Periodic Table of the Elements

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Atomic Number	1	1.00794	†Atomic Weight
Symbol	H	$^2S_{1/2}$ 2.2	†Ground-State Level; *Electronegativity (Pauling)
Name	Hydrogen		
*Density [Note]	0.0899	13.5984	†Ionization Energy (eV)
*Melting Point (°C)	-259.14	-252.87	*Boiling Point (°C)
Atomic radius (pm) [Note]	(v) 37	FCC	Crystal Structure [Note]
	$1s^1$		†Electron Configuration
	+1,-1		Possible Oxidation States [Note]

Phase at STP

Gas Liquid Solid Synthetic

Categories

Alkali Metals	Noble Gas
Alkaline Earth Metals	Halogens
Transition Metals	Non Metals
Rare Earth Metals	
Poor 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	2.817940×10^{-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 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 H 1.00794 $^2S_{1/2}$ 2.2 Hydrogen 0.0899 13.5984 -259.14 -252.87 (v) 37 - $1s^1$ +1,-1																	2 He 4.002602 $^1S_0$ - Helium 0.1785 24.5874 - -268.93 (v) 32 - $1s^2$ 0
2	3 Li 6.941 $^2S_{1/2}$ 0.98 Lithium 0.535 5.3917 180.54 1342 (m) 152 BCC [He] $2s^1$ +1	4 Be 9.012182 $^1S_0$ 1.57 Beryllium 1.848 9.3227 1287 2470 (m) 112 HCP [He] $2s^2$ +2											5 B 10.811 $^2P^\circ_{1/2}$ 2.04 Boron 2.46 8.2980 2075 4000 (v) 82 rhom. [He] $2s^2$ $2p^1$ +3	6 C 12.0107 $^3P_0$ 2.55 Carbon 2.26 11.2603 3550 4027 (v) 77 hex [He] $2s^2$ $2p^2$ +2,4,-4	7 N 14.0067 $^4S^\circ_{3/2}$ 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 O 15.9994 $^3P_2$ 3.44 Oxygen 1.429 13.6181 -218.3 -182.9 (v) 73 - [He] $2s^2$ $2p^4$ -2	9 F 18.9984032 $^2P^\circ_{3/2}$ 3.98 Fluorine 1.696 17.4228 -219.6 -188.12 (v) 71 - [He] $2s^2$ $2p^5$ -1	10 Ne 20.1797 $^1S_0$ - Neon 0.9 21.5645 -248.59 -246.08 (v) 69 - [He] $2s^2$ $2p^6$ 0
3	11 Na 22.989770 $^2S_{1/2}$ 0.93 Sodium 0.968 5.1391 97.72 883 (m) 186 BCC [Ne] $3s^1$ +1	12 Mg 24.3050 $^1S_0$ 1.31 Magnesium 1.738 7.6462 650 1090 (m) 160 HCP [Ne] $3s^2$ +2											13 Al 26.981538 $^2P^\circ_{1/2}$ 1.61 Aluminum 2.7 5.9858 660.32 2519 (m) 143 FCC [Ne] $3s^2$ $3p^1$ +3	14 Si 28.0855 $^3P_0$ 1.90 Silicon 2.33 8.1517 1414 2900 (v) 111 cubic [Ne] $3s^2$ $3p^2$ +2,4,-4	15 P 30.97361 $^4S^\circ_{3/2}$ 2.19 Phosphorus 1.823 10.4867 44.2 280.5 (v) 106 § [Ne] $3s^2$ $3p^3$ +3,4,5,-3	16 S 32.065 $^3P_2$ 2.58 Sulfur 1.96 10.3600 115.21 444.72 (v) 102 FCO [Ne] $3s^2$ $3p^4$ +2,4,6,-2	17 Cl 35.453 $^2P^\circ_{3/2}$ 3.16 Chlorine 3.214 12.9676 -101.5 -34.04 (v) 99 - [Ne] $3s^2$ $3p^5$ +1,3,5,7,-1	18 Ar 39.948 $^1S_0$ - Argon 1.784 15.7596 -189.3 -185.8 (v) 97 - [Ne] $3s^2$ $3p^6$ 0
4	19 K 39.0983 $^2S_{1/2}$ 0.82 Potassium 0.856 4.3407 63.38 759 (m) 227 BCC [Ar] $4s^1$ +1	20 Ca 40.078 $^1S_0$ 1.00 Calcium 1.55 6.1132 842 1484 (m) 197 FCC [Ar] $4s^2$ +2	21 Sc 44.955910 $^2D_{3/2}$ 1.36 Scandium 2.985 6.5615 1541 2830 (m) 162 HCP [Ar] $3d^1$ $4s^2$ +3	22 Ti 47.867 $^3F_2$ 1.54 Titanium 4.507 6.8281 1668 3287 (m) 147 HCP [Ar] $3d^2$ $4s^2$ +2,3,4	23 V 50.9415 $^4F_{3/2}$ 1.63 Vanadium 6.11 6.7462 1910 3407 (m) 134 BCC [Ar] $3d^3$ $4s^2$ +2,3,4,5	24 Cr 51.9961 $^7S_3$ 1.66 Chromium 7.14 6.7665 1907 2671 (m) 128 BCC [Ar] $3d^5$ $4s^1$ +2,3,6	25 Mn 54.938049 $^6S_{5/2}$ 1.55 Manganese 7.47 7.4340 1246 2061 (m) 127 §cubic [Ar] $3d^5$ $4s^2$ +2,3,4,6,7	26 Fe 55.845 $^5D_4$ 1.83 Iron 7.874 7.9024 1538 2861 (m) 126 BCC [Ar] $3d^6$ $4s^2$ +2,3	27 Co 58.933200 $^4F_{9/2}$ 1.88 Cobalt 8.9 7.8810 1495 2927 (m) 125 HCP [Ar] $3d^7$ $4s^2$ +2,3	28 Ni 58.6934 $^3F_4$ 1.91 Nickel 8.908 7.6398 1455 2913 (m) 124 FCC [Ar] $3d^8$ $4s^2$ +2,3	29 Cu 63.546 $^2S_{1/2}$ 1.90 Copper 8.92 7.7264 1084.62 2927 (m) 128 FCC [Ar] $3d^{10}$ $4s^1$ +1,2	30 Zn 65.409 $^1S_0$ 1.65 Zinc 7.14 9.3942 419.53 907 (m) 134 §hex [Ar] $3d^{10}$ $4s^2$ +2	31 Ga 69.723 $^2P^\circ_{1/2}$ 1.81 Gallium 5.904 5.9993 29.76 2204 (m) 135 §BCO [Ar] $3d^{10}$ $4s^2$ $4p^1$ +3	32 Ge 72.64 $^3P_0$ 2.01 Germanium 5.323 7.8994 938.3 2820 (v) 122 §cubic [Ar] $3d^{10}$ $4s^2$ $4p^2$ +2,4	33 As 74.92160 $^4S^\circ_{3/2}$ 2.18 Arsenic 5.727 9.7886 817 614 (v) 119 rhom. [Ar] $3d^{10}$ $4s^2$ $4p^3$ +3,5,-3	34 Se 78.96 $^3P_2$ 2.55 Selenium 4.819 9.7524 221 685 (v) 116 §hex [Ar] $3d^{10}$ $4s^2$ $4p^4$ +2,4,6,-2	35 Br 79.904 $^2P^\circ_{3/2}$ 2.96 Bromine 3.12 11.8138 -7.3 59 (v) 114 BCO [Ar] $3d^{10}$ $4s^2$ $4p^5$ +1,5,-1	36 Kr 83.798 $^1S_0$ 3 Krypton 3.75 13.9996 -157.36 -153.22 (v) 110 - [Ar] $3d^{10}$ $4s^2$ $4p^6$ 0
5	37 Rb 85.4678 $^2S_{1/2}$ 0.82 Rubidium 1.532 4.1771 39.31 688 (m) 248 BCC [Kr] $5s^1$ +1	38 Sr 87.62 $^1S_0$ 0.95 Strontium 2.63 5.6949 777 1382 (m) 215 FCC [Kr] $5s^2$ +2	39 Y 88.90585 $^2D_{3/2}$ 1.22 Yttrium 4.472 6.2173 1526 3345 (m) 180 HCP [Kr] $4d^1$ $5s^2$ +3	40 Zr 91.224 $^3F_2$ 1.33 Zirconium 6.511 6.6339 1855 4409 (m) 160 HCP [Kr] $4d^2$ $5s^2$ +4	41 Nb 92.90638 $^6D_{1/2}$ 1.60 Niobium 8.57 6.7589 2477 4744 (m) 146 BCC [Kr] $4d^4$ $5s^1$ +3,5	42 Mo 95.94 $^7S_3$ 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 Ru 101.07 $^5F_5$ 2.20 Ruthenium 12.37 7.3605 2334 4150 (m) 134 HCP [Kr] $4d^7$ $5s^1$ +2,3,4,6,8	45 Rh 102.90550 $^4F_{9/2}$ 2.28 Rhodium 12.45 7.4589 1964 3695 (m) 134 FCC [Kr] $4d^8$ $5s^1$ +2,3,4	46 Pd 106.42 $^1S_0$ 2.20 Palladium 12.023 8.3369 1554.9 2963 (m) 137 FCC [Kr] $4d^{10}$ +2,4	47 Ag 107.8682 $^2S_{1/2}$ 1.93 Silver 10.49 7.5762 961.78 2162 (m) 144 FCC [Kr] $4d^{10}$ $5s^1$ +1	48 Cd 112.411 $^1S_0$ 1.69 Cadmium 8.65 8.9938 321.07 767 (m) 151 §hex [Kr] $4d^{10}$ $5s^2$ +2	49 In 114.818 $^2P^\circ_{1/2}$ 1.78 Indium 7.31 5.7864 156.6 2072 (m) 167 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^1$ +3	50 Sn 118.710 $^3P_0$ 1.96 Tin 7.31 7.3439 231.93 2602 (v) 141 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^2$ +2,4	51 Sb 121.760 $^4S^\circ_{3/2}$ 2.05 Antimony 6.697 8.6084 630.63 1587 (v) 138 §rhom. [Kr] $4d^{10}$ $5s^2$ $5p^3$ +3,5,-3	52 Te 127.60 $^3P_2$ 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 I 126.90447 $^2P^\circ_{3/2}$ 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 Xe 131.293 $^1S_0$ 2.60 Xenon 5.9 12.1298 -111.8 -108 (v) 130 - [Kr] $4d^{10}$ $5s^2$ $5p^6$ 0
6	55 Cs 132.90545 $^2S_{1/2}$ 0.79 Cesium 1.879 3.8939 28.44 671 (m) 265 BCC [Xe] $6s^1$ +1	56 Ba 137.327 $^1S_0$ 0.89 Barium 3.51 5.2117 727 1870 (m) 222 BCC [Xe] $6s^2$ +2	Lanthanide Series	72 Hf 178.49 $^3F_2$ 1.3 Hafnium 13.31 6.8251 2233 4603 (m) 159 HCP [Xe] $4f^{14}$ $5d^2$ $6s^2$ +4	73 Ta 180.9479 $^4F_{3/2}$ 1.5 Tantalum 16.65 7.5496 3017 5458 (m) 146 BCC [Xe] $4f^{14}$ $5d^3$ $6s^2$ +5	74 W 183.84 $^5D_0$ 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 Re 186.207 $^6S_{5/2}$ 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 Os 190.23 $^5D_4$ 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 Ir 192.217 $^4F_{9/2}$ 2.2 Iridium 22.65 8.9670 2466 4428 (m) 136 FCC [Xe] $4f^{14}$ $5d^7$ $6s^2$ +2,3,4,6	78 Pt 195.078 $^3D_3$ 2.28 Platinum 21.09 8.9588 1768.3 3825 (m) 139 FCC [Xe] $4f^{14}$ $5d^9$ $6s^1$ +2,4	79 Au 196.96655 $^2S_{1/2}$ 2.54 Gold 19.3 9.2255 1064.18 2856 (m) 144 FCC [Xe] $4f^{14}$ $5d^{10}$ $6s^1$ +1,3	80 Hg 200.59 $^1S_0$ 2 Mercury 13.534 10.4375 -38.83 356.73 (m) 151 §rhom. [Xe] $4f^{14}$ $5d^{10}$ $6s^2$ +1,2	81 Tl 204.3833 $^2P^\circ_{1/2}$ 1.62 Thallium 11.85 6.1082 304 1473 (m) 170 HCP [Hg] $6p^1$ +1,3	82 Pb 207.2 $^3P_0$ 2.33 Lead 11.34 7.4167 327.46 1749 (m) 175 FCC [Hg] $6p^2$ +2,4	83 Bi 208.98038 $^4S^\circ_{3/2}$ 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 $^2P^\circ_{3/2}$ 2.2 Astatine - - 302 - - - [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

Lanthanides	57 La 138.9055 $^2D_{3/2}$ 1.10 Lanthanum 6.146 5.5769 920 3464 (m) 187 §hex [Xe] $5d^1$ $6s^2$ +3	58 Ce 140.116 $^1G^\circ_4$ 1.12 Cerium 6.689 5.5387 798 3360 (m) 182 FCC [Xe] $4f^1$ $5d^1$ $6s^2$ +3,4	59 Pr 140.90765 $^4I^\circ_{9/2}$ 1.13 Praseodymium 6.64 5.473 931 3290 (m) 182 §hex [Xe] $4f^3$ $6s^2$ +3,4	60 Nd 144.24 $^5I_4$ 1.14 Neodymium 7.01 5.5250 1021 3100 (m) 181 §hex [Xe] $4f^4$ $6s^2$ +3	61 ☢ (145) Pm $^6H^\circ_{5/2}$ - Promethium 7.264 5.582 1100 3000 (m) 183 HCP [Xe] $4f^5$ $6s^2$ +3	62 Sm 150.36 $^7F_0$ 1.17 Samarium 7.353 5.6437 1072 1803 (m) 180 §hex [Xe] $4f^6$ $6s^2$ +2,3	63 Eu 151.964 $^8S^\circ_{7/2}$ - Europium 5.244 5.6704 822 1527 (m) 180 BCC [Xe] $4f^7$ $6s^2$ +2,3	64 Gd 157.25 $^9D^\circ_2$ 1.20 Gadolinium 7.901 6.1498 1313 3250 (m) 180 HCP [Xe] $4f^7$ $5d^1$ $6s^2$ +3	65 Tb 158.92534 $^6H^\circ_{15/2}$ - Terbium 8.219 5.8638 1356 3230 (m) 177 HCP [Xe] $4f^9$ $6s^2$ +3,4	66 Dy 162.500 $^5I_8$ 1.22 Dysprosium 8.551 5.9389 1412 2567 (m) 178 HCP [Xe] $4f^{10}$ $6s^2$ +3	67 Ho 164.93032 $^4I^\circ_{15/2}$ 1.23 Holmium 8.795 6.0215 1474 2700 (m) 176 HCP [Xe] $4f^{11}$ $6s^2$ +3	68 Er 167.259 $^3H_6$ 1.24 Erbium 9.066 6.1077 1497 2868 (m) 176 HCP [Xe] $4f^{12}$ $6s^2$ +3	69 Tm 168.93421 $^2F^\circ_{7/2}$ 1.25 Thulium 9.321 6.1843 1545 1950 (m) 176 HCP [Xe] $4f^{13}$ $6s^2$ +2,3	70 Yb 173.04 $^1S_0$ - Ytterbium 6.57 6.2542 819 1196 (m) 176 FCC [Xe] $4f^{14}$ $6s^2$ +2,3	71 Lu 174.967 $^2D_{3/2}$ 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 $^3F_2$ 1.3 Thorium 11.724 6.3067 1750 4820 (m) 179 FCC [Rn] $6d^2$ $7s^2$ +4	91 ☢ 231.0359 $^4K_{11/2}$ 1.5 Protactinium 15.37 5.89 1572 4000 (m) 163 §tetra [Rn] $5f^2$ $6d^1$ $7s^2$ +4,5	92 ☢ 238.0289 $^5L^\circ_6$ 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 $^6L_{11/2}$ 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 $^8S^\circ_{7/2}$ 1.3 Americium - 5.9738 1176 2011 (m) 173 HCP [Rn] $5f^7$ $7s^2$ +3,4,5,6	96 ☢ (247) Cm $^9D^\circ_2$ 1.3 Curium 13.51 5.9914 1345 3110 (m) 174 HCP [Rn] $5f^7$ $6d^1$ $7s^2$ +3	97 ☢ (247) Bk $^6H^\circ_{15/2}$ 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 $^4I^\circ_{15/2}$ 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 $^2F^\circ_{7/2}$ 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 $^2P^\circ_{1/2}$? - Lawrencium - 4.9 ? 1627 - - - [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 ¹²C
- ( ) 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

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PERIODNI SUSTAV ELEMENATA

SKUPINA

PERIODA

	1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8 VIIIB	9 VIIIB	10 VIIIB	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 1.0079 H VODIK																	2 4.0026 He HELIJ
2	3 6.941 Li LITIJ	4 9.0122 Be BERILIJ											5 10.811 B BOR	6 12.011 C UGLJIK	7 14.007 N DUŠIK	8 15.999 O KISIK	9 18.998 F FLUOR	10 20.180 Ne NEON
3	11 22.990 Na NATRIJ	12 24.305 Mg MAGNEZIJ											13 26.982 Al ALUMINIJ	14 28.086 Si SILICIJ	15 30.974 P FOSFOR	16 32.065 S SUMPOR	17 35.453 Cl KLOR	18 39.948 Ar ARGON
4	19 39.098 K KALIJ	20 40.078 Ca KALCIJ	21 44.956 Sc SKANDIJ	22 47.867 Ti TITANIJ	23 50.942 V VANADIJ	24 51.996 Cr KROM	25 54.938 Mn MANGAN	26 55.845 Fe ŽELJEZO	27 58.933 Co KOBALT	28 58.693 Ni NIKAL	29 63.546 Cu BAKAR	30 65.39 Zn CINK	31 69.723 Ga GALIJ	32 72.64 Ge GERMANIJ	33 74.922 As ARSEN	34 78.96 Se SELENIJ	35 79.904 Br BROM	36 83.80 Kr KRIPTON
5	37 85.468 Rb RUBIDIJ	38 87.62 Sr STRONCIJ	39 88.906 Y ITRIJ	40 91.224 Zr CIRKONIJ	41 92.906 Nb NIOBIJ	42 95.94 Mo MOLIBDEN	43 (98) Tc TEHNECIJ	44 101.07 Ru RUTENIJ	45 102.91 Rh RODIJ	46 106.42 Pd PALADIJ	47 107.87 Ag SREBRO	48 112.41 Cd KADMIJ	49 114.82 In INDIJ	50 118.71 Sn KOSITAR	51 121.76 Sb ANTIMON	52 127.60 Te TELURIJ	53 126.90 I JOD	54 131.29 Xe KSENON
6	55 132.91 Cs CEZIJ	56 137.33 Ba BARIJ	57-71 La-Lu Lantanoidi	72 178.49 Hf HAFNIJ	73 180.95 Ta TANTAL	74 183.84 W VOLFRAM	75 186.21 Re RENIJ	76 190.23 Os OSMIJ	77 192.22 Ir IRIDIJ	78 195.08 Pt PLATINA	79 196.97 Au ZLATO	80 200.59 Hg ŽIVA	81 204.38 Tl TALIJ	82 207.2 Pb OLOVO	83 208.98 Bi BIZMUT	84 (209) Po POLONIJ	85 (210) At ASTAT	86 (222) Rn RADON
7	87 (223) Fr FRANCIJ	88 (226) Ra RADIJ	89-103 Ac-Lr Aktinoidi	104 (261) Rf RUTHERFORDIJ	105 (262) Db DUBNIJ	106 (266) Sg SEABORGIJ	107 (264) Bh BOHRIJ	108 (277) Hs HASSIJ	109 (268) Mt MEITNERIJ	110 (281) Uun UNUNNILIJ	111 (272) Uuu UNUNUNIJ	112 (285) Uub UNUNBIJ		114 (289) Uuq UNUNKVADIJ				

RELATIVNA ATOMSKA MASA (2)

SKUPINE IUPAC — SKUPINE CAS

13 IIIA

ATOMSKI BROJ — 5 10.811

SIMBOL — B

BOR

NAZIV ELEMENTA (1)

- Metali
- Polumetali
- Nemetali
- Alkalijski metali
- Zemnoalkalijski metali
- Prijelazni elementi
- Lantanoidi
- Aktinodi
- Halkogeni elementi
- Halogeni elementi
- Plemeniti plinovi

AGREGATNO STANJE (100 °C; 101 kPa)

Ne - plin
Fe - krutina
Ga - tekućina
Tc - sintetski

LANTANOIDI

57 138.91 La LANTAN	58 140.12 Ce CERIJ	59 140.91 Pr PRASEODIMIJ	60 144.24 Nd NEODIMIJ	61 (145) Pm PROMETIJ	62 150.36 Sm SAMARIJ	63 151.96 Eu EUROPIJ	64 157.25 Gd GADOLINIJ	65 158.93 Tb TERBIJ	66 162.50 Dy DISPROZIJ	67 164.93 Ho HOLMIJ	68 167.26 Er ERBIJ	69 168.93 Tm TULIJ	70 173.04 Yb ITERBIJ	71 174.97 Lu LUTECIJ

AKTINOIDI

89 (227) Ac AKTINIJ	90 232.04 Th TORIJ	91 231.04 Pa PROTAKTINIJ	92 238.03 U URANIJ	93 (237) Np NEPTUNIJ	94 (244) Pu PLUTONIJ	95 (243) Am AMERICIJ	96 (247) Cm KURIJ	97 (247) Bk BERKELIJ	98 (251) Cf KALIFORNIJ	99 (252) Es EINSTEINIJ	100 (257) Fm FERMIJ	101 (258) Md MENDELEVIJ	102 (259) No NOBELIJ	103 (262) Lr LAWRENCIJ

(1) Hrvatska nomenklatura anorganske kemije, ed. V. Simeon, Školska knjiga, Zagreb, 1996. Pure Appl. Chem., 69, 2471-2473 (1997) za imena elemenata od rednog broja 104 do 109.

(2) Pure Appl. Chem., 73, No. 4, 667-683 (2001) Relativne atomske mase su zaokružene na pet značajnih znamenki. Za elemente koji nemaju stabilnih nuklida u zagradama je dan maseni broj najduže živućeg izotopa. Izuzetak su Th, Pa i U koji imaju karakterističan izotopski sastav u zemljinoj kori.

The Periodic Table of the Elements

Average relative masses are 2001 values, rounded to two decimal places.

All average masses are to be treated as measured quantities, and subject to significant figure rules. Do not round them further when performing calculations.

Element name → Mercury
Atomic # → **80**
Symbol → **Hg**
Avg. Mass → 200.59
Electronegativity → 1.9

1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Hydrogen 1 **H** 1.01 2.1																		Helium 2 **He** 4.00 ---
Lithium 3 **Li** 6.94 1.0	Beryllium 4 **Be** 9.01 1.5												Boron 5 **B** 10.81 2.0	Carbon 6 **C** 12.01 2.5	Nitrogen 7 **N** 14.01 3.0	Oxygen 8 **O** 16.00 3.5	Fluorine 9 **F** 19.00 4.0	Neon 10 **Ne** 20.18 ---
Sodium 11 **Na** 22.99 0.9	Magnesium 12 **Mg** 24.31 1.2												Aluminum 13 **Al** 26.98 1.5	Silicon 14 **Si** 28.09 1.8	Phosphorus 15 **P** 30.97 2.1	Sulfur 16 **S** 32.07 2.5	Chlorine 17 **Cl** 35.45 3.0	Argon 18 **Ar** 39.95 ---
Potassium 19 **K** 39.10 0.8	Calcium 20 **Ca** 40.08 1.0		Scandium 21 **Sc** 44.96 1.3	Titanium 22 **Ti** 47.88 1.5	Vanadium 23 **V** 50.94 1.6	Chromium 24 **Cr** 52.00 1.6	Manganese 25 **Mn** 54.94 1.5	Iron 26 **Fe** 55.85 1.8	Cobalt 27 **Co** 58.93 1.8	Nickel 28 **Ni** 58.69 1.8	Copper 29 **Cu** 63.55 1.9	Zinc 30 **Zn** 65.39 1.6	Gallium 31 **Ga** 69.72 1.6	Germanium 32 **Ge** 72.61 1.8	Arsenic 33 **As** 74.92 2.0	Selenium 34 **Se** 78.96 2.4	Bromine 35 **Br** 79.90 2.8	Krypton 36 **Kr** 83.80 3.0
Rubidium 37 **Rb** 85.47 0.8	Strontium 38 **Sr** 87.62 1.0		Yttrium 39 **Y** 88.91 1.2	Zirconium 40 **Zr** 91.22 1.4	Niobium 41 **Nb** 92.91 1.6	Molybdenum 42 **Mo** 95.94 1.8	Technetium 43 **Tc** (98) 1.9	Ruthenium 44 **Ru** 101.07 2.2	Rhodium 45 **Rh** 102.91 2.2	Palladium 46 **Pd** 106.42 2.2	Silver 47 **Ag** 107.87 1.9	Cadmium 48 **Cd** 112.41 1.7	Indium 49 **In** 114.82 1.7	Tin 50 **Sn** 118.71 1.8	Antimony 51 **Sb** 121.76 1.9	Tellurium 52 **Te** 127.60 2.1	Iodine 53 **I** 126.90 2.5	Xenon 54 **Xe** 131.29 2.6
Cesium 55 **Cs** 132.91 0.7	Barium 56 **Ba** 137.33 0.9	**57-70** ***** **89-102** ******	Lutetium 71 **Lu** 174.97 1.1	Hafnium 72 **Hf** 178.49 1.3	Tantalum 73 **Ta** 180.95 1.5	Tungsten 74 **W** 183.84 1.7	Rhenium 75 **Re** 186.21 1.9	Osmium 76 **Os** 190.23 2.2	Iridium 77 **Ir** 192.22 2.2	Platinum 78 **Pt** 195.08 2.2	Gold 79 **Au** 196.97 2.4	Mercury 80 **Hg** 200.59 1.9	Thallium 81 **Tl** 204.38 1.8	Lead 82 **Pb** 207.20 1.8	Bismuth 83 **Bi** 208.98 1.9	Polonium 84 **Po** (209) 2.0	Astatine 85 **At** (210) 2.2	Radon 86 **Rn** (222) 2.4
Francium 87 **Fr** (223) 0.7	Radium 88 **Ra** (226) 0.9		Lawrencium 103 **Lr** (262) ---	Rutherfordium 104 **Rf** (267) ---	Dubnium 105 **Db** (268) ---	Seaborgium 106 **Sg** (271) ---	Bohrium 107 **Bh** (272) ---	Hassium 108 **Hs** (270) ---	Meitnerium 109 **Mt** (276) ---	Darmstadtium 110 **Ds** (281) ---	Roentgenium 111 **Rg** (280) ---	Copernicium 112 **Cn** (285) ---	Ununtrium 113 **Uut** (284) ---	Ununquadium 114 **Uuq** (289) ---	Ununpentium 115 **Uup** (288) ---	Ununhexium 116 **Uuh** (293) ---	Ununseptium 117 **Uus** (294?) ---	Ununoctium 118 **Uuo** (294) ---

*lanthanides	Lanthanum 57 **La** 138.91 1.1	Cerium 58 **Ce** 140.12 1.1	Praseodymium 59 **Pr** 140.91 1.1	Neodymium 60 **Nd** 144.24 1.1	Promethium 61 **Pm** (145) 1.1	Samarium 62 **Sm** 150.36 1.2	Europium 63 **Eu** 151.97 1.1	Gadolinium 64 **Gd** 157.25 1.2	Terbium 65 **Tb** 158.93 1.1	Dysprosium 66 **Dy** 162.50 1.2	Holmium 67 **Ho** 164.93 1.2	Erbium 68 **Er** 167.26 1.2	Thulium 69 **Tm** 168.93 1.3	Ytterbium 70 **Yb** 173.04 1.1
**actinides	Actinium 89 **Ac** (227) 1.1	Thorium 90 **Th** 232.04 1.3	Protactinium 91 **Pa** 231.04 1.5	Uranium 92 **U** 238.03 1.4	Neptunium 93 **Np** (237) 1.4	Plutonium 94 **Pu** (244) 1.3	Americium 95 **Am** (243) 1.3	Curium 96 **Cm** (247) 1.3	Berkelium 97 **Bk** (247) 1.3	Californium 98 **Cf** (251) 1.3	Einsteinium 99 **Es** (252) 1.3	Fermium 100 **Fm** (257) 1.3	Mendelevium 101 **Md** (258) 1.3	Nobelium 102 **No** (259) 1.3

Heat of Vaporization (ΔHv)

Heat of Vaporization (ΔHv)

kilojoules per mole (kJ/mol)

0.046 — 412.023 — 824

View... Graph...

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
H 0.046 1																	He 0.082 2
Li 147.7 3	Be 308.8 4											B 504.4 5	C 710.9 6	N 5.58 7	O 6.82 8	F 3.26 9	Ne 1.736 10
Na 99.2 11	Mg 127.6 12											Al 290.8 13	Si 383.3 14	P 51.9 15	S 9.62 16	Cl 20.42 17	Ar 6.53 18
K 79.1 19	Ca 150.6 20	Sc 376.1 21	Ti 425.5 22	V 459.7 23	Cr 341.8 24	Mn 220.5 25	Fe 340.2 26	Co 382.4 27	Ni 374.8 28	Cu 306.7 29	Zn 114.2 30	Ga 270.3 31	Ge 327.6 32	As 31.9 33	Se 90 34	Br 30.5 35	Kr 9.05 36
Rb 75.7 37	Sr 154.4 38	Y 367.4 39	Zr 566.7 40	Nb 680.19 41	Mo 589.9 42	Tc 585.2 43	Ru 567 44	Rh 494.3 45	Pd 361.5 46	Ag 257.7 47	Cd 100.0 48	In 231.8 49	Sn 292.2 50	Sb 165.8 51	Te 104.6 52	I 41.67 53	Xe 12.65 54
Cs 66.5 55	Ba 150.9 56	La 402.1 57	Hf 570.7 72	Ta 758 73	W 824 74	Re 704 75	Os 738 76	Ir 612 77	Pt 469 78	Au 343 79	Hg 59.11 80	Tl 166 81	Pb 178 82	Bi 179 83	Po 101 84	At -- 85	Rn 18.1 86
Fr -- 87	Ra 136.7 88	Ac 293 89	Rf -- 104	Db -- 105	Sg -- 106	Bh -- 107	Hs -- 108	Mt -- 109	Ds -- 110	Rg -- 111	Uub -- 112	Uut -- 113	Uuq -- 114	Uup -- 115	Uuh -- 116	Uus -- 117	Uuo -- 118

Ce 398 58	Pr 357 59	Nd 328 60	Pm -- 61	Sm 164.8 62	Eu 176 63	Gd 301 64	Tb 391 65	Dy 293 66	Ho 303 67	Er 280 68	Tm 247 69	Yb 159 70	Lu 428 71
Th 513.7 90	Pa 481 91	U 417 92	Np 336.6 93	Pu 343.5 94	Am 238.5 95	Cm -- 96	Bk -- 97	Cf -- 98	Es -- 99	Fm -- 100	Md -- 101	No -- 102	Lr -- 103

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Periodic Table for the *Table of Isotopes** (2005)

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)
Hydrogen 1 H_1 -259.34° -252.87° -240.18° +1-1 1.00794 91.0%																	**Helium** 2 He_2 -272.2° -268.93° -267.96° 0 4.002602 8.9%
Lithium 2 1 Li_3 180.5° 1342° +1 6.941 1.86×10^{-7}%	**Beryllium** 2 2 Be_4 1287° 2471° +2 9.012182 2.38×10^{-9}%											**Boron** 2 3 B_5 2075° 4000° +3 10.811 6.9×10^{-8}%	**Carbon** 2 4 C_6 4492t° 3642s° +2+4-4 12.0107 0.033%	**Nitrogen** 2 5 N_7 -210.00° -195.79° -146.94° ±1±2±3+4+5 14.00674 0.0102%	**Oxygen** 2 6 O_8 -218.79° -182.95° -118.56° -2 15.9994 0.078%	**Fluorine** 2 7 F_9 -219.62° -188.12° -129.02° -1 18.9984032 2.7×10^{-6}%	**Neon** 2 8 Ne_{10} -248.59° -246.08° -228.7° 0 20.1797 0.0112%
Sodium 2 8 1 Na_{11} 97.80° 883° +1 22.989770 0.000187%	**Magnesium** 2 8 2 Mg_{12} 650° 1090° +2 24.3050 0.00350%											**Aluminum** 2 8 3 Al_{13} 660.32° 2519° +3 26.981538 0.000277%	**Silicon** 2 8 4 Si_{14} 1414° 3265° +2+4-4 28.0855 0.00326%	**Phosphorus** 2 8 5 P_{15} 44.15° 280.5° 721° +3+5-3 30.973761 0.000034%	**Sulfur** 2 8 6 S_{16} 115.21° 444.60° 1041° +4+6-2 32.066 0.00168%	**Chlorine** 2 8 7 Cl_{17} -101.5° -34.04° 143.8° +1+5+7-1 35.4527 0.000017%	**Argon** 2 8 8 Ar_{18} -189.35° -185.85° -122.28° 0 39.948 0.000329%
Potassium 2 8 8 1 K_{19} 63.38° 759° +1 39.0983 0.0000123%	**Calcium** 2 8 8 2 Ca_{20} 842° 1484° +2 40.078 0.000199%	**Scandium** 2 8 9 2 Sc_{21} 1541° 2836° +3 44.955910 1.12×10^{-7}%	**Titanium** 2 8 10 2 Ti_{22} 1668° 3287° +2+3+4 47.867 7.8×10^{-6}%	**Vanadium** 2 8 11 2 V_{23} 1910° 3407° +2+3+4+5 50.9415 9.6×10^{-7}%	**Chromium** 2 8 13 1 Cr_{24} 1907° 2671° +2+3+6 51.9961 0.000044%	**Manganese** 2 8 13 2 Mn_{25} 1246° 2061° +2+3+4+7 54.938049 0.000031%	**Iron** 2 8 14 2 Fe_{26} 1538° 2861° +2+3 55.845 0.00294%	**Cobalt** 2 8 15 2 Co_{27} 1495° 2927° +2+3 58.933200 7.3×10^{-6}%	**Nickel** 2 8 16 2 Ni_{28} 1455° 2913° +2+3 58.6934 0.000161%	**Copper** 2 8 18 1 Cu_{29} 1084.62° 2562° +1+2 63.546 1.70×10^{-6}%	**Zinc** 2 8 18 2 Zn_{30} 419.53° 907° +2 65.39 4.11×10^{-6}%	**Gallium** 2 8 18 3 Ga_{31} 29.76° 2204° +3 69.723 1.23×10^{-7}%	**Germanium** 2 8 18 4 Ge_{32} 938.25° 2833° +2+4 72.61 3.9×10^{-7}%	**Arsenic** 2 8 18 5 As_{33} 817t° 614s° 1400° +3+5-3 74.92160 2.1×10^{-8}%	**Selenium** 2 8 18 6 Se_{34} 221° 685° 1493° +4+6-2 78.96 2.03×10^{-7}%	**Bromine** 2 8 18 7 Br_{35} -7.2° 58.8° 315° +1+5-1 79.904 3.8×10^{-8}%	**Krypton** 2 8 18 8 Kr_{36} -157.36° -153.22° -63.74° 0 83.80 1.5×10^{-7}%
Rubidium 2 8 18 8 1 Rb_{37} 39.31° 688° +1 85.4678 2.31×10^{-8}%	**Strontium** 2 8 18 8 2 Sr_{38} 777° 1382° +2 87.62 7.7×10^{-8}%	**Yttrium** 2 8 18 9 2 Y_{39} 1522° 3345° +3 88.90585 1.51×10^{-8}%	**Zirconium** 2 8 18 10 2 Zr_{40} 1855° 4409° +4 91.224 3.72×10^{-8}%	**Niobium** 2 8 18 12 1 Nb_{41} 2477° 4744° +3+5 92.90638 2.28×10^{-9}%	**Molybdenum** 2 8 18 13 1 Mo_{42} 2623° 4639° +6 95.94 8.3×10^{-9}%	**Technetium** 2 8 18 13 2 Tc_{43} 2157° 4265° +4+6+7 [98]	**Ruthenium** 2 8 18 15 1 Ru_{44} 2334° 4150° +3 101.07 6.1×10^{-9}%	**Rhodium** 2 8 18 16 1 Rh_{45} 1964° 3695° +3 102.90550 1.12×10^{-9}%	**Palladium** 2 8 18 18 0 Pd_{46} 1554.9° 2963° +2+4 106.42 4.5×10^{-9}%	**Silver** 2 8 18 18 1 Ag_{47} 961.78° 2162° +1 107.8682 1.58×10^{-9}%	**Cadmium** 2 8 18 18 2 Cd_{48} 321.07° 767° +2 112.411 5.3×10^{-9}%	**Indium** 2 8 18 18 3 In_{49} 156.60° 2072° +3 114.818 6.0×10^{-10}%	**Tin** 2 8 18 18 4 Sn_{50} 231.93° 2602° +2+4 118.710 1.25×10^{-8}%	**Antimony** 2 8 18 18 5 Sb_{51} 630.63° 1587° +3+5-3 121.760 1.01×10^{-9}%	**Tellurium** 2 8 18 18 6 Te_{52} 449.51° 988° +4+6-2 127.60 1.57×10^{-8}%	**Iodine** 2 8 18 18 7 I_{53} 113.7° 184.4° 546° +1+5+7-1 126.90447 2.9×10^{-9}%	**Xenon** 2 8 18 18 8 Xe_{54} -111.75° -108.04° 16.58° 0 131.29 1.5×10^{-8}%
Cesium 2 8 18 18 8 1 Cs_{55} 28.44° 671° +1 132.90545 1.21×10^{-9}%	**Barium** 2 8 18 18 8 2 Ba_{56} 727° 1897° +2 137.327 1.46×10^{-8}%	**Lanthanum** 2 8 18 18 9 2 La_{57} † 918° 3464° +3 138.9055 1.45×10^{-9}%	**Hafnium** 2 8 18 32 10 2 Hf_{72} 2233° 4603° +4 178.49 5.02×10^{-10}%	**Tantalum** 2 8 18 32 11 2 Ta_{73} 3017° 5458° +5 180.9479 6.75×10^{-11}%	**Tungsten** 2 8 18 32 12 2 W_{74} 3422° 5555° +6 183.84 4.34×10^{-10}%	**Rhenium** 2 8 18 32 13 2 Re_{75} 3186° 5596° +4+6+7 186.207 1.69×10^{-10}%	**Osmium** 2 8 18 32 14 2 Os_{76} 3033° 5012° +3+4 190.23 2.20×10^{-9}%	**Iridium** 2 8 18 32 15 2 Ir_{77} 2446° 4428° +3+4 192.217 2.16×10^{-9}%	**Platinum** 2 8 18 32 16 2 Pt_{78} 1768.4° 3825° +2+4 195.078 4.4×10^{-9}%	**Gold** 2 8 18 32 18 1 Au_{79} 1064.18° 2856° +1+3 196.96655 6.1×10^{-10}%	**Mercury** 2 8 18 32 18 2 Hg_{80} -38.83° 356.73° 1477° +1+2 200.59 1.11×10^{-9}%	**Thallium** 2 8 18 32 18 3 Tl_{81} 304° 1473° +1+3 204.3833 6.0×10^{-10}%	**Lead** 2 8 18 32 18 4 Pb_{82} 327.46° 1749° +2+4 207.2 1.03×10^{-8}%	**Bismuth** 2 8 18 32 18 5 Bi_{83} 271.40° 1564° +3+5 208.98038 4.7×10^{-10}%	**Polonium** 2 8 18 32 18 6 Po_{84} 254° 962° +2+4 [209]	**Astatine** 2 8 18 32 18 7 At_{85} 302° [210]	**Radon** 2 8 18 32 18 8 Rn_{86} -71° -61.7° 104° 0 [222]
Francium 2 8 18 32 18 8 1 Fr_{87} 27° +1 [223]	**Radium** 2 8 18 32 18 8 2 Ra_{88} 700° +2 [226]	**Actinium** 2 8 18 32 18 9 2 Ac_{89} ‡ 1051° 3198° +3 [227]	**Rutherfordium** 2 8 18 32 10 2 Rf_{104} +4 [261]	**Dubnium** 2 8 18 32 11 2 Db_{105} [262]	**Seaborgium** 2 8 18 32 12 2 Sg_{106} [266]	**Bohrium** 2 8 18 32 13 2 Bh_{107} [264]	**Hassium** 2 8 18 32 14 2 Hs_{108} [269]	**Meitnerium** 2 8 18 32 15 2 Mt_{109} [268]	**Darmstadtium** 2 8 18 32 16 2 Ds_{110} [271]	**Roentgenium** 2 8 18 32 17 2 Rg_{111} [272]	**Element-112** 2 8 18 32 32 18 2 112_{112} [277]					

Group

Element
K E_Z M.P.°
L B.P.°
M C.P.°
N Ox.States
O At.Weight
P Abundance%
Q

Key to Table

† Lanthanides	Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium
	2 8 18 19 9 2 Ce_{58} 798° 3443° +3+4 140.116 3.70×10^{-9}%	2 8 18 21 8 2 Pr_{59} 931° 3520° +3 140.90765 5.44×10^{-10}%	2 8 18 22 8 2 Nd_{60} 1021° 3074° +3 144.24 2.70×10^{-9}%	2 8 18 23 8 2 Pm_{61} 1042° 3000° +3 [145]	2 8 18 24 8 2 Sm_{62} 1074° 1794° +2+3 150.36 8.42×10^{-10}%	2 8 18 25 8 2 Eu_{63} 822° 1596° +2+3 151.964 3.17×10^{-10}%	2 8 18 25 9 2 Gd_{64} 1313° 3273° +3 157.25 1.076×10^{-9}%	2 8 18 27 8 2 Tb_{65} 1356° 3230° +3 158.92534 1.97×10^{-10}%	2 8 18 28 8 2 Dy_{66} 1412° 2567° +3 162.50 1.286×10^{-9}%	2 8 18 29 8 2 Ho_{67} 1474° 2700° +3 164.93032 2.90×10^{-10}%	2 8 18 30 8 2 Er_{68} 1529° 2868° +3 167.26 8.18×10^{-10}%	2 8 18 31 8 2 Tm_{69} 1545° 1950° +3 168.93421 1.23×10^{-10}%	2 8 18 32 8 2 Yb_{70} 819° 1196° +2+3 173.04 8.08×10^{-10}%	2 8 18 32 9 2 Lu_{71} 1663° 3402° +3 174.967 1.197×10^{-10}%

‡ Actinides	Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium	Lawrencium
	2 8 18 32 18 10 2 Th_{90} 1750° 4788° +4 232.0381 1.09×10^{-10}%	2 8 18 32 9 2 Pa_{91} 1572° +5+4 231.03588	2 8 18 32 21 9 2 U_{92} 1135° 4131° +3+4+5+6 238.0289 2.94×10^{-11}%	2 8 18 32 22 9 2 Np_{93} 644° +3+4+5+6 [237]	2 8 18 32 24 8 2 Pu_{94} 640° 3228° +3+4+5+6 [244]	2 8 18 32 25 8 2 Am_{95} 1176° 2011° +3+4+5+6 [243]	2 8 18 32 25 9 2 Cm_{96} 1345° +3 [247]	2 8 18 32 27 8 2 Bk_{97} 1050° +3+4 [247]	2 8 18 32 28 8 2 Cf_{98} 900° +3 [251]	2 8 18 32 29 8 2 Es_{99} 860° +3 [252]	2 8 18 32 30 8 2 Fm_{100} 1527° +3 [257]	2 8 18 32 31 8 2 Md_{101} 827° +2+3 [258]	2 8 18 32 32 8 2 No_{102} 827° +2+3 [259]	2 8 18 32 32 9 2 Lr_{103} 1627° +3 [262]

The new IUPAC Group format numbers the groups from 1 to 18. The numbering system used by the Chemical Abstracts Service (CAS) is given in parentheses. For elements that are not naturally abundant, the mass number of the longest-lived isotope is given in brackets. The abundances (atomic %) are based on meteorite and solar wind data. The melting point (M.P.), boiling point (B.P.), and critical point (C.P.)temperatures are given in °Celsius. Sublimation and critical temperatures are indicated by s and t.

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2. G.J. Leigh, *Nomenclature of Inorganic Chemistry*, Blackwells Scientific Publications, Oxford, (1990).
3. *Chemical and Engineering News*, **63**(5), 27(1985).
4. E. Anders and N. Grevesse, *Abundances of the Elements: Meteoritic and Solar*, Geochimica et Cosmochimica Acta **53**, 197 (1989).

* R.B. Firestone, C.M. Baglin, and S.Y.F. Chu, 1999 Update to the 8th Edition of the *Table of Isotopes*, John Wiley & Sons, (1999).

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Periodic Table of the Elements

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Atomic Number	1	1.00794	†Atomic Weight
Symbol	H	$^2S_{1/2}$ 2.2	†Ground-State Level; *Electronegativity (Pauling)
Name	Hydrogen		
*Density [Note]	0.0899	13.5984	†Ionization Energy (eV)
*Melting Point (°C)	-259.14	-252.87	*Boiling Point (°C)
Atomic radius (pm) [Note]	(v) 37	FCC	Crystal Structure [Note]
	$1s^1$		†Electron Configuration
	+1,-1		Possible Oxidation States [Note]

Phase at STP

Gas Liquid Solid Synthetic

Categories

Alkali Metals	Noble Gas
Alkaline Earth Metals	Halogens
Transition Metals	Non Metals
Rare Earth Metals	
Poor 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	2.817940×10^{-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 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 H 1.00794 $^2S_{1/2}$ 2.2 Hydrogen 0.0899 13.5984 -259.14 -252.87 (v) 37 - $1s^1$ +1,-1																	2 He 4.002602 $^1S_0$ - Helium 0.1785 24.5874 - -268.93 (v) 32 - $1s^2$ 0
2	3 Li 6.941 $^2S_{1/2}$ 0.98 Lithium 0.535 5.3917 180.54 1342 (m) 152 BCC [He] $2s^1$ +1	4 Be 9.012182 $^1S_0$ 1.57 Beryllium 1.848 9.3227 1287 2470 (m) 112 HCP [He] $2s^2$ +2											5 B 10.811 $^2P^\circ_{1/2}$ 2.04 Boron 2.46 8.2980 2075 4000 (v) 82 rhom. [He] $2s^2$ $2p^1$ +3	6 C 12.0107 $^3P_0$ 2.55 Carbon 2.26 11.2603 3550 4027 (v) 77 hex [He] $2s^2$ $2p^2$ +2,4,-4	7 N 14.0067 $^4S^\circ_{3/2}$ 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 O 15.9994 $^3P_2$ 3.44 Oxygen 1.429 13.6181 -218.3 -182.9 (v) 73 - [He] $2s^2$ $2p^4$ -2	9 F 18.9984032 $^2P^\circ_{3/2}$ 3.98 Fluorine 1.696 17.4228 -219.6 -188.12 (v) 71 - [He] $2s^2$ $2p^5$ -1	10 Ne 20.1797 $^1S_0$ - Neon 0.9 21.5645 -248.59 -246.08 (v) 69 - [He] $2s^2$ $2p^6$ 0
3	11 Na 22.989770 $^2S_{1/2}$ 0.93 Sodium 0.968 5.1391 97.72 883 (m) 186 BCC [Ne] $3s^1$ +1	12 Mg 24.3050 $^1S_0$ 1.31 Magnesium 1.738 7.6462 650 1090 (m) 160 HCP [Ne] $3s^2$ +2											13 Al 26.981538 $^2P^\circ_{1/2}$ 1.61 Aluminum 2.7 5.9858 660.32 2519 (m) 143 FCC [Ne] $3s^2$ $3p^1$ +3	14 Si 28.0855 $^3P_0$ 1.90 Silicon 2.33 8.1517 1414 2900 (v) 111 cubic [Ne] $3s^2$ $3p^2$ +2,4,-4	15 P 30.97361 $^4S^\circ_{3/2}$ 2.19 Phosphorus 1.823 10.4867 44.2 280.5 (v) 106 § [Ne] $3s^2$ $3p^3$ +3,4,5,-3	16 S 32.065 $^3P_2$ 2.58 Sulfur 1.96 10.3600 115.21 444.72 (v) 102 FCO [Ne] $3s^2$ $3p^4$ +2,4,6,-2	17 Cl 35.453 $^2P^\circ_{3/2}$ 3.16 Chlorine 3.214 12.9676 -101.5 -34.04 (v) 99 - [Ne] $3s^2$ $3p^5$ +1,3,5,7,-1	18 Ar 39.948 $^1S_0$ - Argon 1.784 15.7596 -189.3 -185.8 (v) 97 - [Ne] $3s^2$ $3p^6$ 0
4	19 K 39.0983 $^2S_{1/2}$ 0.82 Potassium 0.856 4.3407 63.38 759 (m) 227 BCC [Ar] $4s^1$ +1	20 Ca 40.078 $^1S_0$ 1.00 Calcium 1.55 6.1132 842 1484 (m) 197 FCC [Ar] $4s^2$ +2	21 Sc 44.955910 $^2D_{3/2}$ 1.36 Scandium 2.985 6.5615 1541 2830 (m) 162 HCP [Ar] $3d^1$ $4s^2$ +3	22 Ti 47.867 $^3F_2$ 1.54 Titanium 4.507 6.8281 1668 3287 (m) 147 HCP [Ar] $3d^2$ $4s^2$ +2,3,4	23 V 50.9415 $^4F_{3/2}$ 1.63 Vanadium 6.11 6.7462 1910 3407 (m) 134 BCC [Ar] $3d^3$ $4s^2$ +2,3,4,5	24 Cr 51.9961 $^7S_3$ 1.66 Chromium 7.14 6.7665 1907 2671 (m) 128 BCC [Ar] $3d^5$ $4s^1$ +2,3,6	25 Mn 54.938049 $^6S_{5/2}$ 1.55 Manganese 7.47 7.4340 1246 2061 (m) 127 §cubic [Ar] $3d^5$ $4s^2$ +2,3,4,6,7	26 Fe 55.845 $^5D_4$ 1.83 Iron 7.874 7.9024 1538 2861 (m) 126 BCC [Ar] $3d^6$ $4s^2$ +2,3	27 Co 58.933200 $^4F_{9/2}$ 1.88 Cobalt 8.9 7.8810 1495 2927 (m) 125 HCP [Ar] $3d^7$ $4s^2$ +2,3	28 Ni 58.6934 $^3F_4$ 1.91 Nickel 8.908 7.6398 1455 2913 (m) 124 FCC [Ar] $3d^8$ $4s^2$ +2,3	29 Cu 63.546 $^2S_{1/2}$ 1.90 Copper 8.92 7.7264 1084.62 2927 (m) 128 FCC [Ar] $3d^{10}$ $4s^1$ +1,2	30 Zn 65.409 $^1S_0$ 1.65 Zinc 7.14 9.3942 419.53 907 (m) 134 §hex [Ar] $3d^{10}$ $4s^2$ +2	31 Ga 69.723 $^2P^\circ_{1/2}$ 1.81 Gallium 5.904 5.9993 29.76 2204 (m) 135 §BCO [Ar] $3d^{10}$ $4s^2$ $4p^1$ +3	32 Ge 72.64 $^3P_0$ 2.01 Germanium 5.323 7.8994 938.3 2820 (v) 122 §cubic [Ar] $3d^{10}$ $4s^2$ $4p^2$ +2,4	33 As 74.92160 $^4S^\circ_{3/2}$ 2.18 Arsenic 5.727 9.7886 817 614 (v) 119 rhom. [Ar] $3d^{10}$ $4s^2$ $4p^3$ +3,5,-3	34 Se 78.96 $^3P_2$ 2.55 Selenium 4.819 9.7524 221 685 (v) 116 §hex [Ar] $3d^{10}$ $4s^2$ $4p^4$ +2,4,6,-2	35 Br 79.904 $^2P^\circ_{3/2}$ 2.96 Bromine 3.12 11.8138 -7.3 59 (v) 114 BCO [Ar] $3d^{10}$ $4s^2$ $4p^5$ +1,5,-1	36 Kr 83.798 $^1S_0$ 3 Krypton 3.75 13.9996 -157.36 -153.22 (v) 110 - [Ar] $3d^{10}$ $4s^2$ $4p^6$ 0
5	37 Rb 85.4678 $^2S_{1/2}$ 0.82 Rubidium 1.532 4.1771 39.31 688 (m) 248 BCC [Kr] $5s^1$ +1	38 Sr 87.62 $^1S_0$ 0.95 Strontium 2.63 5.6949 777 1382 (m) 215 FCC [Kr] $5s^2$ +2	39 Y 88.90585 $^2D_{3/2}$ 1.22 Yttrium 4.472 6.2173 1526 3345 (m) 180 HCP [Kr] $4d^1$ $5s^2$ +3	40 Zr 91.224 $^3F_2$ 1.33 Zirconium 6.511 6.6339 1855 4409 (m) 160 HCP [Kr] $4d^2$ $5s^2$ +4	41 Nb 92.90638 $^6D_{1/2}$ 1.60 Niobium 8.57 6.7589 2477 4744 (m) 146 BCC [Kr] $4d^4$ $5s^1$ +3,5	42 Mo 95.94 $^7S_3$ 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 Ru 101.07 $^5F_5$ 2.20 Ruthenium 12.37 7.3605 2334 4150 (m) 134 HCP [Kr] $4d^7$ $5s^1$ +2,3,4,6,8	45 Rh 102.90550 $^4F_{9/2}$ 2.28 Rhodium 12.45 7.4589 1964 3695 (m) 134 FCC [Kr] $4d^8$ $5s^1$ +2,3,4	46 Pd 106.42 $^1S_0$ 2.20 Palladium 12.023 8.3369 1554.9 2963 (m) 137 FCC [Kr] $4d^{10}$ +2,4	47 Ag 107.8682 $^2S_{1/2}$ 1.93 Silver 10.49 7.5762 961.78 2162 (m) 144 FCC [Kr] $4d^{10}$ $5s^1$ +1	48 Cd 112.411 $^1S_0$ 1.69 Cadmium 8.65 8.9938 321.07 767 (m) 151 §hex [Kr] $4d^{10}$ $5s^2$ +2	49 In 114.818 $^2P^\circ_{1/2}$ 1.78 Indium 7.31 5.7864 156.6 2072 (m) 167 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^1$ +3	50 Sn 118.710 $^3P_0$ 1.96 Tin 7.31 7.3439 231.93 2602 (v) 141 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^2$ +2,4	51 Sb 121.760 $^4S^\circ_{3/2}$ 2.05 Antimony 6.697 8.6084 630.63 1587 (v) 138 §rhom. [Kr] $4d^{10}$ $5s^2$ $5p^3$ +3,5,-3	52 Te 127.60 $^3P_2$ 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 I 126.90447 $^2P^\circ_{3/2}$ 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 Xe 131.293 $^1S_0$ 2.60 Xenon 5.9 12.1298 -111.8 -108 (v) 130 - [Kr] $4d^{10}$ $5s^2$ $5p^6$ 0
6	55 Cs 132.90545 $^2S_{1/2}$ 0.79 Cesium 1.879 3.8939 28.44 671 (m) 265 BCC [Xe] $6s^1$ +1	56 Ba 137.327 $^1S_0$ 0.89 Barium 3.51 5.2117 727 1870 (m) 222 BCC [Xe] $6s^2$ +2	Lanthanide Series	72 Hf 178.49 $^3F_2$ 1.3 Hafnium 13.31 6.8251 2233 4603 (m) 159 HCP [Xe] $4f^{14}$ $5d^2$ $6s^2$ +4	73 Ta 180.9479 $^4F_{3/2}$ 1.5 Tantalum 16.65 7.5496 3017 5458 (m) 146 BCC [Xe] $4f^{14}$ $5d^3$ $6s^2$ +5	74 W 183.84 $^5D_0$ 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 Re 186.207 $^6S_{5/2}$ 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 Os 190.23 $^5D_4$ 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 Ir 192.217 $^4F_{9/2}$ 2.2 Iridium 22.65 8.9670 2466 4428 (m) 136 FCC [Xe] $4f^{14}$ $5d^7$ $6s^2$ +2,3,4,6	78 Pt 195.078 $^3D_3$ 2.28 Platinum 21.09 8.9588 1768.3 3825 (m) 139 FCC [Xe] $4f^{14}$ $5d^9$ $6s^1$ +2,4	79 Au 196.96655 $^2S_{1/2}$ 2.54 Gold 19.3 9.2255 1064.18 2856 (m) 144 FCC [Xe] $4f^{14}$ $5d^{10}$ $6s^1$ +1,3	80 Hg 200.59 $^1S_0$ 2 Mercury 13.534 10.4375 -38.83 356.73 (m) 151 §rhom. [Xe] $4f^{14}$ $5d^{10}$ $6s^2$ +1,2	81 Tl 204.3833 $^2P^\circ_{1/2}$ 1.62 Thallium 11.85 6.1082 304 1473 (m) 170 HCP [Hg] $6p^1$ +1,3	82 Pb 207.2 $^3P_0$ 2.33 Lead 11.34 7.4167 327.46 1749 (m) 175 FCC [Hg] $6p^2$ +2,4	83 Bi 208.98038 $^4S^\circ_{3/2}$ 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 $^2P^\circ_{3/2}$ 2.2 Astatine - - 302 - - - [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

Lanthanides	57 La 138.9055 $^2D_{3/2}$ 1.10 Lanthanum 6.146 5.5769 920 3464 (m) 187 §hex [Xe] $5d^1$ $6s^2$ +3	58 Ce 140.116 $^1G^\circ_4$ 1.12 Cerium 6.689 5.5387 798 3360 (m) 182 FCC [Xe] $4f^1$ $5d^1$ $6s^2$ +3,4	59 Pr 140.90765 $^4I^\circ_{9/2}$ 1.13 Praseodymium 6.64 5.473 931 3290 (m) 182 §hex [Xe] $4f^3$ $6s^2$ +3,4	60 Nd 144.24 $^5I_4$ 1.14 Neodymium 7.01 5.5250 1021 3100 (m) 181 §hex [Xe] $4f^4$ $6s^2$ +3	61 ☢ (145) Pm $^6H^\circ_{5/2}$ - Promethium 7.264 5.582 1100 3000 (m) 183 HCP [Xe] $4f^5$ $6s^2$ +3	62 Sm 150.36 $^7F_0$ 1.17 Samarium 7.353 5.6437 1072 1803 (m) 180 §hex [Xe] $4f^6$ $6s^2$ +2,3	63 Eu 151.964 $^8S^\circ_{7/2}$ - Europium 5.244 5.6704 822 1527 (m) 180 BCC [Xe] $4f^7$ $6s^2$ +2,3	64 Gd 157.25 $^9D^\circ_2$ 1.20 Gadolinium 7.901 6.1498 1313 3250 (m) 180 HCP [Xe] $4f^7$ $5d^1$ $6s^2$ +3	65 Tb 158.92534 $^6H^\circ_{15/2}$ - Terbium 8.219 5.8638 1356 3230 (m) 177 HCP [Xe] $4f^9$ $6s^2$ +3,4	66 Dy 162.500 $^5I_8$ 1.22 Dysprosium 8.551 5.9389 1412 2567 (m) 178 HCP [Xe] $4f^{10}$ $6s^2$ +3	67 Ho 164.93032 $^4I^\circ_{15/2}$ 1.23 Holmium 8.795 6.0215 1474 2700 (m) 176 HCP [Xe] $4f^{11}$ $6s^2$ +3	68 Er 167.259 $^3H_6$ 1.24 Erbium 9.066 6.1077 1497 2868 (m) 176 HCP [Xe] $4f^{12}$ $6s^2$ +3	69 Tm 168.93421 $^2F^\circ_{7/2}$ 1.25 Thulium 9.321 6.1843 1545 1950 (m) 176 HCP [Xe] $4f^{13}$ $6s^2$ +2,3	70 Yb 173.04 $^1S_0$ - Ytterbium 6.57 6.2542 819 1196 (m) 176 FCC [Xe] $4f^{14}$ $6s^2$ +2,3	71 Lu 174.967 $^2D_{3/2}$ 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 $^3F_2$ 1.3 Thorium 11.724 6.3067 1750 4820 (m) 179 FCC [Rn] $6d^2$ $7s^2$ +4	91 ☢ 231.0359 $^4K_{11/2}$ 1.5 Protactinium 15.37 5.89 1572 4000 (m) 163 §tetra [Rn] $5f^2$ $6d^1$ $7s^2$ +4,5	92 ☢ 238.0289 $^5L^\circ_6$ 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 $^6L_{11/2}$ 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 $^8S^\circ_{7/2}$ 1.3 Americium - 5.9738 1176 2011 (m) 173 HCP [Rn] $5f^7$ $7s^2$ +3,4,5,6	96 ☢ (247) Cm $^9D^\circ_2$ 1.3 Curium 13.51 5.9914 1345 3110 (m) 174 HCP [Rn] $5f^7$ $6d^1$ $7s^2$ +3	97 ☢ (247) Bk $^6H^\circ_{15/2}$ 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 $^4I^\circ_{15/2}$ 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 $^2F^\circ_{7/2}$ 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 $^2P^\circ_{1/2}$? - Lawrencium - 4.9 ? 1627 - - - [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 ¹²C
- ( ) 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

Periodic Table of the Elements
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Periodic Table for the *Table of Isotopes** (2005)

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)
Hydrogen 1 H_1 -259.34° -252.87° -240.18° +1-1 1.00794 91.0%																	**Helium** 2 He_2 -272.2° -268.93° -267.96° 0 4.002602 8.9%
Lithium 2 1 Li_3 180.5° 1342° +1 6.941 1.86×10^{-7}%	**Beryllium** 2 2 Be_4 1287° 2471° +2 9.012182 2.38×10^{-9}%											**Boron** 2 3 B_5 2075° 4000° +3 10.811 6.9×10^{-8}%	**Carbon** 2 4 C_6 4492t° 3642s° +2+4-4 12.0107 0.033%	**Nitrogen** 2 5 N_7 -210.00° -195.79° -146.94° ±1±2±3+4+5 14.00674 0.0102%	**Oxygen** 2 6 O_8 -218.79° -182.95° -118.56° -2 15.9994 0.078%	**Fluorine** 2 7 F_9 -219.62° -188.12° -129.02° -1 18.9984032 2.7×10^{-6}%	**Neon** 2 8 Ne_{10} -248.59° -246.08° -228.7° 0 20.1797 0.0112%
Sodium 2 8 1 Na_{11} 97.80° 883° +1 22.989770 0.000187%	**Magnesium** 2 8 2 Mg_{12} 650° 1090° +2 24.3050 0.00350%											**Aluminum** 2 8 3 Al_{13} 660.32° 2519° +3 26.981538 0.000277%	**Silicon** 2 8 4 Si_{14} 1414° 3265° +2+4-4 28.0855 0.00326%	**Phosphorus** 2 8 5 P_{15} 44.15° 280.5° 721° +3+5-3 30.973761 0.000034%	**Sulfur** 2 8 6 S_{16} 115.21° 444.60° 1041° +4+6-2 32.066 0.00168%	**Chlorine** 2 8 7 Cl_{17} -101.5° -34.04° 143.8° +1+5+7-1 35.4527 0.000017%	**Argon** 2 8 8 Ar_{18} -189.35° -185.85° -122.28° 0 39.948 0.000329%
Potassium 2 8 8 1 K_{19} 63.38° 759° +1 39.0983 0.0000123%	**Calcium** 2 8 8 2 Ca_{20} 842° 1484° +2 40.078 0.000199%	**Scandium** 2 8 9 2 Sc_{21} 1541° 2836° +3 44.955910 1.12×10^{-7}%	**Titanium** 2 8 10 2 Ti_{22} 1668° 3287° +2+3+4 47.867 7.8×10^{-6}%	**Vanadium** 2 8 11 2 V_{23} 1910° 3407° +2+3+4+5 50.9415 9.6×10^{-7}%	**Chromium** 2 8 13 1 Cr_{24} 1907° 2671° +2+3+6 51.9961 0.000044%	**Manganese** 2 8 13 2 Mn_{25} 1246° 2061° +2+3+4+7 54.938049 0.000031%	**Iron** 2 8 14 2 Fe_{26} 1538° 2861° +2+3 55.845 0.00294%	**Cobalt** 2 8 15 2 Co_{27} 1495° 2927° +2+3 58.933200 7.3×10^{-6}%	**Nickel** 2 8 16 2 Ni_{28} 1455° 2913° +2+3 58.6934 0.000161%	**Copper** 2 8 18 1 Cu_{29} 1084.62° 2562° +1+2 63.546 1.70×10^{-6}%	**Zinc** 2 8 18 2 Zn_{30} 419.53° 907° +2 65.39 4.11×10^{-6}%	**Gallium** 2 8 18 3 Ga_{31} 29.76° 2204° +3 69.723 1.23×10^{-7}%	**Germanium** 2 8 18 4 Ge_{32} 938.25° 2833° +2+4 72.61 3.9×10^{-7}%	**Arsenic** 2 8 18 5 As_{33} 817t° 614s° 1400° +3+5-3 74.92160 2.1×10^{-8}%	**Selenium** 2 8 18 6 Se_{34} 221° 685° 1493° +4+6-2 78.96 2.03×10^{-7}%	**Bromine** 2 8 18 7 Br_{35} -7.2° 58.8° 315° +1+5-1 79.904 3.8×10^{-8}%	**Krypton** 2 8 18 8 Kr_{36} -157.36° -153.22° -63.74° 0 83.80 1.5×10^{-7}%
Rubidium 2 8 18 8 1 Rb_{37} 39.31° 688° +1 85.4678 2.31×10^{-8}%	**Strontium** 2 8 18 8 2 Sr_{38} 777° 1382° +2 87.62 7.7×10^{-8}%	**Yttrium** 2 8 18 9 2 Y_{39} 1522° 3345° +3 88.90585 1.51×10^{-8}%	**Zirconium** 2 8 18 10 2 Zr_{40} 1855° 4409° +4 91.224 3.72×10^{-8}%	**Niobium** 2 8 18 12 1 Nb_{41} 2477° 4744° +3+5 92.90638 2.28×10^{-9}%	**Molybdenum** 2 8 18 13 1 Mo_{42} 2623° 4639° +6 95.94 8.3×10^{-9}%	**Technetium** 2 8 18 13 2 Tc_{43} 2157° 4265° +4+6+7 [98]	**Ruthenium** 2 8 18 15 1 Ru_{44} 2334° 4150° +3 101.07 6.1×10^{-9}%	**Rhodium** 2 8 18 16 1 Rh_{45} 1964° 3695° +3 102.90550 1.12×10^{-9}%	**Palladium** 2 8 18 18 0 Pd_{46} 1554.9° 2963° +2+4 106.42 4.5×10^{-9}%	**Silver** 2 8 18 18 1 Ag_{47} 961.78° 2162° +1 107.8682 1.58×10^{-9}%	**Cadmium** 2 8 18 18 2 Cd_{48} 321.07° 767° +2 112.411 5.3×10^{-9}%	**Indium** 2 8 18 18 3 In_{49} 156.60° 2072° +3 114.818 6.0×10^{-10}%	**Tin** 2 8 18 18 4 Sn_{50} 231.93° 2602° +2+4 118.710 1.25×10^{-8}%	**Antimony** 2 8 18 18 5 Sb_{51} 630.63° 1587° +3+5-3 121.760 1.01×10^{-9}%	**Tellurium** 2 8 18 18 6 Te_{52} 449.51° 988° +4+6-2 127.60 1.57×10^{-8}%	**Iodine** 2 8 18 18 7 I_{53} 113.7° 184.4° 546° +1+5+7-1 126.90447 2.9×10^{-9}%	**Xenon** 2 8 18 18 8 Xe_{54} -111.75° -108.04° 16.58° 0 131.29 1.5×10^{-8}%
Cesium 2 8 18 18 8 1 Cs_{55} 28.44° 671° +1 132.90545 1.21×10^{-9}%	**Barium** 2 8 18 18 8 2 Ba_{56} 727° 1897° +2 137.327 1.46×10^{-8}%	**Lanthanum** 2 8 18 18 9 2 La_{57} † 918° 3464° +3 138.9055 1.45×10^{-9}%	**Hafnium** 2 8 18 32 10 2 Hf_{72} 2233° 4603° +4 178.49 5.02×10^{-10}%	**Tantalum** 2 8 18 32 11 2 Ta_{73} 3017° 5458° +5 180.9479 6.75×10^{-11}%	**Tungsten** 2 8 18 32 12 2 W_{74} 3422° 5555° +6 183.84 4.34×10^{-10}%	**Rhenium** 2 8 18 32 13 2 Re_{75} 3186° 5596° +4+6+7 186.207 1.69×10^{-10}%	**Osmium** 2 8 18 32 14 2 Os_{76} 3033° 5012° +3+4 190.23 2.20×10^{-9}%	**Iridium** 2 8 18 32 15 2 Ir_{77} 2446° 4428° +3+4 192.217 2.16×10^{-9}%	**Platinum** 2 8 18 32 16 2 Pt_{78} 1768.4° 3825° +2+4 195.078 4.4×10^{-9}%	**Gold** 2 8 18 32 18 1 Au_{79} 1064.18° 2856° +1+3 196.96655 6.1×10^{-10}%	**Mercury** 2 8 18 32 18 2 Hg_{80} -38.83° 356.73° 1477° +1+2 200.59 1.11×10^{-9}%	**Thallium** 2 8 18 32 18 3 Tl_{81} 304° 1473° +1+3 204.3833 6.0×10^{-10}%	**Lead** 2 8 18 32 18 4 Pb_{82} 327.46° 1749° +2+4 207.2 1.03×10^{-8}%	**Bismuth** 2 8 18 32 18 5 Bi_{83} 271.40° 1564° +3+5 208.98038 4.7×10^{-10}%	**Polonium** 2 8 18 32 18 6 Po_{84} 254° 962° +2+4 [209]	**Astatine** 2 8 18 32 18 7 At_{85} 302° [210]	**Radon** 2 8 18 32 18 8 Rn_{86} -71° -61.7° 104° 0 [222]
Francium 2 8 18 32 18 8 1 Fr_{87} 27° +1 [223]	**Radium** 2 8 18 32 18 8 2 Ra_{88} 700° +2 [226]	**Actinium** 2 8 18 32 18 9 2 Ac_{89} ‡ 1051° 3198° +3 [227]	**Rutherfordium** 2 8 18 32 10 2 Rf_{104} +4 [261]	**Dubnium** 2 8 18 32 11 2 Db_{105} [262]	**Seaborgium** 2 8 18 32 12 2 Sg_{106} [266]	**Bohrium** 2 8 18 32 13 2 Bh_{107} [264]	**Hassium** 2 8 18 32 14 2 Hs_{108} [269]	**Meitnerium** 2 8 18 32 15 2 Mt_{109} [268]	**Darmstadtium** 2 8 18 32 16 2 Ds_{110} [271]	**Roentgenium** 2 8 18 32 17 2 Rg_{111} [272]	**Element-112** 2 8 18 32 32 18 2 112_{112} [277]					

Group

Element
K E_Z M.P.°
L B.P.°
M C.P.°
N Ox.States
O At.Weight
P Abundance%
Q

Key to Table

† Lanthanides	Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium
	2 8 18 19 9 2 Ce_{58} 798° 3443° +3+4 140.116 3.70×10^{-9}%	2 8 18 21 8 2 Pr_{59} 931° 3520° +3 140.90765 5.44×10^{-10}%	2 8 18 22 8 2 Nd_{60} 1021° 3074° +3 144.24 2.70×10^{-9}%	2 8 18 23 8 2 Pm_{61} 1042° 3000° +3 [145]	2 8 18 24 8 2 Sm_{62} 1074° 1794° +2+3 150.36 8.42×10^{-10}%	2 8 18 25 8 2 Eu_{63} 822° 1596° +2+3 151.964 3.17×10^{-10}%	2 8 18 25 9 2 Gd_{64} 1313° 3273° +3 157.25 1.076×10^{-9}%	2 8 18 27 8 2 Tb_{65} 1356° 3230° +3 158.92534 1.97×10^{-10}%	2 8 18 28 8 2 Dy_{66} 1412° 2567° +3 162.50 1.286×10^{-9}%	2 8 18 29 8 2 Ho_{67} 1474° 2700° +3 164.93032 2.90×10^{-10}%	2 8 18 30 8 2 Er_{68} 1529° 2868° +3 167.26 8.18×10^{-10}%	2 8 18 31 8 2 Tm_{69} 1545° 1950° +3 168.93421 1.23×10^{-10}%	2 8 18 32 8 2 Yb_{70} 819° 1196° +2+3 173.04 8.08×10^{-10}%	2 8 18 32 9 2 Lu_{71} 1663° 3402° +3 174.967 1.197×10^{-10}%

‡ Actinides	Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium	Lawrencium
	2 8 18 32 18 10 2 Th_{90} 1750° 4788° +4 232.0381 1.09×10^{-10}%	2 8 18 32 9 2 Pa_{91} 1572° +5+4 231.03588	2 8 18 32 21 9 2 U_{92} 1135° 4131° +3+4+5+6 238.0289 2.94×10^{-11}%	2 8 18 32 22 9 2 Np_{93} 644° +3+4+5+6 [237]	2 8 18 32 24 8 2 Pu_{94} 640° 3228° +3+4+5+6 [244]	2 8 18 32 25 8 2 Am_{95} 1176° 2011° +3+4+5+6 [243]	2 8 18 32 25 9 2 Cm_{96} 1345° +3 [247]	2 8 18 32 27 8 2 Bk_{97} 1050° +3+4 [247]	2 8 18 32 28 8 2 Cf_{98} 900° +3 [251]	2 8 18 32 29 8 2 Es_{99} 860° +3 [252]	2 8 18 32 30 8 2 Fm_{100} 1527° +3 [257]	2 8 18 32 31 8 2 Md_{101} 827° +2+3 [258]	2 8 18 32 32 8 2 No_{102} 827° +2+3 [259]	2 8 18 32 32 9 2 Lr_{103} 1627° +3 [262]

The new IUPAC Group format numbers the groups from 1 to 18. The numbering system used by the Chemical Abstracts Service (CAS) is given in parentheses. For elements that are not naturally abundant, the mass number of the longest-lived isotope is given in brackets. The abundances (atomic %) are based on meteorite and solar wind data. The melting point (M.P.), boiling point (B.P.), and critical point (C.P.)temperatures are given in °Celsius. Sublimation and critical temperatures are indicated by s and t.

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PERIODNI SUSTAV ELEMENATA

SKUPINA

PERIODA

	1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8 VIIIB	9 VIIIB	10 VIIIB	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 1.0079 H VODIK																	2 4.0026 He HELIJ
2	3 6.941 Li LITIJ	4 9.0122 Be BERILIJ											5 10.811 B BOR	6 12.011 C UGLJIK	7 14.007 N DUŠIK	8 15.999 O KISIK	9 18.998 F FLUOR	10 20.180 Ne NEON
3	11 22.990 Na NATRIJ	12 24.305 Mg MAGNEZIJ											13 26.982 Al ALUMINIJ	14 28.086 Si SILICIJ	15 30.974 P FOSFOR	16 32.065 S SUMPOR	17 35.453 Cl KLOR	18 39.948 Ar ARGON
4	19 39.098 K KALIJ	20 40.078 Ca KALCIJ	21 44.956 Sc SKANDIJ	22 47.867 Ti TITANIJ	23 50.942 V VANADIJ	24 51.996 Cr KROM	25 54.938 Mn MANGAN	26 55.845 Fe ŽELJEZO	27 58.933 Co KOBALT	28 58.693 Ni NIKAL	29 63.546 Cu BAKAR	30 65.39 Zn CINK	31 69.723 Ga GALIJ	32 72.64 Ge GERMANIJ	33 74.922 As ARSEN	34 78.96 Se SELENIJ	35 79.904 Br BROM	36 83.80 Kr KRIPTON
5	37 85.468 Rb RUBIDIJ	38 87.62 Sr STRONCIJ	39 88.906 Y ITRIJ	40 91.224 Zr CIRKONIJ	41 92.906 Nb NIOBIJ	42 95.94 Mo MOLIBDEN	43 (98) Tc TEHNECIJ	44 101.07 Ru RUTENIJ	45 102.91 Rh RODIJ	46 106.42 Pd PALADIJ	47 107.87 Ag SREBRO	48 112.41 Cd KADMIJ	49 114.82 In INDIJ	50 118.71 Sn KOSITAR	51 121.76 Sb ANTIMON	52 127.60 Te TELURIJ	53 126.90 I JOD	54 131.29 Xe KSENON
6	55 132.91 Cs CEZIJ	56 137.33 Ba BARIJ	57-71 La-Lu Lantanoidi	72 178.49 Hf HAFNIJ	73 180.95 Ta TANTAL	74 183.84 W VOLFRAM	75 186.21 Re RENIJ	76 190.23 Os OSMIJ	77 192.22 Ir IRIDIJ	78 195.08 Pt PLATINA	79 196.97 Au ZLATO	80 200.59 Hg ŽIVA	81 204.38 Tl TALIJ	82 207.2 Pb OLOVO	83 208.98 Bi BIZMUT	84 (209) Po POLONIJ	85 (210) At ASTAT	86 (222) Rn RADON
7	87 (223) Fr FRANCIJ	88 (226) Ra RADIJ	89-103 Ac-Lr Aktinoidi	104 (261) Rf RUTHERFORDIJ	105 (262) Db DUBNIJ	106 (266) Sg SEABORGIJ	107 (264) Bh BOHRIJ	108 (277) Hs HASSIJ	109 (268) Mt MEITNERIJ	110 (281) Uun UNUNNILIJ	111 (272) Uuu UNUNUNIJ	112 (285) Uub UNUNBIJ		114 (289) Uuq UNUNKVADIJ				

RELATIVNA ATOMSKA MASA (2)

SKUPINE IUPAC — SKUPINE CAS

13 IIIA

ATOMSKI BROJ — 5 10.811

SIMBOL — B

BOR

NAZIV ELEMENTA (1)

- Metali
- Polumetali
- Nemetali
- Alkalijski metali
- Zemnoalkalijski metali
- Prijelazni elementi
- Lantanoidi
- Aktinodi
- Halkogeni elementi
- Halogeni elementi
- Plemeniti plinovi

AGREGATNO STANJE (100 °C; 101 kPa)

Ne - plin
Fe - krutina
Ga - tekućina
Tc - sintetski

LANTANOIDI

57 138.91 La LANTAN	58 140.12 Ce CERIJ	59 140.91 Pr PRASEODIMIJ	60 144.24 Nd NEODIMIJ	61 (145) Pm PROMETIJ	62 150.36 Sm SAMARIJ	63 151.96 Eu EUROPIJ	64 157.25 Gd GADOLINIJ	65 158.93 Tb TERBIJ	66 162.50 Dy DISPROZIJ	67 164.93 Ho HOLMIJ	68 167.26 Er ERBIJ	69 168.93 Tm TULIJ	70 173.04 Yb ITERBIJ	71 174.97 Lu LUTECIJ

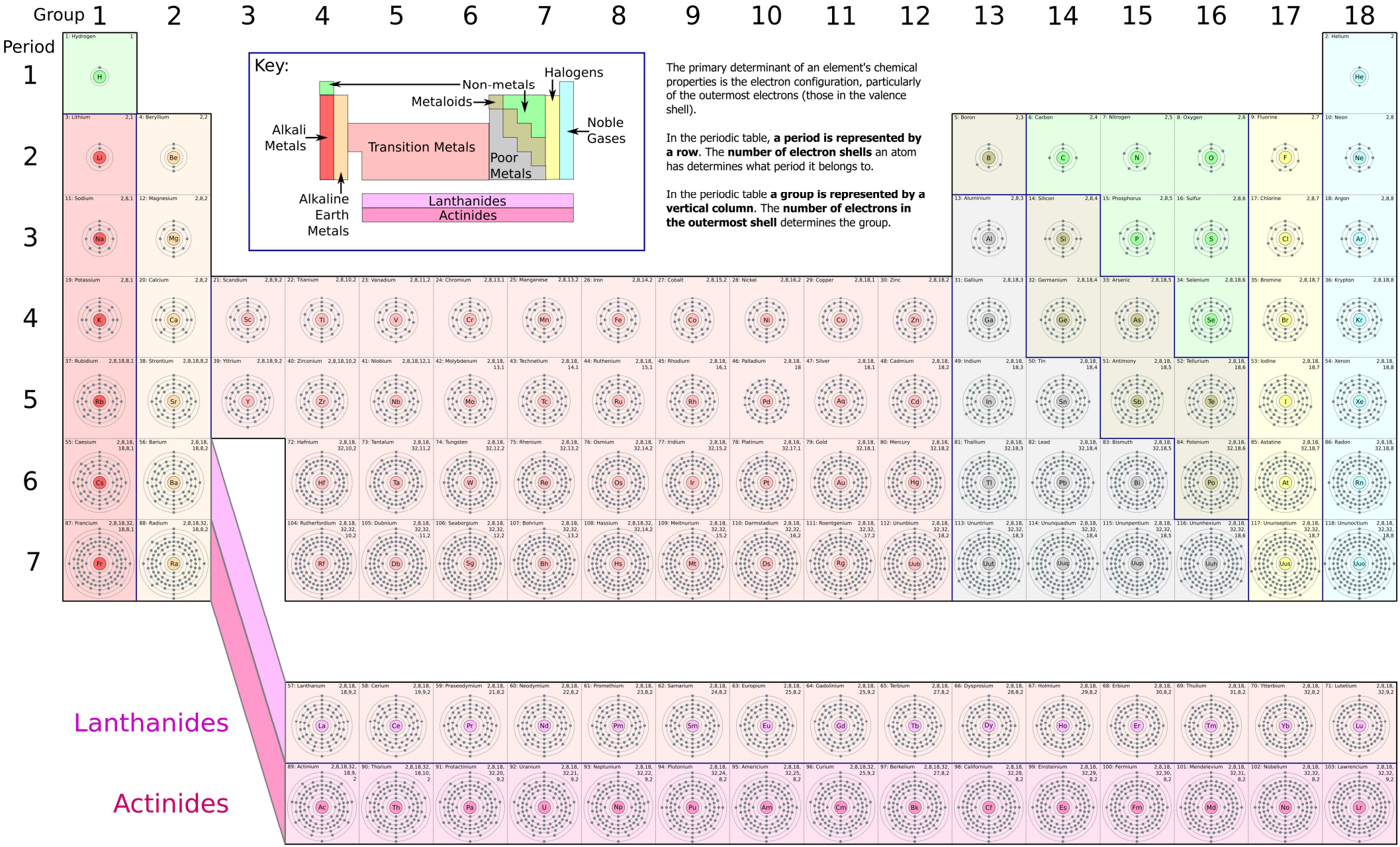
AKTINOIDI

89 (227) Ac AKTINIJ	90 232.04 Th TORIJ	91 231.04 Pa PROTAKTINIJ	92 238.03 U URANIJ	93 (237) Np NEPTUNIJ	94 (244) Pu PLUTONIJ	95 (243) Am AMERICIJ	96 (247) Cm KURIJ	97 (247) Bk BERKELIJ	98 (251) Cf KALIFORNIJ	99 (252) Es EINSTEINIJ	100 (257) Fm FERMIJ	101 (258) Md MENDELEVIJ	102 (259) No NOBELIJ	103 (262) Lr LAWRENCIJ

(1) Hrvatska nomenklatura anorganske kemije, ed. V. Simeon, Školska knjiga, Zagreb, 1996. Pure Appl. Chem., 69, 2471-2473 (1997) za imena elemenata od rednog broja 104 do 109.

(2) Pure Appl. Chem., 73, No. 4, 667-683 (2001) Relativne atomske mase su zaokružene na pet značajnih znamenki. Za elemente koji nemaju stabilnih nuklida u zagradama je dan maseni broj najduže živućeg izotopa. Izuzetak su Th, Pa i U koji imaju karakterističan izotopski sastav u zemljinoj kori.

Periodic Table Of Elements Showing Electron Shells



The primary determinant of an element's chemical properties is the electron configuration, particularly of the outermost electrons (those in the valence shell).

In the periodic table, **a period is represented by a row**. The **number of electron shells** an atom has determines what period it belongs to.

In the periodic table **a group is represented by a vertical column**. The **number of electrons in the outermost shell** determines the group.

PERIODIC TABLE

Atomic Properties of the Elements

NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Physics Laboratory
physics.nist.gov

Standard Reference Data Group
www.nist.gov/srd

Frequently used fundamental physical constants

For the most accurate values of these and other constants, visit physics.nist.gov/constants

1 second = 9 192 631 770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of ^{133}Cs

speed of light in vacuum	c	299 792 458 m s^{-1}	(exact)
Planck constant	h	6.6261×10^{-34} J s	($\hbar = h/2\pi$)
elementary charge	e	1.6022×10^{-19} C	
electron mass	m_e	9.1094×10^{-31} kg	
	$m_e c^2$	0.5110 MeV	
proton mass	m_p	1.6726×10^{-27} kg	
fine-structure constant	α	1/137.036	
Rydberg constant	R_∞	10 973 732 m^{-1}	
	$R_\infty c$	$3.289\,842 \times 10^{15}$ Hz	
	$R_\infty hc$	13.6057 eV	
Boltzmann constant	k	1.3807×10^{-23} J K^{-1}	

Solids
Liquids
Gases
Artificially Prepared

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 $^2S_{1/2}$ **H** Hydrogen 1.00794 $1s$ 13.5984																	2 $^1S_0$ **He** Helium 4.002602 $1s^2$ 24.5874
2	3 $^2S_{1/2}$ **Li** Lithium 6.941 $1s^2 2s$ 5.3917	4 $^1S_0$ **Be** Beryllium 9.012182 $1s^2 2s^2$ 9.3227											5 $^2P^\circ_{1/2}$ **B** Boron 10.811 $1s^2 2s^2 2p$ 8.2980	6 $^3P_0$ **C** Carbon 12.0107 $1s^2 2s^2 2p^2$ 11.2603	7 $^4S^\circ_{3/2}$ **N** Nitrogen 14.0067 $1s^2 2s^2 2p^3$ 14.5341	8 $^3P_2$ **O** Oxygen 15.9994 $1s^2 2s^2 2p^4$ 13.6181	9 $^2P^\circ_{3/2}$ **F** Fluorine 18.9984032 $1s^2 2s^2 2p^5$ 17.4228	10 $^1S_0$ **Ne** Neon 20.1797 $1s^2 2s^2 2p^6$ 21.5645
3	11 $^2S_{1/2}$ **Na** Sodium 22.989770 [Ne]$3s$ 5.1391	12 $^1S_0$ **Mg** Magnesium 24.3050 [Ne]$3s^2$ 7.6462											13 $^2P^\circ_{1/2}$ **Al** Aluminum 26.981538 [Ne]$3s^2 3p$ 5.9858	14 $^3P_0$ **Si** Silicon 28.0855 [Ne]$3s^2 3p^2$ 8.1517	15 $^4S^\circ_{3/2}$ **P** Phosphorus 30.973761 [Ne]$3s^2 3p^3$ 10.4867	16 $^3P_2$ **S** Sulfur 32.065 [Ne]$3s^2 3p^4$ 10.3600	17 $^2P^\circ_{3/2}$ **Cl** Chlorine 35.453 [Ne]$3s^2 3p^5$ 12.9676	18 $^1S_0$ **Ar** Argon 39.948 [Ne]$3s^2 3p^6$ 15.7596
4	19 $^2S_{1/2}$ **K** Potassium 39.0983 [Ar]$4s$ 4.3407	20 $^1S_0$ **Ca** Calcium 40.078 [Ar]$4s^2$ 6.1132	21 $^2D_{3/2}$ **Sc** Scandium 44.955910 [Ar]$3d4s^2$ 6.5615	22 $^3F_2$ **Ti** Titanium 47.867 [Ar]$3d^2 4s^2$ 6.8281	23 $^4F_{3/2}$ **V** Vanadium 50.9415 [Ar]$3d^3 4s^2$ 6.7462	24 $^7S_3$ **Cr** Chromium 51.9961 [Ar]$3d^5 4s$ 6.7665	25 $^6S_{5/2}$ **Mn** Manganese 54.938049 [Ar]$3d^5 4s^2$ 7.4340	26 $^5D_4$ **Fe** Iron 55.845 [Ar]$3d^6 4s^2$ 7.9024	27 $^4F_{9/2}$ **Co** Cobalt 58.933200 [Ar]$3d^7 4s^2$ 7.8810	28 $^3F_4$ **Ni** Nickel 58.6934 [Ar]$3d^8 4s^2$ 7.6398	29 $^2S_{1/2}$ **Cu** Copper 63.546 [Ar]$3d^{10} 4s$ 7.7264	30 $^1S_0$ **Zn** Zinc 65.409 [Ar]$3d^{10} 4s^2$ 9.3942	31 $^2P^\circ_{1/2}$ **Ga** Gallium 69.723 [Ar]$3d^{10} 4s^2 4p$ 5.9993	32 $^3P_0$ **Ge** Germanium 72.64 [Ar]$3d^{10} 4s^2 4p^2$ 7.8994	33 $^4S^\circ_{3/2}$ **As** Arsenic 74.92160 [Ar]$3d^{10} 4s^2 4p^3$ 9.7886	34 $^3P_2$ **Se** Selenium 78.96 [Ar]$3d^{10} 4s^2 4p^4$ 9.7524	35 $^2P^\circ_{3/2}$ **Br** Bromine 79.904 [Ar]$3d^{10} 4s^2 4p^5$ 11.8138	36 $^1S_0$ **Kr** Krypton 83.798 [Ar]$3d^{10} 4s^2 4p^6$ 13.9996
5	37 $^2S_{1/2}$ **Rb** Rubidium 85.4678 [Kr]$5s$ 4.1771	38 $^1S_0$ **Sr** Strontium 87.62 [Kr]$5s^2$ 5.6949	39 $^2D_{3/2}$ **Y** Yttrium 88.90585 [Kr]$4d5s^2$ 6.2173	40 $^3F_2$ **Zr** Zirconium 91.224 [Kr]$4d^2 5s^2$ 6.6339	41 $^6D_{1/2}$ **Nb** Niobium 92.90638 [Kr]$4d^4 5s$ 6.7589	42 $^7S_3$ **Mo** Molybdenum 95.94 [Kr]$4d^5 5s$ 7.0924	43 $^6S_{5/2}$ **Tc** Technetium (98) [Kr]$4d^5 5s^2$ 7.28	44 $^5F_5$ **Ru** Ruthenium 101.07 [Kr]$4d^7 5s$ 7.3605	45 $^4F_{9/2}$ **Rh** Rhodium 102.90550 [Kr]$4d^8 5s$ 7.4589	46 $^1S_0$ **Pd** Palladium 106.42 [Kr]$4d^{10}$ 8.3369	47 $^2S_{1/2}$ **Ag** Silver 107.8682 [Kr]$4d^{10} 5s$ 7.5762	48 $^1S_0$ **Cd** Cadmium 112.411 [Kr]$4d^{10} 5s^2$ 8.9938	49 $^2P^\circ_{1/2}$ **In** Indium 114.818 [Kr]$4d^{10} 5s^2 5p$ 5.7864	50 $^3P_0$ **Sn** Tin 118.710 [Kr]$4d^{10} 5s^2 5p^2$ 7.3439	51 $^4S^\circ_{3/2}$ **Sb** Antimony 121.760 [Kr]$4d^{10} 5s^2 5p^3$ 8.6084	52 $^3P_2$ **Te** Tellurium 127.60 [Kr]$4d^{10} 5s^2 5p^4$ 9.0096	53 $^2P^\circ_{3/2}$ **I** Iodine 126.90447 [Kr]$4d^{10} 5s^2 5p^5$ 10.4513	54 $^1S_0$ **Xe** Xenon 131.293 [Kr]$4d^{10} 5s^2 5p^6$ 12.1298
6	55 $^2S_{1/2}$ **Cs** Cesium 132.90545 [Xe]$6s$ 3.8939	56 $^1S_0$ **Ba** Barium 137.327 [Xe]$6s^2$ 5.2117		72 $^3F_2$ **Hf** Hafnium 178.49 [Xe]$4f^{14} 5d^2 6s^2$ 6.8251	73 $^4F_{3/2}$ **Ta** Tantalum 180.9479 [Xe]$4f^{14} 5d^3 6s^2$ 7.5496	74 $^5D_0$ **W** Tungsten 183.84 [Xe]$4f^{14} 5d^4 6s^2$ 7.8640	75 $^6S_{5/2}$ **Re** Rhenium 186.207 [Xe]$4f^{14} 5d^5 6s^2$ 7.8335	76 $^5D_4$ **Os** Osmium 190.23 [Xe]$4f^{14} 5d^6 6s^2$ 8.4382	77 $^4F_{9/2}$ **Ir** Iridium 192.217 [Xe]$4f^{14} 5d^7 6s^2$ 8.9670	78 $^3D_3$ **Pt** Platinum 195.078 [Xe]$4f^{14} 5d^9 6s$ 8.9588	79 $^2S_{1/2}$ **Au** Gold 196.96655 [Xe]$4f^{14} 5d^{10} 6s$ 9.2255	80 $^1S_0$ **Hg** Mercury 200.59 [Xe]$4f^{14} 5d^{10} 6s^2$ 10.4375	81 $^2P^\circ_{1/2}$ **Tl** Thallium 204.3833 [Hg]$6p$ 6.1082	82 $^3P_0$ **Pb** Lead 207.2 [Hg]$6p^2$ 7.4167	83 $^4S^\circ_{3/2}$ **Bi** Bismuth 208.98038 [Hg]$6p^3$ 7.2855	84 $^3P_2$ **Po** Polonium (209) [Hg]$6p^4$ 8.414	85 $^2P^\circ_{3/2}$ **At** Astatine (210) [Hg]$6p^5$	86 $^1S_0$ **Rn** Radon (222) [Hg]$6p^6$ 10.7485
7	87 $^2S_{1/2}$ **Fr** Francium (223) [Rn]$7s$ 4.0727	88 $^1S_0$ **Ra** Radium (226) [Rn]$7s^2$ 5.2784		104 $^3F_2$? **Rf** Rutherfordium (261) [Rn]$5f^{14} 6d^2 7s^2$? 6.0 ?	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (266)	107 **Bh** Bohrium (264)	108 **Hs** Hassium (277)	109 **Mt** Meitnerium (268)	110 **Uun** Ununnilium (281)	111 **Uuu** Unununium (272)	112 **Uub** Ununbium (285)		114 **Uuq** Ununquadium (289)		116 **Uuh** Ununhexium (292)		

Lanthanides	57 $^2D_{3/2}$ **La** Lanthanum 138.9055 [Xe]$5d6s^2$ 5.5769	58 $^1G^\circ_4$ **Ce** Cerium 140.116 [Xe]$4f5d6s^2$ 5.5387	59 $^4I^\circ_{9/2}$ **Pr** Praseodymium 140.90765 [Xe]$4f^3 6s^2$ 5.473	60 $^5I_4$ **Nd** Neodymium 144.24 [Xe]$4f^4 6s^2$ 5.5250	61 $^6H^\circ_{5/2}$ **Pm** Promethium (145) [Xe]$4f^5 6s^2$ 5.582	62 $^7F_0$ **Sm** Samarium 150.36 [Xe]$4f^6 6s^2$ 5.6437	63 $^8S^\circ_{7/2}$ **Eu** Europium 151.964 [Xe]$4f^7 6s^2$ 5.6704	64 $^9D^\circ_2$ **Gd** Gadolinium 157.25 [Xe]$4f^7 5d6s^2$ 6.1498	65 $^6H^\circ_{15/2}$ **Tb** Terbium 158.92534 [Xe]$4f^9 6s^2$ 5.8638	66 $^5I_8$ **Dy** Dysprosium 162.500 [Xe]$4f^{10} 6s^2$ 5.9389	67 $^4I^\circ_{15/2}$ **Ho** Holmium 164.93032 [Xe]$4f^{11} 6s^2$ 6.0215	68 $^3H_6$ **Er** Erbium 167.259 [Xe]$4f^{12} 6s^2$ 6.1077	69 $^2F^\circ_{7/2}$ **Tm** Thulium 168.93421 [Xe]$4f^{13} 6s^2$ 6.1843	70 $^1S_0$ **Yb** Ytterbium 173.04 [Xe]$4f^{14} 6s^2$ 6.2542	71 $^2D_{3/2}$ **Lu** Lutetium 174.967 [Xe]$4f^{14} 5d6s^2$ 5.4259
Actinides	89 $^2D_{3/2}$ **Ac** Actinium (227) [Rn]$6d7s^2$ 5.17	90 $^3F_2$ **Th** Thorium 232.0381 [Rn]$6d^2 7s^2$ 6.3067	91 $^4K_{11/2}$ **Pa** Protactinium 231.03588 [Rn]$5f^2 6d7s^2$ 5.89	92 $^5L_6$ **U** Uranium 238.02891 [Rn]$5f^3 6d7s^2$ 6.1941	93 $^6L_{11/2}$ **Np** Neptunium (237) [Rn]$5f^4 6d7s^2$ 6.2657	94 $^7F_0$ **Pu** Plutonium (244) [Rn]$5f^6 7s^2$ 6.0260	95 $^8S^\circ_{7/2}$ **Am** Americium (243) [Rn]$5f^7 7s^2$ 5.9738	96 $^9D^\circ_2$ **Cm** Curium (247) [Rn]$5f^7 6d7s^2$ 5.9914	97 $^6H^\circ_{15/2}$ **Bk** Berkelium (247) [Rn]$5f^9 7s^2$ 6.1979	98 $^5I_8$ **Cf** Californium (251) [Rn]$5f^{10} 7s^2$ 6.2817	99 $^4I^\circ_{15/2}$ **Es** Einsteinium (252) [Rn]$5f^{11} 7s^2$ 6.42	100 $^3H_6$ **Fm** Fermium (257) [Rn]$5f^{12} 7s^2$ 6.50	101 $^2F^\circ_{7/2}$ **Md** Mendelevium (258) [Rn]$5f^{13} 7s^2$ 6.58	102 $^1S_0$ **No** Nobelium (259) [Rn]$5f^{14} 7s^2$ 6.65	103 $^2P^\circ_{1/2}$? **Lr** Lawrencium (262) [Rn]$5f^{14} 7s^2 7p$? 4.9 ?

Atomic Number — Ground-state Level
Symbol — Name — Atomic Weight† — Ground-state Configuration — Ionization Energy (eV)

†Based upon ^{12}C. () indicates the mass number of the most stable isotope.

For a description of the data, visit physics.nist.gov/data

NIST SP 966 (September 2003)

The Periodic Table of the Elements, in Pictures

Periods ↓

Atomic Symbol — Atomic Number (number of protons) — Symbols — Name — How it is (or was) used or where it occurs in nature

Solid — Liquid — Gas (at room temperature)

The color of the symbol is the color of the element in its most common pure form. Examples: metallic solid, red liquid, colorless gas

Human Body (top ten elements by weight) — Earth's Crust (top eight elements by weight) — Magnetic (ferromagnetic at room temperature) — Noble Metals (corrosion-resistant) — Radioactive (all isotopes are radioactive) — Only Traces Found in Nature (less than a millionth percent of earth's crust) — Never Found in Nature (only made by people)

Color Key: Metals — Nonmetals; H; Alkali Metals; Alkali Earth Metals; Transition Metals; Poor Metals; Metalloids; Nonmetals; Halogens; Noble Gases; Superheavy Elements; Rare Earth Metals; Actinide Metals

Period	Alkali Metals Group 1	Alkali Earth Metals 2	Transition Metals 3	4	5	6	7	8	9	10	11	12	Boron Group 13	Carbon Group 14	Nitrogen Group 15	Oxygen Group 16	Halogens 17	Noble Gases 18
1	H 1 Hydrogen — Sun and Stars																	He 2 Helium — Balloons
2	Li 3 Lithium — Batteries	Be 4 Beryllium — Emeralds											B 5 Boron — Sports Equipment	C 6 Carbon — Basis of Life's Molecules	N 7 Nitrogen — Protein	O 8 Oxygen — Air	F 9 Fluorine — Toothpaste	Ne 10 Neon — Advertising Signs
3	Na 11 Sodium — Salt	Mg 12 Magnesium — Chlorophyll											Al 13 Aluminum — Airplanes	Si 14 Silicon — Stone, Sand, and Soil	P 15 Phosphorus — Bones	S 16 Sulfur — Egg Yolks	Cl 17 Chlorine — Swimming Pools	Ar 18 Argon — Light Bulbs
4	K 19 Potassium — Fruits and Vegetables	Ca 20 Calcium — Shells and Bones	Sc 21 Scandium — Bicycles	Ti 22 Titanium — Aerospace	V 23 Vanadium — Springs	Cr 24 Chromium — Stainless Steel	Mn 25 Manganese — Earthmovers	Fe 26 Iron — Steel Structures	Co 27 Cobalt — Magnets	Ni 28 Nickel — Coins	Cu 29 Copper — Electric Wires	Zn 30 Zinc — Brass Instruments	Ga 31 Gallium — Light-Emitting Diodes (LEDs)	Ge 32 Germanium — Semiconductor Electronics	As 33 Arsenic — Poison	Se 34 Selenium — Copiers	Br 35 Bromine — Photography Film	Kr 36 Krypton — Flashlights
5	Rb 37 Rubidium — Global Navigation	Sr 38 Strontium — Fireworks	Y 39 Yttrium — Lasers	Zr 40 Zirconium — Chemical Pipelines	Nb 41 Niobium — Mag Lev Trains	Mo 42 Molybdenum — Cutting Tools	Tc 43 Technetium — Radioactive Diagnosis	Ru 44 Ruthenium — Electric Switches	Rh 45 Rhodium — Searchlight Reflectors	Pd 46 Palladium — Pollution Control	Ag 47 Silver — Jewelry	Cd 48 Cadmium — Paint	In 49 Indium — Liquid Crystal Displays (LCDs)	Sn 50 Tin — Plated Food Cans	Sb 51 Antimony — Car Batteries	Te 52 Tellurium — Thermoelectric Coolers	I 53 Iodine — Disinfectant	Xe 54 Xenon — High-Intensity Lamps
6	Cs 55 Cesium — Atomic Clocks	Ba 56 Barium — X-Ray Diagnosis	57 - 71 Rare Earth Metals	Hf 72 Hafnium — Nuclear Submarines	Ta 73 Tantalum — Mobile Phones	W 74 Tungsten — Lamp Filaments	Re 75 Rhenium — Rocket Engines	Os 76 Osmium — Pen Points	Ir 77 Iridium — Spark Plugs	Pt 78 Platinum — Labware	Au 79 Gold — Jewelry	Hg 80 Mercury — Thermometers	Tl 81 Thallium — Low-Temperature Thermometers	Pb 82 Lead — Weights	Bi 83 Bismuth — Fire Sprinklers	Po 84 Polonium — Anti-Static Brushes	At 85 Astatine — Radioactive Medicine	Rn 86 Radon — Surgical Implants
7	Fr 87 Francium — Laser Atom Traps	Ra 88 Radium — Luminous Watches	89 - 103 Actinide Metals	Rf 104 Rutherfordium	Db 105 Dubnium	Sg 106 Seaborgium	Bh 107 Bohrium	Hs 108 Hassium	Mt 109 Meitnerium	Ds 110 Darmstadtium	Rg 111 Roentgenium	112	113	114	115	116	117	118
8	119	120	121 - 153															

Superheavy Elements

X radioactive, never found in nature, no uses except atomic research

Rare Earth Metals														
La 57 Lanthanum — Telescope Lenses	Ce 58 Cerium — Lighter Flints	Pr 59 Praseodymium — Torchworkers' Eyeglasses	Nd 60 Neodymium — Electric Motor Magnets	Pm 61 Promethium — Luminous Dials	Sm 62 Samarium — Electric Motor Magnets	Eu 63 Europium — Color Televisions	Gd 64 Gadolinium — MRI Diagnosis	Tb 65 Terbium — Fluorescent Lamps	Dy 66 Dysprosium — Smart Material Actuators	Ho 67 Holmium — Laser Surgery	Er 68 Erbium — Optical Fiber Communications	Tm 69 Thulium — Laser Surgery	Yb 70 Ytterbium — Scientific Fiber Lasers	Lu 71 Lutetium — Photodynamic Medicine

Actinide Metals														
Ac 89 Actinium — Radioactive Medicine	Th 90 Thorium — Gas Lamp Mantles	Pa 91 Protactinium — Radioactive Waste	U 92 Uranium — Nuclear Power	Np 93 Neptunium — Radioactive Waste	Pu 94 Plutonium — Nuclear Weapons	Am 95 Americium — Smoke Detectors	Cm 96 Curium — Mineral Analyzers	Bk 97 Berkelium — Radioactive Waste	Cf 98 Californium — Mineral Analyzers	Es 99 Einsteinium	Fm 100 Fermium	Md 101 Mendelevium	No 102 Nobelium	Lr 103 Lawrencium

X radioactive, never found in nature, no uses except atomic research

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PERIODIC TABLE

Atomic Properties of the Elements

NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Physics Laboratory
physics.nist.gov

Standard Reference Data Group
www.nist.gov/srd

Frequently used fundamental physical constants

For the most accurate values of these and other constants, visit physics.nist.gov/constants

1 second = 9 192 631 770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of ^{133}Cs

speed of light in vacuum	c	299 792 458 m s^{-1}	(exact)
Planck constant	h	6.6261×10^{-34} J s	($\hbar = h/2\pi$)
elementary charge	e	1.6022×10^{-19} C	
electron mass	m_e	9.1094×10^{-31} kg	
	$m_e c^2$	0.5110 MeV	
proton mass	m_p	1.6726×10^{-27} kg	
fine-structure constant	α	1/137.036	
Rydberg constant	R_∞	10 973 732 m^{-1}	
	$R_\infty c$	$3.289\,842 \times 10^{15}$ Hz	
	$R_\infty hc$	13.6057 eV	
Boltzmann constant	k	1.3807×10^{-23} J K^{-1}	

Solids
Liquids
Gases
Artificially Prepared

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 $^2S_{1/2}$ **H** Hydrogen 1.00794 $1s$ 13.5984																	2 $^1S_0$ **He** Helium 4.002602 $1s^2$ 24.5874
2	3 $^2S_{1/2}$ **Li** Lithium 6.941 $1s^2 2s$ 5.3917	4 $^1S_0$ **Be** Beryllium 9.012182 $1s^2 2s^2$ 9.3227											5 $^2P^\circ_{1/2}$ **B** Boron 10.811 $1s^2 2s^2 2p$ 8.2980	6 $^3P_0$ **C** Carbon 12.0107 $1s^2 2s^2 2p^2$ 11.2603	7 $^4S^\circ_{3/2}$ **N** Nitrogen 14.0067 $1s^2 2s^2 2p^3$ 14.5341	8 $^3P_2$ **O** Oxygen 15.9994 $1s^2 2s^2 2p^4$ 13.6181	9 $^2P^\circ_{3/2}$ **F** Fluorine 18.9984032 $1s^2 2s^2 2p^5$ 17.4228	10 $^1S_0$ **Ne** Neon 20.1797 $1s^2 2s^2 2p^6$ 21.5645
3	11 $^2S_{1/2}$ **Na** Sodium 22.989770 [Ne]$3s$ 5.1391	12 $^1S_0$ **Mg** Magnesium 24.3050 [Ne]$3s^2$ 7.6462											13 $^2P^\circ_{1/2}$ **Al** Aluminum 26.981538 [Ne]$3s^2 3p$ 5.9858	14 $^3P_0$ **Si** Silicon 28.0855 [Ne]$3s^2 3p^2$ 8.1517	15 $^4S^\circ_{3/2}$ **P** Phosphorus 30.973761 [Ne]$3s^2 3p^3$ 10.4867	16 $^3P_2$ **S** Sulfur 32.065 [Ne]$3s^2 3p^4$ 10.3600	17 $^2P^\circ_{3/2}$ **Cl** Chlorine 35.453 [Ne]$3s^2 3p^5$ 12.9676	18 $^1S_0$ **Ar** Argon 39.948 [Ne]$3s^2 3p^6$ 15.7596
4	19 $^2S_{1/2}$ **K** Potassium 39.0983 [Ar]$4s$ 4.3407	20 $^1S_0$ **Ca** Calcium 40.078 [Ar]$4s^2$ 6.1132	21 $^2D_{3/2}$ **Sc** Scandium 44.955910 [Ar]$3d4s^2$ 6.5615	22 $^3F_2$ **Ti** Titanium 47.867 [Ar]$3d^2 4s^2$ 6.8281	23 $^4F_{3/2}$ **V** Vanadium 50.9415 [Ar]$3d^3 4s^2$ 6.7462	24 $^7S_3$ **Cr** Chromium 51.9961 [Ar]$3d^5 4s$ 6.7665	25 $^6S_{5/2}$ **Mn** Manganese 54.938049 [Ar]$3d^5 4s^2$ 7.4340	26 $^5D_4$ **Fe** Iron 55.845 [Ar]$3d^6 4s^2$ 7.9024	27 $^4F_{9/2}$ **Co** Cobalt 58.933200 [Ar]$3d^7 4s^2$ 7.8810	28 $^3F_4$ **Ni** Nickel 58.6934 [Ar]$3d^8 4s^2$ 7.6398	29 $^2S_{1/2}$ **Cu** Copper 63.546 [Ar]$3d^{10} 4s$ 7.7264	30 $^1S_0$ **Zn** Zinc 65.409 [Ar]$3d^{10} 4s^2$ 9.3942	31 $^2P^\circ_{1/2}$ **Ga** Gallium 69.723 [Ar]$3d^{10} 4s^2 4p$ 5.9993	32 $^3P_0$ **Ge** Germanium 72.64 [Ar]$3d^{10} 4s^2 4p^2$ 7.8994	33 $^4S^\circ_{3/2}$ **As** Arsenic 74.92160 [Ar]$3d^{10} 4s^2 4p^3$ 9.7886	34 $^3P_2$ **Se** Selenium 78.96 [Ar]$3d^{10} 4s^2 4p^4$ 9.7524	35 $^2P^\circ_{3/2}$ **Br** Bromine 79.904 [Ar]$3d^{10} 4s^2 4p^5$ 11.8138	36 $^1S_0$ **Kr** Krypton 83.798 [Ar]$3d^{10} 4s^2 4p^6$ 13.9996
5	37 $^2S_{1/2}$ **Rb** Rubidium 85.4678 [Kr]$5s$ 4.1771	38 $^1S_0$ **Sr** Strontium 87.62 [Kr]$5s^2$ 5.6949	39 $^2D_{3/2}$ **Y** Yttrium 88.90585 [Kr]$4d5s^2$ 6.2173	40 $^3F_2$ **Zr** Zirconium 91.224 [Kr]$4d^2 5s^2$ 6.6339	41 $^6D_{1/2}$ **Nb** Niobium 92.90638 [Kr]$4d^4 5s$ 6.7589	42 $^7S_3$ **Mo** Molybdenum 95.94 [Kr]$4d^5 5s$ 7.0924	43 $^6S_{5/2}$ **Tc** Technetium (98) [Kr]$4d^5 5s^2$ 7.28	44 $^5F_5$ **Ru** Ruthenium 101.07 [Kr]$4d^7 5s$ 7.3605	45 $^4F_{9/2}$ **Rh** Rhodium 102.90550 [Kr]$4d^8 5s$ 7.4589	46 $^1S_0$ **Pd** Palladium 106.42 [Kr]$4d^{10}$ 8.3369	47 $^2S_{1/2}$ **Ag** Silver 107.8682 [Kr]$4d^{10} 5s$ 7.5762	48 $^1S_0$ **Cd** Cadmium 112.411 [Kr]$4d^{10} 5s^2$ 8.9938	49 $^2P^\circ_{1/2}$ **In** Indium 114.818 [Kr]$4d^{10} 5s^2 5p$ 5.7864	50 $^3P_0$ **Sn** Tin 118.710 [Kr]$4d^{10} 5s^2 5p^2$ 7.3439	51 $^4S^\circ_{3/2}$ **Sb** Antimony 121.760 [Kr]$4d^{10} 5s^2 5p^3$ 8.6084	52 $^3P_2$ **Te** Tellurium 127.60 [Kr]$4d^{10} 5s^2 5p^4$ 9.0096	53 $^2P^\circ_{3/2}$ **I** Iodine 126.90447 [Kr]$4d^{10} 5s^2 5p^5$ 10.4513	54 $^1S_0$ **Xe** Xenon 131.293 [Kr]$4d^{10} 5s^2 5p^6$ 12.1298
6	55 $^2S_{1/2}$ **Cs** Cesium 132.90545 [Xe]$6s$ 3.8939	56 $^1S_0$ **Ba** Barium 137.327 [Xe]$6s^2$ 5.2117		72 $^3F_2$ **Hf** Hafnium 178.49 [Xe]$4f^{14} 5d^2 6s^2$ 6.8251	73 $^4F_{3/2}$ **Ta** Tantalum 180.9479 [Xe]$4f^{14} 5d^3 6s^2$ 7.5496	74 $^5D_0$ **W** Tungsten 183.84 [Xe]$4f^{14} 5d^4 6s^2$ 7.8640	75 $^6S_{5/2}$ **Re** Rhenium 186.207 [Xe]$4f^{14} 5d^5 6s^2$ 7.8335	76 $^5D_4$ **Os** Osmium 190.23 [Xe]$4f^{14} 5d^6 6s^2$ 8.4382	77 $^4F_{9/2}$ **Ir** Iridium 192.217 [Xe]$4f^{14} 5d^7 6s^2$ 8.9670	78 $^3D_3$ **Pt** Platinum 195.078 [Xe]$4f^{14} 5d^9 6s$ 8.9588	79 $^2S_{1/2}$ **Au** Gold 196.96655 [Xe]$4f^{14} 5d^{10} 6s$ 9.2255	80 $^1S_0$ **Hg** Mercury 200.59 [Xe]$4f^{14} 5d^{10} 6s^2$ 10.4375	81 $^2P^\circ_{1/2}$ **Tl** Thallium 204.3833 [Hg]$6p$ 6.1082	82 $^3P_0$ **Pb** Lead 207.2 [Hg]$6p^2$ 7.4167	83 $^4S^\circ_{3/2}$ **Bi** Bismuth 208.98038 [Hg]$6p^3$ 7.2855	84 $^3P_2$ **Po** Polonium (209) [Hg]$6p^4$ 8.414	85 $^2P^\circ_{3/2}$ **At** Astatine (210) [Hg]$6p^5$	86 $^1S_0$ **Rn** Radon (222) [Hg]$6p^6$ 10.7485
7	87 $^2S_{1/2}$ **Fr** Francium (223) [Rn]$7s$ 4.0727	88 $^1S_0$ **Ra** Radium (226) [Rn]$7s^2$ 5.2784		104 $^3F_2$? **Rf** Rutherfordium (261) [Rn]$5f^{14} 6d^2 7s^2$? 6.0 ?	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (266)	107 **Bh** Bohrium (264)	108 **Hs** Hassium (277)	109 **Mt** Meitnerium (268)	110 **Uun** Ununnilium (281)	111 **Uuu** Unununium (272)	112 **Uub** Ununbium (285)		114 **Uuq** Ununquadium (289)		116 **Uuh** Ununhexium (292)		

Lanthanides	57 $^2D_{3/2}$ **La** Lanthanum 138.9055 [Xe]$5d6s^2$ 5.5769	58 $^1G^\circ_4$ **Ce** Cerium 140.116 [Xe]$4f5d6s^2$ 5.5387	59 $^4I^\circ_{9/2}$ **Pr** Praseodymium 140.90765 [Xe]$4f^3 6s^2$ 5.473	60 $^5I_4$ **Nd** Neodymium 144.24 [Xe]$4f^4 6s^2$ 5.5250	61 $^6H^\circ_{5/2}$ **Pm** Promethium (145) [Xe]$4f^5 6s^2$ 5.582	62 $^7F_0$ **Sm** Samarium 150.36 [Xe]$4f^6 6s^2$ 5.6437	63 $^8S^\circ_{7/2}$ **Eu** Europium 151.964 [Xe]$4f^7 6s^2$ 5.6704	64 $^9D^\circ_2$ **Gd** Gadolinium 157.25 [Xe]$4f^7 5d6s^2$ 6.1498	65 $^6H^\circ_{15/2}$ **Tb** Terbium 158.92534 [Xe]$4f^9 6s^2$ 5.8638	66 $^5I_8$ **Dy** Dysprosium 162.500 [Xe]$4f^{10} 6s^2$ 5.9389	67 $^4I^\circ_{15/2}$ **Ho** Holmium 164.93032 [Xe]$4f^{11} 6s^2$ 6.0215	68 $^3H_6$ **Er** Erbium 167.259 [Xe]$4f^{12} 6s^2$ 6.1077	69 $^2F^\circ_{7/2}$ **Tm** Thulium 168.93421 [Xe]$4f^{13} 6s^2$ 6.1843	70 $^1S_0$ **Yb** Ytterbium 173.04 [Xe]$4f^{14} 6s^2$ 6.2542	71 $^2D_{3/2}$ **Lu** Lutetium 174.967 [Xe]$4f^{14} 5d6s^2$ 5.4259
Actinides	89 $^2D_{3/2}$ **Ac** Actinium (227) [Rn]$6d7s^2$ 5.17	90 $^3F_2$ **Th** Thorium 232.0381 [Rn]$6d^2 7s^2$ 6.3067	91 $^4K_{11/2}$ **Pa** Protactinium 231.03588 [Rn]$5f^2 6d7s^2$ 5.89	92 $^5L_6$ **U** Uranium 238.02891 [Rn]$5f^3 6d7s^2$ 6.1941	93 $^6L_{11/2}$ **Np** Neptunium (237) [Rn]$5f^4 6d7s^2$ 6.2657	94 $^7F_0$ **Pu** Plutonium (244) [Rn]$5f^6 7s^2$ 6.0260	95 $^8S^\circ_{7/2}$ **Am** Americium (243) [Rn]$5f^7 7s^2$ 5.9738	96 $^9D^\circ_2$ **Cm** Curium (247) [Rn]$5f^7 6d7s^2$ 5.9914	97 $^6H^\circ_{15/2}$ **Bk** Berkelium (247) [Rn]$5f^9 7s^2$ 6.1979	98 $^5I_8$ **Cf** Californium (251) [Rn]$5f^{10} 7s^2$ 6.2817	99 $^4I^\circ_{15/2}$ **Es** Einsteinium (252) [Rn]$5f^{11} 7s^2$ 6.42	100 $^3H_6$ **Fm** Fermium (257) [Rn]$5f^{12} 7s^2$ 6.50	101 $^2F^\circ_{7/2}$ **Md** Mendelevium (258) [Rn]$5f^{13} 7s^2$ 6.58	102 $^1S_0$ **No** Nobelium (259) [Rn]$5f^{14} 7s^2$ 6.65	103 $^2P^\circ_{1/2}$? **Lr** Lawrencium (262) [Rn]$5f^{14} 7s^2 7p$? 4.9 ?

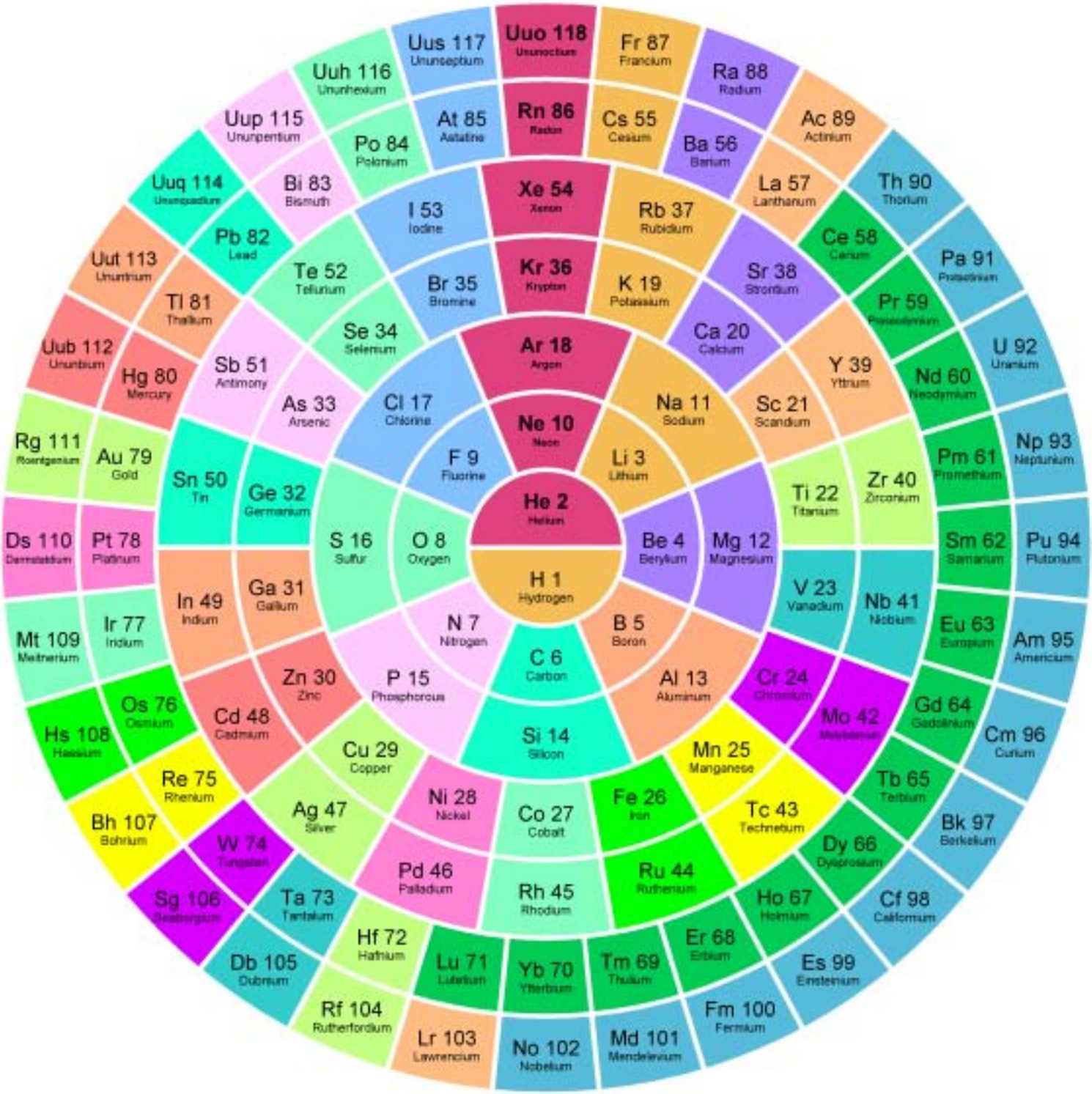
Atomic Number — Ground-state Level
Symbol — Name — Atomic Weight† — Ground-state Configuration — Ionization Energy (eV)

†Based upon ^{12}C. () indicates the mass number of the most stable isotope.

For a description of the data, visit physics.nist.gov/data

NIST SP 966 (September 2003)

The Mayan Periodic Chart of the Elements



MayanPeriodic.com

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PERIODIC TABLE

Atomic Properties of the Elements

NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Physics Laboratory
physics.nist.gov

Standard Reference Data Group
www.nist.gov/srd

Frequently used fundamental physical constants

For the most accurate values of these and other constants, visit physics.nist.gov/constants

1 second = 9 192 631 770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of ^{133}Cs

speed of light in vacuum	c	299 792 458 m s^{-1}	(exact)
Planck constant	h	6.6261×10^{-34} J s	($\hbar = h/2\pi$)
elementary charge	e	1.6022×10^{-19} C	
electron mass	m_e	9.1094×10^{-31} kg	
	$m_e c^2$	0.5110 MeV	
proton mass	m_p	1.6726×10^{-27} kg	
fine-structure constant	α	1/137.036	
Rydberg constant	R_∞	10 973 732 m^{-1}	
	$R_\infty c$	$3.289\,842 \times 10^{15}$ Hz	
	$R_\infty hc$	13.6057 eV	
Boltzmann constant	k	1.3807×10^{-23} J K^{-1}	

Solids
Liquids
Gases
Artificially Prepared

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 $^2S_{1/2}$ **H** Hydrogen 1.00794 $1s$ 13.5984																	2 $^1S_0$ **He** Helium 4.002602 $1s^2$ 24.5874
2	3 $^2S_{1/2}$ **Li** Lithium 6.941 $1s^2 2s$ 5.3917	4 $^1S_0$ **Be** Beryllium 9.012182 $1s^2 2s^2$ 9.3227											5 $^2P^\circ_{1/2}$ **B** Boron 10.811 $1s^2 2s^2 2p$ 8.2980	6 $^3P_0$ **C** Carbon 12.0107 $1s^2 2s^2 2p^2$ 11.2603	7 $^4S^\circ_{3/2}$ **N** Nitrogen 14.0067 $1s^2 2s^2 2p^3$ 14.5341	8 $^3P_2$ **O** Oxygen 15.9994 $1s^2 2s^2 2p^4$ 13.6181	9 $^2P^\circ_{3/2}$ **F** Fluorine 18.9984032 $1s^2 2s^2 2p^5$ 17.4228	10 $^1S_0$ **Ne** Neon 20.1797 $1s^2 2s^2 2p^6$ 21.5645
3	11 $^2S_{1/2}$ **Na** Sodium 22.989770 [Ne]$3s$ 5.1391	12 $^1S_0$ **Mg** Magnesium 24.3050 [Ne]$3s^2$ 7.6462											13 $^2P^\circ_{1/2}$ **Al** Aluminum 26.981538 [Ne]$3s^2 3p$ 5.9858	14 $^3P_0$ **Si** Silicon 28.0855 [Ne]$3s^2 3p^2$ 8.1517	15 $^4S^\circ_{3/2}$ **P** Phosphorus 30.973761 [Ne]$3s^2 3p^3$ 10.4867	16 $^3P_2$ **S** Sulfur 32.065 [Ne]$3s^2 3p^4$ 10.3600	17 $^2P^\circ_{3/2}$ **Cl** Chlorine 35.453 [Ne]$3s^2 3p^5$ 12.9676	18 $^1S_0$ **Ar** Argon 39.948 [Ne]$3s^2 3p^6$ 15.7596
4	19 $^2S_{1/2}$ **K** Potassium 39.0983 [Ar]$4s$ 4.3407	20 $^1S_0$ **Ca** Calcium 40.078 [Ar]$4s^2$ 6.1132	21 $^2D_{3/2}$ **Sc** Scandium 44.955910 [Ar]$3d4s^2$ 6.5615	22 $^3F_2$ **Ti** Titanium 47.867 [Ar]$3d^2 4s^2$ 6.8281	23 $^4F_{3/2}$ **V** Vanadium 50.9415 [Ar]$3d^3 4s^2$ 6.7462	24 $^7S_3$ **Cr** Chromium 51.9961 [Ar]$3d^5 4s$ 6.7665	25 $^6S_{5/2}$ **Mn** Manganese 54.938049 [Ar]$3d^5 4s^2$ 7.4340	26 $^5D_4$ **Fe** Iron 55.845 [Ar]$3d^6 4s^2$ 7.9024	27 $^4F_{9/2}$ **Co** Cobalt 58.933200 [Ar]$3d^7 4s^2$ 7.8810	28 $^3F_4$ **Ni** Nickel 58.6934 [Ar]$3d^8 4s^2$ 7.6398	29 $^2S_{1/2}$ **Cu** Copper 63.546 [Ar]$3d^{10} 4s$ 7.7264	30 $^1S_0$ **Zn** Zinc 65.409 [Ar]$3d^{10} 4s^2$ 9.3942	31 $^2P^\circ_{1/2}$ **Ga** Gallium 69.723 [Ar]$3d^{10} 4s^2 4p$ 5.9993	32 $^3P_0$ **Ge** Germanium 72.64 [Ar]$3d^{10} 4s^2 4p^2$ 7.8994	33 $^4S^\circ_{3/2}$ **As** Arsenic 74.92160 [Ar]$3d^{10} 4s^2 4p^3$ 9.7886	34 $^3P_2$ **Se** Selenium 78.96 [Ar]$3d^{10} 4s^2 4p^4$ 9.7524	35 $^2P^\circ_{3/2}$ **Br** Bromine 79.904 [Ar]$3d^{10} 4s^2 4p^5$ 11.8138	36 $^1S_0$ **Kr** Krypton 83.798 [Ar]$3d^{10} 4s^2 4p^6$ 13.9996
5	37 $^2S_{1/2}$ **Rb** Rubidium 85.4678 [Kr]$5s$ 4.1771	38 $^1S_0$ **Sr** Strontium 87.62 [Kr]$5s^2$ 5.6949	39 $^2D_{3/2}$ **Y** Yttrium 88.90585 [Kr]$4d5s^2$ 6.2173	40 $^3F_2$ **Zr** Zirconium 91.224 [Kr]$4d^2 5s^2$ 6.6339	41 $^6D_{1/2}$ **Nb** Niobium 92.90638 [Kr]$4d^4 5s$ 6.7589	42 $^7S_3$ **Mo** Molybdenum 95.94 [Kr]$4d^5 5s$ 7.0924	43 $^6S_{5/2}$ **Tc** Technetium (98) [Kr]$4d^5 5s^2$ 7.28	44 $^5F_5$ **Ru** Ruthenium 101.07 [Kr]$4d^7 5s$ 7.3605	45 $^4F_{9/2}$ **Rh** Rhodium 102.90550 [Kr]$4d^8 5s$ 7.4589	46 $^1S_0$ **Pd** Palladium 106.42 [Kr]$4d^{10}$ 8.3369	47 $^2S_{1/2}$ **Ag** Silver 107.8682 [Kr]$4d^{10} 5s$ 7.5762	48 $^1S_0$ **Cd** Cadmium 112.411 [Kr]$4d^{10} 5s^2$ 8.9938	49 $^2P^\circ_{1/2}$ **In** Indium 114.818 [Kr]$4d^{10} 5s^2 5p$ 5.7864	50 $^3P_0$ **Sn** Tin 118.710 [Kr]$4d^{10} 5s^2 5p^2$ 7.3439	51 $^4S^\circ_{3/2}$ **Sb** Antimony 121.760 [Kr]$4d^{10} 5s^2 5p^3$ 8.6084	52 $^3P_2$ **Te** Tellurium 127.60 [Kr]$4d^{10} 5s^2 5p^4$ 9.0096	53 $^2P^\circ_{3/2}$ **I** Iodine 126.90447 [Kr]$4d^{10} 5s^2 5p^5$ 10.4513	54 $^1S_0$ **Xe** Xenon 131.293 [Kr]$4d^{10} 5s^2 5p^6$ 12.1298
6	55 $^2S_{1/2}$ **Cs** Cesium 132.90545 [Xe]$6s$ 3.8939	56 $^1S_0$ **Ba** Barium 137.327 [Xe]$6s^2$ 5.2117		72 $^3F_2$ **Hf** Hafnium 178.49 [Xe]$4f^{14} 5d^2 6s^2$ 6.8251	73 $^4F_{3/2}$ **Ta** Tantalum 180.9479 [Xe]$4f^{14} 5d^3 6s^2$ 7.5496	74 $^5D_0$ **W** Tungsten 183.84 [Xe]$4f^{14} 5d^4 6s^2$ 7.8640	75 $^6S_{5/2}$ **Re** Rhenium 186.207 [Xe]$4f^{14} 5d^5 6s^2$ 7.8335	76 $^5D_4$ **Os** Osmium 190.23 [Xe]$4f^{14} 5d^6 6s^2$ 8.4382	77 $^4F_{9/2}$ **Ir** Iridium 192.217 [Xe]$4f^{14} 5d^7 6s^2$ 8.9670	78 $^3D_3$ **Pt** Platinum 195.078 [Xe]$4f^{14} 5d^9 6s$ 8.9588	79 $^2S_{1/2}$ **Au** Gold 196.96655 [Xe]$4f^{14} 5d^{10} 6s$ 9.2255	80 $^1S_0$ **Hg** Mercury 200.59 [Xe]$4f^{14} 5d^{10} 6s^2$ 10.4375	81 $^2P^\circ_{1/2}$ **Tl** Thallium 204.3833 [Hg]$6p$ 6.1082	82 $^3P_0$ **Pb** Lead 207.2 [Hg]$6p^2$ 7.4167	83 $^4S^\circ_{3/2}$ **Bi** Bismuth 208.98038 [Hg]$6p^3$ 7.2855	84 $^3P_2$ **Po** Polonium (209) [Hg]$6p^4$ 8.414	85 $^2P^\circ_{3/2}$ **At** Astatine (210) [Hg]$6p^5$	86 $^1S_0$ **Rn** Radon (222) [Hg]$6p^6$ 10.7485
7	87 $^2S_{1/2}$ **Fr** Francium (223) [Rn]$7s$ 4.0727	88 $^1S_0$ **Ra** Radium (226) [Rn]$7s^2$ 5.2784		104 $^3F_2$? **Rf** Rutherfordium (261) [Rn]$5f^{14} 6d^2 7s^2$? 6.0 ?	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (266)	107 **Bh** Bohrium (264)	108 **Hs** Hassium (277)	109 **Mt** Meitnerium (268)	110 **Uun** Ununnilium (281)	111 **Uuu** Unununium (272)	112 **Uub** Ununbium (285)		114 **Uuq** Ununquadium (289)		116 **Uuh** Ununhexium (292)		

Lanthanides	57 $^2D_{3/2}$ **La** Lanthanum 138.9055 [Xe]$5d6s^2$ 5.5769	58 $^1G^\circ_4$ **Ce** Cerium 140.116 [Xe]$4f5d6s^2$ 5.5387	59 $^4I^\circ_{9/2}$ **Pr** Praseodymium 140.90765 [Xe]$4f^3 6s^2$ 5.473	60 $^5I_4$ **Nd** Neodymium 144.24 [Xe]$4f^4 6s^2$ 5.5250	61 $^6H^\circ_{5/2}$ **Pm** Promethium (145) [Xe]$4f^5 6s^2$ 5.582	62 $^7F_0$ **Sm** Samarium 150.36 [Xe]$4f^6 6s^2$ 5.6437	63 $^8S^\circ_{7/2}$ **Eu** Europium 151.964 [Xe]$4f^7 6s^2$ 5.6704	64 $^9D^\circ_2$ **Gd** Gadolinium 157.25 [Xe]$4f^7 5d6s^2$ 6.1498	65 $^6H^\circ_{15/2}$ **Tb** Terbium 158.92534 [Xe]$4f^9 6s^2$ 5.8638	66 $^5I_8$ **Dy** Dysprosium 162.500 [Xe]$4f^{10} 6s^2$ 5.9389	67 $^4I^\circ_{15/2}$ **Ho** Holmium 164.93032 [Xe]$4f^{11} 6s^2$ 6.0215	68 $^3H_6$ **Er** Erbium 167.259 [Xe]$4f^{12} 6s^2$ 6.1077	69 $^2F^\circ_{7/2}$ **Tm** Thulium 168.93421 [Xe]$4f^{13} 6s^2$ 6.1843	70 $^1S_0$ **Yb** Ytterbium 173.04 [Xe]$4f^{14} 6s^2$ 6.2542	71 $^2D_{3/2}$ **Lu** Lutetium 174.967 [Xe]$4f^{14} 5d6s^2$ 5.4259
Actinides	89 $^2D_{3/2}$ **Ac** Actinium (227) [Rn]$6d7s^2$ 5.17	90 $^3F_2$ **Th** Thorium 232.0381 [Rn]$6d^2 7s^2$ 6.3067	91 $^4K_{11/2}$ **Pa** Protactinium 231.03588 [Rn]$5f^2 6d7s^2$ 5.89	92 $^5L_6$ **U** Uranium 238.02891 [Rn]$5f^3 6d7s^2$ 6.1941	93 $^6L_{11/2}$ **Np** Neptunium (237) [Rn]$5f^4 6d7s^2$ 6.2657	94 $^7F_0$ **Pu** Plutonium (244) [Rn]$5f^6 7s^2$ 6.0260	95 $^8S^\circ_{7/2}$ **Am** Americium (243) [Rn]$5f^7 7s^2$ 5.9738	96 $^9D^\circ_2$ **Cm** Curium (247) [Rn]$5f^7 6d7s^2$ 5.9914	97 $^6H^\circ_{15/2}$ **Bk** Berkelium (247) [Rn]$5f^9 7s^2$ 6.1979	98 $^5I_8$ **Cf** Californium (251) [Rn]$5f^{10} 7s^2$ 6.2817	99 $^4I^\circ_{15/2}$ **Es** Einsteinium (252) [Rn]$5f^{11} 7s^2$ 6.42	100 $^3H_6$ **Fm** Fermium (257) [Rn]$5f^{12} 7s^2$ 6.50	101 $^2F^\circ_{7/2}$ **Md** Mendelevium (258) [Rn]$5f^{13} 7s^2$ 6.58	102 $^1S_0$ **No** Nobelium (259) [Rn]$5f^{14} 7s^2$ 6.65	103 $^2P^\circ_{1/2}$? **Lr** Lawrencium (262) [Rn]$5f^{14} 7s^2 7p$? 4.9 ?

Atomic Number — Ground-state Level
Symbol — Name — Atomic Weight† — Ground-state Configuration — Ionization Energy (eV)

†Based upon ^{12}C. () indicates the mass number of the most stable isotope.

For a description of the data, visit physics.nist.gov/data

NIST SP 966 (September 2003)

Los Alamos National Laboratory Chemistry Division

Periodic Table of the Elements

1A	2A	3B	4B	5B	6B	7B	8B			11B	12B	3A	4A	5A	6A	7A	8A
1 H $1s^1$ hydrogen 1.008																	2 He $1s^2$ helium 4.003
3 Li $[He]2s^1$ lithium 6.941	4 Be $[He]2s^2$ beryllium 9.012											5 B $[He]2s^22p^1$ boron 10.81	6 C $[He]2s^22p^2$ carbon 12.01	7 N $[He]2s^22p^3$ nitrogen 14.01	8 O $[He]2s^22p^4$ oxygen 16.00	9 F $[He]2s^22p^5$ fluorine 19.00	10 Ne $[He]2s^22p^6$ neon 20.18
11 Na $[Ne]3s^1$ sodium 22.99	12 Mg $[Ne]3s^2$ magnesium 24.31											13 Al $[Ne]3s^23p^1$ aluminum 26.98	14 Si $[Ne]3s^23p^2$ silicon 28.09	15 P $[Ne]3s^23p^3$ phosphorus 30.97	16 S $[Ne]3s^23p^4$ sulfur 32.07	17 Cl $[Ne]3s^23p^5$ chlorine 35.45	18 Ar $[Ne]3s^23p^6$ argon 39.95
19 K $[Ar]4s^1$ potassium 39.10	20 Ca $[Ar]4s^2$ calcium 40.08	21 Sc $[Ar]4s^23d^1$ scandium 44.96	22 Ti $[Ar]4s^23d^2$ titanium 47.88	23 V $[Ar]4s^23d^3$ vanadium 50.94	24 Cr $[Ar]4s^13d^5$ chromium 52.00	25 Mn $[Ar]4s^23d^5$ manganese 54.94	26 Fe $[Ar]4s^23d^6$ iron 55.85	27 Co $[Ar]4s^23d^7$ cobalt 58.93	28 Ni $[Ar]4s^23d^8$ nickel 58.69	29 Cu $[Ar]4s^13d^{10}$ copper 63.55	30 Zn $[Ar]4s^23d^{10}$ zinc 65.39	31 Ga $[Ar]4s^23d^{10}4p^1$ gallium 69.72	32 Ge $[Ar]4s^23d^{10}4p^2$ germanium 72.58	33 As $[Ar]4s^23d^{10}4p^3$ arsenic 74.92	34 Se $[Ar]4s^23d^{10}4p^4$ selenium 78.96	35 Br $[Ar]4s^23d^{10}4p^5$ bromine 79.90	36 Kr $[Ar]4s^23d^{10}4p^6$ krypton 83.80
37 Rb $[Kr]5s^1$ rubidium 85.47	38 Sr $[Kr]5s^2$ strontium 87.62	39 Y $[Kr]5s^24d^1$ yttrium 88.91	40 Zr $[Kr]5s^24d^2$ zirconium 91.22	41 Nb $[Kr]5s^14d^4$ niobium 92.91	42 Mo $[Kr]5s^14d^5$ molybdenum 95.94	43 Tc $[Kr]5s^24d^5$ technetium (98)	44 Ru $[Kr]5s^14d^7$ ruthenium 101.1	45 Rh $[Kr]5s^14d^8$ rhodium 102.9	46 Pd $[Kr]4d^{10}$ palladium 106.4	47 Ag $[Kr]5s^14d^{10}$ silver 107.9	48 Cd $[Kr]5s^24d^{10}$ cadmium 112.4	49 In $[Kr]5s^24d^{10}5p^1$ indium 114.8	50 Sn $[Kr]5s^24d^{10}5p^2$ tin 118.7	51 Sb $[Kr]5s^24d^{10}5p^3$ antimony 121.8	52 Te $[Kr]5s^24d^{10}5p^4$ tellurium 127.6	53 I $[Kr]5s^24d^{10}5p^5$ iodine 126.9	54 Xe $[Kr]5s^24d^{10}5p^6$ xenon 131.3
55 Cs $[Xe]6s^1$ cesium 132.9	56 Ba $[Xe]6s^2$ barium 137.3	57 La* $[Xe]6s^25d^1$ lanthanum 138.9	72 Hf $[Xe]6s^24f^{14}5d^2$ hafnium 178.5	73 Ta $[Xe]6s^24f^{14}5d^3$ tantalum 180.9	74 W $[Xe]6s^24f^{14}5d^4$ tungsten 183.9	75 Re $[Xe]6s^24f^{14}5d^5$ rhenium 186.2	76 Os $[Xe]6s^24f^{14}5d^6$ osmium 190.2	77 Ir $[Xe]6s^24f^{14}5d^7$ iridium 190.2	78 Pt $[Xe]6s^14f^{14}5d^9$ platinum 195.1	79 Au $[Xe]6s^14f^{14}5d^{10}$ gold 197.0	80 Hg $[Xe]6s^24f^{14}5d^{10}$ mercury 200.5	81 Tl $[Xe]6s^24f^{14}5d^{10}6p^1$ thallium 204.4	82 Pb $[Xe]6s^24f^{14}5d^{10}6p^2$ lead 207.2	83 Bi $[Xe]6s^24f^{14}5d^{10}6p^3$ bismuth 208.9	84 Po $[Xe]6s^24f^{14}5d^{10}6p^4$ polonium (209)	85 At $[Xe]6s^24f^{14}5d^{10}6p^5$ astatine (210)	86 Rn $[Xe]6s^24f^{14}5d^{10}6p^6$ radon (222)
87 Fr $[Rn]7s^1$ francium (223)	88 Ra $[Rn]7s^2$ radium (226)	89 Ac~ $[Rn]7s^26d^1$ actinium (227)	104 Rf $[Rn]7s^25f^{14}6d^2$ rutherfordium (257)	105 Db $[Rn]7s^25f^{14}6d^3$ dubnium (260)	106 Sg $[Rn]7s^25f^{14}6d^4$ seaborgium (263)	107 Bh $[Rn]7s^25f^{14}6d^5$ bohrium (262)	108 Hs $[Rn]7s^25f^{14}6d^6$ hassium (265)	109 Mt $[Rn]7s^25f^{14}6d^7$ meitnerium (266)	110 Ds $[Rn]7s^15f^{14}6d^9$ darmstadtium (271)	111 Uuu (272)	112 Uub (277)		114 Uuq (296)		116 Uuh (298)		118 Uuo (?)

Lanthanide Series*	58 Ce $[Xe]6s^24f^15d^1$ cerium 140.1	59 Pr $[Xe]6s^24f^3$ praseodymium 140.9	60 Nd $[Xe]6s^24f^4$ neodymium 144.2	61 Pm $[Xe]6s^24f^5$ promethium (147)	62 Sm $[Xe]6s^24f^6$ samarium (150.4)	63 Eu $[Xe]6s^24f^7$ europium 152.0	64 Gd $[Xe]6s^24f^75d^1$ gadolinium 157.3	65 Tb $[Xe]6s^24f^9$ terbium 158.9	66 Dy $[Xe]6s^24f^{10}$ dysprosium 162.5	67 Ho $[Xe]6s^24f^{11}$ holmium 164.9	68 Er $[Xe]6s^24f^{12}$ erbium 167.3	69 Tm $[Xe]6s^24f^{13}$ thulium 168.9	70 Yb $[Xe]6s^24f^{14}$ ytterbium 173.0	71 Lu $[Xe]6s^24f^{14}5d^1$ lutetium 175.0
Actinide Series~	90 Th $[Rn]7s^26d^2$ thorium 232.0	91 Pa $[Rn]7s^25f^26d^1$ protactinium (231)	92 U $[Rn]7s^25f^36d^1$ uranium (238)	93 Np $[Rn]7s^25f^46d^1$ neptunium (237)	94 Pu $[Rn]7s^25f^6$ plutonium (242)	95 Am $[Rn]7s^25f^7$ americium (243)	96 Cm $[Rn]7s^25f^76d^1$ curium (247)	97 Bk $[Rn]7s^25f^9$ berkelium (247)	98 Cf $[Rn]7s^25f^{10}$ californium (249)	99 Es $[Rn]7s^25f^{11}$ einsteinium (254)	100 Fm $[Rn]7s^25f^{12}$ fermium (253)	101 Md $[Rn]7s^25f^{13}$ mendelevium (256)	102 No $[Rn]7s^25f^{14}$ nobelium (254)	103 Lr $[Rn]7s^25f^{14}6d^1$ lawrencium (257)

Los Alamos NATIONAL LABORATORY

CHEMISTRY

element names in **blue** are liquids at room temperature
element names in red are gases at room temperature
element names in black are solids at room temperature

Periodic Table of the Elements

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Atomic Number	1	1.00794	†Atomic Weight
Symbol	H	$^2S_{1/2}$ 2.2	†Ground-State Level; *Electronegativity (Pauling)
Name	Hydrogen		
*Density [Note]	0.0899	13.5984	†Ionization Energy (eV)
*Melting Point (°C)	-259.14	-252.87	*Boiling Point (°C)
Atomic radius (pm) [Note]	(v) 37	FCC	Crystal Structure [Note]
	$1s^1$		†Electron Configuration
	+1,-1		Possible Oxidation States [Note]

Phase at STP

Gas Liquid Solid Synthetic

Categories

Alkali Metals	Noble Gas
Alkaline Earth Metals	Halogens
Transition Metals	Non Metals
Rare Earth Metals	
Poor 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	2.817940×10^{-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 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 H 1.00794 $^2S_{1/2}$ 2.2 Hydrogen 0.0899 13.5984 -259.14 -252.87 (v) 37 - $1s^1$ +1,-1																	2 He 4.002602 $^1S_0$ - Helium 0.1785 24.5874 - -268.93 (v) 32 - $1s^2$ 0
2	3 Li 6.941 $^2S_{1/2}$ 0.98 Lithium 0.535 5.3917 180.54 1342 (m) 152 BCC [He] $2s^1$ +1	4 Be 9.012182 $^1S_0$ 1.57 Beryllium 1.848 9.3227 1287 2470 (m) 112 HCP [He] $2s^2$ +2											5 B 10.811 $^2P^\circ_{1/2}$ 2.04 Boron 2.46 8.2980 2075 4000 (v) 82 rhom. [He] $2s^2$ $2p^1$ +3	6 C 12.0107 $^3P_0$ 2.55 Carbon 2.26 11.2603 3550 4027 (v) 77 hex [He] $2s^2$ $2p^2$ +2,4,-4	7 N 14.0067 $^4S^\circ_{3/2}$ 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 O 15.9994 $^3P_2$ 3.44 Oxygen 1.429 13.6181 -218.3 -182.9 (v) 73 - [He] $2s^2$ $2p^4$ -2	9 F 18.9984032 $^2P^\circ_{3/2}$ 3.98 Fluorine 1.696 17.4228 -219.6 -188.12 (v) 71 - [He] $2s^2$ $2p^5$ -1	10 Ne 20.1797 $^1S_0$ - Neon 0.9 21.5645 -248.59 -246.08 (v) 69 - [He] $2s^2$ $2p^6$ 0
3	11 Na 22.989770 $^2S_{1/2}$ 0.93 Sodium 0.968 5.1391 97.72 883 (m) 186 BCC [Ne] $3s^1$ +1	12 Mg 24.3050 $^1S_0$ 1.31 Magnesium 1.738 7.6462 650 1090 (m) 160 HCP [Ne] $3s^2$ +2											13 Al 26.981538 $^2P^\circ_{1/2}$ 1.61 Aluminum 2.7 5.9858 660.32 2519 (m) 143 FCC [Ne] $3s^2$ $3p^1$ +3	14 Si 28.0855 $^3P_0$ 1.90 Silicon 2.33 8.1517 1414 2900 (v) 111 cubic [Ne] $3s^2$ $3p^2$ +2,4,-4	15 P 30.97361 $^4S^\circ_{3/2}$ 2.19 Phosphorus 1.823 10.4867 44.2 280.5 (v) 106 § [Ne] $3s^2$ $3p^3$ +3,4,5,-3	16 S 32.065 $^3P_2$ 2.58 Sulfur 1.96 10.3600 115.21 444.72 (v) 102 FCO [Ne] $3s^2$ $3p^4$ +2,4,6,-2	17 Cl 35.453 $^2P^\circ_{3/2}$ 3.16 Chlorine 3.214 12.9676 -101.5 -34.04 (v) 99 - [Ne] $3s^2$ $3p^5$ +1,3,5,7,-1	18 Ar 39.948 $^1S_0$ - Argon 1.784 15.7596 -189.3 -185.8 (v) 97 - [Ne] $3s^2$ $3p^6$ 0
4	19 K 39.0983 $^2S_{1/2}$ 0.82 Potassium 0.856 4.3407 63.38 759 (m) 227 BCC [Ar] $4s^1$ +1	20 Ca 40.078 $^1S_0$ 1.00 Calcium 1.55 6.1132 842 1484 (m) 197 FCC [Ar] $4s^2$ +2	21 Sc 44.955910 $^2D_{3/2}$ 1.36 Scandium 2.985 6.5615 1541 2830 (m) 162 HCP [Ar] $3d^1$ $4s^2$ +3	22 Ti 47.867 $^3F_2$ 1.54 Titanium 4.507 6.8281 1668 3287 (m) 147 HCP [Ar] $3d^2$ $4s^2$ +2,3,4	23 V 50.9415 $^4F_{3/2}$ 1.63 Vanadium 6.11 6.7462 1910 3407 (m) 134 BCC [Ar] $3d^3$ $4s^2$ +2,3,4,5	24 Cr 51.9961 $^7S_3$ 1.66 Chromium 7.14 6.7665 1907 2671 (m) 128 BCC [Ar] $3d^5$ $4s^1$ +2,3,6	25 Mn 54.938049 $^6S_{5/2}$ 1.55 Manganese 7.47 7.4340 1246 2061 (m) 127 §cubic [Ar] $3d^5$ $4s^2$ +2,3,4,6,7	26 Fe 55.845 $^5D_4$ 1.83 Iron 7.874 7.9024 1538 2861 (m) 126 BCC [Ar] $3d^6$ $4s^2$ +2,3	27 Co 58.933200 $^4F_{9/2}$ 1.88 Cobalt 8.9 7.8810 1495 2927 (m) 125 HCP [Ar] $3d^7$ $4s^2$ +2,3	28 Ni 58.6934 $^3F_4$ 1.91 Nickel 8.908 7.6398 1455 2913 (m) 124 FCC [Ar] $3d^8$ $4s^2$ +2,3	29 Cu 63.546 $^2S_{1/2}$ 1.90 Copper 8.92 7.7264 1084.62 2927 (m) 128 FCC [Ar] $3d^{10}$ $4s^1$ +1,2	30 Zn 65.409 $^1S_0$ 1.65 Zinc 7.14 9.3942 419.53 907 (m) 134 §hex [Ar] $3d^{10}$ $4s^2$ +2	31 Ga 69.723 $^2P^\circ_{1/2}$ 1.81 Gallium 5.904 5.9993 29.76 2204 (m) 135 §BCO [Ar] $3d^{10}$ $4s^2$ $4p^1$ +3	32 Ge 72.64 $^3P_0$ 2.01 Germanium 5.323 7.8994 938.3 2820 (v) 122 §cubic [Ar] $3d^{10}$ $4s^2$ $4p^2$ +2,4	33 As 74.92160 $^4S^\circ_{3/2}$ 2.18 Arsenic 5.727 9.7886 817 614 (v) 119 rhom. [Ar] $3d^{10}$ $4s^2$ $4p^3$ +3,5,-3	34 Se 78.96 $^3P_2$ 2.55 Selenium 4.819 9.7524 221 685 (v) 116 §hex [Ar] $3d^{10}$ $4s^2$ $4p^4$ +2,4,6,-2	35 Br 79.904 $^2P^\circ_{3/2}$ 2.96 Bromine 3.12 11.8138 -7.3 59 (v) 114 BCO [Ar] $3d^{10}$ $4s^2$ $4p^5$ +1,5,-1	36 Kr 83.798 $^1S_0$ 3 Krypton 3.75 13.9996 -157.36 -153.22 (v) 110 - [Ar] $3d^{10}$ $4s^2$ $4p^6$ 0
5	37 Rb 85.4678 $^2S_{1/2}$ 0.82 Rubidium 1.532 4.1771 39.31 688 (m) 248 BCC [Kr] $5s^1$ +1	38 Sr 87.62 $^1S_0$ 0.95 Strontium 2.63 5.6949 777 1382 (m) 215 FCC [Kr] $5s^2$ +2	39 Y 88.90585 $^2D_{3/2}$ 1.22 Yttrium 4.472 6.2173 1526 3345 (m) 180 HCP [Kr] $4d^1$ $5s^2$ +3	40 Zr 91.224 $^3F_2$ 1.33 Zirconium 6.511 6.6339 1855 4409 (m) 160 HCP [Kr] $4d^2$ $5s^2$ +4	41 Nb 92.90638 $^6D_{1/2}$ 1.60 Niobium 8.57 6.7589 2477 4744 (m) 146 BCC [Kr] $4d^4$ $5s^1$ +3,5	42 Mo 95.94 $^7S_3$ 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 Ru 101.07 $^5F_5$ 2.20 Ruthenium 12.37 7.3605 2334 4150 (m) 134 HCP [Kr] $4d^7$ $5s^1$ +2,3,4,6,8	45 Rh 102.90550 $^4F_{9/2}$ 2.28 Rhodium 12.45 7.4589 1964 3695 (m) 134 FCC [Kr] $4d^8$ $5s^1$ +2,3,4	46 Pd 106.42 $^1S_0$ 2.20 Palladium 12.023 8.3369 1554.9 2963 (m) 137 FCC [Kr] $4d^{10}$ +2,4	47 Ag 107.8682 $^2S_{1/2}$ 1.93 Silver 10.49 7.5762 961.78 2162 (m) 144 FCC [Kr] $4d^{10}$ $5s^1$ +1	48 Cd 112.411 $^1S_0$ 1.69 Cadmium 8.65 8.9938 321.07 767 (m) 151 §hex [Kr] $4d^{10}$ $5s^2$ +2	49 In 114.818 $^2P^\circ_{1/2}$ 1.78 Indium 7.31 5.7864 156.6 2072 (m) 167 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^1$ +3	50 Sn 118.710 $^3P_0$ 1.96 Tin 7.31 7.3439 231.93 2602 (v) 141 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^2$ +2,4	51 Sb 121.760 $^4S^\circ_{3/2}$ 2.05 Antimony 6.697 8.6084 630.63 1587 (v) 138 §rhom. [Kr] $4d^{10}$ $5s^2$ $5p^3$ +3,5,-3	52 Te 127.60 $^3P_2$ 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 I 126.90447 $^2P^\circ_{3/2}$ 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 Xe 131.293 $^1S_0$ 2.60 Xenon 5.9 12.1298 -111.8 -108 (v) 130 - [Kr] $4d^{10}$ $5s^2$ $5p^6$ 0
6	55 Cs 132.90545 $^2S_{1/2}$ 0.79 Cesium 1.879 3.8939 28.44 671 (m) 265 BCC [Xe] $6s^1$ +1	56 Ba 137.327 $^1S_0$ 0.89 Barium 3.51 5.2117 727 1870 (m) 222 BCC [Xe] $6s^2$ +2	Lanthanide Series	72 Hf 178.49 $^3F_2$ 1.3 Hafnium 13.31 6.8251 2233 4603 (m) 159 HCP [Xe] $4f^{14}$ $5d^2$ $6s^2$ +4	73 Ta 180.9479 $^4F_{3/2}$ 1.5 Tantalum 16.65 7.5496 3017 5458 (m) 146 BCC [Xe] $4f^{14}$ $5d^3$ $6s^2$ +5	74 W 183.84 $^5D_0$ 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 Re 186.207 $^6S_{5/2}$ 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 Os 190.23 $^5D_4$ 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 Ir 192.217 $^4F_{9/2}$ 2.2 Iridium 22.65 8.9670 2466 4428 (m) 136 FCC [Xe] $4f^{14}$ $5d^7$ $6s^2$ +2,3,4,6	78 Pt 195.078 $^3D_3$ 2.28 Platinum 21.09 8.9588 1768.3 3825 (m) 139 FCC [Xe] $4f^{14}$ $5d^9$ $6s^1$ +2,4	79 Au 196.96655 $^2S_{1/2}$ 2.54 Gold 19.3 9.2255 1064.18 2856 (m) 144 FCC [Xe] $4f^{14}$ $5d^{10}$ $6s^1$ +1,3	80 Hg 200.59 $^1S_0$ 2 Mercury 13.534 10.4375 -38.83 356.73 (m) 151 §rhom. [Xe] $4f^{14}$ $5d^{10}$ $6s^2$ +1,2	81 Tl 204.3833 $^2P^\circ_{1/2}$ 1.62 Thallium 11.85 6.1082 304 1473 (m) 170 HCP [Hg] $6p^1$ +1,3	82 Pb 207.2 $^3P_0$ 2.33 Lead 11.34 7.4167 327.46 1749 (m) 175 FCC [Hg] $6p^2$ +2,4	83 Bi 208.98038 $^4S^\circ_{3/2}$ 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 $^2P^\circ_{3/2}$ 2.2 Astatine - - 302 - - - [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

Lanthanides	57 La 138.9055 $^2D_{3/2}$ 1.10 Lanthanum 6.146 5.5769 920 3464 (m) 187 §hex [Xe] $5d^1$ $6s^2$ +3	58 Ce 140.116 $^1G^\circ_4$ 1.12 Cerium 6.689 5.5387 798 3360 (m) 182 FCC [Xe] $4f^1$ $5d^1$ $6s^2$ +3,4	59 Pr 140.90765 $^4I^\circ_{9/2}$ 1.13 Praseodymium 6.64 5.473 931 3290 (m) 182 §hex [Xe] $4f^3$ $6s^2$ +3,4	60 Nd 144.24 $^5I_4$ 1.14 Neodymium 7.01 5.5250 1021 3100 (m) 181 §hex [Xe] $4f^4$ $6s^2$ +3	61 ☢ (145) Pm $^6H^\circ_{5/2}$ - Promethium 7.264 5.582 1100 3000 (m) 183 HCP [Xe] $4f^5$ $6s^2$ +3	62 Sm 150.36 $^7F_0$ 1.17 Samarium 7.353 5.6437 1072 1803 (m) 180 §hex [Xe] $4f^6$ $6s^2$ +2,3	63 Eu 151.964 $^8S^\circ_{7/2}$ - Europium 5.244 5.6704 822 1527 (m) 180 BCC [Xe] $4f^7$ $6s^2$ +2,3	64 Gd 157.25 $^9D^\circ_2$ 1.20 Gadolinium 7.901 6.1498 1313 3250 (m) 180 HCP [Xe] $4f^7$ $5d^1$ $6s^2$ +3	65 Tb 158.92534 $^6H^\circ_{15/2}$ - Terbium 8.219 5.8638 1356 3230 (m) 177 HCP [Xe] $4f^9$ $6s^2$ +3,4	66 Dy 162.500 $^5I_8$ 1.22 Dysprosium 8.551 5.9389 1412 2567 (m) 178 HCP [Xe] $4f^{10}$ $6s^2$ +3	67 Ho 164.93032 $^4I^\circ_{15/2}$ 1.23 Holmium 8.795 6.0215 1474 2700 (m) 176 HCP [Xe] $4f^{11}$ $6s^2$ +3	68 Er 167.259 $^3H_6$ 1.24 Erbium 9.066 6.1077 1497 2868 (m) 176 HCP [Xe] $4f^{12}$ $6s^2$ +3	69 Tm 168.93421 $^2F^\circ_{7/2}$ 1.25 Thulium 9.321 6.1843 1545 1950 (m) 176 HCP [Xe] $4f^{13}$ $6s^2$ +2,3	70 Yb 173.04 $^1S_0$ - Ytterbium 6.57 6.2542 819 1196 (m) 176 FCC [Xe] $4f^{14}$ $6s^2$ +2,3	71 Lu 174.967 $^2D_{3/2}$ 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 $^3F_2$ 1.3 Thorium 11.724 6.3067 1750 4820 (m) 179 FCC [Rn] $6d^2$ $7s^2$ +4	91 ☢ 231.0359 $^4K_{11/2}$ 1.5 Protactinium 15.37 5.89 1572 4000 (m) 163 §tetra [Rn] $5f^2$ $6d^1$ $7s^2$ +4,5	92 ☢ 238.0289 $^5L^\circ_6$ 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 $^6L_{11/2}$ 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 $^8S^\circ_{7/2}$ 1.3 Americium - 5.9738 1176 2011 (m) 173 HCP [Rn] $5f^7$ $7s^2$ +3,4,5,6	96 ☢ (247) Cm $^9D^\circ_2$ 1.3 Curium 13.51 5.9914 1345 3110 (m) 174 HCP [Rn] $5f^7$ $6d^1$ $7s^2$ +3	97 ☢ (247) Bk $^6H^\circ_{15/2}$ 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 $^4I^\circ_{15/2}$ 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 $^2F^\circ_{7/2}$ 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 $^2P^\circ_{1/2}$? - Lawrencium - 4.9 ? 1627 - - - [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 ¹²C
- ( ) 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

Periodic Table of the Elements
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Periodic Table of the Elements

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Atomic Number	1	1.00794	†Atomic Weight
Symbol	H	$^2S_{1/2}$ 2.2	†Ground-State Level; *Electronegativity (Pauling)
Name	Hydrogen		
*Density [Note]	0.0899	13.5984	†Ionization Energy (eV)
*Melting Point (°C)	-259.14	-252.87	*Boiling Point (°C)
Atomic radius (pm) [Note]	(v) 37	FCC	Crystal Structure [Note]
	$1s^1$		†Electron Configuration
	+1,-1		Possible Oxidation States [Note]

Phase at STP

Gas Liquid Solid Synthetic

Categories

Alkali Metals	Noble Gas
Alkaline Earth Metals	Halogens
Transition Metals	Non Metals
Rare Earth Metals	
Poor 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	2.817940×10^{-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 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 H 1.00794 $^2S_{1/2}$ 2.2 Hydrogen 0.0899 13.5984 -259.14 -252.87 (v) 37 - $1s^1$ +1,-1																	2 He 4.002602 $^1S_0$ - Helium 0.1785 24.5874 - -268.93 (v) 32 - $1s^2$ 0
2	3 Li 6.941 $^2S_{1/2}$ 0.98 Lithium 0.535 5.3917 180.54 1342 (m) 152 BCC [He] $2s^1$ +1	4 Be 9.012182 $^1S_0$ 1.57 Beryllium 1.848 9.3227 1287 2470 (m) 112 HCP [He] $2s^2$ +2											5 B 10.811 $^2P^\circ_{1/2}$ 2.04 Boron 2.46 8.2980 2075 4000 (v) 82 rhom. [He] $2s^2$ $2p^1$ +3	6 C 12.0107 $^3P_0$ 2.55 Carbon 2.26 11.2603 3550 4027 (v) 77 hex [He] $2s^2$ $2p^2$ +2,4,-4	7 N 14.0067 $^4S^\circ_{3/2}$ 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 O 15.9994 $^3P_2$ 3.44 Oxygen 1.429 13.6181 -218.3 -182.9 (v) 73 - [He] $2s^2$ $2p^4$ -2	9 F 18.9984032 $^2P^\circ_{3/2}$ 3.98 Fluorine 1.696 17.4228 -219.6 -188.12 (v) 71 - [He] $2s^2$ $2p^5$ -1	10 Ne 20.1797 $^1S_0$ - Neon 0.9 21.5645 -248.59 -246.08 (v) 69 - [He] $2s^2$ $2p^6$ 0
3	11 Na 22.989770 $^2S_{1/2}$ 0.93 Sodium 0.968 5.1391 97.72 883 (m) 186 BCC [Ne] $3s^1$ +1	12 Mg 24.3050 $^1S_0$ 1.31 Magnesium 1.738 7.6462 650 1090 (m) 160 HCP [Ne] $3s^2$ +2											13 Al 26.981538 $^2P^\circ_{1/2}$ 1.61 Aluminum 2.7 5.9858 660.32 2519 (m) 143 FCC [Ne] $3s^2$ $3p^1$ +3	14 Si 28.0855 $^3P_0$ 1.90 Silicon 2.33 8.1517 1414 2900 (v) 111 cubic [Ne] $3s^2$ $3p^2$ +2,4,-4	15 P 30.97361 $^4S^\circ_{3/2}$ 2.19 Phosphorus 1.823 10.4867 44.2 280.5 (v) 106 § [Ne] $3s^2$ $3p^3$ +3,4,5,-3	16 S 32.065 $^3P_2$ 2.58 Sulfur 1.96 10.3600 115.21 444.72 (v) 102 FCO [Ne] $3s^2$ $3p^4$ +2,4,6,-2	17 Cl 35.453 $^2P^\circ_{3/2}$ 3.16 Chlorine 3.214 12.9676 -101.5 -34.04 (v) 99 - [Ne] $3s^2$ $3p^5$ +1,3,5,7,-1	18 Ar 39.948 $^1S_0$ - Argon 1.784 15.7596 -189.3 -185.8 (v) 97 - [Ne] $3s^2$ $3p^6$ 0
4	19 K 39.0983 $^2S_{1/2}$ 0.82 Potassium 0.856 4.3407 63.38 759 (m) 227 BCC [Ar] $4s^1$ +1	20 Ca 40.078 $^1S_0$ 1.00 Calcium 1.55 6.1132 842 1484 (m) 197 FCC [Ar] $4s^2$ +2	21 Sc 44.955910 $^2D_{3/2}$ 1.36 Scandium 2.985 6.5615 1541 2830 (m) 162 HCP [Ar] $3d^1$ $4s^2$ +3	22 Ti 47.867 $^3F_2$ 1.54 Titanium 4.507 6.8281 1668 3287 (m) 147 HCP [Ar] $3d^2$ $4s^2$ +2,3,4	23 V 50.9415 $^4F_{3/2}$ 1.63 Vanadium 6.11 6.7462 1910 3407 (m) 134 BCC [Ar] $3d^3$ $4s^2$ +2,3,4,5	24 Cr 51.9961 $^7S_3$ 1.66 Chromium 7.14 6.7665 1907 2671 (m) 128 BCC [Ar] $3d^5$ $4s^1$ +2,3,6	25 Mn 54.938049 $^6S_{5/2}$ 1.55 Manganese 7.47 7.4340 1246 2061 (m) 127 §cubic [Ar] $3d^5$ $4s^2$ +2,3,4,6,7	26 Fe 55.845 $^5D_4$ 1.83 Iron 7.874 7.9024 1538 2861 (m) 126 BCC [Ar] $3d^6$ $4s^2$ +2,3	27 Co 58.933200 $^4F_{9/2}$ 1.88 Cobalt 8.9 7.8810 1495 2927 (m) 125 HCP [Ar] $3d^7$ $4s^2$ +2,3	28 Ni 58.6934 $^3F_4$ 1.91 Nickel 8.908 7.6398 1455 2913 (m) 124 FCC [Ar] $3d^8$ $4s^2$ +2,3	29 Cu 63.546 $^2S_{1/2}$ 1.90 Copper 8.92 7.7264 1084.62 2927 (m) 128 FCC [Ar] $3d^{10}$ $4s^1$ +1,2	30 Zn 65.409 $^1S_0$ 1.65 Zinc 7.14 9.3942 419.53 907 (m) 134 §hex [Ar] $3d^{10}$ $4s^2$ +2	31 Ga 69.723 $^2P^\circ_{1/2}$ 1.81 Gallium 5.904 5.9993 29.76 2204 (m) 135 §BCO [Ar] $3d^{10}$ $4s^2$ $4p^1$ +3	32 Ge 72.64 $^3P_0$ 2.01 Germanium 5.323 7.8994 938.3 2820 (v) 122 §cubic [Ar] $3d^{10}$ $4s^2$ $4p^2$ +2,4	33 As 74.92160 $^4S^\circ_{3/2}$ 2.18 Arsenic 5.727 9.7886 817 614 (v) 119 rhom. [Ar] $3d^{10}$ $4s^2$ $4p^3$ +3,5,-3	34 Se 78.96 $^3P_2$ 2.55 Selenium 4.819 9.7524 221 685 (v) 116 §hex [Ar] $3d^{10}$ $4s^2$ $4p^4$ +2,4,6,-2	35 Br 79.904 $^2P^\circ_{3/2}$ 2.96 Bromine 3.12 11.8138 -7.3 59 (v) 114 BCO [Ar] $3d^{10}$ $4s^2$ $4p^5$ +1,5,-1	36 Kr 83.798 $^1S_0$ 3 Krypton 3.75 13.9996 -157.36 -153.22 (v) 110 - [Ar] $3d^{10}$ $4s^2$ $4p^6$ 0
5	37 Rb 85.4678 $^2S_{1/2}$ 0.82 Rubidium 1.532 4.1771 39.31 688 (m) 248 BCC [Kr] $5s^1$ +1	38 Sr 87.62 $^1S_0$ 0.95 Strontium 2.63 5.6949 777 1382 (m) 215 FCC [Kr] $5s^2$ +2	39 Y 88.90585 $^2D_{3/2}$ 1.22 Yttrium 4.472 6.2173 1526 3345 (m) 180 HCP [Kr] $4d^1$ $5s^2$ +3	40 Zr 91.224 $^3F_2$ 1.33 Zirconium 6.511 6.6339 1855 4409 (m) 160 HCP [Kr] $4d^2$ $5s^2$ +4	41 Nb 92.90638 $^6D_{1/2}$ 1.60 Niobium 8.57 6.7589 2477 4744 (m) 146 BCC [Kr] $4d^4$ $5s^1$ +3,5	42 Mo 95.94 $^7S_3$ 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 Ru 101.07 $^5F_5$ 2.20 Ruthenium 12.37 7.3605 2334 4150 (m) 134 HCP [Kr] $4d^7$ $5s^1$ +2,3,4,6,8	45 Rh 102.90550 $^4F_{9/2}$ 2.28 Rhodium 12.45 7.4589 1964 3695 (m) 134 FCC [Kr] $4d^8$ $5s^1$ +2,3,4	46 Pd 106.42 $^1S_0$ 2.20 Palladium 12.023 8.3369 1554.9 2963 (m) 137 FCC [Kr] $4d^{10}$ +2,4	47 Ag 107.8682 $^2S_{1/2}$ 1.93 Silver 10.49 7.5762 961.78 2162 (m) 144 FCC [Kr] $4d^{10}$ $5s^1$ +1	48 Cd 112.411 $^1S_0$ 1.69 Cadmium 8.65 8.9938 321.07 767 (m) 151 §hex [Kr] $4d^{10}$ $5s^2$ +2	49 In 114.818 $^2P^\circ_{1/2}$ 1.78 Indium 7.31 5.7864 156.6 2072 (m) 167 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^1$ +3	50 Sn 118.710 $^3P_0$ 1.96 Tin 7.31 7.3439 231.93 2602 (v) 141 §tetra. [Kr] $4d^{10}$ $5s^2$ $5p^2$ +2,4	51 Sb 121.760 $^4S^\circ_{3/2}$ 2.05 Antimony 6.697 8.6084 630.63 1587 (v) 138 §rhom. [Kr] $4d^{10}$ $5s^2$ $5p^3$ +3,5,-3	52 Te 127.60 $^3P_2$ 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 I 126.90447 $^2P^\circ_{3/2}$ 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 Xe 131.293 $^1S_0$ 2.60 Xenon 5.9 12.1298 -111.8 -108 (v) 130 - [Kr] $4d^{10}$ $5s^2$ $5p^6$ 0
6	55 Cs 132.90545 $^2S_{1/2}$ 0.79 Cesium 1.879 3.8939 28.44 671 (m) 265 BCC [Xe] $6s^1$ +1	56 Ba 137.327 $^1S_0$ 0.89 Barium 3.51 5.2117 727 1870 (m) 222 BCC [Xe] $6s^2$ +2	Lanthanide Series	72 Hf 178.49 $^3F_2$ 1.3 Hafnium 13.31 6.8251 2233 4603 (m) 159 HCP [Xe] $4f^{14}$ $5d^2$ $6s^2$ +4	73 Ta 180.9479 $^4F_{3/2}$ 1.5 Tantalum 16.65 7.5496 3017 5458 (m) 146 BCC [Xe] $4f^{14}$ $5d^3$ $6s^2$ +5	74 W 183.84 $^5D_0$ 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 Re 186.207 $^6S_{5/2}$ 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 Os 190.23 $^5D_4$ 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 Ir 192.217 $^4F_{9/2}$ 2.2 Iridium 22.65 8.9670 2466 4428 (m) 136 FCC [Xe] $4f^{14}$ $5d^7$ $6s^2$ +2,3,4,6	78 Pt 195.078 $^3D_3$ 2.28 Platinum 21.09 8.9588 1768.3 3825 (m) 139 FCC [Xe] $4f^{14}$ $5d^9$ $6s^1$ +2,4	79 Au 196.96655 $^2S_{1/2}$ 2.54 Gold 19.3 9.2255 1064.18 2856 (m) 144 FCC [Xe] $4f^{14}$ $5d^{10}$ $6s^1$ +1,3	80 Hg 200.59 $^1S_0$ 2 Mercury 13.534 10.4375 -38.83 356.73 (m) 151 §rhom. [Xe] $4f^{14}$ $5d^{10}$ $6s^2$ +1,2	81 Tl 204.3833 $^2P^\circ_{1/2}$ 1.62 Thallium 11.85 6.1082 304 1473 (m) 170 HCP [Hg] $6p^1$ +1,3	82 Pb 207.2 $^3P_0$ 2.33 Lead 11.34 7.4167 327.46 1749 (m) 175 FCC [Hg] $6p^2$ +2,4	83 Bi 208.98038 $^4S^\circ_{3/2}$ 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 $^2P^\circ_{3/2}$ 2.2 Astatine - - 302 - - - [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

Lanthanides	57 La 138.9055 $^2D_{3/2}$ 1.10 Lanthanum 6.146 5.5769 920 3464 (m) 187 §hex [Xe] $5d^1$ $6s^2$ +3	58 Ce 140.116 $^1G^\circ_4$ 1.12 Cerium 6.689 5.5387 798 3360 (m) 182 FCC [Xe] $4f^1$ $5d^1$ $6s^2$ +3,4	59 Pr 140.90765 $^4I^\circ_{9/2}$ 1.13 Praseodymium 6.64 5.473 931 3290 (m) 182 §hex [Xe] $4f^3$ $6s^2$ +3,4	60 Nd 144.24 $^5I_4$ 1.14 Neodymium 7.01 5.5250 1021 3100 (m) 181 §hex [Xe] $4f^4$ $6s^2$ +3	61 ☢ (145) Pm $^6H^\circ_{5/2}$ - Promethium 7.264 5.582 1100 3000 (m) 183 HCP [Xe] $4f^5$ $6s^2$ +3	62 Sm 150.36 $^7F_0$ 1.17 Samarium 7.353 5.6437 1072 1803 (m) 180 §hex [Xe] $4f^6$ $6s^2$ +2,3	63 Eu 151.964 $^8S^\circ_{7/2}$ - Europium 5.244 5.6704 822 1527 (m) 180 BCC [Xe] $4f^7$ $6s^2$ +2,3	64 Gd 157.25 $^9D^\circ_2$ 1.20 Gadolinium 7.901 6.1498 1313 3250 (m) 180 HCP [Xe] $4f^7$ $5d^1$ $6s^2$ +3	65 Tb 158.92534 $^6H^\circ_{15/2}$ - Terbium 8.219 5.8638 1356 3230 (m) 177 HCP [Xe] $4f^9$ $6s^2$ +3,4	66 Dy 162.500 $^5I_8$ 1.22 Dysprosium 8.551 5.9389 1412 2567 (m) 178 HCP [Xe] $4f^{10}$ $6s^2$ +3	67 Ho 164.93032 $^4I^\circ_{15/2}$ 1.23 Holmium 8.795 6.0215 1474 2700 (m) 176 HCP [Xe] $4f^{11}$ $6s^2$ +3	68 Er 167.259 $^3H_6$ 1.24 Erbium 9.066 6.1077 1497 2868 (m) 176 HCP [Xe] $4f^{12}$ $6s^2$ +3	69 Tm 168.93421 $^2F^\circ_{7/2}$ 1.25 Thulium 9.321 6.1843 1545 1950 (m) 176 HCP [Xe] $4f^{13}$ $6s^2$ +2,3	70 Yb 173.04 $^1S_0$ - Ytterbium 6.57 6.2542 819 1196 (m) 176 FCC [Xe] $4f^{14}$ $6s^2$ +2,3	71 Lu 174.967 $^2D_{3/2}$ 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 $^3F_2$ 1.3 Thorium 11.724 6.3067 1750 4820 (m) 179 FCC [Rn] $6d^2$ $7s^2$ +4	91 ☢ 231.0359 $^4K_{11/2}$ 1.5 Protactinium 15.37 5.89 1572 4000 (m) 163 §tetra [Rn] $5f^2$ $6d^1$ $7s^2$ +4,5	92 ☢ 238.0289 $^5L^\circ_6$ 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 $^6L_{11/2}$ 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 $^8S^\circ_{7/2}$ 1.3 Americium - 5.9738 1176 2011 (m) 173 HCP [Rn] $5f^7$ $7s^2$ +3,4,5,6	96 ☢ (247) Cm $^9D^\circ_2$ 1.3 Curium 13.51 5.9914 1345 3110 (m) 174 HCP [Rn] $5f^7$ $6d^1$ $7s^2$ +3	97 ☢ (247) Bk $^6H^\circ_{15/2}$ 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 $^4I^\circ_{15/2}$ 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 $^2F^\circ_{7/2}$ 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 $^2P^\circ_{1/2}$? - Lawrencium - 4.9 ? 1627 - - - [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 ¹²C
- ( ) 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

Periodic Table of the Elements
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PERIODIC TABLE of the ELEMENTS

DEPARTMENT OF SCIENCE AND TECHNOLOGY

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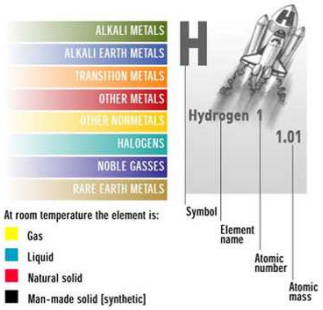
	IA 1	IIA 2	III B 3	IV B 4	V B 5	VI B 6	VII B 7	VIII 8	VIII 9	VIII 10	I B 11	II B 12	III A 13	IV A 14	V A 15	VI A 16	VII A 17	VIII A 18
1	H Hydrogen 1 1.01																	He Helium 2 4.00
2	Li lithium 3 6.94	Be Beryllium 4 9.01											B Boron 5 10.81	C Carbon 6 12.01	N Nitrogen 7 14.01	O Oxygen 8 16.00	F Fluorine 9 19.00	Ne Neon 10 20.18
3	Na Sodium 11 22.99	Mg Magnesium 12 24.31											Al Aluminium 13 26.98	Si Silicon 14 28.09	P Phosphorus 15 30.97	S Sulphur 16 32.06	Cl Chlorine 17 35.45	Ar Argon 18 39.95
4	K Potassium 19 39.10	Ca Calcium 20 40.08	Sc Scandium 21 44.96	Ti Titanium 22 47.88	V Vanadium 23 50.94	Cr Chromium 24 52.00	Mn Manganese 25 54.94	Fe Iron 26 55.85	Co Cobalt 27 58.93	Ni Nickel 28 58.69	Cu Copper 29 63.55	Zn Zinc 30 65.39	Ga Gallium 31 69.72	Ge Germanium 32 72.61	As Arsenic 33 74.92	Se Selenium 34 78.96	Br Bromine 35 79.90	Kr Krypton 36 83.80
5	Rb Rubidium 37 85.47	Sr Strontium 38 87.62	Y Yttrium 39 88.91	Zr Zirconium 40 91.22	Nb Niobium 41 92.91	Mo Molybdenum 42 95.94	Tc Technetium 43 (98)	Ru Ruthenium 44 101.07	Rh Rhodium 45 102.91	Pd Palladium 46 106.42	Ag Silver 47 107.87	Cd Cadmium 48 112.41	In Indium 49 114.82	Sn Tin 50 118.71	Sb Antimony 51 121.76	Te Tellurium 52 127.60	I Iodine 53 126.90	Xe Xenon 54 131.29
6	Cs Caesium 55 132.91	Ba Barium 56 137.33	Lanthanide Series	Hf Hafnium 72 178.49	Ta Tantalum 73 180.95	W Tungsten 74 183.85	Re Rhenium 75 186.21	Os Osmium 76 190.23	Ir Iridium 77 192.22	Pt Platinum 78 195.08	Au Gold 79 196.97	Hg Mercury 80 200.59	Tl Thallium 81 204.38	Pb Lead 82 207.20	Bi Bismuth 83 208.98	Po Polonium 84 (209)	At Astatine 85 (210)	Rn Radon 86 (222)
7	Fr Francium 87 (223)	Ra Radium 88 (226)	Actinide Series	Rf Rutherfordium 104 (261)	Db Dubnium 105 (262)	Sg Seaborgium 106 (263)	Bh Bohrium 107 (262)	Hs Hassium 108 (265)	Mt Meitnerium 109 (266)									

La Lanthanum 57 138.91	Ce Cerium 58 140.12	Pr Praseodymium 59 140.90	Nd Neodymium 60 144.24	Pm Promethium 61 (145)	Sm Samarium 62 150.36	Eu Europium 63 151.96	Gd Gadolinium 64 157.25	Tb Terbium 65 158.92	Dy Dysprosium 66 162.50	Ho Holmium 67 164.93	Er Erbium 68 167.26	Tm Thulium 69 168.93	Yb Ytterbium 70 173.04	Lu Lutetium 71 174.96
Ac Actinium 89 227.02	Th Thorium 90 232.03	Pa Protactinium 91 231.03	U Uranium 92 238.02	Np Neptunium 93 (237)	Pu Plutonium 94 (244)	Am Americium 95 (243)	Cm Curium 96 (247)	Bk Berkelium 97 (247)	Cf Californium 98 (251)	Es Einsteinium 99 (254)	Fm Fermium 100 (257)	Md Mendelevium 101 (258)	No Nobelium 102 (259)	Lr Lawrencium 103 (260)

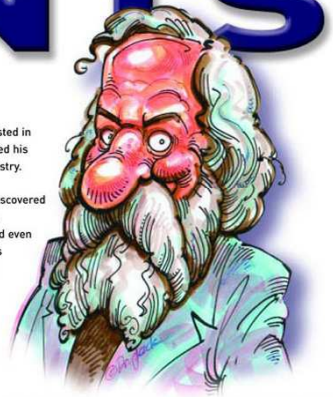


DMITRI MENDELEYEV (1834 – 1907)

The Russian chemist, Dmitri Mendeleyev, was the first to observe that if elements were listed in order of atomic mass, they showed regular (periodical) repeating properties. He formulated his discovery in a periodic table of elements, now regarded as the backbone of modern chemistry.

The crowning achievement of Mendeleyev's periodic table lay in his prophecy of then, undiscovered elements. In 1869, the year he published his periodic classification, the elements gallium, germanium and scandium were unknown. Mendeleyev left spaces for them in his table and even predicted their atomic masses and other chemical properties. Six years later, gallium was discovered and his predictions were found to be accurate. Other discoveries followed and their chemical behaviour matched that predicted by Mendeleyev.

This remarkable man, the youngest in a family of 17 children, has left the scientific community with a classification system so powerful that it became the cornerstone in chemistry teaching and the prediction of new elements ever since.
In 1955, element 101 was named after him: Md, Mendelevium.



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The Periodic Table of the Elements

Average relative masses are 2001 values, rounded to two decimal places.

All average masses are to be treated as measured quantities, and subject to significant figure rules. Do not round them further when performing calculations.

Element name → Mercury
Atomic # → **80**
Symbol → **Hg**
Avg. Mass → 200.59
Electronegativity → 1.9

1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Hydrogen 1 **H** 1.01 2.1																		Helium 2 **He** 4.00 ---
Lithium 3 **Li** 6.94 1.0	Beryllium 4 **Be** 9.01 1.5												Boron 5 **B** 10.81 2.0	Carbon 6 **C** 12.01 2.5	Nitrogen 7 **N** 14.01 3.0	Oxygen 8 **O** 16.00 3.5	Fluorine 9 **F** 19.00 4.0	Neon 10 **Ne** 20.18 ---
Sodium 11 **Na** 22.99 0.9	Magnesium 12 **Mg** 24.31 1.2												Aluminum 13 **Al** 26.98 1.5	Silicon 14 **Si** 28.09 1.8	Phosphorus 15 **P** 30.97 2.1	Sulfur 16 **S** 32.07 2.5	Chlorine 17 **Cl** 35.45 3.0	Argon 18 **Ar** 39.95 ---
Potassium 19 **K** 39.10 0.8	Calcium 20 **Ca** 40.08 1.0		Scandium 21 **Sc** 44.96 1.3	Titanium 22 **Ti** 47.88 1.5	Vanadium 23 **V** 50.94 1.6	Chromium 24 **Cr** 52.00 1.6	Manganese 25 **Mn** 54.94 1.5	Iron 26 **Fe** 55.85 1.8	Cobalt 27 **Co** 58.93 1.8	Nickel 28 **Ni** 58.69 1.8	Copper 29 **Cu** 63.55 1.9	Zinc 30 **Zn** 65.39 1.6	Gallium 31 **Ga** 69.72 1.6	Germanium 32 **Ge** 72.61 1.8	Arsenic 33 **As** 74.92 2.0	Selenium 34 **Se** 78.96 2.4	Bromine 35 **Br** 79.90 2.8	Krypton 36 **Kr** 83.80 3.0
Rubidium 37 **Rb** 85.47 0.8	Strontium 38 **Sr** 87.62 1.0		Yttrium 39 **Y** 88.91 1.2	Zirconium 40 **Zr** 91.22 1.4	Niobium 41 **Nb** 92.91 1.6	Molybdenum 42 **Mo** 95.94 1.8	Technetium 43 **Tc** (98) 1.9	Ruthenium 44 **Ru** 101.07 2.2	Rhodium 45 **Rh** 102.91 2.2	Palladium 46 **Pd** 106.42 2.2	Silver 47 **Ag** 107.87 1.9	Cadmium 48 **Cd** 112.41 1.7	Indium 49 **In** 114.82 1.7	Tin 50 **Sn** 118.71 1.8	Antimony 51 **Sb** 121.76 1.9	Tellurium 52 **Te** 127.60 2.1	Iodine 53 **I** 126.90 2.5	Xenon 54 **Xe** 131.29 2.6
Cesium 55 **Cs** 132.91 0.7	Barium 56 **Ba** 137.33 0.9	**57-70** ***** **89-102** ******	Lutetium 71 **Lu** 174.97 1.1	Hafnium 72 **Hf** 178.49 1.3	Tantalum 73 **Ta** 180.95 1.5	Tungsten 74 **W** 183.84 1.7	Rhenium 75 **Re** 186.21 1.9	Osmium 76 **Os** 190.23 2.2	Iridium 77 **Ir** 192.22 2.2	Platinum 78 **Pt** 195.08 2.2	Gold 79 **Au** 196.97 2.4	Mercury 80 **Hg** 200.59 1.9	Thallium 81 **Tl** 204.38 1.8	Lead 82 **Pb** 207.20 1.8	Bismuth 83 **Bi** 208.98 1.9	Polonium 84 **Po** (209) 2.0	Astatine 85 **At** (210) 2.2	Radon 86 **Rn** (222) 2.4
Francium 87 **Fr** (223) 0.7	Radium 88 **Ra** (226) 0.9		Lawrencium 103 **Lr** (262) ---	Rutherfordium 104 **Rf** (267) ---	Dubnium 105 **Db** (268) ---	Seaborgium 106 **Sg** (271) ---	Bohrium 107 **Bh** (272) ---	Hassium 108 **Hs** (270) ---	Meitnerium 109 **Mt** (276) ---	Darmstadtium 110 **Ds** (281) ---	Roentgenium 111 **Rg** (280) ---	Copernicium 112 **Cn** (285) ---	Ununtrium 113 **Uut** (284) ---	Ununquadium 114 **Uuq** (289) ---	Ununpentium 115 **Uup** (288) ---	Ununhexium 116 **Uuh** (293) ---	Ununseptium 117 **Uus** (294?) ---	Ununoctium 118 **Uuo** (294) ---

*lanthanides	Lanthanum 57 **La** 138.91 1.1	Cerium 58 **Ce** 140.12 1.1	Praseodymium 59 **Pr** 140.91 1.1	Neodymium 60 **Nd** 144.24 1.1	Promethium 61 **Pm** (145) 1.1	Samarium 62 **Sm** 150.36 1.2	Europium 63 **Eu** 151.97 1.1	Gadolinium 64 **Gd** 157.25 1.2	Terbium 65 **Tb** 158.93 1.1	Dysprosium 66 **Dy** 162.50 1.2	Holmium 67 **Ho** 164.93 1.2	Erbium 68 **Er** 167.26 1.2	Thulium 69 **Tm** 168.93 1.3	Ytterbium 70 **Yb** 173.04 1.1
**actinides	Actinium 89 **Ac** (227) 1.1	Thorium 90 **Th** 232.04 1.3	Protactinium 91 **Pa** 231.04 1.5	Uranium 92 **U** 238.03 1.4	Neptunium 93 **Np** (237) 1.4	Plutonium 94 **Pu** (244) 1.3	Americium 95 **Am** (243) 1.3	Curium 96 **Cm** (247) 1.3	Berkelium 97 **Bk** (247) 1.3	Californium 98 **Cf** (251) 1.3	Einsteinium 99 **Es** (252) 1.3	Fermium 100 **Fm** (257) 1.3	Mendelevium 101 **Md** (258) 1.3	Nobelium 102 **No** (259) 1.3

PERIODIC TABLE

Atomic Properties of the Elements

NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Physics Laboratory
physics.nist.gov

Standard Reference Data Group
www.nist.gov/srd

Frequently used fundamental physical constants

For the most accurate values of these and other constants, visit physics.nist.gov/constants

1 second = 9 192 631 770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of ^{133}Cs

speed of light in vacuum	c	299 792 458 m s^{-1}	(exact)
Planck constant	h	6.6261×10^{-34} J s	($\hbar = h/2\pi$)
elementary charge	e	1.6022×10^{-19} C	
electron mass	m_e	9.1094×10^{-31} kg	
	$m_e c^2$	0.5110 MeV	
proton mass	m_p	1.6726×10^{-27} kg	
fine-structure constant	α	1/137.036	
Rydberg constant	R_∞	10 973 732 m^{-1}	
	$R_\infty c$	$3.289\,842 \times 10^{15}$ Hz	
	$R_\infty hc$	13.6057 eV	
Boltzmann constant	k	1.3807×10^{-23} J K^{-1}	

Solids
Liquids
Gases
Artificially Prepared

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 $^2S_{1/2}$ **H** Hydrogen 1.00794 $1s$ 13.5984																	2 $^1S_0$ **He** Helium 4.002602 $1s^2$ 24.5874
2	3 $^2S_{1/2}$ **Li** Lithium 6.941 $1s^2 2s$ 5.3917	4 $^1S_0$ **Be** Beryllium 9.012182 $1s^2 2s^2$ 9.3227											5 $^2P^\circ_{1/2}$ **B** Boron 10.811 $1s^2 2s^2 2p$ 8.2980	6 $^3P_0$ **C** Carbon 12.0107 $1s^2 2s^2 2p^2$ 11.2603	7 $^4S^\circ_{3/2}$ **N** Nitrogen 14.0067 $1s^2 2s^2 2p^3$ 14.5341	8 $^3P_2$ **O** Oxygen 15.9994 $1s^2 2s^2 2p^4$ 13.6181	9 $^2P^\circ_{3/2}$ **F** Fluorine 18.9984032 $1s^2 2s^2 2p^5$ 17.4228	10 $^1S_0$ **Ne** Neon 20.1797 $1s^2 2s^2 2p^6$ 21.5645
3	11 $^2S_{1/2}$ **Na** Sodium 22.989770 [Ne]$3s$ 5.1391	12 $^1S_0$ **Mg** Magnesium 24.3050 [Ne]$3s^2$ 7.6462											13 $^2P^\circ_{1/2}$ **Al** Aluminum 26.981538 [Ne]$3s^2 3p$ 5.9858	14 $^3P_0$ **Si** Silicon 28.0855 [Ne]$3s^2 3p^2$ 8.1517	15 $^4S^\circ_{3/2}$ **P** Phosphorus 30.973761 [Ne]$3s^2 3p^3$ 10.4867	16 $^3P_2$ **S** Sulfur 32.065 [Ne]$3s^2 3p^4$ 10.3600	17 $^2P^\circ_{3/2}$ **Cl** Chlorine 35.453 [Ne]$3s^2 3p^5$ 12.9676	18 $^1S_0$ **Ar** Argon 39.948 [Ne]$3s^2 3p^6$ 15.7596
4	19 $^2S_{1/2}$ **K** Potassium 39.0983 [Ar]$4s$ 4.3407	20 $^1S_0$ **Ca** Calcium 40.078 [Ar]$4s^2$ 6.1132	21 $^2D_{3/2}$ **Sc** Scandium 44.955910 [Ar]$3d4s^2$ 6.5615	22 $^3F_2$ **Ti** Titanium 47.867 [Ar]$3d^2 4s^2$ 6.8281	23 $^4F_{3/2}$ **V** Vanadium 50.9415 [Ar]$3d^3 4s^2$ 6.7462	24 $^7S_3$ **Cr** Chromium 51.9961 [Ar]$3d^5 4s$ 6.7665	25 $^6S_{5/2}$ **Mn** Manganese 54.938049 [Ar]$3d^5 4s^2$ 7.4340	26 $^5D_4$ **Fe** Iron 55.845 [Ar]$3d^6 4s^2$ 7.9024	27 $^4F_{9/2}$ **Co** Cobalt 58.933200 [Ar]$3d^7 4s^2$ 7.8810	28 $^3F_4$ **Ni** Nickel 58.6934 [Ar]$3d^8 4s^2$ 7.6398	29 $^2S_{1/2}$ **Cu** Copper 63.546 [Ar]$3d^{10} 4s$ 7.7264	30 $^1S_0$ **Zn** Zinc 65.409 [Ar]$3d^{10} 4s^2$ 9.3942	31 $^2P^\circ_{1/2}$ **Ga** Gallium 69.723 [Ar]$3d^{10} 4s^2 4p$ 5.9993	32 $^3P_0$ **Ge** Germanium 72.64 [Ar]$3d^{10} 4s^2 4p^2$ 7.8994	33 $^4S^\circ_{3/2}$ **As** Arsenic 74.92160 [Ar]$3d^{10} 4s^2 4p^3$ 9.7886	34 $^3P_2$ **Se** Selenium 78.96 [Ar]$3d^{10} 4s^2 4p^4$ 9.7524	35 $^2P^\circ_{3/2}$ **Br** Bromine 79.904 [Ar]$3d^{10} 4s^2 4p^5$ 11.8138	36 $^1S_0$ **Kr** Krypton 83.798 [Ar]$3d^{10} 4s^2 4p^6$ 13.9996
5	37 $^2S_{1/2}$ **Rb** Rubidium 85.4678 [Kr]$5s$ 4.1771	38 $^1S_0$ **Sr** Strontium 87.62 [Kr]$5s^2$ 5.6949	39 $^2D_{3/2}$ **Y** Yttrium 88.90585 [Kr]$4d5s^2$ 6.2173	40 $^3F_2$ **Zr** Zirconium 91.224 [Kr]$4d^2 5s^2$ 6.6339	41 $^6D_{1/2}$ **Nb** Niobium 92.90638 [Kr]$4d^4 5s$ 6.7589	42 $^7S_3$ **Mo** Molybdenum 95.94 [Kr]$4d^5 5s$ 7.0924	43 $^6S_{5/2}$ **Tc** Technetium (98) [Kr]$4d^5 5s^2$ 7.28	44 $^5F_5$ **Ru** Ruthenium 101.07 [Kr]$4d^7 5s$ 7.3605	45 $^4F_{9/2}$ **Rh** Rhodium 102.90550 [Kr]$4d^8 5s$ 7.4589	46 $^1S_0$ **Pd** Palladium 106.42 [Kr]$4d^{10}$ 8.3369	47 $^2S_{1/2}$ **Ag** Silver 107.8682 [Kr]$4d^{10} 5s$ 7.5762	48 $^1S_0$ **Cd** Cadmium 112.411 [Kr]$4d^{10} 5s^2$ 8.9938	49 $^2P^\circ_{1/2}$ **In** Indium 114.818 [Kr]$4d^{10} 5s^2 5p$ 5.7864	50 $^3P_0$ **Sn** Tin 118.710 [Kr]$4d^{10} 5s^2 5p^2$ 7.3439	51 $^4S^\circ_{3/2}$ **Sb** Antimony 121.760 [Kr]$4d^{10} 5s^2 5p^3$ 8.6084	52 $^3P_2$ **Te** Tellurium 127.60 [Kr]$4d^{10} 5s^2 5p^4$ 9.0096	53 $^2P^\circ_{3/2}$ **I** Iodine 126.90447 [Kr]$4d^{10} 5s^2 5p^5$ 10.4513	54 $^1S_0$ **Xe** Xenon 131.293 [Kr]$4d^{10} 5s^2 5p^6$ 12.1298
6	55 $^2S_{1/2}$ **Cs** Cesium 132.90545 [Xe]$6s$ 3.8939	56 $^1S_0$ **Ba** Barium 137.327 [Xe]$6s^2$ 5.2117		72 $^3F_2$ **Hf** Hafnium 178.49 [Xe]$4f^{14} 5d^2 6s^2$ 6.8251	73 $^4F_{3/2}$ **Ta** Tantalum 180.9479 [Xe]$4f^{14} 5d^3 6s^2$ 7.5496	74 $^5D_0$ **W** Tungsten 183.84 [Xe]$4f^{14} 5d^4 6s^2$ 7.8640	75 $^6S_{5/2}$ **Re** Rhenium 186.207 [Xe]$4f^{14} 5d^5 6s^2$ 7.8335	76 $^5D_4$ **Os** Osmium 190.23 [Xe]$4f^{14} 5d^6 6s^2$ 8.4382	77 $^4F_{9/2}$ **Ir** Iridium 192.217 [Xe]$4f^{14} 5d^7 6s^2$ 8.9670	78 $^3D_3$ **Pt** Platinum 195.078 [Xe]$4f^{14} 5d^9 6s$ 8.9588	79 $^2S_{1/2}$ **Au** Gold 196.96655 [Xe]$4f^{14} 5d^{10} 6s$ 9.2255	80 $^1S_0$ **Hg** Mercury 200.59 [Xe]$4f^{14} 5d^{10} 6s^2$ 10.4375	81 $^2P^\circ_{1/2}$ **Tl** Thallium 204.3833 [Hg]$6p$ 6.1082	82 $^3P_0$ **Pb** Lead 207.2 [Hg]$6p^2$ 7.4167	83 $^4S^\circ_{3/2}$ **Bi** Bismuth 208.98038 [Hg]$6p^3$ 7.2855	84 $^3P_2$ **Po** Polonium (209) [Hg]$6p^4$ 8.414	85 $^2P^\circ_{3/2}$ **At** Astatine (210) [Hg]$6p^5$	86 $^1S_0$ **Rn** Radon (222) [Hg]$6p^6$ 10.7485
7	87 $^2S_{1/2}$ **Fr** Francium (223) [Rn]$7s$ 4.0727	88 $^1S_0$ **Ra** Radium (226) [Rn]$7s^2$ 5.2784		104 $^3F_2$? **Rf** Rutherfordium (261) [Rn]$5f^{14} 6d^2 7s^2$? 6.0 ?	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (266)	107 **Bh** Bohrium (264)	108 **Hs** Hassium (277)	109 **Mt** Meitnerium (268)	110 **Uun** Ununnilium (281)	111 **Uuu** Unununium (272)	112 **Uub** Ununbium (285)		114 **Uuq** Ununquadium (289)		116 **Uuh** Ununhexium (292)		

Lanthanides	57 $^2D_{3/2}$ **La** Lanthanum 138.9055 [Xe]$5d6s^2$ 5.5769	58 $^1G^\circ_4$ **Ce** Cerium 140.116 [Xe]$4f5d6s^2$ 5.5387	59 $^4I^\circ_{9/2}$ **Pr** Praseodymium 140.90765 [Xe]$4f^3 6s^2$ 5.473	60 $^5I_4$ **Nd** Neodymium 144.24 [Xe]$4f^4 6s^2$ 5.5250	61 $^6H^\circ_{5/2}$ **Pm** Promethium (145) [Xe]$4f^5 6s^2$ 5.582	62 $^7F_0$ **Sm** Samarium 150.36 [Xe]$4f^6 6s^2$ 5.6437	63 $^8S^\circ_{7/2}$ **Eu** Europium 151.964 [Xe]$4f^7 6s^2$ 5.6704	64 $^9D^\circ_2$ **Gd** Gadolinium 157.25 [Xe]$4f^7 5d6s^2$ 6.1498	65 $^6H^\circ_{15/2}$ **Tb** Terbium 158.92534 [Xe]$4f^9 6s^2$ 5.8638	66 $^5I_8$ **Dy** Dysprosium 162.500 [Xe]$4f^{10} 6s^2$ 5.9389	67 $^4I^\circ_{15/2}$ **Ho** Holmium 164.93032 [Xe]$4f^{11} 6s^2$ 6.0215	68 $^3H_6$ **Er** Erbium 167.259 [Xe]$4f^{12} 6s^2$ 6.1077	69 $^2F^\circ_{7/2}$ **Tm** Thulium 168.93421 [Xe]$4f^{13} 6s^2$ 6.1843	70 $^1S_0$ **Yb** Ytterbium 173.04 [Xe]$4f^{14} 6s^2$ 6.2542	71 $^2D_{3/2}$ **Lu** Lutetium 174.967 [Xe]$4f^{14} 5d6s^2$ 5.4259
Actinides	89 $^2D_{3/2}$ **Ac** Actinium (227) [Rn]$6d7s^2$ 5.17	90 $^3F_2$ **Th** Thorium 232.0381 [Rn]$6d^2 7s^2$ 6.3067	91 $^4K_{11/2}$ **Pa** Protactinium 231.03588 [Rn]$5f^2 6d7s^2$ 5.89	92 $^5L_6$ **U** Uranium 238.02891 [Rn]$5f^3 6d7s^2$ 6.1941	93 $^6L_{11/2}$ **Np** Neptunium (237) [Rn]$5f^4 6d7s^2$ 6.2657	94 $^7F_0$ **Pu** Plutonium (244) [Rn]$5f^6 7s^2$ 6.0260	95 $^8S^\circ_{7/2}$ **Am** Americium (243) [Rn]$5f^7 7s^2$ 5.9738	96 $^9D^\circ_2$ **Cm** Curium (247) [Rn]$5f^7 6d7s^2$ 5.9914	97 $^6H^\circ_{15/2}$ **Bk** Berkelium (247) [Rn]$5f^9 7s^2$ 6.1979	98 $^5I_8$ **Cf** Californium (251) [Rn]$5f^{10} 7s^2$ 6.2817	99 $^4I^\circ_{15/2}$ **Es** Einsteinium (252) [Rn]$5f^{11} 7s^2$ 6.42	100 $^3H_6$ **Fm** Fermium (257) [Rn]$5f^{12} 7s^2$ 6.50	101 $^2F^\circ_{7/2}$ **Md** Mendelevium (258) [Rn]$5f^{13} 7s^2$ 6.58	102 $^1S_0$ **No** Nobelium (259) [Rn]$5f^{14} 7s^2$ 6.65	103 $^2P^\circ_{1/2}$? **Lr** Lawrencium (262) [Rn]$5f^{14} 7s^2 7p$? 4.9 ?

Atomic Number — Ground-state Level
Symbol — Name — Atomic Weight† — Ground-state Configuration — Ionization Energy (eV)

†Based upon ^{12}C. () indicates the mass number of the most stable isotope.

For a description of the data, visit physics.nist.gov/data

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