

Appendix

Atomic Weight Table(1983) ($^{12}\text{C}=12$)

Atomic weights of many elements are not conserved. They depend on the origins and their processing. Footnotes show the types of atomic weight changes conceivable for each element in detail. The values of atomic weights, $A_r(E)$, are applicable for the elements that are naturally occurring on Earth or for those few artificial ones. Although, it is considered appropriately in the footnotes, the reliability of the value can be considered to be ± 1 at the last effective number.

※ Footnotes

- G : There is a known geological exception, which exceeds the limit of a normal material, in an isotope composition for the element. It may exceed, to a certain degree, the reasonable uncertainty (the difference between the atomic weight of the element and the tabulated value).
- M : Due to unknown causes or carelessness during isotope separation, it is possible to find some commercial products with an isotope composition that is different from commonly known value. Therefore, the atomic weight of the element may differ from the indicated value.
- R : Since there is a variation in isotope composition for a normal material on earth, it is impossible to have atomic weight value with a greater accuracy. $A_r(E)$ value applies to all normal materials.
- A : This denotes a radioactive element on earth that does not have a characteristic isotope composition. Nuclide mass and half-life of one (or more) well known isotope are indicated with an asterisk.
- X : It has been confirmed that thorium consists of a single nuclide with rare exceptions. However, there are cases where measurable amount of ^{230}Th (ionium) is discovered in some places (most frequent in oceanic water).
- Y : Uranium does not have a stable isotope. However, it is the only element in nature that has a long life time isotope with a unique composition so that a meaningful atomic weight can be determined.
- * : Elements with no stable isotopes

The number in () represents the mass of an isotope which has the longest known half life for that element.

| Element Name | Atomic Symbol | Atomic Number | Atomic Weight | Foot Note | Element Name | Atomic Symbol | Atomic Number | Atomic Weight | Foot Note |
|--------------|---------------|---------------|---------------|-----------|--------------|---------------|---------------|---------------|-----------|
| Actinium | Ac | 89 | 227.0278 | A* | Nickel | Ni | 28 | 58.69 | |
| Aluminum | Al | 13 | 26.98154 | | Niobium | Nb | 41 | 92.9064 | |
| Americium | Am | 95 | (243) | A* | Nitrogen | N | 7 | 14.0067 | G |
| Antimony | Sb | 51 | 121.75±3 | | Nobelium | No | 102 | (259) | A* |
| Argon | Ar | 18 | 39.948 | G, R | Osmium | Os | 76 | 190.2 | G |
| Arsenic | As | 33 | 74.9216 | | Oxygen | O | 8 | 15.9994±3 | G, R |
| Astatine | At | 85 | (210) | A* | Palladium | Pd | 46 | 106.42 | G |
| Barium | Ba | 56 | 137.77 g | | Phosphorus | P | 15 | 30.97376 | |
| Berkelium | Bk | 97 | (247) | A* | Platinum | Pt | 78 | 195.08±3 | |
| Beryllium | Be | 4 | 9.01218 | | Plutonium | Pu | 94 | (244) | A* |
| Bismuth | Bi | 83 | 208.9804 | | Polonium | Po | 84 | (209) | A* |
| Boron | B | 5 | 10.811±5 | M, R | Potassium | K | 19 | 39.0983 | |
| Bromine | Br | 35 | 79.904 | | Praseodymium | Pr | 59 | 140.9077 | |
| Cadmium | Cd | 48 | 112.41 | G | Promethium | Pm | 61 | (145) | A* |
| Calcium | Ca | 20 | 40.078±4 | G | Protactinium | Pa | 91 | (231.0369) | A* |
| Californium | Cf | 98 | (251) | A* | Radium | Ra | 88 | (226.0254) | A* |
| Carbon | C | 6 | 12.011 | R | Radon | Rn | 86 | (222) | A* |
| Cerium | Ce | 58 | 140.12 | G | Rhenium | Re | 75 | 186.207 | |
| Cesium | Cs | 55 | 132.9054 | | Rhodium | Rh | 45 | 102.9055 | |
| Chlorine | Cl | 17 | 35.453 | | Rubidium | Rb | 37 | 85.4678±3 | G |
| Chromium | Cr | 24 | 51.9961±6 | | Ruthenium | Ru | 44 | 101.07±2 | G |
| Cobalt | Co | 27 | 58.9332 | | Samarium | Sm | 62 | 150.36±3 | G |
| Copper | Cu | 29 | 63.546±3 | R | Scandium | Sc | 21 | 44.95591 | |
| Curium | Cm | 96 | (247) | A* | Selenium | Se | 34 | 78.96±3 | |
| Dysprosium | Dy | 66 | 162.50±3 | G | Silicon | Si | 14 | 28.0855±3 | R |
| Einsteinium | Es | 99 | (252) | A* | Silver | Ag | 47 | 107.8682±3 | G |
| Erbium | Er | 68 | 167.26±3 g | | Fluorine | F | 9 | 18.998403 | |
| Europium | Eu | 63 | 151.96 | G | Francium | Fr | 87 | (223) | A* |
| Fermium | Fm | 100 | (257) | A* | Gadolinium | Gd | 64 | 157.25±3 | G |
| Neodymium | Nd | 60 | 144.24±3 | G | Gallium | Ga | 31 | 69.723±4 | |
| Neon | Ne | 10 | 20.179 | G, M | Germanium | Ge | 32 | 72.59±3 | |
| Neptunium | Np | 93 | 237.0482 | A* | Gold | Au | 79 | 196.9665 | |

| Element Name | Atomic Symbol | Atomic Number | Atomic Weight | Foot Note | Element Name | Atomic Symbol | Atomic Number | Atomic Weight | Foot Note |
|--------------|---------------|---------------|---------------|-----------|--------------|---------------|---------------|---------------|-----------|
| Hafnium | Hf | 72 | 178.49±3 | | Strontium | Sr | 38 | 87.62 | G |
| Helium | He | 2 | 4.002602±2 | G, R | Sulfur | S | 16 | 32.066±6 | R |
| Holmium | Ho | 67 | 164.9304 | | Tantalum | Ta | 73 | 180.9479 | |
| Hydrogen | H | 1 | 1.00794±7 | G, M, R | Technetium | Tc | 43 | (98) | A* |
| Indium | In | 49 | 114.82 | G | Tellurium | Te | 52 | 127.60±3 | G |
| Iodine | I | 53 | 126.9045 | | Terbium | Tb | 65 | 158.9254 | |
| Iridium | Ir | 77 | 192.22±3 | | Thallium | Tl | 81 | 204.383 | |
| Iron | Fe | 26 | 55.847±3 | | Thorium | Th | 90 | 232.0381 | G, X* |
| Krypton | Kr | 36 | 83.80 | G, M | Thulium | Tm | 69 | 168.9342 | |
| Lanthanum | La | 57 | 138.9055±3 | G | Tin | Sn | 50 | 118.710±7 | |
| Lawrencium | Lr | 103 | (206) | A* | Titanium | Ti | 22 | 47.88±3 | |
| Lead | Pb | 82 | 207.2 | G, R | Tungsten | W | 74 | 183.85±3 | |
| Lithium | Li | 3 | 6.941±2 | G, M, R | Uranium | U | 92 | 238.0289 | G, M, Y* |
| Lutetium | Lu | 71 | 174.967 | G | Vansdium | V | 23 | 50.9415 | |
| Magnesium | Mg | 12 | 24.305 | X | Xenon | Xe | 54 | 131.29±3 | G, M |
| Manganese | Mn | 25 | | | Ytterbium | Yb | 70 | 173.04±3 | G |
| Mendelevium | Md | 101 | (258) | A* | Yttrium | Y | 39 | 88.9059 | |
| Mercury | Hg | 80 | 200.59±3 | | Zinc | Zn | 30 | 65.39±3 | |
| Molybdenum | Mo | 42 | 95.94 | | Zirconium | Zr | 40 | 91.224±2 | G |
| Sodium | Na | 11 | 22.98977 | | | | | | |