

## PERIODIC TABLE OF THE ELEMENTS

Main groups												Main groups																							
1A <sup>a</sup>		2A												3A		4A		5A		6A		7A		8A											
1		2												13		14		15		16		17		18											
1 <b>H</b> 1.00794														5 <b>B</b> 10.811		6 <b>C</b> 12.0107		7 <b>N</b> 14.0067		8 <b>O</b> 15.9994		9 <b>F</b> 18.998403		10 <b>Ne</b> 20.1797											
3 <b>Li</b> 6.941		4 <b>Be</b> 9.012182		Transition metals										13 <b>Al</b> 26.981538		14 <b>Si</b> 28.0855		15 <b>P</b> 30.973761		16 <b>S</b> 32.065		17 <b>Cl</b> 35.453		18 <b>Ar</b> 39.948											
11 <b>Na</b> 22.989770		12 <b>Mg</b> 24.3050		3B 3		4B 4		5B 5		6B 6		7B 7		8B 8 9 10		1B 11		2B 12		31 <b>Ga</b> 69.723		32 <b>Ge</b> 72.64		33 <b>As</b> 74.92160		34 <b>Se</b> 78.96		35 <b>Br</b> 79.904		36 <b>Kr</b> 83.80					
19 <b>K</b> 39.0983		20 <b>Ca</b> 40.078		21 <b>Sc</b> 44.955910		22 <b>Ti</b> 47.867		23 <b>V</b> 50.9415		24 <b>Cr</b> 51.9961		25 <b>Mn</b> 54.938049		26 <b>Fe</b> 55.845		27 <b>Co</b> 58.933200		28 <b>Ni</b> 58.6934		29 <b>Cu</b> 63.546		30 <b>Zn</b> 65.39		31 <b>Ga</b> 69.723		32 <b>Ge</b> 72.64		33 <b>As</b> 74.92160		34 <b>Se</b> 78.96		35 <b>Br</b> 79.904		36 <b>Kr</b> 83.80	
37 <b>Rb</b> 85.4678		38 <b>Sr</b> 87.62		39 <b>Y</b> 88.90585		40 <b>Zr</b> 91.224		41 <b>Nb</b> 92.90638		42 <b>Mo</b> 95.94		43 <b>Tc</b> [98]		44 <b>Ru</b> 101.07		45 <b>Rh</b> 102.90550		46 <b>Pd</b> 106.42		47 <b>Ag</b> 107.8682		48 <b>Cd</b> 112.411		49 <b>In</b> 114.818		50 <b>Sn</b> 118.710		51 <b>Sb</b> 121.760		52 <b>Te</b> 127.60		53 <b>I</b> 126.90447		54 <b>Xe</b> 131.293	
55 <b>Cs</b> 132.90545		56 <b>Ba</b> 137.327		71 <b>Lu</b> 174.967		72 <b>Hf</b> 178.49		73 <b>Ta</b> 180.9479		74 <b>W</b> 183.84		75 <b>Re</b> 186.207		76 <b>Os</b> 190.23		77 <b>Ir</b> 192.217		78 <b>Pt</b> 195.078		79 <b>Au</b> 196.96655		80 <b>Hg</b> 200.59		81 <b>Tl</b> 204.3833		82 <b>Pb</b> 207.2		83 <b>Bi</b> 208.98038		84 <b>Po</b> [208.98]		85 <b>At</b> [209.99]		86 <b>Rn</b> [222.02]	
87 <b>Fr</b> [223.02]		88 <b>Ra</b> [226.03]		103 <b>Lr</b> [262.11]		104 <b>Rf</b> [261.11]		105 <b>Db</b> [262.11]		106 <b>Sg</b> [266.12]		107 <b>Bh</b> [264.12]		108 <b>Hs</b> [269.13]		109 <b>Mt</b> [268.14]		110 <b>Ds</b> [271.15]		111 <b>Rg</b> [272.15]		112 <b>Cn</b> [285]		113		114 <b>Fl</b> [289]		115		116 <b>Lv</b> [292]		117*		118	
				*Lanthanide series																															
				†Actinide series																															

<sup>a</sup>The labels on top (1A, 2A, etc.) are common American usage. The labels below these (1, 2, etc.) are those recommended by the International Union of Pure and Applied Chemistry.

Atomic weights in brackets are the masses of the longest-lived or most important isotope of radioactive elements.

Further information is available at <http://www.shef.ac.uk/chemistry/web-elements/>

\*Element 117 is currently under review by IUPAC

### USEFUL CONVERSION FACTORS AND RELATIONSHIPS

<b>Length</b>	<b>Energy (derived)</b>
<i>SI unit: meter (m)</i>	<i>SI unit: Joule (J)</i>
1 km = 0.62137 mi	1 J = 1 kg·m <sup>2</sup> /s <sup>2</sup>
1 mi = 5280 ft	1 J = 0.2390 cal
= 1.6093 km	= 1 C × 1 V
1 m = 1.0936 yd	1 cal = 4.184 J
1 in. = 2.54 cm (exactly)	1 eV = 1.602 × 10 <sup>-19</sup> J
1 cm = 0.39370 in.	
1 Å = 10 <sup>-10</sup> m	<b>Pressure (derived)</b>
	<i>SI unit: Pascal (Pa)</i>
<b>Mass</b>	1 Pa = 1 N/m <sup>2</sup>
<i>SI unit: kilogram (kg)</i>	= 1 kg/m·s <sup>2</sup>
1 kg = 2.2046 lb	1 atm = 101,325 Pa
1 lb = 453.59 g	= 760 torr
= 16 oz	= 14.70 lb/in <sup>2</sup>
1 amu = 1.66053873 × 10 <sup>-24</sup> g	1 bar = 10 <sup>5</sup> Pa
<b>Temperature</b>	<b>Volume (derived)</b>
<i>SI unit: Kelvin (K)</i>	<i>SI unit: cubic meter (m<sup>3</sup>)</i>
0 K = -273.15°C	1 L = 10 <sup>-3</sup> m <sup>3</sup>
= -459.67°F	= 1 dm <sup>3</sup>
K = °C + 273.15	= 10 <sup>3</sup> cm <sup>3</sup>
°C = $\frac{5}{9}$ (°F - 32°)	= 1.0567 qt
°F = $\frac{9}{5}$ °C + 32°	1 gal = 4 qt
	= 3.7854 L
	1 cm <sup>3</sup> = 1 mL
	1 in <sup>3</sup> = 16.4 cm <sup>3</sup>

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### FUNDAMENTAL CONSTANTS\*

Atomic mass unit	1 amu = 1.66053873 × 10 <sup>-24</sup> g
	1 g = 6.02214199 × 10 <sup>23</sup> amu
Avogadro's number	<i>N</i> = 6.02214199 × 10 <sup>23</sup> /mol
Boltzmann's constant	<i>k</i> = 1.3806503 × 10 <sup>-23</sup> J/K
Electron charge	<i>e</i> = 1.602176462 × 10 <sup>-19</sup> C
Faraday's constant	<i>F</i> = 9.64853415 × 10 <sup>4</sup> C/mol
Gas constant	<i>R</i> = 0.082058205 L·atm/mol·K
Mass of electron	<i>m<sub>e</sub></i> = 5.485799 × 10 <sup>-4</sup> amu
	= 9.10938188 × 10 <sup>-28</sup> g
Mass of neutron	<i>m<sub>n</sub></i> = 1.0086649 amu
	= 1.67492716 × 10 <sup>-24</sup> g
Mass of proton	<i>m<sub>p</sub></i> = 1.0072765 amu
	= 1.67262158 × 10 <sup>-24</sup> g
Pi	π = 3.1415927
Planck's constant	<i>h</i> = 6.62606876 × 10 <sup>-34</sup> J·s
Speed of light	<i>c</i> = 2.99792458 × 10 <sup>8</sup> m/s

\*Fundamental constants are listed at the National Institute of Standards and Technology website: <http://physics.nist.gov/PhysRefData/constants.html>



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