IUPAC Periodic Table of the Elements

1																	18
1 **H** hydrogen 1.007 94(7)	2		Key: atomic number / **Symbol** / name / standard atomic weight									13	14	15	16	17	2 **He** helium 4.002 602(2)
3 **Li** lithium 6.941(2)	4 **Be** beryllium 9.012 182(3)											5 **B** boron 10.811(7)	6 **C** carbon 12.0107(8)	7 **N** nitrogen 14.0067(2)	8 **O** oxygen 15.9994(3)	9 **F** fluorine 18.998 4032(5)	10 **Ne** neon 20.1797(6)
11 **Na** sodium 22.989 769 28(2)	12 **Mg** magnesium 24.3050(6)	3	4	5	6	7	8	9	10	11	12	13 **Al** aluminium 26.981 5386(8)	14 **Si** silicon 28.0855(3)	15 **P** phosphorus 30.973 762(2)	16 **S** sulfur 32.065(5)	17 **Cl** chlorine 35.453(2)	18 **Ar** argon 39.948(1)
19 **K** potassium 39.0983(1)	20 **Ca** calcium 40.078(4)	21 **Sc** scandium 44.955 912(6)	22 **Ti** titanium 47.867(1)	23 **V** vanadium 50.9415(1)	24 **Cr** chromium 51.9961(6)	25 **Mn** manganese 54.938 045(5)	26 **Fe** iron 55.845(2)	27 **Co** cobalt 58.933 195(5)	28 **Ni** nickel 58.6934(2)	29 **Cu** copper 63.546(3)	30 **Zn** zinc 65.409(4)	31 **Ga** gallium 69.723(1)	32 **Ge** germanium 72.64(1)	33 **As** arsenic 74.921 60(2)	34 **Se** selenium 78.96(3)	35 **Br** bromine 79.904(1)	36 **Kr** krypton 83.798(2)
37 **Rb** rubidium 85.4678(3)	38 **Sr** strontium 87.62(1)	39 **Y** yttrium 88.905 85(2)	40 **Zr** zirconium 91.224(2)	41 **Nb** niobium 92.906 38(2)	42 **Mo** molybdenum 95.94(2)	43 **Tc** technetium [98]	44 **Ru** ruthenium 101.07(2)	45 **Rh** rhodium 102.905 50(2)	46 **Pd** palladium 106.42(1)	47 **Ag** silver 107.8682(2)	48 **Cd** cadmium 112.411(8)	49 **In** indium 114.818(3)	50 **Sn** tin 118.710(7)	51 **Sb** antimony 121.760(1)	52 **Te** tellurium 127.60(3)	53 **I** iodine 126.904 47(3)	54 **Xe** xenon 131.293(6)
55 **Cs** caesium 132.905 4519(2)	56 **Ba** barium 137.327(7)	57-71 lanthanoids	72 **Hf** hafnium 178.49(2)	73 **Ta** tantalum 180.947 88(2)	74 **W** tungsten 183.84(1)	75 **Re** rhenium 186.207(1)	76 **Os** osmium 190.23(3)	77 **Ir** iridium 192.217(3)	78 **Pt** platinum 195.084(9)	79 **Au** gold 196.966 569(4)	80 **Hg** mercury 200.59(2)	81 **Tl** thallium 204.3833(2)	82 **Pb** lead 207.2(1)	83 **Bi** bismuth 208.980 40(1)	84 **Po** polonium [209]	85 **At** astatine [210]	86 **Rn** radon [222]
87 **Fr** francium [223]	88 **Ra** radium [226]	89-103 actinoids	104 **Rf** rutherfordium [261]	105 **Db** dubnium [262]	106 **Sg** seaborgium [266]	107 **Bh** bohrium [264]	108 **Hs** hassium [277]	109 **Mt** meitnerium [268]	110 **Ds** darmstadtium [271]	111 **Rg** roentgenium [272]							

57 **La** lanthanum 138.905 47(7)	58 **Ce** cerium 140.116(1)	59 **Pr** praseodymium 140.907 65(2)	60 **Nd** neodymium 144.242(3)	61 **Pm** promethium [145]	62 **Sm** samarium 150.36(2)	63 **Eu** europium 151.964(1)	64 **Gd** gadolinium 157.25(3)	65 **Tb** terbium 158.925 35(2)	66 **Dy** dysprosium 162.500(1)	67 **Ho** holmium 164.930 32(2)	68 **Er** erbium 167.259(3)	69 **Tm** thulium 168.934 21(2)	70 **Yb** ytterbium 173.04(3)	71 **Lu** lutetium 174.967(1)
89 **Ac** actinium [227]	90 **Th** thorium 232.038 06(2)	91 **Pa** protactinium 231.035 88(2)	92 **U** uranium 238.028 91(3)	93 **Np** neptunium [237]	94 **Pu** plutonium [244]	95 **Am** americium [243]	96 **Cm** curium [247]	97 **Bk** berkelium [247]	98 **Cf** californium [251]	99 **Es** einsteinium [252]	100 **Fm** fermium [257]	101 **Md** mendelevium [258]	102 **No** nobelium [259]	103 **Lr** lawrencium [262]

Notes

- "Aluminum" and "cesium" are commonly used alternative spellings for "aluminium" and "caesium."
- IUPAC 2005 standard atomic weights (mean relative atomic masses) as approved at the 43rd IUPAC General Assembly in Beijing, China in August 2005 are listed with uncertainties in the last figure in parentheses [M. E. Wieser, *Pure Appl. Chem.*, in press]. These values correspond to current best knowledge of the elements in natural terrestrial sources. For elements that have no stable or long-lived nuclides, the mass number of the nuclide with the longest confirmed half-life is listed between square brackets.
- Elements with atomic numbers 112 and above have been reported but not fully authenticated.

General Data and Fundamental Constants

Speed of light in vacuum	c_0	299 792 458 m s^{-1} (defined)
Elementary charge	e	1.602 176 53(14) x 10^{-19} C
Boltzmann constant	k, k_B	1.380 650 5(24) x 10^{-23} J K^{-1}
Planck constant	h $\hbar = h/2\pi$	6.626 069 3(11) x 10^{-34} J s 1.054 571 68(18) x 10^{-34} J s
Avogadro constant	L, N_A	6.022 141 5(10) x 10^{23} mol^{-1}
Gas constant	R	8.314 472 (15) J K^{-1} mol^{-1}
Faraday constant	F	9.648 533 83(83) x 10^4 C mol^{-1}

Atomic mass constant (dalton, or unified atomic mass unit, $m(^{12}C)/12$)	m_u = Da = u	1.660 538 86(28) x 10^{-27} kg
Electron rest mass	m_e	9.109 382 6(16) x 10^{-31} kg
Proton rest mass	m_p	1.672 621 71(29) x 10^{-27} kg
Neutron rest mass	m_n	1.674 927 28(29) x 10^{-27} kg

Permeability of vacuum (or magnetic constant)	μ_0	4π x 10^{-7} H m^{-1} (defined) *Note:* H m^{-1} = N A^{-2} = N s^2 C^{-2}
Permittivity of vacuum (or electric constant)	$\varepsilon_0 = 1/\mu_0 c_0^2$	8.854 187 816... x 10^{-12} F m^{-1} *Note:* F m^{-1} = C^2 J^{-1} m^{-1}
Bohr magneton	$\mu_B = e\hbar/2m_e$	9.274 009 49(80) x 10^{-24} J T^{-1}
Nuclear magneton	$\mu_N = (m_e/m_p)\mu_B$	5.050 783 43(43) x 10^{-27} J T^{-1}
Landé g-factor for free electron	g_e	2.002 319 304 371 8(75)

Fine structure constant	$\alpha = \mu_0 e^2 c_0 / 2h$	7.297 352 568(24) x 10^{-3}
Second radiation constant	$c_2 = hc_0/k$	1.438 775 2(25) x 10^{-2} m K
Stefan-Boltzmann constant	$\sigma = 2\pi^5 k^4 / 15h^3 c_0^2$	5.670 400(40) x 10^{-8} W m^{-2} K^{-4}
Bohr radius	$a_0 = 4\pi \varepsilon_0 \hbar^2 / m_e e^2$	5.291 772 108(18) x 10^{-11} m
Hartree energy	$E_h = \hbar^2 / m_e a_0^2$	4.359 744 17(75) x 10^{-18} J
Rydberg constant	$R_\infty = E_h / 2hc_0$	1.097 373 156 852 5(73) x 10^7 m^{-1}

Standard acceleration of free fall g_n	9.806 65 m s^{-2} (defined)
Gravitational constant G	6.674 2(10) x 10^{-11} m^3 kg^{-1} s^{-2}
Zero of Celsius scale	273.15 K (defined)
Molar volume of ideal gas, p = 1 bar and T = 273.15 K	22.710 981 (40) L mol^{-1}
Standard atmosphere	101 325 Pa (defined)
RT at 298.15 K	2.4790 kJ mol^{-1}

PRESSURE CONVERSION FACTORS

	Pa	atm	Torr
1 Pa =	1	9.869 23 x 10^{-6}	7.500 62 x 10^{-3}
1 atm =	101 325	1	760
1 Torr =	133.322	1.315 79 x 10^{-3}	1

Example of the use of this table: 1 atm = 101 325 Pa
Notes: 1 mmHg = 1 Torr ; 1 bar = 10^5 Pa

ENERGY CONVERSION FACTORS

	energy E			molar energy E_m	wavenumber $\tilde{\nu}$
	J	eV	E_h	kJ/mol	cm^{-1}
1 aJ	10^{-18}	6.241 509	0.229 3713	602.2142	50 341.17
1 eV	1.602 177 x 10^{-19}	1	3.674 932 x 10^{-2}	96.485 34	8 065.544
1 E_h	4.359 744 x 10^{-18}	27.211 38	1	2625.500	219 474.6
1 kJ/mol	1.660 539 x 10^{-21}	1.036 427 x 10^{-2}	3.808 799 x 10^{-4}	1	83.593 47
1 cm^{-1}	1.986 446 x 10^{-23}	1.239 842 x 10^{-4}	4.556 335 x 10^{-6}	11.962 66 x 10^{-3}	1

Example of the use of this table: 1 eV 'corresponds to' or 'is equivalent to' 96.485 34 kJ/mol
Note: 1 cal = 4.184 J

Source: The National Institute of Standards and Technology (NIST) reference on Constants, Units, and Uncertainties (2002 values) <http://physics.nist.gov/cuu/constants>.