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 500.0 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 100.0 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<br>100.0 mL of a **0.100 M solution**: | Cup #2<br>100.0 mL of a **0.400 M solution**: | Cup #3<br>100.0 mL of a **0.700 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?