Name _____ Period _____

MOLARITY WORKSHEET #1

For each of the following problems, use proper units and show ALL work:

1. If 10.7 grams of NH_4Cl is dissolved in enough water to make 800 mL of solution, what will be its molarity? **(Answer: 0.25 mol/L).**

2. Calculate the molarity of a solution prepared by dissolving 6.80 grams of $AgNO_3$ in enough water to make 2.50 liters of solution. **(Answer: 0.016 mol/L).**

3. How many moles of $CaCl_2$ are required to prepare 2.00 liters of 0.700 M $CaCl_2$? **(Answer: 1.4 moles).**

4. What mass, in grams, of $CaCl_2$ will be required to prepare the above solution? **(Answer: 155 grams).**

5. How many grams of KNO_3 will be required to prepare 800 mL of 1.40 M KNO_3? **(Answer: 113 grams).**

6. Calculate the volume of a 1.25 M solution of HCN made from 31.0 grams of HCN. **(Answer: 0.919 Liters).**

7. Calculate the volume of a 3.50 molar solution of H_2SO_4 made from 49.0 grams of H_2SO_4. **(Answer: 0.143 Liters).**

8. How many sugar molecules are present in 300 mL of a 2.0 M solution? (The formula for sugar is $C_{12}H_{22}O_{11}$) **(Answer: 3.6×10^{23} molecules).**

9. Your teacher asks you to prepare 500 mL of a 2.75 molar solution of NaCl for an upcoming laboratory experiment. Write a step-by-step procedure describing how you would carry out this task.

Name _____ Period _____

MOLARITY WORKSHEET #1

For each of the following problems, use proper units and show ALL work:

1. If 10.7 grams of NH_4Cl is dissolved in enough water to make 800 mL of solution, what will be its molarity? **(Answer: 0.25 mol/L).**

$$M = \frac{\text{mols (solute)}}{\text{L (sol'n)}} = \frac{10.7\text{ g } NH_4Cl / (53.5\text{ g } NH_4Cl/\text{mol } NH_4Cl)}{0.800\text{ L}}$$

$$= 0.25\text{ mol/L} = 0.25\text{ M}$$

or

2. Calculate the molarity of a solution prepared by dissolving 6.80 grams of $AgNO_3$ in enough water to make 2.50 liters of solution. **(Answer: 0.016 mol/L).**

$$M = \frac{6.80\text{ g } AgNO_3 / (169.88\text{ g } AgNO_3/\text{mol } AgNO_3)}{2.50\text{ L}} = 0.016\text{ M}$$

3. How many moles of $CaCl_2$ are required to prepare 2.00 liters of 0.700 M $CaCl_2$? **(Answer: 1.4 moles).**

$$M = \frac{\text{mols } CaCl_2}{\text{L sol'n}}; \quad \text{mols } CaCl_2 = M \times L = 0.700\frac{\text{mol}}{\text{L}} \times 2.00\text{ L}$$

$$= 1.40\text{ mols}$$

4. What mass, in grams, of $CaCl_2$ will be required to prepare the above solution? **(Answer: 155 grams).**

$$\text{g } CaCl_2 = \text{mols } CaCl_2 \times \frac{110.98\text{ g } CaCl_2}{\text{mol } CaCl_2} = 1.40\text{ mols } CaCl_2 \times \frac{110.98\text{ g } CaCl_2}{\text{mol } CaCl_2}$$

$$= 155\text{ g } CaCl_2$$

5. How many grams of KNO_3 will be required to prepare 800 mL of 1.40 M KNO_3? **(Answer: 113 grams).**

$$M = \frac{\text{mols}}{\text{L}} = \frac{\text{g}/\text{MM}}{\text{L}} \quad \text{so g } KNO_3 = M \times MM \times L$$

$$\text{g } KNO_3 = 1.40\frac{\text{mols}}{\text{L}} \times 0.800\text{ L} \times \frac{101.11\text{ g } KNO_3}{\text{mol } KNO_3}$$

$$= 113\text{ g } KNO_3$$

6. Calculate the volume of a 1.25 M solution of HCN made from 31.0 grams of HCN. **(Answer: 0.917 Liters).**

$M = \frac{\text{mols (solute)}}{L\,(\text{soln})}$ or $L = \frac{\text{mols}}{M} = \frac{31.0\text{ g HCN} / (27.03\text{ g HCN/mol HCN})}{1.25\text{ mols HCN/L}}$

$= 0.917\text{ L}$

7. Calculate the volume of a 3.50 molar solution of H_2SO_4 made from 49.0 grams of H_2SO_4. **(Answer: 0.143 Liters).**

$M = \frac{\text{mols}}{L}$ or $L = \frac{\text{mols } H_2SO_4}{M} = \frac{49.0\text{ g } H_2SO_4 / (98.09\text{ g } H_2SO_4/\text{mol } H_2SO_4)}{3.5\text{ mols/L}}$

$= 0.143\text{ L}$

8. How many sugar molecules are present in 300 mL of a 2.0 M solution? (The formula for sugar is $C_{12}H_{22}O_{11}$) **(Answer: 3.6 x 10^{23} molecules).** $MM_{C_{12}H_{22}O_{11}} = 342.34\text{ g } C_{12}H_{22}O_{11}/\text{mol } C_{12}H_{22}O_{11}$

$M = \frac{\text{mols}}{L}$ or $\text{mols } C_{12}H_{22}O_{11} = M \times L$

$= \frac{2.0\text{ mols}}{L} \times 0.300\text{ L} = 0.60\text{ mol}$

and $0.60\text{ mol} \times 6.022 \times 10^{23} \frac{\text{molecules}}{\text{mol}} = 3.6 \times 10^{23}\text{ molecules}$

9. Your teacher asks you to prepare 500 mL of a 2.75 molar solution of NaCl for an upcoming laboratory experiment. Write a step-by-step procedure describing how you would carry out this task.

1. Determining mass of NaCl needed from the mols needed

from $M = \frac{\text{mols (NaCl)}}{L\,(\text{soln})}$ or $\text{mols (NaCl)} = \frac{2.75\text{ mols (NaCl)}}{L} \times 0.500\text{ L}$

$= 1.38\text{ mol NaCl}$

$\text{g NaCl} = 1.38\text{ mol NaCl} \times \frac{58.44\text{ g NaCl}}{\text{mol NaCl}}$

$= 80.6\text{ g NaCl}$

2. Weigh out 80.6 g NaCl
3. Add the salt to a 500 mL volumetric flask
4. Add deionized H_2O to the mark in the neck of the flask