



This is “Appendix H: Periodic Table of Elements”, appendix 8 from the book Principles of General Chemistry (index.html) (v. 1.0).

This book is licensed under a Creative Commons by-nc-sa 3.0 (<http://creativecommons.org/licenses/by-nc-sa/3.0/>) license. See the license for more details, but that basically means you can share this book as long as you credit the author (but see below), don't make money from it, and do make it available to everyone else under the same terms.

This content was accessible as of December 29, 2012, and it was downloaded then by Andy Schmitz (<http://lardbucket.org>) in an effort to preserve the availability of this book.

Normally, the author and publisher would be credited here. However, the publisher has asked for the customary Creative Commons attribution to the original publisher, authors, title, and book URI to be removed. Additionally, per the publisher's request, their name has been removed in some passages. More information is available on this project's attribution page (http://2012books.lardbucket.org/attribution.html?utm_source=header).

For more information on the source of this book, or why it is available for free, please see the project's home page (<http://2012books.lardbucket.org/>). You can browse or download additional books there.

Chapter 32

Appendix H: Periodic Table of Elements

Group
1
(1A)

Period — 1
1 — Atomic number
H — Symbol
1.00794 — Atomic mass

Main group elements

1 (1A) 2 (2A) 13 (3A) 14 (4A) 15 (5A) 16 (6A) 17 (7A) 18 (8A)

Metals
Semimetals
Nonmetals

Alkali metals
Alkaline earths
Halogens
Noble gases

| | | | | | | | | | | | | | | | | | | | |
|-------------------------|---------------------|-----------------------|-----------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|----------------------|---------------------|-----------------------|---------------------|----------------------|---------------------|
| 1 H 1.00794 | 2 He 4.002602 | | | | | | | | | | | 13 Al 26.9815386 | 14 Si 28.0855 | 15 P 30.973762 | 16 S 32.065 | 17 Cl 35.453 | 18 Ar 39.948 | | |
| 3 Li 6.941 | 4 Be 9.012182 | | | | | | | | | | | 31 Ga 69.723 | 32 Ge 72.64 | 33 As 74.92160 | 34 Se 78.96 | 35 Br 79.904 | 36 Kr 83.798 | | |
| 11 Na 22.98976928 | 12 Mg 24.3050 | 3 (3B) | 4 (4B) | 5 (5B) | 6 (6B) | 7 (7B) | 8 (8B) | 9 (8B) | 10 (8B) | 11 (11B) | 12 (12B) | 49 In 114.818 | 50 Sn 118.710 | 51 Sb 121.760 | 52 Te 127.60 | 53 I 126.90447 | 54 Xe 131.293 | | |
| 19 K 39.0983 | 20 Ca 40.078 | 21 Sc 44.955912 | 22 Ti 47.867 | 23 V 50.9415 | 24 Cr 51.9961 | 25 Mn 54.938045 | 26 Fe 55.845 | 27 Co 58.933195 | 28 Ni 58.6934 | 29 Cu 63.546 | 30 Zn 65.409 | 47 Ag 107.8682 | 48 Cd 112.411 | 49 In 114.818 | 50 Sn 118.710 | 51 Sb 121.760 | 52 Te 127.60 | 53 I 126.90447 | 54 Xe 131.293 |
| 37 Rb 85.4678 | 38 Sr 87.62 | 39 Y 88.90585 | 40 Zr 91.224 | 41 Nb 92.90638 | 42 Mo 95.94 | 43 Tc [98] | 44 Ru 101.07 | 45 Rh 102.90550 | 46 Pd 106.42 | 47 Ag 107.8682 | 48 Cd 112.411 | 79 Au 196.966569 | 80 Hg 200.59 | 81 Tl 204.3833 | 82 Pb 207.2 | 83 Bi 208.98040 | 84 Po [209] | 85 At [210] | 86 Rn [222] |
| 55 Cs 132.9054519 | 56 Ba 137.327 | 57 La 138.90547 | 72 Hf 178.49 | 73 Ta 180.94788 | 74 W 183.84 | 75 Re 186.207 | 76 Os 190.23 | 77 Ir 192.217 | 78 Pt 195.084 | 79 Au 196.966569 | 80 Hg 200.59 | 112 Uub [285] | 113 Uut [284] | 114 Uuq [289] | 115 Uup [288] | 116 Uuh [293] | | | |
| 87 Fr [223] | 88 Ra [226] | 89 Ac [227] | 104 Rf [267] | 105 Db [268] | 106 Sg [271] | 107 Bh [267] | 108 Hs [269] | 109 Mt [276] | 110 Ds [281] | 111 Rg [280] | 112 Uub [285] | 113 Uut [284] | 114 Uuq [289] | 115 Uup [288] | 116 Uuh [293] | | | | |
| Lanthanides | | 58 Ce 140.116 | 59 Pr 140.90765 | 60 Nd 144.242 | 61 Pm [145] | 62 Sm 150.36 | 63 Eu 151.964 | 64 Gd 157.25 | 65 Tb 158.92535 | 66 Dy 162.500 | 67 Ho 164.93032 | 68 Er 167.259 | 69 Tm 168.93421 | 70 Yb 173.04 | 71 Lu 174.967 | | | | |
| Actinides | | 90 Th 232.03806 | 91 Pa 231.03588 | 92 U 238.02891 | 93 Np [237] | 94 Pu [244] | 95 Am [243] | 96 Cm [247] | 97 Bk [247] | 98 Cf [251] | 99 Es [252] | 100 Fm [257] | 101 Md [258] | 102 No [259] | 103 Lr [262] | | | | |

Two systems for numbering periodic groups are shown: 1–18 is the system currently recommended by the International Union of Pure and Applied Chemistry (IUPAC); an older U.S. system, in which letters designate main group elements (A) and transition elements (B), is given in parentheses.

An atomic mass in brackets indicates the mass of the longest-lived isotope of an element having no stable isotopes.

Elements with atomic numbers 114 (ununquadium, 289 amu) and 116 (ununhexium, 293 amu) have been recognized by the International Union of Pure and Applied Chemistry (IUPAC). The collaborating scientists from the Joint Institute for Nuclear Research in Dubna, Russia, and Lawrence Livermore National Laboratory in California have been invited to propose names for the new elements. See <http://iupac.org/publications/pac/asap/PAC-REP-10-05-01>

| List of Elements | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------|--------------------|
| Name | Symbol | Atomic Number | Atomic Mass |
| Actinium | Ac | 89 | [227]* |
| Aluminum | Al | 13 | 26.9815386(8) |
| Americium | Am | 95 | [243]* |
| Antimony | Sb | 51 | 121.760(1) |
| Argon | Ar | 18 | 39.948(1) |
| Arsenic | As | 33 | 74.92160(2) |
| Astatine | At | 85 | [210]* |
| Barium | Ba | 56 | 137.327(7) |
| Berkelium | Bk | 97 | [247]* |
| Beryllium | Be | 4 | 9.012182(3) |
| Bismuth | Bi | 83 | 208.98040(1) |
| Bohrium | Bh | 107 | [267]* |
| Boron | B | 5 | 10.811(7) |
| Bromine | Br | 35 | 79.904(1) |
| Cadmium | Cd | 48 | 112.411(8) |
| Calcium | Ca | 20 | 40.078(4) |
| Californium | Cf | 98 | [251]* |
| Carbon | C | 6 | 12.0107(8) |
| Cerium | Ce | 58 | 140.116(1) |
| Cesium | Cs | 55 | 132.9054519(2) |
| Chlorine | Cl | 17 | 35.453(2) |
| Chromium | Cr | 24 | 51.9961(6) |
| <p>*Element has no stable isotope. A value enclosed in brackets, e.g. [209], indicates the mass number of the longest-lived isotope of the element. Three such elements (Th, Pa, and U), however, do have a characteristic terrestrial isotopic composition, and an atomic mass is given for them. An uncertainty in the last digit in the Atomic Mass column is shown by the number in parentheses; e.g., 1.00794(7) indicates ± 0.00007.</p> | | | |
| <p>†Element 112 named shortly before the release of this text. Other periodic tables in this version of the text may refer to it as Ununbium (Uub).</p> | | | |

| List of Elements | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------|--------------------|
| Name | Symbol | Atomic Number | Atomic Mass |
| Cobalt | Co | 27 | 58.933195(5) |
| Copernicium† | Cn | 112 | [285]* |
| Copper | Cu | 29 | 63.546(3) |
| Curium | Cm | 96 | [247]* |
| Darmstadtium | Ds | 110 | [281]* |
| Dubnium | Db | 105 | [268]* |
| Dysprosium | Dy | 66 | 162.500(1) |
| Einsteinium | Es | 99 | [252]* |
| Erbium | Er | 68 | 167.259(3) |
| Europium | Eu | 63 | 151.964(1) |
| Fermium | Fm | 100 | [257]* |
| Fluorine | F | 9 | 18.9984032(5) |
| Francium | Fr | 87 | [223]* |
| Gadolinium | Gd | 64 | 157.25(3) |
| Gallium | Ga | 31 | 69.723(1) |
| Germanium | Ge | 32 | 72.64(1) |
| Gold | Au | 79 | 196.966569(4) |
| Hafnium | Hf | 72 | 178.49(2) |
| Hassium | Hs | 108 | [269]* |
| Helium | He | 2 | 4.002602(2) |
| Holmium | Ho | 67 | 164.93032(2) |
| Hydrogen | H | 1 | 1.00794(7) |
| <p>*Element has no stable isotope. A value enclosed in brackets, e.g. [209], indicates the mass number of the longest-lived isotope of the element. Three such elements (Th, Pa, and U), however, do have a characteristic terrestrial isotopic composition, and an atomic mass is given for them. An uncertainty in the last digit in the Atomic Mass column is shown by the number in parentheses; e.g., 1.00794(7) indicates ± 0.00007.</p> | | | |
| <p>†Element 112 named shortly before the release of this text. Other periodic tables in this version of the text may refer to it as Ununbium (Uub).</p> | | | |

| List of Elements | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------|--------------------|
| Name | Symbol | Atomic Number | Atomic Mass |
| Indium | In | 49 | 114.818(3) |
| Iodine | I | 53 | 126.90447(3) |
| Iridium | Ir | 77 | 192.217(3) |
| Iron | Fe | 26 | 55.845(2) |
| Krypton | Kr | 36 | 83.798(2) |
| Lanthanum | La | 57 | 138.90547(7) |
| Lawrencium | Lr | 103 | [262]* |
| Lead | Pb | 82 | 207.2(1) |
| Lithium | Li | 3 | 6.941(2) |
| Lutetium | Lu | 71 | 174.967(1) |
| Magnesium | Mg | 12 | 24.3050(6) |
| Manganese | Mn | 25 | 54.938045(5) |
| Meitnerium | Mt | 109 | [276]* |
| Mendelevium | Md | 101 | [258]* |
| Mercury | Hg | 80 | 200.59(2) |
| Molybdenum | Mo | 42 | 95.94(2) |
| Neodymium | Nd | 60 | 144.242(3) |
| Neon | Ne | 10 | 20.1797(6) |
| Neptunium | Np | 93 | [237]* |
| Nickel | Ni | 28 | 58.6934(2) |
| Niobium | Nb | 41 | 92.90638(2) |
| Nitrogen | N | 7 | 14.0067(2) |
| <p>*Element has no stable isotope. A value enclosed in brackets, e.g. [209], indicates the mass number of the longest-lived isotope of the element. Three such elements (Th, Pa, and U), however, do have a characteristic terrestrial isotopic composition, and an atomic mass is given for them. An uncertainty in the last digit in the Atomic Mass column is shown by the number in parentheses; e.g., 1.00794(7) indicates ± 0.00007.</p> | | | |
| <p>†Element 112 named shortly before the release of this text. Other periodic tables in this version of the text may refer to it as Ununbium (Uub).</p> | | | |

| List of Elements | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------|--------------------|
| Name | Symbol | Atomic Number | Atomic Mass |
| Nobelium | No | 102 | [259]* |
| Osmium | Os | 76 | 190.23(3) |
| Oxygen | O | 8 | 15.9994(3) |
| Palladium | Pd | 46 | 106.42(1) |
| Phosphorus | P | 15 | 30.973762(2) |
| Platinum | Pt | 78 | 195.084(9) |
| Plutonium | Pu | 94 | [244]* |
| Polonium | Po | 84 | [209]* |
| Potassium | K | 19 | 39.0983(1) |
| Praseodymium | Pr | 59 | 140.90765(2) |
| Promethium | Pm | 61 | [145]* |
| Protactinium | Pa | 91 | 231.03588(2)* |
| Radium | Ra | 88 | [226]* |
| Radon | Rn | 86 | [222]* |
| Rhenium | Re | 75 | 186.207(1) |
| Rhodium | Rh | 45 | 102.90550(2) |
| Roentgenium | Rg | 111 | [280]* |
| Rubidium | Rb | 37 | 85.4678(3) |
| Ruthenium | Ru | 44 | 101.07(2) |
| Rutherfordium | Rf | 104 | [267]* |
| Samarium | Sm | 62 | 150.36(2) |
| Scandium | Sc | 21 | 44.955912(6) |
| <p>*Element has no stable isotope. A value enclosed in brackets, e.g. [209], indicates the mass number of the longest-lived isotope of the element. Three such elements (Th, Pa, and U), however, do have a characteristic terrestrial isotopic composition, and an atomic mass is given for them. An uncertainty in the last digit in the Atomic Mass column is shown by the number in parentheses; e.g., 1.00794(7) indicates ± 0.00007.</p> | | | |
| <p>†Element 112 named shortly before the release of this text. Other periodic tables in this version of the text may refer to it as Ununbium (Uub).</p> | | | |

| List of Elements | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------|--------------------|
| Name | Symbol | Atomic Number | Atomic Mass |
| Seaborgium | Sg | 106 | [271]* |
| Selenium | Se | 34 | 78.96(3) |
| Silicon | Si | 14 | 28.0855(3) |
| Silver | Ag | 47 | 107.8682(2) |
| Sodium | Na | 11 | 22.98976928(2) |
| Strontium | Sr | 38 | 87.62(1) |
| Sulfur | S | 16 | 32.065(5) |
| Tantalum | Ta | 73 | 180.94788(2) |
| Technetium | Tc | 43 | [98]* |
| Tellurium | Te | 52 | 127.60(3) |
| Terbium | Tb | 65 | 158.92535(2) |
| Thallium | Tl | 81 | 204.3833(2) |
| Thorium | Th | 90 | 232.03806(2)* |
| Thulium | Tm | 69 | 168.93421(2) |
| Tin | Sn | 50 | 118.710(7) |
| Titanium | Ti | 22 | 47.867(1) |
| Tungsten | W | 74 | 183.84(1) |
| Ununhexium | Uuh | 116 | [293]* |
| Ununpentium | Uup | 115 | [288]* |
| Ununquadium | Uuq | 114 | [289]* |
| Ununtrium | Uut | 113 | [284]* |
| Uranium | U | 92 | 238.02891(3)* |
| <p>*Element has no stable isotope. A value enclosed in brackets, e.g. [209], indicates the mass number of the longest-lived isotope of the element. Three such elements (Th, Pa, and U), however, do have a characteristic terrestrial isotopic composition, and an atomic mass is given for them. An uncertainty in the last digit in the Atomic Mass column is shown by the number in parentheses; e.g., 1.00794(7) indicates ± 0.00007.</p> | | | |
| <p>†Element 112 named shortly before the release of this text. Other periodic tables in this version of the text may refer to it as Ununbium (Uub).</p> | | | |

| List of Elements | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------|--------------------|
| Name | Symbol | Atomic Number | Atomic Mass |
| Vanadium | V | 23 | 50.9415(1) |
| Xenon | Xe | 54 | 131.293(6) |
| Ytterbium | Yb | 70 | 173.04(3) |
| Yttrium | Y | 39 | 88.90585(2) |
| Zinc | Zn | 30 | 65.409(4) |
| Zirconium | Zr | 40 | 91.224(2) |
| <p>*Element has no stable isotope. A value enclosed in brackets, e.g. [209], indicates the mass number of the longest-lived isotope of the element. Three such elements (Th, Pa, and U), however, do have a characteristic terrestrial isotopic composition, and an atomic mass is given for them. An uncertainty in the last digit in the Atomic Mass column is shown by the number in parentheses; e.g., 1.00794(7) indicates ± 0.00007.</p> | | | |
| <p>†Element 112 named shortly before the release of this text. Other periodic tables in this version of the text may refer to it as Ununbium (Uub).</p> | | | |

Source of data: Atomic weights of the elements 2001 (IUPAC Technical Report) as supplemented by the Table of Standard Atomic Weights 2005 (to be published in Pure and Applied Chemistry) on the IUPAC web site, and “Nuclear Data Sheets for A-266-294” (to be published in Nuclear Data Sheets) at <http://www.nndc.bnl.gov/superheavy.pdf>.