

## 4. PERIODIC TABLE OF THE ELEMENTS

**Table 4.1.** Revised 2010 by D.E. Groom (LBNL), and E. Bergren. Atomic weights of stable elements are adapted from the Commission on Isotopic Abundances and Atomic Weights, “Atomic Weights of the Elements 2007,” <http://www.chem.qmul.ac.uk/iupac/AtWt/>. The atomic number (top left) is the number of protons in the nucleus. The atomic mass (bottom) of a stable elements is weighted by isotopic abundances in the Earth’s surface. If the element has no stable isotope, the atomic mass (in parentheses) of the most stable isotope currently known is given. In this case the mass is from <http://www.nndc.bnl.gov/amdc/masstables/Ame2003/mass.mas03> and the longest-lived isotope is from [www.nndc.bnl.gov/ensdf/zaf.form.jsp](http://www.nndc.bnl.gov/ensdf/zaf.form.jsp). The exceptions are Th, Pa, and U, which do have characteristic terrestrial compositions. Atomic masses are relative to the mass of  $^{12}\text{C}$ , defined to be exactly 12 unified atomic mass units (u) (approx. g/mole). Relative isotopic abundances often vary considerably, both in natural and commercial samples; this is reflected in the number of significant figures given. Previously confirmed element 112 was named Copernicium (Cp). The discovery of element 114 was confirmed in 2009. There are no other confirmed elements with  $Z > 112$ .

1 IA	<b>PERIODIC TABLE OF THE ELEMENTS</b>																		18 VIIIA
1 H Hydrogen 1.00794	2 IIA Beryllium 9.012182	3 Li Lithium 6.941	4 Be Beryllium 9.012182	5 Mg Magnesium 24.3050	6 VIB VIIIB	7 VIIIB	8	9	10	11 IB	12 IIB	13 III A Boron 10.811	14 IV A Carbon 12.0107	15 V A Nitrogen 14.0067	16 VI A Oxygen 15.9994	17 VII A Fluorine 18.9984032	2 He Helium 4.002602	10 Ne Neon 20.1797	
11 Na Sodium 22.98976928	12 Mg Magnesium 24.3050	3 IIIB IVB	4 VB	5 VIB	6 VIIIB	7 VIIIB	8	9	10	11 IB	12 IIB	13 Al Aluminum 26.9815386	14 Si Silicon 28.0855	15 P Phosph. 30.973762	16 S Sulfur 32.065	17 Cl Chlorine 35.453	18 Ar Argon 39.948		
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955912	22 Ti Titanium 47.867	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938045	26 Fe Iron 55.845	27 Co Cobalt 58.933195	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge German. 72.64	33 As Arsenic 74.92160	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.798		
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybd. 95.96	43 Tc Technet. (97.90722)	44 Ru Ruthen. 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.90447	54 Xe Xenon 131.293		
55 Cs Cesium 132.9054519	56 Ba Barium 137.327	57–71 Lanthanides 178.49	72 Hf Hafnium 180.94788	73 Ta Tantalum 183.84	74 W Tungsten 186.207	75 Re Rhenium 190.23	76 Os Osmium 192.217	77 Ir Iridium 195.084	78 Pt Platinum 196.966569	79 Au Gold 200.59	80 Hg Mercury 204.3833	81 Tl Thallium 204.98040	82 Pb Lead 207.2	83 Bi Bismuth (208.98243)	84 Po Polonium (208.98243)	85 At Astatine (209.98715)	86 Rn Radon (222.01758)		
87 Fr Francium (223.01974)	88 Ra Radium (226.02541)	89–103 Actinides (267.122)	104 Rf Rutherford (268.125)	105 Db Dubnium (271.133)	106 Sg Seaborg. (270.134)	107 Bh Bohrium (269.134)	108 Hs Hassium (276.151)	109 Mt Meitner. (281.162)	110 Ds Darmstadt. (280.164)	111 Rg Roentgen. (277)	112 Cp Copernicium (288)	114							

Lanthanide series	57 La Lanthan. 138.90547	58 Ce Cerium 140.116	59 Pr Praseodym. 140.90765	60 Nd Neodym. 144.242	61 Pm Prometh. (144.91275)	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolin. 157.25	65 Tb Terbium 158.92535	66 Dy Dyspros. 162.500	67 Ho Holmium 164.93032	68 Er Erbium 167.259	69 Tm Thulium 168.93421	70 Yb Ytterbium 173.054	71 Lu Lutetium 174.9668
	89 Ac Actinium (227.02775)	90 Th Thorium 232.03806	91 Pa Protactin. 231.03588	92 U Uranium 238.02891	93 Np Neptunium (237.04817)	94 Pu Plutonium (244.06420)	95 Am Americ. (243.06138)	96 Cm Curium (247.07035)	97 Bk Berkelium (247.07031)	98 Cf Californ. (251.07959)	99 Es Einstein. (252.0830)	100 Fm Fermium (257.09510)	101 Md Mendelev. (258.09843)	102 No Nobelium (259.1010)	103 Lr Lawrenc. (262.110)