Name: _____

Please read through the formulas and answer each question on a separate piece of paper.

Measuring Concentration:
There are several different ways to measure and express the concentration of a solution. Molarity, a term we will learn about later, refers to the concentration of a solution expressed in moles of solute per liter of solution. We also use several other units, including the following:

1. Percent by Mass $\frac{\text{mass of solute (g)}}{\text{mass of solution (g)}} \text{x}100\%$
2. Percent by Volume $\frac{\text{volume of solute (mL)}}{\text{volume of solution (mL)}} \text{x}100\%$
3. Mass/Volume Percent $\frac{\text{mass of solute (mg)}}{\text{volume of solution (dL)}} \text{x}100\%$ (units are used in medicine)
4. Parts per million $\frac{1\text{ g of solute}}{1 \text{x} 10^6\text{ g of solution}}$

   For this type of unit, these equivalents work for water solutions:

   1 ppm = 1 mg/L 1 ppb = 1μg/L 1 ppt = 1 ng/L

   ppm = parts per million ppb = billion ppt = trillion
5. Molality $\frac{\text{amount of solute (mol)}}{\text{mass of solvent (kg)}}$ this unit is independent of temperature

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1. Glucose is a sugar that is found abundantly in nature. What is the percent by mass of a solution made by dissolving 163 g of glucose in 755 g of water? Do you need to know the formula of glucose? Why or why not?
2. What is the mass percent sucrose in a solution obtained by mixing 225 g of an aqueous solution that is 6.25% sucrose by mass with 135 g of an aqueous solution that is 8.20% sucrose by mass?
3. Determine the volume percent of toluene in a solution made by mixing 40.0 mL toluene with 75.0 mL of benzene.
4. Describe the process you would use in order to prepare 5.00 kg of an aqueous solution that is 8.00% NaCl by mass.
5. What is the mass percent of solute when 4.12 g is dissolved in 100.0 g of water?
6. What is the volume percent of 10.00 g of acetone (d = 0.789 g/mL) in 1.55 L of an acetone-water solution?
7. Convert 0.0035% NaCl by mass into parts per million of NaCl.
8. What is the percentage concentration of 75.0 g of ethanol dissolved in 500.0 g of water?
9. A chemist dissolves 3.50 g of potassium iodate and 6.23 g of potassium hydroxide in 805.05 g of water. What is the percentage concentration of each solute in the solution?
10. A student wants to make a 5.00% solution of rubidium chloride using 0.377 g of the substance. What mass of water will be needed to make the solution?
11. What mass of lithium nitrate would have to be dissolved in 30.0 g of water in order to make an 18.0% solution?