CHEM103 – Equation Bank

Module 1

1 foot (ft) = 12 inches (in)	1 pound (lb) = 16 ounces (oz)	1 gallon (gal) = 4 quarts (qt)
1 mile = 5280 feet (ft)	1 ton = 2000 pounds (lbs)	1 quart = 2 pints
kilo (= 1000)	milli (= 1/1000)	centi (= 1/100)
	deci (= 1/10)	

K – 273 = ºC
ºC + 273 = K
(ºF – 32) / 1.8 = ºC
(ºC x 1.8) + 32 = ºF

$$D = \frac{M}{V} \qquad M = D \times V$$

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

Module 2

$$\text{moles} = \text{grams/molecular weight}$$

$$\text{grams} = \text{moles x molecular weight}$$

$$\text{moles}_{\text{unknown}} = \text{moles}_{\text{known}} \times \frac{\text{coeff}_{\text{unkown}}}{\text{coeff}_{\text{known}}}$$

$$\%\text{ of an element} = \frac{\text{weight of element}}{\text{molecular weight of compound}} \times 100$$

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Module 3

$$\text{Heat}_{\text{temp change}} = q_{\text{temp change}} = m \times c \times \Delta t$$

$$q_{s \leftrightarrow l} = \text{mass} \times \text{Heat of Fusion} = m \times \Delta H_{fusion}$$

$$q_{l \leftrightarrow g} = \text{mass} \times \text{Heat of Vaporization} = m \times \Delta H_{vapor}$$

$$q = \Delta H_{rx} \times \text{new moles} / \text{original moles}$$

$$\Delta H_{rx} = q / (\text{new moles} / \text{original moles})$$

$$q_{\text{water}} = s \text{ (specific heat of water)} \times \text{mass} \times \Delta t$$

$$q_{\text{calorimeter}} = \text{heat capacity} \times \Delta t$$

$$\Delta H_{rxn} = \Sigma\, n\, \Delta H_f^0 \text{ (products)} - \Sigma\, m\, \Delta H_f^0 \text{ (reactants)}$$

$$\frac{P_i \times V_i}{T_i} = \frac{P_f \times V_f}{T_f}$$

$$PV = nRT \qquad PV = \frac{g}{MW} \times RT \qquad R = 0.0821 \frac{\text{liters} \times \text{atm}}{\text{mol} \times K}$$

$$P_T = P_1 + P_2 + P_3 \ldots.$$

$$\text{Mole Fraction of gas 1} = X_1 = \frac{n_1}{n_T}$$

$$P_1 = \frac{n_1 (R \times T)}{V}$$

$$\frac{n_1}{n_T} = \frac{P_1}{P_T}$$

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$$P_1 = \frac{n_1}{n_T} \times P_T$$

$$P_1 = X_1 \times P_T$$

$$\text{Mole \%} = 100 \times X_1 = 100 \times \frac{n_1}{n_T}$$

$$1 \text{ atm} = 760 \text{ mm}$$

$$\frac{r_1}{r_2} = \sqrt{\frac{MW_2}{MW_1}} \qquad \left(\frac{r_1}{r_2}\right)^2 = \frac{MW_2}{MW_1}$$

Module 4

$$v \times \lambda = c \qquad c = 3.0 \times 10^8 \text{ m/s}$$

Module 5

Electronegativity Values

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 = 1.0			Si = 1.8	P = 2.1	S = 2.5	Cl = 3.0

Module 6

$$\text{Mass Percent} = \frac{\text{grams of solute}}{\text{grams of solute} + \text{grams of solvent}} \times 100\%$$

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$$\text{Molarity (M)} = \frac{\text{grams of solute} \div \text{molecular weight of solute}}{\text{ml of solution} \div 1000}$$

$$\text{Molality (m)} = \frac{\text{grams of solute} \div \text{molecular weight of solute}}{\text{grams of solvent} \div 1000}$$

$$X_s = \frac{\text{grams of solvent/MW of solvent}}{\text{grams of solvent/MW of solvent} + \text{grams of solute/MW of solute}}$$

$$P_s = P^0 \text{ x } X_s \qquad \Delta P = P^0 - P_s$$

$$\Delta t_b = K_b \text{ x } m \qquad BP_{solution} = BP_{solvent} + \Delta t_b$$

$$\Delta t_f = K_f \text{ x } m \qquad FP_{solution} = FP_{solvent} - \Delta t_f$$

$$MW_{solute} = \frac{K_f \times g_{solute} \times 1000}{g_{solvent} \times \Delta t_f}$$

$$MW_{solute} = \frac{K_b \times g_{solute} \times 1000}{g_{solvent} \times \Delta t_b}$$