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Lab Activity- Kool-Aid Concentration

Introduction: This activity introduces you to solutions and allows you to experience making different concentrations of Kool- aid solution. 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, 3 Plastic cups

Pre-Lab Calculations: ***For full credit you must list your givens, show the formula, all your work, and box/highlight your answer with correct units & significant figures!***

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?

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4. Kool-Aid Calculations: ***The molar mass of Kool-aid powder (sucrose, $C_{12}H_{22}O_{11}$) = 342 grams.***

	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: (for every lab group of 3-4 people):

1. Place the Powder Measuring Cup on the scale and push "Zero."
2. "Using your calculations from **Pre-Lab Question #4** above, measure out the correct amount of GRAMS of Kool-Aid powder into the assigned cup to make a 0.1 M solution.
3. Transfer the powder into a "mixing cup."
4. Label this mixing cup: Cup #1.
5. Place cup back onto scale.
6. Since 1 gram H_2O = 1 mL, add water into the Cup #1 until you have 100 mL of solution.
7. Stir with a spoon or stick.
5. Repeat steps 1-6 in order to make the 0.4 M (Cup #2) and 0.7 M (Cup #3) solutions.
6. 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.
7. Record in data table.
8. Clean-Up…Throw away cups that you drank out of, but save the mixing & measuring cups.

Data Table:

	Cup #1 – 0.1 M solution	**Cup #2 – 0.4 M solution**	**Cup #3 – 0.7 M solution**
Observations of look, color, smell, and taste			

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Analysis Conclusion Questions:

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?

Conclusion Calculations Questions: ***For full credit you must list your givens, show the formula, all your work, and box/highlight your answer with correct units & significant figures!***

1. Determine the following concentrations (molarity). Reminder: 1 gram H_2O = 1 mL & 1 L = 1000 mL
    a. If 1.80 moles of NaCl was dissolved in enough water to make 3.60 L of solution:

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