Name: _____ Per:____

Lab Activity- Kool-Aid Concentration

Introduction: This activity introduces you to solutions and allows you to experience making different concentrations of Kool- aid solution. There are many ways to calculate the concentration of a substance including: molarity (M), parts per million (ppm), percent composition (% comp), and grams per liter (g/L). In chemistry, concentration is usually measured by the number of moles of substance dissolved in a liter of liquid. This is called **molarity** and is expressed as **mol/L** or **M (The formula is: M = moles/Liter)**.

Purpose:

- Practice molarity calculations in order to make 3 different solutions of Kool-Aid with the following concentrations: **0.1 M, 0.4 M, & 0.7M .**
- Determine the concentration (molarity) of properly made Kool-Aid through a taste test.

Materials:

Kool-Aid Powder, Popsicle sticks (to stir solutions), Water, Balance, Plastic cups

Pre-Lab Calculations: ***For full credit you must show the formula, all your work, and box/highlight your answer!***

1. If 0.35 moles of NaCl was dissolved in enough water to make 200 ml of solution, what is the molarity? (NOTE: 1000 mL = 1 L)

2. You are asked to make 500 mL of a 0.250 M sodium chloride (NaCl) solution.
   a. How many moles of NaCl would you need?
   b. How many grams of NaCl would you need?

3. You need to prepare 100 mL of a 0.050 M solution of calcium chloride ($CaCl_2$).
   a. How many moles of $CaCl_2$ are needed?
   b. How many grams of $CaCl_2$ are needed?

4. **YOUR KOOL-AID CALCULATIONS: SHOW WORK!**

The "molar mass" of Kool-Aid powder: **342 g/ mol Kool-Aid is mostly sucrose sugar ($C_{12}H_{22}O_{11}$)****

	Cup #1 100 mL of a 0.1 M solution:	Cup #2 100 mL of a 0.4 M solution:	Cup #3 100 mL of a 0.7 M solution:
Calculate # **of moles** of Kool-Aid powder needed:			
Calculate # **of grams** of Kool- aid powder needed:			

Procedure to making Kool-Aid (for every lab group of 3-4 people):

1. Using your calculations from **question #4** above, measure out the correct amount of solid Kool-Aid powder (grams) into the assigned cup to make a 0.1 M solution. **Be careful not to include the mass of the cup in your measurement!**
2. Transfer the powder into the assigned "mixing cup".
3. Add water into the "mixing cup" until you have 100 mL of solution. Stir with a spoon or stick.
4. Observe and taste the solutions you have made. You can have one "designated taster" or you can pour a little into separate little cups for each group member to taste. Record in data table.
5. Repeat steps 1-5 in order to make the 0.4 M and 0.7 M solutions.
6. Clean-Up...Throw away cups that you drank out of, but save the mixing & measuring cups.

Data / Observations:	0.1 M solution:	0.4 M solution:	0.7 M solution:
Observations -looks (colors), smells, . tastes			

Calculations/ Analysis:

1. Which concentration that you tested was closest to the ideal concentration of Kool-Aid? What was wrong with each of the other solutions that you made?

2. What was the **solute** used in this lab? What was the **solvent**?

3. What is molarity?

Questions for discussion: ***You must show the formula, all your work, and box/highlight your answers!***

1. Write the formulas for the 4 different ways to calculate concentrations:

a. Molarity b. grams/ Liter c. % composition d. Parts per million

Determine the following concentrations using the 4 different methods:

(Reminder: 1 gram H_2O = 1 mL & 1 L = 1000 mL)

2. **If 1.80 moles of NaCl was dissolved in enough water to make 3.60 L of solution:**

a. Molarity? b. Grams/ Liter? c. % composition? d. Parts per million?

3. **If 20 grams of NaOH was dissolved in enough water to make a 250 mL NaOH solution:**

a. Molarity? b. Grams/ Liter? c. % composition? d. Parts per million?