DOUGHERTY VALLEY HS CHEMISTRY EQUATIONS AND CONSTANTS

EQUILIBRIUM and ACID BASE

$K_C = \frac{[C]^C[D]^D}{[A]^A[B]^B}$ $\quad K_p = \frac{(P_C)^C(P_D)^D}{(P_A)^A(P_B)^B}$

$K_a = \frac{[H^+][A^-]}{[HA]}$; $\quad K_b = \frac{[OH^-][HB^+]}{[B]}$

$K_w = [H^+][OH^-]$ $\quad K_w = K_a \, x \, K_b$

$pH = -\log[H^+]$, $\quad pOH = -\log[OH^-]$

$14 = pH + pOH \quad (at\ 25℃)$

Equilibrium Constant:

$K_w = 1.0 \, x \, 10^{-14} \; at \; 25℃$

THERMOCHEMISTRY

No Phase Change: $q = mc\Delta T$

Phase Change: $q = m \, x \, \Delta H_{fus}$ $\quad (or \; q = mL_{fus})$

$q = m \, x \, \Delta H_{vap}$ $\quad (or \; q = mL_{vap})$

Calorimetry: $q_{object\ 1} = -q_{object\ 2}$

Specific Heats:

Water = $4.184 \, \frac{J}{g°C}$

Steam = $1.87 \, \frac{J}{g°C}$

Ice = $2.09 \, \frac{J}{g°C}$

Latent Heats:

Fusion = $334 \, \frac{J}{g}$

Vaporization = $2260 \, \frac{J}{g}$

Energy Conversion:

$1 \, cal = 4.184 \, J$

GASES

Ideal Gas Law: $PV = nRT$

Combined Gas Law: $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

Dalton's Law: $P_{total} = P_A + P_B + P_c \ldots$

Molar Mass: $M = \frac{mRT}{PV}$ $\quad n = \frac{m}{M}$

Gas Density: $D = \frac{MP}{RT}$

Kinetic Energy: $KE = \frac{1}{2}mv^2$

Temperature Conversion: $Kelvin = °C + 273K$

Volume of Ideal Gas at STP: $22.42 \, \frac{L}{mol}$

Ideal Gas Constants:

$= 8.314 \, \frac{L \bullet kPa}{K \bullet mol}$

$= 0.0821 \, \frac{L \bullet atm}{K \bullet mol}$

$= 62.4 \, \frac{L \bullet mmHg}{K \bullet mol}$

Pressure Conversions:

$1 \, atm = 760 \, mm \, Hg$

$= 760 \, torr$

$= 101{,}325 \, Pa$

$= 101.3 \, kPa$

$= 14.7 \, \frac{lbs}{in^2}$

SOLUTIONS

Molarity: $M = \frac{mole\ solute}{Liters\ of\ solution}$

Mass Percent: $\% \, \frac{mass\ solute}{mass\ solute + mass\ solvent}$

Mole Fraction: $\chi_A = \frac{mol_A\ solute}{mol_A\ solute + mol\ solvent}$

ENTHALPY

$\Delta H_{Bonds} = \Sigma Bonds_{Broken} - \Sigma Bonds_{Formed}$

$\Delta H_{Rxn} = \Sigma \Delta H_{f\ Products} - \Sigma \Delta H_{f\ Reactants}$