

SHOW **ALL WORK**, ALL EQUATIONS, and ALL UNITS  
Molarity and Percent Composition:

Name: \_\_\_\_\_

- 1) How many moles of potassium chloride are dissolved in 3.98 L of a 4.09 M KCl solution.?

$$\frac{3.98 \text{ L}}{1} \times \frac{4.09 \text{ mol}}{\text{L}} = 16.3 \text{ mol}$$

- 2) How many moles of sodium chloride are dissolved in a 2.9 M NaCl solution that has a volume of 340 mL?

- 3) How many moles of copper sulfate must be placed in a container with to yield a 1.75 M CuSO<sub>4</sub> solution which has a volume of 2300 mL?

$$\frac{2300 \text{ mL}}{1000 \text{ mL}} \times \frac{1 \text{ L}}{1} \times \frac{1.75 \text{ mol}}{\text{L}} = 4.03 \text{ mol}$$

- 4) How many grams of sodium chloride are needed to make one liter of a 2.33 M NaCl solution?

- 5) How many grams of hydrochloric acid is needed to make 3.9 liters of a 7.7 M HCl solution?

$$\frac{3.9 \text{ L}}{1} \times \frac{7.7 \text{ mol}}{\text{L}} \times \frac{36.458 \text{ grams}}{1 \text{ mol HCl}} = 1.09 \times 10^3 \text{ grams}$$

- 6) What is the molarity of a nickel(II) sulfate solution where 47.32 grams of NiSO<sub>4</sub> is dissolved in enough solvent so that the final volume is 3.9 liters?

7) How many atoms of oxygen are in a copper(II) sulfate solution that has a concentration of 4.50 M in 4.50 liters?

$$\frac{4.50 \text{ L}}{1} \times \frac{4.50 \text{ mol}}{1 \text{ L}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol CuSO}_4} \times \frac{4 \text{ atoms of O}}{1 \text{ molecule CuSO}_4} = 4.88 \times 10^{25} \text{ atoms}$$

8) What is the molarity of a sodium hydroxide solution where 48.9 grams of NaOH is dissolved in enough water so that the final volume is 679 mL?

9) Give directions for the preparation of 3.50 liters of a 1.70 M  $\text{Pb}(\text{NO}_3)_2$  solution.

$$\frac{3.50 \text{ L}}{1} \times \frac{1.70 \text{ mol}}{1 \text{ L}} \times \frac{331.21 \text{ grams}}{1 \text{ mol Pb}(\text{NO}_3)_2} = 1970.70 \text{ grams}$$

- Place 1970.70 grams of  $\text{Pb}(\text{NO}_3)_2$  in a beaker, and then *add enough water* so that the *total volume* is 3.50 liters?

10) What is the percent composition of hydrogen in ammonium phosphate?

11) What is the percent composition of nitrogen in beryllium nitrate?

$$\text{Be}(\text{NO}_3)_2 = (9.012 \text{ g}) + (2)(14.01 \text{ g}) + (6)(16.00 \text{ g}) = 133.02 \text{ g / mol}$$

$$\text{Nitrogen} = 28.02 \text{ g}$$

$$\% \text{ N} = \frac{28.02 \text{ g}}{133.02 \text{ g}} \times 100 = 21.1\%$$