Periodic Table of the Elements

GROUP 1 IA — 18 VIIIA

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

1	1.00794
H	$^2S_{1/2}$ 2,2
Hydrogen	
0,0899	13,5984
-259,14	-252,87
(v) 37	FCC
$1s^1$ +1,-1	

†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

Categories: Alkali Metals, Alkaline Earth Metals, Transition Metals, Rare Earth Metals, Poor Metals, Noble Gas, Halogens, Non Metals, Metalloids

†Common Constants (Source: physics.nist.gov)

Absolute Zero		-273.15 °C	Gravitation Constant	G	6.67428×10^{-11} m³ 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 m³/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	9.10938215×10^{-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	2.8179403×10^{-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	$2\pi hc^2$	3.7417749×10^{-16} W m²	Standard Pressure		101 325 Pa

Period	1	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 H Hydrogen 1.00794 $^2S_{1/2}$ 2,2 0,0899 13,5984 -259,14 -252,87 (v) 37 - $1s^1$ +1,-1																	2 He Helium 4.002602 $^1S_0$ - 0,1785 24,5874 - -268,93 (v) 32 - $1s^2$ 0
2	3 Li Lithium 6.941 $^2S_{1/2}$ 0,98 0,535 5,3917 180,54 1342 (m) 152 BCC [He] $2s^1$ +1	4 Be Beryllium 9.012182 $^1S_0$ 1,57 1,848 9,3227 1287 2470 (m) 112 HCP [He] $2s^2$ +2											5 B Boron 10.811 $^2P^\circ_{1/2}$ 2,04 2,46 8,2980 2075 4000 (v) 82 rhom. [He] $2s^2 2p^1$ +3	6 C Carbon 12.0107 $^3P_0$ 2,55 2,26 11,2603 3550 4027 (v) 77 hex [He] $2s^2 2p^2$ +2,4,-4	7 N Nitrogen 14.0067 $^4S^\circ_{3/2}$ 3,04 1,251 14,5341 -210,1 -195,79 (v) 75 - [He] $2s^2 2p^3$ +2,3,4,5,-2,-3	8 O Oxygen 15.9994 $^3P_2$ 3,44 1,429 13,6181 -218,3 -182,9 (v) 73 - [He] $2s^2 2p^4$ -2	9 F Fluorine 18.9984032 $^2P^\circ_{3/2}$ 3,98 1,696 17,4228 -219,6 -188,12 (v) 71 - [He] $2s^2 2p^5$ -1	10 Ne Neon 20.1797 $^1S_0$ - 0,9 21,5645 -248,59 -246,08 (v) 69 - [He] $2s^2 2p^6$ 0
3	11 Na Sodium 22.989770 $^2S_{1/2}$ 0,93 0,968 5,1391 97,72 883 (m) 186 BCC [Ne] $3s^1$ +1	12 Mg Magnesium 24.3050 $^1S_0$ 1,31 1,738 7,6462 650 1090 (m) 160 HCP [Ne] $3s^2$ +2											13 Al Aluminum 26.981538 $^2P^\circ_{1/2}$ 1,61 2,7 5,9858 660,32 2519 (m) 143 FCC [Ne] $3s^2 3p^1$ +3	14 Si Silicon 28.0855 $^3P_0$ 1,90 2,33 8,1517 1414 2900 (v) 111 cubic [Ne] $3s^2 3p^2$ +2,4,-4	15 P Phosphorus 30.97361 $^4S^\circ_{3/2}$ 2,19 1,823 10,4867 44,2 280,5 (v) 106 § [Ne] $3s^2 3p^3$ +3,4,5,-3	16 S Sulfur 32.065 $^3P_2$ 2,58 1,96 10,3600 115,21 444,72 (v) 102 FCO [Ne] $3s^2 3p^4$ +2,4,6,-2	17 Cl Chlorine 35.453 $^2P^\circ_{3/2}$ 3,16 3,214 12,9676 -101,5 -34,04 (v) 99 - [Ne] $3s^2 3p^5$ +1,3,5,7,-1	18 Ar Argon 39.948 $^1S_0$ - 1,784 15,7596 -189,3 -185,8 (v) 97 - [Ne] $3s^2 3p^6$ 0
4	19 K Potassium 39.0983 $^2S_{1/2}$ 0,82 0,856 4,3407 63,38 759 (m) 227 BCC [Ar] $4s^1$ +1	20 Ca Calcium 40.078 $^1S_0$ 1,00 1,55 6,1132 842 1484 (m) 197 FCC [Ar] $4s^2$ +2	21 Sc Scandium 44.955910 $^2D_{3/2}$ 1,36 2,985 6,5615 1541 2830 (m) 162 HCP [Ar] $3d^1 4s^2$ +3	22 Ti Titanium 47.867 $^3F_2$ 1,54 4,507 6,8281 1668 3287 (m) 147 HCP [Ar] $3d^2 4s^2$ +2,3,4	23 V Vanadium 50.9415 $^4F_{3/2}$ 1,63 6,11 6,7462 1910 3407 (m) 134 BCC [Ar] $3d^3 4s^2$ +2,3,4,5	24 Cr Chromium 51.9961 $^7S_3$ 1,66 7,14 6,7665 1907 2671 (m) 128 BCC [Ar] $3d^5 4s^1$ +2,3,6	25 Mn Manganese 54.938049 $^6S_{5/2}$ 1,55 7,47 7,4340 1246 2061 (m) 127 §cubic [Ar] $3d^5 4s^2$ +2,3,4,6,7	26 Fe Iron 55.845 $^5D_4$ 1,83 7,874 7,9024 1538 2861 (m) 126 BCC [Ar] $3d^6 4s^2$ +2,3	27 Co Cobalt 58.933200 $^4F_{9/2}$ 1,88 8,9 7,8810 1495 2927 (m) 125 HCP [Ar] $3d^7 4s^2$ +2,3	28 Ni Nickel 58.6934 $^3F_4$ 1,91 8,908 7,6398 1455 2913 (m) 124 FCC [Ar] $3d^8 4s^2$ +2,3	29 Cu Copper 63.546 $^2S_{1/2}$ 1,90 8,92 7,7264 1084,62 2927 (m) 128 FCC [Ar] $3d^{10} 4s^1$ +1,2	30 Zn Zinc 65.409 $^1S_0$ 1,65 7,14 9,3942 419,53 907 (m) 134 §hex [Ar] $3d^{10} 4s^2$ +2	31 Ga Gallium 69.723 $^2P^\circ_{1/2}$ 1,81 5,904 5,9993 29,76 2204 (m) 135 §BCO [Ar] $3d^{10} 4s^2 4p^1$ +3	32 Ge Germanium 72.64 $^3P_0$ 2,01 5,323 7,8994 938,3 2820 (v) 122 §cubic [Ar] $3d^{10} 4s^2 4p^2$ +2,4	33 As Arsenic 74.92160 $^4S^\circ_{3/2}$ 2,18 5,727 9,7886 817 614 (v) 119 rhom. [Ar] $3d^{10} 4s^2 4p^3$ +3,5,-3	34 Se Selenium 78.96 $^3P_2$ 2,55 4,819 9,7524 221 685 (v) 116 §hex [Ar] $3d^{10} 4s^2 4p^4$ +2,4,6,-2	35 Br Bromine 79.904 $^2P^\circ_{3/2}$ 2,96 3,12 11,8138 -7,3 59 (v) 114 BCO [Ar] $3d^{10} 4s^2 4p^5$ +1,5,-1	36 Kr Krypton 83.798 $^1S_0$ 3 3,75 13,9996 -157,38 -153,22 (v) 110 - [Ar] $3d^{10} 4s^2 4p^6$ 0
5	37 Rb Rubidium 85.4678 $^2S_{1/2}$ 0,82 1,532 4,1771 39,31 688 (m) 248 BCC [Kr] $5s^1$ +1	38 Sr Strontium 87.62 $^1S_0$ 0,95 2,63 5,6949 777 1382 (m) 215 FCC [Kr] $5s^2$ +2	39 Y Yttrium 88.90585 $^2D_{3/2}$ 1,22 4,472 6,2173 1526 3345 (m) 180 HCP [Kr] $4d^1 5s^2$ +3	40 Zr Zirconium 91.224 $^3F_2$ 1,33 6,511 6,6339 1855 4409 (m) 160 HCP [Kr] $4d^2 5s^2$ +4	41 Nb Niobium 92.90638 $^6D_{1/2}$ 1,60 8,57 6,7589 2477 4744 (m) 146 BCC [Kr] $4d^4 5s^1$ +3,5	42 Mo Molybdenum 95.94 $^7S_3$ 2,16 10,28 7,0924 2623 4639 (m) 139 BCC [Kr] $4d^5 5s^1$ +2,3,4,5,6	43 Tc Technetium (98) $^6S_{5/2}$ 1,9 11,5 7,28 2157 4265 (m) 136 HCP [Kr] $4d^5 5s^2$ +4,7	44 Ru Ruthenium 101.07 $^5F_5$ 2,20 12,37 7,3605 2334 4150 (m) 134 HCP [Kr] $4d^7 5s^1$ +2,3,4,6,8	45 Rh Rhodium 102.90550 $^4F_{9/2}$ 2,28 12,45 7,4589 1964 3695 (m) 134 FCC [Kr] $4d^8 5s^1$ +2,3,4	46 Pd Palladium 106.42 $^1S_0$ 2,20 12,023 8,3369 1554,9 2963 (m) 137 FCC [Kr] $4d^{10}$ +2,4	47 Ag Silver 107.8682 $^2S_{1/2}$ 1,93 10,49 7,5762 961,78 2162 (m) 144 FCC [Kr] $4d^{10} 5s^1$ +1	48 Cd Cadmium 112.411 $^1S_0$ 1,69 8,65 8,9938 321,07 767 (m) 151 §hex [Kr] $4d^{10} 5s^2$ +2	49 In Indium 114.818 $^2P^\circ_{1/2}$ 1,78 7,31 5,7864 156,6 2072 (m) 167 §tetra. [Kr] $4d^{10} 5s^2 5p^1$ +3	50 Sn Tin 118.710 $^3P_0$ 1,96 7,31 7,3439 231,93 2602 (v) 141 §tetra. [Kr] $4d^{10} 5s^2 5p^2$ +2,4	51 Sb Antimony 121.760 $^4S^\circ_{3/2}$ 2,05 6,697 8,6084 630,63 1587 (v) 138 §rhom. [Kr] $4d^{10} 5s^2 5p^3$ +3,5,-3	52 Te Tellurium 127.60 $^3P_2$ 2,10 6,24 9,0096 449,51 988 (v) 135 hex [Kr] $4d^{10} 5s^2 5p^4$ +2,4,6,-2	53 I Iodine 126.90447 $^2P^\circ_{3/2}$ 2,66 4,94 10,4513 113,7 184,3 (v) 133 BCO [Kr] $4d^{10} 5s^2 5p^5$ +1,5,7,-1	54 Xe Xenon 131.293 $^1S_0$ 2,60 5,9 12,1298 -111,8 -108 (v) 130 - [Kr] $4d^{10} 5s^2 5p^6$ 0
6	55 Cs Cesium 132.90545 $^2S_{1/2}$ 0,79 1,879 3,8939 28,44 671 (m) 265 BCC [Xe] $6s^1$ +1	56 Ba Barium 137.327 $^1S_0$ 0,89 3,51 5,2117 727 1870 (m) 222 BCC [Xe] $6s^2$ +2	Lanthanide Series	72 Hf Hafnium 178.49 $^3F_2$ 1,3 13,31 6,8251 2233 4603 (m) 159 HCP [Xe] $4f^{14} 5d^2 6s^2$ +4	73 Ta Tantalum 180.9479 $^4F_{3/2}$ 1,5 16,65 7,5496 3017 5458 (m) 146 BCC [Xe] $4f^{14} 5d^3 6s^2$ +5	74 W Tungsten 183.84 $^5D_0$ 2,36 19,25 7,8640 3422 5555 (m) 139 BCC [Xe] $4f^{14} 5d^4 6s^2$ +2,3,4,5,6	75 Re Rhenium 186.207 $^6S_{5/2}$ 1,9 21,02 7,8335 3186 5596 (m) 137 HCP [Xe] $4f^{14} 5d^5 6s^2$ +2,4,6,7,-1	76 Os Osmium 190.23 $^5D_4$ 2,2 22,61 8,4382 3033 5012 (m) 136 HCP [Xe] $4f^{14} 5d^6 6s^2$ +2,3,4,6,8	77 Ir Iridium 192.217 $^4F_{9/2}$ 2,2 22,65 8,9670 2466 4428 (m) 136 FCC [Xe] $4f^{14} 5d^7 6s^2$ +2,3,4,6	78 Pt Platinum 196.078 $^3D_3$ 2,28 21,09 8,9588 1768,3 3825 (m) 139 FCC [Xe] $4f^{14} 5d^9 6s^1$ +2,4	79 Au Gold 196.96658 $^2S_{1/2}$ 2,54 19,3 9,2255 1064,18 2856 (m) 144 FCC [Xe] $4f^{14} 5d^{10} 6s^1$ +1,3	80 Hg Mercury 200.59 $^1S_0$ 2 13,534 10,4375 -38,83 356,73 (m) 151 §rhom. [Xe] $4f^{14} 5d^{10} 6s^2$ +1,2	81 Tl Thallium 204.3833 $^2P^\circ_{1/2}$ 1,62 11,85 6,1082 304 1473 (m) 170 HCP [Hg] $6p^1$ +1,3	82 Pb Lead 207.2 $^3P_0$ 2,33 11,34 7,4167 327,46 1749 (m) 178 FCC [Hg] $6p^2$ +2,4	83 Bi Bismuth 208.98038 $^4S^\circ_{3/2}$ 2,02 9,78 7,2855 271,3 1564 (v) 148 §rhom. [Hg] $6p^3$ +3,5	84 Po Polonium (209) $^3P_2$ 2,0 9,196 8,414 254 962 - §cubic [Hg] $6p^4$ +2,4	85 At Astatine (210) $^2P^\circ_{3/2}$ 2,2 - - 302 - - [Hg] $6p^5$ +1,3,5,7,-1	86 Rn Radon (222) $^1S_0$ - 9,73 10,7485 -71 -61,7 (v) 145 - [Hg] $6p^6$ 0
7	87 Fr Francium (223) $^2S_{1/2}$ 0,7 - 4,0727 - - - [Rn] $7s^1$ +1	88 Ra Radium (226) $^1S_0$ 0,9 5 5,2784 700 1737 - BCC [Rn] $7s^2$ +2	Actinide Series	104 Rf Rutherfordium (261) $^3F_2$? 6.0? [Rn] $5f^{14} 6d^2 7s^2$? +4	105 Db Dubnium (262)	106 Sg Seaborgium (266)	107 Bh Bohrium (264)	108 Hs Hassium (277)	109 Mt Meitnerium (268)	110 Ds Darmstadtium (281)	111 Rg Roentgenium (272)	112 Cn Copernicium (285)	113 Uut Ununtrium	114 Fl Flerovium (289)	115 Uup Ununpentium	116 Lv Livermorium (298) +4,-2	117 Uus Ununseptium	118 Uuo Ununoctium

Lanthanides	57 La Lanthanum 138.9055 $^2D_{3/2}$ 1,10 6,146 5,5769 920 3464 (m) 187 §hex [Xe] $5d^1 6s^2$ +3	58 Ce Cerium 140.116 $^1G^\circ_4$ 1,12 6,689 5,5387 798 3360 (m) 182 FCC [Xe] $4f^1 5d^1 6s^2$ +3,4	59 Pr Praseodymium 140.90765 $^4I^\circ_{9/2}$ 1,13 6,64 5,473 931 3290 (m) 182 §hex [Xe] $4f^3 6s^2$ +3,4	60 Nd Neodymium 144.24 $^5I_4$ 1,14 7,01 5,5250 1021 3100 (m) 181 §hex [Xe] $4f^4 6s^2$ +3	61 Pm Promethium (145) $^6H^\circ_{5/2}$ - 7,264 5,582 1100 3000 (m) 183 HCP [Xe] $4f^5 6s^2$ +3	62 Sm Samarium 150.36 $^7F_0$ 1,17 7,353 5,6437 1072 1803 (m) 180 §hex [Xe] $4f^6 6s^2$ +2,3	63 Eu Europium 151.964 $^8S^\circ_{7/2}$ - 5,244 5,6704 822 1527 (m) 180 BCC [Xe] $4f^7 6s^2$ +2,3	64 Gd Gadolinium 157.25 $^9D^\circ_2$ 1,20 7,901 6,1498 1313 3250 (m) 180 HCP [Xe] $4f^7 5d^1 6s^2$ +3	65 Tb Terbium 158.92534 $^6H^\circ_{15/2}$ - 8,219 5,8638 1356 3230 (m) 177 HCP [Xe] $4f^9 6s^2$ +3,4	66 Dy Dysprosium 162.500 $^5I_8$ 1,22 8,551 5,9389 1412 2567 (m) 178 HCP [Xe] $4f^{10} 6s^2$ +3	67 Ho Holmium 164.93032 $^4I^\circ_{15/2}$ 1,23 8,795 6,0215 1474 2700 (m) 176 HCP [Xe] $4f^{11} 6s^2$ +3	68 Er Erbium 167.259 $^3H_6$ 1,24 9,066 6,1077 1497 2868 (m) 176 HCP [Xe] $4f^{12} 6s^2$ +3	69 Tm Thulium 168.93421 $^2F^\circ_{7/2}$ 1,25 9,321 6,1843 1545 1950 (m) 176 HCP [Xe] $4f^{13} 6s^2$ +2,3	70 Yb Ytterbium 173.04 $^1S_0$ - 6,57 6,2542 819 1196 (m) 176 FCC [Xe] $4f^{14} 6s^2$ +2,3	71 Lu Lutetium 174.967 $^2D_{3/2}$ 1,27 9,841 5,4259 1663 3402 (m) 174 HCP [Xe] $4f^{14} 5d^1 6s^2$ +3
Actinides	89 Ac Actinium (227) $^2D_{3/2}$ 1,1 10,07 5,17 1050 3200 - FCC [Rn] $6d^1 7s^2$ +3	90 Th Thorium 232.0381 $^3F_2$ 1,3 11,724 6,3067 1750 4820 (m) 179 FCC [Rn] $6d^2 7s^2$ +4	91 Pa Protactinium 231.0359 $^4K_{11/2}$ 1,5 15,37 5,89 1572 4000 (m) 163 §tetra [Rn] $5f^2 6d^1 7s^2$ +4,5	92 U Uranium 238.0289 $^5L^\circ_6$ 1,38 19,05 6,1941 1135 3927 (m) 156 BCP [Rn] $5f^3 6d^1 7s^2$ +3,4,5,6	93 Np Neptunium (237) $^6L_{11/2}$ 1,36 20,45 6,2657 644 4000 (m) 155 SO [Rn] $5f^4 6d^1 7s^2$ +3,4,5,6	94 Pu Plutonium (244) $^7F_0$ 1,28 19,816 6,0260 640 3230 (m) 159 §mono. [Rn] $5f^6 7s^2$ +3,4,5,6	95 Am Americium (243) $^8S^\circ_{7/2}$ 1,3 - 5,9738 1176 2011 (m) 173 HCP [Rn] $5f^7 7s^2$ +3,4,5,6	96 Cm Curium (247) $^9D^\circ_2$ 1,3 13,51 5,9914 1345 3110 (m) 174 HCP [Rn] $5f^7 6d^1 7s^2$ +3	97 Bk Berkelium (247) $^6H^\circ_{15/2}$ 1,3 14,78 6,1979 1050 - (m) 170 hex [Rn] $5f^8 7s^2$ +3,4	98 Cf Californium (251) $^5I_8$ 1,3 15,1 6,2817 900 - - hex [Rn] $5f^{10} 7s^2$ +3	99 Es Einsteinium (252) $^4I^\circ_{15/2}$ 1,3 - 6,42 860 - - [Rn] $5f^{11} 7s^2$ +3	100 Fm Fermium (257) $^3H_6$ 1,3 - 6,50 1527 - - [Rn] $5f^{12} 7s^2$ +3	101 Md Mendelevium (258) $^2F^\circ_{7/2}$ 1,3 - 6,58 827 - - [Rn] $5f^{13} 7s^2$ +2,3	102 No Nobelium (259) $^1S_0$ 1,3 - 6,65 827 - - [Rn] $5f^{14} 7s^2$ +2,3	103 Lr Lawrencium (262) $^2P^\circ_{1/2}$? - 4.9? - - - [Rn] $5f^{14} 7s^2 7p$? +3

Notes:
- Density units are g/cm³ for solids and g/L or kg/cm³ 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

Adapted from Periodic Table of the Elements
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UNIVERSITÀ DEGLI STUDI DI TRIESTE
Dipartimento di Scienze Chimiche e Farmaceutiche

ORDINE DEI CHIMICI DI TRIESTE
Con il contributo di