

Solubility Rules

1. All compounds containing Na^+ , K^+ , or NH_4^+ ions are soluble in water.
2. All nitrates (NO_3^-) are soluble in water.
3. Most chlorides (Cl^-), and sulfates (SO_4^{2-}) are soluble. Some important exceptions are silver chloride (AgCl), barium sulfate (BaSO_4), and lead sulfate (PbSO_4) which are insoluble.
4. Most carbonates (CO_3^{2-}), phosphates (PO_4^{3-}), sulfides (S^{2-}), and hydroxides (OH^-) are insoluble in water. Important exceptions are those of Na^+ , K^+ , and NH_4^+ , as well as barium hydroxide, $\text{Ba}(\text{OH})_2$.

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+																	
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+	V 3+	Cr 2+	Mn 2+	Fe 2+	Co 2+	Ni 2+	Cu 1+	Zn 2+					Br 1-	
Rb 1+	Sr 2+								Pd 2+	Ag 1+	Cd 2+		Sn 2+			I 1-	
Cs 1+	Ba 2+								Pt 2+	Au 1+	Hg 2+		Pb 2+				
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 Hg₂²⁺.

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

0-0.4 (non-metals)

0.5 or more (non metals)

Metal + non-metal

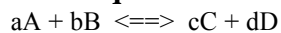
Bond type

Non polar covalent

Polar Covalent

Ionic

Equilibrium reactions



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

Gas Laws

$$PV = nRT$$

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

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

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

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

$$\text{Avogadro's Number: } 6.02 \times 10^{23}$$

$$6.02 \times 10^{23} \text{ molecules} = 1 \text{ mole}$$

pH equations

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

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

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

Solutions and Molarity

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

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

$$\text{Dilutions} \quad M_1 V_1 = M_2 V_2$$

TABLE 9.1 Some Acids and Their Conjugate Bases, in Decreasing Order of Acid Strength

Acid	Conjugate Base
HI	I ⁻
H ₂ SO ₄	HSO ₄ ⁻
HCl	Cl ⁻
HNO ₃	NO ₃ ⁻
H ₃ O ⁺	H ₂ O
HSO ₄ ⁻	SO ₄ ²⁻
H ₃ PO ₄	H ₂ PO ₄ ⁻
HF	F ⁻
CH ₃ CO ₂ H	CH ₃ CO ₂ ⁻
H ₂ CO ₃	HCO ₃ ⁻
H ₂ S	HS ⁻
H ₂ PO ₄ ⁻	HPO ₄ ²⁻
NH ₄ ⁺	NH ₃
C ₆ H ₅ OH	C ₆ H ₅ O ⁻
HCO ₃ ⁻	CO ₃ ²⁻
HPO ₄ ²⁻	PO ₄ ³⁻
H ₂ O	OH ⁻
C ₂ H ₅ OH	C ₂ H ₅ O ⁻

Strong Acids

Weak Bases

Weak Acids

Strong Bases

