

PERIODIC TABLE OF THE ELEMENTS

1 H 1.0																	2 He 4.0
3 Li 6.9	4 Be 9.0											5 B 10.8	6 C 12.0	7 N 14.0	8 O 16.0	9 F 19.0	10 Ne 20.2
11 Na 23.0	12 Mg 24.3											13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.5	18 Ar 39.9
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La* 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.0	89 Ac† 227.0	104 Unq (261)	105 Unp (262)	106 Unh (263)	107 Uns (262)	108 Uno (265)	109 Une (267)									

* 58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
† 90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

Charges of some Common Monatomic ions

H 1+ 1-																	
Li 1+	Be 2+													N 3-	O 2-	F 1-	
Na 1+	Mg 2+											Al 3+				Cl 1-	
K 1+	Ca 2+	Sc 3+	Ti 3+ 4+	V 3+ 4+	Cr 2+ 3+	Mn 2+ 3+	Fe 2+ 3+	Co 2+ 3+	Ni 2+ 4+	Cu 1+ 2+	Zn 2+					Br 1-	
Rb 1+	Sr 2+								Pd 2+ 4+	Ag 1+	Cd 2+		Sn 2+ 4+			I 1-	
Cs 1+	Ba 2+								Pt 2+ 4+	Au 1+ 3+	Hg 2+ *		Pb 2+ 4+				
Fr 1+	Ra 2+																

Please note that many of the metals shown here can have more possibilities than I can show here. Vanadium, for example, can be 2+, 3+, 4+ or 5+. I have only shown the more common charges.

*Mercury can be 1+ in the polyatomic ion Hg_2^{2+} .

Table 11.2 Prefixes used to show the presence of one to ten carbons in an unbranched chain.

Prefix	Number of Carbon atoms	Prefix	Number of Carbon atoms
meth-	1	hex-	6
eth-	2	hept-	7
prop-	3	oct-	8
but-	4	non-	9
pent-	5	dec-	10

Electronegativity Values of Selected Elements

Metallic Elements			Nonmetallic Elements			
Li (1.0)	Be (1.5)	H (2.1)	C (2.5)	N (3.0)	O (3.5)	F (4.0)
Na (1.0)	Mg (1.2)	Al (1.5)	P (2.1)	S (2.5)	Cl (3.0)	
K (0.9)	Ca (1.0)	Sc (1.3)	Se (2.4)	Br (2.8)		

Electronegativity

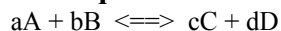
Difference Bond type

0-0.4 Non polar covalent

0.5-1.9 Polar Covalent

2.0 - Ionic

Equilibrium reactions



$$K = \frac{[C]^c [D]^d}{[A]^a [B]^b}$$

Gas Laws

$$PV = nRT$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$K = 273 + ^\circ C$$

$$760 \text{ mm Hg} = 760 \text{ torr} = 1 \text{ atm}$$

$$R = 0.08206 \text{ L atm mol}^{-1} \text{K}^{-1}$$

pH equations

$$[H_3O^+] [OH^-] = 1 \times 10^{-14} \quad pH + pOH = 14$$

$$pH = -\log[H_3O^+] \quad [H_3O^+] = 10^{-pH}$$

$$pOH = -\log[OH^-] \quad [OH^-] = 10^{-pOH}$$

Solutions and Molarity

$$M = \frac{\text{moles}}{L}$$

$$M \times V = \text{moles}$$

Dilutions

$$M_1 V_1 = M_2 V_2$$

TABLE 8.2 Some Acids and Their Conjugate Bases, in Decreasing Order of Acid Strength

Acid		Conjugate Base	
HI	Hydroiodic acid	I ⁻	Iodide ion
H ₂ SO ₄	Sulfuric acid	HSO ₄ ⁻	Hydrogen sulfate ion
HCl	Hydrochloric acid	Cl ⁻	Chloride ion
HNO ₃	Nitric acid	NO ₃ ⁻	Nitrate ion
H ₃ O ⁺	Hydronium ion	H ₂ O	Water
HSO ₄ ⁻	Hydrogen sulfate ion	SO ₄ ²⁻	Sulfate ion
H ₃ PO ₄	Phosphoric acid	H ₂ PO ₄ ⁻	Dihydrogen phosphate ion
HF	Hydrofluoric acid	F ⁻	Fluoride Ion
CH ₃ CO ₂ H	Acetic acid	CH ₃ CO ₂ ⁻	Acetate ion
H ₂ CO ₃	Carbonic acid	HCO ₃ ⁻	Bicarbonate ion
H ₂ S	Hydrogen sulfide	HS ⁻	Hydrogen sulfide ion
H ₂ PO ₄ ⁻	Dihydrogen phosphate ion	HPO ₄ ²⁻	Hydrogen phosphate ion
NH ₄ ⁺	Ammonium ion	NH ₃	Ammonia
C ₆ H ₅ OH	Phenol	C ₆ H ₅ O ⁻	Phenoxide ion
HCO ₃ ⁻	Bicarbonate ion	CO ₃ ²⁻	Carbonate ion
HPO ₄ ²⁻	Hydrogen phosphate ion	PO ₄ ³⁻	Phosphate ion
H ₂ O	Water	OH ⁻	Hydroxide ion
C ₂ H ₅ OH	Ethanol	C ₂ H ₅ O ⁻	Ethoxide ion
NH ₃	Ammonia	NH ₂ ⁻	Amide ion

Strong Acids



Weak Acids

Weak Bases



Strong Bases