Chemistry Notes and Equations - 8/9/2013 www.askmath.weebly.com

Sig-Fig Rules : Decimal $\implies$ Start on the right; No decimal $\implies$ Start on the left.

Specific Heat capacity : $q = m \cdot c \cdot \Delta T \implies (g)(\frac{J}{g^\circ C})(^\circ C)$

c of water $= 4.184 \frac{J}{g^\circ C}$

1 calorie $= 4.184\ J$

$c = \lambda \cdot v$, where v is the frequency of light.

$c = 3.00 \times 10^8 \frac{m}{s}$

$E = h \cdot v$, where h is Planck's constant : $6.626 \times 10^{-}34\ Js$ and v is frequency.

Visible light wavelength in nanometers:

Red $650 - 710$

Green $490 - 549$

Violet $390 - 429$

Acid suffixes and Prefixes $\implies$ Anion name

Hydro—ic $\implies$ —ide

Hypo—ous $\implies$ Hypo—ite

—ous $\implies$ —ite

—ic $\implies$ —ate

Per—ic $\implies$ Per—ate

Empirical Formula

1. Divide the percent by the atomic mass to get moles
2. Divide all the moles by the smalls mole
3. Multiply to get whole #

$q = m \cdot c \cdot \Delta T + (H_f)(mol) + m \cdot c \cdot \Delta T + (H_v)(mol) + m \cdot c \cdot \Delta T$

1 atm pressure
$=$ 760 mm Hg and torr
$=$ 101.3 kPa

Boyle : $P_1V_1 = P_2V_2$

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

Gay-Lussac : $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

Ideal Gas Law :

$$\boxed{P \cdot V = n \cdot R \cdot T}$$

$$\text{kPa} \implies 8.31 \, \frac{kPa \cdot L}{mol \cdot k}$$

$$\text{atm} \implies .0821 \, \frac{atm \cdot L}{mol \cdot k}$$

$$\text{mmHg} \implies 62.4 \, \frac{mmHg \cdot L}{mol \cdot k}$$

Graham's Law : Rate of effusion $\propto \frac{1}{\sqrt{m}}$

$\frac{R_a}{R_b} = \sqrt{\frac{MM_b}{MM_a}}$

Molarity : $\dfrac{\text{moles of solute}}{\text{L of solvent}}$

Molality : $\dfrac{\text{moles of solute}}{\text{kg of solvent}}$

$M_1V_1 = M_2V_2$

$\Delta T_{BP} = k_{BP} \cdot m \cdot i \implies$ (BP constant)(molality)(van Hoff Factor)

BP constant : $.512 \, \frac{^\circ C}{m}$

MP constant : $1.86 \, \frac{^\circ C}{m}$

$q_{H_2O} = m \cdot c \cdot \Delta T$

$q_c = C \cdot \Delta T$

$q_{\text{reaction}} = q_{H_2O} + q_c$

Heat of Formation and others

Enthalpy : $\Delta H = \sum \text{Products} - \sum \text{Reactions} \implies H_f$ in kJ

Entropy : $\Delta S = \sum \text{Products} - \sum \text{Reactions} \implies > 0 = \text{endothermic}$

Gibbs Free energy : $\Delta G = \Delta H - T \cdot \Delta S$

ΔG :

$< 0 \implies$ spontaneous

$> 0 \implies$ non spontaneous

$= 0 \implies$ reaction is at equilibrium

For $aA + bB \leftrightharpoons cC + dD$:

$k_{eq} = \dfrac{[C]^c \cdot [D]^d}{[A]^a \cdot [B]^b}$

$pH = -\log[H^+]$

$pOH = -\log[OH^-]$

$H^+ + OH^- = H_2O$

$k_w = 1 \times 10^{-14} = [H^+] \cdot [OH^-]$

logs : sig-fig in M becomes decimals on the answer

Ex. $-log(1.5 \times 10^{-12}) = 11.82$