Dougherty Valley HS Chemistry
Solutions – Calculations Part 1

Worksheet #2

Name: **Period:** **Seat#:**

Directions: Read the definitions, highlight key points. Under each definition write in the generic equation that would be used for performing the calculations.

Grams per liter represents the mass of solute divided by the volume of solution, in liters. This measure of concentration is most often used when discussing the solubility of a solid in solution.

Molarity describes the concentration of a solution in moles of solute divided by liters of solution. Mass of solute must first be converted to moles using the molar mass of the solute. This is the most widely used unit for concentration when preparing solutions in chemistry and biology. The units of molarity, mol/L, are usually represented by a capital "M".

Parts per million (ppm) is used when low concentrations are significant. It is a ratio of parts of solute to one million parts of solution, and is usually applied to very dilute solutions. It is often found in reports of concentration of water contaminants. To calculate the parts per million, divide the mass of the solute by the total mass of the solution. This number is then multiplied by 1×10^6 and expressed as parts per million (ppm). A dilute water-based solution has a mass of 1 gram, so 1 liter of solution has a mass of 1000 grams.

Percent composition is the ratio of parts solute to one hundred parts of solution and is expressed as a percent. Determine the mass of solute and solution and then divide the mass of the solute by the total mass of the solution. This number is then multiplied by 100 and expressed as a percent. In dilute water solutions, we can assume that 1 mL of water-based solution has a mass of 1 gram, so 1 liter of solution has a mass of 1000 grams.

Dilutions are when we take a stronger concentration of a solution, take a small amount of it and add it to more water to create a new lower concentration solution of the same substance. Serial dilutions is when you take some of Solution #1 to make weaker solution #2, then take some of Solution #2 to make even weaker Solution #3, etc.

Mathematical Questions

- Show plugging in the variables to the correct places in the equation
- Get an actual answer, including units! Box your answer!
- Don't forget - you must show units and any conversions that might be involved.
- You can either rearrange your equation before you plug in your variables, or after. Do what works for you!

1) Calculate the concentration of the following solution in units of grams per liter:
12grams of NaCl is dissolved in 3.00 L of solution

2) Calculate the concentration of the following solution in units of molarity, M, moles per liter:
5.00 grams of glucose, $C_6H_{12}O_6$, in 900 mL of solution

3) Calculate the concentration of the following solution in units of <u>percent composition</u>:
5.00 grams of glucose, $C_6H_{12}O_6$, in 900 mL of solution

4) Calculate the concentration of the following solution in units of <u>molarity, M, mole per liter</u>:
12 grams of NaCl is dissolved in 3.00 L of solution

5) Calculate the concentration of the following solution in units of <u>grams per liter</u>:
5.00 grams of glucose, $C_6H_{12}O_6$, in 900 mL of solution

6) Calculate the concentration of the following solution in units of <u>parts per million, ppm</u>:
12 grams of NaCl is dissolved in 3.00 L of solution

7) Calculate the concentration of the following solution in units of <u>parts per million, ppm</u>:
5.00 grams of glucose, $C_6H_{12}O_6$, in 900 mL of solution

8) Calculate the concentration of the following solution in units of <u>percent composition</u>:
25.0 moles of NaOH is dissolved in 650 mL of water

9) Calculate the concentration of the following solution in units of <u>parts per million, ppm</u>:
25.0 moles of NaOH is dissolved in 650 mL of water

10) Calculate the concentration of the following solution in units of <u>percent composition</u>:
12 moles of NaCl is dissolved in 3.00 L of solution