Periodic Table of the Elements

Free Downloads at Vertex42.com

Period	GROUP 1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8 VIII	9 VIII	10 VIII	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 1.00794 H $^2S_{1/2}$ 2.2 Hydrogen 0.0899 13.5984 -259.14 -252.87 (v) 37 - $1s^1$ +1,-1																	2 4.002602 He $^1S_0$ - Helium 0.1785 24.5874 - -268.93 (v) 32 - $1s^2$ 0
2	3 6.941 Li $^2S_{1/2}$ 0.98 Lithium 0.535 5.3917 180.54 1342 (m) 152 BCC [He] $2s^1$ +1	4 9.012182 Be $^1S_0$ 1.57 Beryllium 1.848 9.3227 1287 2470 (m) 112 HCP [He] $2s^2$ +2											5 10.811 B $^2P^o_{1/2}$ 2.04 Boron 2.46 8.2980 2075 4000 (v) 82 rhom. [He] $2s^2$ $2p^1$ +3	6 12.0107 C $^3P_0$ 2.55 Carbon 2.26 11.2603 3550 4027 (v) 77 hex [He] $2s^2$ $2p^2$ +2,4,-4	7 14.0067 N $^4S^o_{3/2}$ 3.04 Nitrogen 1.251 14.5341 -210.1 -195.79 (v) 75 - [He] $2s^2$ $2p^3$ +2,3,4,5,-2,-3	8 15.9994 O $^3P_2$ 3.44 Oxygen 1.429 13.6181 -218.3 -182.9 (v) 73 - [He] $2s^2$ $2p^4$ -2	9 18.9984032 F $^2P^o_{3/2}$ 3.98 Fluorine 1.696 17.4228 -219.6 -188.12 (v) 71 - [He] $2s^2$ $2p^5$ -1	10 20.1797 Ne $^1S_0$ - Neon 0.9 21.5645 -248.59 -246.08 (v) 69 - [He] $2s^2$ $2p^6$ 0
3	11 22.989770 Na $^2S_{1/2}$ 0.93 Sodium 0.968 5.1391 97.72 883 (m) 186 BCC [Ne] $3s^1$ +1	12 24.3050 Mg $^1S_0$ 1.31 Magnesium 1.738 7.6462 650 1090 (m) 160 HCP [Ne] $3s^2$ +2											13 26.981538 Al $^2P^o_{1/2}$ 1.61 Aluminum 2.7 5.9858 660.32 2519 (m) 143 FCC [Ne] $3s^2$ $3p^1$ +3	14 28.0855 Si $^3P_0$ 1.90 Silicon 2.33 8.1517 1414 2900 (v) 111 cubic [Ne] $3s^2$ $3p^2$ +2,4,-4	15 30.97361 P $^4S^o_{3/2}$ 2.19 Phosphorus 1.823 10.4867 44.2 280.5 (v) 106 § [Ne] $3s^2$ $3p^3$ +3,4,5,-3	16 32.065 S $^3P_2$ 2.58 Sulfur 1.96 10.3600 115.21 444.72 (v) 102 FCO [Ne] $3s^2$ $3p^4$ +2,4,6,-2	17 35.453 Cl $^2P^o_{3/2}$ 3.16 Chlorine 3.214 12.9676 -101.5 -34.04 (v) 99 - [Ne] $3s^2$ $3p^5$ +1,3,5,7,-1	18 39.948 Ar $^1S_0$ - Argon 1.784 15.7596 -189.3 -185.8 (v) 97 - [Ne] $3s^2$ $3p^6$ 0
4	19 39.0983 K $^2S_{1/2}$ 0.82 Potassium 0.856 4.3407 63.38 759 (m) 227 BCC [Ar] $4s^1$ +1	20 40.078 Ca $^1S_0$ 1.00 Calcium 1.55 6.1132 842 1484 (m) 197 FCC [Ar] $4s^2$ +2	21 44.955910 Sc $^2D_{3/2}$ 1.36 Scandium 2.985 6.5615 1541 2830 (m) 162 HCP [Ar] $3d^1$ $4s^2$ +3	22 47.867 Ti $^3F_2$ 1.54 Titanium 4.507 6.8281 1668 3287 (m) 147 HCP [Ar] $3d^2$ $4s^2$ +2,3,4	23 50.9415 V $^4F_{3/2}$ 1.63 Vanadium 6.11 6.7462 1910 3407 (m) 134 BCC [Ar] $3d^3$ $4s^2$ +2,3,4,5	24 51.9961 Cr $^7S_3$ 1.66 Chromium 7.14 6.7665 1907 2671 (m) 128 BCC [Ar] $3d^5$ $4s^1$ +2,3,6	25 54.938049 Mn $^6S_{5/2}$ 1.55 Manganese 7.47 7.4340 1246 2061 (m) 127 §cubic [Ar] $3d^5$ $4s^2$ +2,3,4,6,7	26 55.845 Fe $^5D_4$ 1.83 Iron 7.874 7.9024 1538 2861 (m) 126 BCC [Ar] $3d^6$ $4s^2$ +2,3	27 58.933200 Co $^4F_{9/2}$ 1.88 Cobalt 8.9 7.8810 1495 2927 (m) 125 HCP [Ar] $3d^7$ $4s^2$ +2,3	28 58.6934 Ni $^3F_4$ 1.91 Nickel 8.908 7.6398 1455 2913 (m) 124 FCC [Ar] $3d^8$ $4s^2$ +2,3	29 63.546 Cu $^2S_{1/2}$ 1.90 Copper 8.92 7.7264 1084.62 2927 (m) 128 FCC [Ar] $3d^{10}$ $4s^1$ +1,2	30 65.409 Zn $^1S_0$ 1.65 Zinc 7.14 9.3942 419.53 907 (m) 134 §hex [Ar] $3d^{10}$ $4s^2$ +2	31 69.723 Ga $^2P^o_{1/2}$ 1.81 Gallium 5.904 5.9993 29.76 2204 (m) 135 §BCO [Ar] $3d^{10}$ $4s^2$ $4p^1$ +3	32 72.64 Ge $^3P_0$ 2.01 Germanium 5.323 7.8994 938.3 2820 (v) 122 §cubic [Ar] $3d^{10}$ $4s^2$ $4p^2$ +2,4	33 74.92160 As $^4S^o_{3/2}$ 2.18 Arsenic 5.727 9.7886 817 614 (v) 119 rhom. [Ar] $3d^{10}$ $4s^2$ $4p^3$ +3,5,-3	34 78.96 Se $^3P_2$ 2.55 Selenium 4.819 9.7524 221 685 (v) 116 §hex [Ar] $3d^{10}$ $4s^2$ $4p^4$ +2,4,6,-2	35 79.904 Br $^2P^o_{3/2}$ 2.96 Bromine 3.12 11.8138 -7.3 59 (v) 114 BCO [Ar] $3d^{10}$ $4s^2$ $4p^5$ +1,5,-1	36 83.798 Kr $^1S_0$ 3 Krypton 3.75 13.9996 -157.36 -153.22 (v) 110 - [Ar] $3d^{10}$ $4s^2$ $4p^6$ 0
5	37 85.4678 Rb $^2S_{1/2}$ 0.82 Rubidium 1.532 4.1771 39.31 688 (m) 248 BCC [Kr] $5s^1$ +1	38 87.62 Sr $^1S_0$ 0.95 Strontium 2.63 5.6949 777 1382 (m) 215 FCC [Kr] $5s^2$ +2	39 88.90585 Y $^2D_{3/2}$ 1.22 Yttrium 4.472 6.2173 1526 3345 (m) 180 HCP [Kr] $4d^1$ $5s^2$ +3	40 91.224 Zr $^3F_2$ 1.33 Zirconium 6.511 6.6339 1855 4409 (m) 160 HCP [Kr] $4d^2$ $5s^2$ +4	41 92.90638 Nb $^6D_{1/2}$ 1.60 Niobium 8.57 6.7589 2477 4744 (m) 146 BCC [Kr] $4d^4$ $5s^1$ +3,5	42 95.94 Mo $^7S_3$ 2.16 Molybdenum 10.28 7.0924 2623 4639 (m) 139 BCC [Kr] $4d^5$ $5s^1$ +2,3,4,5,6	43 ☢ (98) Tc $^6S_{5/2}$ 1.9 Technetium 11.5 7.28 2157 4265 (m) 136 HCP [Kr] $4d^5$ $5s^2$ +4,7	44 101.07 Ru $^5F_5$ 2.20 Ruthenium 12.37 7.3605 2334 4150 (m) 134 HCP [Kr] $4d^7$ $5s^1$ +2,3,4,6,8	45 102.90550 Rh $^4F_{9/2}$ 2.28 Rhodium 12.45 7.4589 1964 3695 (m) 134 FCC [Kr] $4d^8$ $5s^1$ +2,3,4	46 106.42 Pd $^1S_0$ 2.20 Palladium 12.023 8.3369 1554.9 2963 (m) 137 FCC [Kr] $4d^{10}$ +2,4	47 107.8682 Ag $^2S_{1/2}$ 1.93 Silver 10.49 7.5762 961.78 2162 (m) 144 FCC [Kr] $4d^{10}$ $5s^1$ +1	48 112.411 Cd $^1S_0$ 1.69 Cadmium 8.65 8.9938 321.07 767 (m) 151 §hex [Kr] $4d^{10}$ $5s^2$ +2	49 114.818 In $^2P^o_{1/2}$ 1.78 Indium 7.31 5.7864 156.6 2072 (m) 167 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^1$ +3	50 118.710 Sn $^3P_0$ 1.96 Tin 7.31 7.3439 231.93 2602 (v) 141 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^2$ +2,4	51 121.760 Sb $^4S^o_{3/2}$ 2.05 Antimony 6.697 8.6084 630.63 1587 (v) 138 §rhom. [Kr] $4d^{10}$ $5s^2$ $5p^3$ +3,5,-3	52 127.60 Te $^3P_2$ 2.10 Tellurium 6.24 9.0096 449.51 988 (v) 135 hex [Kr] $4d^{10}$ $5s^2$ $5p^4$ +2,4,6,-2	53 126.90447 I $^2P^o_{3/2}$ 2.66 Iodine 4.94 10.4513 113.7 184.3 (v) 133 BCO [Kr] $4d^{10}$ $5s^2$ $5p^5$ +1,5,7,-1	54 131.293 Xe $^1S_0$ 2.60 Xenon 5.9 12.1298 -111.8 -108 (v) 130 - [Kr] $4d^{10}$ $5s^2$ $5p^6$ 0
6	55 132.90545 Cs $^2S_{1/2}$ 0.79 Cesium 1.879 3.8939 28.44 671 (m) 265 BCC [Xe] $6s^1$ +1	56 137.327 Ba $^1S_0$ 0.89 Barium 3.51 5.2117 727 1870 (m) 222 BCC [Xe] $6s^2$ +2	Lanthanide Series	72 178.49 Hf $^3F_2$ 1.3 Hafnium 13.31 6.8251 2233 4603 (m) 159 HCP [Xe] $4f^{14}$ $5d^2$ $6s^2$ +4	73 180.9479 Ta $^4F_{3/2}$ 1.5 Tantalum 16.65 7.5496 3017 5458 (m) 146 BCC [Xe] $4f^{14}$ $5d^3$ $6s^2$ +5	74 183.84 W $^5D_0$ 2.36 Tungsten 19.25 7.8640 3422 5555 (m) 139 BCC [Xe] $4f^{14}$ $5d^4$ $6s^2$ +2,3,4,5,6	75 186.207 Re $^6S_{5/2}$ 1.9 Rhenium 21.02 7.8335 3186 5596 (m) 137 HCP [Xe] $4f^{14}$ $5d^5$ $6s^2$ +2,4,6,7,-1	76 190.23 Os $^5D_4$ 2.2 Osmium 22.61 8.4382 3033 5012 (m) 135 HCP [Xe] $4f^{14}$ $5d^6$ $6s^2$ +2,3,4,6,8	77 192.217 Ir $^4F_{9/2}$ 2.2 Iridium 22.65 8.9670 2466 4428 (m) 136 FCC [Xe] $4f^{14}$ $5d^7$ $6s^2$ +2,3,4,6	78 195.078 Pt $^3D_3$ 2.28 Platinum 21.09 8.9588 1768.3 3825 (m) 139 FCC [Xe] $4f^{14}$ $5d^9$ $6s^1$ +2,4	79 196.96655 Au $^2S_{1/2}$ 2.54 Gold 19.3 9.2255 1064.18 2856 (m) 144 FCC [Xe] $4f^{14}$ $5d^{10}$ $6s^1$ +1,3	80 200.59 Hg $^1S_0$ 2 Mercury 13.534 10.4375 -38.83 356.73 (m) 151 §rhom. [Xe] $4f^{14}$ $5d^{10}$ $6s^2$ +1,2	81 204.3833 Tl $^2P^o_{1/2}$ 1.62 Thallium 11.85 6.1082 304 1473 (m) 170 HCP [Hg] $6p^1$ +1,3	82 207.2 Pb $^3P_0$ 2.33 Lead 11.34 7.4167 327.46 1749 (m) 175 FCC [Hg] $6p^2$ +2,4	83 208.98038 Bi $^4S^o_{3/2}$ 2.02 Bismuth 9.78 7.2855 271.3 1564 (v) 146 §rhom. [Hg] $6p^3$ +3,5	84 ☢ (209) Po $^3P_2$ 2.0 Polonium 9.196 8.414 254 962 - §cubic [Hg] $6p^4$ +2,4	85 ☢ (210) At $^2P^o_{3/2}$ 2.2 Astatine - - - - [Hg] $6p^5$ +1,3,5,7,-1	86 ☢ (222) Rn $^1S_0$ - Radon 9.73 10.7485 -71 -61.7 (v) 145 - [Hg] $6p^6$ 0
7	87 ☢ (223) Fr $^2S_{1/2}$ 0.7 Francium - 4.0727 - - - - [Rn] $7s^1$ +1	88 ☢ (226) Ra $^1S_0$ 0.9 Radium 5 5.2784 700 1737 - BCC [Rn] $7s^2$ +2	Actinide Series	104 ☢ (261) Rf $^3F_2$? Rutherfordium 6.0 ? [Rn] $5f^{14}$ $6d^2$ $7s^2$? +4	105 ☢ (262) Db Dubnium	106 ☢ (266) Sg Seaborgium	107 ☢ (264) Bh Bohrium	108 ☢ (277) Hs Hassium	109 ☢ (268) Mt Meitnerium	110 ☢ (281) Ds Darmstadtium	111 ☢ (272) Rg Roentgenium	112 ☢ (285) Cn Copernicium	113 ☢ Uut Ununtrium	114 ☢ (289) Uuq Ununquadium	115 ☢ Uup Ununpentium	116 ☢ (292) Uuh Ununhexium	117 ☢ Uus Ununseptium	118 ☢ Uuo Ununoctium

Atomic Number
Symbol
Name
*Density [Note]
*Melting Point (°C)
Atomic radius (pm) [Note]

†Atomic Weight
†Ground-State Level
*Electronegativity (Pauling)
†Ionization Energy (eV)
*Boiling Point (°C)
Crystal Structure [Note]
†Electron Configuration
Possible Oxidation States [Note]

Phase at STP
Gas Liquid Solid Synthetic

†Common Constants

Source: physics.nist.gov

Absolute Zero		-273.15 °C	Gravitation Constant	G	6.67428×10^{-11} m^3 kg^{-1} s^{-2}
Atomic Mass Unit	m_u	1.660539×10^{-27} kg	Molar Gas Constant	R	8.314472 J mol^{-1} K^{-1}
Avogadro Constant		6.022142×10^{23} mol^{-1}	Molar Volume (Ideal Gas)		0.02241410 m^3/mol
Base of Natural Logarithms	e	2.718281828	PI	p	3.14159265358979
Boltzmann constant	k	1.380650×10^{-23} J/K	Planck Constant	h	6.626069×10^{-34} J s
Electron Mass	m_e	$9.10938215 \times 10^{-31}$ kg	Proton-Electron Mass Ratio	m_e/m_p	1836.15267247
	mec 2	0.5110 MeV	Rydberg Constant	R_∞	10 973 732 m^{-1}
Electron Radius (Classical)	r0	$2.8179403 \times 10^{-15}$ m		$R_\infty c$	3.289842×10^{15} Hz
Electron Volt	eV	1.602176×10^{-19} J		$R_\infty hc$	13.6057 eV
Elementry Charge	e	1.602176×10^{-19} C	Second Radiation Constant	ch/k	0.01438769 m K
Faraday Constant	F	96 485.3399 C/mol	Speed of Light in a Vacuum	c	299 792 458 m/s
fine-structure constant	α	0.0072973525	Speed of sound in air at STP		343.2 m/s
First Radiation Constant	$2\pi hc^2$	$3.7417749 \times 10^{-16}$ W m^2	Standard Pressure		101 325 Pa

Lanthanides	57 138.9055 La $^2D_{3/2}$ 1.10 Lanthanum 6.146 5.5769 920 3464 (m) 187 §hex [Xe] $5d^1$ $6s^2$ +3	58 140.116 Ce $^1G^o_4$ 1.12 Cerium 6.689 5.5387 798 3360 (m) 182 FCC [Xe] $4f^1$ $5d^1$ $6s^2$ +3,4	59 140.90765 Pr $^4I^o_{9/2}$ 1.13 Praseodymium 6.64 5.473 931 3290 (m) 182 §hex [Xe] $4f^3$ $6s^2$ +3,4	60 144.24 Nd $^5I_4$ 1.14 Neodymium 7.01 5.5250 1021 3100 (m) 181 §hex [Xe] $4f^4$ $6s^2$ +3	61 ☢ (145) Pm $^6H^o_{5/2}$ - Promethium 7.264 5.582 1100 3000 (m) 183 HCP [Xe] $4f^5$ $6s^2$ +3	62 150.36 Sm $^7F_0$ 1.17 Samarium 7.353 5.6437 1072 1803 (m) 180 §hex [Xe] $4f^6$ $6s^2$ +2,3	63 151.964 Eu $^8S^o_{7/2}$ - Europium 5.244 5.6704 822 1527 (m) 180 BCC [Xe] $4f^7$ $6s^2$ +2,3	64 157.25 Gd $^9D^o_2$ 1.20 Gadolinium 7.901 6.1498 1313 3250 (m) 180 HCP [Xe] $4f^7$ $5d^1$ $6s^2$ +3	65 158.92534 Tb $^6H^o_{15/2}$ - Terbium 8.219 5.8638 1356 3230 (m) 177 HCP [Xe] $4f^9$ $6s^2$ +3,4	66 162.500 Dy $^5I_8$ 1.22 Dysprosium 8.551 5.9389 1412 2567 (m) 178 HCP [Xe] $4f^{10}$ $6s^2$ +3	67 164.93032 Ho $^4I^o_{15/2}$ 1.23 Holmium 8.795 6.0215 1474 2700 (m) 176 HCP [Xe] $4f^{11}$ $6s^2$ +3	68 167.259 Er $^3H_6$ 1.24 Erbium 9.066 6.1077 1497 2868 (m) 176 HCP [Xe] $4f^{12}$ $6s^2$ +3	69 168.93421 Tm $^2F^o_{7/2}$ 1.25 Thulium 9.321 6.1843 1545 1950 (m) 176 HCP [Xe] $4f^{13}$ $6s^2$ +2,3	70 173.04 Yb $^1S_0$ - Ytterbium 6.57 6.2542 819 1196 (m) 176 FCC [Xe] $4f^{14}$ $6s^2$ +2,3	71 174.967 Lu $^2D_{3/2}$ 1.27 Lutetium 9.841 5.4259 1663 3402 (m) 174 HCP [Xe] $4f^{14}$ $5d^1$ $6s^2$ +3
Actinides	89 ☢ (227) Ac $^2D_{3/2}$ 1.1 Actinium 10.07 5.17 1050 3200 - FCC [Rn] $6d^1$ $7s^2$ +3	90 ☢ 232.0381 Th $^3F_2$ 1.3 Thorium 11.724 6.3067 1750 4820 (m) 179 FCC [Rn] $6d^2$ $7s^2$ +4	91 ☢ 231.0359 Pa $^4K_{1/2}$ 1.5 Protactinium 15.37 5.89 1572 4000 (m) 163 §tetra [Rn] $5f^2$ $6d^1$ $7s^2$ +4,5	92 ☢ 238.0289 U $^5L^o_6$ 1.38 Uranium 19.05 6.1941 1135 3927 (m) 156 BCP [Rn] $5f^3$ $6d^1$ $7s^2$ +3,4,5,6	93 ☢ (237) Np $^6L^o_{11/2}$ 1.36 Neptunium 20.45 6.2657 644 4000 (m) 155 SO [Rn] $5f^4$ $6d^1$ $7s^2$ +3,4,5,6	94 ☢ (244) Pu $^7F_0$ 1.28 Plutonium 19.816 6.0260 640 3230 (m) 159 §mono. [Rn] $5f^6$ $7s^2$ +3,4,5,6	95 ☢ (243) Am $^8S^o_{7/2}$ 1.3 Americium - 5.9738 1176 2011 (m) 173 HCP [Rn] $5f^7$ $7s^2$ +3,4,5,6	96 ☢ (247) Cm $^9D^o_2$ 1.3 Curium 13.51 5.9914 1345 3110 (m) 174 HCP [Rn] $5f^7$ $6d^1$ $7s^2$ +3	97 ☢ (247) Bk $^6H^o_{15/2}$ 1.3 Berkelium 14.78 6.1979 1050 - (m) 170 hex [Rn] $5f^9$ $7s^2$ +3,4	98 ☢ (251) Cf $^5I_8$ 1.3 Californium 15.1 6.2817 900 - - hex [Rn] $5f^{10}$ $7s^2$ +3	99 ☢ (252) Es $^4I^o_{15/2}$ 1.3 Einsteinium - 6.42 860 - - - [Rn] $5f^{11}$ $7s^2$ +3	100 ☢ (257) Fm $^3H_6$ 1.3 Fermium - 6.50 1527 - - - [Rn] $5f^{12}$ $7s^2$ +3	101 ☢ (258) Md $^2F^o_{7/2}$ 1.3 Mendelevium - 6.58 827 - - - [Rn] $5f^{13}$ $7s^2$ +2,3	102 ☢ (259) No $^1S_0$ 1.3 Nobelium - 6.65 827 - - - [Rn] $5f^{14}$ $7s^2$ +2,3	103 ☢ (262) Lr $^2P^o_{1/2}$? - Lawrencium - 4.9 ? 1627 - - - [Rn] $5f^{14}$ $7s^2$ $7p$? +3

Notes:
- Density units are g/cm^3 for solids and g/L or kg/cm^3 at 0° Celsius for gases
- Atomic Weight based on ^{12}C
- ( ) indicate mass number of most stable isotope
- Common Oxidation States in bold
- Electron Config. based on IUPAC guidelines
- § indicates crystal structure is unusual or may require explanation
- (m) Metallic radius, (v) Covalent radius

References:
†Nist.gov, *Wolfram.com (Mathematic), CRC Handbook of Chemistry and Physics 81st Edition, 2000-2001, and others