

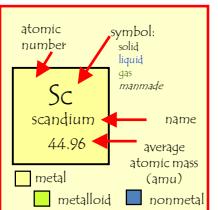
	1 valence electron
+1	alkali metals group 1
1s	2 valence electrons
2s	alkaline earth metals group 2
1 H hydrogen 1.008 (H is a nonmetal)	



3 Li lithium 6.94	4 Be beryllium 9.012
11 Na sodium 22.99	12 Mg magnesium 24.31
19 K potassium 39.10	20 Ca calcium 40.08
37 Rb rubidium 85.47	38 Sr strontium 87.62
55 Cs cesium 132.91	56 Ba barium 137.33
87 Fr francium 223.02	88 Ra radium 226.03

transition metals											
group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10	group 11	group 12		
21 Sc scandium 44.96	22 Ti titanium 47.90	23 V vanadium 50.94	24 Cr chromium 52.00	25 Mn manganese 54.94	26 Fe iron 55.85	27 Co cobalt 58.93	28 Ni nickel 58.71	29 Cu copper 63.55	30 Zn zinc 65.37		
39 Y yttrium 88.91	40 Zr zirconium 91.22	41 Nb niobium 92.91	42 Mo molybdenum 95.94	43 Tc technetium 96.91	44 Ru ruthenium 101.07	45 Rh rhodium 102.91	46 Pd palladium 106.40	47 Ag silver 107.87	48 Cd cadmium 112.40		
71 Lu lutetium 174.97	72 Hf hafnium 178.49	73 Ta tantalum 180.95	74 W tungsten 183.85	75 Re rhenium 186.21	76 Os osmium 190.20	77 Ir iridium 192.22	78 Pt platinum 195.09	79 Au gold 196.97	80 Hg mercury 200.59		
103 Lr lawrencium 262.11	104 Rf rutherfordium 267.12	105 Db dubnium 268.13	106 Sg seaborgium 171.13	107 Bh bohrium 270.13	108 Hs hassium 277.15	109 Mt meitnerium 278.16	110 Ds darmstadtium 281.17	111 Rg roentgenium 281.16	112 Cn copernicium 285.18		

metal	nonmetal	valence electrons:	8 O noble gases group 18
+3	3	4	8
5	4	5	7
-3	-3	-2	-1 halogens
10 Ne	10 Ne	10 Ne	10 Ne
2 He	2 He	2 He	2 He
5 B boron 10.81	6 C carbon 12.01	7 N nitrogen 14.01	8 O oxygen 16.00
13 Al aluminum 26.98	14 Si silicon 28.09	15 P phosphorus 30.97	16 S sulfur 32.07
31 Ga gallium 69.72	32 Ge germanium 72.59	33 As arsenic 74.92	34 Se selenium 78.96
51 In indium 114.82	50 Sn tin 118.69	51 Sb antimony 121.75	52 Te tellurium 127.60
81 Tl thallium 204.37	82 Pb lead 207.19	83 Bi bismuth 208.980	84 Po polonium 208.982
113 Nh nihonium 286.19	114 Fl flerovium 289.19	115 Mc moscovium 289.19	116 Lv livermorium 293.20
117 Ts tennessine 294	118 Og oganesson 294		



57 La lanthanum 138.91	58 Ce cerium 140.12	59 Pr praseodymium 140.91	60 Nd neodymium 144.24	61 Pm promethium (144.91)	62 Sm samarium 150.41	63 Eu europium 151.96	64 Gd gadolinium 157.25	65 Tb terbium 158.92	66 Dy dysprosium 162.50	67 Ho holmium 164.93	68 Er erbium 167.26	69 Tm thulium 168.93	70 Yb ytterbium 173.04
89 Ac actinium 227.03	90 Th thorium 232.04	91 Pa protactinium 231.04	92 U uranium 238.03	93 Np neptunium 237.05	94 Pu plutonium 244.06	95 Am americium 243.06	96 Cm curium 247.07	97 Bk berkelium 247.07	98 Cf californium 251.08	99 Es einsteinium 252.08	100 Fm fermium 257.10	101 Md mendelevium 258.10	102 No nobelium 259.10

common ions

acetate CH_3CO_2^-	bisulfite HSO_3^-	chlorite ClO_2^-	hydroxide OH^-	nitrite NO_2^-	phosphide P^{3-}
ammonium NH_4^+	bromide Br^-	chromate CrO_4^{2-}	hypochlorite ClO^-	oxide O^{2-}	sulfate SO_4^{2-}
bromide Br^-	carbonate CO_3^{2-}	cyanide CN^-	iodide I^-	perchlorate ClO_4^-	sulfide S^{2-}
bicarbonate HCO_3^-	chlorate ClO_3^-	dichromate $\text{Cr}_2\text{O}_7^{2-}$	nitrate NO_3^-	permanganate MnO_4^-	sulfite SO_3^{2-}
bisulfate HSO_4^-	chloride Cl^-	fluoride F^-	nitride N^{3-}	phosphate PO_4^{3-}	thiosulfate $\text{S}_2\text{O}_3^{2-}$