SOLUBILITY RULES:

SOLUBLE:
All Nitrates, Acetates, Ammonium and Group I salts
All Chlorides, Bromides, and Iodides, except Silver, Lead, and Mercury(I)
All Fluorides except Group II, Lead(II), and Iron(III)
All Sulfates except Calcium, Strontium, Barium, Mercury, Lead(II), and Silver

INSOLUBLE:
All Carbonates and Phosphates except Group I and Ammonium
All Hydroxides except Group I, Strontium, and Barium
All Sulfides except Group I, II, and Ammonium
All Oxides except Group I

*INSOLUBLE means a precipitate forms when equal volumes of 0.10 M solutions or
greater are mixed*

Molarity = M = moles of solute/liters of solution
Molality = m = moles of solute/kg of solvent
For dilutions $M_1 V_1 = M_2 V_2$

q = m C ΔT

q = m ΔH

Colligative Properties

$P = X_1P_1 + X_2P_2 + X_3P_3 + ...$
where P is pressure and X is mole fraction

Gas Laws:

PV = nRT

$\Delta T = i\, m\, K_{bp}$ (boiling pt elevation)

$\Delta T = i\, m\, K_{fp}$ (freezing pt depression)

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

1 atm = 760 Torr = 760 mm Hg = 1.013 bar = 14.7 psi
R = 0.08206 L atm / (mol K) = 8.314 J / (mol K)

First order integrated rate law:

$\ln[A] = -k\, t + \ln[A]_0$

Second order integrated rate law:

$$\frac{1}{[A]_t} = kt + \frac{1}{[A]_0}$$

pH = -log [H$^+$]

pOH = -log [OH$^-$]

$K_w = 1.00E-14 = [H^+] [OH^-]$

Quadratic equation

$$x = \frac{-b +/- \sqrt{b^2 - 4ac}}{2a}$$

ΔG = ΔH – T ΔS

ΔG = ΣnΔG$_{products}$ - ΣnΔG$_{reactants}$ (where 'n' refers to the properly balanced equation coefficients)

ΔH = ΣnΔH$_{products}$ - ΣnΔH$_{reactants}$

ΔS = ΣnΔS$_{products}$ - ΣnΔS$_{reactants}$

ΔG°$_{rxn}$ = -RT ln(K)   where K is the equilibrium constant