TEXAS A&M UNIVERSITY CORPUS CHRISTI | CASA CENTER FOR ACADEMIC STUDENT ACHIEVEMENT

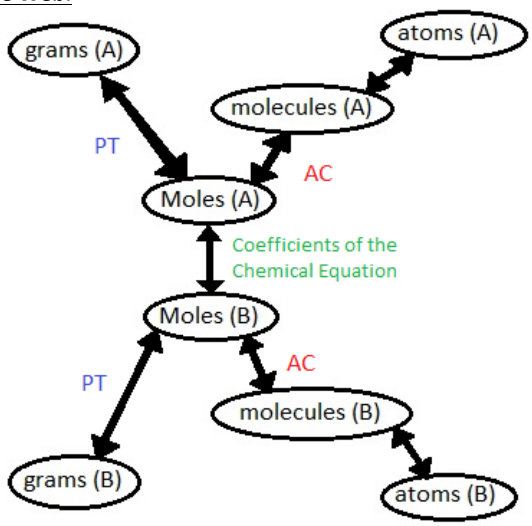
General Chemistry I Equations & Info

Significant Figures:

1) Any non-zero number is significant (1-9)
2) Any zero between two non-zero numbers is significant (203)
3) Any zero to the right of a non-zero and to the left of a decimal is significant (100.)
4) Any zero to the right of a non-zero and a decimal is significant (1.00)
5) Any zero to the left of a non-zero is not significant (0.001 or 01.)

×/÷ number of significant figures is dependent of smallest number of significant figures of products. (25×5=125➔100)
+/- number of significant figures dependent of smallest number of decimal places of added or subtracted numbers. (1.0+0.05+2.002=3.052➔3.1)

Mole Web:



(A) and (B) are any compounds in the Chemical Equation.
PT-Find molar mass from periodic table.
AC-Avogadro's Constant: (6.02×10^{23} molecules/mole)

Percent Yield = $\frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\%$

Percent Error = $\frac{|\text{measured value} - \text{accepted value}|}{\text{accepted value}} \times 100\%$

Molarity = $\frac{\text{moles solute}}{\text{1 L solution}}$

Molality = $\frac{\text{moles of solute}}{\text{volume (kg) solvent}}$

Mole Fraction = $\frac{\text{moles (A)}}{\text{moles (A) + moles (B) + ...}}$

Mass Percent = $\frac{\text{mass (A)}}{\text{total mass}} \times 100\%$

ICE Table:

I-initial number of moles
Δ-the change in moles
E-end number of moles

Ex: If you start with 20 moles of Li_2O and 15 moles of $BeCl_2$, how much BeO and LiCl will you end up with?

	Li_2O +	$BeCl_2$ ---->	BeO +	2LiCl
I	20	15	0	0
Δ	-15	-15	+15	+30
E	5	0	15	30

So for the above reaction, when you start with 20 moles of Li_2O and 15 moles of $BeCL_2$, you end up with 5 moles of Li_2O, 15 moles of BeO, and 30 moles of LiCl. $BeCl_2$ was the Limiting Reagent.

General Naming of Compounds:

(Ionic) Metal - Non-Metal
(no prefix)Metal name (no prefix)Non-Metal Name(ide)

Li_2O	Lithium Oxide
$MgCl_2$	Magnesium Chloride

(Covalent) Non-Metal – Non-Metal
(prefix except Mono)1st Non-Metal (Prefix)2nd Non-Metal(ide)

H_2O	Dihydrogen Monoxide
N_2O_3	Dinitrogen Trioxide
SCl_2	Sulfur Dichloride

Ideal Gas Law: PV=nRT

P: pressure (usually atm)
V: volume (L)
n: number of moles
R: (a constant that varies with units used) $0.082\,\frac{L*atm}{mole*K}$ or $0.008314\,\frac{kJ}{mole*K}$
T: temperature (K)

1 mole of any gas takes up 22.5 L of space at STP.

STP means Standard Temperature and Pressure. Usually 273K and 1atm.

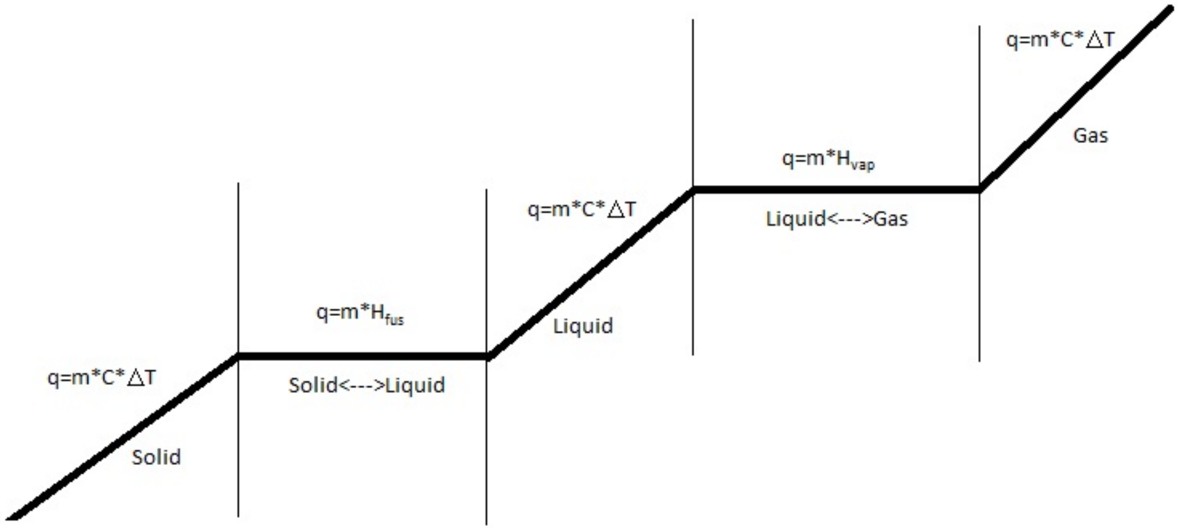
Dilutions: $C_1V_1 = C_2V_2$

$C_1V_1 + C_2V_2 = C_fV_f$

C = concentration (M) of a solution
V = volume (L) of the container the solution is in

Quantum Numbers (n, l, m_l, m_s)						Subshells		
(n) shell #	(l) subshells biggest is (n-1)	(l) subshell names	(m_l) orbital lables	(m_s) electron spins in orbitals	total # of electrons	Subshell Name	Orbitals	electrons
1	0	s	0	-1/2, 1/2	2	s	-	2
2	1, 0	p, s	-1, 0, 1	-1/2, 1/2	8	p	- - -	6
3	2, 1, 0	d, p, s	-2, -1, 0, 1, 2	-1/2, 1/2	18	d	- - - - -	10
4	3, 2, 1, 0	f, d, p, s	-3, -2, -1, 0, 1, 2, 3	-1/2, 1/2	32	f	- - - - - - -	14

Energy/Heat used/released to Change Phase



Heat of Reaction:
q=m*C*ΔT
q=Energy/Heat (J or kJ)
m=mass (g or kg)
ΔT=Change in Temperature (K)
$\Delta T = T_f - T_i$
T_f=Final Temperature (K)
T_i=Initial Temperature (K)

(2) For Water (H_2O)
$C_{solid\ water}$ = 2.11 J/(g*K)
$C_{liquid\ water}$ = 4.22 J/(g*K)
$C_{water\ vapor}$ = 2.08 J/(g*K)

H_{fus} = 333.6 (kJ/kg)
H_{vap} = 2258.7 (kJ/kg)

Density Equations:

$$D = \frac{\mathcal{m}*P}{R*T}$$

D=Density (g/L)
$\mathcal{m}$=molar mass (g/mole)
P=Pressure (atm)
R=constant ((L*atm)/(mole*K))
T=Temperature (K)

$$D = \frac{m}{V}$$

m=mass (g)
V=volume (L)

Pressure Conversions:
(1) 1 atm = 1.01295 bar = 101,295 pascals (pa)

Sections of this handout were comprised from the following sources.
(1) Pressure conversion table. (2012, May 14). Retrieved from http://wiki.xtronics.com/index.php/Pressure_Conversion_Table
(2) X. Ge, X. Wang. Estimation of Freezing Point Depression, Boiling Point Elevation and Vaporization enthalpies of electrolyte solutions. Ind. Eng. Chem. Res. 48(2009)2229-2235. doi: 10.1021/ie801348c