Name:
Date:
Hour: (ALVIN

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.**

$M = \frac{n}{L}$ $\quad 475\,g\,Mg(OH)_2 \left| \frac{1\,mol\,Mg(OH)_2}{58.33\,g\,Mg(OH)_2} \right. = \frac{(8.14\,mol)}{(7.00L)} = \boxed{1.16M}$

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

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

3) **Find the molality of a solution made from dissolving 342 g of sucrose ($C_{12}H_{22}O_{11}$) in 225 g of water.**

$342\,g\,C_{12}H_{22}O_{11} \left| \frac{1\,mol\,C_{12}H_{22}O_{11}}{342.34\,g\,C_{12}H_{22}O_{11}} \right. = \frac{(0.999\,mol)}{(0.225kg)} = \boxed{4.44\,molal}$

4) **The boiling point of an aqueous solution containing a nonvolatile electrolyte is 100.94 degrees Celsius.**
   a. **What is the boiling point elevation?** $\boxed{0.94°C}$
   b. **What is the molality of the solution?**

$\Delta t_b = K_b \cdot m\,(molal)$ $\quad (molal) = \frac{(0.94°C)}{(0.512°C/molal)} = \boxed{1.84\,molal}$

5) **Find the freezing point depression when 86.3 g of $C_6H_{12}O_6$ are added to 361 g of water.**

$86.3\,g\,C_6H_{12}O_6 \left| \frac{1\,mol\,C_6H_{12}O_6}{180.18\,g\,C_6H_{12}O_6} \right. = \frac{0.479\,mol}{0.361kg}$

$(molal) = 1.33\,molal$

$\Delta t_f = K_f \cdot molal. = (1.86°C/molal)(1.33\,molal) = 2.47°C$

$T_f = 0 - 2.47°C$

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

$M_1V_1 = M_2V_2$

$M_2 = \frac{M_1V_1}{V_2} = \frac{(4.00M)(0.085L)}{(0.275L)} = \boxed{1.24M}$

7) Write out dissolution reactions for:
   a. Sodium Chloride $NaCl_{(s)} \xrightarrow{H_2O} Na^+_{(aq)} + Cl^-_{(aq)}$
   b. Potassium Sulfide $K_2S_{(s)} \xrightarrow{H_2O} 2K^+_{(aq)} + S^{2-}_{(aq)}$
   c. Calcium Nitrate $Ca(NO_3)_{2(s)} \xrightarrow{H_2O} Ca^{2+}_{(aq)} + 2NO_3^-{}_{(aq)}$

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. $K_2(SO_4)*3H_20$ Potassium Sulfate · tri hydrate
   b. $AlCl_3*5H_2O$ Aluminum Chloride · penta hydrate
   c. $Fe_2O_3*4H_2O$ Iron(III) Oxide · tetra hydrate

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

	Suspension	Colloid	Solution
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 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:

Rean.

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^3 of water. At 25 Celsius the density of water is 0.9971 g/cm^3 and the vapor pressure is 23.76 torr

$\frac{643.5\,cm^3}{1} \left| \frac{0.9971\,g}{1\,cm^3} \right. = 641.6\,g\,H_2O$

$\frac{158.0\,g\,Sucrose}{342.3\,g\,Sucrose} \left| \frac{1\,mol\,Sucrose}{} \right. = 0.4616\,mol$

$\frac{641.6\,g\,H_2O}{18.02\,g\,H_2O} \left| \frac{1\,mol\,H_2O}{} \right. = 35.60\,mol$

$\chi_{H_2O} = \frac{(35.60\,mol)}{(36.06\,mol)} = 0.9873$

$P_{SOLN} = \chi_{H_2O} \cdot P^\circ_{H_2O} = (0.9872)(23.76\,torr) = \boxed{23.46\,torr}$

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.**

$\Delta t_b = K_b \cdot m$ (molal) $\quad m = \frac{\Delta t_b}{K_b} = \frac{(0.34°C)}{(0.51°C/\text{molal})} = 0.67 \text{ molal}$

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

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

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

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

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

Ex//

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

Add 87.7g of NaCl to enough H_2O 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.**

Ex./ $M_1V_1 = M_2V_2$

$V_1 = \frac{M_2V_2}{M_1} = \frac{(0.500 \text{ M})(1.00 \text{ L})}{(1.50 \text{ M})} = 0.333 \text{ L}$

GO VIKINGS!!!

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