

EVE 410

HW # 1 SOLUTIONS

$$(1) \left(16.6624 \text{ g } C_{10}H_8 \right) \left(\frac{\text{mol}}{128 \text{ g } C_{10}H_8} \right) = 0.13 \text{ mol Naph}$$

$$\left(200 \text{ ml } C_6H_6 \right) \left(\frac{0.87865 \text{ g}}{\text{ml}} \right) \left(\frac{\text{mol benzene}}{78 \text{ g}} \right) = 2.25 \text{ mol benzene}$$

$$\text{mole fraction naph } (C_{10}H_8) = \frac{0.13}{2.25 + 0.13} = 0.055 \quad \text{mol \%} = 5.5\%$$

$$\text{mole fraction benzene} = \frac{2.25}{2.25 + 0.13} = 0.945 \quad \text{mol \%} = 94.5\%$$

$$(2) \text{ molality, } m = \frac{\text{mol solute}}{\text{Kg solvent}} = \frac{\frac{\text{g solute}}{\text{g/mol}}}{\text{Kg solvent}}$$

$$0.25 = \frac{\frac{293 \text{ g}}{58 \text{ g/mol NaCl}}}{\text{Kg } H_2O}$$

$$\text{Kg } H_2O = 20.2$$

(3) g/L to make following solns?

$$a. 0.5 \text{ M NaCl} \left(\frac{58.44 \text{ g}}{\text{mole}} \right) = \boxed{29.22 \text{ g/L}}$$

$$b. 0.1 \text{ M K}_2\text{Cr}_2\text{O}_7 \left(\frac{294.20 \text{ g}}{\text{mole}} \right) = \boxed{\cancel{29.4} \text{ g/L}} \quad 29.4 \text{ g/L}$$

$$c. 10^{-2} \text{ M Fe}(\text{NH}_4)_2(\text{SO}_4)_2 \left(\frac{284.07 \text{ g}}{\text{mol}} \right) = \boxed{2.84 \text{ g/L}}$$

(4)	MW (g/mol)	M	eg/L
$[\text{Ca}^{2+}] = 75 \frac{\text{mg}}{\text{L}}$	40.08	1.87×10^{-3}	3.74×10^{-3}
$[\text{Mg}^{2+}] = 40 \frac{\text{mg}}{\text{L}}$	24.31	1.65×10^{-3}	3.92×10^{-3}
$[\text{Na}^+] = 10 \frac{\text{mg}}{\text{L}}$	23	4.35×10^{-4}	4.35×10^{-4}
$[\text{HCO}_3^-] = 300 \text{ mg/L}$	61	4.92×10^{-3}	4.92×10^{-3}
$[\text{Cl}^-] = 10 \frac{\text{mg}}{\text{L}}$	35.45	2.82×10^{-4}	2.82×10^{-4}
$[\text{SO}_4^{2-}] = 109 \frac{\text{mg}}{\text{L}}$	96	1.14×10^{-3}	2.27×10^{-3}

Sample Calc:

$$\frac{300 \text{ mg}}{\text{L}} \text{HCO}_3^- \left(\frac{\text{mol}}{61 \text{ g}} \right) \left(\frac{\text{g}}{1000 \text{ mg}} \right) = 4.92 \times 10^{-3} \frac{\text{mol}}{\text{L}}$$

$$4.92 \times 10^{-3} \frac{\text{mol}}{\text{L}} \left(\frac{1 \text{ eg}}{1 \text{ mol}} \right) = 4.92 \times 10^{-3} \text{ eg/L}$$

$$\text{Sum of ANIONS} = 7.47 \times 10^{-3} \text{ eq/L}$$

$$\text{Sum of CATIONS} = 7.47 \times 10^{-3} \text{ eq/L}$$

Electroneutrality is maintained

(c) TDS = Total dissolved solids

$$\sum \text{ of all concentrations in mg/L} = \boxed{544 \text{ mg/L}}$$