane-2-acetate;ethyl acetoacetate propylene glycol acetal
E192	Ethyl 4-methylpent-3-enoate	
E193	Ethyl 2-methoxybenzoate(Ethyl o-anisate)	o-Anisic acid, ethyl ester; Ethyl o-methoxybenzoate; o-Methoxybenzoic acid, ethyl ester;Benzoic acid, 2-methoxy-, ethyl ester
E194	1-Ethoxy-1-methoxyethane	Acetaldehyde, ethyl methyl acetal;Acetaldehyde methyl ethyl acetyl; 1,1-Ethoxymethoxyethane;Ethane, 1-ethoxy-1-methoxy-
E195	Ethyl 3,7-dimethyl-2,6-octadienoate	
E196	1-Ethoxy-1-pentyloxyethane	Acetaldehyde ethyl amyl acetal; 1-(1-ethoxyethoxy)pentane (acetaldehyde ethylamyl acetal);Pentane, 1-(1-ethoxyethoxy)-
E197	1-Ethoxy-1-isopentyloxyethane	
E198	1-Ethoxy-1-(2-methylbutoxy)ethane	

Order	General Name	Synonyms
E199	3-(Ethylthio)propan-1-ol	
E200	5-Ethyl-2-methylthiazole	Thiazole, 5-ethyl-2-methyl-; 5-Ethyl-2-methyl-1,3-thiazole;2-methyl-5-ethylthiazole
E201	δ-Elemene	Cyclohexene, 4-ethenyl-4-methyl-3-(1-methylethenyl)-1-(1-methylethyl)-, (3r-trans)-; p-Menth-3-ene, 2-isopropenyl-1-vinyl-, (1S,2R)-(-)-; 3-Isopropenyl-1-isopropyl-4-methyl-4-vinyl-1-cyclohexene
E202	1-Ethoxy-1-propoxyethane	Acetaldehyde, ethyl propyl acetal;1-(1-Ethoxyethoxy)propane; Ethane, 1-ethoxy-1-propoxy;Propane, 1-(1-ethoxyethoxy)-
E203	(+/-) Ethyl 2-hydroxy-3-methylvalerate	Ethyl 2-ethyl lactate; Pentanoic acid, 2-hydroxy-3-methyl-, ethyl ester (9CI); Valeric acid, 2-hydroxy-3-methyl-, ethyl ester (8CI);2-Hydroxy-3-methylpentanoic acid ethyl ester; Ethyl 2-hydroxy-3-methylpentanoate
E204	Ethyl 4-methylpentanoate	Ethyl 4-methylvalerate; Ethyl isocaproate; Ethyl isohexanoate;Pentanoic acid, 4-methyl-, ethyl ester; Valeric acid, 4-methyl-, ethyl ester
E205	(+/-) Ethyl 3-hydroxy-2-methylbutyrate	Butanoic acid, 3-hydroxy-2-methyl-, ethyl ester
E206	Ethyl dodec-2-enoate	
E207	Ethyl geranyl ether	
E208	Ethyl pentadecanoate	n-Pentadecanoic acid ethyl ester;Pentadecanoic acid, ethyl ester
E209	Ethyl hept-2-enoate	
E210	1-Ethoxy-1-hexyloxyethane	Acetaldehyde ethyl hexyl acetal; 1-(1 Ethoxyethoxy) hexane;Ethyl hexyl acetal;Hexane, 1-(1-ethoxyethoxy)-
E211	Ethyl 4-hydroxybenzyl ether	
E212	Ethyl dec-9-enoate	Ethyl 9-decenoate
E213	N-[(Ethoxycarbonyl)methyl]-p-menthane-3-carboxamide	[1R-(1α,2β,5α)]-N-[[5-Methyl-2-(1-methylethyl)cyclohexyl] carbonyl glycine ethyl ester
E214	cis- and trans-5-Ethyl-4-methyl-2-(2-methylpropyl)-thiazoline	5-ethyl-2,5-dihydro-4-methyl-2-(2-methylpropyl)-thiazole
E215	cis- and	5-ethyl-2,5-dihydro-4-methyl-2-(1-methylpropyl)-thiazole

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	trans-5-Ethyl-4-methyl-2-(2-butyl)-thiazoline	
E216	Ethyl 3-acetoxy octanoate	Ethyl 3-(acetoxy)octanoate
E217	3-(Ethylthio)butanol	
E218	1-Ethoxy-1-(3-methylbutoxy)-3-methylbutane	
E219	1-Ethoxy-2-methyl-1-propoxypropane	
E220	1-Ethoxy-2-methyl-1-isopentyloxypropane	
E221	(+/-)- Ethyl 3-mercapto-2-methylbutanoate	
F001	α -Farnesene	1,3,6,10-Dodecatetraene, 3,7,11-trimethyl (α -isomer)
F002	β -Farnesene	3,7,11-Trimethyl-1,3,6,10-dodecatetraene; 2,6,10-Trimethyl-2,6,9,11-dodecatetrene
F003	Farnesol	2,6,10-Trimethyl-2,6,10-dodecatrien-12-ol; 3,7,11-Trimethyl-2,6,10-dodecatrien-1-ol; 3,7,11-Trimethyldodeca-2,6,10-trien-1-ol; Farnesol
F004	Fenchol	2-Fenchanol; α -Fenchol; 1,3,3-Trimethylbicyclo-2,2,1-heptan-2-ol; 1,3,3-Trimethylbicycloheptan-2-ol
F005	d-Fenchone	d-1,3,3-Trimethyl-2-norcamphanone; 1,3,3-trimethylbicyclo (2.2.1) heptan-2-one; d-2-Fenchanone; fenchone; 1,3,3-Trimethylbicyclo-1,2,2-heptanone-2; d-1,3,3-Trimethyl-2-norbornanone; Fenchone; d-1,3,3-Trimethyl-2-norbornanone; d-1,3,3- Trimehyl-2-norcamphanone; 1,3,3-trimethylbicyclo[2.2.1]heptan-2-one; d-2-fenchanone
F006	Formic acid*	Methanoic acid
F007	2-Formyl-6,6-dimethylbicyclo[3.1.1]hept-2-ene	Myrtenal; benihinal; 2-Formyl-6,6-dimethyl-2-norpinene; 6,6-Dimethyl-2-norpinene-2-aldehyde;

Order	General Name	Synonyms
		6,6-Dimethylbicyclo[3.1.1]hept-2-ene-2-carboxaldehyde, 6,6-Dimethyl-2-norpinene-2-carboxaldehyde, Pin-2-ene-1-carbaldehyde; Pin-2-en-10-al
F008	Furaneol acetate	4-Acetoxy-2,5-dimethylfuran-3(2H)-one
F009	4-[(2-Furanmethyl)thio]-2-pentanone	4-(Furan-2-ylmethylsulfanyl)pentane-2-one; 4-Furfurylthio-2-pentanone
F010	Furfural	Furfuraldehyde; 2-Furylcarboxaldehyde; fural; 2-Furancarboxal; 2-Formylfuran; 2-Furaldehyde; α -Furfuraldehyde; Pyromucic aldehyde; 2-Furancarboxaldehyde
F011	Furfuryl 2-methyl-3-furyl disulfide	3-[(2-Furanylmethyl)dithio]-2-methylfuran; 2-Methyl-3-[(2-furanylmethyl)-dithio]furan; (2-Methyl-3-furyl) furfuryl disulfide; 3-(Furfuryldithio)-2-methylfuran; 2-Methyl-3-furyl 2-furylmethyl disulphide
F012	Furfuryl 3-methylbutanoate	3-Methylbutanoic acid; Furanylmethyl ester; Furfuryl isovalerate
F013	Furfuryl acetate	2-Furanmethanol, acetate; 2-Furyl carbiny acetate
F014	Furfuryl alcohol	2-Furancarbinol; 2-Furanmethanol; Furfuralcohol; α -Furylcarbinol; 2-Furylcarbinol; 2-Hydroxymethylfuran
F015	Furfuryl butyrate	3-Octanon-1-ol; Methylol methyl amyl ketone; Ketone alcohol; Caproylethanol; 3-Oxo-1-octanol; Hexanoylethanol; 2-Acetyl-1-hexanol; Butanoic acid; 2-Furanylmethyl ester; 2-Furylmethyl butanoate
F016	Furfuryl isopropyl sulfide	Isopropyl furfuryl sulfide; Isopropyl furfuryl sulphide
F017	Furfuryl mercaptan	α -Furfuryl mercaptan; Furfurylidene-2-butanal; 2-Furanmethanethiol; 2-Furyl methanethiol
F018	Furfuryl methyl ether	Methyl furfuryl ether
F019	Furfuryl methyl sulfide	Methyl furfuryl sulfide
F020	Furfuryl octanoate	α -Furfuryl octanoate; α -Furfuryl caprylate; Octanoic acid; 2-Furanylmethyl

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Order	General Name	Synonyms
		ester; 2-furfuryl octanoate
F021	Furfuryl pentanoate	Furfuryl valerate; α-Furfuryl pentanoate; α-Furfuryl valerate; Pentanoic acid; 2-Furanylmethyl ester; α-Furfuryl pentanoate; Furfuryl pentanoate
F022	Furfuryl propionate	Furfuryl propanoate; 2-Furanmethanol propionate
F023	S-Furfuryl thioacetate	furfuryl thioacetate; Furfuryl thiol acetate; S-furfuryl acetothioate
F024	S-Furfuryl thioformate	2-furanmethanethiol formate; Furfurylthiol formate; 2-Furfuryl thioformate
F025	S-Furfuryl thiopropionate	furfuryl thiopropionate; s-Furfuryl propanethioate
F026	2-Furfurylidenebutyraldehyde	2-Ethyl-3-(2-furyl)-2-propenal; 2-Furfurylidenebutanal; 3-(2-furyl)-2-ethyl-2-propenal; 3-(2-furyl)-2-ethylacrolein; Furfurylidene-2-butyraldehyde; 3-Ethyl-3(2-furyl)-2-propenal; 2-Ethyl-3(2-furyl)acrolein
F027	N-Furfurylpyrrole	1-Furfurylpyrrole; 1-(2-Furfuryl)pyrrole; 1-Furfuryl-1H-pyrrole
F028	2-Furyl methyl ketone	2-Acetylfuran; Methyl 2-furyl ketone; Acetylfuran; 2-Furyl methyl ketone
F029	4-(2-Furyl)-3-buten-2-one	4-(2-Furyl)-3-buten-2-one; furfuralacetone; 3-(2-Furyl)acrylaldehyde; 4-(2-Furyl)but-3-en-2-one
F030	3-(2-Furyl)acrolein	Furyl acrolein; (3-(2-furyl) acrolein); 2-Furanmethanethiol; 2-Furanacrolein; 3-(2-Furyl)-2-propen-1-al; 2-Propenal, 3-(2-Furanyl)-; 3-(2-Furyl)acrylaldehyde
F031	1-(2-Furyl)butan-3-one	1-(2-Furanyl)-3-butanone; 1-(2-Furyl)-3-butanone; 4-(2-Furyl)-2-butanone; Furfurylacetone; 2-Butanone, 4-(2-furanyl)-; 4-(2-Furyl) butan-2-one
F032	2-Furyl-2-propanone	4-(2-Furyl)but-3-en-2-one; 1-(2-Furyl)-propan-2-one; Furfuryl methyl ketone; 2-Acetonylfuran; Furyl acetone; Methyl furfuryl ketone
F033	1-Furyl-2-propanone	furyl acetone

Order	General Name	Synonyms
F034	Fusel oil, refined	1-(2-Furyl)-propan-2-one; Amyl alcohol, commercial; (not well defined); Fusel oil, refined (mixed amyl alcohols)
F035	2-Furoic acid	α -Furancarboxylic acid; α -Furoic acid; Pyromucic acid; 2-Carboxyfuran; Furan-2-carboxylic acid; Furancarboxylic acid-(2); 2-Furancarboxylic acid
F036	2-Formyl pyrrole	Pyrrole-2-carboxaldehyde; Pyrrole-2-aldehyde; 2-Pyrrolylcarboxaldehyde; α -Pyrrolaldehyde; 2-Pyrrolecarbaldehyde; 2-Pyrrolecarboxaldehyde; 1H-Pyrrole-2-carbaldehyde; 1H-pyrrole-2-carboxyaldehyde; 2-carboxaldehyde-1H-pyrrole; H-pyrrole-2-carboxaldehyde; 2-Pyrrolcarbaldehyde
F037	Furfural diethyl acetal	Furan, 2-(diethoxymethyl)-; 2-(Diethoxymethyl)furan; 2-Furaldehyde diethyl acetal
G001	Geranic acid	(E)-2,6-Octadienoic acid, 3,7-dimethyl-; 3,7-Dimethyl-2(trans),6-octadienoic acid; 3,7-Dimethylocta-2,6-dienoic acid
G002	Geraniol*	trans-3,7-Dimethyl-2,7-octadien-1-ol; trans-3,7-Dimethyl-2,6-octadien-1-ol; 2,6-Dimethyl-2,6-octadien-8-ol; trans-3,7-Dimethyl-2,7-octadien-1-ol; 2-trans-3,7-Dimethyl-2,6-octadien-1-ol; 3,7-Dimethyl-2,6 and 3,6-octadien-1-ol
G003	Geranyl 2-methylbutyrate	Butanoic acid, 2-methyl-, (2E)-3,7-dimethyl-2,6-octadienyl ester; Butanoic acid, 2-methyl-, 3,7-dimethyl-2,6-octadienyl ester, (E)-; Geranyl 2-methylbutanoate
G004	Geranyl acetate*	Geranyl ethanoate; trans-3,7-dimethyl-2,6-octadien-1-yl ethanoate; trans-3,7-dimethyl-2,6-octadien-1-yl acetate; 2,6-Dimethyl-2,6-octadiene-8-yl acetate; geraniol acetate
G005	Geranyl acetoacetate	trans-3,7-dimethyl-2,6-octadien-1-yl 3-oxobutanoate;

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Order	General Name	Synonyms
		trans-3,7-Dimethyl-2,6-octadien-1-yl acetoacetate; Geranyl β -ketobutyrate; Geranyl 3-oxo-butanoate
G006	Geranyl acetone	6,10-Dimethyl-5,9-undecadien-2-one.
G007	Geranyl benzoate	Geraniol benzoate; trans-3,7-Dimethyl-2,6-octadien-1-yl benzoate; 3,7-Dimethylocta-2(trans),6-dienyl benzoate
G008	Geranyl butyrate	trans-3,7-Dimethyl-2,6-octadien-1-yl butanoate
G009	Geranyl formate*	Geranyl methanoate; trans-3,7-Dimethyl-2,6-octadien-1-yl methanoate; trans-3,7-Dimethyl-2,6-octadien-1-yl formate
G010	Geranyl hexanoate	trans-3,7-Dimethyl-2,6-octadien-1-yl hexanoate; Geranyl caproate; geranyl hexylate
G011	Geranyl isobutyrate	Geranyl 2-methylpropanoate; trans-3,7-Dimethyl-2,6-octadien-1-yl 2-methylpropanoate; trans-3,7-Dimethyl-2,6-octadien-1-yl isobutyrate; 3,7-Dimethyl-2,6-octadienyl-2-methyl propanoate; Geranyl 2-methylpropionate
G012	Geranyl isovalerate	Geranyl isovalerianate; trans-3,7-Dimethyl-2,6-octadien-1-yl 3-methylbutanoate; trans-3,7-dimethyl-2,6-octadien-1-yl isovalerate; trans-3,7-dimethyl-2,6-octadien-1-yl isopentanoate; Geranyl 3-methylbutanoate; Geranyl isopentanoate; 3,7-Dimethyl-2,6-octadienyl-3-methylbutanoate; Geranyl 3-methylbutyrate
G013	Geranyl phenylacetate	trans-3,7-Dimethyl-2,6-octadien-1-yl phenylacetate; Geranyl α -toluate; 3,7-dimethylocta-2(trans),6-dienyl phenylacetate
G014	Geranyl propionate	trans-3,7-Dimethyl-2,6-octadien-1-yl propanoate; Geranyl propanoate; trans-3,7-Dimethyl-2,6-octadien-1-yl propanoate; 2,6-Dimethyl octadien-6-yl-8-n-propionate
G015	Geranyl tiglate	2-Butenoic acid, 2-methyl 3,7-dimethyl-2,6-octadienyl ester,(E,E)-; Tiglic acid,3,7-dimethyl-2,6-octadienyl ester; Tiglic acid, geraniol ester

Order	General Name	Synonyms
G016	Geranyl valerate	Pentanoic acid, (2E)-3,7-dimethyl-2,6-octadienyl ester; 2,6-Octadien-1-ol, 3,7-dimethyl-, valerate, (E)-; Pentanoic acid, 3,7-dimethyl-2,6-octadienyl ester, (E)-; Valeric acid, 3,7-dimethyl-2,6-octadienyl ester, (E)-; Geraniol valerate; Geranyl pentanoate; 2,6-Dimethyl-2,6-octadiene-8-yl pentanoate
G017	Glucose pentaacetate	1,2,3,4,6-Pentaacetyl- α -D-glucose; β -Phenylacetyl-dextro-glucose; α -Pentaacetyl-dextro-glucose; 1,2,3,4,6-Pentaacetyl- β -D-glucose; Pentaacetyl glucose; 1,2,3,4,6-pentaacetyl- α -O-glucose; 1,2,3,4,6-pentaacetyl- β -O-glucose
G018	Glyceryl 5-hydroxydecanoate	Decanoic acid, 5-hydroxy-, Monoester with glycerol; 2,3-Dihydroxypropyl 5-hydroxydecanoate
G019	Glyceryl 5-hydroxydodecanoate	Dodecanoic acid, 5-hydroxy-, Monoester with glycerol; 2,3-Dihydroxypropyl 5-hydroxydodecanoate
G020	Glyceryl tribenzoate	1,2,3-Propanetriol tribenzoate; Tribenzoin; Propanetri-1,2,3-yl tribenzoate
G021	Glyceryl tripropionate	Propionic acid, triglyceride; Tripropionin; 1,2,3-Tri(propionyloxy)propane
G022	Glycyrrhizin, ammoniated	Glycyrrhizic acid, ammoniated; Glycyrrhizin
G023	Guaiacol	Pyroguaiac acid; 1-Oxy-2-methoxybenzene; o-Methylcatechol; 1-Hydroxy-2-methoxybenzene; 2-Methoxyphenol; o-Hydroxyanisole; o-Methoxyphenol; Methylcatechol; Pyrocatechol monomethyl ether; 1-Oxy-2-methoxybenzene
G024	Guaiacyl acetate	1-Acetoxy-2-methoxybenzene; 2-Methoxyphenyl acetate; acetyl guaiacol; o-Methoxyphenyl acetate; 2-methoxyphenol acetate; o-Acetoxyanisole; Guaiacyl acetate
G025	Guaiacyl phenylacetate	o-Methylcatechol acetate; Guaiacol phenylacetate; o-methoxyphenyl phenylacetate; 2-Methoxyphenyl phenylacetate; o-Methylcatechol phenylacetate;

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Order	General Name	Synonyms
		o-methoxyphenyl acetate
G026	Guaiene	1,4-Dimethyl-7-isopropenyl-D9,10-octahydroazulene
G027	Guaiol acetate	1,4-Dimethyl-7-(α -hydroxyisopropyl)-d9,10-octahydroazulene acetate.
G028	Geosmin	4A(2h)-Naphthalenol, octahydro-4,8a-dimethyl-, (4a,4aa,8a β)-; 4a(2H)-Naphthalenol, octahydro-4,8a-dimethyl-, [4S-(4a,4aa,8a β)]-; 4a- α -(2H)-Naphthol, octahydro-4- α ,8a- β -dimethyl-; 4,8a-Dimethyloctahydro-4a(2H)-naphthalenol
G029	Germacre-1(10),4(14),5-triene	Germacrene D; 8-Isopropyl-1-methyl-5-methylene-1,6-cyclodecadiene; 1,6-Cyclodecadiene, 1-methyl-5-methylene-8-(1-methylethyl)-, [s-(e,e)]-; D-Germacrene
G030	N-Gluconyl ethanolamine	N-(2-Hydroxyethyl)-hexonamide; 2,3,4,5,6-Pentahydroxy-N-(2-hydroxyethyl)-hexanamide; gluconic acid ethanolamine; N-(2-Hydroxyethyl)-gluconamide
G031	N-Gluconyl ethanolamine phosphate	N-(2-Hydroxyethyl)-hexonamide phosphate; 2-[(2,3,4,5,6-pentahydroxyhexanoyl)amino]ethyl dihydrogen phosphate; 2,3,4,5,6-Pentahydroxy-N-(2-hydroxyethyl)hexanamide phosphate; Gluconic acid ethanolamine phosphate
H001	cis-3-Hecenyl anthranilate	3-Hexenyl-2-aminobenzoate; (Z)-Hex-3-enyl anthranilate; (Z)-3-Hexenyl anthranilate; Hex-3(cis)-enyl anthranilate; (Z)-Hexenyl 2-aminobenzoate
H002	Hept-2(trans)-enal	trans-2-Heptenal; 3-Butylacrolein; β -Butylacrolein; 2-Heptenic aldehyde; 4-Propylcrotonaldehyde; α,β -heptenoic aldehyde; 2-Heptenal; (E)-2-hepten-1-al; 2-Heptenal; β -Butyl acrolein; Trans-hept-2-en-1-al; 3-Butylacrolein; β -Butylacrolein; Hept-2-enal; Trans-Hept-2-enal
H003	Hept-2-en-1-yl isovalerate	Hept-2-enyl isovalerate; Butanoic acid, 3-methyl-, (E2)-heptenyl ester
H004	trans-2-trnas-4-Heptadien-1-ol	2,4-Heptadien-1-ol, (2E,4E)-; 2,4-Heptadien-1-ol, (E,E)-;

Order	General Name	Synonyms
		(2E,4E)-Heptadienol; (E,E)-Hepta-2,4-dien-1-ol
H005	(E,E)-2,4-Heptadienal	2,4-Heptadienal; trans,trans-2,4-Heptadienal; Hepta-2,4-dienal
		4-Heptanolide; 5-Propyldihydro-2(3H)-furanone; Hepta-1,4-lactone;
H006	γ -Heptalactone	Heptanolide-1,4; 4-n-propyl-4-hydroxybutanoic acid lactone;
		Heptano-1,4-lactone; Heptanolide-(4,1); 4-hydroxyheptanoic acid, γ -lactone;
		γ -n-Propyl- γ -butyrolactone; γ -Heptalactone; Heptanolide-(4,1);
		4-Hydroxyheptanoic acid, γ -Lactone
H007	(+/-)-Heptan-2-yl butyrate	Hept-2-yl butyrate; 2-Heptyl ester; 1-Methylhexyl butyrate; Butanoic acid;
		1-Methylhexyl ester
H008	(+/-)-Heptan-3-yl acetate	Hept-3-yl acetate; 1-Ethylpent-1-yl acetate; Acetic acid, 3-Heptyl ester;
		1-Ethylpentyl acetate, 3-Heptanol acetate; Hex-3-enyl but-2-enoate
H009	N-(Heptan-4-yl)benzo[D][1,3]dioxole-5-carboxamide	1,3-Benzodioxole-5-carboxamide, N-(1-propylbutyl)-N-(1-propylbutyl)-1,3-benzodioxole-5-carboxamide
H010	Heptanal	Enanthal; oenanthal; Aldehyde C-7; Enanthaldehyde; n-Heptaldehyde; n-Heptyl aldehyde; Heptyl aldehyde; Heptaldehyde; Aldehyde Heptan-1-alc-7
H011	Heptanal dimethyl acetal	Enanthal dimethyl acetal; Oenanthal dimethyl acetal; Heptaldehyde dimethyl acetal; 1,1-Dimethoxy heptane; Aldehyde C-7 dimethyl acetal
		2-Hexyl-4-hydroxymethyl-1,3-dioxolan; 2-Hexyl-4-hydroxy-1,3-dioxan;
H012	Heptanal glyceryl acetal (mixed 1,2 and 1,3 acetals)	Mixture of 2-hexyl-4-hydroxymethyl-1,3-dioxolane and
		2-hexyl-5-hydroxy-1,3-dioxane; 4-Hexyl- 2-hydroxymethyl-1,3-dioxolane;
		heptaldehyde glyceryl acetal; 2- Hexyl-4- hydroxymethyl-1,3-dioxolan & 2-
		Hexyl-5-hydroxy-1,3-dioxane; 2-Hexyl-4-hydroxy- 1,3-dioxane
H013	2,3-Heptanedione	Acetyl pentanoyl; Acetyl valeryl; Valeryl acetyl
H014	2-Heptanethiol	(+/-)-2-Heptanethiol

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Order	General Name	Synonyms
H015	Heptanoic acid	n-Heptylic acid; Oenanthic acid; Heptoic acid; Oenanthylic acid; Enanthic acid; n-Heptanoic; Enanthic; n-Heptanoic acid
H016	2-Heptanol	2-Hydroxyheptane; <i>n</i> -amyl methyl carbinol; <i>sec</i> -heptyl alcohol; Amyl methyl carbinol; Methyl amyl carbinol
H017	3-Heptanol	Butyl ethyl carbinol; Ethyl butyl carbinol; n-Butyl ethyl carbinol
H018	2-Heptanone	Amyl methyl ketone; ketone C-7; Methyl amyl ketone; Heptan-2-one; Amyl methyl ketone
H019	3-Heptanone	Butyl ethyl ketone; Ethyl butyl ketone; Ethyl- <i>n</i> -butyl ketone
H020	4-Heptanone	Butyrone; dipropyl ketone
H021	(<i>Z</i>)-4-Hepten-1-ol	Cis-4-heptenol; 4-(<i>Z</i>)-heptenol
H022	3-Hepten-2-one	n-Butylideneacetone; 1-Acetyl-1-pentene; Butylidene acetone; Methyl pentenyl ketone; Hept-3-en-2-one
H023	(+/-)-1-Hepten-3-ol	Hept-1-en-3-ol; Butyl vinyl carbinol; 1-Hepten-3-ol
H024	2-Hepten-4-one	Propenyl propyl ketone; Ethyl ethylidene acetone; 1-Butyryl propylene; Hept-2-en-4-one
H025	cis-4-Heptenal	(<i>Z</i>)-hept-4-en-1-al; 4-Hepten-1-al; n-Propylidene butyraldehyde; Cis-4-hepten-1-al; Hept-4-enal; Cis-4-Ethylidene butyraldehyde
H026	trans-4-Heptenal	trans Hept-4-enal; 4-Hepten-1-al; n-Propylidene butyraldehyde
H027	4-Heptenal diethyl acetal	1,1-Diethoxyhept-4-ene (cis and trans); 1,1-Diethoxy-4-heptene
H028	(<i>E</i>)-2-Heptenoic acid	trans-2-Heptenoic acid
H029	trans-3-Heptenyl 2-methylpropanoate	<i>trans</i> -3-Heptenyl isobutyrate; Hept-3(trans)-enyl isobutyrate
H030	trans-3-Heptenyl acetate	Hept-3(trans)-enyl acetate; 3-Hepten-1-ol, acetate

Order	General Name	Synonyms
H031	Hept-trans-2-en-1-yl acetate	2-Hepten-1-ol, acetate, (2E)-; 2-Hepten-1-ol, acetate, (E)-; (E)-2-Heptenyl acetate; trans-2-Heptenyl acetate
H032	Heptyl acetate	Heptyl ethanoate; Acetate C-7; Heptanyl acetate
H033	Heptyl alcohol	pri-Heptyl alcohol; Hexyl carbinol; Alcohol C-7; Enanthic alcohol; 1-Heptanol; Hydroxy heptane; Heptan-1-ol; Enanthyl alcohol
H034	Heptyl butyrate	Heptyl butanoate; n-Heptyl-n-butanoate; n-heptyl-n-butyrate
H035	Heptyl cinnamate	Heptyl- β -phenylacrylate; heptyl-3-phenyl propenoate
H036	Heptyl formate	Heptyl methanoate ; n-Heptyl methanoate
H037	Heptyl isobutyrate	n-Heptyl dimethylacetate; n-Heptyl isobutanoate; n-Heptyl-2-methylpropanoate
H038	Heptyl octanoate	Heptyl caprylate; Heptyl octylate; n-Heptyl octanoate
H039	cis- and trans-2-Heptylcyclopropanecarboxylic acid	Cyclopropanecarboxylic acid, 2-heptyl-
H040	3-Heptyldihydro-5-methyl-2(3H)-furanone	3-Heptyl-4-pentanolide; α -n-Heptyl- γ -vaerolactone; 3-Heptyl-5-methyl-2(3H)-furanone; α -Heptyl- γ -valerolactone; α -n-Heptyl-8-valerolactone;
H041	2-Heptylfuran	1-(2-Furyl)-heptane
H042	Hex-2-enyl acetate	2-Hexen-1-yl acetate; 2-hexenyl ethanoate; Hex-2-enyl acetate
H043	Hex-3(trans)-enal	
H044	1-Hexadecanol	Alcohol C-16; Cetyl alcohol; Palmityl alcohol; Hexadecan-1-ol; n-Hexadecyl alcohol
H045	omega-6-Hexadecenlactone	6-Hexadecenolide; Oxacycloheptadec-7-en-2-one; Hexadec-6-eno-1,16-lactone; Ambrettolide; Hexadec-6-eno-1,16-lactone; Cyclohexadecen-7-olide; 16-Hydroxy-6-hexadecenoic acid, w-lactone; 16-hydroxy- Δ^7 -hexadecenoic acid, lactone; hexadec-7-en-1,16-lactone;

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Order	General Name	Synonyms
		omega-6-hexadecenlactone; 16-Hydroxy-7-hexadecenoic acid lactone; 6-Hexadecenolide
H046	2,4-Hexadien-1-ol	1-Hydroxy-2,4-hexadiene, Sorbic alcohol, Sorbyl alcohol; Hexa-2,4-dien-1-ol
H047	(E,E)-2,4-Hexadienal	trans, trans-2,4-hexadienal; 2-Propylene acrolein; Hexa-2(trans),4(trans)-dienal; Sorbic aldehyde; Hexa-2(trans),4(trans)-dienal; Hexa-2,4-dienal
H048	(E,E)-2,4-Hexadienoic acid	(E,E)-2,4-Hexadienoic acid, Panosorb, (E,E)-1,3-Pentadiene-1-carboxylic acid, Sorbistat; Sorbic acid; Hexa-2,4-dienoic acid
H049	2,4-Hexadienyl acetate	Sorbyl acetate; 2,4-Hexadien-1-ol, acetate
H050	2,4-Hexadienyl butyrate	Sorbyl butyrate; Butanoic acid, 2,4-Hexadienyl ester
H051	2,4-Hexadienyl isobutyrate	Sorbyl isobutyrate; Propanoic acid, 2-Methyl-, 2,4-Hexadienyl ester
H052	2,4-Hexadienyl propionate	Sorbyl propionate; 2,4-Hexadien-1-ol, propanoate
H053	1,6-Hexalactam	epsilon-Caprolactam; omega-Caprolactam; 1-Aza-2-cycloheptanone; 2-Azacycloheptanone; 2-Ketohexamethylenimine; 2-Oxohexamethylenimine; 2-Perhydrazepinone; 6-Caprolactam; 6-Hexanelactam; Aminocaproic lactam; Azepan-2-one; Caprolactam; Hexahydro-2-azepinone; Hexahydro-2H-azepin-2-one; Hexano-6-lactam; Hexanoic acid, 6-amino-, cyclic lactam; Hexanolactam
H054	gamma-Hexalactone	4-Hexanolide; 5-Ethylidihydro-2(3H)-furanone; 4-Hydroxyhexanoic acid lactone; hexa-1,4-lactone; Ethyl butyrolactone; 4-Ethyl-4-hydroxybutanoic acid lactone; gamma-Ethyl-gamma-butyrolactone; Hexano-1,4-lactone; gamma-Caprolactone; ethyl butyrolactone; gamma-Ethyl-n-butyrolactone; Hexanolide-1,4; 4-Hydroxyhexanoic acid gamma-lactone; Tonkalide; gamma-Hexalactone
H055	delta-Hexalactone	5-Hexanolide; 6-Methyltetrahydro-2-pyrone; 5-Hydroxyhexanoic acid lactone; 5-Hydroxyhexanoic acid lactone; 5-Methyl-5-hydroxypentanoic acid lactone;

Order	General Name	Synonyms
		5-Methyl- δ -valerolactone; Hexano-1,5-lactone; 5-Hydroxyhexanoic acid, δ -lactone; δ -Caprolactone; Tetrahydro-6-methyl-2H-pyran-2-one; delta-Hexalactone; 5-Methyl-d-valerolactone
H056	Hexanal	Hexaldehyde; Caproaldehyde; Aldehyde C-6; n-Caproaldehyde; Caproic aldehyde; Hexoic aldehyde; n-Hexaldehyde
H057	2,3-Hexandione	Butyryl acetyl; Acetyl butyryl; Acetyl-n-butyryl; Methyl propyl diketone
H058	3,4-Hexandione	Diethyl diketone; Dipropionyl; 3,4-Dioxohexane; Diethyl- α , β -diketone
H059	1,6-Hexanedithiol	1,6-Dimercaptohexane; Hexamethylene dimercaptan
H060	1-Hexanethiol	Hexyl mercaptan
H061	Hexanoic acid	n-Caproic acid; hexoic acid; n-Hexylic acid; Pentane-1-carboxylic acid; Caproic acid; 2-Butylacetic acid; Pentylformic acid
H062	3-Hexanol	Ethyl propyl carbinol; 3-Hydroxyhexane
H063	3-Hexanone	Ethyl propyl ketone; 3-Oxohexane
H064	2-Hexen-1-ol	2-Hexenol; <i>trans</i> -2-hexenol; α,β -Hexenol; Leaf alcohol; γ -Propyl allyl alcohol; Hex-2(<i>trans</i>)-en-1-ol; 3-Propylallyl alcohol; Trans-2-hexen-1-ol; <i>trans</i> -2-Hexen-1-ol
H065	cis-3-Hexen-1-ol	3-Hexen-1-ol; (<i>Z</i>)-hex-3-enol; Green leaf alcohol; Leaf alcohol; Blatter alcohol; cis-3-hexenol; β,γ -Hexenol; Hex-3(<i>cis</i>)-en-1-ol; Blatteralkohol; Hex-3-en-1-ol; Hex-3(<i>trans</i>)-en-1-ol
H066	4-Hexen-1-ol	Hex-4-en-1-ol; 2-Hexen-ol-6; 4-Hexenyl alcohol
H067	2-Hexen-1-yl acetate	
H068	1-Hexen-3-ol	Vinyl propyl carbinol; 1-Vinylbutan-1-ol; Vinyl butan-1-ol; Propyl vinyl carbinol

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Order	General Name	Synonyms
H069	4-Hexen-3-one	2-Hexen-4-one; 2-Hexen-2-one; Hex-2-en-4-one; Propylene ethyl ketone
H070	2-Hexenal	Hexen-2-al; β -propylacrolein; Leaf aldehyde; trans-2-Hexenal; trans-2-Hexen-1-al; β -Propylacrolein; trans-hex-2-enal
H071	cis-3-Hexenal	3-Hexenal, (Z)-; cis- β,γ -Hexylenic aldehyde; Hex-3-enal
H072	cis-4-Hexenal	4-Hexenal, (Z)-; Hex-4-enal
H073	3-Hexenal	
H074	trans-4-Hexenal	(E)-4-Hexenal; trans-Hex-4-enal
H075	(E)-2-Hexenal diethyl acetal	2-Hexene,1,1-diethoxy-, (2E)-
H076	trans-2-Hexenoic acid	β -Propylacrylic acid; 3-Propylacrylic acid; Acrylic, β -propyl acid; Hexen-2-oic acid; α,β -Hexylenic acid; α,β -Hexenoic acid; Hex-2(trans)-enoic acid
H077	3-Hexenoic acid	3-Hexenic acid; hydrosorbic acid; β -Amylene- α -carboxylic acid; 2-Pentene-1-carboxylic acid; Propylidenepropionic acid
H078	cis-2-Hexenol	(Z)-3-Hexen-1-ol; (Z)-2-Hexenol; 2-Hexen-1-ol; Hex-2(cis)-en-1-ol; 2-Hexenol
H079	(Z)-3-Hexenyl (E)-2-butenolate	2-Butanoic acid, 3-hexenyl ester; (E,Z)-Crotonate de (Z)-3-hexenyle; (Z)-3-Hexenyl crotonate; (Z)-2-Butenoic acid 3-hexenyl ester; cis-3-Hexenyl trans-2-butenolate; Hex-3-enyl but-2-enoate
H080	3-Hexenyl 2-hexenoate	(Z)-Hexenyl(E)-2-Hexenoate; 2-Hexenoic acid, 3-hexenyl ester, (E,Z); 2-Hexenoic acid, (E), 3-hexenyl ester, (Z); cis-3-Hexenyl trans-2-hexenoate; Hex-3-enyl hex-2-enoate
H081	3-Hexenyl 2-methylbutanoate	3-Hexenyl 2-methylbutyrate; cis-3-Hexenyl- α -methylbutyrate; Hex-3-enyl 2-methylbutyrate; Hex-3-enyl 2-methylbutanoate
H082	3-Hexenyl 3-methylbutanoate	3-Hexenyl 3-isovalerate; 3-Hexenyl isopentanoate; 3-Hexenyl isovalerate;

Order	General Name	Synonyms
		cis-3-hexenyl isovalerate; Hex-3-enyl isovalerate
H083	cis-3-Hexenyl acetate	cis-3-Hexen-1-yl acetate; cis-3-Hexenyl ethanoate; Hex-3(cis)-enyl acetate
H084	cis-3-Hexenyl benzoate	Hex-3-enyl benzoate; 3-Hexen-1-ol, benzoate, (Z); (Z)-3-hexenyl benzoate
H085	cis-3-Hexenyl butyrate	Hex-3-enyl butyrate; β,γ -Hexenyl-n-butylate; cis-3-Hexenyl butanoate; Leaf butyrate
H086	trans-2-Hexenyl butyrate	(E)-2-Hexenyl butyrate; Butanoic acid, 2-hexenyl ester; trans-2-Hexenyl butanoate; Hex-2-enyl butyrate
H087	cis-3-Hexenyl cis-3-hexenoate	Hex-3-enyl hex-3-enoate; 3-Hexenoic acid, 3-hexenyl ester, (Z,Z)-; (Z)-3-Hexenyl (Z)-3-hexenoate
H088	cis-3-Hexenyl formate	3-Hexenyl methanoate; Hex-3(cis)-enyl formate; β,γ -Hexenyl methanoate; (Z)-3-hexenol formate; Leaf alcohol formate
H089	trans-3-Hexenyl formate	
H090	trans-2-Hexenyl formate	Hexen-1-ol, formate, (E)-(E)-Hex-2-enyl formate; Hex-2-enyl formate; (E)-Hex-2-enyl formate
H091	3-Hexenyl formate (cis and trans mixture)	
H092	cis-3-Hexenyl hexanoate	Hex-3-enyl hexanoate; β,γ -Hexenyl hexoate; cis-3-Hexenyl caproate; Leaf caproate; cis-3-hexen-1-ol hexenoate; 3-Hexenyl caproate
H093	(E)-2-Hexenyl hexanoate	Hexanoic acid, (2E)-2-hexenyl ester; trans-2-Hexenyl caproate; trans-2-Hexenyl hexanoate
H094	cis-Hexenyl isobutyrate	(Z)-3-Hexenyl isobutyrate; (Z)-Hex-3-enyl isobutyrate; 3-Hexenyl 2-methylpropionate; cis-3-Hexenyl isobutyrate; Hex-3(cis)-enyl isobutyrate; β,γ -Hexenyl isobutanoate
H095	(E)-2-Hexenyl isovalerate	Butanoic acid, 3-methyl-, 2-hexenyl ester, (E); (E)-Hex-2-enyl isovalerate;

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Order	General Name	Synonyms
		trans-2-Hexenyl isovalerate; Hex-2-enyl isovalerate
H096	cis-3-Hexenyl lactate	Hex-3-enyl lactate; cis-3-Hexenyl 2-hydroxypropanoate; (Z)-3-hexenyl lactate; propanoic acid, 2-hydroxy-, 3-hexenyl ester, (Z)-; Leaf lactate
H097	2-Hexenyl octanoate	Octanoic acid, 2-hexenyl ester, (E)-
H098	3-Hexenyl phenylacetate	Benzeneacetic acid, 3-hexenyl ester, (Z)-; cis-3-Hexenyl phenyl acetate; 3-Hexenyl α -toluate; β,τ -hexenyl o-toluate; β,γ -Hexenyl α -toluate; Hex-3(cis)-enyl phenylacetate
H099	cis-3- and trans-2-Hexenyl propionate	(Z)-3 and (E)-2-Hexenyl propionate; Green note propionate; cis-1-3, trans-2-Hexenyl propionate; Propanoic acid, cis-3, trans-2-hexenyl ester
H100	cis-3 and trans-2-Hexenyl propionate	(E)-2-Hexenyl propionate; 2-Hexen-1-ol, propionate,(E); (E)-Hex-2-enyl propionate; 2-Hexenyl propanoate; trans-2-Hexenyl propionate
H101	cis-Hexenyl propionate	2-Hexen-1-ol, propanoate, (E); (E)-Hex-2-enyl-propionate; trans-2-Hexenyl propionate; (Z)-3-hexenyl propionate; Hex-3(cis)-enyl propionate; β,γ -Hexenyl propanoate
H102	cis-3-Hexenyl pyruvate	(Z)-3-Hexenyl pyruvate; Propanoic acid, 3-oxo-, 3-hexenyl ester,(Z); Hex-3-enyl 2-oxopropionate; Hex-3-enyl pyruvate
H103	cis-Hexenyl tiglate	(Z)-3-Hexenyl(E)-2-methyl-2-butenolate; (Z)-3-hexenyl2-methylcrotonate; cis-3-Hexenyl α -methylcrotonate; cis-3-Hexenyl trans-2-methyl-2-butenolate; cis-3-Hexenyl tiglate; Hex-3(cis)-enyl 2-methylcrotonate; cis-3-Hexenyl-2-methyl- trans-2-butenolate
H104	(E)-2-Hexenyl valerate	trans-2-Hexenyl pentanoate; (E)-Hex-2-enyl valerate; Pentanoic acid, 2-hexenyl ester,(E)
H105	cis-Hexenyl valerate	(Z)-3-Hexenyl valerate; cis-3-Hexenyl pentanoate; (Z)-Hex-3-enyl valerate; Valeric acid, 3-hexenyl ester,(Z); cis-3-Hexenyl valerate; Hex-3-enyl valerate

Order	General Name	Synonyms
H106	n-Hexyl 2-butenolate	Hexyl crotonate; Hexyl 2-butenolate
H107	Hexyl 2-furoate	2-Furancarboxylic acid, hexyl ester; 2-Furoic acid; Hexyl furan-2-carboxylate
H108	Hexyl 2-methyl-3- and 4-pentenoate (mixture)	Hexyl-2-methylpent-(3 and 4)-enoate
H109	Hexyl 2-methylbutyrate	hexyl 2-methylbutanoate
H110	Hexyl 3-mercaptopentanoate	Butanoic acid, 3-mercapto-, Hexyl ester; 3-Mercaptobutanoic acid hexyl ester
H111	Hexyl 3-methylbutanoate	Hexyl isovalerate; hexyl isopentanoate; Hexyl isovalerianate
H112	Hexyl acetate	Hexyl ethanoate; 1-Acetoxy-hexane
H113	Hexyl alcohol	Caproic alcohol; Alcohol C-6; 1-Hexanol; Hexan-1-ol; n-Hexyl alcohol; Amyl carbinol; n-Hexanol
H114	Hexyl benzoate	Benzoic acid, hexyl ester; Agrumat; n-Hexyl benzenecarboxylate; n-Hexyl benzoate; Hexyl phenyl methanoate
H115	Hexyl butyrate	Hexyl butanoate; n-Hexyl n-butanoate
H116	Hexyl formate	Hexyl methanoate; n-Hexyl formate; Formic acid hexyl ester
H117	Hexyl hexanoate	Hexyl caproate; Hexyl capronate; hexyl hexylate
H118	Hexyl isobutyrate	Hexyl 2-methylpropanoate
H119	Hexyl octanoate	Hexyl caprylate; <i>n</i> -Hexyl- <i>n</i> -octanoate; <i>n</i> -Hexyl- <i>n</i> -octoate; <i>n</i> -Hexyl octylate; Hexyl octylate
H120	Hexyl phenylacetate	Phenylacetic acid, hexyl ester; Henzeneacetic acid, hexyl ester; Hexyl α -toluate; n-hexyl phenylacetate
H121	Hexyl propionate	n-Hexyl propanoate
H122	Hexyl trans-2-hexenoate	Hexyl 2-hexenoate; 2-Hexenoic acid, hexyl ester, (E)-; Hexyl (E)-2-hexenoate

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H123	2-Hexyl-4,5-dimethyl-1,3-dioxolane	Heptanal2,3-butandiol acetal
H124	2-Hexyl-4-acetoxytetrahydrofuran	
H125	2-Hexyl-5 or 6-jeto-1,4-dioxane	5-Hexyl-1,4-dioxan-2-one
H126	Hexylamine	1-Aminohexane; 1-Hexylamine; Mono-n-hexylamine; n-Hexylamine
H127	α -Hexylcinnamaldehyde	α -n-Hexylcinnamic aldehyde; Jasmonal h; 2-Benzylidene-octanal; α -n-Hexyl- β -phenyl acrolein; Hexyl cinnamic aldehyde; 1-(phenylmethylene)cotanal
H128	2-Hexylidene cyclopentanone	Cyclopentanone, 2-hexylidene-; α -Hexylidene cyclopentanone; Jasmalone; 2-Hexylidenecyclopentan-1-one
H129	2-Hexylthiophene	Thiophene, 2-hexyl-
H130	(-)-Homoeriodictyol, sodium salt	4H-1-Benzopyran-4-one, 2,3-dihydro-5,7-dihydroxy-2-(4-hydroxy-3-methoxyphenyl)-, sodium salt; (+,-)-5,7,4-Trihydroxy-3-methoxyflavanone, sodium salt; (+,-)-Homoeriodictyol sodium salt
H131	2-(2-Hydroxy-4-methyl-3-cyclohexenyl) propionic acid γ -lactone	Wine lactone; 2(3H)-Benzofuranone, 3a,4,5,7a-tetrahydro-3,6-dimethyl; 3a,4,5,7a-Tetrahydro-3,6-dimethylbenzofuran-2(3H)-one
H132	Hydratropic aldehyde	2-Phenylpropanal; Hydratropaldehyde; α -Methyltolualdehyde; α -Methylphenyl- acetaldehyde; α -Phenylpropionaldehyde; 2-Phenylpropionaldehyde; 2-Phenylpropanal; 2-Phenylpropionald
H133	Hydratropic aldehyde dimethyl acetal	1,1-Dimethoxy-2-phenylpropane; 2-Phenylpropionaldehyde dimethyl acetal; Phenylpropanal dimethyl acetal
H134	Hydrogen sulfide	Hydrosulfuric acid
H135	Hydroquinone monoethyl ether	1-Ethoxy-4-hydroxybenzene; p-Ethoxyphenol; 4-Ethoxyphenol; p-Hydroxyphenetole
H136	4-Hydroxy-2,3-dimethyl-2,4-nonadien	4-Hydroxy-2,3-dimethyl-2,4-nonadienoic acid γ lactone; Bovolide;

Order	General Name	Synonyms
		2(5H)-Furanone, 3,4-dimethyl-5-pentylidene-; 3,4-Dimethyl-5-pentylidene-5H-furan-2-one; 5-Pentylidene-3,4-dimethyl-2,5-dihydrofuran-2-one; 4-Hydroxy-2,3-dimethyl-2,4-nonadienoic acid γ lactone
H137	5-Hydroxy-2,4-decadienoic acid delta-lactone	2,4-Decadien-5-olide; pentyl- α -pyrone; 6-Pentyl-2H-pyran-2-one; 6-Pentyl- α -pyrone; 2H-pyran-2-one, 6-pentyl-; 5-Hydroxy-2,4-decadienoic acid lactone; 6-amy- α -pyrone
H138	4-Hydroxy-2,5-dimethyl-1(2H)-furanon	4-Hydroxy-2,5-dimethylfuran-3(2H)-one; 2,5-Dimethyl-4-hydroxy-3(2H)furanone; fleureol(Fleurchem); Fraison(Vioryl); Furanone pure crystals; Strawberry furanone; Furaneol;
H139	1-Hydroxy-2-butanone	2,5-Dimethyl-4-hydroxy-2,3-dihydrofuran-3-one 2-Oxo-1-butanol; propionyl carbinol; Ethyl hydroxymethyl ketone; 1-Butanol-2-one
H140	4-Hydroxy-2-butenic acid γ -lactone	2(5H)-Furanone; Crotonic acid, 4-hydroxy-, γ -lactone; α , β -Crotonolactone; delta, α , β -Butenolide; γ -Crotolactone; γ -Crotonolactone; γ -Hydroxycrotonic acid lactone; 2,5-Dihydrofuranone; 2-Buten-4-olide; 2-Butenoic acid, 4-hydroxy-, γ -lactone; 2-Oxo-2,5-dihydrofuran; 4-Hydroxy-2-butenic acid lactone; 5-Oxo-2,5-dihydrofuran-3-yl ester; 5H-Furan-2-one; Cratone; Isocrotonolactone
H141	2-Hydroxy-2-cyclohexen-1-one	3-Methyl-1,2-cyclohexanedione; 2-Methyl-3,4-cyclohexanedione; 1,2-Cyclohexanedione; 2-cyclohexen-1-one, 2-hydroxy-; Cyclohexane-1,2-dione
H142	5-Hydroxy-2-decenoic acid delta-lactone, 5-hydroxy-2-dodecenoic acid delta-lactone and 5-tetradecenoic acid delta-lactone, mixture of	
H143	5-Hydroxy-2-decenoic acid δ -lactone	2-decen-5olide; 6-pentyl-5,6-dihydro-2-pyrone; 2-decene-1,5-lactone;

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Order	General Name	Synonyms
		Dec-2-eno- 1,5-lactone; (-)-2-Decenoic acid, 5-hydroxy, δ -lactone; 5,6-Dihydro-6- pentyl- 2H- pyran-2-one; (R)-5,6-dihydro-6-pentyl-2H-pyran-2-one; Massoia lactone; Massoi lactone; 2H-pyran-2-one, 5,6-dihydro-6-pentyl-, (R)-; 5-Hydroxy-2-decenoic acid lactone
H144	5-Hydroxy-2-dodecenoic acid delta-lactone	Dodec-2-eno-1,5-lactone; 2-Dodecen-5-olide; 6-Heptyl-2h-dihydro-2-pyrone; 6-heptyl-5,6-dihydro(2H)pyran-2-one; 5-Hydroxy-2-dodecenoic acid lactone; Delta-2-dodecenolactone; 6-Heptyl-5,6-dihydro-2-pyrone; 5-Heptyl-2-pentene-5-olide
H145	3-Hydroxy-2-octanone	2-Octanone, 3-hydroxy-
H146	3-Hydroxy-2-oxopropionic acid	Propanoic acid, 3-hydroxy-2-oxo-; 3-Hydroxy-2-oxopropanoic acid
H147	3-Hydroxy-2-pentanone	Acetyl ethyl carbinol; 2-Pentanone, 3-hydroxy-; 3- Hydroxypentan-2-one; Acetyl ethyl carbonol
H148	2-Hydroxy-3,5,5-trimethyl-2-cyclohexen-1-one	2-Hydroxy-3,5,5-trimethyl-2-cyclohexenone; 3,5,5-trimethyl-1,2-cyclohexanedione; 2-Cyclohexen-1-one, 2-hydroxy-3,5,5-trimethyl-; 3,5,5-Trimethyl-1,2-cyclohexanedione
H149	4-Hydroxy-3,5-dimethoxybenzaldehyde	Syringic aldehyde; Syringaldehyde; Gallaldehyde 3,5-dimethyl ether
H150	6-Hydroxy-3,7-dimethyloctanoic acid lactone	3,7-dimethyl-6-octanolide; 4-methyl-7-(1-methylethyl)-2-oxooxacycloheptane; 3,7-dimethylocta-1,6-lactone; Menthone lactone; 3,7-Dimethyloctano-1,6-lactone; 6-Hydroxy-3,7-dimethyl caprylic acid, lactone; 4-Methyl-7-isopropyl-2-oxoepanone; Menthanol lactone
H151	4-Hydroxy-3-methoxybenzoic acid	Vanillic acid; 4-Hydroxy-m-anisic acid
H152	N-(4-Hydroxy-3-methoxybenzyl) nonanamide	Nonanoyl 4-hydroxy-3-methoxybenzylamide; n-Nonanoyl vanillylamide; Pelargonyl vanillylamide; N-Nonanoyl 4-hydroxy-3-methoxybenzylamide;

Order	General Name	Synonyms
		Nonivamide; vanillylnonanamide; N-(4-Hydroxy-3-methoxybenzyl)nonanamide
H153	4-Hydroxy-3-methyloctanoic acid γ -lactone	Whiskey lactone; 3-Methyloctano-1,4-lactone; 3-Methyl-4-octanolide; 5-butyl-4-methyldihydro-2(3h)-furanone; 4-Hydroxy-3-methyloctanoic acid lactone; methyl octalactone; β -Methyl- γ -octalactone; 4-Butyl-3-methyl-1,4-butyrolactone; 5-butyldihydro-4-methylfuran-2(3H)-one
H154	4-Hydroxy-3-pentenoic acid lactone	α -Angelica lactone; 3-penten-4-olide; Pent-3-en-1,4-lactone; 5-Methyl-2(3H)-furanone; 5-Methylfuran-2(3H)-one; 4-Hydroxy-3-pentenoic acid lactone; β - γ -Angelica lactone; γ -Methyl β -butenolide
H155	4-Hydroxy-4-methyl-5-hexenoic acid γ lactone	Lilac lactone; 2(3H)-Furanone, 5-ethenyldihydro-5-methyl-; 5-Methyl-5-vinyl-dihydrofuran-2-one; 4-Methyl-5-hexen-1,4-olide; 4-Hydroxy-4-methyl-5-hexenoic acid
H156	4-Hydroxy-4-methyl-7-cis-decenoic acid γ lactone	2(3H)-Furanone, 5-(3-Hexenyl)dihydro-5-methyl-, (Z); (Z)-5-Hex-3-enyldihydro-5-methylfuran-2(3H)-one; Lactone of cis Jasmone; 4-Methyl-cis-7-decene γ -lactone; cis-5-Hexenyldihydro-5-methylfuran-2(3H)-one; 4-Hydroxy-4-methyldec-9-enoic acid lactone
H157	2-Hydroxy-4-methylbenzaldehyde	2,4-Cresotaldehyde; 4-Methylsalicylic aldehyde; 4-Methylsalicylaldehyde
H158	5-Hydroxy-4-methylhexanoic acid delta-lactone	2H-Pyran-2-one,tetrahydro-5,6-dimethyl-; Hexanoic acid, 5-hydroxyl-4-methyl-, delta-lactone; 4-Methyl-5-hydroxyhexanoic acid lactone; 5,6-Dimethyltetra-hydropyran-2-one
H159	5-Hydroxy-4-octanone	5-Hydroxyoctan-4-one; Butyrolin; 5-Octanol-4-one; Butyrolin
H160	3-Hydroxy-4-phenylbutan-2-one	2-Butanone, 3-hydroxy-4-phenyl-
H161	3(2)-Hydroxy-5-methyl-2(3)-hexanone	

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Order	General Name	Synonyms
H162	1-(3-Hydroxy-5-methyl-2-thienyl)ethanone	Ethanone, 1-(3-hydroxy-5-methyl-2-thienyl)
H163	4-Hydroxy-5-methyl-3(2H)-furanone	3(2H)-Furanone, 4-hydroxy-5-methyl-; 4-Hydroxy-5-methyl-2,3-dihydrofuran-3-one; 5-Methyl-4-hydroxy-3(2H)-furanone; 2,3-Dihydro-4-hydroxy-5-methylfuran-3-one
H164	cis-4-Hydroxy-6-dodecenoic acid lactone	(E)-6-dodecen-4-olide; 5-(cis-2octenyl)dihydro-2(3H)-furanone; (Z)-4-hydroxy-6- dodecenoic acid lactone; Dodec-6-eno-1,4-lactone; γ -Dodecen-6-lactone; 1,4-Dodec- 6-enolactone; cis-6-dodecen-4-olide; 2(3H)-furanone, dihydro-5(2-octenyl), (Z)-; cis-dihydro-5-(2-octenyl)-2(3H)furanone; 4-Hydroxy-6-dodecenoic acid lactone; Dihydro-5(2-octenyl)-2(3H)-furanone
H165	5-Hydroxy-7-decenoic acid δ -lactone	7-Decen-5-olide; 6-Pentyltetrahydro-2-pyrone; 7-decene-1,5-lactone; Dec-7- eno-1,5-lactone; Jasmine lactone; cis-5-(2-Pentenyl)pentanolide; 2H-pyran-2-one, tetrahydro-6-(2-pentenyl)-, Z; 5-Hydroxy-7-decenoic acid lactone
H166	5-Hydroxy-8-undecenoic acid delta-lactone	8-Undecen-5-olide; 6-Hexyltetrahydro-2-pyrone; Undec-8-eno-1,5-lactone; 2H-pyran-2-one, 6-(3-hexenyl)tetrahydro-, (Z)-; 5-Hydroxy-8-undecenoic acid lactone; cis-6-(3-Hexenyl)tetrahydro(2H)pyran-2-one; 5-Hydroxyundec-8-enoic acid deltalactone; 6-(3-Hexenyl)tetrahydro(2H)pyran-2-one
H167	2-Hydroxyacetophenone	<i>o</i> -Acetylphenol; ethanone, 1-(2-hydroxyphenyl)-; <i>o</i> -hydroxyacetophenone; 2'-Hydroxyacetophenone
H168	4-Hydroxybenzaldehyde	p-Oxybenzaldehyde; 4-Formylphenol; p-Formylphenol; p-Hydroxybenzaldehyde
H169	2-Hydroxybenzoic acid	2-Carboxy phenol; 2-Hydroxybenzene carboxylic acid; Salicylic acid; <i>o</i> -Hydroxybenzoic acid

Order	General Name	Synonyms
H170	4-Hydroxybenzoic acid	4-Carboxyphenol; p-Hydroxybenzoic acid; p-salicylic acid
H171	4-Hydroxybenzyl alcohol	4-Hydroxybenzene methanol; p-Hydroxybenzyl alcohol; p-(Hydroxymethyl)phenol; (4-Hydroxyphenyl)methanol
H172	4-Hydroxybutyric acid lactone	γ -Butyrolactone; 4-butanolide; Dihydro-2(3H)-furanone; Butyro-1,4-lactone; 4-Hydroxybutanoic acid lactone; 1,4-Epoxy butan-1-one; 2-Oxo oxolen; 3 (or 4)-Hydroxybutyric acid, lactone; 1,2-Butanolide
H173	Hydroxycitronellal *	Citronellalhydrate; Oxydihydrocitronellal; Lily aldehyde; 3,7-Dimethyl-7-hydroxy octanal; 7-Hydroxy-3,7-dimethyl octan-1-al; Laurine, Citronellaldehyde; 3,7-Dimethyl-1,7-octanediol; 7-Hydroxy-3,7-dimethyloctan-1-al
H174	Hydroxycitronellal diethyl acetal	1,1-Diethoxy-3,7-dimethyl-7-octanol; 8,8-Diethoxy-2,6-dimethyl-2-octanol; 1,1-Diethoxy-3,7-dimethyloctan-7-ol; 7-Hydroxy-1,1-diethoxy-3,7-dimethyl octane
H175	Hydroxycitronellal dimethyl acetal*	8,8-Dimethoxy-2,6-dimethyl-2-octanol; 1,1-Dimethoxy-3,7-dimethyl-7-octanol; 8,8-Dimethoxy-2,6-dimethyl-2-octanol; 1,1-Dimethoxy-3,7-dimethyloctan-7-ol
H176	Hydroxycitronellol	3,7-Dimethyl-1,7-octanediol; Dydroxydihydrocitronellol; citronellohydrate; 3,7-Dimethyloctane-1,7-diol; 3,7-Dimethyl-1,7-octanediol, 2,6-dimethyl-2,8-octanediol; 3,7-Dimethyloctane-1,7-diol; Hydroxycitronellol; 7-Hydroxy-3,7-dimethyloctan-1-ol; Hydroxydihydrocitronellol; hydroxyciol
H177	6-Hydroxydihydrotheaspirane	6-Hydroxy-2,6,10,10-tetramethyl-1-oxasprio(4,5)decane; 1-Oxasprio[4,5]decan-6-ol, 2,6,10,10-tetramethyl-[2S-2 α ,5 α (R-*)]]-
H178	3-(Hydroxymethyl)-2-heptanone	3-Octanon-1-ol; methylol methyl amyl ketone; Ketone alcohol; caproylethanol; 3-Oxo-1-octanol; hexanoylethanol; Octan-3-on-1-ol; Hexanoylethanoate; 1-hydroxyoctan-3-on

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Order	General Name	Synonyms
H179	3-Hydroxymethyl-2-octanone	3-(Hydroxymethyl)octan-2-one
H180	10-Hydroxymethylene-2-pinene	2-(6,6-Dimethylbicyclo[3.1.1]hept-2-en-2-yl)ethan-1-ol; 6,6-Dimethyl-bicyclo- [3.1.1]hept-2-ene-2-ethanol, Homomyrtenol; 2-Hydroxyethyl-6,6- dimethyl- bicyclo- [3,1,1]-hept-2-ene; 2-Norpinene-2-ethanol, 6,6-Dimethyl-; Nopol; 6,6-Dimethyl-2-norpinene-2-ethanol
H181	Hydroxynonanoic acid delta-lactone	5-Nonanolide; 6-Butyltetrahydro-2pyrone, delta-Nonalactone; Nona-1,5-lactone; 5-n-Butyl-5-hydroxypentanoic acid lactone; 5-Hydroxynonanoic acid lactone; 5-n-Butyl-δ-valerolactone; Nonano-1,5-lactone; δ-Nonalactone; α,n-Butyl-δ-hydroxypelargonic acid, lactone; 6-Butyltetrahydro-2H-pyrann-2-one; 1,5-Nonanolactone; Nonanolide-1,5; n-Butyl-delta-valerolactone
H182	4-(p-Hydroxyphenyl)-2-butanone	1-p-Hydroxyphenyl-3-butanone; oxyphenylon; p-Hydrobenzylacetone; p-Hydroxybenzyl acetone; 4-(4-Hydroxyphenyl)butan-2-one; Raspberry ketone; Rastone; Oxanone
H183	(+/-)-2-Hydroxypiperitone	Piperitone, 2-hydroxy-; Diosphenol; Buccocamphor; 2-Hydroxy-6-isopropyl-3-methyl- 2-cyclohexen-1-one
H184	5-Hydroxyundecanoic acid delta-lactone	5-Undecanolide; 6-Hexyltetrahydro-2-pyrone; Undeca-1,5-lactone; delta-Undecalactone; 5-n-Hexyl-5-hydroxypentanoic acid lactone; δ-n-Hexyl-δ-valerolactone; Undecano- 1,5-lactone; 5-Hydroxyundecanoic acid lactone; Undecanolide-1,5; α-nhexyl- delta- valerolactone; 5-n-Hexyl-5-hydroxypentanoic acid
H185	3-(4-hydroxy-phenyl)-1-(2,4,6-trihydroxy-phenyl)-propan-1-one	Phloretin; 2',4',6'-trihydroxy-3-(p-hydroxyphenyl)propiophenone; beta.-(p-Hydroxyphenyl)-2,4,6-trihydroxypropiophenone; beta-(p-Hydroxyphenyl)phloropropiophenone; 2',4',6'-Trihydroxy-3-(4-Hydroxyphenyl)propiophenone;

Order	General Name	Synonyms
		2',4',6'-Trihydroxy-3-(p-hydroxyphenyl)propiofenone; Dihydranaringenin; Naringenin dihydrochalcone; Phloretol
H186	5-Hydroxymethylfurfuraldehyde	2-Furaldehyde, 5-(hydroxymethyl)-; 5-Hydroxymethylfurfural; Hydroxymethylfurfureole; 5-(Hydroxymethyl)Furfureole; 5-(Hydroxymethyl)-2-formylfuran; 5-(Hydroxymethyl)-2-furaldehyde; 5-(Hydroxymethyl)-2-furancarbal; 5-(Hydroxymethyl)-2-furfural; 5-(Hydroxymethyl)-2-furfuraldehyde; 5-(Hydroxymethyl)furan-2-aldehyde; 5-(Hydroxymethyl)furfural; 5-Oxymethylfurfureole; 5-Hydroxymethylfurfuraldehyde; 5-Hydroxymethyl-2-furancarbaldehyde; Hydroxymethylfurfuraldehyde; 5-(Hydroxymethyl)-2-furancarboxaldehyde; 2-Hydroxymethyl-5-furfural; 5-(hydroxymethyl)-2-furfural (HMF); 2-Furancarboxaldehyde, 5-(hydroxymethyl)-
H187	4-Hydroxyacetophenone	Ethanone, 1-(4-hydroxyphenyl)-; p-Hydroxyacetophenone; p-Hydroxyphenyl methyl ketone; p-Oxyacetophenone; Methyl p-hydroxyphenyl ketone; Phenol, p-acetyl-; Piceol; 4'-Hydroxyacetophenone; Acetophenone, p-hydroxy-; Hydroxyacetophenone, para; p-Acetylphenol; 4-Acetylphenol
H188	Hexadecano-1,16-lactone	Cyclohexadecanolide; Dihydroambrettolide; Hexadecanoic acid, 16-hydroxy-, o-lactone; Hexadecanolide; Juniperic acid lactone; 1,16-Hexadecanolide; 16-Hexadecanolactone; 16-Hexadecanolide; Hexadecanolid; 1,16-Hexadecanolactone; 16-Hydroxyhexadecanoic acid lactone; Oxacycloheptadecan-2-one
H189	1-Hydroxypropan-2-one	Acetol; Hydroxyacetone; Acetone alcohol; Acetylcarbinol; Hydroxypropanone; Methanol, acetyl-; 1-Hydroxy-2-propanone; hydroxyacetone (acetol); hydroxypropan-2-one; 1-Hydroxyacetone; -Hydroxy-2-propanone 2-Propanone, 1-hydroxy-
H190	4-Hydroxy-4-methylpentan-2-one	2-Pentanone, 4-hydroxy-4-methyl-; Acetonyldimethylcarbinol; Diacetone alcohol; Diketone alcohol; Tyranton; 4-Hydroxy-4-methylpentanone;

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Order	General Name	Synonyms
		4-Hydroxy-4-methyl-2-pentanone; 2-Methyl-2-pentanol-4-one; 4-Methyl-2-pentanone-4-ol; 4-Hydroxy-2-keto-4-methylpentane; 4-Hydroxy-4-methyl-pentan-2-on; Diacetone; 4-Hydroxy-4-methylpentanone-2; 2-Hydroxy-2-methyl-4-pentanone; 2-Methyl-3-pentanol-4-one; 4-Methyl-4-hydroxy-2-pentanone; Hydroxy-4-methyl-2-pentanone; Pyraton
H191	4-Hydroxy-3-methoxycinnamaldehyde	
H192	2-Hydroxy-4-methylvaleric acid	
H193	2-(4-Hydroxyphenyl)ethanol	p-Hydroxyphenethyl alcohol; 4-Hydroxyphenethyl alcohol; β -(p-Hydroxyphenyl)ethanol; β -(4-Hydroxyphenyl)ethanol; 2-(p-Hydroxyphenyl)ethanol; 2-(4-Hydroxyphenyl)ethanol; 4-Hydroxyphenylethanol; Phenethyl alcohol, p-hydroxy-; p-Tyrosol; Tyrosol; p-Tyrosol; 4-Hydroxyphenylethyl alcohol; p-Hydroxyphenylethyl alcohol; Ethanol, 2-(4-hydroxyphenyl); p-Hydroxy-benzeneethanol; tyrosol [2-(4-hydroxy-phenyl)ethanol]; Benzeneethanol, 4-hydroxy-; 4-(2-Hydroxyethyl)phenol
H194	4-Hydroxy-3,5-dimethoxybenzoic acid	Benzoic acid, 4-hydroxy-3,5-dimethoxy-; 3,5-Dimethoxy-4-hydroxybenzoic acid; Cedar acid; Syringic acid
H195	4-Hydroxy-3,5-dimethoxycinnamic acid	3,5-Dimethoxy-4-hydroxycinnamic acid; Sinapinic acid; Sinapic acid; trans-3,5-Dimethoxy-4-hydroxycinnamic acid; 2-Propenoic acid, 3-(4-hydroxy-3,5-dimethoxyphenyl)-; (2E)-3-(4-Hydroxy-3,5-dimethoxyphenyl)-2-propenoic acid; Cinnamic acid, 4-hydroxy-3,5-dimethoxy-
H196	Heptyl heptanoate	Heptyl heptoate; Heptanoic acid, heptyl ester
H197	Hexadec-1-yl acetate	Acetic acid, hexadecyl ester; Cetyl acetate; Hexadecyl acetate; Palmityl acetate; n-Hexadecyl ethanoate; 1-Acetoxyhexadecane; Acrylated lanolin alcohol; hexadecanyl acetate

Order	General Name	Synonyms
H198	Hexadecanal	Palmitaldehyde; 1-hexadecanal;n-Hexadecanal
H199	Hexadecano-1,4-lactone	2(3H)-Furanone, 5-dodecyldihydro-; Hexadecanoic acid, 4-hydroxy-, γ-lactone; γ-Palmitolactone; 5-Dodecyldihydro-2(3H)-furanone;γ-hexadecalactone
H200	5-Hexenol	1-Hexen-6-ol; Hex-5-en-1-ol;5-Hexen-1-ol
H201	cis-4-hexen-1-ol	(4Z)-4-Hexen-1-ol; (Z)-4-Hexen-1-ol;4-Hexen-1-ol, (z)-
H202	trans-3-hexenol	trans-3-Hexen-1-ol; trans-3-Hexenol; E-3-Hexenol; (E)-Hex-3-en-1-ol; (3E)-3-Hexen-1-ol; 3(E)-hexen-1-ol; (3E)-Hexenol; (E)-3-Hexen-1-ol; (E)Hex-3-enol; (Z)-3-hexen-1-ol;3-Hexen-1-ol, (E)-
H203	Hexyl valerate	Pentanoic acid, hexyl ester; Hexyl pentanoate; Hexyl valerianate; Valeric acid, hexyl ester; 1-Hexyl n-valerate;Hexyl n-valerate
H204	Hexyl heptanoate	Heptanoic acid, hexyl ester
H205	2-Hexylpyridine	Pyridine, 2-hexyl-; Pyridine, 2-(n-hexyl)-
H206	4-Hydroxy-3-methoxycinnamic acid	2-Propenoic acid, 3-(4-hydroxy-3-methoxyphenyl)-; Ferulic acid; 3-(4-Hydroxy-3-methoxyphenyl)-2-propenoic acid; 3-(4-Hydroxy-3-methoxyphenyl)acrylic acid; 3-Methoxy-4-hydroxycinnamic acid; (2E)-3-(4-Hydroxy-3-methoxyphenyl)-2-propenoic acid;Cinnamic acid, 4-hydroxy-3-methoxy-
H207	Heptadecan-1-ol	n-Heptadecanol; Heptadecyl alcohol; 1-Hydroxyheptadecane; Prim-n-heptadecyl alcohol; Heptadecanol;1-Heptadecanol
H208	1-Hexene-3-one	Propyl vinyl ketone; Vinyl propyl ketone
H209	Heptane-1-thiol	n-Heptylmercaptan; Heptyl mercaptan; Heptyl thiol; Normal-heptyl mercaptan
H210	4-Hydroxy-3,5-dimethoxyacetophenone	Acetophenone, 4'-hydroxy-3',5'-dimethoxy-; Acetosyringone; 1-(4-Hydroxy-3,5-dimethoxyphenyl)ethanone; 3',5'-Dimethoxy-4'-hydroxyacetophenone; Acetosyringon; 3,5-Dimethoxy-4-hydroxyacetophenone; Acetophenone, 3,5-dimethoxy-4-hydroxy-; 1-(4-Hydroxy-3,5-dimethoxyphenyl)-ethanone

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Order	General Name	Synonyms
		(acetosyringone); 4-acetylsyringol; Phenol, 4-acetyl-2,6-dimethoxy; Ethanone, 1-(4-hydroxy-3,5-dimethoxyphenyl)-
H211	Heptano-1,5-lactone	Heptanoic acid, 5-hydroxy-, δ -lactone; 6-Ethyltetrahydro-2H-pyran-2-one; 2H-pyran-2-one, 6-ethyltetrahydro-; δ -Heptalactone; 5-Hydroxyheptanoic acid lactone
H212	Hexanal diethyl acetal	1,1-Diethoxyhexane; n-Hexanal diethyl acetal; Hexane, 1,1-diethoxy-
H213	4-Hydroxymethyl-2-methyl-1,3-dioxolane	
H214	trans-3-Hexenyl acetate	(3E)-3-Hexenyl acetate; (3E)-Hexenyl acetate; (E)-3-hexen-1-ol acetate; (E)-3-Hexen-1-yl acetate; (E)-3-hexenol acetate; (E)-3-Hexenyl acetate; (E)-Hex-3-enol acetate; 3-Hexen-1-ol, acetate, (e)-
H215	4-Hydroxy-3,5-dimethoxycinnamaldehyde	
H216	Heptanal propylene glycol acetal	
H217	Hexyl isothiocyanate	Hexane, 1-isothiocyanato-; Isothiocyanic acid, hexyl ester; n-Hexyl isothiocyanate; 1-Isothiocyanatohexane
H218	4-Hydroxybenzyl methyl ether	
H219	2-Heptyl acetate	1-Methylhexyl acetate; 2-Heptanol, acetate
H220	Hexyl nonanoate	Nonanoic acid, hexyl ester
H221	sec-Heptyl hexanoate	Hexanoic acid, 1-methylhexyl ester; 1-Methylhexyl hexanoate; 2-heptyl hexanoate
H222	3,7,10-Humulatriene	1,4,8-Cycloundecatriene, 2,6,6,9-tetramethyl-, (E,E,E)-; Humulene; Cycloundeca-1,4,8-triene, 2,6,6,9-tetramethyl-; 2,6,6,9-Tetramethyl-1,4,8-cycloundecatriene; α -Caryophyllene
H223	Heptyl hexanoate	Hexanoic acid, heptyl ester; N-heptyl hexanoate
H224	Hexyl decanoate	Decanoic acid, hexyl ester
H225	Hept-3-en-1-ol	(3E)-3-Hepten-1-ol; 3-Hepten-1-ol
H226	Hexyl lactate	propanoic acid, 2-hydroxy-, hexyl ester
H227	Hexyl 9-octadecenoate	
H228	Hexanal dihexyl acetal	
H229	Hexyl dodecanoate	

Order	General Name	Synonyms
H230	Hex-4-enyl acetate	4-Hexen-1-ol, acetate, (z)-; (Z)-4-Hexen-1-yl, acetate; cis-4-Hexenyl acetate
H231	Hexyl tetradecanoate	
H232	5-hexenyl isothiocyanate	hexenyl isothiocyanate
H233	Heptyl 2-methylbutyrate	heptyl 2-methylbutanoate; Butanoic acid, 2-methyl-, heptyl ester
H234	Heptyl isovalerate	
H235	trans-3-Hexenyl hexanoate	(E)-3-Hexen-1-ol, hexanoate; (E)-3-hexenyl hexanoate
H236	cis-3-Hexenyl heptanoate(3-Hexenyl heptanoate)	Heptanoic acid, 3-hexenyl ester, (z)-; (3Z)-3-Hexenyl heptanoate; (Z)-3-hexenyl heptanoate
H237	cis-3-Hexenyl octanoate(Hex-3-enyl octanoate)	Octanoic acid, 3-hexenyl ester, (z)-; cis-3-Hexenyl n-octanoate; (3Z)-3-Hexenyl octanoate; (Z)-3-hexenyl octanoate
H238	cis-3-Hexenyl salicylate(Hex-3-enyl salicylate)	Benzoic acid, 2-hydroxy-, 3-hexenyl ester, (Z)-; Salicylic acid, 3-hexen-1-yl ester; β,γ -cis-Hexenyl salicylate; Salicylic acid, 3-hexenyl ester, (Z)-; (3Z)-3-Hexenyl salicylate; (Z)-3-Hexenyl salicylate
H239	3-Hexenyl methyl carbonate	
H240	Hex-2-enyl phenylacetate	
H241	cis-3-hexenyl decanoate(Hex-3-enyl decanoate)	Decanoic acid, 3-hexenyl ester, (z)-; cis-3-Hexenyl n-decanoate; (3Z)-3-Hexenyl decanoate
H242	sec-Hept-4(cis)-enyl acetate	
H243	trans-2-Hexenyl 2-methylbutyrate	hexenyl methyl butyrate
H244	trans-2-Hexenal propylene glycol acetal	(+/-)(E)&(Z)-2-Hexenal propylene glycol acetal; 1,3-Dioxolane, 4-methyl-2-(1E)-1-pentenyl- (9CI); 1,3-Dioxolane, 4-methyl-2-(1-pentenyl)-, (E)-
H245	Hexanal butane-2,3-diol acetal	
H246	Hexanal octane-1,3-diyl acetal	hexanal 1,3-octanediol acetal; hexanal octanediol acetal
H247	Hexenal glyceryl acetal	
H248	Hex-3-enyl hexadecanoate	
H249	Hex-3-enyl 2-ethylbutyrate	
H250	sec-Heptyl isovalerate	

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Order	General Name	Synonyms
H251	Hexanal hexyl isoamyl acetal	
I001	Indole	Benzopyrrole; 1-Benzazole; 1-Benzazole; 1-BenzoPyrrole; 2,3-Benzopyrrole
I002	α -Ionol	3-Buten-2-ol, 4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-; 4(2,6,6-trimethyl-2-cyclohexenyl)-3-buten-2-ol; 4-(2,6,6-Trimethyl-2-cyclohexenyl)but-3-en-2-ol
I003	β -Ionol	4-(2,2,6-Trimethyl-1-cyclohexenyl)but-3-en-2-ol; 3-Buten-2-ol, 4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-; 4-(2,6,6-trimethyl-1-yl)-3-buten-2-ol
I004	α -Ionone*	1-(2,6,6-Trimethyl-1,3-cyclohexadienyl)-2-buten-1-one; 4-(2,6,6-Trimethylcyclohexa-1,3-dienyl)but-2-en-4-one; floriffone; α -risone; α -Cyclocitrylideneacetone; 4-(2,6,6-Trimethyl-2-cyclohexen-1-yl)-3-buten-2-one
I005	β -Ionone*	Ionone; β -Cyclocitrylideneacetone; 4-(2,6,6-Trimethyl-1-cyclohexen-1-yl)-3-buten-2-one; Irisone
I006	γ -Ionone	4-(2-Methylene-6,6-dimethylcyclohexyl)-3-buten-2-one; 4-(2,2-Dimethyl-6-methylenecyclohexyl)-3-buten-2-one
I007	β -Ionone epoxide	3-Buten-2-one, 4-(2,2,6-trimethyl-7-oxabicyclo[4.1.0]hept-1-yl)-; 4-(2,6,6-Trimethyl-7-oxabicyclo[4.1.0]heptane, 3-buten-2-one; β -Ionone 5,6-epoxide; β -Ionone epoxide; 4-(1,2-Oxido-2,6,6-trimethylcyclohexyl)-3-buten-2-one; 4-(2,6,6-Trimethyl-1,2-epoxycyclohexyl)-3-buten-2-one; 5,6- β -Ionone epoxide; 5,6-Epoxy- β -ionone
I008	β -Ionyl acetate	3-Buten-2-ol, 4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-, acetate
I009	α -Irone	6-Methylionone; 6-Methyl- α -ionone; 4-(2,5,6,6-Tetramethyl-2-cyclohexenyl)-3-buten-2-one; cis-(2,6)-cis-(21,22)- α -Irone; 6-methyl-x-ionone; 4-(2,5,6,6-Tetramethyl-

Order	General Name	Synonyms
		2-cyclohexen-1-yl)-3-buten-2-one; 6-Methyl- α -ionone
I010	Isoambrettolide	Oxacycloheptadec-10-en-2-one; 9-Hexadecenoic acid, 16-hydroxy-, o-lactone; delta- 9-Isoambrettolic acid, lactone; Oxacycloheptadec-10-en-2-one
I011	Isoamyl 2-furanpropionate	α -Isoamyl furfurylacetate.
I012	Isoamyl 2-methylbutyrate	3-Methylbutyl 2-methylbutanoate; Isoamyl 2-methylbutanoate; Isopentyl 2-methylbutanoate
I013	Isoamyl acetate*	Amyl isoacetate; 3-Methylbutyl acetate; Amyl iso ethanoate; Isoamyl ethanoate; Isopentyl acetate; Common amyl acetate; β -Methylbutyl acetate; Isoamyl ethanoate
I014	Isoamyl acetoacetate	
I015	Isoamyl alcohol	Butyl iso carbinol; Amyl iso alcohol; Pentyl iso alcohol; Isopentanol; Isobutyl carbinol; isopentyl alcohol; 3-Methyl-1-butanol; Isopentyl alcohol
I016	Isoamyl benzoate	Pentyl iso benzoate; Amyl iso benzoate; Benzoic acid, isopentyl ester; 3-Methylbutyl benzoate; Amyl benzoate; Isopentyl benzoate; Isopentyl phenyl methanoate
I017	Isoamyl butyrate*	Amyl iso butyrate; Pentyl iso butyrate; isopentyl butanoate; Isoamyl butanoate; Pentyl iso butanoate; Amyl iso butanoate; 3-methylbutyl butanoate; 3-Methylbutyl butyrate; Isopentyl butyrate; Isoamyl n-butyrate
I018	Isoamyl cinnamate	Pentyl iso cinnamate; Amyl iso cinnamate; Cinnamic acid, Isoamyl ester; Pentyl iso 3-phenylacrylate; Amyl iso β -phenylacrylate; Pentyl iso 3-phenylpropenoate; isopentyl β -phenylacrylate; Isoamyl β -phenylacrylate; Isoamyl 3-phenyl-propenoate; Isopentyl cinnamate
I019	Isoamyl formate*	Amyl iso formate; Pentyl iso formate; Pentyl iso methanoate; Isopentyl

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Order	General Name	Synonyms
		methanoate; Amyl iso methanoate; Isoamyl methanoate; 3-Methylbutyl formate; Isopentyl formate; Isoamyl formate
I020	Isoamyl formate	3-Methylcutyl 3-furylpropionate; Amyl(iso) 2-furanpropionate; Isoamyl 2-furanpropionate; Isoamyl 2-furylpropionate; Isopentyl 2-furanpropionate; Isoamyl furylpropionate; Isoamyl furfurylacetate; Isoamyl furfurylhydracrylate; α -Isoamyl furfurylacetate
I021	Isoamyl hexanoate	Pentyl iso hexanoate; Pentyl iso caproate; Isopentyl caproate; Amyl iso hexanoate; amyl iso caproate, 3-methylbutyl hexanoate; Isoamyl caproate; Isoamyl capronate; isoamyl hexylate; Isopentyl hexanoate; Isoamyl hexanoate; Isopentyl n-hexanoate
I022	Isoamyl isobutyrate	Isopentyl isobutyrate; 3-Methylbutyl 2-methylpropanoate; Isopentyl isobutyrate; Isoamyl 2-methylpropanoate; Iso-amyl 2-methylpropanoate; Iso-amyl isobutyrate; isopentyl 2-methylpropanoate
I023	Isoamyl isovalerate*	Amyl iso isovalerate; Pentyl iso isovalerate; Isopentyl isopentanoate; Isoamyl 3-methylbutanoate; Isoamyl isopentanoate; 3-Methylbutyl 3-methylbutyrate; 3-methylbutyl 3-methylbutanoate; Isopentyl 3-methylbutanoate; Pentyl iso 3-methylbutanoate; Pentyl iso isopentanoate; Amyl iso 3-methylbutanoate; Amyl iso isopentanoate; Isopentyl isovalerate; Isopentyl isopentanoate; Iso amyl β -methyl butyrate
I024	Isoamyl laurate	Amyl iso laurate; Amyl iso dodecanoate; Pentyl iso laurate; Pentyl iso dodecanoate; Isopentyl dodecanoate; Isopentyl dodecylate, 3-methylbutyl dodecanoate; Isoamyl dodecanoate; Isoamyl dodecylate; Isopentyl laurate; 3-Methylbutyl laurate; Isoamyl laurate
I025	Isoamyl nonanoate	Pentyl iso nonanoate; Amyl iso nonanoate; Isopentyl nonylate; 3-Methylbutyl nonaoate; 3-Methylbutyl pelargonate; Isopentyl pelargonate; Amyl iso pelargonate; Amyl iso nonylate; Isoamyl nonylate; Isoamyl pelargonate; Isopentyl nonanoate

Order	General Name	Synonyms
I026	Isoamyl octanoate	Pentyl iso octanoate; Amyl iso octanoate; amyl iso caprylate; Pentyl iso octylate; Isopentyl octylate; Amyl iso octylate; 3-Methylbutyl octanoate; Isoamyl caprylate; isoamyl octylate; Isopentyl octanoate; Isopentyl octanoate
I027	Isoamyl phenylacetate	Amyl iso phenylacetate; Pentyl iso phenylacetate; Phenylacetic acid, Isopentyl ester; Amyl iso α -toluate; 3-Methylbutyl phenylacetate; Isoamyl α -toluate; Isopentyl phenylacetate; Pentyl phenylacetate and 3-methylbutyl phenylacetate
I028	Isoamyl propionate*	Amyl iso propionate; Pentyl iso propionate; Isopentyl propanoate; Isoamyl propanoate; 3-methylbutyl propanoate; 3-Methylbutyl propionate; Pentyl iso propanoate; Amyl iso propanoate; Isopentyl propionate; Isoamyl propionate
I029	Isoamyl pyruvate	Amyl iso pyruvate' pentyl iso pyruvate; Isoamyl α -ketopropionate; Isoamyl 2-oxopropanoate; Isopentyl pyruvate; 3-Methylbutyl 2-oxopropanoate; Isoamyl pyroracemate; Pentyl pyruvate
I030	Isoamyl salicylate	Amyl iso salicylate; Amyl iso o-hydroxybenzoate; Pentyl iso salicylate; 3-Methylbutyl o-hydroxybenzoate; 3-Methylbutyl salicylate; Pentyl iso o-hydroxybenzoate; Isopentyl o-hydroxybenzoate; Salicylic acid, isopentyl ester; Isoamyl 2-hydroxybenzoate; Isoamyl o-hydroxybenzoate; isopentyl salicylate; Isopentyl 2-hydroxybenzoate
I031	Isoborneol	Borneo(iso); Exo-2-camphanol; exo-2-bornanol; Isobornyl alcohol; Isocamphol; (iso)-Camphol; (exo)-2-Camphanol; (exo)-2-Bornanol; Bornan-2-ol; exo-1,7,7- Trimethylbicyclo[2.2.1]heptan-2-ol
I032	Isobornyl 2-methylbutyrate	Butanoic acid, 2-methyl-, 1,7,7-trimethylbicyclo-[2.2.1]hept-2-yl ester
I033	Isobornyl acetate	Bornyl iso acetate; exo-2-bornyl acetate; Bornyl iso ethanoate; Isobornyl ethanoate; exo-2-camphanyl acetate; 2-Camphanyl acetate
I034	Isobornyl formate	Bornyl iso formate; exo-2-bornyl formate; Isobornyl methanoate;

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Order	General Name	Synonyms
		exo-2-camphanyl formate
I035	Isobornyl isobutyrate	Propanoic acid, 2-methyl-, (1R,2R,4R)-1,7,7-trimethylbicyclo[2.2.1]hept-2-yl ; Isobornyl 2-methylpropionate
I036	Isobornyl isovalerate	Isobornyl isovalerianate; Bornyl iso isovalerianate; Bornyl iso isovalerate; Isobornyl 3-methylbutanoate; Isobornyl isopentanoate; Bornyl iso isopentanoate; Bornyl iso 3-methylbutanoate; Isobornyl 3-methylbutyrate
I037	Isobornyl propionate	Bornyl iso propionate; exo-2-bornyl propionate; Isobornyl propionate; exo-2-camphanyl propionate
I038	Isobutyl 2-butenolate	Isobutyl crotonate
I039	(+/-)-Isobutyl 3-methylthiobutyrate	2-Methylpropyl 3-(methylthio)butyrate; 2-Methylpropyl 3-(methylthio)butanoate; Butanoic acid, 3-(methylthio)-, 2-methylpropyl ester; Isobutyl 3-(methylthio)butyrate
I040	Isobutyl acetate	Butyl iso acetate; Butyl iso ethanoate; 2-methyl-1-propyl acetate; isobutyl ethanoate
I041	Isobutyl acetoacetate	Butyl iso acetoacetate; butyl iso 3-ketobutyrate; isobutyl 3-ketobutyrate; Butyl iso 3-ketobutanoate; isobutyl 3-ketobutanoate; 2-methyl-1-propyl acetoacetate; Butyl iso 3-Oxobutanoate; Isobutyl- β -ketobutyrate; Isobutyl-3-oxobutanoate; 2-Methylpropyl 3-oxobutyrate
I042	Isobutyl alcohol	Butyl iso alcohol; butanol(iso); Propyl iso carbinol; 2-Methyl-1-propanol; Isopropyl carbinol; Isobutanol; 2-Methylpropanol; 2-Methylpropan-1-ol; Isobutanol; Isopropyl carbinol
I043	Isobutyl angelate	Butyl iso angelate; Buty iso cis-2-methyl-2-butenolate; Isobutyl 2-methylbut-2(cis)-enoate; Isobutyl cis- α,β -dimethylacrylate; Isobutyl cis-2-methyl-2-butenolate; isobutyl cis- α -methylcrotonate
I044	Isobutyl anthranilate	Butyl iso anthranilate; Butyl iso o-aminobenzoate; Isobutyl 2-aminobenzoate;

Order	General Name	Synonyms
		Isobutyl o-aminobenzoate
I045	Isobutyl benzoate	butyl iso benzoate; 2-methylpropyl benzoate; Isobutyl benzenecarboxylate, Eglantine; Isobutyl phenyl methanoate
I046	Isobutyl butyrate	Butyl iso butyrate; 2-methyl-1-propyl butyrate; butyl iso butanoate; isobutyl butanoate; 2-Methyl propanyl butyrate; 2-methylpropyl butanoate
I047	Isobutyl cinnamate	Isobutyl-3-phenylpropenoate; isobutyl-β-phenylacrylate; Labdanol; 2-methylpropyl cinnamate; 2-Methylpropyl β-phenylacrylate; 2-Methylpropyl 3-phenylpropenoate
I048	Isobutyl formate	Butyl iso formate; 2-Methyl-1-propyl formate; Isobutyl methanoate; Butyl iso methanoate; Tetryl formate
I049	Isobutyl furyl propionate	Isobutyl 3-(2-furyl)propionate; Isobutyl 2-furanpropionate; Isobutyl furfurylacetate; Isobutyl-2-furanpropionate
I050	Isobutyl heptanoate	Butyl iso heptanoate; Butyl iso heptoate; 2-Methyl-1-propyl heptanoate; Isobutyl heptoate; Isobutyl heptylate; Isobutyl heptoate
I051	Isobutyl hexanoate	Butyl iso hexanoate; Butyl iso caproate; 2-Methyl-1-propyl caproate, 2-methylpropyl hexanoate; Isobutyl caproate; Isobutyl capronate; isobutyl hexylate
I052	Isobutyl isobutyrate	Butyl iso isobutyrate; Butyl iso 2-methylpropanoate; 2-Methyl-1-propyl 2-methylpropanoate; Isobutyl 2-methylpropanoate; Isobutyl 2-methylpropionate
I053	Isobutyl N-methylantranilate	Benzoic acid, 2-(methylamino)-, 2-methylpropyl ester
I054	Isobutyl phenylacetate*	Butyl iso phenylacetate; 2-Methylpropyl phenylacetate; Isobutyl α-toluate
I055	Isobutyl propionate	Butyl iso propionate; Isobutyl propanoate; Butyl iso propanoate; 2-Methyl-1-propyl propanoate

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Order	General Name	Synonyms
I056	Isobutyl salicylate	Butyl iso salicylate; 2-Methyl-1-propyl salicylate; Butyl iso o-hydroxybenzoate; 2-Methylpropyl o-hydroxybenzoate; Isobutyl o-hydroxybenzoate; Isobutyl 2-hydroxybenzoate; 2-Methylpropyl 2-hydroxybenzoate; Butyl salicylate
I057	2-Isobutyl-3-methoxypyrazine	2-Butyl-iso-3-methoxypyrazine; 2-Methoxy-3-(2-methylpropyl)pyrazine; 2-Methoxy-3- isobutylpyrazine; 2-Butyl-3-methoxypyrazine
I058	2-Isobutyl-3-methylpyrazine	2-Butyl-iso-3-methylpyrazine; 2-Methyl-3-isobutyl pyrazine; 2-methyl-3-(2- methylpropyl)-pyrazine; 2-(2-Methylpropyl)-3-methylpyrazine; 2-Isobutyl-3-methyl- 1,4-diazine; 2-Butyl-3-methylpyrazine
I059	2-Isobutyl-4,6-dimethyldihydro-1,3,5-dithiazine and 4-isobutyl-2,6-dimethyldihydro-1,3,5-dithiazine (mixture)	2(4)-Isobutyl-4(2),6-dimethyldihydro-4H-1,3,5-dithiazine; Dimethyl isobutyl dihydro- 1,3,5-dithiazine; Dihydro-2-isobutyl-4,6-dimethyl-4h-1,3,5-dithiazine and dihydro-6-isobutyl-2,4-dimethyl-4h-1,3,5-dithiazine
I060	Isobutylamine	1-Amino-2-methylpropane; 2-Methyl-1-aminopropane; 2-Methyl-1-propanamine; 2-Methylpropanamine; 2-Methylpropylamine; 3-Methyl-2-propylamine; iso-Butylamine; Monoisobutylamine; Valamine
I061	N-Isobutyldeca-trans-2-trans-4-dienamide	N-Isobutyl (E2),(E4)-decadienamide; 2,4-Decadienamide, N-(2-methylpropyl)-, (2E, 4E)-; 2,4-Decadienamide, N-(2-methylpropyl)-, (E,E)-; 2,4-Decadienamide, N- isobutyl-, (E,E)-; (E,E)-N-(2-Methylpropyl)-2,4-decadienamide; N-(2-methyl-propyl)deca-trans-2-trans-4-dienamide; N-Isobutyl-2-trans-4-trans-decadienamide; N-Isobutyl deca-trans-2-trans-4-dienamide; Pellitorin; Pellitorine; trans-Pellitorine
I062	α -Isobutylphenethyl alcohol	Benzylisobutyl carbinol; α -butyl iso phenethyl alcohol; 2-Methylpropyl benzyl carbno; Benzyl isoamyl alcohol; isobutyl benzylcarbinol; 4-Methyl-1-yl-1-phenyl-2- pentanol; 4-Methyl-1-phenyl-2-pentanol, 2-Methyl propyl benzyl

Order	General Name	Synonyms
		carbinol, Benzylisoamyl acetone; 4-Methyl-1-phenylpentan-2-ol
I063	2-Isobutylthiazole	2-Butyl iso thiazole; Thiazole, 2-isobutyl; 2-Butylthiazole
I064	Isobutyraldehyde	Butyraldehyde(iso); butyl iso aldehyde; Butyric iso aldehyde; Isobutyl aldehyde; isobutyric aldehyde; 2-Methyl propanal; Isobutanal
I065	Isobutyric acid	Butyric iso acid; 2-Methylpropionic acid; Isopropylformic acid; 2-Methylpropanoic acid; Isobutyric acid
I066	Isoeugenol*	4-Hydroxy-3-methoxy-1-propen-1-yl benzene; 3-Methoxy-4-hydroxy-1-propen-1-yl benzene; 1-Hydroxy-2-methoxy-4-propenylbenzene; 2-Methoxy-4-propenylphenol; 4-propenyl guaiacol; 1-Hydroxy-2-methoxy-4-propen-1-ylbenzene; 2-Methoxy-4-(1-propenyl)phenol
I067	Isoeugenyl acetate	Isoeugenol acetate; 4-Acetoxy-3-methoxy-1-(1-propen-1-yl) benzene; 2-Methoxy-4-(prop-1-enyl)phenyl acetate; Acetyl isoeugenol; 2-Methoxy-4-propenylphenyl acetate; Acetisoeugenol
I068	Isoeugenyl benzyl ether	4-Propenyl-1(benzylloxy)-2-methoxybenzene; Benzyl 2-methoxy-4-propenylphenyl ether; 1-Benzylloxy-2-methoxy-4-propenylbenzene; 2-Methoxy-4-propenylphenyl benzyl ether; Benzyl isoeugenyl ether; Benzyl isoeugenol; 2-Methoxy-4- propenylphenyl ether
I069	Isoeugenyl ethyl ester	1-Ethoxy-2-methoxy-4-(prop-1-enyl)benzene; 1-Ethoxy-2-methoxy-4- propenylbenzene; 2-Ethoxy-5-propenylanisole; Ethyl isoeugenol; Ethyl isoeugenyl ether; 1-Ethoxy-2-methoxy-4-benzene
I070	Isoeugenyl formate	4-(1-Propen-1-yl)-2-methoxyphenyl formate; 2-Methoxy-4-(1-propen-1-yl) phenyl formate; 2-Methoxy-4-propenyl phenyl formate; propenyl-2-methoxyphenyl formate; 4-Methoxy-4-phenyl

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Order	General Name	Synonyms
		formate; 2-Methoxy-4-propenylphenyl formate
I071	Isoeugenyl methyl ether	Isoeugenol methyl ether; 3,4-Dimethoxy-1-(1-propen-1-yl) benzene; 1,2-Dimethoxy-4-propenylbenzene; Methyl isoeugenol; 4-Propenyl veratrole; 1,2-Dimethoxy-4-(prop-1-enyl)benzene; 1,2-Dimethoxy-4-propen
I072	Isoeugenyl phenylacetate	2-Methoxy-4-(1-propen-1-yl) phenyl phenylacetate; Isoeugenol α -toluate; 2-Methoxy-4-propenyl phenylacetate; 4-Propenylguaiacyl phenylacetate; 2-Methoxy-4-phenyl phenylacetate
I073	Isojasmone	2-hexylidene cyclopentanone and 2-hexyl-2-cyclopenten-1-one (mixture); 2-Hexyl-2-cyclopenten-1-one and 2-hexylidenecyclopentanone (mixture); 2-Methyl-3-(2-pentenyl)-2-cyclopenten-1-one; 2-Hexyl-cyclopenten-2-one-1
I074	DL-Isomenthone	cis-Menthone; cis-2-Methyl-5-isopropylcyclohexanone; d,l-Isomenthone; Cyclohexanone, 5-methyl-2-(1-methylethyl)-, (Z)-; Isomenthone; cis-para-Menthan-3-one; cis-1-Methyl-4-isopropyl-3-cyclohexanone; 1-Methyl-4-isopropyl-3-cyclohexanone; d,l-cis-para-Menthan-3-one
I075	α -Isomethionyl acetate	3-Methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-yl acetate
I076	α -Isomethyl ionone	γ -Methylionone; Raldeine- γ ; iraldeine- γ ; α -Cyclocitrylidene butanone; Methyl- γ -ionone(so called); 4-(2,6,6-Trimethyl-2-cyclohexen-1-yl)-3-methyl-3-buten-2-one; Isomethylionone
I077	β -Isomethylionone	3-Buten-2-one, 3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-
I078	Isoorioenyl pyrazine (Isopropenyl)	2-(α -Methylvinyl) pyrazine; 2-Isopropenyl-1,4-diazine; 2-(1-methylvinyl)pyrazine; 2-Isopropenylpyrazine; Isopropenylpyrazine
I079	Isopentyl 4-(2-furan)butyrate	3-Methylbutyl 2-furylbutyrate; Amyl 2-furanbutyrate; Isoamyl 2-furanbutyrate; Isopentyl 2-furanbutyrate; Isopentyl furyl-2-butyrate; Isoamyl

Order	General Name	Synonyms
I080	Isopentyl acetoacetate	furfurylpropionate; 3-Methylbutyl 2-furanbutyrate; α -Isoamyl furfurylpropionate Amyl iso acetoacetate; Isopenetyl acetoacetate; 3-Methylbutyl acetoacetate; 3-methylbutyl 3-oxobutanoate; Isopentyl β -ketobutyrate; isopentyl β -ketobutyrate; Pentyl iso 3-oxobutanoate; Isopentyl 3-oxobutanoate; Amyl iso β -ketobutyrate; 3-Methylbutyl β -ketobutyrate; Amyl iso 3-oxobutanoate; Isoamyl β -ketobutyrate; Isoamyl 3-oxobutanoate, 3-Methylbutyl 3-oxobutyrate; Pentyl 3-Oxobutanoate
I081	Isopentyl amine	Pentyl iso amine; 1-Aminoisopentane; Butyl iso carbylamine; Isoamylamine; 3-Methylbutylamine; isoamino pentane; Isobutyl carbylamine; 1-Butanamine, 3-methyl-
I082	Isopentylidene isopentylamine	N-(3-Methylbutylidene)-3-methyl-1-butylamine; N-Isoamylidene-isoamylamine; 1-Butanamine, 3-methyl-N-(3-methylbutylidene)-
I083	Isophorone	2-Cyclohexen-1-one, 3,5,5-trimethyl-; isoacetophorone; 3,5,5-Trimethyl-2-cyclohexen-1-one; 3,5,5-Trimethylcyclohex-2-en-1-one; 1,5,5-Trimethyl-3-oxocyclohexene; 1,3,3-Trimethylcyclohexane-5-one; Isophorone
I084	Isoprenyl acetate	3-Methyl-3-butenyl acetate
I085	Isopropenyl acetate	
I086	5-Isopropenyl-2-methyl-2-vinyl tetrahydrofuran	Anhydro linalool oxide; 2-Ethenyl-2-methyl-5-(1-methylethenyl) tetrahydrofuran; furan, 2-ethenyl-tetrahydro-2-methyl-5-(1-methylethenyl)-; 2-Methyl-2-vinyl- 5- isopropenyl tetrahydroforan; Anhydrolinalool oxide
I087	cis-5-Isopropenyl-cis-2-methylcyclopentan-1-carboxaldehyde	Cyclopentanecarboxaldehyde, 2-methyl-5-(1-methylethenyl)-, [R-(1 α ,2 α ,5 α 0)]-; <i>cis</i> -2-methyl- <i>cis</i> -5-isopropenylcyclopentan-1-carboxaldehyde; Photocitral; 5-(1-Methylene-ethyl)-2-methylcyclopentanecarboxaldehyde; Photocitral; 5-

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Order	General Name	Synonyms
I088	Isopropyl 2-methylbutyrate	Isopropenyl-2- methylcyclopentanecarboxaldehyde; Photocitral A Butanoic acid, 2-methyl-, 1-methylethyl ester; 1-Methylethyl-2-methylbutanoate
I089	Isopropyl acetate	Propyl iso acetate
I090	Isopropyl alcohol *	Propyl iso alcohol; Propanol(iso); Petrohol; sec-Propyl alcohol; Dimethylcarbinol; Isopropanol; 2-propanol; Isopropanol; Propan-2-ol; Isopropanol
I091	Isopropyl benzoate	Propyl iso benzoate; 1-Methylethyl benzoate
I092	Isopropyl butyrate	Propyl iso butyrate; propyl iso butanoate; Isopropyl butanoate; Isopropyl n-butanote; Isopropyl
I093	Isopropyl cinnamate	Propyl iso cinnamate; 1-Methylethyl-3-phenylpropenoate; Isopropyl β-phenylacrylate; Isopropyl 3-phenylpropenoate
I094	Isopropyl formate	Isopropyl methanoate; Propyl iso formate; Propyl iso methanoate
I095	Isopropyl hexanoate	Propyl iso hexanoate; Propyl iso hexylate; Propyl iso capronate; Propyl iso caproate; Isopropyl caproate; Isopropyl capronate; isopropyl hexylate
I096	Isopropyl isobutyrate	Propyl iso isobutyrate; Isopropyl 2-methylpropanoate; Propyl-iso-2-methylpropanoate
I097	Isopropyl isovalerate	Propyl iso isovalerate; Isopropyl isovalerianate; Propyl iso isopentanoate; Isopropyl isopentanoate; Isopropy 3-methylbutanoate; Propyl iso 3-methylbutanoate
I098	Isopropyl myristate	Tetradecanoic isopropyl ester; Isopropyl tetradecanoate; Tetradecanoic acid, 1-Methylethyl ester; Isopropyl myristate
I099	p-Isopropyl phenylacetaldehyde	p-Propyl iso phenylacetaldehyde; Cortexal; Cumylacetaldehyde; Cuminic acetaldehyde; p-Cymen-7-carboxaldehyde; homo-cuminic aldehyde; 4-Isopropyl phenyl acetaldehyde; 2-(p-Isopropylphenyl)acetaldehyde; Cumylaldehyde; p-Propylphenylacetaldehyde

Order	General Name	Synonyms
I100	Isopropyl phenylacetate	Isopropyl α -toluate
I101	Isopropyl propionate	Propyl iso propionate; Isopropanoate
I102	Isopropyl sorbate	Theobromine; 3,7-Dihydro-3,7-dimethyl-1h-purine-2,6-dione; 3,7-Dimethylxanthine; 1H-purine-2,6-dione, 3,7-dihydro-3,7-dimethyl
I103	Isopropyl tiglate	Crotonate; Isopropyl-2-methyl-2-butenate; Propyl iso tiglate; Propyl iso α -methylcrotonate; Isopropyl 2-methylcrotonate; Isopropyl- α -methyl crotonate; isopropyl-3-methyl-2-butenate; Propyl tiglate
I104	4-Isopropyl-2-cyclohexenone	2-Cyclohexenone, 4-(1-methylethyl)-; 4-Isopropylcyclohex-2-enone; 4-Isopropylcyclohex-2-en-1-one, Crypton; Cryptone; dl-Kryptone
I105	2-Isopropyl-4,6-dimethyl and 4-isopropyl-2,6-dimethyldihydro-1,3,5-dithiazine (mixture)	2(4)-Isopropyl-4(2),6-dimethyldihydro-4H-1,3,5-dithiazine; 4,6-Dimethyl-2-(1-methylethyl)dihydro-1,3,5-dithiazine; Dimethyl isopropyl dihydro-1,3,5-dithiazine; Dihydro-2-isopropyl-4,6-dimethyl-4h-1,3,5-dithiazine and dihydro-4-isopropyl-2,6-dimethyl-4h-1,3,5-dithiazine
I106	2-Isopropyl-4-methylthiazole	Thiazole, 4-methyl-2-(1-methylethyl)-; 4-Methyl-2-isopropylthiazole
I107	2-Isopropyl-5-methyl-2-hexenal	<i>iso</i> -Dihydrovandulyl aldehyde
I108	p-Isopropylacetophenone	p-Propyl iso acetophenone; p-Isopropylacetylbenzene; 4-Isopropylacetophenone; Acetocumene; p-Acetyl cumol; 1,4-Acetyl-isopropyl benzol; 1-Isopropyl-4-acetylbenzene; p-Isopropyl acetylbenzol; Methyl p-isopropylphenyl ketone; 1-(4-Isopropylphenyl)ethanone; p-Acetylcumene; p-Propylacetophenone
I109	Isopropylamine	1-Methylethylamine; 2-Aminopropane; 2-Propylamine; Monoisopropylamine; sec-Propylamine
I110	p-Isopropylbenzyl alcohol	Cuminol; Cumin alcohol; p-Cymen-7-ol; Cunic alcohol; Cuminic alcohol; Cuminol; Cuminy alcohol; p-cymen-1-ol; 4-Isopropylbenzyl alcohol

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Order	General Name	Synonyms
I111	Isopropylmethoxypyrazine	2-Ethyl (or methyl)-(3,5 or 6)-isopropylpyrazine; 2-Isopropyl-(3,5 or 6)-methoxypyrazine; 2-propyl-iso-(3,6 or 6)-methoxypyrazine; 2-Isopropyl-3- methoxypyrazine; 2-Isopropyl-5-methoxypyrazine; 2-Isopropyl-6-methoxypyrazine; 2-methoxy-3 or 6-(1-methylethyl)pyrazine; Methoxy isopropyl pyrazines mixture; 2- Isopropyl-3-methoxypyrazine; 2-Methoxy-(3,5 or 6)-isopropylpyrazine
I112	2-Isopropyl-N,2,3-trimethyl butyram	2-Isopropyl- N,2,3-trimethylbutanamide; N,2,3-Trimethyl-2-(1-methylethyl)butanamide; 2-Isopropyl-N,2,3-trimethylbutyramide; N,2,3-trimethyl-2-isopropylbutanamide
I113	2-Isopropylphenol	<i>o</i> -Cumenol; 1-Hydroxy-2-isopropylbenzene; <i>o</i> -Isopropylphenol; Phenol, 1-(1-methylethyl)-; Phenol, 2-(1-methylethyl)-; 1-Hydroxy-1-isopropylbenzene
I114	3-(<i>p</i> -Isopropylphenyl)propionaldehyde	<i>p</i> -Propyl iso hydrocinnamaldehyde; 3-(4-Isopropylphenyl)propionaldehyde; Cumyl acetaldehyde; <i>p</i> -cymyl propanal; <i>p</i> -Isopropylhydrocinnamaldehyde; 3-(<i>p</i> -Isopropylphenyl)-propionic aldehyde; 3-(<i>p</i> -Cumenyl)propionaldehyde, <i>p</i> -Cumminylpropanal; 3-(<i>p</i> -Cumenyl)propionaldehyde
I115	2-Isopropylpyrazine	Pyrazine, (1-methylethyl)- isopropyl-Pyrazine; Isopropylpyrazine; Isopropyl-1,4-diazine
I116	Isopulegol	Pulegol (iso); <i>p</i> -8(9)-Menthen-3-ol; <i>p</i> -Menth-8-en-3-ol; 1-Methyl-4-isopropenyl- cyclohexan-3-ol; <i>p</i> -Menth-8(9)-en-3-ol; 1-Isopulegol
I117	Isopulegone	8-8(9)- <i>p</i> -Menthen-3-one; 1-Isopropyl-4-methyl-2-cyclohexanone; 1-Propyl-iso-4- methyl-2-cyclohexanone; <i>p</i> -Menth-8-en-3-one; 1-Methyl-4-isopropenylcyclo- hexan-3-one; 1-Methyl-4-isopropenyl-3-cyclohexanone; <i>trans-p</i> -Menth-8-en-3- one
I118	Isopulegyl acetate	Pulegol-iso-acetate; 1-Methyl-4-isopropenylcyclohexan-3-yl acetate; <i>p</i> -menth-8- en- 3-yl acetate; Isopulegol acetate; Acetylated citronellal;

Order	General Name	Synonyms
		Pulegol acetate; 5-Methyl-2-isopropenylcyclohexyl acetate
I119	Isoquercitrin, enzymatically modified	α -Glycosyl-isoquercitrin; Isoquercetin
I120	Isoquinoline	Quinoline(iso); 3,4-benzopyridine; 2-Azanaphthalene; 2-Benzazine; Benzo(o)pyridine; BenzoPyrine
I121	Isovaleric acid	Active valeric acid; Valeric iso acid; 3-Methylbutyric acid; 3-Methylbutanoic acid; Delphinic acid; Isobutyl formic acid; Isopropyl lactic acid; β -Methyl butyric acid; valerianic acid; Isopentanoic acid
I122	Isobutyl 2-methylprop-2-enoate	Methacrylic acid, isobutyl ester; Isobutyl α -methacrylate; Isobutyl methacrylate; Isobutyl 2-methyl-2-propenoate; 2-Methylpropyl methacrylate; Isobutyl α -methacrylate; 2-Propenoic acid, 2-methyl-, 2-methylpropyl ester
I123	4-Isopropylphenol	Phenol, p-isopropyl-; p-Cumenol; p-Isopropylphenol; Australol; 4-(1-Methylethyl)phenol; 1-Hydroxy-4-isopropylbenzene; p-Cuminol ;Phenol, 4-(1-methylethyl)-
I124	Isopentyl heptanoate	Heptanoic acid, 3-methylbutyl ester; ; 3-methylbutyl heptanoate; iso-Amyl n-heptanoate
I125	Isobutyl hexadecanoate	Hexadecanoic acid, 2-methylpropyl ester
I126	Isopropyl hexadecanoate	Hexadecanoic acid, 1-methylethyl ester; Palmitic acid, isopropyl ester; Hexadecanoic acid, isopropyl ester; Isopropyl n-hexadecanoate; Isopropyl ester of hexadecanoic acid; 1-Methylethyl ester 1-methylethyl hexadecanoate; Hexadecanoic acid isopropyl n-hexadecanoate; 1-methylethyl hexadecanoate; 2-propyl hexadecanoate; Isopropyl palmitate
I127	α -Ionene	1,2,3,4-tetrahydro-1,1,6-trimethyl-naphthalene; Ionene; 1,1,6-trimethyltetraline; 1,1,6-Trimethyl-1,2,3,4-tetrahydronaphthalene; ionene (1,1,6-trimethyl-1,2,3,4-tetrahydronaphthalene); Naphthalene, tetrahydro-1,1,6-trimethyl-; Naphthalene, 1,2,3,4-tetrahydro-1,1,6-trimethyl-
I128	Isophytol	1-Hexadecen-3-ol, 3,7,11,15-tetramethyl-; Hexadec-1-en-3-ol,

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Order	General Name	Synonyms
		3,7,11,15-tetramethyl-; 3,7,11,15-Tetramethyl-1-hexadecen-3-ol; 1-Hexadecene-3-ol, 3,7,11,15-tetramethyl
I129	2-Isopropyl-5-methylphenyl acetate	O-Acetylthymol; Thymol acetate; Thymyl acetate; Thimyl acetate; Phenol, 5-methyl-2-(1-methylethyl)-, acetate
I130	Isobutyl lactate	Isobutyl 2-hydroxypropanoate; 2-methylpropyl 2-hydroxypropanoate; Propanoic acid, 2-hydroxy-, 2-methylpropyl ester
I131	Isobutyl isothiocyanate	Propane, 1-isothiocyanato-2-methyl-; Isothiocyanic acid, isobutyl ester; i-Butyl isothiocyanate; 2-Methylpropyl isothiocyanate; 1-Isothiocyanato-2-methylpropane
I132	3-Isopropylphenol	Phenol, m-isopropyl-; m-Cumenol; m-Isopropylphenol; 3-(1-Methylethyl)phenol; Isopropylphenol, meta; Phenol, 3-(1-methylethyl)-
I133	Isoamyl isothiocyanate	Butane, 1-isothiocyanato-3-methyl-; 1-Isothiocyanato-3-methylbutane
I134	2-Isopropylpyridine	Pyridine, 2-(1-methylethyl)-
I135	Isolongifolene	2H-2,4a-Methanonaphthalene, 1,3,4,5,6,7-hexahydro-1,1,5,5-tetramethyl-, (2S,4aR)-(-)-; 2H-2,4a-Methanonaphthalene, 1,3,4,5,6,7-hexahydro-1,1,5,5-tetramethyl-; 2H-2,4a-Methanonaphthalene, 1,3,4,5,6,7-hexahydro-1,1,5,5-tetramethyl-, (2S-cis)-; (-)-Isolongifoline; Isolongipholene; 2H-2,4a-methanonaphthalene, 1,3,4,5,6,7-hexahydro-1,1,5,5-tetramethyl-, (2s)-
I136	Isobutanal diethyl acetal	Isobutyraldehyde, diethyl acetal; Isobutylaldehyde diethyl acetal; 1,1-Diethoxy-2-methylpropane; 1,1-Diethoxyisobutane; Propane, 1,1-diethoxy-2-methyl-
I137	Isopentyl valerate	Valeric acid, 3-methylbutyl ester; iso-Amyl N-valerate; 3-Methylbutyl pentanoate; Pentanoic acid, 3-methylbutyl ester; Isopentyl pentanoate
I138	Isopropyl isothiocyanate	Propane, 2-isothiocyanato-; 2-Isothiocyanatopropane
I139	[R-(E)]-5-Isopropyl-8-methylnona-6,8-dien-2-one	isopropyl methyl nonadienone
I140	Isoamyl decanoate(3-methylbutyl decanoate)	Pentadecanoic acid, 3-methylbutyl ester; iso-Amyl n-decanoate; Isopentyl

Order	General Name	Synonyms
I141	Isopropyl decanoate	decanoate;3-methylbutyl decanoate Decanoic acid, 1-methylethyl ester;N-capric acid isopropyl ester
I142	Isobutyl 2-methylbutyrate	Butyric acid, 2-methyl-, isobutyl ester; Isobutyl 2-methylbutanoate; 2-Methyl-1-propyl 2-methylbutyrate; 2-methylpropyl 2-methylbutanoate;Butanoic acid, 2-methyl-, 2-methylpropyl ester
I143	Isovaleraldehyde diethyl acetal	Butane, 1,1-diethoxy-3-methyl-; Isovaleraldehyde, diethyl acetal; 3-Methylbutanal, diethyl acetal; 1,1-diethoxy-3-methyl butane; isopentanal diethyl acetal
I144	Isobutyl 10-undecenoate	isobutyl undecenoate
I145	Isopropyl octanoate	n-Octanoic acid isopropyl ester; Octanoic acid, 1-methylethyl ester; Octanoic acid, isopropyl ester; iso-Propyl n-octanoate;2-propyl octanoate
I146	Isobutyl octanoate	n-Caprylic acid isobutyl ester; Octanoic acid, 2-methylpropyl ester; iso-Butyl caprylate; Octanoic acid, isobutyl ester; iso-Butyl n-octanoate;2-methylpropyl octanoate
I147	Isopropyl crotonate	
I148	3-Isopropenylpentanedioic acid	
I149	1-Isobutoxy-1-ethoxyethane	
I150	Isopropyl dodecanoate	Dodecanoic acid, 1-methylethyl ester; Isopropyl laurate
I151	Isopentyl 2-methylcrotonate	Isoamyl angelate; (Z)-2-Methyl-2-butenic acid 3-methylbutyl ester; 2-Butenoic acid, 2-methyl-, 3-methylbutylester
I152	Isobutyl valerate	Valeric acid, isobutyl ester; Isobutyl valerate; 2-Methyl-1-propyl n-valerate; 2-Methylpropyl valerate; Isobutyl pentanoate;Pentanoic acid, 2-methylpropyl ester
I153	1-Isopentyloxy-1-pentyloxyethane	
I154	Isopropyl valerate	Valeric acid, isopropyl ester; Pentanoic acid isopropyl ester; Isopropyl pentanoate;Pentanoic acid, 1-methylethyl ester
I155	2-Isobutyl-4-methyl-1,3-dioxolane	1,3-Dioxolane, 4-methyl-2-(2-methylpropyl)-; 2-Isobutyl-4-methyl-1,3-dioxolane
I156	Isodihydrocarveol	

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Order	General Name	Synonyms
I157	Isoamyl lactate(3-methylbutyl 2-hydroxypropanoate)	Propanoic acid, 2-hydroxy-, 3-methylbutyl ester; Isopentyl 2-hydroxypropanoate; 3-methylbutyl lactate
I158	Isobutyl tetradecanoate	Tetradecanoic acid, 2-methylpropyl ester;2-methylpropyl tetradecanoate;Myristic acid isobutyl ester;Isobutyl myristate
I159	2-Isobutyl-4,5-dimethyloxazole	Oxazole, 4,5-dimethyl-2-(2-methylpropyl)-;2-Isobutyl-4,5-dimethyl-1,3-oxazole; Oxazole, 4,5-dimethyl-2-isobutyl;4,5-Dimethyl-2-isobutyloxazole
I160	Isobutyl decanoate	Decanoic acid, 2-methylpropyl ester; Decanoic acid, isobutyl ester; 2-methylpropyl decanoate;N-capric acid isobutyl ester
I161	S-Isopropyl 3-methylbut-2-enethioate	S-Isopropyl thiosenecioate; S-isopropyl 3-methylthiocrotonate;isopropyl methyl but enethioate
I162	Isobutyl dodecanoate	Lauric acid isobutyl ester;Dodecanoic acid, 2-methylpropyl ester; 2-methylpropyl dodecanoat;Isobutyl laurate
I163	Isovaleraldehyde glyceryl acetal	
I164	Isopentyl tetradecanoate	
I165	1-Isobutoxy-1-ethoxypropane	
I166	2-Isopropyl-4-methyl-1,3-dioxolane	1,3-Dioxolane, 4-methyl-2-(1-methylethyl), trans
I167	1-Isobutoxy-1-isopentyloxyethane	
I168	Isopentyl hexadecanoate	3-Methylbutyl hexadecanoate
I169	1-Isobutoxy-1-ethoxy-3-methylbutane	
I170	1-Isopentyloxy-1-propoxyethane	
I171	1-Isopentyloxy-1-propoxypropane	
L001	Lauric aldehyde	Aldehyde C-12; 1-dodecanal; n-Dodecyl aldehyde; Lauraldehyde; Dodecanal; Aldehyde C-12 lauric; Lauryl aldehyde; dodecyl aldehyde; Dodecanal; n-Dodecylic aldehyde; Duodecylic aldehyde; Dodecan-1-al
L002	Lauryl acetate	Acetate C-12; dodecanyl acetate; Dodecyl acetate; Lauryl ethanoate; Dodecanyl ethanoate; Lauryl acetate
L003	Lauryl alcohol	Alcohol C-12; Dodecyl; n-Dodecyl alcohol; 1-Dodecanol; Dodecyl carbinol;

Order	General Name	Synonyms
		Dodecan-1-ol; Dodecyl alcohol; 1-Dodecanol; Undecyl carbinol
L004	Levulinic acid	3-Acetylpropionic acid; Laevulic acid; 3-Ketobutane-1-carboxylic acid; γ -Oxopentanoic acid; 4-oxovaleric acid; laevulinic acid; β -Acetylpropionic acid; γ -Ketovaleric acid; 4-Oxopentanoic acid; Acetopropionic acid; Levulinic acid
L005	d-Limonene	Cinene; citrene; Cajeputene; Carvene; dipentene; Kautschin; 1,8(9)-p-Menthadiene; p-Mentha-1,8-diene; 1-Methyl-4-isopropenyl-1-cyclohexene; d-1-Methyl-4-isopropenyl-1-cyclohexene
L006	l-Limonene	Levo-Limonene
L007	Linalool*	Linalol; 2,6-Dimethyl-2,7-octadiene-6-ol; Coriandrol (d-linalool from coriander oil); 3,7-Dimethyl-1,6-octadien-3-ol; dl-linalool (synthetic); 2,6-Dimethyl-octadien-2,7-ol-6
L008	Linalool oxide	2-Methyl-2-vinyl-5-(2-hydroxy-2-propyl)tetrahydrofuran; 5(2-Hydroxyisopropyl)-2-methyl-2-vinyltetrahydrofuran; 2-Furanmethanol, 5-ethenyltetrahydro- α,α -5-trimethyl-, cis; cis-trans-2-vinyl-2-methyl-5-(1'-hydroxy-1'-methylethyl)-tetrahydrofuran; Linalool oxide (5-ring)
L009	Linalyl acetate*	1,5-Dimethyl-1-ethenylhex-4-enyl acetate; Licareol acetate; Linalool acetate; Bergamol; 3,7-Dimethyl-1,6-octadien-3-yl acetate
L010	Linalyl anthranilate	3,7-Dimethyl-1,6-octadien-3-yl anthranilate; Linalyl o-aminobenzoate; 3,7-Dimethyl-1,6-octadien-3-yl-2-aminobenzoate; Linalyl 2-aminobenzoate
L011	Linalyl benzoate	1,5-Dimethyl-1-vinylhex-enyl benzoate; Linalool benzoate; 3,7-Dimethyl-1,6-octadien-3-yl benzoate
L012	Linalyl butyrate	1,5-Dimethyl-1-ethenylhex-4-enyl butyrate; 3,7-Dimethyl-1,6-octadien-3-yl butyrate; 3,7-Dimethyl-1,6-octadien-3-yl butanoate; linalool isobutyrate;

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Order	General Name	Synonyms
		Linalyl-n-butyrate; linalool butanoate
L013	Linalyl cinnamate	3,7-Dimethyl-1,6-octadien-3-yl cinnamate; 3,7-Dimethyl-1,6-octadien-3-yl 3-phenylpropenoate; 3,7-Dimethyl-1,6-octadien-3-yl β -phenylacrylate; Linalyl β -phenylacrylate; linalyl 3-phenylpropenoate; Linalyl 3-phenylpropenoate
L014	Linalyl formate	1,5-Dimethyl-1-ethenylhex-4-enyl formate; 3,7-Dimethyl-1,6-octadien-3-yl formix acid ester; Linalool formate; 3,7-Dimethyl-1,6-octadien-3-yl formate
L015	Linalyl hexanoate	1,5-Dimethyl-1-ethenylhex-4-enyl hexanoate; 3,7-dimethylocta-1,6-dien-3-yl hexanoate; linalyl capronate; linalyl caproate; Linalyl hexoate; linalyl hexylate; Linalyl hexoate; 3,7-Dimethyl-1,6-octadien-3-yl hexanoate
L016	Linalyl isobutyrate	1,5-Dimethyl-1-ethenylhex-4-enyl 3-methylpropionate; 3,7-Dimethylocta-1,6-dien-3-yl isobutylate; Linalool isobutyrate; Linalyl 3-methylpropionate; 3,7-Dimethyl-1,6-octadien-3-yl 2-methylpropanoate; Linalool 2-methylpropanoate; Linalyl 2-methylpropionate
L017	Linalyl isovalerate	1,5-Dimethyl-1-ethenylhex-4-enyl 3-methylbutyrate; 3,7-dimethylocta-1,6-dien-3-yl isovalerate; Linalyl isopentanoate; Linalyl 3-methylbutylate; Linalyl isovalerianate; 3,7-Dimethyl-1,6-octadien-3-yl isovalerate; 3,7-Dimethyl-1,6-octadien-3-yl 3-methylbutanoate; Linalyl 3-methylbutanoate
L018	Linalyl octanoate	1,5-Dimethyl-1-ethenylhex-3-enyl octanoate; 3,7-Dimethyl-1,6-octadien-3-yl octanoate; Linalool octanoate; Linalyl caprylate; Linalyl octoate; linalyl octylate
L019	Linalyl phenylacetate	Benzeneacetic acid, 1-ethenyl-1,5-dimethyl-4-hexenyl ester; 3,7-dimethyl-1,6-octadien-3-yl phenylacetate; Linalyl α -toluate; 1,5-dimethyl-1-vinylhex-4-enyl phenylacetate

Order	General Name	Synonyms
L020	Linalyl propionate	1,5-Dimethyl-1,6-octadien-3-yl propionate; Linalool propanoate; 3,7-Dimethyl-1,6-octadien-3-yl propionate; 3,7-Dimethyl-1,6-octadien-3-yl-propanoate
L021	linoleic acid and linolenic acid (mixture)	(9Z,12Z)-cotadeca-9,12-dienoic acid; 9,12-Octadecadienoic acid; 9,12,15-octadecatrienoic acid; Octadeca-9,12-dienoic acid
L022	Longifolene	1,4-Methanoazulene, decahydro-4,8,8-trimethyl-9-methylene-, (1S,3aR,4S,8aS)-(+) -; (+)-Longifolene; D-longifolene; 1,4-Methanoazulene, decahydro-4,8,8-trimethyl-9-methylene-; (+)-Longifolene; (+)-Longifolene; 1,4-Methanoazulene, decahydro-4,8,8-trimethyl-9-methylene-, [1S-(1 α ,3a β ,4 α ,8a β)]-
L023	Lavandulol	4-Hexen-1-ol, 5-methyl-2-(1-methylethenyl)-, (r)-; 4-Hexen-1-ol, 2-isopropenyl-5-methyl-, (-)-; (R)-Lavandulol; 2-Isopropenyl-5-methyl-4-hexen-1-ol; (-)-Lavandulol
L024	N-Lactoyl ethanolamine	Propanamide, 2-hydroxy-N-(2-hydroxyethyl)-; N-(β -Hydroxyethyl)-2-hydroxypropionamide; N-(β -Hydroxyethyl)lactamide; N-Hydroxyaethyl lactamid; 2-Hydroxy-N-(2-hydroxyethyl)propanamide; Lactic acid monoethanolamide; Monoethanolamine lactic acid amide; N-(2-Hydroxyethyl)lactamide
L025	Linalyl valerate	Pentanoic acid, 1-ethenyl-1,5-dimethyl-4-hexenyl ester; Linalyl N-valerate; 1,5-Dimethyl-1-vinyl-4-hexenyl pentanoate
L026	Lavandulyl Acetate	
L027	Linalool oxide(5) acetate	
L028	N-Lactoyl ethanolamine phosphate	N-(2-hydroxy-1-oxopropyl)ethanolamine O-phosphate; 2-[(2-hydroxypropanoyl)amino]ethyl dihydrogen phosphate; Phosphoric acid mono-[2-(2-hydroxypropionylamino)-ethyl] ester
L029	Lauric acid	Dodecanoic acid

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Order	General Name	Synonyms
M001	Maltol*	3-Hydroxy-2-methyl-4h-pyran-4-one; 3-hydroxy-2-methyl-γ-pyrone; Palatone; Corps praline; Veltol; 3-Hydroxy-2-methyl-(1,4-pyran); 3-hydroxy-2-methyl-4-pyrone; larixinic acid; 2-Methyl pyromeconic acid; 4H-Pyran-4-one, 3-hydroxy-2-methyl; 2-Methyl pyromeconic acid
M002	Maltol propionate	4H-Pyran-4-one, 2-methyl-3-(1-oxopropoxy)-, Veltol propionate
M003	Maltol isobutyrate	Maltol 2-methylpropanoate; 2-methyl-4-pyran-3-yl 2-methylpropanoate; propanoic acid, 2-methyl-, 2-methyl-4-oxo-4H-pyran-3-yl ester; Maltol isobutyrate
M004	p-Menth-1-en-3-ol	1-Methyl-4-isopropyl-1-cyclohexen-3-ol; Neopiperitol(trans-form); piperitol
M005	p-Menth-1-en-9-al	Carvomenthenal
M006	p-Menth-3-en-1-ol	Terpinen-1-ol; 4-Isopropyl-1-methyl-3-cyclohexen-1-ol; 1-Terpinenol; Δβ-para- Menthen-1-ol; 1-Methyl-4-isopropyl-3-cyclohexen-1-ol; 1-Terpinenol; 1- Terpinenol; p-3-Methenol-1
M007	p-Menth-8-en-1-ol	1-Methyl-4-isopropenylcyclohexan-1-ol; β-Terpineol; 4-Isopropenyl-1-methyl- 1- cyclohexanol
M008	p-Mentha-1,4(8)-dien-3-one	2-Cyclohexen-1-one, 3-methyl-6-(1-methylethylidene)-; 1-Methyl-4-isopropylidene- 1-cyclohexen-3-one; Piperitenone; 3-Methyl-6-(1-methylethylidene)cyclohex-2-en- 1-one; Piperitenone; 4-Isopropylidene-1-methyl-1-cyclohexen-3-one
M009	p-Mentha-1,8-dien-7-al	1-Cyclohexene-1-carboxaldehyde, 4-(1-methylethenyl)-; Dihydrocuminic aldehyde; 4-isopropenyl-1-cyclohexene-1-carboxaldehyde; Perilla aldehyde; Perillaldehyde; p-mentha-1,8-dien-7-al
M010	p-Mentha-1,8-dien-7-ol	Dihydrocuminic alcohol; Hydrocumin alcohol; Menthadien -7-carbinol; 4-isopropenyl- 1-cyclohexenecarbinol; Iso-carveol; Perilla alcohol;

Order	General Name	Synonyms
		1-Hydroxymethyl-4- isopropenyl-1-cyclohexene; Perillyl alcohol; Dihydrocuminy alcohol
M011	p-Mentha-1,8-dien-7-yl acetate	Perillyl acetate; Acetic acid, perillyl ester; Menthadien-7-carbinyl acetate; 1,8-para- Menthadien-7-yl acetate; 4-Isopropenyl-1-cyclohexene carbinol acetate; Dihydrocuminy acetate; 4-(1-Methylvinyl)cyclohex-1-ene-1-methylacetate; Perilla acetate; p-Mentha-1,8-dien-7-yl acetate
M012	p-Mentha-8-thiol-3-one	8-Mercapto-p-menthane-3-one; 8-Mercapto-3-p-menthanone; Thiomenthone; 8-Mercaptomenthone
M013	p-1(7)8-Menthadien-2-yl acetate, cis and trans isomers	cis- and trans-p-1(7),8-Menthadien-2-yl acetate; p-Mentha-1(7),8-dien-2-yl acetate, Acetic acid, p-1(7),8-menthadien-2-yl ester; Menthadienyl acetate; p-Mentha-1,8(10)- dien-9-yl acetate
M014	Menthadienol	p-Mentha-1,8(10)-dien-9-ol.
M015	p-Menthan-2-ol	Carvomenthol; Cyclohexanol, 2-Methyl-5-(1-methylethyl)-;Hexahydrocarvacrol; 3-Isopropyl-6-methylcyclohexanol; 1-Methyl-4-isopropyl-2-cyclohexanol
M016	p-Menthan-2-one	Carvomenthone; Tetrahydrocarvone; 1-Methyl-4-isopropylcyclohexan-2-one; 5-Isopropyl-2-methylcyclohexanone; Tetrahydromenthone
M017	p-Menthane-3,8-diol	Cyclohexanemethanol,2-hydroxy- $\alpha,\alpha,4$ -trimethyl; 2-(2-Hydroxypropan-2'-yl)-5- methylcyclohexanol; 2-Hydroxy- $\alpha,\alpha,4$ -trimethylcyclohexanmethanol
M018	1-p-Menthen-9-yl acetate	9-Acetoxy-1-p-menthene; 3-cyclohexene-1-menthanol, $\alpha,4$ -dimethyl-,acetate; p-menth-1-en-9-yl acetate
M019	1-p-Menthene-8-thiol	$\alpha,\alpha,4$ -Trimethyl-3-cyclohexene-1-methanethiol; p-Menth-1-ene-8-thiol
M020	Menthofuran	4,5,6,7-Tetrahydro-3,6-dimethylbenzofuran; 3,9-Epoxy-p-mentha-3,8-diene
M021	-Menthol*	Peppermint camphor; 5-Methyl-2-isopropylhexahydrophenol;

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Order	General Name	Synonyms
M022	dl-Menthol*	5-Methyl-2-isopropyl- cyclohexanol; menthacamphor; 1-Isopropyl-iso-4-methylcyclohexan-2-ol; 1-Propyl-iso-4-methylcyclohexan-2-ol; Hexahydrothymol; 3-p-Menthanol; p-menthan-3-ol; 1-Methyl-4-isopropylcyclohexan-3-ol, 1-3-p-Menthanol; dl-3-p-Menthanol; 2-Isopropyl-5-methylcyclohexanol
M023	d-neo-Menthol	2-Isopropyl-5-methylcyclohexanol; ; 2-Propyl-iso-5-methylcyclohexanol; 2-Isopropyl-5-methylcyclohexanol; d-β-Pulegomenthol; (+)-Neo-menthol
M024	(-)-Menthol 1- and 2-propylene glycol carbonate	Carbonic acid, 2-hydroxyethyl 5-methyl-2-(1-methylethyl)cyclohexyl ester; 1-Menthol 1-(or 2)-propylene glycol carbonate; Menthol propylene glycol carbonate
M025	(-)-Menthol ethylene glycol carbonate	Carbonic acid, 2-hydroxyethyl 5-methyl-2-(1-methylethyl)cyclohexyl ester; 1-menthol ethylene glycol carbonate; 2-Hydroxyethyl 5-methyl-2-(1-methylethyl)cyclohexyl carbonate; Menthol glycol carbonate
M026	D,L-Menthol-propylene glycol carbon	D,L-Menthol(+/-)-propylene glycol carbonate; Carbonic acid, 2-hydroxypropyl-5- methyl-2-(1-methylethyl)cyclohexylester; 5-Methyl-2-(1-methylethyl)-2-hydroxy propyl carbonic acid cyclohexyl ester
M027	Menthone	4-Isopropyl-1-methylcyclohexan-3-one; 4-Propyl-iso-1-methylcyclohexan-3-one; 2-Isopropyl-5-methyl- cyclohexanone; p-Menthan-3-one, trans-p-Menthan-3-one, trans-menthone; trans-2-Methyl-5-isopropylcyclohexanone
M028	DL-Menthone 1,2-glycerol ketal	1,4-Dioxaspiro[4,5]decane-2-menthanol; 1-Menthone 1,2-glycerol ketal; 1-menthone 1,2-glyceryl ketal; 6-Isopropyl-9-methyl-1,4-dioxaspiro[4,5]decana-2-methanol;

Order	General Name	Synonyms
		1-9-Methyl-6-(1-methylethyl)-1,4-dioxaspiro[4,5]decane-2-methanol
M029	(-)-Menthone-1,2-glycerol ketal	1,4-Dioxaspiro[4,5]decane-2-menthanol; d,l-Menthone 1,2-glycerol ketal; d,l-Methyl- 6-(1-methylethyl)-1,4-dioxaspiro[4,5]fecane-2-mthanol; Frescolat racemic ; DL- Menthone-1,2-glycerol ketal
M030	cis and trans-Menthone-8-thioacetate	Menthon 8-thioacetate; (S)-menthon-8-yl thioacetate; menthone thioacetate; 8-Acetylthio-p-menthan-3-one; 8-Acetylthiomenthan-3-one; cis-1-methyl-1-(4-methyl- 2-oxocyclohexyl)ethyl thioacetate; cis-2-(1-Acetylthio-1-methylethyl)- 5- methylcyclohexanone; trans-1-methyl-1-(4-methyl-2-oxocyclohexyl)ethyl thioacetate; trans-2-(1-Acetylthio-1-methylethyl)-5-methylcyclohexanone
M031	3-(L-Menthoxo)-2-methylpropane-1,2-diol	3-l-Menthoxo-2-methylpropan-1,2-diol
M032	2-(L-Menthoxo)ethanol	Ethanol, 2-[[5-methyl-2-(1-methylethyl)cyclohexy]-oxy]-; 2-(p-Menthan-3-yloxy) ethanol; 3-(2-Hydroxyethoxy)-p-menthane; Coolact5
M033	Menthyl acetate	p-Menthan-3-yl acetate; 5-Methyl-2-(1-methylethyl)cyclohexyl acetate; l-p-Menth-3- yl acetate; Menthol acetate; 1-Isopropyl-4-methylcyclohex-2-yl acetate
M034	Menthyl isovalerate	Menthyl 3-methylbutanoate; Menthyl isovalerianate; Menthyl isopentanoate; 1-Isopropyl-4-methylcyclohex-2-yl 3-methylbutanoate; Menthol isovalerate; 1-propyl- iso-4-methylcyclohex-2-yl 3 methylbutanoate; p-Menth-3-yl isovalerate; validol
M035	l-Menthyl lactate	Frescolate; α-Hydroxypropanoic acid, 5-methyl-2-(1-methylethyl)cyclohexyl ester; (-)-p-Menthan-3-yl lactate; propanoic acid, 2-hydroxy-, 5-methyl-2-(1-methylethyl) cyclohexyl ester; (-)-Menthyl lactate; 5-Methyl-2-(1-methylethyl)cyclohexyl α-hydroxypropanoate; l-p-Menthan-3-yl lactate

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Order	General Name	Synonyms
M036	L-Menthyl methyl ether	Cyclohexane,2-methoxy-4-methyl-1-(1-methylethyl)-,(1S,2R,4R)-; 1-Isopropyl-2-methoxy-4-methylcyclohexane; 2-Isopropyl-5-methylcyclohexyl methyl ether; 1-Menthyl methyl ether
M037	Menthyl pyrrolidone carboxylate	D- and L-proline, 5-oxo, 5-methyl-2-(1-methylethyl)cyclohexyl ester; 2-Isopropyl-5-methylcyclohexyl 5-oxo-2-pyrrolidine carboxylate; Questice
M038	Menthyl valerate	Pentanoic acid, (1R,2S,5R)-5-methyl-2-(1-methylethyl)cyclohexyl ester; Methyl pentanoate; Methyl valerianate
M039	3-Mercapto-2-butanone	
M040	erythro and threo-3-Mercapto-2-methylbutan-1-ol	1-Butanol, 3-mercapto-2-methyl; 3-Mercapto-2-methylbutyl alcohol
M041	3-Mercapto-2-methylpentan-1-ol (racemic)	
M042	3-Mercapto-2-methylpentanal	
M043	3-Mercapto-2-pentanone	
M044	4-Mercapto-2-pentanone	2-Pentanone, 4-mercapto-4-Mercaptopentan-2-one
M045	1-Mercapto-2-propanone	Mercaptoacetone
M046	2-Mercapto-3-butanol	2-Butanol, 3-mercapto-, (R*, S*)-; 2-Hydroxy-3-butanethiol; 3-hydroxy-2-butanethiol; 3-Mercapto-2-butanol; 3-Mercaptobutan-2-ol
M047	3-Mercapto-3-methyl-1-butanol	1-Butanol, 3-mercapto-3-methyl-; 3-Methyl-3-mercaptobutyl alcohol; 3-Mercapto-3-methylbutyl alcohol
M048	3-Mercapto-3-methylbutyl formate	3-Methyl-3-thiobutyl formate; 1-Butanol, 3-mercapto-3-methyl, formate ester; 3-Methyl-3-mercaptobutyl formate
M049	(+/-)-4-Mercapto-4-methyl-2-pentanol	2-Pentanol, 4-mercapto-4-methyl-
M050	4-Mercapto-4-methyl-2-pentanone	Thiomethyl pentanone-4,4,2; 2-Mercapto-2-methylpentan-4-one

Order	General Name	Synonyms
M051	2-Mercaptoanisole	2-Methoxythiophenol; Benzenethiol, o-methoxy-; Methoxybenzenethiol; o-Methoxythiophenol; Thioguaiacol; 2-Methoxybenzenethiol
M052	3-Mercaptohexanol	3-Mercapto-1-hexanol, 3-Thiohexan-1-ol; 3-Thiohexanol; 3-Thiohexanol
M053	3-Mercaptohexyl acetate	3-Thiohexyl acetate; 3-Thiohexyl ethanoate
M054	3-Mercaptohexyl butyrate	3-Thiohexyl butrate; 3-Thiohexyl butanoate
M055	3-Mercaptohexyl hexanoate	3-Mercaptohexyl caproate; 3-Thiohexyl caproate; 3-thio-1-hexyl caproate; 3-Thio-1-hexyl hexanoate
M056	2-(Mercaptomethyl)pyrazine	Mercaptomethylpyrazine; Pyrazine methanethiol; Pyrazinyl methylmercaptan
M057	(+/-)-2-Mercaptomethylpentan-1-ol	(+/-)-2-Mercapto-2-methylpentan-1-ol
M058	2-, 3- and 10-Mercaptopinane	Mixture of 2,6,6 trimethyl-bicyclo[3.1.1]heptane-(2,3 and 10)-thiols; Bicyclo[3.1.1]heptane-2-thiol, 2,6,6-trimethyl-; pinanethiol; Pinanyl mercaptan
M059	2-Mercaptopropionic acid	Thiolactic acid; α-Mercaptopropanoic acid; 2-Thiolpropionic acid
M060	Methionyl butyrate	1-Propanol, 3-(methylthio)-, butyrate; Butyric acid, 3-(methylthio)propyl ester; 3-(Methylthio)propyl butyrate
M061	3-(1-Methoxy)-1,2-propanediol	3-1-Menthoxyp propane-1,2-diol; 3-L-Menthoxyp propane-1,2-diol; 3-1-(p-Menthane-3-yl)oxy-1,2-propanediol
M062	trans- and cis-1-Methoxy-1-decene	(E)- and (Z)-1-Methoxy-1-decene; 1-Decene, 1-methoxy- (E,Z)-; Decanal methyl enol ether
M063	4-Methoxy-2-methyl-2-butanethiol	4-Methoxy-2-methylbutanethiol; 2-Butanethiol, 4-methoxy-2-methyl-
M064	2-Methoxy-3-(1-methylpropyl)pyrazine	2-Methoxy-3-sec-butylpyrazine; 2-(1-Methylpropyl)-3-methoxypyrazine; 2-Sec-butyl-3-methoxypyrazine, 2-(2-Butyl)-3-methoxypyrazine; 2-But-2-yl-3-methoxypyrazine; 2-Methoxy-3-(1-methylpropyl)-cyclohexanone

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Order	General Name	Synonyms
M065	(S1)-Methoxy-3-heptanethiol	3-Heptanethiol, 1-methoxy-, (3S); Aruscol
M066	2,5 or 6-Methoxy-3-methylpyrazine(mixture of isomers)	2-Methoxy-3-methylpyrazine; 2-Methoxy-5-methylpyrazine; 2-methoxy-6-methylpyrazine; Mixture of 2-methoxy-3-methylpyrazine; Methylmethoxypyrazine
M067	1-Methoxy-4-(1-propenyl)benzene	Anethole; p-Propylanisole; Isoestrageole; p-Propylphenyl methylether; Propenylanisole;
M068	N1-(2-Methoxy-4-methylbenzyl)-N2-(2-(pyridin-2-yl)ethyl)oxalamide	Ethanediamide, N-[(2-methoxy-4-methylphenyl)methyl]-N-[2-(2-pyridinyl)ethyl]-
M069	N1-(2-Methoxy-4-methylbenzyl)-N2-(2-(5-methylpyridin-2-yl)ethyl)oxalamide	Ethanediamide, N-[(2-methoxy-4-methylphenyl)methyl]-N-[2-(5-methyl-2-pyridinyl)ethyl]-
M070	2-Methoxy-4-methylphenol	3-Methoxy-4-hydroxytoluene; Homocatechol monoethyl ether; 1-Hydroxy-2-methoxy-4-methylbenzene; Valspice; Cresol; 4-Hydroxy-3-methyl-1-methyl benzene; 2-Methoxy- p-cresol; 4-methylguaiaicol
M071	2-Methoxy-4-propylphenol	Dihydroeugenol; Phenol, 2-methoxy-4-propyl-; 4-Propylguaiaicol; 5-propyl-o-hydroxyanisole; 4-Propyl-o-methoxyphenol; 4-Propyl-ortho-Methoxyphenol; 5-Propyl-ortho-Hydroxyanisole
M072	2-Methoxy-4-vinylphenol	4-Hydroxy-3-methoxystyrene; p-vinylguaiaicol / 4-Hydroxy-3-methoxystyrene; Phenol, 4-ethenyl-2-methoxy-; p-Vinylcatechol-o-methyl ether; p-Vinylguaiaicol; Vinyl guaiaicol; p-Vinylcatechol-Omethyl ether
M073	2-Methoxyacetophenone	1-(2-Methoxyphenyl)ethanone; 2-Acetylanisole; 2-Methoxyphenyl methyl ketone; Methyl 2-methoxyphenyl ketone; Methyl o-methoxyphenyl ketone; o-Acetylanisole; o-Methoxyacetophenone
M074	p-Methoxy-α-methylcinnamaldehyde	3-(4-Methoxyphenyl)-2-methylprop-2-enal; 3-(p-Methoxyphenyl)-2-methyl-2-propenal;

Order	General Name	Synonyms
		4'-Methoxy-2-methylcinnamaldehyde; α -Methyl-p-methoxycinnamaldehyde; 3-(2-Methoxyphenyl)-2-methyl-2-propenal; α -Methylmethoxycinnamic aldehyde
M075	p-Methoxybenzaldehyde	p-Anisaldehyde; Anisic aldehyde; aubepine; 4-Methoxybenzaldehyde; Aubepine; Aubepine liquid
M076	2-Methoxybenzoic acid	o-Anisic acid; o-Methoxybenzoic acid; Salicylic acid methyl ether
M077	3-Methoxybenzoic acid	3-Anisic acid; m-Anisic acid; m-Methoxybenzoic acid
M078	4-Methoxybenzoic acid	4-Anisic acid; Anisic acid; p-Anisic acid, p-Methoxybenzoic acid; Draconic acid
M079	o-Methoxycinnamaldehyde	β -(o-Methoxyphenyl) acrolein; 3-(o-methoxyphenyl)-2-propenal; Methoxycinnamaldehyde; 3-(4-Methoxyphenyl)-2-propenal; 2-propenal, 3-(4-methoxy0-phenyl)-; 2'-Methoxycinnamaldehyde; β -o-Methoxyphenyl acrolein; 3-o-Methoxyphenyl-2-propenal; 3-(2-Methoxyphenyl)-2-propenal
M080	p-Methoxycinnamaldehyde	3-(4-Methoxyphenyl)-2-propenal; 4-Methoxycinnamaldehyde; p-Cumaric aldehyde methyl ether; β -(p-Methoxyphenyl)-acrolein; 3-(p-Methoxyphenyl)-propenal; 3-(p-Methoxyphenyl)propen-2-al-1; 3-4-Methoxyphenyl-2-propenal
M081	1-(p-Methoxyphenyl)-1-penten-3-one	Ethone; p-Methoxystyryl ethyl ketone; α -Methyl anisylacetone; α -Methylanisylideneacetone; 1-(4-Methoxyphenyl)-1-penten-3-one; amethylanisylidene acetone; 1-(4-Methoxyphenyl)pent-1-en-3-one
M082	4-(p-Methoxyphenyl)-2-butanone	p-Methoxybenzylacetone; Methyl oxanone; Bramble ketone; Frambinonmethylether; Ketanone; Anisyl acetone; Rambinone methylether; p-Methoxy phenylbutanone; Raspberry ketone methylether; 4-(4-Methoxyphenyl)-2-butanone, Methyloxanone; Raspberry ketone
M083	1-(p-Methoxyphenyl)-2-propanone	4-Methoxyphenylacetone; Anisic ketone; anisketone; Anisyl methyl ketone; p-Methoxyphenylacetone; 1-(4-Methoxyphenyl)-2-propanone;

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Order	General Name	Synonyms
		3-(4-Methoxyphenyl)-propan-2-one; Anisic ketone
M084	1-(4-Methoxyphenyl)-4-methyl-1-penten-3-one	Isopropyl 4-methoxystyryl ketone; α,α -Dimethylanisylacetone; p-Methoxystyryl isopropyl ketone; Isopropyl p-methoxystyryl ketone; Methoxystyryl isopropyl ketone
M085	Methoxypyrazine	2-Methoxy-1,4-diazine; 2-methoxypyrazine
M086	Methyl (E)-2-(Z)-4-decadienoate	Methyl deca-2,4-dienoate
M087	Methyl (methylthio) acetate	Acetic acid, (methylthio)-, methyl ester; Methyl 2-(methylthio)acetate; (Methylthio)acetic acid methyl ester
M088	Methyl 10-undecenoate	10-Undecenoic acid, methyl ester; Methyl undec-10-enoate; Methyl undecylate
M089	Methyl 1-acetoxycyclohexyl ketone	1-Acetylcyclohexyl acetate; 1-Acetoxy-1-acetylcyclohexane; 1-Acetoxycyclohexyl acetate; ethanone, 1-[1-(acetyloxy)cyclohexyl]-
M090	Methyl 1-propenyl disulfide	Methyl propenyl disulfide; Disulfide, methyl 1-propenyl-; Methylthio-1-propene; 1-propenyl methyl disulfide; 1-Propenyl methyl disulphide
M091	Methyl 2-furoate	Methyl furoate; Furan- α -carboxylic acid, methyl ester; Methyl-2-furoate; methyl pyromucate; 2-Furoic acid
M092	Methyl 2-hydroxy-4-methylpentanoate	Methyl 2-hydroxy-4-methylvalerate; Methyl 2-hydroxyisocaproate; Pentanoic acid, 2-hydroxy-4-methyl-, methyl ester
M093	Methyl 2-methyl-2-propenoate	2-Propenoic acid, 2-methyl-, methyl ester; Methyl 2-methacrylate, 2-(methoxycarbonyl)-1-propene
M094	Methyl 2-methyl-3-furyl disulfide	Furan, 2-methyl-3-(methylthio)-; 2-Methyl-3-(methylthio)furan, 2-Methyl-3-furyl methyl disulfide
M095	S-Methyl 2-methylbutanethioate	Methyl 2-(methylthio)butyrate; Methylthiol 2-methylbutyrate
M096	Methyl 2-methylbutyrate	Butanoic acid, 2-methyl-, methyl ester; Methyl-2-methylbutanoate; Methyl

Order	General Name	Synonyms
		methylethylacetate
M097	Methyl 2-methylpentanoate	Methyl 2-methylvalerate; Pentanoic acid, 2-methyl-, methyl ester
M098	Methyl 2-nonenoate	
M099	Methyl 2-nonenonate	Methyl non-2-enoate; Methyl nonylenate; Methyl nonylenoate
M100	Methyl 2-oxo-3-methylpentanoate	Methyl 2-keto-3-methylvalerate; methyl 3-methyl-2-oxovalerate; Pentanoic acid, 3-methyl-2-oxo-, methyl ester; Methyl 2-oxo-3-methylvalerate; Methyl 2-keto-3-methylpentanoate
M101	Methyl 2-pyrrolyl ketone	2-Pyrrolyl methyl ketone; 2-Acetyl pyrrole; 2-Acetopyrrole; Methyl-2-pyrrolyl ketone
M102	Methyl 2-undecynoate	Methyl decine carbonate; Methyl decyne carbonate; Methyl undec-2-ynoate; Methyl octyl propiolate
M103	Methyl 3-(methylthio)butanoate	3-(Methylthio)butyric acid methyl ester; Butanoic acid, 3-(methylthio)-, methyl ester; 3-Methylsulfanylbutyric acid methyl ester
M104	Methyl 3,7-dimethyl-6-octenoate	Methyl citronellate ; Methyl-3,7-dimethyl-oct-6-enoate
M105	Methyl 3-hexenoate	o-Hexylhexanolide; Methyl hydrosorbate
M106	Methyl 3-hydroxyhexanoate	Hexanoic acid, 3-hydroxy-, methyl ester; Methyl β -hydroxycaproate; Methyl β -hydroxyhexanoate; Methyl 3-hydroxycapropate
M107	Methyl 3-mercaptoputanoate	Butanoic acid, 3-mercapto-, methyl ester; 3-Mercaptoputanoic acid methyl ester
M108	S-Methyl 3-methylbutanethioate	Methyl thioisovalerate; S-methyl 3-methylbutyrate; Methane thioisopentanoate
M109	Methyl 3-methylthiopropionate	Methyl β -methylthiopropionate; Methylmercaptomethylpropionate; Methyl- β -methylmercaptopropionate; Methyl- β -methylthiopropionate; β -Methylthiopropionic acid, methyl ester ; Methyl β -Methiopropionate
M110	Methyl 3-nonenoate	3-Nonenoic acid, methyl ester; Methyl non-3-enoate

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Order	General Name	Synonyms
M111	Methyl 3-phenylpropionate	Methyl dihydrocinnamate; Methyl hydrocinnamate; Methyl phenyl propionate
M112	Methyl 4-(methylthio)butyrate	Methyl 4-(methylmercapto)butyrate; Mixture of methyl 9,12-octadecadienoate and methyl 9,12,15-octadecatrienoate; Methyl γ -methyl mercapto butyrate; Methyl γ -(methylthio)butyrate
M113	S-Methyl 4-methylpentanethioate	
M114	Methyl 4-methylvalerate	Methyl isobutyrylacetate; Methyl isocaproate; Methyl-4-methyl pentanoate; Methyl isobutyl acetate
M115	Methyl 4-phenylbutyrate	Methyl γ -phenylbutyrate; γ -Phenylbutyric acid, methyl ester
M116	(+/-)-Methyl 5-acetoxyhexanoate	Hexanoic acid, 5-(acetyloxy)-,methyl ester; 5-Acetoxyhexanoic acid methyl ester
M117	Methyl 9-undecenoate	methyl undec-9-enoate; Methyl undecylenate; Methyl 9-hendecenoate; Methyl 9- undecylenate
M118	Methyl acetate	Methyl ethanoate
M119	Methyl anisate	Methyl p-anisate; Methyl p-methoxybenzoate; Methyl 4-methoxybenzoate
M120	Methyl anthranilate *	o-Amino methyl benzoate; Methyl 2-aminobenzoate; methyl o-aminobenzoate
M121	Methyl benzoate	Methyl benzenecarboxylate; Niobe oil
M122	S-Methyl benzothioate	Methanethiol, Benzoate; Methylthiyl benzoate; Methane thiobenzoate; S-Methyl thiobenzoate
M123	Methyl benzyl disulfide	Benzylthiomethane; Benzyl methyl disulfide; disulfide, phenylmethyl methyl; Methyl phenylmethyl disulfide
M124	Methyl β -naphthyl ketone*	Cetone d; Oranger crystals; β -Acetylnaphthalene; 2'-Acetonaphthone; 2-acetyl-naphthalene; methyl naphthyl ketone; β -naphthyl methyl ketone; 1-(2-Naphthyl)

Order	General Name	Synonyms
		ethanone; Methyl 2-naphthyl ketone
M125	4-Methyl biphenyl	p-Methyldiphenyl; p-methylphenylbenzene; 4-Methyl-1,1'-biphenyl; Phenyl-p-tolyl; p-Phenyltoluene
M126	Methyl butyrate	Methyl butanoate
M127	Methyl caproate	Methyl hexanoate; Methyl hexanoate; methyl hexylate
M128	Methyl cinnamate*	Methyl-3-phenyl propenoate; Methyl-3-phenyl prop-2-enoate
M129	Methyl cis-3-hexenoate	Methyl (Z)-3-hexenoate
M130	Methyl cis-4-octenoate	(Z)-methyl oct-4-enoate; Methyl oct-4(cis)-enoate
M131	Methyl cis-5-octenoate	5-Octenoic acid, methyl ester, (5Z)
M132	Methyl cyclohexanecarboxylate	Cyclohexanecarboxylic acid, methyl ester
M133	γ -Methyl decalactone	4-Methyl-4-decanolide; 5-Hexyldihydro-5-methyl-2(3H)-furanone; 5-Hexyl-5-methyldihydrofuran-2(3H)-one; Dihydrojasmonone lactone; 2(3H)-furanone, 5-hexyldihydro-5-methyl-; 4-Methyldecanolide; lactojasmonone; Methyl γ -decalactone; Dihydrojasmonone lactone
M134	Methyl dihydrojasmonate	hedione; Methyl 3-oxo-2-pentyl-1-cyclopentylacetate; 2-Amylcyclopentanone acetic acid, methyl ester; Methyl hydrojasmonate; Methyl-(2-amyl-3-oxocyclopentyl); methyl-2-(-pentyl-3-oxo-1-cyclopentyl)acetate; Methyl epi-dihydrojasmonone; Jasmonic acid, (E)-dihydro-, methyl ester
M135	Methyl disulfide	dimethyl disulfide
M136	Methyl ethyl sulfide	(Methylthio)Ethane; 1-(methylthio)Ethane; 2-Thiabutane; Ethyl methyl sulfide; Ethyl methyl thioether
M137	Methyl ethyl trisulfide	Ethyl methyl trisulfide, 2,3,4-Trythiahexane; 2,3,4-Trithiohexane

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Order	General Name	Synonyms
M138	Methyl furfuryl disulfide	Methyl 2-furylmethyl disulfide; Furfuryl methyl disulfide
M139	Methyl heptanoate	Methyl heptoate; Methyl heptylate; Methyl oenanthate
M140	Methyl heptin cabonate	Methyl 2-octynoate; Methyl heptine carbonate; Methyl heptyne carbonate; Methyl oct-2-ynoate; Methyl pentylpropiolate
M141	Methyl hex-2-enoate	Methyl- α,β -hexanoate; methyl- β -propylacrylate
M142	S-Methyl hexanethioate	
M143	Methyl isobutyrate	Methyl dimethylacetate; Methyl-2-methylpropanoate
M144	Methyl isopentyl disulfide	Disulfi de, isopentyl methyl; Isoamyl methyl disulfi de; Isopentyl methyl disulfi de; Methyl isopentyl disulfi de
M145	Methyl isovalerate	Methyl isovalerianate; Methyl isopentanoate; Methyl 3-methylbutyrate; Methyl 3-methylbutanoate; Methyl β -methyl butyrate
M146	Methyl jasmonate	Methyl 3-oxo-2-pent-2-enyl-1-cyclopentylacetate; 2-Pentenyl cyclopentanone-3- acetic acid, methyl ester; 2-(cis-Penten-2'-yl)-3-oxo-cyclopentane acetic acid, methyl ester; methyl (2-pent-2-enyl-3-oxo-1-cyclopentyl) acetate; Methyl epi-jasmonate
M147	Methyl laurate	Methyl dodecanoate; Methyl dodecylate; Methyl laurate
M148	Methyl linoleate and methyl linolenate (mixture)	Methyl linoleate; Methyl linolenate, methyl linoleate mixture; methyl 9,12-octadecadienoate; methyl 9,12,15-octadecatrienoate mixture; 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z,)-; Linoleic and linolenic methyl acids; Methyl octadeca-9(cis),12(cis)-dienoate
M149	Methyl mercaptan	Thiomethyl alcohol; methyl sulfhydrate; Mercaptomethane; Methanethiol; Methylmercaptan
M150	Methyl myristate	Methyl tetradecanoate; Methyl n-tetradecanoate; Methyl myristate

Order	General Name	Synonyms
M151	Methyl N,N-dimethylantranilate	Benzoic acid, 2-(dimethylamino)-, methyl ester; Anthranilic acid, N,N-dimethyl-, methyl ester; Methyl 2-(dimethylamino)benzoate; Methyl o-(dimethylamino)benzoate
M152	Methyl N-acetylantranilate	Benzoic acid, 2-(acetylamino)-, methyl ester; Anthranilic acid, N-acetyl-, methyl ester; Methyl 2-(acetylamino)benzoate; Methyl 2-acetamidobenzoate; Methyl N-acetoantranilate; o-(Methoxycarbonyl)acetanilide; o-Acetamidobenzoic acid methyl ester
M153	Methyl N-formylantranilate	Benzoic acid, 2-(formylamino)-, methyl ester; Methyl o-formamidobenzoate; N-Formylantranilic acid, methyl ester
M154	Methyl nicotinate	3-Carbomethoxypyridine; Methyl 3-pyridinecarboxylate; 3-Pyridinecarboxylic acid, methyl ester
M155	Methyl N-methylantranilate*	Dimethyl anthranilate
M156	Methyl nonanoate	Methyl nonylate; Methyl pelargonate; Methyl nonylate
M157	Methyl octanoate	Methyl caprylate; Methyl octoate; Methyl octylate
M158	Methyl octyne carbonate	Methyl 2-nonynoate; Methyl octine carbonate; Methyl octyne carbonate
M159	Methyl o-methoxybenzoate	o-Methoxy methyl benzoate; Methyl salicylate o-methyl ether; Dimethyl salicylate; Methyl o-anisate; Methyl 2-methoxybenzoate; Methyl salicylate methyl ether; o-Methoxybenzoic acid methyl ester
M160	Methyl phenethyl ether	Pandanol; 2-Methoxyethyl benzene; Phenylethyl methyl ether; Phenylethylmethylether
M161	Methyl phenyl disulfide	Phenyl methyl disulfide
M162	Methyl phenyl sulfide	(methylthio)Benzene; 1-phenyl-1-thioethane; Methyl phenyl thioether; Phenyl methyl sulfide; Phenylthiomethane; Thioanisol; Thioanisol; Thioanisole; Benzene, (methylthio)-; Sulfide, methyl phenyl-

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Order	General Name	Synonyms
M163	Methyl phenylacetate	Phenylacetic acid methyl ester; Methyl α -toluate
M164	Methyl p-hydroxybenzoate	Methylparaben
M165	S-Methyl propanethionate	Propanethioic acid, S-methyl ester; S-Methyl thiopropionate
M166	Methyl propionate	Methyl propanoate
M167	Methyl propyl disulfide	Methyldithiopropene; Methyl n-propyl disulfide; Propyl methyl disulfide
M168	Methyl propyl trisulfide	Propyl methyl trisulfide; Methyl trithio propane; Propyl methyl trisulphide
M169	3-(2-Methyl propyl) pyridine	3-Butyl iso pyridine; 3-Isobutyl pyridine; 3-ButylPyridine
M170	2-(2-Methyl propyl)pyridine	2-Butyl iso pyridine; 2-Isobutyl pyridine; 2-ButylPyridine
M171	Methyl p-tert-butylphenylacetate	<i>p-tert</i> -Butylphenylacetic acid, methyl ester; Methyl (4-(1,1-dimethylethyl)phenyl)- acetate
M172	Methyl salicylate*	Methyl 2-hydroxybenzoate; synthetic wintergreen oil; synthetic sweet birch oil; synthetic teaberry oil; Methyl o-hydroxybenzoate
M173	Methyl sorbate	2,4-Hexadienoic acid, methyl ester; methyl 2,4-hexadienoate; methyl (E,E)-2,4- hexadienoate; Methyl hexa-2,4-dienoate
M174	Methyl sulfide	2-Thiapropene; Thiobismethane; Dimethyl sulfide
M175	S-Methyl thioacetate	S-methyl acetothioate; Methanethiol acetate; S-methyl ethanethioate
M176	Methyl thiobutyrate	S-methyl butanethioate; Methylthiol n-butyrate; Thiobutyric acid, methyl ester; Mathanethiol n-butyrate
M177	S-Methyl thiofuroate	Methyl 2-thiofuroate; Methanethiol furoate; Methyl thiofuroate; Thiofuroic acid, methylester; S-methyl 2-furanthiocarboxylate; Furoylthiomethane; Methyl thio-2-furoate
M178	Methyl trans-2-octenoate	Methyl (E)-2-octenoate; 2-Octenoic acid, methyl ester, (E)-; Methyl-2-octenoate; Methyl oct-2(trans)-enoate
M179	Methyl valerate	Methyl pentanoate; Methyl-n-valerate; methyl valerianate

Order	General Name	Synonyms
M180	3-Methyl-1,2,4-trithiane	1,2,4-Trithiane, 3-methyl, 3-Methyl-1,2,4-trithiacyclohexane
M181	2-Methyl-1,3-cyclohexadiene	Dihydrotoluene(1,3); dihydrotoluene(delta1,3)
M182	2-Methyl-1,3-dithiolane	
M183	2-Methyl-1-butanethiol	Amyl mercaptan; 2-Methylbutyl mercaptan; Thioamyl alcohol
M184	(+/-)-2-Methyl-1-butanol	(+/-)-2-Methyl-1-butanol; 2-Methyl-n-butanol; 2-Methylbutyl alcohol; Active amyl alcohol; Active primary amyl alcohol; Primary active amyl alcohol; sec-Butylcarbinol
M185	3-Methyl-1-cyclopentadecanone	<i>d,l</i> -Muscone; methyloxaltone; 3-methylcyclopentadecanone; 3-Methylcyclopentadecan-1-one; Muscone
M186	1-Methyl-1-cyclopenten-3-one	3-Methyl-2-cyclopenten-1-one; 1-Methyl-1-cyclopenten-3-one
M187	2-Methyl-1-methylthio-2-butene	2-Methyl-1-methylsulfanyl-but-2-ene; Methyl 2-methyl-2-butenyl sulfi de
M188	3-Methyl-1-pentanol	3-methylpentan-1-ol; 2-ethyl-4-butanol; 1-pentanol, 3-methyl-
M189	1-Methyl-1-phenethyl isobutyrate	2-phenylpropan-2-yl isobutyrate; α,α -dimethylbenzyl 2-methylpropanoate; Phenyl dimethyl carbonyl isobutyrate; Dimethyl phenyl carbonyl isobutyrate; Phenylpropan-2-yl 2-methylpropionate; α,α -Dimethylbenzyl isobutyrate; 2-Phenylpropan-2-yl 2-methylpropanoate
M190	4-Methyl-1-phenyl-2-pentanone	Benzyl isobutyl ketone; Isobutyl benzyl ketone; Benzyl 2-methylpropyl ketone
M191	2-Methyl-1-propanethiol	Isobutyl nercaptan
M192	(2S-trans)-5 Methyl-2-(1-methylethyl)cyclohexanone	l-Menthone
M193	3-Methyl-2-(2-pentenyl)-2-cyclopenten-1-one	cis Jasmone; Jasmone; 3-Methyl-2-pent-2-enylcyclopent-2-en-1-one; 3-Methyl-2- (pent-2(cis)-enyl)cyclopent-2-en-1-one

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Order	General Name	Synonyms
M194	3-Methyl-2(3-methylbut-2-enyl)furan	γ -Clausenane; Rosefuran; 2-(3-Methyl-2-butenyl)-3-methylfuran; Furan, 3-methyl- 2-(3-methyl-2-butenyl)-; 3-Methyl-2(3-methylbut-2-en-1-yl)furan
M195	2-Methyl-2-(methyldithio)propanal	2-Methyl-2-(methyldithio)propionaldehyde; 2-(Methyldithio)isobutyraldehyde
M196	1-Methyl-2,3-cyclohexadione	3-Methyl-1,2-cyclohexanedione; 2-methyl-3,4-cyclohexanedione; 3-Methylcyclohexan-1,2-dione
M197	5-Methyl-2,3-hexanedione	2-Methyl-4,5-hexanedione; acetyl isovaleryl; Isobutyl methyl diketone; Isobutyl methyl glyoxal; Acetyl isopentanoyl
M198	3-Methyl-2,4-nonanedione	3-Methylnonane-2,4-dione
M199	4-Methyl-2,6-dimethoxyphenol	2,6-Dimethoxy- <i>p</i> -cresol; 4-Methylsyringol; Phenol, 2,6-dimethoxy-4-methyl-
M200	3-Methyl-2-butanethiol	Isopentyl mercaptan; isoamyl mercaptan; Isopentanethiol; Isoamyl thioalcohol; Isoamyl sulfhydrate; sec-Isoamylmercaptan
M201	3-Methyl-2-butanol	Isopropyl methyl carbinol; 2-Butanol, 3-methyl; Methyl isopropyl carbinol
M202	3-Methyl-2-buten-1-ol	Prenol
M203	2-Methyl-2-butenal	2-Methylcrotonaldehyde; 2-Methyl crotonaldehyde; tiglic aldehyde; 2,3-Dimethyl- acrolein; Tiglaldehyde
M204	3-Methyl-2-butenal	3-Methylcrotonaldehyde; 2-Butenal, 3-methyl-; 3-Methylcrotonaldehyde; Prenal; senecialdehyde; 3-Methyl but-2-enal
M205	trans-2-Methyl-2-butenic acid	2-Methyl-2-butenic acid; 2-Butenoic acid, 2-methyl-, (E); trans-2-Methyl-crotonic acid; tiglic acid; trans-2-methylcrotonic acid
M206	3-Methyl-2-cyclohexen-1-one	3-Methyl- Δ^2 -cyclohexenone; 3-Methyl-d-2-cyclohexenone; 1-Methyl-1-cyclohexenone-3
M207	3-(5-Methyl-2-furyl) butanal	3-(5-Methyl-2-furyl) butyraldehyde; 2 Furanpropanal, β ,5-dimethyl-

Order	General Name	Synonyms
M208	3-(5-Methyl-2-furyl)prop-2-enal	3-(5-Methylfuryl)acrolein; 1-(5-Methyl-2-furanyl)-1-propen-3-al; 3-(5-Methyl-2-furanyl)-2-propenal; 5-Methyl-2-furanacrolein; 2-Propenal, 3-(5-methyl-2-furanyl)-
M209	5-Methyl-2-hept-4-one	Fibertone; hazeltone; 2-hepten-4-one, 5-methyl
M210	2-(4-Methyl-2-hydroxyphenyl)propionic acid γ -lactone	dimethyl-3,6-benzo-2(3H)-furanone; furaminton
M211	2-Methyl-2-octenal	
M212	3-Methyl-2-oxobutanoic acid	3-Methyl-2-oxobutyric acid; 2-Oxoisovaleric acid; Dimethylpyruvic acid
M213	3-Methyl-2-oxobutanoic acid, sodium salt	Soudim 3-methyl-2-oxobutyrate, Sodium, α -ketoisovalerate; Sodium 3-methyl-2-oxobutanoate
M214	3-Methyl-2-oxopentanoic acid	3-Methyl-2-oxovaleric acid, Methyl ethyl pyruvic acid; Sodium 3-methyl-2-oxopentanoic acid
M215	4-Methyl-2-oxopentanoic acid	4-Methyl-2-oxovaleric acid, Isopropyl pyruvic acid; 2-Keto-4-methyl-pentanoic acid; 4-Methyl-2-oxopentanoic acid; α -Ketoisocaproic acid
M216	3-Methyl-2-oxopentanoic acid, sodium salt	Soudim 3-methyl-2-oxobutyrate
M217	4-Methyl-2-oxopentanoic acid, sodium salt	Sodium 4-methyl-2-oxovalerate, 4-Methyl-2-oxovaleric acid, Sodium salt; Sodium 4-methyl-2-ketopentanoate; Sodium 4-methyl-2-oxopentanoate
M218	4-Methyl-2-pentanone	Isobutyl methyl ketone; Isopropylacetone; Isohexanone; Butyl iso methyl ketone; hexone; Methyl isobutyl ketone; isohexanone-2
M219	2-Methyl-2-pentenal	α -Methyl- β -ethylacrolein; 3-Ethyl-2-methylacraldehyde 2-propylidene propionaldehyde; Methyl ethyl acrolein; 2,4-Dimethyl crotonaldehyde; Homotiglic aldehyde; Isohexenal
M220	4-Methyl-2-pentenal	

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Order	General Name	Synonyms
M221	2-Methyl-2-pentenoic acid	Strawberriff; 3-Ethyl-2-methylacrylic acid; β -Amylene- β -carboxylic acid; 2-Pentene-2-carboxylic acid; 2-Propylidenepropionic acid; 2-Pentene-2-carboxylic acid
M222	4-Methyl-2-pentyl-1,3-dioxolane	2-Amyl-4-methyl-1,3-dioxolane; 1,3-Dioxolane, 4-methyl-2-pentyl-, <i>cis</i> 4-Methyl-2-pentyl-1,3-dioxolane; Hexanal propylene glycol acetal
M223	5-Methyl-2-phenyl-2-hexenal	2-Phenyl-5-methyl-2-hexenal
M224	4-Methyl-2-phenyl-2-pentenal	Eglantal
M225	3-Methyl-2-phenylbutyraldehyde	α -iso-Propyl phenylacetaldehyde; α -Phenylisopentanal; α -Isopropyl phenylacetaldehyde; α -phenyl isovaleraldehyde; 3-Methyl-2-phenylbutanal; α -iso-propyl phenylacetaldehyde
M226	5-Methyl-2-thiophenecarboxyaldehyde	5-Methyl-2-thiophenecarbaldehyde; 5-Methyl-2-thenaldehyde; 5-Methyl-2-thiophenecarbaldehyde; 2-Formyl-5-methylthiophen; 2-Thiophene carboxaldehyde, 5-methyl; 2-Thiophenecarbaldehyde, 5-methyl-
M227	2-Methyl-3-(2-furyl)acrolein	Furfurylidene-2-propanal; α -Methyl- β -furylacrolein; 2-Methyl-3-(2-furyl)propenal; 2-methyl-3-furylacrolein; α -Methylfurylacrolein; 2-propenal, 3-(2-furanyl)-2-methyl-; 3-(2-Furyl)-2-methylprop-2-enal; 2-Furfurylidenepropionaldehyde; α -Methyl- β -furylacrolein
M228	5-Methyl-3(2H)-furanone	3(2H)-Furanone, 5-methyl-
M229	2-Methyl-3-(methylthio)furan	Dimethylthiofuran; 2-Methyl-3-thiomethylfuran
M230	2-Methyl-3-(p-methylphenyl)propanal	Satinaldehyde; 2-Methyl-3-(p-tolyl)propionaldehyde; 2-Methyl-3-(4-methylphenyl)- propanal; 2-Methyl-3-tolylpropionaldehyde
M231	2-Methyl-3,5 and 6-(furfurylthio)pyrazine	1. 2-Furfurylthio-3-methylpyrazine; 2. 2-furfurylthio-5-methylpyrazine; 3. 2-furfurylthio-6-methylpyrazine; 2-Furfuryl thio-(3,5 or 6)-methylpyrazine;

Order	General Name	Synonyms
		Methyl(furfurylthio)pyrazine (mixture of isomers)
M232	2-Methyl-3,5 or 6-ethoxypyrazine	2-Methyl-3-ethoxypyrazine and 2-methyl-5-ethoxypyrazine and 2-methyl-6-ethoxypyrazine, 2-ethoxy-3 or 5 or 6-methylpyrazine
M233	6-Methyl-3,5-heptadien-2-one	2-Methyl-hepta-2,4-dien-6-one; methyl heptadienone; 1-Acetyl-4-methyl-1,3-pentadiene
M234	2-Methyl-3-buten-2-ol	
M235	2-Methyl-3-furanthiol	2-Methyl-3-furylmercaptan
M236	2-Methyl-3-furfurylthiopyrazine	
M237	bis(2-Methyl-3-furyl) disulfide	3,3'-Dithio-bis-(2-methylfuran); 3,3'-Dithio-2,2'-dimethyldifuran; 2-Methyl-3-furyl disulfide
M238	bis(2-Methyl-3-furyl) tetrasulfide	3,3'-Tetrathio-bis(2-methylfuran); Bis(2-methyl-3-furyl) tetrasulfide; 2-Methyl-3-furyl tetrasulfide; 2-Methyl-3-furyl tetrasulphide
M239	(+/-)-3-[(2-Methyl-3-furyl)thio]-2-butanone	2-Butanone, 3-[(2-methyl-3-furanyl)thio]-; 3-[(2-Methyl-3-furyl)sulfanyl]-2-butanone; 3-[(2-Methyl-3-furanyl)sulfanyl]-2-butanone
M240	3-[(2-Methyl-3-furyl)thio]-4-heptanone	1,3-Diethylacetyl 2-methyl-3-furyl sulfide; 4-heptanone, 3-[(2-methyl-3-furanyl)]thiol-
M241	4-[(2-Methyl-3-furyl)thio]-5-nonanone	1,3-Dipropylacetyl 2-methyl-3-furyl sulfide; 5-nonanone, 4-((2-methyl-3-furyl)thio)-
M242	(E)-6-Methyl-3-hepten-2-one	trans-6-Methylhept-3-en-2-one; 3-Hepten-2-one, 6-methyl-
M243	5-Methyl-3-hexen-2-one	Isobutylidene acetone; 5-Methylhex-3-en-2-one
M244	Methyl-3-methyl-1-butenyl disulphide	
M245	1-Methyl-3-methoxy-4-isopropylbenzene	1-Isopropyl-2-methoxy-4-methylbenzene; 3-Methyl-p-cymene; Thymol

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Order	General Name	Synonyms
		methylether; 3-Methoxy-para-Cymene
M246	(E)-7-Methyl-3-octen-2-one	trans-7-Methyl-3-octen-2-one; 7-Methyl-3-octenone-2
M247	4-Methyl-3-penten-2-one	Isopropylidene acetone; Methyl isobutenyl ketone; Mesityl oxide
M248	2-Methyl-3-pentenoic acid	3-Pentenoic acid, 2-methyl-
M249	2-Methyl-3-tetrahydrofuranthiol	bis-(2-methyl-3-tetrahydrofuran)disulfide; 2-Methyltetrahydrofuran-3-thiol
M250	2-Methyl-3-thioacetoxy-4,5-dihydrofuran	4,5-Dihydro-2-methyl-3-thioacetoxyfuran; 4,5-Dihydro-2-methyl-3-furanthiol acetate; ethanethioic acid, S-(4,5-dihydro-2-methyl-3-furanyl)ester; 2-Methyl-4,5- dihydro-3-furanthiol acetate; S-(4,5-dihydro-2-methyl)-3-furyl thioacetate
M251	2-Methyl-3-tolylpropionaldehyde (mixed o,m,p-)	2-Methyl-3-tolyl propanal
M252	7-Methyl-4,4a,5,6-tetrahydro-2(3H)-naphthalenone	2(3H)-Naphthalenone, 4,4a,5,6-tetrahydro-7-methyl-
M253	2-Methyl-4-pentenoic acid	2-methylpent-4-enoate; 4-Pentenoic acid, 2-methyl-
M254	2-Methyl-4-phenyl-2-butanol	Butanol, 2-methyl-4-phenyl-; Dimethylphenylethyl carbinol; Dimethyl phenylethyl carbinol; 1,1-dimethyl-3-phenyl-1-propanol; α,α-Dimethyl-γ phenylpropyl alcohol; Phenyl ethyl dimethyl carbinol; Phenylethyl dimethyl carbinol
M255	2-Methyl-4-phenyl-2-butyl acetate	Dimethylphenylethyl carbinyol acetate
M256	2-Methyl-4-phenyl-2-butyl isobutyrate	Dimethylphenyl ethylcarbinyol isobutyrate
M257	3-Methyl-4-phenyl-3-buten-2-one	3-Benzylidene-2-butanone; 1-Methyl-1-benzylideneacetone; α-methyl-α-benzalacetone; Benzylidene methyl ethyl ketone; 3-Benzylidene-butane-2-one; Benzylidene methyl acetone; Benzylidene methyl acetone
M258	2-Methyl-4-phenylbutyraldehyde	2-Methyl-4-phenylbutanal; Butanol, 2-
M259	2-Methyl-4-propyl-1,3-oxathiane	1,3-Oxathiane, 2-methyl-4-propyl-; Oxane

Order	General Name	Synonyms
M260	2-Methyl-5-(methylthio)furan	2-Methyl-5-thiomethylfuran; Methyl 5-methyl-2-furyl sulfide; (5-Methylfuryl-2)-thiomethane
M261	Methyl-5-hepten-2-ol	
M262	6-Methyl-5-hepten-2-one	2-Methyl heptenone; 2-Methyl-2-hepten-6-one; methyl hexenyl ketone; Methyl heptenone
M263	6-Methyl-5-hepten-2-yl acetate	5-Hepten-2-ol, 6-methyl-, acetate; (+/-)-Sulcatol acetate
M264	5-Methyl-5-hexen-2-one	Methallyl acetone; 4-Acetyl-2-methyl-1-butene; Isobutylidene acetone; 2-Methylallylacetone; 2-Methyl-1-hexen-5-one; 2-Methyl-allylacetone
M265	2-Methyl-5-isopropylpyrazine	5-Isopropyl-2-methylpyrazine; 2-Isopropyl-5-methylpyrazine; 5-Methyl-5-isopropyl-1,4-diazine
M266	2-Methyl-5-methoxythiazole	5-Methoxy-2-methylthiazole
M267	3-Methyl-5-propyl-2-cyclohexen-1-one	Celery ketone; 3-Methyl-5-propyl-2-cyclohexenone; 1-Methyl-5-n-propyl-1-cyclohexen-3-one
M268	4-Methyl-5-thiazole ethanol	4-Methyl-5-(β -hydroxyethyl)-thiazole; 5-Hydroxyethyl-4-methylthiazole; 5-(2-hydroxyethyl-4-methylthiazole; 2-(4-Methylthiazol-5-yl)ethanol; sulfurol; 4-methyl-5-thiazoleethanol; 5- β -Hydroxyethyl-4-methylthiazole; 4-Methyl-5-thiazole ethanol; 5-Thiazole ethanol, 4-methyl-
M269	4-Methyl-5-thiazoleethanol acetate	4-Methyl-5-(2-acetoxyethyl)-thiazole; Sulfuryl acetate; 4-Methyl-5-thiazoleethanol acetate; 4-Methyl-5-thiazoleethyl acetate; 4-Methyl-5-thiazoleethanol acetate; 5-Thiazoleethanol, 4-methyl-, acetate
M270	(+/-)-2-(5-Methyl-5-vinyltetrahydrofuran-2-yl)propionaldehyde	2-Furanacetaldehyde, 5-ethenyltetrahydro- α ,5-dimethyl-, (+/-); Lilac aldehyde, (+/-)
M271	4-Methyl-5-vinylthiazole	Thiazole, 4-methyl-5-vinyl

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Order	General Name	Synonyms
M272	5-Methyl-6,7-dihydro-5H-cyclopentapyrazine	5h-5-Methyl-6,7-dihydrocyclopenta(b) pyrazine; 6,7-Dihydro-5-methyl-5h-cyclopentapyrazine; Maple lactone pyrazine
M273	4-Methylacetophenone*	p-Tolyl methyl ketone; 1-Acetyl-4-methylbenzene; p-Acetotoluene; p-methylacetophenone; 1-Methyl-4-acetyl benzene; Methyl p-toly ketone; 1-(4-Methylphenyl)ethane; p-Acetyl toluene
M274	2-Methylallyl butyrate	2-Methylallyl butanoate; Isopropenyl carbinyln-butyrate; Methanllyl butyrate; β -methylallyln-butyrate; 2-Methyl-2-propen-1-yl butyrate
M275	Methyl- α -ionone	Iraldein; α -Cetone; α -Cyclocitrylidene butanone; α -Cyclocitrylidene methyl ethyl ketone; α -n-methylionone; Raldeine; 5-(2,6,6-Trimethyl-2-cyclohexen-1-yl)-4-penten-3-one
M276	o-Methylanisole	1-Methoxy-2-methylbenzene; o-Cresyl methyl ether; 2-Methoxy toluene; o-methoxy toluene; Methyl o-toly ether
M277	p-Methylanisole	4-Methoxytoluene; o-Methyl-p-cresol; 1-Methoxy-4-methylbenzene; p-Cresyl methyl ether; p-Methoxy toluene; Methyl p-cresol; Methyl p-toly ether; Methyl ptolyl ether
M278	α -Methylbenzyl acetate	sec-Phenylethyl acetate; α -Phenylethyl acetate; Styrollylacetat; 1-Phenethyl acetate; Gardenol; Methyl phenylcarbiny acetate; Styrallyl acetate; Styrolene acetate; 1-Phenylethyl acetate, Phenyl methyl carbiny acetate; Styrallyl acetate
M279	Methylbenzyl acetate (mixed o,m,p)	2-Methylbenzyl acetate; Tolyl acetate; Mixture of o-methylbenzyl acetate and m-methylbenzyl acetate and p-methylbenzyl acetate, Acetoxymethyl-toluene(o,m,p); Tolubenzyl acetate(o,m,p); Tolyl carbiny acetate(o,m,p); Tolyl acetate
M280	α -Methylbenzyl alcohol	1-Phenylethan-1-ol; 1-phenyl-1-hydroxyethane; Methylphenylcarbinol; 1-Phenylethanol; α -Phenylethyl alcohol; Phenyl methyl carinol; Styralyl alcohol;

Order	General Name	Synonyms
		Styrolol alcohol; Styralyl alcohol
M281	α -Methylbenzyl butyrate	1-Phenyl-1-ethyl butanoate; 1-Phenethyl butyrate; Methyl phenylcarbinyl-n-butyrate; styralyl butyrate; 1-Phenylethyl butyrate; Methyl phenyl carbinyl butyrate; α -Phenylethyl butyrate
M282	α -Methylbenzyl formate	α -Methylbenzyl methanoate; 1-Phenyl-1-ethyl formate; 1-Phenyl-1-ethyl methanoate; 1-Phenethyl formate; Methyl phenylcarbinyl formate; Styralyl formate; 1-Phenylethyl formate; α -Methylbenzyl formate
M283	α -Methylbenzyl isobutyrate	1-Phenyl-1-ethyl isobutyrate; α -Methylbenzyl 2-methylpropanoate; 1-Phenyl-1-ethyl 2-methylpropanoate; 1-Phenethyl isobutyrate; Methyl phenylcarbinyl isobutyrate; styralyl isobutyrate; 1-Phenylethyl 2-methylpropanoate, 1-Phenylidethyl isobutyrate; α -phenethyl-2-methylpropanoate; α -Methylbenzyl isobutyrate; Methyl phenyl carbinyl butyrate
M284	α -Methylbenzyl propionate	1-Phenyl-1-ethyl propionate; 1-Phenethyl propionate; Methyl phenylcarbinyl propionate; styralyl propionate; 1-Phenylethyl propionate; α -Phenylethyl propionate
M285	Methyl- β -ionone	β -Iraldeine; β -Cetone; β -Cyclocitrylidene butanone; β -n-Methylionone; Raldeine; 5-(2,6,6-trimethyl-1-cyclohexen-1-yl)-4-penten-3-one; β -Methylionone
M286	α -Methyl- β -hydroxypropyl sulfide	α -methyl- β -mercaptopropyl sulfide; 2-Butanol, 3-[2-mercapto-1-methylpropyl]thio]-; 3-((2-Mercapto-1-methylpropyl)thio)- 2-butanol
M287	2-Methylbut-2-en-1-ol	
M288	3-Methylbutanethiol	Isoamyl mercaptan; 3-Methyl-1-butanethiol, Isoamyl mercaptan; 3-Methylbutane-1-thiol
M289	2-Methylbutyl 2-methylbutyrate	2-Methylbutyl 2-methylbutanoate; α,β -Methylbutyl-dl-2-methyl butanoate
M290	2-Methylbutyl 3-methylbutanoate	Methylbutyl 2-isovalerate; 2-Methylbutyl isopentanoate; d-sec-Butylcarbinyl

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Order	General Name	Synonyms
		isopentanoate; 2-Methylbutyl isovalerate; 2-Methylbutyl isovalerianate
M291	2-Methylbutyl acetate	2- Methylbutyl acetate
M292	2-Methylbutylamine	Butylamine, 2-methyl-; (+/-)-2-Methylbutylamine; β -Methylbutylamine; 1-Amino-2- methylbutane; 2-Ethylpropylamine; 2-Methyl-1-butanamine; 2-Methyl-1-butylamine; 2-Methylbutanamine; 2-Methylbutylamine; dl-2-Methylbutylamine
M293	2-Methylbutyraldehyde	2-methylbutanal; 2-Methylbutanal-1; α -Methyl butyraldehyde; methyl ethyl acetaldehyde
M294	3-Methylbutyraldehyde	Amyl iso aldehyde; Valeric iso aldehyde; Valeraldehyde(iso); Butanal, 3-methyl-; Isoamyl aldehyde; Isopentaldehyde, isovaleraldehyde; isovaleral; Isovaleric aldehyde; 3-Methylbutanal
M295	2-Methylbutyric acid	Butane-2-carboxylic acid; 2-Methylbutanoic acid; α -Methyl butyric acid; Methyleneethyl acetic acid; Optically active isovaleric acid
M296	α -Methylcinnamaldehyde	α -Methylcinnamal; α -methyl cinnamic aldehyde; 2-methyl-3-phenyl-2-propenal; 3-Phenyl-2-methyl acrolein; Methyl, α -cinnamaldehyde; 2- Methylcinnamaldehyde
M297	p-Methylcinnamaldehyde	3-p-Tolylpropenal; 3-(p-Methylphenyl)-propenal; 3-(4-methylphenyl)-2-propenal
M298	6-Methylcoumarin	6-Methyl-2h-1-benzopyran-2-one; 6-Methyl-cis-o-coumarinic lactone; 5-Methyl-2- hydroxyphenylpropenoic acid lactone; Cocodescol; 6-Methylbenzopyrone; Pralina; Toncair; Toncarine; Tonkarin
M299	3-Methylcrotonic acid	Senecioic acid; 3,3-Dimethylacrylic acid; β , β -Dimethylacrylic acid; 3-Methyl-but- 2-enoic acid
M300	2-Methylcrotonic acid	Tiglic acid; 2-Methyl crotonic acid; 2-Methyl-2-butenic acid;

Order	General Name	Synonyms
		trans-2,3-Dimethyl- acrylic acid
M301	2-Methylcyclohexanone	Methyl anone
M302	3-Methylcyclohexanone	Tetrahydro-m-cresol
M303	4-Methylcyclohexanone	
M304	Methylcyclopentenolone	3-Methyl-2-cyclopenten-2-ol-1-one; maple lactone; Cyclotene; 2-Hydroxy-3- methyl-2-cyclopenten-1-one; Kentonarome; 3-methylcyclopentan-1,2-dione; Methylcyclopentenolone; 3-Methylcyclopentane-1,2-dione; Corylone
M305	Methyl- δ -ionone	4-(2,6,6-Trimethyl-3-cyclohexen-1-yl)-3-methyl-3-buten-2-one; β -Iso methylionone; deta-methylionone; Isomethyl- β -ione; 5-(2,6,6-Trimethyl-3-cyclohexen-1-yl)- 4- penten-3-one
M306	(R)-5-(1-Methylethyl)-2-methyl-1,3-cyclohexadiene	
M307	(+/-)-1-2-Methylfuran	Ethanol, 1-ethoxy-, acetate; 1-Ethoxy-1-ethanol acetate; 1-Ethoxyethyl acetate
M308	2-Methylfuran	α -Methylfuran; Silvan; Sylvan; Furan, 2-methyl-
M309	5-Methylfurfural	5-Methyl-2-furaldehyde; α -Methylfurfural
M310	(+/-)3-Methyl- γ -decalactone	2(3H)-Furanone; 5-hexyldihydro-4-methyl-(9CI), 5-Hexylihydro-4-methylfuran- 2(3H)-one
M311	2-Methylheptan-3-one	Butyl isopropyl ketone; 3-Heptanone; 2-Methylbutyl isopropyl ketone
M312	2-Methylheptanoic acid	Hexane-2-carboxylic acid; Isocaprylic acid; Isooctanoic acid; Methylamylacetic acid; 2-Methyloanthic acid
M313	2-Methylhexanoic acid	2-Methylcaproic acid; 2-Butylpropionic acid; Butyl methylacetic acid; Hexane-2-carboxylic acid; 2-Butylpropanoic acid

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Order	General Name	Synonyms
M314	5-Methylhexanoic acid	Hexanoic acid, 5-methyl-; Isoheptanoic acid; Isovenanthic acid; Isoenanthic acid; Isoamyl acetic acid
M315	S- Methylmethioninesulphonium chloride	dl-(3-Amino-3-carboxypropyl)dimethyl sulfonium chloride; dl-Methylmethionine sulfonium chloride; S-Methylmethioninesulphonium chloride; Vitamin U; DL-(3-Amino-3-carboxypropyl)dimethylsulphonium chloride
M316	1-Methylnaphthalene	α -Methylnaphthalene
M317	4-Methylnonanoic acid	Isodecanoic acid; 4-Methylpelargonic acid; Nonanoic acid, 4-methyl-
M318	2-Methyloctanal	Methyl hexyl acetaldehyde
M319	4-Methyloctanoic acid	Isononanoic acid; Octanoic acid, 4-methyl-
M320	4-Methylpent-2-enoic acid	4-Methyl-2-pentenoic acid; 4-methylpent-2-en-1-oic acid
M321	4-Methylpentan-2,3-dione	Methyl isopropyl diketone; Methyl propyl iso diketone; Propyl iso methyl diketone; Acetyl isobutyryl; 4-Methyl-2,3-pentanedione
M322	Methylpentanal	2-Methylpentanal; 2-Methyl valeraldehyde
M323	3-Methylpentanoic acid	2-Methylbutane-1-carboxylic acid; sec-Butylacetic acid; β -Methylvaleric acid; 3-Methylvaleric acid
M324	4-Methylpentanoic acid	Isocaproic acid; Isohexanoic acid; 3-Methylbutane-1-carboxylic acid; 4-Methylvaeric acid; pentanoic acid, 4-methyl-
M325	α -Methylphenethyl butyrate	1-Phenyl-2-propyl butyrate; 3-(p-Methylphenyl)-propenal; 1-Methyl-2-phenylethyl butyrate; Methyl benzyl carbinyl butyrate
M326	2-Methylpiperidine	2-Pipecoline; (+/-)- α -Pipecoline; (+/-)-2-Methylpiperidine; α -Methylpiperidine; α -Pipecoline; DL-2-Methylpiperidine
M327	2-Methylpropyl 3-methylbutyrate	Isobutyl isovalerate; 2-Methylpropyl 3-methylbutanoate; Isobutyl isovalerate
M328	2-(1-Methylpropyl)thiazole	2-sec-Butyl thiazole; 2-But-2-ylthiazole; Thiazole, 2-sec-butyl-

Order	General Name	Synonyms
M329	2-Methylpyrazine	2-Methyl-1,4-diazine; methylpyrazine
M330	6-Methylquinoline	p-Methylquinoline; p-toluquinoline; Cincholidine; Lepidine; Quinoline, 4-methyl-; Quinoline, 6-methyl
M331	5-Methylquinoxaline	5-Methyl-1,4-benzodiazine; Menoxaline
M332	Methylsulfinylmethane	Methyl sulfoxide; Dimethyl sulfoxide; Dimethyl-sulfoxide-
M333	2-Methyltetrahydrothiophen-3-one	2-Methyl-4,5-dihydro-3(2h)-thiophenone; 2-Methylthiolan-3-one; 4,5-Dihydro-2-methyl-3(2h)-thiophenone; 2-Methyl-4,5-dihydro-3(2h)thio-phenone; 4,5-Dihydro-2-methylthiophene-3(2H)-one; 2-Methyltetrahydrothiophen-3-one; 2-Methyl-4,5-3-thiophenone; Dihydrothiophenone-3(2H), 2-methyl-
M334	2-Methyltetrahydropfuran-3-one	Dihydro-2-methyl-3(2h)-furanone; 4,5-Dihydro-2-methylfuran-3(2H)-one; Tetrahydro-2-methyl-3-oxofuran; Dihydro-2-methyl-3-furanone; Dihydrofuranone-3(2H)-, 2-methyl
M335	4-Methylthiazole	Thiazole, 4-methyl-
M336	Methylthio 2-(acetyloxy)propionate	Acetyl lactic acid thiomethyl ester; S-methyl-2-(acetyloxy) propanethioate; propanethioic acid, 2-(acetyloxy)-, S-methyl ester; Thiomethyl acetylacetate
M337	3-(Methylthio)-1-hexanol	3-Methylmercapto-1-hexanol
M338	1-(Methylthio)-2-butanone	2-Thia-4-hexanone
M339	4-(Methylthio)-2-butanone	3-Methylmercapto-2-butanone; Methyl propyl thioketone; 4-Methyl-2-butanone-thione; 2-Pentane thione
M340	3-(Methylthio)-2-butanone	2-Butanone, 3-(methylthio)-; (+/-)-3-(Methylthio)butanone
M341	(3,5 or 6)-(Methylthio)-2-methylpyrazine	Mixture of 2-methyl-3-(methylthio)pyrazine and 2-methyl-5-(methylthio)pyrazine and 2-methyl-6-(methylthio)pyrazine,

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Order	General Name	Synonyms
		2-Methyl-3,5-or 6-methylthiopyrazine; Methylpyrazinyl methyl sulfides (Mixture); (Methylthio)methylpyrazine(mixture of isomers); Pyrazine, methyl(methylthio); Methyl(methylthio)pyrazine (mixture of isomers)
M342	4-(Methylthio)-2-pentanone	2-Pentanone, 4-(methylthio)-
M343	4-(Methylthio)-4-methyl-2-pentanone	4-methyl-4-(methylthio)-2-pentanone
M344	3-(Methylthio)butanal	3-(Methylthio)-butyraldehyde; 3-Methyl thio butyraldehyde; 3-Methyl propanethiol; Thio isoamyl aldehyde; Thio isovaleraldehyde
M345	4-(Methylthio)butanal	γ -(Methylmercapto) butyraldehyde; 4-(Methylthio) butyraldehyde; 4-(Methylmercapto)butanal, 4-(methylthio)butanal; γ -methylthiobutyraldehyde
M346	4-(Methylthio)butanol	4-(Methylthio)-1-butanol
M347	2-(Methylthio)ethanol	β -(Methylthio)ethanol; β -Hydroxyethyl methyl sulfide; β -Methylmercaptoethanol; 2-Hydroxyethyl methyl sulfide; 2-Methylmercaptoethanol; Hydroxyethyl methyl sulfide; Methyl 2-hydroxyethyl sulfide; S-Methylmercaptoethanol; 2-(Methylthio)ethan-1-ol
M348	(+/-)-3-(Methylthio)heptanal	
M349	3-(Methylthio)hexyl acetate	3-(Methylthio)-1-hexyl acetate
M350	3-(Methylthio)methylthiophene	3-Methylsulfanylmethylthiophene
M351	o-(Methylthio)phenol	2-(Methylthio)phenol; Thioguaiacol; 1-Hydroxy-2-methylmercaptobenzene; 2-Hydroxy-2-methylmercaptobenzene; 2-Methylmercapto phenol; Methyl-(2-hydroxyphenol)sulfide; 1-Thioguaiacol
M352	3-(Methylthio)propanol	3-(Methylthio)propan-1-ol; Methionol; 3-Methylthiol propyl alcohol; γ -Hydroxypropyl methyl sulfide; γ -Methyl mercaptopropyl alcohol; Methyl-3-hydroxypropyl sulfide; 3-Hydroxypropyl methyl sulfide; 3-(Methylthio)propylalcohol

Order	General Name	Synonyms
M353	3-(Methylthio)propionaldehyde	Methylmercapto propionaldehyde; 3-Methylmercapto propionaldehyde; β -methylthio propionaldehyde; β -Methylmercapto propionaldehyde; Methional; β -methiopropionaldehyde; methyl- β -mercaptopropionaldehyde; 3-Methylthiopropanol; 3-(Methylthio)propanal
M354	3-(Methylthio)propyl acetate	3-Acetoxypropyl methyl sulfide; Methionyl acetate; 1-Propanol, 3-(methylthio)-, acetate
M355	3-(Methylthio)propyl isothiocyanate	3-Methylmercatopropyl isothiocyanate; Isothiocyanic acid, 3-(Methylthio)propyl ester
M356	Methylthio-2-(propionyloxy)propionate	S-Methyl-2-(propionyloxy)propanethioate; Propionyl lactic acid thiomethyl ester; Thiomethyl propionyllacetate
M357	1-Methylthio-2-propanone	(Methylthio)Acetone; α -(Methylthio)Acetone; α -(Methylthio)Propanone; 2-Thia-4-pentanone
M358	2-Methylthioacetaldehyde	Methylmercapto acetaldehyde; Methyl mercapto aldehyde
M359	3-Methylthiohexanal	3-Methylthiohexaldehyde
M360	Methylthiomethyl butyrate	
M361	Methylthiomethyl hexanoate	
M362	2-(Methylthiomethyl)-3-phenylpropenal	α -Benzylidene methional; 2-Propenal, 2-(methylthiomethyl)-3-phenyl-
M363	2-(Methylthiomethyl)butenal	2-Ethylidene methional; 2-(Methylthiomethyl)but-2-enal
M364	Methylthiomethylmercaptan	Methanethiol, 1-methylthio-; (Methylthio)methanethiol
M365	12-Methyltridecanal	
M366	2-Methylundecanal	Methyl n-nonyl acetaldehyde; Aldehyde C-12, M.N.A.; 2-Methylhendecanal; methyl nonyl acetaldehyde; 2-methylundecanal
M367	2-Methylvaleric acid	2-Methylpentanoic acid; 2-Methylpentanoic-1-acid; methyl propyl acetic acid;

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Order	General Name	Synonyms
		α -Methyl valeric acid; Pentane-2-carboxylic acid
M368	Mintlactone	5,6,7,7a-Tetrahydro-3,6-dimethylbenzofuran-2(4H)-one; 2(4H)-Benzofuranone, 5,6,7,7a-tetrahydro-3,6-dimethyl-; dehydroxymenthofurolactone; 3,6-Dimethyl-5,6,7,7a-tetrahydro-2(4H)-benzofuranone; 3,6-Dionethyl-4,5,6,7-tetrahydro-7aH-benzo(b) furan-2-one; Menthalactone
M369	L-Monomenthyl glutarate	Pentanedioic acid, mono[5 methyl-2-(1-methylethyl)cyclohexyl] ester[1L][1R(-)] Monomethyl glutarate
M370	Monomenthyl succinate	Butanedioic acid, monomethyl ester; Mono-Menth-3-yl succinate; Butanedioic acid, mono-(5-methyl-2-isopropyl-cyclohexyl)ester; 5-Methyl-2-(1-methylethylcyclohexyl) butanedioate, mono ester; mono-Menth-3-yl succinate; Butanedioic acid, mono[5-methyl 2-(1-methyl-ethyl)cyclohexyl]ester, [1R-(1 α ,2 β ,5 α)]
M371	Myrcene	7-Methyl-3-methylene-1,6-octadiene
M372	Myristaldehyde	Aldehyde C-14; myristic aldehyde; Tetradecanal; <i>n</i> -Tetradecyl aldehyde; Tetradecyl aldehyde; Tetradecan-1-al
M373	Myrtenol	6,6-Dimethyl-2-oxomethylbicyclo [1.1.3]-hept-2-ene; 10-hydroxy-2-pinene; 2-pinen-10-ol; 6,6-Dimethylbicyclo[3.1.1]hept-2-ene-methanol; 6,6-Dimethyl-2-oxomethylbicyclo [1,3,3]-hept-2-ene
M374	Myrtenyl acetate	(6,6-Dimethylbicyclo[3.3.1]hept-2-en-2-yl)methyl acetate; 2-Pinen-10-ol acetate
M375	6,6-Myrtenyl formate	Myrtenyl formate; (6,6-Dimethylbicyclo[3.3.1]hept-2-en-2-yl)methyl formate; 2-Hydroxymethyl-6,6-dimethylbicyclo[3.1.1]hept-2-enyl formate; 2-Pinen-10-ol formate
M376	2-Methylpropan-2-ol	2-Propanol, 2-methyl-; tert-Butyl Alcohol; tert-Butanol; Trimethylcarbinol;

Order	General Name	Synonyms
		Trimethylmethanol; 1,1-Dimethylethanol; 2-Methyl-2-propanol; tert-Butyl hydroxide; 2-Methylpropanol-2; t-Butyl alcohol; t-Butyl hydroxide; Methanol, trimethyl-; 2-Methyl n-propan-2-ol; Tert.-butyl alcohol; Methyl-2 propanol-2;t-Butanol;Ethanol, 1,1-dimethyl-
M377	3-Methylpentan-3-ol	3-Methyl-3-pentanol; Methyl-diaethylcarbinol; Methyl-diethylcarbinol; 3-Methyl-pentanol-(3); Methyl-3 pentanol-3;3-Pentanol, 3-methyl-
M378	p-Menthane-1,8-diol	Terpin; 1,8-Terpin; Dipenteneglycol; 4-(1-Hydroxy-1-methylethyl)-1-methylcyclohexanol;Cyclohexanemethanol, 4-hydroxy- $\alpha,\alpha,4$ -trimethyl-
M379	5-Methyl-2-(tert-butyl)phenol	m-Cresol, 6-tert-butyl-; 2-tert-Butyl-5-Methylphenol; 6-tert-Butyl-m-Cresol; 6-tert-Butyl-3-Methylphenol; 2-t-Butyl-5-methylphenol;Phenol, 2-(1,1-dimethylethyl)-5-methyl-;3-Methyl-6-tert-butylphenol
M380	2-Methylnaphthalene	β -Methylnaphthalene; Methyl-2-naphthalene;Naphthalene, 2-methyl-
M381	2-Methylquinoline	Khinaldin; Quinaldine; Chinaldine; 2-Methylchinolin; α -Methylquinoline;Quinoline, 2-methyl-
M382	2-Methyl-4,5-benzo-oxazole	2-Methyl-1,3-benzoxazole;Benzoxazole, 2-methyl-;2-Methylbenzoxazol
M383	Methyl 4-methylbenzoate	p-Toluic acid, methyl ester; p-Carbomethoxytoluene; Methyl p-methylbenzoate; Methyl p-toluate; Methyl 4-toluate; 4-Methylbenzoic acid, methyl ester; Methyl ester of 4-methylbenzoic acid; p-Toluylic acid, methyl ester;Methyl 4-toluate;Benzoic acid, 4-methyl-, methyl ester
M384	Methyl acetoacetate	Acetoacetic acid, methyl ester; Methyl acetylacetate; Methyl 3-oxobutyrate; Acetoacetic methyl ester; Methyl acetylacetonate; Methylester kyseliny acetove; 3-Oxobutanoic acid methyl ester; Methyl 3-oxobutanoate;Butanoic acid, 3-oxo-, methyl ester
M385	Methyl formate	Formic acid, methyl ester; Methyl methanoate; Methylformiaat; Methyl ester of

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Order	General Name	Synonyms
		formic acid
M386	4-Methylpentan-2-ol	Isobutylmethylcarbinol; Isobutylmethylmethanol; Methylisobutylcarbinol; 2-Methyl-4-Pentanol; 4-Methyl-2-Pentanol; 1,3-Dimethylbutanol; Methyl amyl alcohol; 2-Methanol-4-pentanol; 4-Methylpentanol-2; 4-Pentanol, 2-methyl-; 4-Methyl-2-pentyl alcohol; 1,3-Dimethyl-1-butanol; Methyl-2-pentanol; Methylpentanol; Pentanol, 4-methyl-; Sec-hexyl alcohol; 2-Pentanol, 4-methyl-
M387	3-Methylpyridine	3-Picoline; β -Methylpyridine; β -Picoline; m-Picoline; meta-Methylpyridine; B-Picoline; 5-Methylpyridine; Pyridine, 3-methyl-
M388	Methyl decanoate	Capric acid methyl ester; Methyl caprate; Methyl caprate; Methyl-n-caprate; Methyl n-decanoate; n-Capric acid methyl ester; Decanoic acid, methyl ester
M389	Methyl hexadecanoate	Palmitic acid, methyl ester; n-Hexadecanoic acid methyl ester; Methyl n-hexadecanoate; Methyl palmitate; Hexadecanoic acid, methyl ester
M390	Methyl octadecanoate	Stearic acid, methyl ester; n-Octadecanoic acid, methyl ester; Methyl n-octadecanoate; Methyl stearate; Methyl ester of octadecanoic acid; Methyl (Z)-9-octadecenoate; Octadecanoic acid, methyl ester
M391	Methyl oleate	Oleic acid, methyl ester; Methyl cis-9-octadecenoate; (Z)-9-Octadecenoic acid methyl ester; cis-9-Octyldecenoic acid, methyl ester; Emery; Emery, oleic acid ester; Methyl 9-octadecenoate; Methyl cis-9-octadecanoate; Methyl cis-9-octadecenoate; oleic acid methyl ester; Methyl (9Z)-9-octadecenoate; 9-octadecenoic acid, methyl ester (Z); Methyl-cis-oleate; Methyl (Z)-9-oleate; Methyl cis-9-octadecanoate; Methyl cis-9-octadecenoate, oleic acid methyl ester; cis-9-Octadecenoic acid, methyl ester; 9-Octadecenoic acid (Z)-, methyl ester
M392	2-Methyl-4,5-benzothiazole	2-Methyl-1,3-benzothiazole; Benzothiazole, 2-methyl-; 2-Methylbenzothiazole
M393	Malonic acid	Propanedioic acid; Carboxyacetic acid; Dicarboxymethane; Methanedicarboxylic

Order	General Name	Synonyms
		acid; Kyselina malonova; Methanedicarbonic acid
M394	3-Methoxyphenol	Phenol, 3-methoxy-; m-Guaiacol; Phenol, m-methoxy-; m-Hydroxyanisole; m-Methoxyphenol; Resorcinol methyl ether; Resorcinol monomethyl ether; 1-Hydroxy-3-methoxybenzene; 3-Hydroxyanisole
M395	4-Methoxyphenol	Phenol, 4-methoxy-; Phenol, p-methoxy-; p-Guaiacol; p-Hydroxyanisole; p-Methoxyphenol; Hydroquinone methyl ether; Hydroquinone monomethyl ether; 1-Hydroxy-4-methoxybenzene; 4-Hydroxyanisole; Monomethyl ether hydroquinone; Hydroxyanisole; Mequinol
M396	4-Methylquinoline	Lepidine; γ -Methylquinoline; p-Methylquinoline; Cincholepidine; Lepidin; 4-Lepidine; Quinoline, 4-methyl-
M397	p-Menthan-8-ol	Dihydro- α -terpineol; 1-Methyl-4-isopropylcyclohexane-8-ol; 2-(4-Methylcyclohexyl)-2-propanol; α -Dihydroterpineol; Cyclohexanemethanol, $\alpha,\alpha,4$ -trimethyl-
M398	4-Methylpent-3-enoic acid	Pyroterebic acid; 3-Pentenoic acid, 4-methyl-; 4-Methyl-3-pentenoic acid
M399	Myrtanol	Bicyclo[3.1.1]heptane-2-methanol, 6,6-dimethyl-; (6,6-Dimethylbicyclo[3.1.1]hept-2-yl)methanol
M400	5-Methylheptan-3-one	Ethyl 2-methylbutyl ketone; 3-Methyl-5-heptanone; 5-Methyl-3-heptanone; 5-Methylheptanone-(3); Ethyl sec-amyl ketone; 3-Heptanone, 5-methyl-
M401	Myrcenol	2-Methyl-6-methylene-7-octen-2-ol; 3-Methylene-7-methyl-1-octen-7-ol; 7-Octen-2-ol, 2-methyl-6-methylene-
M402	2-Methylthiophene	2-methylthiacyclopentadiene; Thiophene, 2-methyl-
M403	Methyl isothiocyanate	Isothiocyanic acid, methyl ester; Isothiocyanatomethane; Methyl mustard oil; Methyl thioisocyanate; Methyl-isothiocyanat; Methane isothiocyanate; Methane, isothiocyanato-
M404	3-Methylbutan-2-one	Isopropyl methyl ketone; Ketone, isopropyl methyl; Methyl butanone-2; Methyl

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Order	General Name	Synonyms
		isopropyl ketone; Methylbutanone; 3-Methyl-2-butanone; 2-Acetylpropane;2-Butanone, 3-methyl-
M405	3-Methylpentan-2-ol	3-Methyl-2-pentanol; 3-Methyl-4-pentanol;2-Pentanol, 3-methyl-
M406	3-Methylpentan-2-one	sec-Butyl Methyl ketone; Methyl sec-butyl ketone; Methyl 1-methylpropyl ketone; 3-Methyl-2-pentanone;2-Pentanone, 3-methyl-
M407	2-Methylacetophenone	Acetophenone, 2'-methyl-; o-Acetyltoluene; o-Methylacetophenone; 2-Acetyltoluene; 1-(2-Methylphenyl)ethanone;2'-Methylacetophenone; 2'-Methylacetylphenone;Ethanone, 1-(2-methylphenyl)-
M408	2-Methylpentan-2-ol	2-Pentanol, 2-methyl-; 2-Hydroxy-2-methylpentane; 1,1-Dimethylbutanol; 2-Methyl-2-hydroxypentane; Methyl-2 pentanol-2;2-Methyl-2-pentanol
M409	3-Methoxybenzaldehyde	m-Anisaldehyde; m-Methoxybenzaldehyde; 3-Anisaldehyde; Metamethoxybenzaldehyde;Benzaldehyde, 3-methoxy-
M410	Methyl 2-oxopropionate	Pyruvic acid, methyl ester; Methyl pyruvate; Methylglyoxylic acid methyl ester;Propanoic acid, 2-oxo-, methyl ester;Methyl 2-oxopropanoate
M411	3-Methylthiophene	3-Thiotolene; Methyl-3-thiophene;Thiophene, 3-methyl-
M412	2-Methylhexan-3-ol	1-Isopropyl-1-butanol; 2-Methyl-3-hexanol; 5-Methyl-4-hexanol;3-Hexanol, 2-methyl-
M413	Methyl crotonate	Crotonic acid, methyl ester, (E)-; trans-2-Butenoic Acid methyl ester; Methyl trans-crotonate; Methyl trans-2-butenolate; (E)-2-Butenoic acid methyl ester; Methyl α-crotonate; Methyl E-crotonate; Methyl (2E)-2-butenolate; Methyl 2-butenolate, (E)-; methyl (E)-2-butenolate;(E)-Crotonic acid methyl ester;2-Butenoic acid, methyl ester, (E)-
M414	6-Methylheptan-3-one	Ethyl isoamyl ketone; 2-Methyl-5-heptanone; 6-Methyl-3-heptanone;3-Heptanone, 6-methyl-
M415	4-Methylpentan-1-ol	Isohexyl alcohol; Isohexanol; 2-Methyl-5-pentanol; 4-Methyl-1-pentanol; 4-methylpentanol; Pentanol, 4-methyl-;1-Pentanol, 4-methyl-

Order	General Name	Synonyms
M416	Methyl butyl sulfide	Sulfide, butyl methyl; Butyl methyl sulfide; Butyl methyl thioether; 2-Thiahexane; 1-(Methylthio)butane; Butyl methyl sulphide; Methyl-n-butyl sulfide; n-Butyl methyl sulfide; 1-(Methylsulfanyl)butane; Butane, 1-(methylthio)-
M417	3-(Methylthio)propionic acid	Propanoic acid, 3-(methylthio)-; Propionic acid, 3-(methylthio)-; 4-Thiapentanoic acid; 3-(Methylsulfanyl)propanoic acid; 3-(Methylthio)propionic acid
M418	3-Methylbut-3-en-1-ol	Isobutenylcarbinol; Isopropenylethyl alcohol; 2-Methyl-1-buten-4-ol; 3-Isopentenyl alcohol; 3-Methyl-3-buten-1-ol; Methallyl carbinol; 3-methyl-3-butenol; Methyl-3-but-3-en-1-ol; 3-Buten-1-ol, 3-methyl-
M419	Methyl 4-pentenoate	methyl pentenoate
M420	2-Methyloctan-1-ol	1-Octanol, 2-methyl-; 2-Methyl-1-octanol
M421	2-Methylhexanal	2-Methylhexanaldehyde; Hexanal, 2-methyl-
M422	6-Methylheptan-2-one	2-Methyl-6-heptanone; 6-Methyl-2-heptanone; Methyl isohexyl ketone; 2-Heptanone, 6-methyl-
M423	Myrcenyl acetate	
M424	Methyl deca-4,8-dienoate	
M425	1-Methyl-1H-pyrrole-2-carboxaldehyde	2-Formyl-1-methylpyrrole; N-Methyl-2-formylpyrrole; 1-Methyl-2-formylpyrrole; N-Methylpyrrole-2-carboxaldehyde; 1-Methylpyrrole-2-carboxaldehyde; Pyrrole-2-carboxaldehyde, 1-methyl-; N-Methylpyrrole-2-aldehyde; 1-Methyl-1H-pyrrole-2-carbaldehyde; 1-Methyl-2-pyrrolaldehyde; 1-methyl-2-pyrrolecarboxaldehyde; 1-methylformylpyrrole; 1-Methylpyrrole-2-carbaldehyde; N-methylpyrrole-2-carboxy aldehyde; 1-methylpyrrole-2-carboxyaldehyde; 1H-Pyrrole-2-carboxaldehyde, 1-methyl-
M426	p-Mentha-1,3-dien-7-al	
M427	Methyl 4-methoxybenzyl ether	

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Order	General Name	Synonyms
M428	4-Methylhexanoic acid	
M429	8-p-menthene-1,2-diol	limonenediol;8,9-p-Menthen-1,2-diol; 8-p-Menthene-1,2-diol; d-Limonene-1,2-diol; Limonene glycol
M430	Menthyl formate	
M431	Methyl geranate	2,6-Octadienoic acid, 3,7-dimethyl-, methyl ester; Methyl (2E)-3,7-dimethyl-2,6-octadienoate;Methyl geraniate
M432	2-Methylbutyl propionate	1-Butanol, 2-methyl-, propanoate; 1-Butanol, 2-methyl-, propionate;1-Butanol, 2-methyl-, propanoate
M433	2-Methylbutyl isobutyrate	Propanoic acid, 2-methyl-, 2-methylbutyl ester; Isobutyric acid, 2-methylbutyl ester;2-Methylbutyl 2-methylpropanoate; 2-Metylbutyl Isobutyrate
M434	Methyl dec-2-enoate	Methyl ester of 2-Decenoic acid; Methyl (2E)-2-decenoate;2-Decenoic acid, methyl ester;Methyl 2-decenoate
M435	2-Methylbutyl hexanoate	Hexanoic acid, 2-methylbutyl ester; 2-Methylbutyl caproate
M436	Methyl methanethiosulfonate	S-Methyl methanethiosulphonate; S-Methyl methanethiosulfonate; Methanesulfonothioic acid, S-methyl ester; Methanesulfonic acid, thio-, S-methyl ester; Methyl methanesulfonothioate; S-Methyl methanesulfonothioate; dimethyl thiosulfonate; S-methyl methylthiosulfonate;Methyl methanethiosulfonate
M437	1,1-Diethoxy-2-methylbutane	Butyraldehyde, 2-methyl-, diethyl acetal;Butane, 1,1-diethoxy-2-methyl-
M438	3-Methylhexanoic acid	
M439	Methyl propyl sulfide	Sulfide, methyl propyl; 2-Thiapentane; 1-(Methylthio)propane; 1-(Methylsulfanyl)propane;Propane, 1-(methylthio)-
M440	Methyl vanillate	Vanillic acid, methyl ester; Methyl 3-methoxy-4-hydroxybenzoate; Methyl 4-hydroxy-3-methoxybenzoate; 4-Hydroxy-3-methoxybenzoic acid methyl ester; Methyl ester of 4-hydroxy-3-methoxybenzoic acid; 4-Hydroxy-3-methoxybenzoic acid methyl ester;Vanillic acid methyl;Benzoic acid, 4-hydroxy-3-methoxy-, methyl ester
M441	4-Methyl-2-propyl-1,3-dioxolane	1,3-Dioxolane, 4-methyl-2-propyl
M442	4-methylthiobutyl isothiocyanate	1-isothiocyanato-4-(methylthio)-butane;methyl thio butyl isothiocyanate

Order	General Name	Synonyms
M443	6-(methylthio)hexyl isothiocyanate	
M444	5-(methylthio)pentyl isothiocyanate	
M445	2-Methylbut-3-en-1-ol	2-Methyl-3-buten-1-ol; 2-methyl-3-butene-1-ol; 3-Buten-1-ol, 2-methyl-
M446	Methyl hexyl ether	Ether, hexyl methyl; Hexyl methyl ether; 1-Methoxyhexane; Hexane, 1-methoxy-
M447	2-(Methylthio) Ethyl Acetate	
M448	Methyl isoprenyl sulfide	
M449	Menthyl hexanoate	
M450	Methyl dodec-2-enoate	
M451	2-(4-Methyl-5-thiazolyl)ethyl formate	sulfuryl formate; Methanoic acid, 2-(4-methyl-5-thiazolyl)ethyl ester
M452	Methyl tiglate (Methyl 2-methylcrotonate)	Tiglic acid methyl ester; 2-Butenoic acid, 2-methyl-, methyl ester, (E)-; Crotonic acid, 2-methyl-, methyl ester, (E)-; Methyl (E)-2-methylcrotonate; Methyl trans-2-methyl-2-butenate; 2-Carbomethoxy-2-butene, (E)-; Methyl α -methylcrotonate; Methyl trans-2-methylcrotonate; Methyl (2E)-2-methyl-2-butenate; 2-Methylecrotonic acid (Tiglic acid), methyl ester; methyl (E)-2-methyl-2-butenate
M453	Methyl dec-4-enoate	
M454	Methyl prop-1-enyl sulfide	
M455	α -Murolene	
M456	2-Methyl-1,1-di-isopentyloxypropane	
M457	Megastigma-4,6,8-trien-3-one	
M458	3-Methyl-1,1-di-isopentyloxybutane	
M459	1-(2-Methylbutoxy)-1-isopentyloxyethane	
M460	3-Methylhexanal	Hexanal, 3-methyl-
M461	Methyl 3-acetoxyhexanoate	Hexanoic acid, 3-(acetyloxy)-, methyl ester
M462	2,8-p-menthadien-1-ol	cis-p-Mentha-2,8-dien-1-ol; cis-p-Menth-2,8-dienol; 4-Isopropenyl-1-methyl-2-cyclohexen-1-ol; p-menth-2,8-dien-1-ol; p-Mentha-2,8-dien-1-ol

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Order	General Name	Synonyms
M463	2-Methoxy-3-propylpyrazine	
M464	Menthyl phenylacetate	
M465	3-Mercapto-2-methylpropionic acid	
M466	Myrtanyl acetate	(6,6-Dimethylbicyclo[3.1.1]hept-2-yl)methyl acetate; Bicyclo[3.1.1]heptane-2-methanol, 6,6-dimethyl-, acetate
M467	1-Mercapto-p-menthan-3-one	mercapto menthanone
M468	Mixture of methyl cyclohexadiene and methylene cyclohexene	Cyclohexene, 3-methylene-; 1-Methylene-2-cyclohexene; 3-Methylene-1-cyclohexene; 1-Methyl-1,3-cyclohexadiene
M469	6-Methyloctanal	
M470	8-(Methylthio)-p-menthan-3-one	
M471	Methyl prop-1-enyl trisulfide	
M472	3-Methylnonano-1,4-lactone	
M473	2-Methylbutyl formate	1-Butanol, 2-methyl-, formate
M474	3-Mercapto-3-methyl-1-butyl acetate	3-Mercapto-3-methylbutyl acetate; 3-Methyl-3-sulfanylbutyl acetate;
M475	2-Methylbutyl butyrate	Butanoic acid, 2-methylbutyl ester; 2-methylbutyl butanoate
M476	3-Methyl-3-buten-1-yl hexanoate	3-Methylbut-3-en-1-yl hexanoate
M477	3-Methyl-3-buten-1-yl butyrate	
M478	2-Methylbutyl dodecanoate	
M479	2-Methylbutyl decanoate	
M480	p-Menthan-8-yl acetate	
M481	1-Menthyl acetoacetate	Butanoic acid, 3-oxo-, 5-methyl-2-(1-methylethyl)cyclohexyl ester, [1R-(1 α ,2 β ,5 α)]-DSL; Butanoic acid, 3-oxo-, 5-methyl-2-(1-methylethyl)cyclohexyl ester, [1R-(1 α ,2 β ,5 α)]- (AICS); (-)-Menthyl acetoacetate
M482	6-Methylene-2,10,10-trimethyl-1-oxaspiro[4.5]dec-7-ene	Vitispirane; 2,10,10-trimethyl-6-methylene-1-oxaspiro[4.5]dec-7-ene
M483	1-(Methylthio)pentan-3-one	1-(Methylthio)-3-pentanone; 3-Pentanone, 1-(methylthio)-; 1-(Methylsulfanyl)-3-pentanone
M484	2-Methylbutyl octanoate	2-Methylbutyl caprylate
M485	Megastigma-5,8-dien-4-one	

Order	General Name	Synonyms
M486	Methyl heptenone propylene glycol acetal	
M487	S-(Methylthiomethyl) 2-methylpropanethioate	
M488	Methyl propyl tetrasulfide	
M489	3-Mercapto-1-butyl acetate	3-Mercaptobutyl acetate; 3-Thio-butyl acetate; 1-Butanol, 3-mercapto-, 1-acetate
M490	2-(3-Methyl-1,3-butadienyl)-4-methyltetrahydrofuran	
M491	2-Methylbutyl tetradecanoate	
M492	2-(4-Methyl-5-thiazolyl)ethyl propionate	sulfuryl propionate; Propanoic acid, 2-(4-methyl-5-thiazolyl)ethyl ester (9CI)
M493	2-(4-Methyl-5-thiazolyl)ethyl butanoate	sulfuryl butyrate
M494	Sulfuryl hexanoate	2-(4-Methyl-5-thiazolyl)ethyl hexanoate
	(+/-)-cis- and	
M495	trans-2-methyl-2-(4-methyl-3-pentenyl) cyclopropanecarbaldehyde	2-methyl-2-(4-methylpent-3-enyl)cyclopropane-1-carbaldehyde
M496	2-Methylbutyl 3-methyl-2-butenate (2-Methylbutyl 3-methylbutenoate)	2-Methylbutyl senecioate
M497	Sulfuryl decanoate	2-(4-Methyl-5-thiazolyl)ethyl decanoate
M498	(+/-)-Menthyl 3-hydroxybutyrate	Menthyl methyllactate; Butanoic acid, 3-hydroxy-, 5-methyl-2-(1-methylethyl)cyclohexyl ester
M499	2-(4-Methyl-5-thiazolyl)ethyl octanoate	Octanoic acid, 2-(4-methyl-5-thiazolyl)ethyl ester (6CI)
M500	5-Methylhexyl acetate	methyl hexyl acetate
M501	2-(5-Methyl-4-thiazolyl)ethyl isobutyrate	sulfuryl isobutyrate ;Propanoic acid, 2-methyl-, 2-(5-methyl-4-thiazolyl)ethyl ester (9CI)
M502	2-Methyl-3-furyl methylthiomethyl disulfide	2-methyl{[(methylsulfanyl)methyl] disulfanyl}furan
M503	3-Mercaptoheptyl acetate	Aruscolate
M504	4-Methylpentyl isovalerate	methyl pentyl isovalerate
M505	Myristic acid	Tetradecanoic acid; Crodacid
N001	2-Naphthalenethiol	2-Naphthyl mercaptan; 2-mercaptonaphthalene; 2-Thionaphthol; β -Thionaphthol

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Order	General Name	Synonyms
N002	β -Naphthyl anthranilate	2-Naphthyl anthranilate; 2-Naphthalenol, 2-aminobenzoyl ester; 2-Naphthyl o-aminobenzoate
N003	β -Naphthyl ethyl ether	Nerolin; Bromelia; 2-Ethoxynaphthalene; Ethyl-2-naphthyl ther; Ethyl- β -naphthyl ether; Nerolin II; Nerolin bromelia
N004	β -Naphthyl methyl ether	
N005	β -Naphthyl isobutyl ether	Isobutyl β -naphthyl ether; Fragarol; 2-isobutoxynaphthalene; Isobutyl β -naphthyl ether; Naphthalene, 2-(2-methylpropoxy)-; Nerolin fragarol
N006	Neohesperidine dihydrochalcone	Neohesperidin DHC
N007	Nerol	Nerosol; Allerol; cis-2,6-Dimethyl-2,6-octadien-8-ol; Nergenol; Nerodol; Nerolo; Neraniol; cis-3,7-Dimethyl-2,6-octadien-1-ol Note: see Geraniol for trans-form; Nerolol
N008	Nerol oxide	3,6-Dihydro-4-methyl-2(2-methylpropen-1-yl)-2H-pyran; 3,6-Dihydro-4-methyl-2- (2-methyl-1-propenyl)-2H-pyran
N009	Nerolidol	Peruvicol; methylvinyl homogeranyl carbinol; Melaleucol; Dodecatriene; 3,7,11-Trimethyl-1,6,10-dodecatrien-3-ol
N010	Neryl acetate	cis-3,7-Dimethyl-2,6-octadien-1-yl ethanoate; Neryl ethanoate; cis-3,7-Dimethyl-2,6- octadien-1-yl acetate
N011	Neryl butyrate	cis-3,7-Dimethyl-2,6-octadien-1-yl butanoate; cis-3,7-Dimethyl-2,6-octadien-1-yl butyrate; Neryl-n-butyrate
N012	Neryl formate	cis-3,7-Dimethyl-2,6-octadien-1-yl methanoate; cis-3,7-Dimethyl-2,6-octadien-1-yl formate; Meryl methanoate
N013	Neryl isobutyrate	cis-3,7-Dimethyl-2,6-octadien-1-yl 2-methylpropanoate; cis-3,7-Dimethyl-2,6- octadien-1-yl isobutyrate; neryl 2-methylpropanoate;

Order	General Name	Synonyms
		2-cis-3,7-Dimethyl-2,6-octadien-1-yl isobutyrate
N014	Neryl isovalerate	Neryl isovalerianate; Neryl 3-methylbutanoate; cis-3,7-Dimethyl-2,6-octadien-1-yl butanoate; 3-Methylbutanoate; cis-3,7-Dimethyl-2,6-octadien-1-yl isopentanoate; cis-3,7-Dimethyl-2,6-octadien-1-yl isovalerate; Neryl- β -methylbutyrate; cis-3,7-Dimethyl-2,6-octadien-1-yl-2-methylbutanoate; Neryl 3-methylbutyrate
N015	Neryl propionate	Neryl propanoate; cis-3,7-Dimethyl-2,6-octadien-1-yl propionate; cis-3,7-Dimethyl-2,6-octadien-1-yl propanoate
N016	Non-2-enal	3-Hexyl-2-propenal; 3-Hexylacrolein; Heptylideneacetaldehyde; β -Hexylacrolein; α -Nonenyl aldehyde; Nonylenic aldehyde; trans-2-Nonenal
N017	Nona-2,4,6-trienal	
N018	Nona-2-trans-6-cis-dienal	2,6-Nonadienal; Cucumber aldehyde; Nona-2,6-dienal; 2,6-nonadienal(trans, cis)
N019	2,6-Nonadien-1-ol	2,4-Nonadienal; Nonadienol; Cucumber alcohol; Violet leaf alcohol; tr-2, cis-6-Nonadien-1-ol
N020	(E,Z)-3,6-Nonadien-1-ol	(E)-3-(Z)-nonadien-1-ol; trans-3-cis-6-nonadienal
N021	(Z,Z)-3,6-Nonadien-1-ol	Nona-3,6-dien-1-ol; cis-3, cis-6-nonadienol
N022	2,4-Nonadien-1-ol	
N023	(E,Z)-2,6-Nonadien-1-ol acetate	trans-2-cis-6-Nonadien-1-yl acetate
N024	(E,Z)-3,6-Nonadien-1-ol-acetate	trans-3-cis-6-Nonadien-1-yl acetate
N025	2,4-Nonadienal	trans,trans-2,4-nonadien-1-al; trans-2-Nonenal; 3-Hexyl-2-propenal; Non-2-enal; 3 or β -hexyl acrolein; Heptyliceneacetaldehyde; tr-2, tr-4-Nonadienal

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Order	General Name	Synonyms
N026	2-trans, 6-trans-Nonadienal	Nona-2(trans),6(trans)-dienal; 2,6-Nonadienal, (E,E)-; (E,E)-nona-2,6-dienal
N027	2,6-Nonadienal diethyl acetal	1,1-Diethoxy-2,6-nonadiene; 1,1-Diethoxynona-2,6-diene; Nonadienyl diethyl acetal
N028	γ -Nonalactone*	4-nonanolide; 5-pentylidihydro-2(3H)-furanonenona-1,4-lactone; aldehyde c-18; 4-n-Amyl-4-hydroxybutyric acid lactone; γ -pelargolactone; γ -Nonyllactone; Nonano-1,4-lactone; γ -Amyl butyrolactone; Coconut aldehyde; 4-Hydroxynonanoic acid, γ -lactone; nonanolide; γ -Lactone; Nonanolide-1,4; γ -Nonalactone
N029	(+/-)Nonan-3-yl acetate	3-Nonanol, acetate; 1-Ethylhept-1-yl acetate; 1-Ethylheptyl acetate, Non-3-yl acetate
N030	Nonanal	Pelargonaldehyde; Nonoic aldehyde; Nonyl-aldehyde; Aldehyde C-9; Nonanoic aldehyde; n-Nonyl aldehyde; α -Oxononane; Pelargonic aldehyde; n-Nonanal
N031	1,3-Nonanediol acetate (mixed esters)	Nonane diacetate; Jasmon acetate; Octyl crotonate, Mixture of 3-acetate and 1-(2-hydroxyethyl)heptyl acetate; Hexylene glycol diacetate; 3-hexy-1,3-propane-diol acetate, mixed esters; Nonanediol-1,3-acetate; Octylcrotonyl acetate; Diacetate; diasmol; Diasmylacetate; Drago-jasimia; jasmelia; jasmonyl; Jersemal; Hexylene glycol acetate; 1,3-Nonanediol acetate; Acetoxy nonyl acetate(mixed esters)
N032	Nonanediol diacetate	
N033	1,4-Nonanediol diacetate	1,4-Nonadiol diacetate; Nonane-1,4-diyl diacetate; Nonanediol-1,4 acetate
N034	1,9-Nonanedithiol	1,9-Dimercaptononane; nonamethylene dimercaptan
N035	Nonanoic acid	Nonoic acid; <i>n</i> -nonylic acid; Octane-1-carboxylic acid; Pelargonic acid; Nonylic acid; Nonoic
N036	2-Nonanol	n-heptyl methyl carbinol; Methyl n-butyl carbinol; Methyl-n-Heptyl carbinol; sec-n-Nonanol; Methyl heptyl carbinol

Order	General Name	Synonyms
N037	3-Nonanon-1-yl acetate	1-hydroxy-3-nonanone acetate; Ketone alcohol ester; Methylol methyl hexyl ketone acetate; 3-Oxononanyl acetate
N038	2-Nonanone	Hethyl methyl ketone; Nonan-2-one; Methyl heptyl ketone; 3-Oxononyl acetate
N039	3-Nonanone	Ethyl hexyl ketone; 3-Oxononanone
N040	cis-6-Nonen-1-ol	<i>cis</i> -6-Nonenol; 6-Nonen-1-ol, (Z)-; Non-6-en-1-ol
N041	cis-2-Nonen-1-ol	(Z)-2-nonen-1-ol; 2-Nonen-1-ol, (Z)-; Non-2(cis)-en-1-ol
N042	3-Nonen-2-one	Methyl heptenyl ketone
N043	cis-6-Nonenal	Non-6(cis)-enal; 6-Nonenal, (Z)-; cis-6-Nonen-1-al; Non-6-enal
N044	2-Nonenoic acid	(E)-2-Nonenoic acid; trans-2-Nonenoic acid
N045	2-Nonenoic acid γ -lactone	5-Pentyl-5H-furan-2-one; 2(5H)-Furanone, 5-pentyl-; 2-Nonenoic acid, 4-hydroxy-, γ -lactone
N046	trans-2-Nonenol	Non-2(trans)-en-1-ol; trans-2-nonen-1-ol
N047	Nonyl acetate	Acetate C-9; Nonanol acetate; <i>n</i> -Nonyl acetate; Pelargonyl acetate; Nonyl ethanoate
N048	Nonyl alcohol	Nonanol; Alcohol C-9; Nonanol-1; 1-nonanol; Octyl carbinol; Pelargonic alcohol; Nonan-1-ol; <i>n</i> -Nonyl alcohol
N049	Nonyl isovalerate	Nonyl isovalerianate; Nonyl 3-methylbutanoate; Nonanol isopentanoate; <i>n</i> -nonyl 3-methylbutanoate; Nonyl isopentanoate
N050	Nonyl octanoate	Nonyl caprylate; <i>n</i> -Nonyl octoate; Nonyl octylate
N051	Nootkatone	4a,5-Dimethyl-1,2,3,4,4a,5,6,7-octahydro-7-keto-3-isopropenylnaphthalen; 4,4a,5,6,7,8-Hexahydro-6-isopropenyl-4,4a-dimethyl-2(3H)-naphthalenone; 4a,5-Dimethyl-1,2,3,4,4a,5,6,7-keto-3-isopropenyl-naphthalene;

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Order	General Name	Synonyms
		5,6-Dimethyl-8-isopropenyl-bicyclo- (4,4,0)-dec-1-en-3-one
N052	Nonanedioic acid	1,7-Heptanedicarboxylic acid; Heptanedicarboxylic acid; Azelaic acid, technical grade; 1,9-Nonanedioic acid; 1,7-Dicarboxyheptan;n-Nonanedioic acid
N053	(E)-4-Nonenal	4-Nonenal, (4E); (E)-Non-4-enal; trans-4-nonenal;
N054	8-Nonen-2-one	Non-8-en-2-one
N055	cis-3-Nonen-1-ol	(3Z)-3-Nonen-1-ol; (Z)-3-nonen-1-ol;3-Nonen-1-ol, (Z)-
N056	Non-3-enyl acetate	
N057	Nonanal dimethyl acetal	Nonane, 1,1-dimethoxy-; n-Nonanal dimethyl acetal; 1,1-Dimethoxynonane
N058	1-Nonen-3-ol	Hexylvinylcarbinol; 1-Vinylheptanol; Non-1-en-3-ol; nonene-1-ol-3;1-Nonene-3-ol
N059	5-Nonen-(E)-2-one	(5E)-5-Nonen-2-one
N060	Non-2-en-4-one	2-Nonen-4-one;(2E)-2-Nonen-4-one;Nonenone
N061	2,4-Nonadiene	(2E,4E)-2,4-Nonadiene; (E,E) - 2,4-nonadiene;trans-2,trans-4-nonadiene
N062	Nonanal propyleneglycol acetal	2-Octyl-4-methyl-1,3-dioxolane
N063	Non-6-enyl acetate	6-Nonen-1-ol, acetate, (z)-;(Z)-6 Nonen-1-yl acetate; (Z)-6-nonenyl acetate; (Z)-non-6-en-1-yl acetate;(6Z)-6-Nonenyl acetate
N064	2-Nonanone propyleneglycol acetal	2-heptyl-2,4-dimethyl-1,3-dioxolane
O001	Ocimene	3,7-Dimethyl-1,3,6-octatriene; trans-b-Ocimene
O002	8-Ocimenyl acetate	2,6-Dimethyl-2,5,7-octatriene-1-yl acetate; Piperitanate
O003	9-Octadecenal	Olealdehyde; Elialdehyde; Octadecenyl aldehyde; Oleic Aldehyde
O004	Octadien-1-ol	(E,E)-2,4-Octadien-1-ol; trans-2,4-Octadienol; trans,trans-2,4-Octadien-1-ol
O005	(E,E)-3,5-Octadien-2-one	Octa-3,5-dien-2-one trans, trans-3,5-Octadien-2-one; trans,trans-3,5-octadien-2-one
O006	2-trans-6-trans-Octadienal	2,6-Octadienal; Octa-2(trans),6(trans)-dienal; 2,6-Octadienal,(E,E)-;

Order	General Name	Synonyms
		trans,trans-2,6- octadienal
O007	trans,trans-2,4-Octadienal	Octa-2(trans),4(trans)-dienal; 2,4-Octadienal; (E,E)-2,4-octadienal
O008	Octahydrocoumarin	2H-1-Benzopyran-2-one, octahydro-; Bicyclononalactone; Cyclohexyl lactone; Octahydro-2H-1-benzopyran-2-one
O009	γ -Octalactone	4-Octanolide; 5-Butyldihydro-2(3H)-furanone; Octa-1,4-lactone; 4-n-Butyl-4- hydroxybutyric acid lactone; Octano-1,4-lactone; γ -n-Butyl- γ -butyrolactone; 4-Hydroxyoctanoic acid, γ -lactone; n-octalactone; octanolide-1,4
O010	delta-Octalactone	5-Octanolide; 6-propyltetrahydro-2-pyrone; 5-Hydroxyoctanoic acid lactone; Octa-1,5-lactone; 5-Hydroxyoctanoic acid lactone; δ -Propyl- δ -valerolactone; 5-Propyl-5-hydroxypentanoic acid lactone; Octano-1,5-lactone; Tetrahydro-6-propyl- 5-hydroxy-2H-pyran-2-one; octanoic acid, Δ -lactone; delta-Octalactone
O011	Octan-3-yl formate	(+/-)Octan-3-yl formate; 3-Octanol, formate; Oct-3-yl formate; 1-Ethylhex-1-yl formate; (+/-)-Octan-3-yl formate
O012	Octanal*	Aldehyde C-8; Caprylaldehyde; Caprylic aldehyde; n-Octaldehyde; n-Octylaldehyde; n-Octanal; Octyl aldehyde
O013	Octanal dimethyl acetal	Aldehyde C-8 dimethyl acetal; caprylaldehyde dimethyl acetal; 1,1-Dimethoxy octane; octaldehyde dimethyl acetal; C-8 dimethylacetal; Octanal dimethyl acetal; Caprylaldehyde dimethyl acetal
O014	2,3-Octanedione	Octan-2,3-dione
O015	1,8-Octanedithiol	1,8-Dimercaptooctane; Octamethylene dimercaptan
O016	Octanoic acid	Carpylic acid; C-8- acid; Octoic acid; C-8; Octylic acid; 1-Heptanecarboxilic acid
O017	1-Octanol	Alcohol C-8; n-Caprylic alcohol; Heptyl carbinol; Octyl alcohol; Capryl alcohol;

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Order	General Name	Synonyms
		pri-octyl alcohol; n-Octyl alcohol; Caprylic alcohol; pri.-Octyl alcohol
0018	2-Octanol	Octyl alcohol, secondary; Capryl alcohol, secondary; sec-Caprylic alcohol; sec-Capryl alcohol; Methyl hexyl carbinol; Hexyl methyl carbinol; sec-n-Octyl alcohol; Octan-2-ol; sec-octhyl alcohol
0019	3-Octanol	Amyl ethyl carbinol; Ethyl <i>n</i> -amyl carbinol; <i>d</i> - <i>n</i> -Octanol; Amylethylcarbinol
0020	2-Octanone	Hexyl methyl ketone; n-Hexyl methyl ketone; methyl hexyl ketone; Octan-2-one
0021	3-Octanone	Amyl ethyl ketone; Ethyl amyl ketone; Ethyl- <i>n</i> -amyl ketone
0022	cis-3-Octen-1-ol	<i>cis</i> -3-Octenol; 3-octen-1-ol, (Z)-; Oct-3-en-1-ol
0023	cis-5-Octen-1-ol	<i>Z</i> -5-octen-1-ol; Oct-5(cis)-en-1-ol
0024	(E)-2-Octen-1-ol	Oct-2-en-1-ol; trans-2-Octen-1-ol
0025	2-Octen-1-yl acetate	Oct-2-enyl acetate; 2-Octen-1-ol, acetate, (E)-
0026	3-Octen-2-ol	Methyl hexenyl carbinol; trans-3-Octen-2-ol
0027	3-Octen-2-one	Methyl hexenyl ketone; Oct-3-en-2-one
0028	1-Octen-3-ol	Amyl vinyl carbinol; Matsutake alcohol; 3-octenol; n-Pentyl vinyl carbinol; Oct-1-en-3-ol; Amylvinylcarbinol; Matsuka alcohol; Matsutakeol; Pentyl vinyl carbinol
0029	1-Octen-3-one	Amyl vinyl ketone; Vinyl amyl ketone
0030	1-Octen-3-yl acetate	Pentyl crotonyl acetate; Amyl vinyl carbinol acetate; 3-Acetoxy octene; Amyl crotonyl acetate; Amyl vinyl carbinyol acetate; Octenyl acetate; β -octenyl acetate; n-pentyl vinyl carvinyl acetate; Matsutake acetate; Oct-1-en-3-yl acetate; Amyl crotonyl acetate
0031	1-Octen-3-yl butyrate	Butanoic acid, 1-ethenylhexyl ester; Oct-1-en-3-yl butyrate

Order	General Name	Synonyms
0032	(E)-2-Octen-4-ol	Oct-2-en-4-ol; trans-2-octenol-4; Butyl propenyl carbinol; 2-Octen-4-ol; trans-2-octen-4-ol
0033	2-Octen-4-one	Butylpropenyl ketone; Propenyl butyl ketone ; Butyl propenyl ketone
0034	2-Octenal	2-Pentyl acrolein; α-Amyl acrolein
0035	cis-5-Octenal	Oct-5(cis)-enal; 5-Octenal, (Z)-; (Z)-5-Octenal
0036	2-Octenoic acid	(E)-2-Octanoic acid; trans-2-octenoic acid
0037	trans-2-Octenyl butyrate	trans-2-Octen-1-yl butanoate; trans-2-Octen-1-yl butyrate; Oct-2(trans)-enyl butyrate; trans-2-Octenyl butyrate
0038	(Z)-5-Octenyl propionate	(Z)-5-octen-1-yl propanoate; (Z)-5-octen-1-yl propionate; cis-5-Octen-1-yl propionate
0039	cis-3-Octenyl propionate	Pearlate; 3-Octen-1-ol, propanoate, (Z)-
0040	(E)-2-(2-Octenyl)cyclopentanone	2-Hexylidene cyclopentanone and 2-hexyl-2-cyclopenten-1-one (mixture); 2-Hexyl-2-cyclopenten-1-one and 2-hexylidenecyclopentanone (mixture); 2-Hexylcyclopent-2-en-1-one and 2-hexylidenecyclopentanone, Dihydrojasnone; n-Hexylidene cyclopentanone; 2-(2-octenyl)cyclopentanone
0041	Octyl 2-furoate	2-Furancarboxylic acid, octyl ester. Octyl 2-furancarboxylate; 2-Furoic acid
0042	Octyl 2-methylbutyrate	Butanoic acid, 2-methyl-, octyl ester; Octyl-2-methylbutanoate
0043	Octyl acetate	Octyl ethanoate; Acetate C-8; Capryl acetate; n-octyl acetate; 2-Ethyl hexyl acetate
0044	3-Octyl acetate	n-Amyl ethyl carbinyl acetate; 1-Ethyl hexyl acetate
0045	Octyl butyrate	Octyl butanoate; Octyl-n-butyrate; 3-octyl butyrate
0046	Octyl formate	n-Octyl formate; Octyl formate; octyl methanoate
0047	Octyl heptanoate	Octyl heptoate; Octyl heptylate; Heptanoic acid, octyl ester; Octyl oenanthate

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Order	General Name	Synonyms
0048	Octyl isobutyrate	Octyl 2-methylpropanoate
0049	Octyl isovalerate	Octyl isovalerianate; Octyl isopentanoate; Octyl 3-methylbutyrate; n-Octyl-3-methylbutyrate; Octyl 3-methylbutanoate
0050	Octyl octanoate	Octyl caprylate; <i>n</i> -Octyl octoate; Octyl octylate
0051	Octyl phenylacetate	n-Octyl phenylacetate; Octyl-n-toluate; n-Octyl- α -toluate; Octyl α -toluate
0052	Octyl propionate	Octyl propanoate
0053	2-Oxo-3-phenyl propionic acid	3-Phenylpyruvic acid; 3-Phenyl-2-oxopropanoic acid
0054	3-Oxobutanal dimethyl acetal	4,4-Dimethoxy-2-butanone, Acetylaldehyde dimethylacetal; 3-Ketobutyraldehyde dimethyl acetal; Acetyl acetaldehyde, dimethyl acetal; 1,1-Dimethyl-oxy-3-butanone; 4,4-Dimethoxybutan-2-one
0055	2-Oxobutyric acid	Butanoic acid, 2-oxo-; α -Ketobutyric acid; Ketobutyric acid
0056	3-Oxodecanoic acid glyceride	Glyceryl ester of 3-oxodecanoic acid; 2,3-Dihydroxypropyl 3-oxodecanoate; Glyceryl β -ketodecanoate; Glyceryl monoester of 3-oxodecanoic acid
0057	3-Oxododecanoic acid glyceride	Glyceryl ester of 3-oxododecanoic acid; 2,3-Dihydroxypropyl 3-oxododecanoate; Glyceryl β -ketododecanoate; Glyceryl monoester of 3-oxododecanoic acid
0058	3-Oxohexadecanoic acid glyceride	Glyceryl ester of 3-oxohexadecanoic acid; 2,3-Dihydroxypropyl 3-oxohexadecanoate; Glyceryl β -ketohehexadecanoate; Glyceryl monoester of 3-oxohexadecanoic acid
0059	3-Oxohexanoic acid glyceride	Glyceryl ester of 3-oxohexanoic acid; 2,3-Dihydroxypropyl 3-oxohexanoate; Glyceryl β -ketohehexanoate; Glyceryl diester of 3-oxohexanoic acid
0060	3-Oxo-octanoic acid glyceride	Glyceryl ester of 3-oxooctanoic acid; 2,3-Dihydroxypropyl 3-oxooctanoate; Glyceryl β -ketooctanoate; Glyceryl monoester of 3-oxooctanoic acid
0061	2-Oxopentanedioic acid	2-Oxoglutaric acid; 2-Ketoglutaric acid; α -Ketoglutaric acid;

Order	General Name	Synonyms
		2-Oxo-1,5-pentanedioic acid
0062	3-Oxotetradecanoic acid glyceride	Glyceryl ester of 3-oxotetradecanoic acid; 2,3-Dihydroxypropyl 3-oxotetradecanoate; Glyceryl β -ketotetradecanoate; Glyceryl monoester of 3-oxotetradecanoic acid
0063	1-Octene	α -Octene; α -Octylene; n-1-Octene; Caprylene; Oct-1-ene; OCTENE-1; Neodene 8; Octylene
0064	Octadecan-1-ol	n-Octadecanol; n-Octadecyl alcohol; n-1-Octadecanol; Octadecyl alcohol; Stearol; Stearyl alcohol; Stenol; Steraffine; Decyl octyl alcohol; 1-Hydroxyoctadecane; Octadecanol; Octanodecanol; 1-Octadecanol
0065	cis-9-Octadecenol	9-Octadecen-1-ol, (Z)-; cis-9-Octadecen-1-ol; cis-9-Octadecenyl Alcohol; (Z)-9-Octadecen-1-ol; Octadec-9-en-1-ol; Octadec-9Z-enol; (9Z)-9-Octadecen-1-ol; Oleic alcohol; Octadec-9-en-1-ol; Oleyl Alcohol
0066	Oleyl acetate	
0067	2-Octylthiophene	2-n-Octylthiophene; Thiophene, 2-octyl-
0068	3-octenoic acid	octenoic acid
0069	Octyl hexanoate	Hexanoic acid, Octyl ester; n-Octyl hexanoate
0070	4,5-Octanedione (Octane-4,5-dione)	n-Octane-4,5-dione; Bibutyryl; 4,5-Octadione
0071	Ocimenol	2,6-Dimethyl-5,7-octadien-2-ol; (5E)-2,6-Dimethyl-5,7-octadien-2-ol; 5,7-Octadien-2-ol, 2,6-dimethyl-
0072	4-Octen-3-one	Oct-4-en-3-one; (4E)-4-Octen-3-one
0073	trans-4-Octenoic acid	
0074	Octane-1,3-diol	Propane-1,3-diol, 1-pentyl-; 1,3-Octanediol
0075	cis-5-Octenoic acid	octenoic acid
0076	cis-4-Octenol	octenol
0077	Octanal diethyl acetal	1,1-Diethoxyoctane; n-Octanal diethyl acetal; Octane, 1,1-diethoxy-
0078	1,5-Octadien-3-one	Octa-1,5-dien-3-one; octadien
0079	Octa-3,5-dien-1-ol	
0080	Octanal propylene glycol acetal	

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Order	General Name	Synonyms
O081	Octa-1,5-dien-3-ol	
O082	Oleic acid	Oleinic acid; trans-Elaidic acid; (Z)-Octadeca-9-enoic acid
P001	Paraldehyde	s-Trioxane; 2,4,6-Trimethyl-1,3,5-trioxane; Acetaldehyde, trimer; Elaldehyde; paracetaldehyde; 2,4,6-Trimethyl-1,3,5-trioxacyclohexane
P002	Pent-2-enyl hexanoate	2-Penten-1-yl hexanoate
P003	omega-Pentadecalactone	Angelicalactone; Exaltolide; 15-Hydroxypentadecanoic acid; w-Lactonel pentadecanolide; Thibetolide; 15-Pentadecanolide; Oxacyclohexadecan-2-one; Pentadeca-1,5-lactone; Cyclopentadecanolide; Pentadecanolide; Muscolactone; 14-Oxytetradecane carbonic acid lactone; Pentadecano-1,15-lactone; Pentalide; omega-Pentadecalactone; 15-Hydroxytetradecanoic acid lactone; 1,15-Epoxy-pentadecan-1-one
P004	2-Pentadecanone	Methyl tridecyl ketone; Pentadecan-2-one; 2-Oxopentadecane
P005	2,4-Pentadienal	
P006	2,3-Pentadione	β,γ -Dioxopentane; Pentan-2,3-dione; Acetyl propionyl; 2,3-Pentanedione
P007	2-Pentanethiol	sec-Amylmercaptan; 2-Mercaptopentane; 1-Methylbutanethiol; 2-Pentyl mercaptan
P008	2-Pentanol	Propyl methyl carbinol; α -Methylbutanol; sec-amyl Alcohol; Methyl n-propyl carbinol; sec-n-Amyl alcohol
P009	2-Pentanone	Propyl methyl ketone; Ethyl acetone; Methyl propyl ketone; Pentane-2-one
P010	2-Pentanoylfuran	1-(2-Furanyl)-1-pentanone; Butyl 2-furyl ketone; 1-Pentanone, 1-(2-furanyl)-; 1-Pentanone, 1-(2-furyl)-
P011	3-Penten-2-one	Ethylidene acetone; methyl propenyl ketone
P012	1-Penten-3-ol	Vinyl ethyl carbinol; Ethyl vinyl carbinol; Pent-1-en-3-ol; B-Pentenol
P013	1-Penten-3-one	Ethyl vinyl ketone; propionyl ethylene

Order	General Name	Synonyms
P014	2-Penten-3-one	2-Pentylpyridine; 2-Amylpyridine
P015	2-Pentenal	3-Ethyl-2-propenal; 3-Ethylacrolein; 2-Ethylacrylic aldehyde
P016	4-Pentenoic acid	Pent-4-enoic acid; Allyl acetate; allyl acetic acid
P017	2-Pentenoic acid	Pent-2-enoic acid; Pent-2-en-1-oic acid
P018	4-Pentenyl acetate	4-Penten-1-ol, acetate; 4-Penten-1-yl acetate; 5-Acetoxy-1-pentene; 1-Acetoxy-4-Pentene
P019	Pentyl 2-furyl ketone	2-Furyl pentyl ketone; 2-Hexanoylfuran; 1-(2-furyl-1-hexanone)
P020	2-Pentyl acetate	1-Methylbutyl acetate, 2-Pentanol acetate
P021	2-Pentyl butyrate	1-Methylbutyl butyrate; 2-pentyl butanoate; Pent-2-yl butyrate
P022	2-Pentyl-1-buten-3-one	3-Methylene-2-octanone; 2-Octanoic acid, 3-methylene-
P023	Pentylamine	Pentylamine; 1-Aminopentane; 1-Pentylamine; Amylamine; Monoamylamine; Monopentylamine; n-Amylamine; n-Pentylamine; Norleucamine
P024	2-Pentylfuran	2-Amylfuran
P025	α -Phellandrene	p-Mentha-1,5-diene; 1-methyl-4-propyl-iso-1,5-cyclohexadiene; Dihydro-p-cymene; 5-propyl-iso-2-methyl-1,3-cyclohexadiene; 4-Propyl-iso-1-methyl-1,5-cyclohexadiene; 1-Propyl-iso-4-methyl-2,4-cyclohexadiene; 1-Isopropyl-4-methyl-2,4-cyclohexadiene; 4-Isopropyl-1-methyl-1,5-cyclohexadiene; 5-Isopropyl-2-methyl-1,3-cyclohexadiene; 1-Methyl-4-isopropyl-1,5-cyclohexadiene; 2-Methyl-5-isopropyl-1,3-cyclohexadiene; ; Phellandrene
P026	Phenethyl 2-furoate	2-Furancarboxylic acid; 2-phenethyl ester; 2-Phenethyl 2-furoate

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Order	General Name	Synonyms
P027	Phenethyl 2-methylbutyrate	β -Phenethyl α -methylbutanoate; Benzylcarbiny 2-methylbutyrate; 2-Phenylethyl 2-methylbutanoate; Anatoly; Benzyl carbiny ethyl methyl acetate; phenethyl- α -methylbutanoate
P028	Phenethyl acetate*	Benzyl carbiny acetate; 2-Phenylethyl acetate
P029	Phenethyl alcohol	2-Phenylethyl alcohol; Benzylmethanol; 1-Phenyl-2-ethanol; 2-Phenylethan-1-ol; Benzyl carbinol; 2-Phenylethanol; phenylethyl alcohol; β -Phenyethyl alcohol
P030	Phenethyl amine	2-Aminoethylbenzene; 2-Phenylethylamine; β -Phenylethylamine; 1-amino-2-phenylethane; β -Aminoethyl benzene
P031	Phenethyl anthranilate	2-Phenylethyl anthranilate; Benzyl carbiny anthranilate; β -Phenylethyl-o-aminobenzoate
P032	Phenethyl benzoate	Benzylcarbiny benzoate; 2-Phenylethyl benzoate
P033	Phenethyl butyrate	2-Phenylethyl butyrate; benzylcarbiny butyrate; 2-Phenylethyl butanoate; β -Phenethyl-n-butanoate
P034	Phenethyl cinnamate	2-phenylethyl cinnamate; β -Phenethyl- β -phenylacrylate; Benzylcarbiny 3-phenylpropenoate; 2-Phenylethyl 3-phenylpropenoate; Benzyl carbiny cinnamate; Phenylethyl- β -phenyacrylate; β -Phenethyl-3-phenylpropenoate; Benzylcarbiny cinnamate
P035	Phenethyl formate	2-Phenylethyl methanoate; Benzylcarbiny methanoate; Phenylethyl formate; Benzyl carbiny formate; Phenethyl methanoate; 2-Phenylethyl formate
P036	Phenethyl hexanoate	Benzylcarbiny octanoate; 2-phenylethyl caprylate; Phenyl ethyl caproate; β -phenethyl hexoate; benzyl carbiny hexylate; Benzylcarbiny hexanoate; 2-Phenethyl hexanoate; 2-Phenylethyl caproate; 2-Phenylethyl hexanoate; Benzylcarbiny caproate

Order	General Name	Synonyms
P037	Phenethyl isobutyrate	Benzylcarbiny l isobutyrate; Phenethyl 2-methylpropanoate; Benzylcarbiny l 2-methylpropanoate; 2-Phenylethyl isobutyrate
P038	Phenethyl isothiocyanate	Benzene, (2-isothiocyanatoethyl)-, Isothiocyanic acid, phenethyl ester; β -Phenethyl isothiocyanate; 2-Phenylethyl isothiocyanate; Phenethyl mustard oil
P039	Phenethyl isovalerate	Phenethyl isovalerianate; Benzylcarbiny l isovalerate; Benzylcarbiny l 3-methylbutanoate; 2-phenylethyl 3-methylbutanoate; benzylcarbiny l isopentanoate; Benzyl carbiny l isovalerianate; Phenethyl isopentanoate; Phenethyl-3-methylbutyrate; 2-phenylethyl isovalerate
P040	Phenethyl mercaptan	2-Phenylethane-1-thiol; 2-Phenylethanethiol; 2-Phenethylthiol; 2-Phenylethanethiol
P041	Phenethyl octanoate	Phenyl ethyl caprylate; Phenethyl octoate; phenyl ethyl octanoate; Benzyl carbiny l octylate; 2-Phenylethyl octanoate, Benzylcarbiny l octanoate; 2-Phenylethyl caprylate
P042	Phenethyl phenylacetate	2-Phenylethyl α -toluate; Benzylcarbiny l α -toluate; Benzyl carbiny l Phenylacetate; 2-Phenylethyl phenylacetate; phenethyl- α -toluate
P043	Phenethyl propionate	2-Phenylethyl propanoate; Benzyl carbiny l propionate; 2-Phenylethyl propionate; Phenylethyl propionate
P044	Phenethyl salicylate	2-Phenylethyl 2-hydroxybenzoate; Benzylcarbiny l 2-hydroxybenzoate; Benzyl carbiny l salicylate; Phenethyl-2-hydroxybenzoate; Phenethyl-o-hydroxybenzoate; 2-Phenylethyl salicylate; 2-Phenylethyl salicylate; Benzylcarbiny l salicylate
P045	Phenethyl senecioate	2-Phenylethyl senecioate; 2-Phenylethyl 3-methyl-2-butenate; 2-Phenethyl 3-methylcrotonate; Phenethyl-3,3-dimethylacrylate; Phenethyl-3-methyl-2-butenate; phenethyl-3-methylcrotonate; Phenethyl 3,4-dimethylacrylate
P046	Phenethyl tiglate	2-Phenylethyl tiglate; 2-Phenylethyl-trans-2-methylbutenoate; 2-Phenylethyl-rans-2,3-dimethylacrylate; Phenethyl 2-methylcrotonate; Benzyl carbiny l tiglate;

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Order	General Name	Synonyms
		Phenethyl trans-2,3-dimethylacrylate; Phenethyl trans-2-methylbutenoate; Phenethyl trans-2-methylcrotonate; Phenylethyl tiglate; (E)-2-Phenylethyl 2-methylbutenoate
P047	Phenol	Carbolic acid; Benzenol; Hydroxybenzene; Phenic or phenylic acid; Phenyl hydroxide; oxybenzene
P048	Phenoxyacetic acid	phenylum; Glycoic acid phenyl ether; Phenoxyethanoic acid; o-Phenylglycolic acid
P049	2-Phenoxyethyl isobutyrate	2-Phenoxyethyl 2-methylpropanoate; Ethyleneglycol monophenylether, isobutyrate; 2-Phenoxyethyl isobutanoate; Phenylcellosolve isobutyrate; Phenoxyethyl isobutyrate; Floranol
P050	Phenyl acetate	(Acetyloxy)benzene; Phenol acetatel; Acetoxybenzene; Acetic acid, phenyl ester; Phenol acetate; Acetoxybenzene
P051	Phenyl disulfide	Diphenyl disulfide; phenyldithiobenzene; Biphenyl disulfide
P052	Phenyl salicylate	Phenyl-2-hydroxybenzoate; 2-Hydroxybenzenoic acid, Phenyl ester; Salol
P053	1-Phenyl-(3 or 5)-propylpyrazole	1-Phenyl-3 or 5-propyl-1,2-diazole; 1-Phenyl-3 or 5-propyl-1,2-diaxole; 1H-pyrazole, 1-phenyl-3(or 5)-propyl-
P054	1-Phenyl-1,2-propanedione	Phenyl methyl diketone; Acety benzoyl; Methyl phenyl diketone; Methyl phenyl glyoxal
P055	1-Phenyl-1-propanol	α -Ethylbenzyl alcohol; α -Hydroxypropylbenzene; 1-Phenylpropyl alcohol; Dihydro isocinnamic alcohol; Dihydro- α -phenyl allyl alcohol; Ethyl phenyl carbinol; phenyl ethyl carbinol; sec-Phenyl propyl alcohol; 1-Phenylpropanol
P056	3-Phenyl-1-propanol	Dihydrocinnamyl alcohol; Benzyl ethyl alcohol; Hydrocinnamyl alcohol; Phenyl propyl alcohol; 3-Phenylpropanol, Phenethyl carbinol; 3-hydroxy-1-phenylpropane; (3-Hydroxypropyl)benzene

Order	General Name	Synonyms
P057	4-Phenyl-2-butanol	Methyl 2-phenylethyl carbinol; Methyl phenylethyl carbinol; Phenylethyl methyl carbinol
P058	2-Phenyl-2-butenal	2-Phenyl crotonaldehyde; 2-Phenyl-but-2-en-1-al
P059	4-Phenyl-2-butyl acetate	1-Methyl-3-phenylpropyl acetate; Phenylethyl methyl carbonyl acetate; 1-Methyl-3-phenylpropyl acetate; Methyl phenyl ethyl carbonyl acetate; 4-Phenyl-2-butyl acetate
P060	2-Phenyl-3-(2-furyl) prop-2-enal	3-(2-Furyl)-2-phenylprop-2-enal; Benzeneacetaldehyde, α -(2-furanylmethylene)-, (E)-; 2-Furfurylidenebenzylaldehyde
P061	4-Phenyl-3-buten-2-ol	Methyl styryl carbinol; Homocinnamyl alcohol; α -Methylcinnamyl alcohol
P062	4-Phenyl-3-buten-2-one	Benzylideneacetone; Benzylidene acetone; cinnamyl methyl ketone; Methyl styryl ketone; Methyl cinnamyl ketone; 4-Phenylbut-3-en-2-one; Acetocinnamone; Benzalacetone
P063	2-Phenyl-3-carbethoxyfuran	Ethyl 2-phenyl-3-furoate; 3-furanecarboxylic acid, 2-phenyl-, ethyl ester; Phenyl oxaromate
P064	1-Phenyl-3-methyl-3-pentanol	3-Methyl-1-phenylpentan-3-ol; Methyl ethyl phenylethyl carbinol; 3-methyl-1-phenylpentanol; Phenylethyl methyl ethyl carbinol; 3-Methyl-1-phenyl-3-pentanol;
P065	(+/-)-2-Phenyl-4-methyl-2-hexenal	Benzeneacetaldehyde, α -(2-methylbutylidene)-; 2-Hexenal, 4-methyl-2-phenyl-
P066	3-Phenyl-4-pentenal	3-Phenyl-3-vinylpropionaldehyde; β -Vinylhydrocinnamaldehyde
P067	2-Phenyl-4-pentenal	Benzeneacetaldehyde, α -2-propenyl
P068	Phenylacetaldehyde	Phenylacetic aldehyde; benzylcarboxaldehyde; Hyacinthin; 1-Oxo-2-phenylethane; α -Toluic aldehyde; α -Tolualdehyde; α -tolyl aldehyde; Phenylacetic aldehyde; Benzylcarboxyaldehyde, 1-Oxo-2-

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Order	General Name	Synonyms
P069	Phenylacetaldehyde 2,3-butylene glycol acetal	2-Benzyl-4,5-dimethyl-1,3-dioxane; 4,5-Dimethyl-2-benzyl-1,3-dioxolan; 2-Benzyl-4,5-dimethyl-1,3-dioxolane
P070	Phenylacetaldehyde diisobutyl acetal	1,1-Diisobutoxy-2-phenylethane; 1,1-Di(2-methylpropoxy)-2-phenylethane
P071	Phenylacetaldehyde dimethyl acetal	Viridine; rosal; Vertodor; 1,1-Dimethoxy-2-phenylethane; α -Toluic aldehyde dimethylacetal; α -Tolyl aldehyde dimethyl acetal
P072	Phenylacetaldehyde glyceryl acetal	5-Hydroxy-2-benzyl-1,3-dioxane and 4-hydroxymethyl-2-benzyl-1,3-dioxolane mixture); 5-Hydroxymethyl-2-benzyl-1,3-dioxolane; 5-Hydroxymethyl-2-benzyl-1,3-dioxolane
P073	Phenylacetic acid	Benzylcarboxylic acid; α -Toluic acid
P074	(+/-)-1-Phenylethylmercaptan	Benzenemethanethiol, α -methyl, (+/-); 1-Phenylethanethiol, (+/-)
P075	5-Phenylpentanol	Benzenepentanol; Phenylamyl alcohol; Benzenepentan-1-ol
P076	2-Phenylphenol	2-Biphenylol; [1,1'-Biphenyl]-2-ol; Dowicide; 1, 2-Hydroxy-1,1'-biphenyl; o-Hydroxybiphenyl; o-Phenylphenol.; Biphenyl-2-ol; (1-1'-biphenyl)-2-ol; 2-Hydroxydiphenyl; o-Hydroxydiphenyl; Torsite; Xenol; 2-Biphenylol
P077	2-Phenylpropan-1-ol	Hydratropic alcohol; Hydratropyl alcohol; 2-Phenylpropyl alcohol; β -Methylphenethyl alcohol
P078	3-Phenylpropionaldehyde	3-Phenylpropanal; Benzyl acetaldehyde; Dihydrocinnamic aldehyde; hydrocinnamaldehyde; hydrocinnamic aldehyde; β -Phenyl propionaldehyde; β -Phenyl propionaldehyde; Phenylpropyl aldehyde; Benzenepropanal
P079	3-Phenylpropionic acid	β -Phenylpropionic acid; Dihydrocinnamic acid; Benzylacetic acid; Hydrocinnamic acid; γ -phenylpropionic acid; Benzenepropanoic acid
P080	3-Phenylpropyl acetate	β -Phenylpropyl acetate; Phenylpropyl acetate; Hydrocinnamyl acetate; Benzenepropanol acetate; 3-Phenyl-1-propyl acetate

Order	General Name	Synonyms
P081	2-Phenylpropyl butyrate	Hydratropyl butyrate; β -methyl phenethyl butyrate; α -Phenylpropyl alcohol, butyric ester; 2-Phenylpropyl- <i>n</i> -butyrate
P082	3-Phenylpropyl cinnamate	Hydrocinnamyl 3-phenylpropenoate; β -Phenylpropyl cinnamate; 3-Phenylpropyl 3-phenylpropenoate; Hydrocinnamyl cinnamate; 3-Phenylpropyl- β -phenylacrylate; 3-Phenylpropyl-3-phenyl-2-propenoate; Phenylpropyl cinnamate
P083	3-Phenylpropyl formate	Hydrocinnamyl methanoate; β -Phenylpropyl formate; 3-Phenylpropyl methanoate; Hydrocinnamyl formate; 3-Phenyl-1-propyl methanoate; Benzenepropanol formate; Phenylpropyl formate
P084	3-Phenylpropyl hexanoate	Hydrocinnamyl caproate; Hydrocinnamyl hexanoate; 3-Phenylpropyl caproate; Phenylpropyl capronate; phenylpropyl hexylate
P085	2-Phenylpropyl isobutyrate	Hydratropyl isobutyrate; α -Phenylpropyl alcohol, isobutyric ester; 2-Methyl-2-henylethyl 2-methylpropanoate; Hydratropyl 2-methylpropanoate; 2-Phenylpropyl 2-methylpropanoate; 2- α -Phenylpropyl alcohol, isobutyric ester
P086	3-Phenylpropyl isobutyrate	3-phenylpropyl 2-methylpropanoate; β -phenylpropyl 2-methylpropanoate; hydrocinnamyl 2-methylpropanoate; Hydrocinnamyl isobutyrate
P087	3-Phenylpropyl isovalerate	3-Phenylpropyl isovalerianate; Hydrocinnamyl 3-methylbutanoate; 3-phenylpropyl 3-methylbutanoate; 3-Phenylpropyl isopentanoate; β -Phenylpropyl 3-methylbutanoate; Hydrocinnamyl isovalerate; 3-Phenylpropyl- β -methylbutyrate; 3-Phenylpropyl isovaleriate
P088	3-Phenylpropyl propionate	Hydrocinnamyl propionate; 3-Phenylpropyl propanoate; β -Phenylpropyl propionate; Benzenepropanol propionate; Phenylpropyl propionate; β -Phenylpropyl propanoate
P089	2-(3-Phenylpropyl)pyridine	Pyridine, 2-(3-phenylpropyl)-

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Order	General Name	Synonyms
P090	2-(3-Phenylpropyl)tetrahydrofuran	2-Hydrocinnamyl tetrahydrofuran; α -(3-Phenylpropyl)-tetrahydrofuran
P091	Phthalide	2-Hydroxymethylbenzoic acid γ lactone; α -Hydroxy-o-toluic acid lactone; 1(3H)-Isobenzofuranone
P092	Phytol	
P093	Phytyl acetate	
P094	3-Pinanone	Isopinocampnone; Bicyclo[3.1.1]heptan-3-one, 2,6,6-trimethyl-
P095	Pine tar oil	
P096	2(10)-Pinen-3-ol	Bicyclo[3.1.1]heptan-3-ol, 6,6-dimethyl-2-methylene-; 6,6-Dimethyl-3-hydroxy-2-methylenebicyclo(3.1.1)heptane; pinocarveol; Pinocarveol; 2(10)-Pinenol-3
P097	α -Pinene	Pinene; Pin-2(3)-ene; 2-Pinene; 2,6,6-Trimethylbicyclo-(3,1,1)-2-heptene; Pin-2(3)-ene
P098	β -Pinene	6,6-Dimethyl-2-methylenebicyclo-(3,1,1)-heptane; Pseudopinene; Pin-2(10)-ene; 6,6-Dimethyl-2-methylene norpinane; nopinene; 2(10)-pinene
P099	Piperazine	1,4-Diazocyclohexane; 1,4-Piperazine; Antiren; Diethylenediamine; Dispermine; Eraverm; Hexahydropyrazine; Lumbrical; Piperizidine; Pipersol; Pyrazine hexahydrate
P100	Piperidine	Hexahydropyridine; Hexazane; Pentamethylenimine
P101	Piperine	Piperoylpiperidine; 1-Piperolypiperidine
P102	Piperitenone oxide	7-Oxabicyclo[4.1.0]heptan-2-one, 6-methyl-3-(1-methylethylidene)-; 1,2-Epoxy-p-menth-4-(8)-en-3-one
P103	Piperitone	d-piperitone; α -piperitone; 1-Methyl-4-isopropyl-1-cyclohexen-3-one; 4-Propyl-iso-1-ethyl-1-cyclohexen-3-one; p-Menth-1-en-3-one; 4-isopropyl-1-methyl-1-cyclohexen-3-one,

Order	General Name	Synonyms
		6-Isopropyl-3-methylcyclohex-2-enone
P104	L-Piperitone	2-Cyclohexen-1-one, 3-Methyl-6-isopropyl, (6R)-; 2-Cyclohexen-1-one, 3-methyl-6-1-methylethyl)-, (6R)-; p-Menth-1-en-3-one; (-)-Piperitone
P105	Piperonal *	Dioxymethylene protocatechuic aldehyde; Heliotropine; 3,4-methylenedioxy-benzaldehyde; piperonylaldehyde; Protocatechualdehyde methylene ether
P106	Piperonyl acetate	Heliotropin acetate; 1,3-Benzodioxole-5-methanol, acetate; Heliotropyl acetate; 3,4-Methylenedioxybenzyl acetate
P107	Piperonyl acetone	4-(3,4-methylenedioxyphenyl)2-butanone; Dulciny; 2-Butanone, 4-(1,3-benzodioxol-5-1); Dulciny; Heliotropyl acetone
P108	Piperonyl isobutyrate	3,4-Methylenedioxybenzyl 2-methylpropanoate; piperonyl 2-methylpropanoate; heliotropyl 2-methylpropanoate; Heliotropyl isobutyrate; 3,4-Methylenedioxybenzyl isobutyrate; Piperonyl 2-methylpropionate
P109	Polylimonene	
P110	Potassium 2-(1'-ethoxy)ethoxypropanoate	1-Ethoxyethyl ether of potassium lactate; potassium <i>O</i> -(1'-ethoxy)ethoxypropanoate
P111	Potassium acetate	
P112	Prenyl caproate	Hexanoic acid, 3-methyl-2-butenyl ester
P113	Prenyl acetate	3-Methylbuten-2-yl acetate, 2-Buten-1-ol, 3-methyl-, acetate; 2-Buten-1-ol, 3-methyl-, acetate; 3-Methyl-2-butenyl acetate
P114	Prenyl benzoate	Benzoic acid, hexyl ester; 2-Buten-1-ol, 3-methyl-, benzoate; 3-Methyl-2-butenyl benzoate; Benzoic acid, 3-methyl-2-butenyl ester
P115	Prenyl formate	2-Buten-1-ol, 3-methyl-, formate; Methanoic acid, 3-methyl-2-butenyl ester
P116	Prenyl isobutyrate	Propanoic acid, 2-methyl-, 3-; Methyl-2-butenyl ester; Isobutyric acid,

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Order	General Name	Synonyms
		3-methyl-2- butenyl ester
P117	Prenyl thioacetate	S-Prenyl thioacetate; S-(3-methyl-2-butenyl)acetothioate, S-3-methyl-2-butenyl ethanethioate; 3-methyl-3-butenyl thioacetate; Ethanethioic acid, S-(3-methyl-2-buten-1-yl) ester; Thioacetic acid, S-(3-methyl-but-2-en-1-yl) ester
P118	Prenylthiol	3-Methyl-2-buten-1-thiol, Prenyl mercaptan; 3-Methyl-2-butenyl mercaptan; 3-Methyl-2-butenethiol-1
P119	1,2-Propanedithiol	1,2- Dimercaptopropane
P120	1,3-Propanedithiol	1,3-Dimercaptopropane; trimethylene dimercaptan
P121	Propanethiol	n-Thiopropyl alcohol; n-Propyl mercaptan; Propylthiol; 1-Propanethiol; 1-Propane- 1-thiol; Propyl mercaptan
P122	2-Propanethiol	Isopropyl mercaptan
P123	Propenyl propyl disulfide	1-Propenyl propyl disulfide; Prop-1-enyl propyl disulfide
P124	Propenyl-2,6-dimethoxyphenol	4-Propenyl-2,6-dimethoxy phenol; 2,6-Dimethoxy-4-prop-1-enylphenol; 6-Methoxyisoeugenol; phenol, 2,6-dimethoxy-4-(1-propenyl)-, (E)-; 4-propenylsyringol
P125	Propenylguaethol	Vanitrope; Ethoxyprop-3-enylphenol; 6-Ethoxy-m-anol; 1-ethoxy-2-hydroxy-4- propenylbenzene; 2-Ethoxy-5-propenylphenol; hydroxymethyl anethole; 2-Propwnyl-6 -ethoxyphenol; 6-Ethoxyprop-3-enylphenol; 5-Propenylguaethol; 3-Propenyl-6- ethoxyphenol
P126	(Z)-4-Propenylphenol	Phenol, 4-(1-propenyl)-isochavicol
P127	Propionaldehyde	Methylacetaldehyde; Propanal; Propyl aldehyde; Propion aldehyde; Propan-1-al; Aldehyde c-3
P128	Propionic acid*	Methylacetic acid; Ethylformic acid; Propanoic acid

Order	General Name	Synonyms
P129	2-Propionyl-2-thiazoline	1-Propanone, 1-(4,5-dihydro-2-thiazolyl)-; 1-(4,5-Dihydro-1,3-thiazol-2-yl)-1-propanone; 1-Propanone, 1-(2-thiazolin-2-yl)-
P130	2-Propionylpyrrole	Ethyl 2-pyrrolyl ketone; 1-(2-Pyrrolyl)-1-propanone
P131	2-Propionylpyrroline	1-(3,4-Dihydro-2H-pyrrol-5-yl)-1-propanone
P132	2-Propionylthiazole	1-Propanone, 1-(5-methyl-2-furanyl)-; 1-(2-Thiazolyl)-1-propanone; Thiazole, 2-propionyl-
P133	Propiophenone	Phenyl ethyl ketone; 1-phenyl-1-propanone; 1-Propanone, 1-phenyl-; Propionylbenzene; 1-Phenyl-1-propanone, Ethyl phenyl ketone; Propiophenone
P134	Propyl 2,4-decadienoate	Propyl deca-2,4-dienoate
P135	Propyl 2-furanacrylate	Propyl-3-(2-furyl)-2-propenoate; Propyl 3-(2-furyl)acrylate; Propyl β -furylacrylate; propyl-3-furylpropenoate; propyl 3(2-furyl)propenoate; Propyl furanacrylate; Propyl furylacrylate
P136	Propyl 2-furoate	Furancarboxylic acid, propyl ester; propyl furan-2-carboxylate; <i>n</i> -Propyl pyromucate; 2-Furoic acid; <i>n</i> -Propyl furan-2-carboxylate
P137	Propyl 2-mercaptopropionate	2-Mercaptopropanoic acid, propyl ester; Propyl 2-sulfanylpropanoate
P138	Propyl 2-methyl-3-furyl disulfide	2-Methyl-3-furyl propyl disulfide; 2-Methyl-3-(propyldithio)furan
P139	Propyl acetate	Propyl ethanoate; <i>n</i> -Propyl acetate
P140	Propyl alcohol	Ethylcarbinol; Albacol; optal; 1-Propanol; Propylic alcohol; <i>n</i> -Propyl alcohol; <i>n</i> -propanol; Propylic alcohol; Propan-1-ol
P141	<i>p</i> -Propyl anisole	4-Propylmethoxybenzene; 1-Methoxy-4-propylbenzene; Dihydroanethole; 1-Methoxy-4- <i>n</i> -propylbenzene; Methyl <i>p</i> -propylphenyl ether; Propylmethoxybenzene; <i>p</i> -Propylanisole; <i>p</i> - <i>n</i> -Propyl anisole; 4-Propylmethoxybenzene;

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Order	General Name	Synonyms
P142	Propyl benzoate	n-Propyl benzenecarboxylate; n-Propyl benzoate; Propyl phenyl methanoate
P143	Propyl butyrate	n-Propyl-n-butanoate; n-Propyl butyrate; Propyl butanoate
P144	Propyl cinnamate	n-Propyl cinnamate; Propyl-β-phneyl acrylate; Propyl-3-phenylpropenoate; n-Propyl 3-phenylpropenoate; n-Propyl β-phenylacrylate
P145	Propyl disulfide	
P146	Propyl formate	n-Propyl formate; n-Propyl methanoate
P147	propyl furfuryl disulfide	2-[(propyldithio)methyl]-furan; Furfuryl propyl disulfide
P148	Propyl heptanoate	n-Propyl heptate; n-propyl heptylate; Propyl heptylate; Propyl heptate; Propyl oenanthate
P149	Propyl hexanoate	n-Propyl caproate; n-Propyl-n-hexate; n-Propyl hexylate; Propyl caproate
P150	Propyl isobutyrate	n-Propyl isobutyrate; n-Proypl-2-methylpropanoate
P151	Propyl isovalerate	Propyl isovalerianate; Propyl 3-methylbutanoate; Propyl isopentampate; propyl 3-methylbutyrate; n-Propyl isovalerate; n-propyl-β-methylbutyrate; n-propyl methylbutyrate
P152	Propyl phenylacetate	n-Propyl-a-toluate; Propyl a-toluate; Propyl a-Toluate
P153	Propyl p-hydroxybenzoate	Propyl 4-hydroxybenzoate; Benzoic acid, p-hydroxy-, propyl ester; Preserval P; propyl chemosept; Propylparasept; Propylparaben
P154	Propyl propionate	Propyl propanoate; n-Propyl propionate
P155	Propyl thioacetate	Acetic acid, thiopropyl ester; S-propyl thioacetate, Propanethiol acetate; Ethanethioic acid, S-propyl ester
P156	4-Propyl-2,6-dimethoxyphenol	2,6-Dimethoxy-4-propylphenol; Phenol, 2,6-dimethoxy-4-propyl; 4-Propylsyringol
P157	Propylamine	1-Aminopropane; 1-Propylamine; Mono-n-propylamine; Monopropylamine;

Order	General Name	Synonyms
		n-Propylamine; Propan-1-ylamine
P158	Propylene glycol dibenzoate	1,2-Propanediol dibenzoate
P159	Propylene glycol stearate	Propylene glycol monostearate; Propylene glycol octadecanoate; Octadecanoic acid, 2-hydroxypropyl ester; Propylene glycol monooctadecanoate
P160	3-Propylidenephthalide	Celeiax
P161	α -Propylphenethyl alcohol	Benzylpropyl carbinol; Benzylbutyl alcohol; Benzyl-n-propyl carbinol; 1-Phenyl-2-pentanol; 1-phenylpentan-2-ol; n-propyl benzyl carbinol
P162	o-Propylphenol	1-(2-Hydroxyphenyl)propane; phenol, 2-propyl-; 2-Propylphenol
P163	p-Propylphenol	Phenol, 4-propyl-; 4-Propylphenol; 1-(4-Hydroxyphenyl)propane
P164	2-Propylpyrazine	Propylpyrazine, 2-propyl-1,4-diazine
P165	2-Propylpyridine	
P166	Pulegone	1-Methyl-4-isopropenylidene-3-cyclohexanone; δ -4(8)-p-menthen-3-one; 1-Isopropylidene-4-methyl-2-cyclohexanone; p-Menth-4(8)-en-3-one; 1-methyl-4-isopropylidenecyclohexan-3-one; 5-Methyl-2-(1-methylethylidene)cyclohexanone
P167	Pyrazine	p-Diazine; 1,4-Diazine; Piazzine; Paradiazine; 1,4-Diazabenzene; d-Diazine
P168	Pyrazineethanethiol	Pyrazinyl ethanethiol; 2-(Pyrazinyl)ethanethiol; 2-pyrazinyl ethylmercaptan
P169	Pyrazinyl methyl sulfide	Pyrazinylmethyl methyl sulfide; 2-methylthiopyrazine; Methylthioprazine; Pyrazinylmethyl methyl sulphide
P170	Pyridine	Azine; Azabenzene
P171	2-Pyridine methanethiol	2-Pyridylmethanethiol; 2-Pyridylmethyl mercaptan; 2-Mercaptomethylpyridine
P172	Pyroligneous acid	
P173	Pyroligneous acid extract	Pyroligneous vinegar; Wood vinegar

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Order	General Name	Synonyms
P174	Pyrrole	Azloe; imidole; Divynyleneimine
P175	Pyrrolidine	Tetrahydropyrrole; Tetramethylenimine
P176	1-Pyrroline	3,4-dihydro-(2H)-pyrrole
P177	Pyruvaldehyde	2-Ketopropionaldehyde; Acetyl formaldehyde; 1,2-ketopropionic aldehyde; α -ketopropionic aldehyde; Methyl glyoxal; 2-Oxopropanal; Pyruvic aldehyde; Propan-2-on-1-al
P178	Pyruvic acid	2-Ketopropionic acid; Acetylformic acid; α -Ketopropionic acid; 2-Oxopropanoic acid; Pyrroacemic acid
P179	1-Phenylbutan-1,3-dione	α -Acetylacetophenone; Acetoacetophenone; cetylbenzoylmethane; Benzoylacetone; 1-Benzoyl-2-propanone; ; 2-Acetylacetophenone; 2-Propanone, benzoyl-; 1-Benzoylacetone; Benzoyl-aceton;1,3-Butanedione, 1-phenyl-;1-Phenyl-1,3-butanedione
P180	3-Pentanone	Diethyl ketone; 1,3-Dimethylacetone; Ethyl Ketone; Metacetone;Methacetone; Propione; Ethyl propionyl; Pentan-3-one;Diethylcetone; Pentanone-3; Dimethylacetone
P181	1-Phenylpropan-2-one	2-Propanone, 1-phenyl-; Methyl benzyl ketone; Phenyl-2-propanone; Phenylacetone; 1-Phenyl-2-propanone; 3-Phenyl-2-propanone; α -Phenylacetone; Phenylmethyl methyl ketone; 1-Phenylacetone;Benzyl methyl ketone
P182	Prop-2-en-1-ol	Allyl alcohol; Allylic alcohol; Vinylcarbinol; 1-Propen-3-ol; 2-Propenol; 2-Propenyl alcohol; 3-Hydroxypropene; Propenol; Propen-1-ol-3; Propenyl alcohol; 1-Propenol-3; 2-Propene-1-ol; 3-Hydroxy-1-propene; 1-Propenol-3-ol; Propene-1-ol; Propenol-3; 4-Quinolinecarboxylic acid, 2-phenyl-; 2-propen-1-ol (allyl alcohol);2-Propen-1-ol
P183	1-Pentanethiol	n-Amyl mercaptan; n-Pentyl mercaptan; Amyl hydrosulfide; Amyl mercaptan;

Order	General Name	Synonyms
		Amyl sulfhydrate; Amyl thioalcohol; Pentane-1-thiol; Pentanethiol; Pentyl mercaptan; 1-Mercaptopentane; Mercaptan amylique; Pentalarm; 1-Pentanthiol
P184	1,5-Pentanedioic acid	Glutaric acid; 1,3-Propanedicarboxylic acid; Pentandioic acid; Pentanedioic acid
P185	Pentan-2,4-dione	2,4-Pentanedione; Acetoacetone; Diacetylmethane; 2-Propanone, acetyl-; 2,4-Dioxopentane; 2,4-Pentadione; Pentane-2,4-dione; Acetone, acetyl-; Pentanedione; Pentanedione-2,4; Acetyl 2-propanone; 2,4-Pentandione; Acetylacetone
P186	Propyl valerate	Valeric acid, propyl ester; n-Propyl n-valerate; Propyl pentanoate; n-propyl pentanoate; Pentanoic acid, propyl ester
P187	Pseudoionone	ψ -Ionone; Citrylideneacetone; 6,10-Dimethyl-3,5,9-undecatrien-2-one; 2,6-Dimethylundeca-2,6,8-triene-10-one; (3E,5E)-6,10-Dimethyl-3,5,9-undecatrien-2-one; 2,6-Dimethyl hendeca-2,6,8-trien-10-one
P188	1,2,3,5,6-pentathiepane	Lenthionine; Lenthionin
P189	2-Phenylpropionic acid	2-Phenylpropanoic acid; α -Phenylpropionic acid; α -Methylphenylacetic acid; Hydratropic acid; dl- α -Phenylpropionic acid; α -Methylbenzeneacetic acid; Propanoic acid, 2-phenyl; Benzeneacetic acid, α -methyl-
P190	1-Phenylbutan-1-one	Butyrophenone; n-Butyrophenone; Phenyl propyl ketone; Propyl phenyl ketone; 1-Butanone, 1-phenyl-; 1-Phenyl-1-butanone
P191	β -Phellandrene	Cyclohexene, 3-methylene-6-(1-methylethyl)-; p-Mentha-1(7),2-diene; Phellandrene, β ; 3-Isopropyl-6-methylene-1-cyclohexene; 3-methylene-6-(1-methylethenyl)-cyclohexane
P192	Pentan-3-ol	Diethyl carbinol; 3-Pentyl alcohol; sec-Amyl alcohol; Pentanol-3; 3-Pentanol
P193	Propyl lactate	Propanoic acid, 2-hydroxy-, propyl ester; propyl 2-hydroxypropanoate
P194	2-Phenylpropan-2-ol	Benzyl alcohol, α,α -dimethyl-; α -Cumyl alcohol; α,α -Dimethylbenzyl alcohol;

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Order	General Name	Synonyms
		Dimethylphenylcarbinol; Dimethylphenylmethanol; 1-Hydroxycumene; 2-Phenyl-2-propanol; 2-Propanol, 2-phenyl-; α,α -Dimethylbenzenemethanol; Phenyldimethylcarbinol; 2-Phenylisopropanol; 1-Methyl-1-phenylethanol; Benzenemethanol, α,α -dimethyl-
P195	Propyl octanoate	Octanoic acid, propyl ester; n-Propyl n-octanoate; n-propyl octanoate
P196	Pentyl acetate	n-Amyl acetate; n-Pentyl acetate; Amyl acetate; Birnenoel; Acetic acid, amyl ester; Amyl acetic ester; Amyl acetic ether; Banana oil; Pear oil; Pent-acetate; 1-Pentanol acetate; 1-Pentyl acetate; Acetic acid n-amyl ester; n-Pentyl ethanoate; Pentyl ester of acetic acid; Acetic acid, n-pentyl ester; 1-Acetoxypentane; Primary amyl acetate; Acetic acid, pentyl ester
P197	Pentadecane	n-Pentadecane
P198	Pentadecan-1-ol	n-Pentadecanol; n-1-Pentadecanol; Pentadecyl alcohol; Pentadecanol-(1); 1-Pentadecanol; Pentadecanol
P199	Pent-4-en-1-ol	4-Pentenol; 4-Pentenyl alcohol; 4-Pentene-1-ol; 4-Penten-1-ol
P200	Pentadecanoic acid	Pentadecylic acid; n-Pentadecanoic acid; n-Pentadecylic acid; Pentadecanoic (Palmitic) acid
P201	Propyl propane thiosulfonate	1-Propanesulfonothioic acid, S-propyl ester
P202	4-Pentenal	Pent-4-enal
P203	Propyl hexadecanoate	Hexadecanoic acid, propyl ester; Propyl palmitate
P204	Pentyl 2-methylpropanoate	Isobutyric acid, pentyl ester; Amyl isobutyrate; Pentyl isobutyrate; 1-Pentyl isobutyrate; N-Amyl iso-butyrate; Pentyl iso-butyrate; Pentyl isobutanoate; n-Pentyl isobutyrate; Propanoic acid, 2-methyl-, pentyl ester
P205	4-Phenylbutan-2-one	2-Butanone, 4-phenyl-; Benzylacetone; Methyl phenethyl ketone; Methyl 2-phenylethyl ketone; Phenethyl methyl ketone; 1-Phenyl-3-butanone; Methyl phenylethyl ketone; β -Phenylethyl methyl ketone; 4-phenyl-2-butanone (benzyl acetone); 4-phenylbutanone; 4-Phenyl-2-butanone
P206	Propyl dodecanoate	Dodecanoic acid, propyl ester; Propyl laurate

Order	General Name	Synonyms
P207	2-Propylfuran	Furan, α -propyl-; 2-n-Propylfuran;Furan, 2-propyl-
P208	2-Pentylthiophene(2-Amylthiophene)	Thiophene, 2-pentyl-; 2-n-Amylthiophene; 2-n-Pentylthiophene
P209	Patchoulol	1,6-Methanonaphthalen-1(2H)-ol, octahydro-4,8a,9,9-tetramethyl-, [1R-(1 α ,4 β ,4 $\alpha\alpha$,6 β ,8 $\alpha\alpha$)]-; 1,6-Methanonaphthalen-1 β (2H)-ol, 3,4,4a β ,5,6 β ,7,8,8a-octahydro-4a,8a β ,9,9-tetramethyl-; Patchoulic alcohol; Patchoulol; 1,6-Methanonaphthalen-1(2H)-ol, octahydro-4,8a,9,9-tetramethyl-, (1 α ,4 β ,4 $\alpha\alpha$,6 β ,8 $\alpha\alpha$)-;Patchoulanol
P210	3-Phenylpropyl butyrate	Butanoic acid, 3-phenylpropyl ester; Butyric acid, 3-phenylpropyl ester; Phenylpropyl butyrate; Phenylpropyl n-butyrate;3-Phenylpropyl butanoate
P211	Phenethyl valerate	2-Phenylethyl pentanoate;Valeric acid, phenethyl ester;Valeric acid, 2-phenylethyl ester; Phenylethyl N-valerate; 2-Phenylethyl pentanoate; phenylethyl pentanoate;Pentanoic acid, 2-phenylethyl ester
P212	Pentyl 2-methylisocrotonate	
P213	Propyl crotonate	2-Butenoic acid, propyl ester; Crotonic acid, propyl ester; Propyl 2-butenolate; Propyl (2E)-2-butenolate;(E)-2-Butenoic acid propyl ester
P214	4-pentenyl isothiocyanate	pentenyl isothiocyanate
P215	(Z)-2-Pentenol	2-Penten-1-ol;pent-2-en-1-ol
P216	Propyl decanoate	Decanoic acid, propyl ester; n-propyl decanoate
P217	Propyl 2-methylbutyrate	Butanoic acid, 2-methyl-, propyl ester; n-Propyl 2-methyl butyrate;Propyl 2-methylbutanoate
P218	3-Pentenol-1	(3E)-3-Penten-1-ol;3-Penten-1-ol;3-pentenol
P219	5-Pentyl-3H-furan-2-one	4-Hydroxy-3-nonenic acid lactone, 5-(1-pentyl)-3H-furan-2-one, 5-amyl-3H-furan-2-one
P220	2-(trans-2-Pentenyl)cyclopentanone	JASMINONE; (E)-2-(Pent-2-enyl)cyclopentan-1-one,
P221	2-Propyl-4,5-dimethyloxazole(4,5-Dimethyl-2-propyloxazole)	4,5-Dimethyl-2-propyloxazole;4,5-Dimethyl-2-propyl-1,3-oxazole;Oxazole, 4,5-dimethyl-2-propyl-
P222	Phenethyl decanoate	Decanoic acid 2-phenylethyl ester; Phenylethyl n-decanoate;2-Phenylethyl decanoate

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Order	General Name	Synonyms
P223	Phenethyl crotonate	
P224	2-Pentyl 2-methylpentanoate	1-methylbutyl 2-methylpentanoate
P225	Pyrrolidino-[1,2E]-4H-2,4-dimethyl-1,3,5-dithiazine	2,4-dimethyltetrahydropyrrolo[2,1-d][1,3,5]-dithiazine; dimethyl pyrrolidino dithiazine
P226	Phenethyl lactate	
P227	Palmitic acid	Hexadecanoic acid; Hexadecylic acid; Cetylic acid; 1-Pentadecanecarboxylic acid
Q001	Quinine bisulfate	
Q002	Quinine hydrochloride	Quinine monohydrochloride; Quinine chloride
Q003	Quinine sulphate	
Q004	Quinoline	1-Benzazine; Benzo(b)pyridine; 2,3-Benzopyridine; chinoleine; Leucoline; 2,3-Benzopyrine; Benzopyrine; Chinolein; 1-Azanephtalene; Leucol
R001	Resorcinol	1,3-Benzenediol; <i>m</i> -dihydroxybenzene; Benzene-1,3-diol; Resorcinol; 1,3-Dihydroxybenzene; <i>m</i> -Dihydroxybenzene
R002	Rhodinol	<i>l</i> -Citronellol; 3,7-dimethyl-6-octen-1-ol; 3,7-Dimethyl-7-octen-1-ol; α -Citronellol; 2,6-Dimethyl-1-octen-8-ol
R003	Rhodinyl acetate	Rhodinyl ethanoate; 3,7-Dimethyl-7-octen-1-yl ethanoate; 3,7-Dimethyl-7-octen-1-yl acetate; α -Citronellyl acetate
R004	Rhodinyl butyrate	3,7-Dimethyl-6 or 7-octen-1-yl butanoate; Citronellyl butyrate
R005	Rhodinyl formate	3,7-Dimethyl-6 or 7-octen-1-yl formate; Rhodinyl methanoate; 3,7-Dimethyl-6 or 7-octen-1-yl methanoate; Citrinellyl formate; α -Citronellyl formate
R006	Rhodinyl isobutyrate	Rhodinyl 2-methylpropanoate; 3,7-dimethyl-6 or 7-octen-1-yl 2-methylpropanoate; 3,7-dimethyl-6 or 7-octen-1-yl isobutyrate; Citronellyl isobutyrate
R007	Rhodinyl isovalerate	Rhodinyl isovalerianate; 3,7-Dimethyl-6 or 7-octen-1-yl isovalerate; Rhodinyl

Order	General Name	Synonyms
		3-methylbutanoate; Rhodinyl isopentanoate; 3,7-Dimethyl-6 or 7-octen-1-yl 3-methylbutanoate; Citronellyl isovalerate; rhodinyl- β -methylbutyrate; 3,7-dimethyl-7-octen-1-yl isopentanoate; Rhodinyl isopentanoate; α -Citronellyl isopentanoate
R008	Rhodinyl phenylacetate	3,7-Dimethyl-6 or 7-octen-1-yl phenylacetate; Citronellyl phenylacetate; rhodinyl α -toluate; 3,7-Dimethyloct-7-enyl 2-phenylacetate; α -Citronellyl phenylacetate
R009	Rhodinyl propionate	3,7-Dimethyl-7-octen-1-yl propanoate; rhodinyl propanoate; 3,7-dimethyl-7-octen-1-yl propionate; Citronellyl propionate; α -Citronellyl propionate
R010	Rum ether	Ethyl oxyhydrate
S001	Salicylaldehyde	Salicylal; 2-Hydroxybenzaldehyde; o-Hydroxybenzaldehyde; Salicylic aldehyde
S002	Santalol (α and β)	12- β -Santalen-14-ol; Argeol; arheol; d- α -santalol; l- β -santalol; 2-Methyl-5-(2,3-dimethyltricyclo[2.2.1.0(2.6)]hept-3-yl)pent-2-en-1-ol and 2-methyl-5-(2-methyl-3-methylenebicyclo[2.2.1]hept-2-yl)pent-2-en-1-ol; β -Santalol; 12- α -Santalen-14-ol
S003	Santalyl acetate (α and β)	α -Santaalol, acetate; β -Santalol, acetate; 2-Methyl-5-(2,3-dimethyltricyclo[2.2.1.0(2.6)]hept-3-yl)pent-2-enyl acetate and 2-methyl-5-(2-methyl-3-methylenebicyclo[2.2.1]hept-2-yl)pent-2-enyl acetate
S004	Santalyl phenylacetate (α and β)	β -Santalyl phenylacetate; α -santalyl phenylacetate; Santalyl α -toluate; α -Santalyl α -toluate; β -santalyl α -toluate; 5-(2,3-Dimethyltricyclo[2.2.1.0(2.6)]hept-3-yl)-2-methylpent-2-enyl phenylacetate and 2-methyl-5-(2-methyl-3-methylenebicyclo[2.2.1]hept-2-yl)pent-2-enyl phenylacetate
S005	Sclareolide	Decahydro tetramethylnaphtho-furanone; naphtho[2,1-b]furan-2(1H)-one,

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Order	General Name	Synonyms
		decahydro- 3a,6,6,9a-tetramethyl, [3aR-(3a,α,5a β,9a α,9b β]; norambrienolide; Decahydrotetramethylnaphtho[2,1b]furan-2(1H)one
S006	β-Sinensal	2,6-dimethyl-10-methylene-2,6,11-dodecatrienal
S007	Skatole	3-Methyl-4,5-benzopyrrole; 3-Methylindole; β-methylindole; 3-methyl(1H)indole; Skatole
S008	Sodium 2-(4-methoxyphenoxy)propanoate	Sodium 2-(4-methoxyphenoxy)propionate; Propanoic acid, 2-(4-methoxyphenoxy), sodium salt
S009	Sodium 3-mercaptopropionate	Sodium 3-mercapto-2-oxopropionate; Sodium mercaptopyruvate; Pyruvic acid, 3-mercapto-, Sodium salt; Sodium 3-mercapto-2-oxopropanote
S010	Sodium 3-methoxy-4-hydroxycinnamate	Sodium 3-(4-hydroxy-3-methoxyphenyl)propenoate; sodium ferulate
S011	Sodium 4-(methylthio)-2-oxobutanoate	4-(Methylthio)-2-oxobutyric acid; 4-(methylthio)-2-oxobutanoic acid; 4-(methylthio)-2- ketobutyric acid
S012	Sodium 4-methoxybenzoylacetate	
S013	Spiro[2,4-dithia-1-methyl-8-oxabicyclo(3.3.0)octane-3,3'-(1'-oxa-2'-methyl)-cyclopentane]	spiro(2,4-Dithia-1-methyl-8-oxa-bicyclo[3.3.0]octane-3,3'-(1'-oxa-2'-methyl)-cyclopentane) and spiro(Dithia-6-methyl-7-oxa-bicyclo[3.3.0]octane-3,3'-(1'-oxa- 2-methyl)-cyclopentane); hexahydro-2',3a-dimethylspiro[1,3]dithiolo(4,5-b)furan-2 ,3'(2'h)furan; Spiro [dithia-6-methyl-7-oxabicyclo [3.3.0] octane-3,3-α-(1-α- oxa-2-methyl)- cyclopentane] (isomere component)
S014	Styrene	Vinylbenzol; Phenylethene; Vinylbenzene; Styrol; Phenylethylene
S015	Sucrose octaacetate	Octoacetyl sucrose; Octaacetyl sucrose
S016	α-Santalene	Tricyclo[2.2.1.0(2,6)]heptane, 1,7-dimethyl-7-(4-methyl-3-pentenyl)-, (-)-; (-)-α-Santalene; Santalen; Santalene
S017	Sclareol	1-Naphthalenepropanol,

Order	General Name	Synonyms
		α -ethenyldecahydro-2-hydroxy- α ,2,5,5,8a-pentamethyl-, [1r-[1 α (r*),2 β ,4 α β ,8 α]]-; Labd-14-ene-8,13-diol, (13R)-; 1-(3-Hydroxy-3-methyl-4-pentenyl)-2,5,5,8a-tetramethyldecahydro-2-napht halenol
S018	Sabinene	4(10)-Thujene; Sabinen; (+)-Sabinene; 1-Isopropyl-4-methylenebicyclo[3.1.0]hexane; 1-isopropyl-4-methylenebicyclo[3.1.0]hexane (sabinene); 4-thujene; Sabinene (β -Thujene);Sabenene;Bicyclo[3.1.0]hexane, 4-methylene-1-(1-methylethyl)-
S019	Styryl acetate	
S020	Stearic acid	Octadecanoic acid
T001	α -Terpinene	Terpinene; 1-Methyl-4-propyl(iso)-1,3-cyclohexadiene; p-Menthadiene-1,3; 1,3-p- menthadiene; 1-Methyl-4-isopropyl-1, 3-cyclohexadiene; 1-Methyl-4- isopropylcyclohexadiene-1,3; p-Mentha-1,3-diene
T002	γ -Terpinene	1-Methyl-4-propyl(iso)-1,4-cyclohexadiene; p-mentha-1,4-diene; Crithmene; Moslene; 1,4-p-Menthadiene; 1-Methyl-4-isopropyl-1,4-cyclohexadiene
T003	α -Terpineol	1-p-Menthen-8-ol; Terpeneol schlechthin; α -terpilenol; 1-Methyl-4-proypl-iso-1- cyclohexen-8-ol; p-Menth-1-en-8-ol; 1-methyl-4-isopropyl-1-cyclohexen-8-ol; α -Terpineol; 1-Methyl-4-isopropyl-1-cyclohexen-8-ol; α -Terpilenol; α , α -4- trimethyl-3-cyclohexene-1-methanol
T004	Terpinolene	Tereben; Terpinene; p-Menth-1,4(8)-diene; 1-Methyl-4-isopropylidene-1-cyclohexene; 1,4(8)-terpadiene
T005	Terpinyl acetate	Methen1-1yl-8 acetate; menthen-1-yl-8-acetate; Terpeneol acetate; α -Terpinyl acetate; p-Menth-1-en-8-yl acetate; 3-Cyclohexene-1-methanol, α , α , 4-trimethyl, acetate; Terpeneol acetate
T006	Terpinyl anthranilate	α -Terpinyl anthranilate; p-mentha-1-en-8-yl 2-aminobenzoate; Terpinyl

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Order	General Name	Synonyms
		anthranilate; p-Menth-1-en-8-yl anthranilate; Terpinyl-2-aminobenzoate; Terpinyl-o-aminobenzoate
T007	Terpinyl butyrate	p-Menth-1-en-8-ol butyrate; p-Menth-1-en-8-yl butyrate
T008	Terpinyl cinnamate	p-Menth-1-en-8-yl 3-phenylpropenoate; p-Menth-1-en-8-yl cinnamate; Terpinyl β-phenacrylate; Terpinyl-3-phenyl propenoate; (Z)-1-methyl-1-(4-methyl-3- cyclohexen-1-yl) ethyl cinnamate
T009	Terpinyl formate	α-Terpinyl formate; p-Menth-1-en-8-yl formate
T010	Terpinyl isobutyrate	Terpinyl 2-methylpropionate; p-Menth-1-en-8-yl isobutyrate; 1-Methyl-1-(4-methylcyclohex-3-enyl)ethyl 2-methylpropionate
T011	Terpinyl isovalerate	Isopentanoate; p-Menth-1-en-8-yl 3-methylbutanoate; p-Menth-1-en-8-yl isopentanoate; Terpinyl isopentanoate; p-Menth-1-en-8-yl 3-methylbutyrate; p-Menth-1-en-8-yl isovalerate; p-Menth-1-en-8-yl-β-methylbutyrate; terpinyl isovalerianate
T012	Terpinyl propionate	Menthen-1-yl-8-ate; p-Menth-1-en-8-ol propionate; p-Menth-1-en-8-yl propanoate; p-Menth-1-en-8-yl propionate; p-Menthanyl propionate (mixed isomers)
T013	Tetradec-2-enal	
T014	delta-Tetradecalactone	4-Tetradecanolide; 6-Nonyltetrahydro-2-pyrone; Tetradeca-1,5-lactone; Tetradecano- 1,5-lactone; 5-Hydroxytetradecanoic acid lactone; 2H-pyran-2-one, tetrahydro-6- nonyl-
T015	(Z)-8-Tetradecenal	(Z)-Tetradec-8-enal
T016	Tetrahydro-4-methyl-2-(2-methylpropen-1-yl)pyran	Menthofuran (tetrahydro-4-methyl-2-(2-methyl-1-p); 2-(2-Methylprop-1-enyl)-4- methyltetrahydropyran; Tetrahydro-4-methyl-2-(2-methyl-1-propenyl)-(2H)pyran; Rosenoxid

Order	General Name	Synonyms
		inaktiv(Dragon); Rose oxide; Tetrahydro-4-methyl-2- (2-methylpropen-1-yl)pyran
T017	1,2,5,6-Tetrahydrocuminic acid	3-Cyclohexene-1-carboxylic acid, 4-(1-methylethyl)-, (±); 4-isopropyl-3-cyclohexene-1-carboxylic acid; 4-(1-Methylethyl)-3-cyclohexene-1-carboxylic acid; 1-(4-Isopropylcyclohex-3-enyl)carboxylic acid
T018	Tetrahydrofurfuryl acetate	Tetrahydro-2-furyl methylacetate
T019	Tetrahydrofurfuryl alcohol	Tetrahydro-2-furancarbinol; Tetrahydro-2-furanmethanol; Tetrahydro-2-furylmethanol
T020	Tetrahydrofurfuryl butyrate	Tetrahydrofurfuryl- <i>n</i> -butyrate; Tetrahydro-2-furylmethyl- <i>n</i> -butanoate
T021	Tetrahydrofurfuryl cinnamate	Tetrahydrofurfuryl 3-phenylpropenoate; Tetrahydro-2-furylmethyl 3-phenylpropenoate; tetrahydro-2-furylmethyl cinnamate; Cinnamic acid, tetrahydrofurfuryl ester
T022	Tetrahydrofurfuryl propionate	Tetrahydrofurfuryl propanoate; 2-Tetrahydrofurfurylmethyl propionate; Tetrahydro-2-furylmethylpropionate
T023	Tetrahydrolinalool	3,7-Dimethyloctan-3-ol; 3,7-dimethyloctanol-3; Tetrahydrolinalool; Tetrahydrolinalol; 1-Ethyl-1,5-dimethyl hexanol
T024	3,4,5,6-Tetrahydropseudoionone	Tetrahydro-pseudo-ionone; Tetrameran (IFF); Dihydrogeranyl acetone; 6,10-Dimethyl-9-undecen-2-one; 6,10-Dimethylundec-9-en-2-one
T025	Tetrahydro-pseudo-ionone	6,10-Dimethyl-9-undecen-2-one
T026	5,6,7,8-Tetrahydroquinoxaline	Cyclohexapyrazine; tetrahydroquinoxaline
T027	Tetramethyl ethylcyclohexenone (mixture of isomers)	Mixture of 5-ethyl-2,3,4,5-tetramethyl-2-cyclohexen-1-one and 5-ethyl-3,4,5,6-tetramethyl-2-cyclohexen-1-one
T028	1,5,5,9-Tetramethyl-13-oxatricyclo(8.3.0.0(4,9))tridecane	Ambroxan; ambrox; Dodecahydro-3a,6,6,9a-tetramethylnaphtho (2,1-b) furan;

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Order	General Name	Synonyms
		Dodecahydro-3a,6,6,9a-tetramethylnaphto (2,1-b)furan; Tetramethyl-perhydronaphtofuran
T029	2,3,5,6-Tetramethylpyrazine	Tetramethylpyrazine; Tetramethyl-1,4-diazine
T030	Theaspirane	Spirooxide; 1-Oxaspiro[4,5]dec-6-ene, 2,6,10,10-tetramethyl-; 1-Oxaspiro-2,6,10,10- tetra-methyl[4,5]dec-6-ene; 2,6,10,10-tetramethyl-1-oxaspiro(4,5)dec-6-ene
T031	Thiamine hydrochloride	Vitamin b1 hydrochloride; 3-((4-Amino-2-methyl-5-pyrimidinyl)methyl)-5-(2- hydroxy-ethyl)-4-methylthiazolium chloride, Aneurine hydrochoride; Thiamine; Vitamin B1
T032	Thiazole	
T033	2-Thienyl disulfide	2,2'-Dithiodithiophene; 2,2-α-Dithiodithiophene
T034	2-Thienylmercaptan	2-Mercaptothiophene; 2-thienylthiol; thiophene-2-thiol; 2-Thionyl mercaptan; 2-Thiophenethiol
T035	Thioacetic acid	Ethanethioic acid; Thiolacetic acid; Acetothioic acid
T036	2,2'-(Thiodimethylene)difuran	Difurfuryl monosulfide; 2-Furfuryl monosulfide; Difurfuryl sulfide; bis(2-furfuryl)sulfide; 2-Furfuryl monosulfide; 2,2'-(Thiodimethylene)-difuran; 2-Furfuryl monosulphide; Difurfuryl monosulphide;
T037	Thiogeraniol	3,7-Dimethyl-2(trans),6-octadien-1-thiol, 3,7-Dimethyl-2,6-octadien-1-yl mercaptan; 3,7-Dimethyl-2,6-octadien-1-thiol; 2,6-octadiene-1-thiol, 3,7-dimethyl-, (E)-
T038	4-Thujanol	Sabina hydrate; Sabinene hydrate; 2-Methyl-5-(1-methylethyl)bicyclo[3.1.0]hexan-2-ol; Thujan-4-ol

Order	General Name	Synonyms
T039	Thujyl alcohol	Bicyclo[3.1.0]hexan-3-ol, 4-methyl-1-(1-methylethyl)-, (1S,3S,4R,5R)-; 3-Thujanol, (1S,3S,4R,5R)-(-)-; Bicyclo[3.1.0]hexan-3-ol, 4-methyl-1-(1-methylethyl)-, [1S-(1.a., 3.a.,4.a.,5.a.)]-; (-)-3-neoisothujanol; (-)-Thujol; 3-neoIsothujanol, (-)-; thijol, (-)-
T040	Thymol	5-Methyl-2-isopropylphenol; 2-Isopropyl-5-methylphenol; α -Cymophenol; 6-isopropyl-m-cresol; 5-Methyl-2(1-methylethyl)phenol; 3-p-Cymenol; 3-Hydroxy-p-cymene; p-Isopropyl-m-cresol; 1-Methyl-3-hydroxy-4-isopropylbenzene; 3-Methyl-6-isopropylphenol; Thyme camphor; m-Thymol
T041	Tolualdehyde glyceryl acetal	2-(<i>o</i> -, <i>m</i> -, <i>p</i> -Cresyl)-5-hydroxydoixan; 2-(<i>o</i> -, <i>m</i> -, <i>p</i> -cresyl)-5-hydroxymethyldioxolan; 2-(methylphenyl)-1,3-dioxan-5-ol, mixed <i>o</i> -, <i>m</i> -, <i>p</i> - tolyl glycerin; 2-(2,3 and 4-methylphenyl)-5-hydroxy-1,3-dioxane and 2-(2,3 and 4-methylphenyl)-5-phdroxymethyl-1,3-dioxolane (mixture), Tolyl glycerin; 2-(<i>o</i> , <i>m</i> , <i>p</i> -cresyl)-5-hydroxy dioxane and 2-(<i>o</i> , <i>m</i> , <i>p</i> -cresyl)-5-hydroxymethyldioxolane mixture; 2-(<i>o</i> , <i>m</i> , <i>p</i> -cresyl)-4-hydroxymethyldioxolane; 2-5-hydroxymethyldioxolane
T042	Tolualdehydes (mixed <i>o</i> , <i>m</i> , <i>p</i>)	Mixture of <i>o</i> -methylbenzaldehyde and <i>m</i> -methylbenzaldehyde and <i>p</i> -methylbenzaldehyde, Toluic aldehyde (mixed <i>o</i> , <i>m</i> , <i>p</i>); Tolyl aldehyde (mixed <i>o</i> , <i>m</i> , <i>p</i>); methylbenzaldehyde(mixed 2,3,4); Toluic aldehyde(mixed 2,3,4)
T043	<i>o</i> -Toluenethiol	2-Methylthiophenol; <i>o</i> -tolylmercaptan; 2-Methylbenzene-1-thiol; 2-Methylbenzenethiol
T044	2-(<i>p</i> -Tolyl)propionaldehyde	<i>p</i> -methyl- α -Methylphenylacetaldehyde; <i>p</i> -Methylhydratropaldehyde
T045	<i>p</i> -Tolyl 3-methylbutyrate	<i>p</i> -Tolyl isovalerate; <i>p</i> -cresyl 3-methylbutanoate; <i>p</i> -Methylphenyl 3-methylbutyrate; 4-Methylphenyl isovalerate; <i>p</i> -Cresyl isovalerate; <i>p</i> -Tolyl isovalerate; <i>p</i> -Cresyl isopentanoate; 4-Methylphenyl 3-methylbutyrate

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Order	General Name	Synonyms
T046	<i>o</i> -Tolyl acetate	2-Methylphenyl acetate; <i>o</i> -Cresol acetate; Acetyl <i>o</i> -cresol; <i>o</i> -Cresyl acetate; α -Cresylic acetate
T047	<i>p</i> -Tolyl acetate	<i>p</i> -Cresylic acetate; <i>p</i> -tolyl ethanoate; Acetyl- <i>p</i> -cresol; <i>p</i> -cresyl acetate; <i>p</i> -methylphenyl acetate; cresyl acetate para(Givaudan Roure); <i>p</i> -Cresyl acetate; 4-methylbenzoic acid methyl ester; Acetyl <i>p</i> -Cresol
T048	<i>p</i> -Tolyl isobutyrate	<i>p</i> -Tolyl 2-methylpropanoate; <i>p</i> -Methylphenyl isobutyrate; <i>p</i> -Methylphenyl 2-methylpropanoate; <i>p</i> -Cresyl isobutyrate
T049	<i>o</i> -Tolyl isobutyrate	<i>o</i> -Cresyl isobutyrate; 2-Methylphenyl 2-methylpropanoate; Propanoic acid, 2-Methyl-, 2-methylphenyl ester; <i>o</i> -Tolyl 2-methylpropanoate
T050	<i>p</i> -Tolyl laurate	<i>p</i> -Methylphenyl dodecanoate; <i>p</i> -Cresyl dodecanoate; <i>p</i> -Cresyl laurate; <i>p</i> -Tolyl dodecanoate; <i>p</i> -Tolyl dodecylate
T051	<i>p</i> -Tolyl octanoate	<i>p</i> -Cresyl caprylate; <i>p</i> -Cresyl octanoate; <i>p</i> -Methylphenyl octanoate; Octanoic acid, 4-methylphenyl ester, <i>p</i> -Tolyl caprylate
T052	<i>p</i> -Tolyl phenylacetate	<i>p</i> -Methylphenyl phenylacetate; narcissin; <i>p</i> -Cresyl phenylacetate; <i>p</i> -tolyl α -toluate; <i>p</i> -Cresyl α -toluate; <i>p</i> -Methylphenyl α -toluate
T053	<i>o</i> -Tolyl salicylate	Benzoic acid, 2-hydroxy-, 2-methylphenyl ester, <i>o</i> -cesyl salicylate; 2-Methylphenyl 2-hydroxybenzoate
T054	4-(<i>p</i> -Tolyl)-2-butanone	<i>p</i> -Methylbenzylacetone; 4-(4-Methylphenyl)-2-butanone
T055	<i>p</i> -Tolylacetaldehyde	<i>p</i> -Methyl phenylacetaldehyde; Syringa aldehyde; (4-Methylphenyl)acetaldehyde
T056	Tributyl acetylcitrate	Acetyl tributylcitrate; Tributyl 2-acetox-1,2,3-propanetricarboxylate
T057	Tributylin	Glyceryl tributyrinate; butylin; 1,2,3-tri(butyryloxy)propane; Tributyrin
T058	2-Tridecanone	Tridecan-2-one; Hendecyl methyl ketone; methyl undecyl ketone
T059	2-trans-4-cis-7-cis-Tridecatrienal	Trideca-2(trans),4(cis),7(cis)-trienal; 2,4,7-Tridecatrienal, (E,Z,Z)-;

Order	General Name	Synonyms
		Trideca-2,4,7-trienal
T060	2-Tridecenal	
T061	trans-2-Tridecenal	3-Decylacrolein; Tridec-2-enal; aldehyde C-13
T062	Triethyl citrate	Citric acid, triethyl ester; Ethyl citrate; 1,2,3-Propanetricarboxylic acid, 2-hydroxy-, triethyl ester; Triethyl 2-hydroxy-1,2,3-propane-tricarboxylate
T063	Triethylamine	Triethylamine; (Diethylamino)ethane; N,N-Diethylethanamine
T064	2,4,6-Triisobutyl-5,6-dihydro-4H-1,3,5-dithiazine	4H-1,3,5-Dithiazine, dihydro-2,4,6-tri(2-methylpropyl)-; Dihydro-2,4,6-triisobutyl-4h- 1,3,5-dithiazine
T065	3,3,5-Trimethyl cyclohexanol	Cyclonol; Homomenthol; 1-Methyl-3,3-dimethyl cyclohexan-5-ol; 3,3,5-Trimethylcyclohexan-1-ol
T066	2,6,6-Trimethyl-1&2-cyclohexen-1-carboxaldehyde	α,β -Cyclocitral (mixture); 2,6,6- Trimethylcyclohex-2-ene-1-carboxaldehyde; β - Cyclocitral
T067	2,2,4-Trimethyl-1,3-dioxacyclopentane	Acetone propylene glycol acetal; 2,2,4-Trimethyl-1,3-dioxolane; propylene glycol acetone ketal; Acetone propylene glycol ketal
T068	2,6,6-Trimethyl-1-cyclohexen-1-acetaldehyde	β -Homocyclocitral; 2,6,6- Trimethylcyclohex-1-en-1-acetaldehyde
T069	2,6,6-Trimethyl-1-cyclohexen-1-carboxaldehyde	2,6,6-Trimethyl-1 or 2-cyclohexen-1-carboxaldehyde; 2,6,6-Trimethyl-2-cyclohexene-1- carboxaldehyde; β -cyclocitral; cyclocitral
T070	3,5,5-Trimethyl-1-hexanol	3,5,5,-trimethylhexanol; Isononanol; Isononyl alcohol; tert-butyl isopentanol; Trimethyl hexyl alcohol
T071	2,6,10-Trimethyl-2,6,10-pentadecatrien-14-one	6,10,14-Trimethylpentadeca-5,9,13-trien-2-one; 6,10,14-Trimethyl-5,9,13-penta- decatrien-2-one; farnesyl acetone; 2,6,10-Trimethyl-2,6,10-pentadecatrien- 14-one
T072	3,7,11-Trimethyl-2,6-10-dodecatrienal	3,7,11-Trimethyl dodecatrien-2,6,10-al-1; Farnesal

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Order	General Name	Synonyms
T073	cis-1-(2,6,6-Trimethyl-2-cyclohexen-1-yl)but-2-en-1-one	cis- α -Damascone
T074	(+/-)-(2,6,6-Trimethyl-2-hydroxycyclohexylidene)acetic acid γ -lactone	(+/-)Dihydroactinidiolide-5,6,7,7a-Tetrahydro-4,4,7a-trimethyl-2(4H)benzofuranone
T075	1,3,3-Trimethyl-2-norbornanyl acetate	Fenchyl acetate; Fenchyl acetate
T076	2,6,6-Trimethyl-2-vinyltetrahydropyran	Bois de rose oxide; 2H-pyran, 2-ethenyltetrahydro-2,6,6-trimethyl-; Trimethyl-2,2,6-vinyl-6-tetrahydropyrane
T077	trans- and cis-2,4,8-Trimethyl-3,7-nonadien-2-ol	3,7-Nonadien-2-ol, 2,4,8-trimethyl- (2E,4Z)-; Cranberry extra
T078	2,3,4-Trimethyl-3-pentanol	Diisopropyl methyl carbinol
T079	(+/-)-2,4,8-Trimethyl-7-nonen-2-ol	7-Nonen-2-ol, 2,4,8-trimethyl-
T080	Trimethylamine	N,N-Dimethylmethanamine
T081	p- α , α -Trimethylbenzyl alcohol	2-p-Tolyl-2-propanol; 2-(4-Methylphenyl)-2-propanol; 8-Hydroxy-p-cymene; 2-(4-Methylphenyl)propan-2-ol; p-Cymen-8-ol; Dimethyl-p-tolylcarbinol; 2-(4-Methylphenyl)propan-2-ol
T082	2,6,6-Trimethylcyclohex-2-ene-1,4-dione	3,5,5-Trimethyl-2-cyclohexene-1,4-dione; 2-Cyclohexenedione-1,4,3,5,5-trimethyl-
T083	2,6,6-Trimethylcyclohexa-1,3-dienyl methanal	2,2,6-Trimethyl-1,3-cyclohexadien-1-carboxaldehyde; 2,2,6-trimethyl-4,6-cyclohexadien-1-carboxaldehyde; 1,1,3-Trimethyl-2-formylcyclohexa-2,4-diene; Dehydro β -cyclocitral; safranal; 2,6,6-Trimethylcyclohexa-1,3-diene-1-carbaldehyde; 2,3-Dihydro-2,2,6-trimethylbenzaldehyde; 2,6,6-Trimethyl-1,3-cyclohexadinal
T084	2,2,6-Trimethylcyclohexanone	Cyclohexanone, 2,2,6-trimethyl-
T085	2,2,3-Trimethylcyclopent-3-en-1-yl acetaldehyde	Acetaldehyde, (2,2,3-trimethylcyclopent-3-en-1-yl); Campholenic aldehyde;

Order	General Name	Synonyms
		(R)-2,2,3-trimethylcyclopent-3-ene-1-acetaldehyde; α -Campholenic aldehyde; (2,3,3-Trimethylcyclopent-3-en-1-yl-2)acetaldehyde
T086	2,4,5-Trimethyl-delta-3-oxazoline	2,4,5-Trimethyl-3-oxazoline; Oxazole, 2,5-dihydro-2,4,5-trimethyl-; 2,4,5-Trimethyl-2,5- dihydrooxazole; 3-Oxazoline, 2,4,5-trimethyl
T087	2,4,6-Trimethyldihydro-4H-1,3,5-dithiazine	4H-1,3,5-dithiazine, dihydro-2,4,6-trimethyl-(2a, 4a, 6a)-; 2,4,6-Trimethyldihydro-1,3,5-dithiazine; 2,4,6-Trimethylperhydro-1,3-dithiazine; 2,6-Dihydro-2,4,6-trimethyl-1,3,5-dithiazine; Dihydro-2,4,6-trimethyl-1,3,5(4H)dithiazine; Dihydro-2,4,6-trimethyl-4h-1,3,5-dithiazine, Thialdine
T088	3,7,11-Trimethyldodeca-2,6,10-trienyl acetate	Farnesol acetate; Farnesyl acetate
T089	3,5,5-Trimethylhexanal	Verdinal; Hexanal, 3,5,5-trimethyl; Vandor B; Isononylaldehyde; Tert-Butylisopentanal
T090	Trimethylamine oxide	Trimethylamine, N-oxide; N,N-Dimethylmethanamine N-oxide
T091	2,3,6-Trimethylphenol	3-Hydroxypseudocumene; Methyl xlenol-2,3,6; 3-Hydroxypseudocumene
T092	2,3,5-Trimethylpyrazine	Trimethylpyrazine; 2,3,5-Trimethyl-1,4-diazine
T093	2,4,5-Trimethylthiazole	
T094	Tripropylamine	N,N-Dipropyl-1-propanamine; Propyldi-n-propylamine; Tri-n-propylamine
T095	1,2,3-Tris([1'-ethoxy]-ethoxy)propane	3,5,9,11-Tetraoxatridecane, 7-(1-ethoxyethoxy)-4,10-dimethyl-; Acetaldehyde ethyl glyceryl mixed acetal
T096	2,4,6-Trithiaheptane	bis-(Methylthiomethyl)sulfi de
T097	2,3,5-Trithiahexane	Methyl(methylthio)methyl disulfide; (Methyldithio) (methylthio)methane; 2,4,5-

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Order	General Name	Synonyms
		Trithiahexane
T098	Trithioacetone	2,2,4,4,6,6-Hexamethyl-s-trithiane; 2,2,4,4,6,6-Hexanethyl-5-trithiane; 1,3,5-trithiane, 2,2,4,4,6,6-hexamethyl-; 2,2,4,4,6,6-Hexamethyl-1,3,5-trithiane
T099	Tuberosc lactone	2(3H)-Furanone, dihydro-5-(2,5-octadienyl)-; (Z,Z)-6,9-Dodecadien-4-olide, (z,z)-
T100	Tyramine	4-(2-Aminoethyl)phenol; 2-(4-Hydroxyphenyl) ethylamine; Systogene; Tocosine; Uteramine; Tyrosamine; p-β-Aminoethylphenol; 4-Hydroxyphenylethylamine; 4-Hydroxyphenethylamine; p-Hydroxyphenylethylamine; p-Hydroxyphenethylamine; Benzeneethanamine
T101	Thiophene-2-carbaldehyde	α-Formylthiophene; α-Thiophenecarboxaldehyde; 2-Formylthiophene; 2-Thienylaldehyde; 2-Thienylcarboxaldehyde; 2-Thiophenealdehyde; Thiophene-2-carboxaldehyde; Thiophene-2-aldehyde; 2-Thiophenecarbaldehyde; 2-Thiophenaldehyde; 2-thiophencarboxaldehyde; 2-thiophene carboxyaldehyde; 2-thiophenic aldehyde; thiophen-2-carboxaldehyde;2-Carboxaldehyde-thiophene;2-Thiophenecarboxaldeh yde
T102	2,4,6-Trimethylpyridine	α,γ,α'-Collidine; γ-Collidine; s-Collidine; 2,4,6-Collidine; sym-Collidine; 2,4,6-Kollidin; a,g,α'-Collidine; g-Collidine; Collidine;Pyridine, 2,4,6-trimethyl-
T103	Tetrahydrothiophene	Tetramethylene sulfide; Thiacyclopentane; Thilane; Thiolane; Thiophane; Tetramethylene sulphide; Thiolan Tetrahydrothiopen; Thiofan;Tetrahydrothiophen;Thiophene, tetrahydro-
T104	Thiophene	Thiacyclopentadiene; Thiofuran; Thiofuran; Thiofurfuran; Thiole; Thiotetrole; Divinylene sulfide;Furan, Thio-;Thiaphene;Thiofen
T105	Tetradecan-1-ol	n-Tetradecan-1-ol; n-Tetradecanol; n-Tetradecyl alcohol; Myristic alcohol; Myristyl alcohol; Tetradecyl alcohol; n-Tetradecanol-1;1-Hydroxytetradecane;

Order	General Name	Synonyms
		Myristyl alcohol; Tetradecanol-1; Tetradecanol; 1-Tetradecanol
T106	Triethoxymethane	Ethane, 1,1',1''-[methylidynetris(oxy)]tris-; Orthoformic acid, triethyl ester; Aethon; Ethone; Orthoformic acid ethyl ester; Triethyl orthoformate; Ethyl formate(ortho); 1-(Diethoxymethoxy)ethane; Triethoxmethane; Methane, triethoxy-; 1,1',1'-(Methylidynetris(oxy))tris(ethane); Triethyl ester of Orthoformic acid; Ethyl orthoformate
T107	1,2,4-Trithiolane	
T108	1,2,4,5-Tetrathiane	s-Tetrathiane; 1,2,4,5-Tetrathiacyclohexane
T109	6,10,14-Trimethylpentadecan-2-one	Hexahydrofarnesyl acetone; 6,10,14-Trimethyl-2-pentadecanone; 6,10,14-Trimethylpentadecan-2-one (hexahydrofarnesylacetone); 6,10,14-trimethylpentadecanone; 2-Pentadecanone, 6,10,14-trimethyl-
T110	1,7,7-Trimethyltricyclo[2.2.1.0.(2.6)]heptane	Tricyclo[2.2.1.0(2,6)]heptane, 1,7,7-trimethyl-; Tricyclene; 1,7,7-Trimethyltricyclo[2.2.1.0(sup2,6)]heptane; α-Tricyclene; 1,7,7-Trimethyl-tricyclo[2.2.1.0*2,6*]heptane; Tricyclo[2.2.1.02,6]heptane, 1,7,7-trimethyl-
T111	2,4,6-Trimethylphenol	Mesitol; 1-Hydroxy-2,4,6-trimethylbenzene; 2-Hydroxymesitylene; Mesityl alcohol; 2,4,6-Trimetylofenol; Phenol, 2,4,6-trimethyl-
T112	3,3,6-Trimethylhepta-1,5-dien-4-one	1,5-Heptadien-4-one, 3,3,6-trimethyl-; Isoartemesia ketone; 2,5,5-Trimethyl-2,6-heptadien-4-one; Artemesia; Hepta-1,5-dien-4-one, 3,3,6-trimethyl; Artemesia ketone; 3,3,6-Trimethyl-1,5-heptadien-4-one
T113	Tetradecane	n-Tetradecane
T114	1,2,3-Trimethoxybenzene	Methylsyringol; Pyrogallol trimethyl ether; Tri-O-methylpyrogallol; Benzene, 1,2,3-trimethoxy-
T115	Tridecanoic acid	n-Tridecanoic acid; n-Tridecoic acid; Tridecylic acid
T116	3,3,5-Trimethylcyclohexan-1-one	Dihydroisophorone; 3,5,5-Triethylcyclohexanone;

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Order	General Name	Synonyms
		3,3,5-trimethyl-cyclohexanone; Cyclohexanone, 3,3,5-trimethyl-; 3,3,5-Trimethylcyclohexanone
T117	Tetradecan-2-one	2-Tetradecanone
T118	1,1,3-Triethoxypropane	β-Ethoxypropionaldehyde diethyl acetal; 3-Ethoxypropionaldehyde diethyl acetal; Propionaldehyde, 3-ethoxy-, diethyl acetal; Propane, 1,3,3-triethoxy-; 1,3,3-Triethoxypropane; Propane, 1,1,3-triethoxy-
T119	Tridecanal	n-Tridecylaldehyde; Tridecanaldehyde; Tridecyl aldehyde; 1-Tridecanal; Tridecane aldehyde; n-Tridecanal
T120	α-Terpinyl methyl ether	
T121	1,1'-(Tetrahydro-6a-hydroxy-2,3a,5-trimethylfuro[2,3-d]-1,3-dioxole-2,5-diyl)bis-ethanone	Diacetyl trimer; Furo[2,3-d]-1,3-dioxol-6a(3aH)-ol, 2,5-diacetyldihydro-2,3a,5-trimethyl-; Furo[2,3-d]-1,3-dioxole, ethanone derivative 2,3-Butanedione trimer; 2,5-Diacetyl-3a,5,6,6a-tetrahydro-6a-hydroxy-2,3a,5-trimethylfuro[2,3-d]-1,3-dioxole; Biacetyl trimer
T122	2,6,6-Trimethylcyclohex-2-en-1-one	2,6,6-trimethyl-2-cyclohexenone; 2,6,6-Trimethylcyclohex-2-enone; 2-Cyclohexen-1-one, 2,6,6-trimethyl-; 5-Cyclohexen-1-one, 2,2,6-trimethyl; 2,6,6-Trimethyl-2-cyclohexen-1-one
T123	Trimethyloxazole	2,4,5-Trimethyloxazole; 2,4,5-Trimethyl-1,3-oxazole; Oxazole, 2,4,5-trimethyl; Oxazole, trimethyl-
T124	4-(2,3,6-Trimethylphenyl)but-3-en-2-one	
T125	[S-(cis)]-3,7,11-Trimethyl-1,6,10-dodecatrien-3-ol	1,6,10-Dodecatrien-3-ol, 3,7,11-trimethyl-, (Z)-(S)-(+) -; (+)-Nerolidol; D-nerolidol; Nerolidol; Nerolidol, cis-(+) -; Peruviol; 3,7,11-Trimethyl-1,6,10-dodecatriene-3-ol, Z-; (6Z)-3,7,11-Trimethyl-1,6,10-dodecatrien-3-ol; (Z)-Nerolidol; 1,6,10-Dodecatrien-3-ol, 3,7,11-trimethyl-, [S-(Z)] -
U001	2,4-undecadienal	tr-2, tr-4-Undecadienal
U002	2,3-Undecadione	Acetyl nonanoyl; Acetyl nonyryl; Acetyl pelargonyl; Acetyl nonanyl

Order	General Name	Synonyms
U003	γ -Undecalactone *	4-Undecanolide; 5-heptyldihydro-2(3H)-furanone; Aldehyde c-14 pure; undeca-1,4- lactone; γ -Undecyl lactone; 4-Hydroxyundecanoic acid, γ -lactone; 1,4-Hendecanolide; 4-n-heptyl-4-Hydroxybutanoic acid lactone; 4-Hydroxyundecanoic acid lactone; γ -n-Heptyl- γ -butyrolactone; Undecano-1,4-lactone; γ -Heptyl butyrolactone; 4-Hydroxyundecanoic acid, γ -lactone; Peach aldehyde; undecanolide- 1,4; aldehyde C?14; γ -Undecalactone; γ -Heptyl butyrolactone
U004	Undecanal	Aaldehyde C-11(saturated); hendecanal; α -Oxo-undecane; n-Undecylic aldehyde; Undecylenic; Undecylic aldehyde; Aldehyde C-11 undecylic; Undecanoic aldehyde; n-Undecylaldehyde; Undecan-1-al
U005	Undecanoic acid	n-Undecoic acid; n-Undecylic acid; Decane- α -carboxylic acid; Hendecanoic acid
U006	2-Undecanol	sec-Undecylic alcohol; Methyl nonyl carbinol; 2-Hendecanol; sec-Undecyl alcohol
U007	2-Undecanone	2-Hendecanone; 2-oxoundecane; Nonyl methyl ketone; Rue ketone; Methyl nonyl ketone; Undecanone
U008	6-Undecanone	Undecan-6-one, Diamyl ketone; Dipentyl ketone
U009	1,3,5-Undecatriene	Undeca-1,3,5-triene; Galbanolene; Galbanolene super
U010	2-Undecen-1-ol	1-Hydroxy-2-undecene; trans-2-Undecenol
U011	Undecen-1-ol	Undecylenic alcohol
U012	10-Undecen-1-yl acetate	Acetate C-11; 10-hendecenyl acetate; Undecenyl acetate; Undecelynic acetate; Undec-10-enyl acetate
U013	9-Undecenal	Aldehyde C-11 undecylenic; Hendecen-9-al; Undecenoic aldehyde; Undecylenic aldehyde; 10-Hendecenal; 9-Undecylenic aldehyde
U014	10-Undecenal	Acetate C-11 undecylenic; Hendecenal; Undecylenic aldehyde; 10-Hendecenal;

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Order	General Name	Synonyms
		Undecylenic aldehyde (mixed isomers); Undecenal; Intreleven aldehyde; Aldehyde C-11
U015	2-Undecenal	2-Undecen-1-al; Undecen-2-al; 3-Octylacrolein
U016	Undecenal	
U017	10-Undecenoic acid	10-Hendecenoic acid; Undecylenic acid
U018	Undecyl alcohol	Alcohol C-11; Hendecanol; 1-Undecanol; Alcohol c-11 undecylic; Decyl carbinol; 1-Hendecanol; Undecan-1-ol
U019	Undecyl acetate	n-undecyl acetate; 1-Undecanol, acetate
U020	10-Undecen-2-one	undecenone
U021	Undecanal propylene glycol acetal	
V001	Valencene	1,2,3,5,6,7,8,8a-Octahydro-1,8a-dimethyl-7-(1-methylethenyl)-naphthalene; 1,2,3,5,6,7,8a-Octahydro-1,8a-dimethyl-7-isopropenyl naphthalene
V002	Valeraldehyde	n-valeraldehyde; Pentanal; Amylaldehyde; n-Pentanal; Valeral; n-Valeric aldehyde; Valeric aldehyde; Pentan-1-al; Aldehyde c-5
V003	Valeric acid	Valerianic acid; Pentanoic acid; Propylacetic acid; 1-Butanecarboxylic acid
V004	γ -Valerolactone	4-pentanolide; 5-Methyldihydro-2(3H)-furanone; penta-1,4-lactone; 3-Valerolantone; 3-methylbutyrolactone; γ -Methyl- γ -butyrolactone; Pentano-1,4-lactone; 2(3H)-Furanone, dihydro-5-methyl-; 4-Hydroxypentanoic acid, γ -lactone; γ -Methyl- γ -butyrolactone; 4-Methyl-4-hydroxybutanoic acid lactone; Pentanolide-1,4; 4-Valerolactone; γ -valeryllactone; 4-Hydroxypentanoic acid lactone; γ -Pentalactone
V005	Vanillin *	Vanillic aldehyde; 3-methoxy-4-hydroxybenzaldehyde; Vanillaldehyde; 4-Hydroxy-3-methoxybenzaldehyde; methyl protocatechuic aldehyde; Protocatechualdehyde-3-methylether

Order	General Name	Synonyms
V006	Vanillin 3-(1-menthoxy)propane-1,2-diol acetal	4-(1-Menthoxymethyl)-2-(3-methoxy-4-hydroxyphenyl)-1,3-dioxolane; 4-[2-(Methylethyl)-5-methylcyclohexyloxy]-2,5-dioxolanyl-2-methoxyphenol
V007	Vanillin erythro- and threo-butan-2,3-diol acetal	2-(4-Hydroxy-3-methoxyphenyl)-4,5-dimethyl-1,3-dioxolane, 4-(4,5-dimethyl-1,3-dioxolan-2-yl)-2-methoxyphenol
V008	Vanillin isobutyrate	Isobutavan; m-Anisaldehyde, 4-hydroxy, 2-methyl propionate; Benzaldehyde, 4-hydroxy, 3-methoxy, 2-methylpropanoate; 4-Formyl-2-methoxy-phenyl 2-methylpropanoate; isobutyric acid, ester with vanillin; 3-Methoxy-4- isobutyrylbenzaldehyde; Propanoic acid, 2-methyl, 4-formyl-2-methoxyphenyl ester; 4-Hydroxy-3-methoxybenzaldehyde; 4-Hydroxy-m-anisaldehyde 2-methyl propionate; anillyl isobutyrate; 4-Isobutyryl-m-anisaldehyde
V009	Vanillin propylene glycol acetal	2-(3-methoxy-4-hydroxyphenyl)-4-methyl-1,3-dioxolane; 2-Methoxy-4-(4-methyl-1,3-dioxolan-2-yl)phenol; 4-Methyl-2-(4-hydroxy-3-methoxyphenyl)-1,3-dioxolane
V010	Vanillyl acetate	Acetyl vanillin; 3-Methoxy-4-acetoxy benzaldehyde; 4-Acetoxy-3-methoxy- benzaldehyde; Benzaldehyde, 4-(acetyloxy)-3-methoxy-; Vanillin acetate
V011	Vanillyl alcohol	Benzenemethanol, 4-hydroxy-3-methoxy-; 4-Hydroxy-3-methoxybenzyl alcohol; 4-hydroxy-3-methoxyphenylmethanol
V012	Vanillyl butyl ether	4-(Butoxymethyl)-2-methoxyphenol; Phenol, 4-(butoxymethyl)-2-methoxy-; Butyl vanillyl ether; 2-methoxy-4-(butoxymethyl)phenol
V013	Vanillyl ethyl ether	4-(Ethoxymethyl)-2-methoxyphenol, Vee; Ethyl 4-hydroxy-3-methoxybenzyl ether
V014	Vanillylidene acetone	3-Buten-2-one, 4-(4-hydroxy-3-methoxyphenyl)-; 4-(4-Hydroxy-3-methoxyphenyl)but-3-en-2-one; Methyl

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Order	General Name	Synonyms
V015	Veratraldehyde	3-methoxy-4-hydroxystyryl ketone; Dihydrozingerone Dimethyl ether protocatechualdehyde; Veratric aldehyde; 3,4-Dimethoxybenzaldehyde; 3,4-Dimethoxybenzenecarbonal; Methyl vanillin; Protocatechualdehyde dimethylether; Vanillin methyl ether; O-Methyl vanillin; p-Veratric aldehyde
V016	Verbenol	Bicyclo[3,1,1]hept-2-en-2-ol, 4,6,6-trimethyl-; 4-Hydroxy-2,6,6-trimethylbicyclo(3,1,1)- hept-2-ene; 2-Pinen-4-ol; <i>d</i> -Verbenol; Pin-2-en-4-ol; 2-Pinenol-4; 2-pinen-4-ol
V017	Verbenone	Pin-2-en-4-one; 4,6,6-Trimethyl-bicyclo[3.1.1]hept-3-en-2-one; Bicyclo[3.1.1]hept-3- en-2-one, 4,6,6-trimethyl-
V018	Vetiverol	Vetivenol; Vetiverol; Lignolia; Khusimol; Octahydro-7,7-dimethyl-8-methylene-1H, 3A, 6-methanoazulene-3-methanol; 6-Azulenol, 1,2,3,3a,4,5,6,8a-octahydro-4,8- dimethyl-2-(1-methylethylidene)-; Vetivol
V019	Vetiveryl acetate	Vetacetyl; Vetacetia; Acetivenol; 6-Azulenol, 1,2,3,3a,4,5,6,8a-octahydro-4,8- dimethyl-2-(1-methylethylidene)-, acetate; Vetiver acetate; Vetivert acetate
V020	o-Vinyl anisole	1-Methoxy-2-vinylbenzene; 2-Methoxystyrene; o-Methoxystyrene
V021	p-Vinylphenol	4-Vinylphenol; 4-Ethenylphenol; 4-Hydroxystyrene; phenol, 4-ethenyl-
V022	Viridiflorol	1H-Cycloprop[e]azulen-4-ol, decahydro-1,1,4,7-tetramethyl-, [1ar-(1aa,4β,4aβ,7a,7aβ,7ba)]-; 1,1,4,7-Tetramethyldecahydro-1H-cyclopropa[e]azulen-4-ol;Viridflorol
V023	Valeraldehyde dibutyl acetal	1,3-Dioxolane, 2-butyl-4-methyl-; 2-Butyl-4-methyl-1,3-dioxolane;
V024	Valeraldehyde propylene glycol acetal	1,3-Dioxolane, 2-butyl-4-methyl, trans; 1,3-Dioxolane, 4-methyl-2-butyl;1,3-Dioxolane, 2-butyl-4-methyl, cis

Order	General Name	Synonyms
X001	2,6-Xylenol	2-Hydroxy-1,3-dimethylbenzene; 2,6-Dimethylphenol
X002	2,5-Xylenol	2,5-Dimethylpheno, 1-hydroxy-2,5-dimethylbenzene; phenol, 2,5-dimethyl-; 2,5- Dimethylphenol
X003	3,4-Xylenol	3,4-Dimethylphenol; 1-Hydroxy-3,4-dimethylbenzene; Phenol, 3,4-dimethyl-
Z001	Zingerone	4-(4-Hydroxy-3-methoxyphenyl)-2-butanone; 2-(4-Hydroxy-3-methoxyphenyl) ethyl methyl ketone; 4-Hydroxy-3-methoxy benzylacetone; (4-Hydroxy-3-methoxy- phenylethyl)methyl ketone; 3-Methoxy-4-hydroxy benzylacetone; 4-(3-Methoxy- 4-hydroxyphenyl)-2-butanone; Vanillyl acetone; 2-Ethyl methyl ketone; 3-Methoxy-4-methoxybenzylacetone

As the items listed individually in 3. Specifications and Standards, A. synthetic additives, these specifications and standards are followed the specification and standard of individual item.

425. Ozone Water

Definition Ozone water is obtained by dissolving ozone gas generated from an ozone apparatus and main ingredient is ozone.

Compositional Specifications of Ozone water

Content When Ozone water is quantified, it should not be less than Ozone (O₃) 1.0mg/l.

Description Ozone water is colorless liquid with characteristic scent.

Identification 20 ml each of alizarin solution is taken to 200 ml of two flasks respectively. To the first flask, water without ozone is taken to make 200 ml, blank test solution. To another flask, a sample is taken from the below of alizarin solution using pipette or long-neck funnel to prevent the loss of ozone and the total becomes 200 ml, test solution. Immediately, measure absorbances of each solution at wavelengths of 548 nm, respectively, using 1 cm cell for analysis. When the absorption of test solution is lower than the absorption of blank test solution, ozone exists in sample.

Alizarin solution : 124.5mg of alizarin violet 3R is precisely weighed into a 1,000ml/ flask, 500ml of water is added and dissolved. Set aside for 24 hours. Then 20mg of sodium hexametaphosphate, 48.5g of ammonium chloride, 6.2ml of ammonium hydroxide (corresponds to 1.6 g of NH₃) are weighed, water is added to make 1,000 ml and set aside for 24 hours. The absorption of ten times diluted solution of this solution at 548nm is 0.155, and the pH is 8.1~8.5

Assay 10 ml each of indigo solution is taken to 50 ml of two flasks respectively. To the first flask, water without ozone is taken to make 15 ml, blank test solution. To another flask, a 5 ml sample is gradually taken along the inner wall of flask using pipette or long-neck funnel to prevent the loss of ozone and the total becomes 15 ml, test solution. Immediately, measure absorbances of each solution at wavelengths of 600 nm, respectively, using 1 cm cell. Measure the concentration of ozone in sample under following equation.(However, when chlorine exists, 1 ml of malonic acid is added before taking samples to each flask and proceed test in the same manner to correct the influence by interference).

$$\text{content of ozone (mg/l)} = 15\text{ml} \times D / (f \times b \times V)$$

D: Absorbance difference between test solution and blank test solution

b: Path length (cm)

V: Weight of sample(5ml)

f: 0.42(extinction coefficient of ozone)

Indigo undiluted standard solution : 0.770 g of potassium indigotrisulfonate) is weighed and dissolved in 500 ml of water, 1 ml of phosphate is added, mixed and make 1,000 ml with water.

Indigo test solution : 100ml/ of Indigo undiluted standard solution, 10 g of sodium phosphate, monobasic, 7ml/ of phosphate, water are added to make 1,000 ml and mixed.

Malonic acid solution : Water is added to 5 g of malonic acid to make 100 ml.

426. Hypochlorous Acid Water

Definition Hypochlorous Acid Water is obtained by electrolysis of hydrochloric acid or saline solution and main ingredient is Hypochlorous Acid. Strongly acidic hypochlorous acid water (aqueous solution obtained from both poles by electrolyzing sodium chloride (not more than 0.2%) in an electrolytic bath with septum composed of anode and cathode, which are separated by septum) and slightly acidic hypochlorous acid water (aqueous solution obtained by electrolyzing 2~6% hydrochloric acid water in an aseptate electrolytic bath composed of anode and cathode, which are not separated by septum) are included in this material.

Compositional Specifications of Hypochlorous Acid Water

Content When Hypochlorous Acid Water is quantified, strongly acidic Hypochlorous Acid Water should contain 20~60 ppm of active chlorine and slightly acidic Hypochlorous Acid Water should contain 10~30 ppm of active chlorine.

Description Hypochlorous Acid Water is colorless, odorless or with slight odor of chlorine.

Identification (1) To 5 ml of Hypochlorous Acid Water, 1 ml of sodium hydroxide(1→2,500) and 0.2 ml of potassium iodide are added, then yellow color develops. When 0.5 ml of starch solution is added to this solution, blue color develops.
(2) To 5 ml of Hypochlorous Acid Water, 0.1 ml of potassium permanganate solution(1→300) and 1 ml of sulfuric acid(1→20) is added, then red violet color doesn't fade.
(3) To 90 ml of Hypochlorous Acid Water, 100 ml of sodium hydroxide(1→5) is added, then the solution exhibits an absorption maximum at a wavelength of 290~294 nm.

Purity (1) pH : When pH is determined by glass electrode method, not more than 2.7 for strongly acidic Hypochlorous Acid Water, and 5.0~6.5 for slightly acidic Hypochlorous Acid Water.

(2) Residue on Evaporation : When 20.0g of Hypochlorous Acid Water is dried for 2 hours at 110°C after water is evaporated, the residue should not be more than 0.25%.

Assay (1) Strongly acidic Hypochlorous Acid Water : 200 g of Hypochlorous Acid Water is precisely weighed, 2 g of potassium iodide and 10 ml of acetic acid(1→4) are added, immediately place with a stopper, and set aside in a dark place for 15 minutes. Titrate the liberated iodine with 0.01 M sodium thiosulfate (indicator : starch solution). Separately, a blank experiment is done in the same manner.

1 ml of 0.01M sodium thiosulfate solution = 0.35453mg Cl

(2) Slightly acidic Hypochlorous Acid Water : 200 g of Hypochlorous Acid Water is precisely weighed, 2 g of potassium iodide and 10 ml of acetic acid(1→4) are added, immediately place with a stopper, and set aside in a dark place for 15 minutes. Titrate the liberated iodine with 0.01 M sodium thiosulfate (indicator : starch solution). Separately, a blank experiment is done in the same manner.

1 ml of 0.005M sodium thiosulfate solution = 0.17727mg Cl

427. Ammonium Molybdate

Chemical Formula $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$

Molecular Weight 1235.86

Compositional Specifications of Ammonium Molybdate

Content Ammonium Molybdate should contain within a range of 99.3~101.8% of Ammonium Molybdate $((\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O})$.

Description Ammonium Molybdate is white~light green crystalline powder with slight odor of ammonia.

Identification 0.6 g of Ammonium Molybdate is dissolved in the mixture of 1.4 ml of water and 1.45 ml of ammonia solution. The mixture is cooled, 7.2 ml of the solution, which 3.2 ml of nitric acid and 4 ml of water are mixed and cooled, is added while stirring slowly. Set aside for 24~48 hours, filter, and add 2 ml of disodium phosphate to 5 ml of filtrate. Then yellow filtrate generates and it dissolves in excess amount of ammonia solution.

Purity (1) Chloride : When 0.5g of Ammonium Molybdate is tested by Chloride Limit Test, the content should not be more than the amount that correspond to 0.30 ml of 0.001 N hydrochloric acid.

(2) Sulfate : When 0.25 g of Ammonium Molybdate is tested by Sulfate Limit Test, the content should not be more than the amount that correspond to 1.0 ml of 0.001 N sulfuric acid.

(3) Phosphate : When 20 g of Ammonium Molybdate is precisely weighed and dissolved in 3N ammonia solution to make 100 ml. 3.5 ml of iron nitrate(1→10) is added and set aside for 15 minutes. Gradually heat it, filter when the precipitates are cohered, and wash the residue with 1.5N ammonia solution several times. Dissolve the residue with 60 ml of warm 4N nitric acid, 13 ml of ammonia solution is added and bring to 40°C. 50 ml of Ammonium Molybdate solution is added, shaken for 5 minutes, set aside for 2 hours at 40°C, then the precipitates should not be more than precipitates of standard solution.(not more than 5 ppm). However, 144.3 mg of dried potassium phosphate is dissolved in water to make 1,000 ml, and 1.0 ml of this solution is dissolved in 3N ammonia solution to make 100 ml, standard solution.

(4) Magnesium salt and alkali salt : 5g of Ammonium Molybdate is precisely weighed and dissolved in water to make 50 ml and filtered. To the filtrate, 0.5 g of sodium carbonate and 25 ml of 2.5N sodium hydroxide are added, boiled for 5

- minutes, filtered with filter paper, and the residue is washed with 1N ammonia solution. Measure the residue after it is heat-treated for 30 minutes at $800 \pm 25^\circ\text{C}$, the weight of residue should not be more than 1mg (not more than 0.02%).
- (5) Lead : Ammonium Molybdate is tested by Purity (2) for Sodium Metaphosphate(not more than 2.0 ppm).
- (6) Water-insoluble substances : To 20 g of Ammonium Molybdate, water is added to make 200ml, heat for 1 hour in a water bath, and filter it. Wash the residue with hot water and dry for 2 hours at 105°C , then its content should not be more than 1 mg. (not more than 0.005%).
- (7) Nitrate : 1 g of Ammonium Molybdate is precisely weighed and dissolved in 0.05% sodium chloride to make 10 ml. 0.1 ml of indigo carmin solution dissolved in 3.6 N sulfuric acid is added, then blue color doesn't completely disappear in 5 minutes.

Assay 1 g of Ammonium Molybdate is precisely weighed and dissolved in the mixture of 10 ml of water and 1 ml of ammonia solution, and diluted with water to 250 ml. To 50 ml of the filtrate of this solution, 250 ml of water, 20 g of ammonium chloride, 15 ml of hydrochloric acid, and 0.15 ml of methy orange solution are added, heated until it boils, and 18 ml of lead acetate solution(9.5 \rightarrow 100) is added. Saturated acetate ammonium solution is added while stirring until yellow color develops, 15 ml of lead acetate solution (9.5 \rightarrow 100) is added and heated until precipitates generate at the temperature below boiling point. Filter it and wash the residue with the mixture of water, saturated acetate ammonium solution, mixture of nitric acid (890:100:10) 7~8 times. Lastly, wash it with hot water 3 times, heat-treat at $560 \sim 625^\circ\text{C}$ and measure the weight of lead molybdate.

$$1 \text{ mg of lead molybdate.} = 0.4809\text{mg } (\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$$

428. Acetone

2-Propanone

Dimethyl Ketone

Chemical Formula C_3H_6O

Molecular Weight 58.08

Compositional Specifications of Acetone

Content Acetone should contain within a range of 99.5~100.5% of Acetone (C_3H_6O)

Description Acetone is colorless, transparent, volatile fluid with characteristic odor.

Identification 0.1 ml of acetone is mixed with 10 ml of water, 5 ml of sodium hydroxide is added, heated, and 5 ml of iodine solution, then yellow precipitate of iodoform is generated.

Purity (1) Solubility : 38 ml of Acetone(corresponds to about 30g) is mixed with boiled and cooled water(50:50), this solution should clear at least for 30 minutes. the same amount of water after 1 hour.

(2) Acid Value (as acetic acid) : 38 ml of Aceton is mixed with boiled and cooled water(50:50), titrated with 0.1N sodium hydroxide solution, then the consumption should not be more than 0.1 ml.(Indicator : phenolphthalein solution)

(3) Alkali Value(as ammonia) : 1 drop of Methyl red solution is added to 25 ml of water and 0.1 N sulfuric acid is added until red color develops. 23 ml of Acetone(corresponds to about 18g) is added, titrated with 0.1N sulfuric acid, the consumption should not be more than 0.1 ml.

(4) Aldehydes(as formaldehyde) : 2.5 ml of Acetone(corresponds to about 2g) is dissolved in 7.5 ml of water, test solution. $40\mu g$ of formaldehyde is dissolved in 10 ml of water, standard solution. 0.15m/ of 5% 5,5-dimethyle-1,3-cyclohexanedione · alcohol solution is added to test solution and standard solution respectively, and evaporated in a water bath until acetone is volatilized. Water is added to make 10 ml, vigorously stirred in an ice bath, rapidly cooled, the turbidity of test solution should not be deeper than turbidity of standard solution. (not more than 0.002%).

(5) Matters that reduce permanganates : 10 ml of Acetone transfer into a cylinder with a stopper. After adding 0.05 ml of 0.1 N potassium permanganate solution, it is set aside for 15 minutes. Pale red color should not disappear completely.

(6) Heavy Metal : 25 ml (approximately 20 g) of Acetone is evaporated to dryness in a water bath. After cooling, 2 ml of hydrochloric acid is added, which is slowly evaporated to dryness in a water bath. The residue is wetted with 1 drop of

- hydrochloric acid and decomposed for 1 minute by adding 10 ml of hot water. After cooling, water is added to bring the total volume to 25 ml. To this solution 2 ml of dilute acetic acid and water are added so that the total volume becomes 50 ml (Test Solution). The Test solution is tested by Heavy Metal Limit Test and the content should not be more than 1 ppm.
- (7) Methyl alcohol : To 1 m each of test solution, where water is added to 10 ml of acetone to make 100 ml, and methyl alcohol standard solution($40\mu\text{g}/\text{ml}$ water), 0.2 ml of 10% phosphate and 0.25 ml of potassium permanganate(1→20) are added, and set aside for 15 minutes. 0.3 ml of sodium bisulfite(1→10) is added and shaken until it becomes colorless. 5 ml of 80% sulfuric acid cooled in ice is gradually added while keeping cold. 0.1 m of chromotropic acid(1→100) is added, immersed in a water bath for 20 minutes, then the purple color in test solution should not be deeper than that of standard solution. (not more than 0.05%).
- (8) Phenols : 3 ml of acetone is evaporated to dryness at 60°C , 3 drops of sulfuric acid solution of sodium nitrite(0.1→5) are added, and set aside for 3 minutes. When 3 ml of 2N sodium hydroxide is carefully added, it should not be colored.
- (9) Distillation test : When acetone is tested for boiling point and amount of distillate, 95%(v/v) or more should be extracted at $55.1\sim 57.1^{\circ}\text{C}$.
- (10) Residue on Evaporation : 125 ml (approximately 100 g) of acetone is dried in a water bath and is further dried for 30 minutes at 105°C . The weight of the residue should not be more than 10 ppm.

Water Content Water content of Acetone is determined by water determination (Karl-Fischer Method) and should not be more than 0.5%.

Assay

The content of Acetone is tested by determination of specific gravity. It should not be more than 0.7930 as specific gravity.

429. Sodium Selenite

Chemical Formula Na_2SeO_3
weight 172.94

Molecular

Compositional Specifications of Sodium Selenite

Content Sodium Selenite should contain within a range of 98~101% of Sodium Selenite(Na_2SeO_3).

Description Sodium Selenite is white~pale light grey, odorless crystalline powder.

Identification

50 mg of Sodium Selenite, 5 ml of 0.1N hydrochloric acid is added, dissolved, 50 mg of stannous chloride, then yellowish brown~orange colored precipitates are generated.

Purity (1) Carbonate : 0.5g of Sodium Selenite is added to 1 ml of water and 2 ml of diluted hydrochloric acid, bubbles should not be generated.

(2) Chloride : When 0.5g of Sodium Selenite is tested by Chloride Limit Test, the content of chlorine should not be more than 0.05 mg(not more than 0.01%).

(3) Nitrate : When measure the content of nitrate under following method, the content should not be more than 0.02mg (not more than 0.01%).

Nitrate test : 0.2 g of Sodium Selenite is dissolved in 3 ml of water, brucine in sulfuric acid solution is added to make 50ml, test solution. To 2 ml of nitrate standard solution and 0.2 g of Sodium Selenite, brucine in sulfuric acid solution is added to make 50 ml, reference solution. 50 ml of brucine in sulfuric acid solution is blank test solution. Test solution, reference solution, and blank test solution are heated in a water bath for 10 minutes, rapidly cooled at room temperature. Set the spectrophotometer to zero with blank test solution, measure the absorbance, the absorbance of test solution should not be higher than that of reference solution. (wave length : 410nm).

* Brucine in sulfuric acid solution : 600mg of brucine in sulfuric acid is dissolved in 600 ml of sulfuric acid solution(2→3) which is previously prepared, to make 1l.

Nitrate standard solution : 163 mg of potassium nitrate is dissolved in water to make 100 ml, 10 ml of this solution is diluted to 1l (0.01mg NO_3/ml).

(4) Selenate and Sulphate : To 0.5 g of Sodium Selenite, 20 mg of sodium carbonate and 10 ml of hydrochloric acid are added, mixed, and slowly evaporated in a hood. The residue is washed with 1 ml of hydrochloric acid, evaporated again, and dried. To dried residue, 15 ml of hot water and 1 ml of hydrochloric acid are added and

tested by Sulfate Limit Test, it should not be more than the turbidity generated by 0.15 mg of sulfuric acid. (not more than 0.03%).

Assay 180mg of Sodium Selenite, which is previously dried at 120° , is precisely weighed and 50 ml of water is added and dissolved. 3 g of potassium iodide is added, 5 ml of hydrochloric acid is added, the stopper is placed, and set aside for 10 minutes. 50 ml of water is added, 3 ml of 0.1N sodium thiosulfate standard solution and starch solution are added, immediately titrated with 0.1N iodine standard solution until blue color develops, and tested by assay. Separately, perform a blank test, Sodium Selenite that corresponds to 1 ml of 0.1N iodine standard solution is as follows.

$$1\text{ml of } 0.1\text{N Iodine} = 4.323 \text{ mg Na}_2\text{SeO}_3$$

430. Chromic chloride

Chromium(III) chloride

Chemical Formula $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$

molecular weight hexahydrate 266.45

Compositional Specifications of Chromic chloride

Content Chromic chloride should contain within a range of 98.0~101.0% of Chromic chloride($\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$).

Description Chromic chloride is purple or green crystalline solid.

Identification (1) To 5ml of the aqueous solution of chromic chloride (1→250), 1ml of 5N sodium hydroxide and 10 drops of 30% hydrogen peroxide are added, gently heated for about 2 minutes, yellow color develops.

(2) To 5 ml of the aqueous solution of chromic chloride (1→250), 5 drops of silver nitrate solution are added, then white precipitate is generated, which is not soluble to nitric acid.

Purity (1) Water-insoluble substances : 10 g of chromic chloride is precisely weighed, 100 ml of water is added, the solution is resolved in a water bath for 30 minutes, and the insoluble substances are filtered through a glass filter (IG4), The solution in a beaker, which is washed by hot water, is filtered though a glass filter, and the residue is washed until the color of the solution washed lastly. When the glass filter is dried for 2 hours at 105° , its content should not be more than 1 mg. (not more than 0.01%)

(2) Ammonium hydroxide soluble substances : 2 g of chromic chloride is added to 80 ml of water, heated, and 10 ml of ammonia water is added. It is occasionally shaken while warming up in a water bath for 30 minutes, cooled, water is added to 100 ml, mixed, and filtered. To 50 ml of filtrate, 0.5 ml of sulfuric acid is added, and evaporated to dryness in a water bath. It is then heat-treated until the weight becomes constant, the residue should not be more than 2 mg. (not more than 0.20% as SO_4^{2-}).

(3) Sulfate : To 10 ml of chromic chloride solution (2→10), 1 ml of 3N hydrochloric acid is added, filtered, the filter paper is washed twice with 5 ml of water, and diluted with water to 40 ml, test solution. Separately, 1 g of chromic chloride is dissolved in 10 ml of water, filtered, and 0.1ml of 0.02N sulfuric acid is added, reference solution. To both solutions, 3 ml of barium chloride(12→100)is added, mixed well, and set aside whole night at the room temperature. When supernatant

liquid is discarded, the solution, which is more than 2 times of test solution, is remained in reference solution. Both solutions are diluted with water to 25 ml, processed under ultrasonic waves, then the turbidity of test solution should not be more than that of reference solution (not more than 0.01%).

- (4) Iron : 1 g of chromic chloride is added to 100 ml of water, dissolved, 10 ml of the solution is added to water to make 45 ml, and 2 ml of hydrochloric acid is added and mixed, test solution. 15 ml each of butyl alcohol is added to test solution and iron standard solution, and 15 ml of ammonium thiocyanate(30→100) are added, and mixed well. When the layer is separated, the color of the supernatant should not be deeper than the color of standard solution (not more than 0.01%).

Assay 0.4 g of chromic chloride is precisely weighed, dissolved in 100 ml of water, 5 ml of 5N sodium hydroxide is added and mixed. 4 ml of 30% hydrogen peroxide is slowly added, boiled for 5 minutes, slightly cooled, and 5 ml of sulfuric acid nickel solution(1→20) is added. It is boiled and cooled until oxygen is not generated, and 2N sulfuric acid is added until the color of the solution changes from yellow to orange. To this solution, 4 g of potassium iodide and 2 g of sodium hydrogen carbonate are dissolved in 100 ml of water and added. Then 6 ml of hydrochloric acid is added and mixed. Place the stopper on the flask, set it aside in a dark place for 10 minutes, and titrate the liberated iodine with 0.1N sodium thiosulfate (indicator : starch solution).

$$1 \text{ ml of } 0.1\text{N sodium thiosulfate} = 8.882\text{mg CrCl}_3 \cdot 6\text{H}_2\text{O}$$

431. Methyl Alcohol

Methanol

Chemical Formula CH_3OH

Molecular weight 32.04

Compositional Specifications of Methyl Alcohol

Content Methyl Alcohol should not be less than 99.85% of Methyl Alcohol (CH_3OH).

Description Methyl Alcohol is colorless, transparent, flammable liquid with a characteristic odor.

Purity (1) Solubility : 15 ml of Methyl Alcohol is mixed with 45 ml of water, this solution should clear as the same amount of water after 1 hour.

(2) Acid Value (as formic acid) : To the mixture of 10 ml of ethyl alcohol and 25 ml of water, 0.5 ml of phenolphthalein solution is added, 0.02 N sodium hydroxide is added for at least 30 seconds until pale red persists. Then 19 ml (corresponds to 15 g) of Methyl Alcohol is added and mixed. It is titrated with 0.02N sodium hydroxide until pale red develops again, and the consumed amount should not be more than 0.25 ml. (indicator : 0.1 ml of phenolphthalein solution)

(3) Alkali Value(as ammonia) : 1 drop of Methyl red solution is added to 25 ml of water and 0.02 N sulfuric acid is added until red color develops. 29 ml of Methyl Alcohol(corresponds to about 22.5g) is added, titrated until the red color develops again, the consumption should not be more than 0.3 ml.

(4) Acetone and Aldehydes : To 1.25 ml of Methyl Alcohol (corresponds to about 1 g), 3.75 ml of water and 5.0 ml of Meyer solution are added, the turbidity of test solution should not be deeper than turbidity of standard solution containing 30 μg of acetone (not more than 0.003%).

(5) Matters that reduce permanganates : 20 ml of Methyl Alcohol is cooled to 15°C, transferred to a cylinder with a stopper. After adding 0.1 ml of 0.1 N potassium permanganate solution, it is set aside for 5 minutes. Pale red color should not disappear completely.

(6) Lead : When 5.0 g of Methyl Alcohol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.

(7) Distillation test : When Methyl Alcohol is tested for boiling point and amount of distillate, 95%(v/v) or more should be extracted at 63.6~65.6°C.

(8) Carbonized substances : To 25 ml of Methyl Alcohol, 25 ml of sulfuric acid solution to make 10°C is added and mixed, and the color of the solution should not be deeper than that of the solution, which is made by adding water to 3.5 ml of platinum-cobalt solution to make 50 ml.

Platinum-cobalt solution : To 1.246 g of Potassium chloroplatinate(K_2PtCl_6) and 1.00 g of cobalt chloride($CoCl_2 \cdot 6H_2O$), 200 ml of water and 100 ml of hydrochloric acid are added, dissolved, and water is added to make 1,000 ml.

(9) Residue on Evaporation : 125 ml (approximately 100 g) of Methyl Alcohol is dried in a water bath, further dried for 30 minutes at 105°C and cooled. The weight of the residue should not be more than 10 ppm.

Water Content Water content of Methyl Alcohol is determined by water determination (Karl-Fischer Method) and should not be more than 0.1%.

Assay The content of Methyl Alcohol is tested by determination of specific gravity. It should not be more than 0.7928 as specific gravity.

432. Hydroxypropyl cellulose

Compositional Specifications of Hydroxypropyl cellulose

Content Hydroxypropyl cellulose, when calculated on the dried basis, should contain not more than 80.5% of hydroxypropoxyl group ($-\text{OC}_3\text{H}_6\text{OH}$)

Description Hydroxypropyl cellulose is scentless white~yellowish white fibrous powder or granule.

Identification (1) When Hydroxypropyl cellulose solution (0.1→100) is shaken vigorously, it generates layer of foams.

(2) When 5 ml of Hydroxypropyl cellulose solution (0.5→100) is added to 5 ml of 5% copper sulfate or aluminum sulfate solution, it should not be form precipitates.

Purity (1) pH : pH of Hydroxypropyl cellulose solution (1→100) should be within a range of 5.0~8.0 as determined by glass electrode method.

(2) Propylenechlorohydrine : It is tested by Purify (2) in 「Hydroxypropylmethylcellulose」, the content should not be more than 0.1 ppm.

(3) Lead : Accurately weigh bout 5 g of Hydroxypropyl cellulose into a platinum or quartz crucible. Add minute amounts of sulfuric acid and wet, slowly heat the solution and pre-ash at the temperature as low as possible. Again add 1 ml of sulfuric acid, slowly heat, ignite until it is ashed at 450~550°C. After completing ashing, add minute amounts of nitric acid(1→150) to the residue, and dissolved. Add Nitric acid(1→150) again to make 10 ml, test solution. Separately, pipette 1 ml of lead standard solution, add 10 ml of nitric acid(1→150) to make 10 ml, reference solution. When test solutions and reference solution are tested for flame atomic absorption spectrophotometric method according to the following operation conditions, the absorption of test solution should not be more than that of reference solution. (not more than 2 ppm).

Loss on Drying When Hydroxypropyl cellulose is dried for 4 hours at 105°C, the weight loss should not be more than 10.0%.

Residue on Ignition Residue on ignition of Hydroxypropyl cellulose should not be more than 0.5%.

Assay About 0.065 g of Hydroxypropyl cellulose, previously dried and accurately weighed and put in a 5 ml-vial equipped with a pressure tight septum closure, and 0.065 g of adipic acid, 2.0 ml of the inner standard solution, and 2.0 ml of hydrogen iodide are added, the vial is stoppered, and its weight is then accurately measured. However, Octane · o-xylene solution(1→25) is used as the inner standard solution. The bottle is shaken for 30 sec for mixing, and heated at 150°C for 30 minutes while

shaking and mixing every 5 minute. Then the vial is heated for 30 minutes, cooled and the weight is again accurately measured. When the weight loss is not more than 0.01 g, the supernatant is used as the test solution. Separately, 0.065 g of adipic acid, 2.0 ml of the inner standard solution, and 2.0 ml of hydrogen iodide are put in another pressure tight vial, which is then stoppered, and the weight is measured accurately. 50 μ l of isopropyl iodide is added and the weight is measured again accurately. After the bottle is shaken for 30 sec, the supernatant is used as the standard solution. 1 μ l each of the test solutions and standard solutions is injected to gas chromatograph and the content(%) of the hydroxypropoxyl group is obtained using the following equation.

$$\text{the content(\% of the hydroxypropoxyl group (\%))} = \frac{Q_t}{Q_s} \times \frac{W_s}{\text{Weight of sample(g)}} \times 44.17$$

W_s : Amount (mg) of isopropyl iodide in the standard solution(g)

Q_t : The ratio of the peak area of isopropyl iodide to that of octane in the standard solution

Q_s : The ratio of the peak area of isopropyl iodide to that of octane in the test solution

Pressure tight vial : 5 ml of internal pressure bottle with stopper made of glass. Inner part of the bottom is cone shaped, 20 mm external diameter, 50mm height and the capacity to 30 mm is 2 ml. thermal resistance resin, fluoroplastic are used for a stopper and inner stopper, respectively. However, when heating before use, check if the content does not leak.

Heater : Metal aluminum block with 60~80mm height, having a hole with a diameter of 20.6mm, 32mm height. Heater be used which the inner temperature of block should be controlled at the range of 1°C.

Operation Condition

Capillary Column : DB-5 or its equivalent

Detector : Hydrogen Flame Ionization Detector (FID)

Column Temperature : 100°C

Carrier gas : Helium

Flow rate : Adjust to make the peak of octane appear about after 10 minutes

Selection of Column : 1 μ l of standard solution is weighed and operated under following operation condition, it is spilled in order of isopropyl iodide, octane. The column that each peak is completely separated should be used.

433. Amidated Pectin

Definition Amidated Pectin is polymer of refined carbohydrate obtained by processing pectin, which is obtained from extracting citrus fruits or apples with hot water or acidic aqueous solution, with ammonia in alkali condition. The main parts of pectin chain is composed of α -1,4 combination of D-galacturonic acid unit. Some of Carboxyl Group are methyl esterificated and amidated. Others exist as the form of free acid or ammonium, potassium, and sodium salt. Upon the purpose of use, sugars can be added to standardize the property of matter or food additives which is used as buffer for adjusting of acidity can be used.

Compositional Specifications of Amidated Pectin

Content Amidated Pectin is white~brown pale powder or granule. It is odorless or has slightly characteristic odor.

Identification (1) To certain amount of 1% of Amidated Pectin solution, same amount of alcohol is added, then precipitate of transparent gelatin is formed.
(2) To 10 ml of 1% Amidated Pectin solution, 1 ml of nitric acid thorium is added, mixed, and set aside for 2 minutes, then precipitate or gel is formed.
(3) To 5 ml of 1% Amidated Pectin solution, 1 ml of sodium hydroxide is added, set aside for 15 minutes at the room temperature, then gel is formed.
(4) To the gel formed from (3), 1 ml of hydrochloric acid is added, acidified, shaken well, then voluminous colorless gelatin precipitate formed. When it is boiled, white cohesion is formed.

Purity (1) Arsenic : 0.25 g of Amidated Pectin transfer into a platinum, quartz, or porcelain crucible. 10 ml solution of magnesium nitrate in ethyl alcohol (1→50) is added to the crucible and then alcohol is ignited. It is then reduced to ash by heating at 450~550°C. If carbonaceous substance persists, it is wetted with minute amount of nitric acid, which is further heat-treated at 450~550°C. After cooling, 3 ml of hydrochloric acid is added to the residue, which is then dissolved by heating in a water bath. When test by Arsenic Limit Test is carried out with this test solution, it should not be more than 4 ppm.
(2) Lead : When 5.0 g of Amidated Pectin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 5.0 ppm.
(3) Cadmium : When 5.0 g of Amidated Pectin is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 1.0 ppm.

- (4) Mercury : When Amidated Pectin is tested by Mercury Limit Test, its content should not be more than 1.0 ppm.
- (5) Residual solvent : 0.1 g of Amidated Pectin is precisely weighed, 10 ml of diluted inner standard solution(1→25) is added, the stopper is placed, and mixed until being dispersed equally. This solution is transferred to ultrafilter centrifugal filtration tube, centrifuged for 30 minutes at 5,000rpm, and the filtrate is test solution. However, tert-butyl alcohol(1→1,000) is used as inner standard solution. Separately, 0.1 g each of methyl alcohol and isopropyl alcohol is precisely measured and water is added to 100 ml. Again, 10 ml of this solution and 4 ml of inner standard solution are weighed and water is added to make 100 ml, mixed standard solution. 2μl each of test solution and mixed standard solution is weighed and injected into gas chromatography under following operation condition. Ratio of methyl alcohol and isopropyl alcohol peak against tert-butyl alcohol peak, Q_{T1} , Q_{T2} and Q_{S1} , Q_{S2} , is measured respectively, and measure the content of methyl alcohol and isopropyl alcohol under following equation, it should be not more than 1.0% as individual or total if combined

$$\text{Content of methyl alcohol (\%)} = \frac{\text{Weight of methyl alcohol(g)}}{\text{Weight of sample(g)}} \times \frac{Q_{T1}}{Q_{S1}}$$

$$\text{Content of isopropyl alcohol (\%)} = \frac{\text{Weight of isopropyl alcohol(g)}}{\text{Weight of sample(g)}} \times \frac{Q_{T2}}{Q_{S2}}$$

Q_{T1} : Ratio of methyl alcohol peak against tert-butyl alcohol peak in Test Solution

Q_{T2} : Ratio of 2-propyl alcohol peak against tert-butyl alcohol peak in Test Solution

Q_{S1} : Ratio of methyl alcohol peak against tert-butyl alcohol peak in mixed standard Solution

Q_{S2} : Ratio of isopropyl alcohol peak against tert-butyl alcohol peak in mixed standard Solution

Column : PLOT Q or its equivalent

Detector : Hydrogen Flame Ionization Detector (FID)

Temperature at injection hole : 200°C

Column Temperature : 120°C

Detector Temperature : 300°C

Carrier gas : Nitrogen or Helium

- (6) Amide group : 5 g of Amidated Pectin is precisely weighed into a beaker, 5 ml of hydrochloric acid and 100 ml of 60% ethyl alcohol are added, stirred for 10 minutes, filtered with a glass filter(1G3 or its equivalent). 60% of residue in a glass filter is

washed with 15 ml each of 60% mixture of ethyl alcohol: hydrochloric acid(20:1) six times, washed solution is washed with 60% ethyl alcohol until it doesn't react by Chloride Limit Test, and washed with 20 ml of ethyl alcohol again. It is dried for 2.5 hours at 105°C, cooled in a desiccator, and weighed. The amount which corresponds to 1/10 of the weight of the dried substance is precisely weighed. Then the weight is W(mg). To this solution, 2 ml of ethyl alcohol is added and wetted, 100 ml of freshly boiled and cooled water is added, shaken, and mixed. 5 drops of phenolphthalein solution, titrated with 0.1N sodium hydroxide solution, and the consumed amount of the solution is V_1 (ml). 20 ml of 0.5N sodium hydroxide solution is precisely weighed, added, shaken well, mixed, and set aside for 15 minutes. Again, 20 ml of 0.5N hydrochloric acid is precisely weighed, added, titrated with 0.1N sodium hydroxide solution until the red color disappears, and the consumed amount of this solution is V_2 (ml). However, the final point is when the color of solution becomes slightly red after shaking vigorously. Titrated solution is transferred to 500 ml flask for decomposition, which is apparatus of Total Kjeldahl Nitrogen Test (nitrogen determination method). After distilling apparatus is attached, 20 ml of 0.1N hydrochloric acid and 150 ml of freshly boiled and cooled water are into flask for absorption. Tip of the condenser is submerged in the solution, 20 ml of sodium hydroxide(1→20) is transferred into a flask for decomposition, heated while caring generating bubbles, and 80~120 ml of distillate is obtained. It is titrated with 0.1N sodium hydroxide solution (indicator : Methyl red solution), the consumed amount of the solution is S(ml). Separately, perform the blank test, and the consumed amount of 0.1N sodium hydroxide is B(ml). When measure the content of amide group to against the total carboxyl, its content should not be more than 25%.

$$\text{The content of amide group to against the total carboxyl (\%)} = \frac{B-S}{V_1+V_2+(B-S)} \times 100$$

- (7) Galacturonic acid : When the content of galacturonic acid is measured under following equation with using W, V_1 , V_2 , B, S obtained from (6) Purity, its amount should not be more than 65%.

$$\text{Content of Galacturonic acid(\%)} = \frac{19.41 \times [V_1+V_2+(B-S)]}{W} \times 100$$

- (8) Sulfur dioxide : When Amidated Pectin is tested by Assay in sulfurous acid, hyposulfurous acid, and their salts test method in General Test Method in 「Standards and Specifications for Foods」, it should not be more than 50 ppm.
- (9) Acid-Insoluble Ash : When 3 g of Amidated Pectin is tested by Ash and

Acid-Insoluble Ash Limit Test, it should not be more than 1.0%.

Loss on Drying When 3g of Amidated Pectin is dried for 2 hours at 105°C, the weight loss should not be more than 12%.

434. Sodium Selenate

Chemical Formula Na_2SeO_4
weight 188.94

Molecular

Compositional Specifications of Sodium Selenate

Content Sodium Selenate should contain more than 98% of Sodium Selenate(Na_2SeO_4).

Description Sodium Selenate is white~ light grey, minute crystalline powder.

Identification

- (1) Sodium Selenate responds to test of Sodium Salt in Identification.
- (2) When Sodium Selenate is quantitatively analyzed, it shows an absorption maximum at a wavelength of the Sodium Selenate standards solution.

Purity (1) Clarity and Color of Solution : Dissolve 10 g of Sodium Selenate in 100 ml of water. This solution should be clear.

- (2) Grain : When observe the solution of purity test (1) under the bright light, there is no the colored particle or even though there is it, it has a little colored particle.

Assay Sodium Selenate that corresponds to about 100 mg of Selenium, is precisely weighed and is put into a flask for decomposition. Dissolve completely in 12ml of nitric acid by shaking and mixing it and boil it gradually for 15 minutes. After cooling it to room temperature, boil it with adding 80 ml of perchloric acid until smoke disappears. It is transferred into 50 ml flask and wash a flask for decomposition with ammonium chloride(4→200). Add washed solution and ammonium chloride(4→200) to make to 50ml, this solution is used as test solution. Test solution and each standard solution are tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy under below operation condition using the mixed solution of ammonium chloride(4→200)·perchloric acid(20:1) as a reference. Prepare the calibration curve and obtain concentration C (mg/ml) of selenium of test solution. The content of Sodium Selenate is calculated using the following equation.

$$\text{Content of Sodium Selenate(\%)} = \frac{C \times 2.3929}{\text{Weight of sample (g)}} \times \frac{100}{1,000}$$

Standard solution : 1.0 g of selenium is precisely weighted and is dissolved in maximum volume of nitric acid. After expelling it, add 2 ml of water to evaporate to dryness. Repeat this procedure 3 times and add 3 N hydrochloric acid to make to 1 L, this solution is used as standard solution. Again take precisely 10 ml of this

solution and add water to make to 100 ml. Take 5, 10 and 25 ml of this solution and transfer each solution into flask. And add 5ml of perchloric acid into each flask and boil it slightly for 15 minutes. After cooling to room temperature, add ammonium chloride solution(4→200) to make to 100 ml. 1 ml of each solution contains 5.0, 10.0 and 25.0 mg of selenium.

435. Sodium Molybdate

Chemical Formula $\text{Na}_2\text{MnO}_4 \cdot 2\text{H}_2\text{O}$

Molecular weight 241.95

Compositional Specifications of Sodium Molybdate

Content Sodium Molybdate should contain more than 99.0% of Sodium Molybdate($\text{Na}_2\text{MnO}_4 \cdot 2\text{H}_2\text{O}$).

Description Sodium Molybdate is colorless~ white, crystals or as a white crystalline powder.

Identification

- (1) Sodium Selenate responds to test of Sodium Salt in Identification.
- (2) When Sodium Selenate is quantitatively analyzed, it shows an absorption maximum at a wavelength of the Sodium Selenate standards solution.

Purity (1) Acidity, and Alkalinity : pH of Sodium Molybdate solution(1→20) should not be more than 10.0.

- (2) Clarity and Color of Solution : Weigh 1.0 g of Sodium Molybdate, add 20 ml of water, and dissolve it. The turbidity of test solution should not be more than almost clear.

- (3) Ammonium : Approximately 1.0 g of Sodium Molybdate is precisely weighed into a distillation flask. 140 ml of water and 2 g of magnesium oxide is added and a distilling plant is attached to the flask. Add 20 ml of boric acid solution(1→200) as solution for absorption to 100 ml flask. Immerse the end of the distilling plant condenser to solution for absorption and adjust the temperature for heating to flow by 5~7 ml per minute so that the distilled solution is made to 60 ml. Wash the end of the condenser with a little of water and add water to make to 100 ml. This solution is used as test solution. Separately, a reference solution, 1.0 ml of ammonium standard solution(1 ml of this solution contains 0.01 ml of ammonium) is taken into a flask for distilling. And 60 ml of distilled solution is made by the same method of test solution. Wash the end of the condenser with a little of water and add water to make to 100 ml. This solution is used as reference solution. Each 30 ml of test solution and 30 ml of reference solution is separately taken into Nessler tube and add 6 ml of phenol-sodium nitroprusside solution. After shaking it to mix, add 4 ml of sodium hypochlorite • sodium hydroxide solution and water to make to 50 ml and shake it. And then allow the solution to stand for 60 minutes. The color of test solution should not be more intense than that of reference solution. (not

more than 0.001%).

Reagent

Phenol-sodium nitroprusside solution : Add water to 5 g of phenol and 25 mg of sodium nitroprusside to make to 500 ml. The solution should be stored in a cold dark place.

Sodium hypochlorite • sodium hydroxide solution : Add water to 1.05 g of sodium hypochlorite and 15 g of sodium hydroxide to make to 1000 ml. The solution is prepared before use.

- (4) Chloride : When 1.0 g of Sodium Molybdate is dissolved in 10 ml of dilute nitric acid by heating, which is tested by Chloride Limit Test, its content should not be more than the amount that corresponds to 0.14 ml of 0.01 N hydrochloric acid.
- (5) Nitrate : Dissolve 1.0 g of Sodium Molybdate in 10 ml of water. When adding 0.05 ml of Indigo Carmine and 10 ml of Sulfuric acid, the blue color appears. This blue color should not disappear completely in 5 minutes.
- (6) Sulfate : Dissolve 1.0 g of Sodium Molybdate in 5 ml of hot water. Add 5 ml of nitric acid to evaporate to dryness in water bath. After adding 1 ml of hydrochloric acid(1→4) and 10 ml of water to precipitate, add water to make to 50 ml. Filtered solution is used as test solution. When it is tested by Sulfate Limit Test, its content should not be more than the amount that corresponds to 0.1 ml of 0.01 N sulfuric acid.
- (7) Phosphate : 2.5 g of Sodium Molybdate is taken into beaker of polyethylene material(PE). Dissolve it in 70 ml of water and adjust pH 4~5 with hydrochloric acid(1→10). And then add 2 ml of bromine solution and again adjust pH 1.7~1.9 with hydrochloric acid(1→10). Transfer this solution into glass beaker and heat it until it starts to boil. After cooling at about 20 °C, add water to make to 90 ml and transfer it into a separatory funnel. Add 10 ml of hydrochloric acid and 20 ml of ether and shake strongly it to mix for 3 minutes. Take water layer and it is used as A solution. Wash ether layer with each 10 ml of hydrochloric acid 4 times. Add 0.2 ml of tin chloride solution(This solution is made with 2 g of tin chloride by adding hydrochloric acid to make to 100 ml) and shake it to mix for 30 seconds. And then add 25 ml of ether to this solution. The color of this solution should not be more intense than that of reference solution. Separately, 2.5 g of Sodium Molybdate is taken into beaker of polyethylene material(PE). Dissolve it in 1 ml of phosphate standard solution(0.01 mg/ml) and 10 ml of silicate standard solution(0.01 mg/ml) and 60 ml of water adjust pH 4~5 with hydrochloric acid(1→10). And then add 2 ml of bromine solution and again adjust pH 1.7~1.9 with hydrochloric acid(1→

- 10). Transfer this solution into glass beaker and heat it until it starts to boil. After cooling at about 20 °C, add water to make to 90 ml and transfer it into a separatory funnel. Add 10 ml of hydrochloric acid and 20 ml of ether and shake strongly it to mix for 3 minutes. Take water layer and it is used as B solution. Wash ether layer with each 10 ml of hydrochloric acid 4 times. Add 0.2 ml of tin chloride solution(This solution is made with 2 g of tin chloride by adding hydrochloric acid to make to 100 ml) and shake it to mix for 30 seconds. And then add 25 ml of ether to this solution. This solution is used as reference solution(not more than 0.0005%)
- (8) Silicate : Add water to A solution of purity (7) to make to 100 ml. Transfer it into 200 ml separatory funnel. After adding 10 ml of hydrochloric acid and 50 ml of n-butanol, shake strongly it to mix for 5 minutes. Discard water layer and wash n-butanol with each 10ml of hydrochloric acid(1→10) 4 times. Add 0.5 ml of tin chloride of purity (7) to n-butanol layer for 30 minutes and shake it to mix. And then add n-butanol to make to 50 ml solution. The color of this solution should not be more intense than that of reference solution. Separately, add water to B solution of purity (7) to make to 100 ml. Transfer it into 200 ml separatory funnel. After adding 10 ml of hydrochloric acid and 50 ml of n-butanol, shake strongly it to mix for 5 minutes. Discard water layer and wash n-butanol with each 10ml of hydrochloric acid(1→10) 4 times. Add 0.5 ml of tin chloride of purity (7) to n-butanol layer for 30 minutes and shake it to mix. And then add n-butanol to make to 50 ml solution. This blue solution is used as reference solution(not more than 0.005%)
- (9) Lead : When 5.0 g of Sodium Molybdate is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
- (10) Iron : Add water to 0.4g of Sodium Molybdate to make 40 ml solution. And then add 5 ml of 10% Sodium hydroxide solution and boil it for 5 minutes. After cooling it, add 30 ml of 10% tartaric acid solution, transfer it into a separatory funnel. Add 20ml of hydroxylamine hydrochloride • ammonium perchlorate and 3 ml of ammonia water(2→5). After adjusting pH to pH 4, add 2 ml of 0.2% o-phenanthroline solution. Keep it at 20~35°C for 15 minutes and extract it by shaking strongly it with 10 ml of each chloroform 2 times for 30 seconds. Collect the chloroform layer and add chloroform to make to 25 ml. The color of this solution should not be more intense than that of reference solution. Separately, add water to 0.8 ml of Iron standard solution(0.01 mg/ml) to make 40 ml solution. And

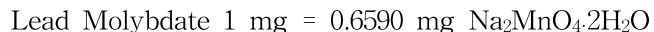
then add 5 ml of 10% Sodium hydroxide solution and boil it for 5 minutes. After cooling it, add 30 ml of 10% tartaric acid solution, transfer it into a separatory funnel. Add 20ml of hydroxylamine hydrochloride • ammonium perchlorate and 3 ml of ammonia water(2→5). After adjusting pH to pH 4, add 2 ml of 0.2% *o*-phenanthroline solution. Keep it at 20~35°C for 15 minutes and extract it by shaking strongly it with 10 ml of each chloroform 2 times for 30 seconds. Collect the chloroform layer and add chloroform to make to 25 ml. This dark reddish brown solution is used as reference solution(not more than 0.002%)

Reagent

Hydroxylamine hydrochloride • ammonium perchlorate solution : Add water to 25 g of hydroxylamine hydrochloride and 4.3 ml of 60% perchlorate solution and 200 ml of water and 46 ml of ammonia water. Adjust pH to pH 4 and add water to make to 500 ml.

Assay 0.6 g of Sodium Molybdate is precisely weighed and dissolved in 50 ml of water.

After adding 2 ml of acetic acid(1→3) and water to make to 200 ml, heat it until it starts to boil. Then boil it with lead acetate solution for 5 minutes and keep it to precipitate it. After filtering it, wash it until reaction of lead ion is disappeared. After ashing it at 560~625°C, weigh of lead molybdate.



Reagent

Lead acetate solution : After adding water to 1.5 g of lead acetate to make to 20 ml, add 5 drops of acetic acid.

436. Polyvinyl Alcohol

Definition Polyvinyl Alcohol is polymer(ester of polyvinyl is partly hydrolyzed).

Compositional Specifications of Polyvinyl Alcohol

Description Polyvinyl Alcohol is odorless as a white~pale yellow powder or granule.

Identification

- (1) Polyvinyl Alcohol is soluble in water and Polyvinyl Alcohol is insoluble in ethanol.
- (2) pH of Polyvinyl Alcohol solution(1→25) should be 5.0~6.5.
- (3) When Polyvinyl Alcohol proceed as directed under (1) potassium bromide disk method in Infrared Spectrophotometry, the maximum absorption should appear at the same wavelength as a Polyvinyl Alcohol standard.
- (4) After dissolving 0.01 g of Polyvinyl Alcohol in 100 ml of water, heat and cool it at room temperature. Add 1 drop of iodine solution and a few drops of boric acid to 5 ml of this solution and wait. And then the color shows blue.
- (5) After dissolving 0.5 g of Polyvinyl Alcohol in 10 ml of water, heat and cool it at room temperature. Add 1 drop of iodine solution to 5 ml of this solution and wait. And then the color shows dark red~blue.
- (6) When add 10 ml of ethanol to 5 ml of the rest solution (5), a white precipitation is generated.

- Purity**
- (1) Water Insoluble Substances : 10 g of Polyvinyl Alcohol, accurately weighed, dissolve in 100 ml of hot water. Insoluble substances are separated by a glass filter (100 mesh screen) and washed with 30 ml of hot water. The glass filter is dried for 2 hours at 105°C. The amount of insoluble substances should not be more than 0.1%.
 - (2) Particles Size : Take 100 g of Polyvinyl Alcohol and measure amount of passing through sieve of 100 mesh. The amount should be more than 99.0%.
 - (3) Lead : When 5.0 g of Polyvinyl Alcohol is tested by Atomic Absorption Spectrophotometry or Inductively Coupled Plasma Emission Spectroscopy, its content should not be more than 2.0 ppm.
 - (4) Methanol and Methyl acetate : 2.0 g of Polyvinyl Alcohol is accurately weighed into a 100 ml glass bottle with stopper, 98ml of water and 30 μ l of acetone are added. After the stopper is placed to bottle, mix it continually with boiling in water bath. When the solution is clear, take it out of the water bath and cool it at room temperature. This solution is used as test solution. Separately, make each concentration of methanol and methyl acetate to 1.2%(v/v). Take 2 ml of this solution and add 98ml of water and 30 μ l of acetone. Make solution by the above

same method on making test solution. This solution is used as standard solution(1 ml of this solution contains 0.24 μ l of methanol and 0.24 μ l of methyl acetate). Inject respectively each 0.4 μ l of methanol and methyl acetate to gas chromatography under below operation conditions. The content of methanol and methyl acetate are calculated by following formula, the content should not be more than 1.0% respectively.

$$\text{Content of Methanol(\%)} = \frac{Q_{T2}}{Q_{T1}} \times \frac{Q_{S1}}{Q_{S2}} \times 0.024 \times \frac{100}{\text{Weight of sample(g)}}$$

$$\text{Content of Methyl acetate(\%)} = \frac{Q_{T2}}{Q_{T1}} \times \frac{Q_{S1}}{Q_{S2}} \times 0.024 \times \frac{100}{\text{Weight of sample(g)}}$$

Q_{T1} : Peak area of acetone of test solution

Q_{T2} : Peak area of methanol of test solution

Q_{T2} : Peak area of methyl acetate of test solution

Q_{S1} : Peak area of acetone of standard solution

Q_{S2} : Peak area of methanol of standard solution

Q_{S2} : Peak area of methyl acetate of standard solution

Operation Conditions

Column : PLOT Q or its equivalent

Detector : Hydrogen Flame Ionization Detector (FID)

Temperature at injection hole: 160°C

Column Temperature : 160°C

Detector Temperature : 160°C

Carrier gas and flow rate : Nitrogen

- (5) Acid value : 3 g of Polyvinyl Alcohol is precisely weighted and taken into round bottom flask and dissolved in 250 ml of water. Put a magnetic bar into flask and attach a reflux condenser. Boil it in water bath for 30 minutes with mixing and cool it. 50 ml of this solution is used as test solution. When test solution is tested by Acid Value Test Methods in Flavoring Substances Test, the value should be not more than 3.
- (6) Ester value : 1 g of Polyvinyl Alcohol is precisely weighted and 25ml of 0.5 N alcoholic potassium hydroxide and 25 ml of water are added into 250 ml round bottom flask. A reflux condenser is attached and the solution is heated for 30 minutes in a water bath. Cool it and add 1 ml of phenolphthalein solution. Excess alkali is titrated with 0.5 N hydrochloric acid and ester value is calculated by the following equation. Ester value should be 125~153. Separately, a blank test is

carried out.

$$\text{Saponification Value} = \frac{(a-b) \times 28.05}{\text{Weight of sample(g)}}$$

a : Consumed amount of 0.5 N hydrochloric acid for blank test (ml)

b : Consumed amount of 0.5 N hydrochloric acid for Test Solution (ml)

- (7) Degree of Hydrolysis : Saponification Value(S_d) of the above (6) is calculated on the dried basis. And calculate degree of hydrolysis is calculated by following formula, the value should be 86.5~89.0%.

$$\text{Saponification Value (calculated on the dried basis, } S_d) = \frac{\text{Saponification Value} \times 100}{\text{Weight of sample(g)}}$$

$$\text{Degree of Hydrolysis (\%)} = 100 - \frac{7.84 \times S_d}{100 - (0.075 \times S_d)}$$

- (8) Viscosity : After drying Polyvinyl Alcohol, take precisely 6.0 g. Put it into 250 ml flask and add water of 140 ml and mix it with using a magnetic bar. When the solution is completely saturated, increase speed of stirring. After removing the effervescence, heat it by 90°C and keep it 5 minutes. And then stop heating and stir it for 1 hour. After adding a little water to make precisely 150 g, stir it to make this solution homogeneous. And cool it until the temperature of solution is about 15°C. When the viscosity is measured by Method 1 Capillary Viscosity Measurement in Viscosity at 20±0.1°C, it should be 4.8~5.8cps.

Loss on Drying When Polyvinyl Alcohol is dried for 3 hours at 150°C, the weight loss should not be more than 5.0%.

Residue on Ignition When thermogravimetric analysis is done with Polyvinyl Alcohol, the residue should not be more than 0.1%.