More Practice: Molarity Problems Name: _____

1. If 12 grams of NaOH is dissolved in enough water to give 500 mL of solution, calculate the molarity of the solution.

$$\frac{1\ \text{mol NaOH}}{40\ \text{g NaOH}} \left| \frac{12\ \text{g NaOH}}{500\ \text{mL soln}} \right| \frac{1000\ \text{mL soln}}{1\ \text{L soln}} = \boxed{0.6\ \frac{\text{mol NaOH}}{\text{L}}}$$

2. How many liters of 0.2 M Na_2CO_3 can be prepared from 140 grams of sodium carbonate?

$$\frac{1\ \text{L soln}}{0.2\ \text{mol } Na_2CO_3} \left| \frac{1\ \text{mol } Na_2CO_3}{105.99\ \text{g } Na_2CO_3} \right| 140\ \text{g } Na_2CO_3 = \boxed{6.60\ \text{L soln} \text{ or } 7\ \text{L soln}}$$

3. A solution of NaCl contains 12 grams of NaCl in 750 mL of solution. What is the molarity of the solution?

$$\frac{1\ \text{mol NaCl}}{58.44\ \text{g NaCl}} \left| \frac{12\ \text{g NaCl}}{750\ \text{mL soln}} \right| \frac{1000\ \text{mL soln}}{1\ \text{L soln}} = \boxed{0.27\ \frac{\text{mol NaCl}}{\text{L}}}$$

4. If 200 mL of 0.3 M Na_2SO_4 are evaporated to dryness, how many grams of sodium sulfate will be obtained?

$$\frac{142.05\ \text{g } Na_2SO_4}{1\ \text{mol } Na_2SO_4} \left| \frac{0.3\ \text{mol } Na_2SO_4}{1\ \text{L soln}} \right| \frac{1\ \text{L soln}}{1000\ \text{mL soln}} \left| 200\ \text{mL soln} \right. = \boxed{8.52\ \text{g} \text{ or } 9\ \text{g } Na_2SO_4}$$

5. Sam dissolves 13 grams of a chemical in enough water to make 750 mL of solution. If the solution is rated 0.1 M, what is the mass of one mole of the solute?

$$\frac{13\ \text{g solute}}{750\ \text{mL soln}} \left| \frac{1000\ \text{mL soln}}{1\ \text{L soln}} \right| \frac{1\ \text{L soln}}{0.1\ \text{mol solute}} = \boxed{173\ \text{g/mol} \text{ or } 200\ \text{g/mol}}$$

6. How many grams of solute are required to produce:

a) 150 mL of 0.5 M HCl

b) 5 liters of 0.2 M H_2SO_4

a)
$$\frac{36.46\ \text{g HCl}}{1\ \text{mol HCl}} \left| \frac{0.5\ \text{mol HCl}}{1\ \text{L soln}} \right| \frac{1\ \text{L soln}}{1000\ \text{mL soln}} \left| 150\ \text{mL soln} \right. = \boxed{2.73\ \text{g HCl} \text{ or } 3\ \text{g HCl}}$$

b)
$$\frac{98.09\ \text{g } H_2SO_4}{1\ \text{mol } H_2SO_4} \left| \frac{0.2\ \text{mol } H_2SO_4}{1\ \text{L soln}} \right| 5\ \text{L soln} = \boxed{98.1\ \text{g } H_2SO_4 \text{ or } 100\ \text{g } H_2SO_4}$$

7. How many grams of salt are there in 75 grams of a 25% salt solution?

$$\frac{25\text{ g Salt}}{100\text{ g Soln}} \Big| \frac{75\text{ g Soln}}{} = \boxed{19\text{ g Salt}}$$

8. Find the percent concentration if 30 grams of solute are dissolved in 100 grams of water.

$$\frac{30\text{ g solute}}{130\text{ g solution}} \times 100 = \boxed{23.1\%}$$

9. Suzy needs to make a 2.0 M solution of HCl from concentrated 5.0 M HCl. If the total volume of the dilute needs to be 400 mL, then how many mL of the concentrate does she need to mix with how much water? (You need an HCl volume and a water volume.)

M_D V_D M_C V_C

$M_C V_C = M_D V_D$

$$\frac{(5.0\text{ M})(V_C)}{5.0\text{ M}} = \frac{(2.0\text{ M})(400\text{ mL})}{5.0\text{ M}}$$

$400 - 160 = 240$

$\boxed{V_C = 160\text{ mL HCl}}$ $\boxed{240\text{ mL } H_2O}$

10. What is the molarity of a solution that has a volume of 1000 mL if it was obtained by diluting 300 mL of a 4.0 M solution of H_2SO_4?

V_C M_C M_D V_D

$M_C V_C = M_D V_D$

$$\frac{(4.0\text{ M})(300\text{ mL})}{1000\text{ mL}} = \frac{M_D(1000\text{ mL})}{1000\text{ mL}}$$

$\boxed{M_D = 1.2\text{ M}}$ or $\boxed{1\text{ M}}$