

Equation Sheet

$$\% \text{ yield} = \frac{\text{isolated yield}}{\text{theoretical yield}} \times 100\%$$

$$M_1V_1 = M_2V_2$$

$$\text{molarity (M)} = \frac{\text{moles of solute}}{\text{liters of solution}}$$

$$P_1V_1 = P_2V_2$$

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

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

$$X_i = \frac{n_i}{n_T}$$

$$1 \text{ atm} = 760 \text{ mmHg} = 760 \text{ torr} = 101.3 \text{ kPa}$$

$$? \text{ K} = (^\circ\text{C} + 273.15) \frac{1 \text{ K}}{1^\circ\text{C}}$$

$$\text{STP: } 0.00^\circ\text{C} (273.15 \text{ K}) \text{ \& } 1 \text{ atm}$$

$$PV = nRT$$

$$R = 8.314 \frac{\text{J}}{\text{mol K}}$$

$$R = 0.0821 \frac{\text{L atm}}{\text{mol K}}$$

$$101.33 \text{ J} = 1 \text{ L}\cdot\text{atm}$$

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

$$ax^2 + bx + c = 0$$

$$\Delta U = q + w$$

$$w = -P\Delta V$$

$$\Delta H = \Delta U + P\Delta V$$

$$\Delta U = \Delta H - RT\Delta n$$

$$q = ms\Delta t$$

$$C = ms$$

$$q = C\Delta t$$

$$\Delta H_{rxn}^o = \sum n \Delta H_f^o (\text{products}) - \sum m \Delta H_f^o (\text{reactants})$$

$$Z_{eff} = Z - \sigma$$

$$\ln P = -\frac{\Delta H_{vap}}{RT} + C$$

$$K_p = K_c (0.0821 T)^{\Delta n}$$

$$K_w = [\text{H}^+][\text{OH}^-] = 1.0 \times 10^{-14} \quad \text{pH} = -\log[\text{H}^+]$$

$$\text{pH} + \text{pOH} = 14.00$$

$$\Delta S_{universe} = \Delta S_{sys} + \Delta S_{surr} > 0$$

$$\Delta S_{rxn}^o = \sum n \Delta S^o (\text{products}) - \sum m \Delta S^o (\text{reactants})$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta G_{rxn}^o = \sum n \Delta G_f^o (\text{products}) - \sum m \Delta G_f^o (\text{reactants})$$

Electronegativity Chart

1A												8A					
H 2.1																	
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	
		3B	4B	5B	6B	7B	8B		1B	2B	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0	
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.9	Ni 1.9	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6

Solubility Rules

Soluble Compounds Containing: Alkali metal ions Nitrates Ammonium Halides Sulfates	EXCEPTIONS PbX ₂ (lead halides), AgX (silver halides) are insoluble Sulfates of calcium, barium, lead, strontium and silver are <u>insoluble</u>
Insoluble Compounds Containing: Carbonates Phosphates Sulfides Hydroxides	EXCEPTIONS Carbonates, phosphates, and sulfides of alkali metal ions or ammonium are <u>soluble</u> Hydroxides of alkali metal ions and barium hydroxide are <u>soluble</u>

Periodic Table of the Elements

1 H 1.01																	18 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 51.99	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.63	33 As 74.92	34 Se 78.97	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.95	43 Tc 98.91	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.6	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57-71 Lanthanide Series	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.09	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po [208.981]	85 At 209.99	86 Rn 222.02
87 Fr 223.02	88 Ra 226.03	89-103 Actinide Series	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [269]	109 Mt [278]	110 Ds [281]	111 Rg [280]	112 Cn [285]	113 Nh [286]	114 Fl [289]	115 Mc [289]	116 Lv [293]	117 Ts [294]	118 Og [294]
57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm 144.91	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.06	71 Lu 174.97			
89 Ac 227.03	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu 244.06	95 Am 243.06	96 Cm 247.07	97 Bk 247.07	98 Cf 251.08	99 Es [254]	100 Fm 257.10	101 Md 258.1	102 No 259.10	103 Lr [262]			