

Chem 121 Ch9 Extra Problems KEY

1. $C_s V_s = C_D V_D$

$$(3.0M) V_s = (0.0500M) (100.0mL)$$

$$V_s = 1.7mL$$

take 1.7mL of 3.0M solution + add 98.3mL of H₂O

2. $7g Fe_2(SO_4)_3 = \left(\frac{0.55 \text{ moles}}{L} \right) (1.754) \left(\frac{399.91g Fe_2(SO_4)_3}{1 \text{ mole}} \right) = 380g Fe_2(SO_4)_3$

$$0.5M = M \times i = .55 \times 5 = 2.75M$$

3. 7mL methanol $D = \frac{m}{V}$ $V = \frac{m}{D}$ $V = \frac{30g}{.740g/mL} = 40.5mL$

$$50\% v/v = \frac{20.0mL \text{ ethanol}}{(20mL \text{ EtOH} + 40.5mL \text{ MeOH})} \times 100 = 33.1\% v/v$$

4. $M = \frac{\text{moles solute}}{L \text{ soln}} = \frac{(10.97g C_2H_6O)}{40g} \left(\frac{1 \text{ mole}}{46.08g C_2H_6O} \right) \left(\frac{10g}{29.6mL} \right) \left(\frac{10^3 mL}{1L} \right)$

$$= 2.01M$$

$$5. C_s V_s = C_d V_d$$

$$(3.5M)V_s = (2.0L)(1.5M) \quad V_s = \frac{(2.0L)(1.5M)}{3.5M} = .29L$$

take .29L (290mL) of 3.5M soln + add 1.71L (1710mL) of water.

$$6. .05M = M \times i = \left(\frac{2.75g \text{ Ba}_3(\text{PO}_4)_2}{450L} \right) \left(\frac{1 \text{ mole}}{601.93g} \right) (5) = 0.05705M$$

$$7. \% \text{ v/v} = \frac{\text{mL solute}}{\text{mL soln}} \times 100 \quad d = \frac{m}{V} \quad v = \frac{m}{d} = \frac{12g}{.740g/mL} = 16 \text{ mL}$$

$$= \frac{16 \text{ mL}}{(16 + 450)} \times 100 = 3.4\% \text{ v/v}$$

$$8. \% \text{ m/v} = \frac{g \text{ solute}}{\text{mL soln}} \times 100 \quad \text{or} \quad \frac{g \text{ solute}}{100 \text{ mL soln}}$$

$$\frac{.25 \text{ moles}}{L \text{ soln}} \text{ or } \frac{.25 \text{ moles}}{1000 \text{ mL}} \text{ or } \left(\frac{2.5 \text{ moles}}{100 \text{ mL}} \right) \left(\frac{180.18g}{1 \text{ mole}} \right) = 4.5\% \text{ m/v}$$

$$9. C_s V_s = C_D V_D$$

$$(3.5M)(250mL) = C_D (50^{mL} + 250mL)$$

$$C_D = \frac{(3.5M)(250mL)}{300mL} = 2.9M$$

$$10. C_s V_s = C_D V_D$$

$$(2.0M) V_s = (.75M)(150mL) \quad V_s = \frac{(.75M)(150mL)}{(2.0M)} = 56mL$$

take 56mL of 2.0M soln + add 94mL water

$$11. C_s V_s = C_D V_D$$

$$(5.090\% w/v) V_s = (.35M)(250mL)$$

Problem! concentrations units don't cancel - must convert to same conc. units.

$$5.090\% w/v = \left(\frac{5g}{100mL} \right) \left(\frac{1mole}{40.00g} \right) \left(\frac{10^3 mL}{1L} \right) = 1.25M$$

so

$$(1.25M) V_s = (.35M)(250mL)$$

$$V_s = 70mL$$

take 70mL of 5.090% w/v soln + add 180mL water.