

Name:  
 Date: ALVIN  
 Hour:

AP Chem – Ch.11 Practice

- 1) Find the Molarity for a solution where 475 g of Magnesium Hydroxide are dissolved in 700. mL of water.

$$M = \frac{n}{L} \quad \frac{475 \text{ g Mg(OH)}_2}{58.33 \text{ g Mg(OH)}_2} \cdot \frac{1 \text{ mol Mg(OH)}_2}{8.14 \text{ mol}} = \frac{8.14 \text{ mol}}{7.00 \text{ L}} = \boxed{1.16 \text{ M}}$$

- 2) Find the volume of 1.50 M NaCl needed for a reaction that requires 2.50 moles of NaCl.

$$M = \frac{n}{L} \quad L = \frac{n}{M} = \frac{2.50 \text{ mol}}{1.50 \text{ mol/L}} = \boxed{1.67 \text{ L}}$$

- 3) Find the molality of a solution made from dissolving 342 g of sucrose ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) in 225 g of water.

$$\frac{342 \text{ g C}_{12}\text{H}_{22}\text{O}_{11}}{342.34 \text{ g C}_{12}\text{H}_{22}\text{O}_{11}} \cdot \frac{1 \text{ mol C}_{12}\text{H}_{22}\text{O}_{11}}{0.999 \text{ mol}} = \frac{0.999 \text{ mol}}{0.225 \text{ kg}} = \boxed{4.44 \text{ molal}}$$

- 4) The boiling point of an aqueous solution containing a nonvolatile electrolyte is 100.94 degrees Celsius.

- a. What is the boiling point elevation?  
 b. What is the molality of the solution?

$$\boxed{0.94^\circ\text{C}}$$

$$\Delta T_b = K_b \cdot \text{molal} \quad \text{molal} = \frac{0.94^\circ\text{C}}{0.512^\circ\text{C/molal}} = \boxed{1.84 \text{ molal}}$$

- 5) Find the freezing point depression when 86.3 g of  $\text{C}_6\text{H}_{12}\text{O}_6$  are added to 361 g of water.

$$\frac{86.3 \text{ g C}_6\text{H}_{12}\text{O}_6}{180.18 \text{ g C}_6\text{H}_{12}\text{O}_6} \cdot \frac{1 \text{ mol C}_6\text{H}_{12}\text{O}_6}{0.479 \text{ mol}} = \frac{0.479 \text{ mol}}{0.361 \text{ kg}} = \text{molal} = 1.33 \text{ molal}$$

$$\Delta T_f = K_f \cdot \text{molal} = (1.86^\circ\text{C/molal})(1.33 \text{ molal}) = 2.47^\circ\text{C}$$

$$T_f = \boxed{-2.47^\circ\text{C}}$$

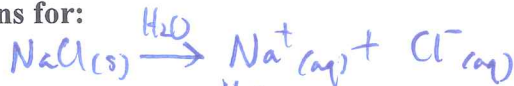
- 6) If 85.0 mL of 4.00 M HCl is diluted to a new volume of 0.275 L, find the new Molarity of the solution.

$$M_1 V_1 = M_2 V_2$$

$$M_2 = \frac{M_1 V_1}{V_2} = \frac{(4.00 \text{ M})(0.085 \text{ L})}{0.275 \text{ L}} = \boxed{1.24 \text{ M}}$$

7) Write out dissolution reactions for:

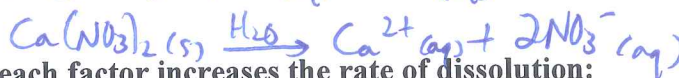
a. Sodium Chloride



b. Potassium Sulfide



c. Calcium Nitrate



8) In one BRIEF statement explain how each factor increases the rate of dissolution:

a. Agitation ~ brings fresh solvent to solute

b. Temperature ~ more collisions between solute/solvent

c. Surface area ~ more contact between solute/solvent

9) Name the following hydrates:

a.  $\text{K}_2(\text{SO}_4) \cdot 3\text{H}_2\text{O}$  Potassium Sulfate trihydrate

b.  $\text{AlCl}_3 \cdot 5\text{H}_2\text{O}$  Aluminium Chloride penta hydrate

c.  $\text{Fe}_2\text{O}_3 \cdot 4\text{H}_2\text{O}$  Iron(III) Oxide tetra hydrate

10) Complete the chart (Y or N for each):

	<u>Suspension</u>	<u>Colloid</u>	<u>Solution</u>
a. Settles	Y	N	N
b. Tyndall effect	Y	Y	N
c. Filters	Y	N	N

11) Term for two liquids that will not mix together (like oil and water) immiscible

12) Use the chart from the board:

a. Which one is NOT affected by temperature \_\_\_\_\_

b. Which one is MOST affected by temperature \_\_\_\_\_

c. Which one becomes LESS soluble with temperature \_\_\_\_\_

d. How many grams of  $\text{KNO}_3$  can be dissolved in 100g of water at 70 degrees Celsius? \_\_\_\_\_

13) A solution that cannot hold any more solute is saturated

14) Two ways to dissolve more solute in a saturated solution are:

i. Add more solvent

ii. Increase temp.

15) Give ONE example where the solvent is NOT water:

Beer

16) Use Raoult's law to calculate the expected vapor pressure at 25 Celsius for a solution prepared by dissolving 158.0g of Sucrose (342.3 g/mol) in 643.5 cm<sup>3</sup> of water. At 25 Celsius the density of water is 0.9971 g/cm<sup>3</sup> and the vapor pressure is 23.76 torr

$$\frac{158.0 \text{ g Sucrose}}{342.3 \text{ g Sucrose}} \times \frac{1 \text{ mol Sucrose}}{1} = 0.4616 \text{ mol}$$

$$\frac{643.5 \text{ cm}^3 \times 0.9971 \text{ g/cm}^3}{1 \text{ cm}^3} = 641.6 \text{ g H}_2\text{O}$$

$$\frac{641.6 \text{ g H}_2\text{O}}{18.02 \text{ g H}_2\text{O}} \times \frac{1 \text{ mol H}_2\text{O}}{1} = 35.60 \text{ mol}$$

$$\chi_{\text{H}_2\text{O}} = \frac{(35.60 \text{ mol})}{(35.60 \text{ mol} + 0.4616 \text{ mol})} = 0.9873$$

$$P_{\text{SILN}} = \chi_{\text{H}_2\text{O}} \cdot P_{\text{H}_2\text{O}}^{\circ} = (0.9873)(23.76 \text{ torr}) = \boxed{23.46 \text{ torr}}$$

17) A solution was prepared by dissolving 18.00g glucose in 150.0g of water. The resulting solution was found to have a boiling point of 100.34 Celsius. Calculate the molar mass of glucose. Glucose is a molecular solid that is present as individual molecules in solution.

$$\Delta T_b = K_b \cdot m \quad m = \frac{\Delta T_b}{K_b} = \frac{(0.34^\circ\text{C})}{(0.51^\circ\text{C}/m)} = 0.67 m$$

$$m = \frac{n}{kg} \quad n = m \cdot kg = (0.67 m)(0.1500 kg) = 0.10 mol$$

$$\frac{0.10}{18.00} = \frac{1.0}{x}$$

$$x = 180 \text{ g/mol}$$

18) Prepare 1.50 M NaCl. Describe exactly HOW to make it and show all math.

$$M = \frac{n}{L}$$

Ex //

$$n = M \cdot L = (1.50 \frac{mol}{L})(1.00 L) = 1.50 mol NaCl \quad \frac{58.44 g NaCl}{1 mol NaCl} = 87.7 g NaCl$$

★ Add 87.7g of NaCl to enough H<sub>2</sub>O to make 1.0L of solution.

19) Take your 1.50 M NaCl and prepare 0.500 M NaCl. Describe exactly HOW to make it and show all math.

$$M_1(V_1) = M_2(V_2)$$

$$(V_1) = \frac{M_2(V_2)}{M_1} = \frac{(0.500 M)(1.00 L)}{(1.50 M)} = 0.333 L$$

GO VIKINGS!!!

Add 333mL of 1.50M NaCl to enough water to make 1.0 L of solution