**Name: Partners:**

**Chemistry**  **Solutions Lab**

**Problem:** What is the ideal concentration (molarity) of sugar in a Kool-Aid solution?

**PreLab:** What is a solution?

Whenever you dissolve something in a liquid, you’ve made a solution. If you have a liquid that is not a pure substance, it’s a solution. The liquid part is the “**solvent**” and the stuff you dissolve in your liquid is the “**solute**”. For example, if you dissolve salt in water- water is your solvent and the salt is your solute.

For most solutions, water is the most common solvent. Because of water’s unique properties, (polar, hydrogen bonding etc) it can dissolve a lot of compounds to make solutions.

Describing solutions involves various terms that deal with concentrations of solute. Here are a few terms that we will be using to describe solutions:

1. **Unsaturated:** A solution in which more solute can be dissolved. This means that if you were to add more solute to the liquid, it would keep dissolving.
2. **Saturated:** A solution that has the maximum amount of solvent that has been dissolved. No more solute will dissolve in the solution no matter how much more you stir your solution.
3. **Supersaturated:**  A solution that has MORE solute than it can dissolve. This is usually made possible by heating up your solvent. Once the temperature increases the **solubility** (how much solute can dissolve) **increases.** When that solution cools down it would be considered supersaturated and if it is disturbed, the excess solute will start to form crystals in the container.
4. **Molarity:** This is a unit of concentration; we abbreviate molarity as (M). Molarity is equal to the moles of solute divided by the liters of solution (remember: 1liter = 1000 mL).

**M= moles of solute**

**Liters of solution**

During your lab today, you will be determining the molarity of your “ideal” solution of Kool-Aid. In order to find out the molarity of your Kool-Aid, you will use this formula. Here are a few practice problems with molarity: **SHOW YOUR WORK!!**

1. What’s the molarity of a solution that contains 5.5 moles of sodium chloride (NaCl) in 10.5 liters of solution?
2. Calculate the concentration of a solution that has 3.7 moles of sugar (sucrose) dissolved in 500 mL of water.
3. What is the molarity of a solution that has 12 grams of sodium chloride in 3.00 liters of solution?
4. Calculate the concentration of the 80 grams of NaOH when dissolved in 2.0 L of solution?
5. A solution of sugar contains 35 grams of sucrose (C12H22O11) in 100 mL of solution. What would the molarity of this solution be?

**Kool-Aid Lab:**

During this lab you will be making 5 different concentrations of Kool-Aid (0.1M, 0.3m, 0.5M, 0.7M and 1.0M) You will taste the Kool-Aid solution you make to determine how you like your Kool-Aid and which is the “ideal” solution.

Kool-Aid is mostly sugar (sucrose: C12H22O11) with added color and flavorings. You can assume the molar mass of Kool-Aid is that of sugar (sucrose).

1. Calculate the molar mass of Kool-Aid: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Calculate the mass (in grams) of sugar needed to make 0.1 L solutions of the following concentrations:
3. 0.1M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. 0.3M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. 0.5M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. 0.7M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. 1.0M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. When the sugar and Kool-Aid are dissolved in water, what is the solvent? \_\_\_\_\_\_\_\_\_. What is the solute? \_\_\_\_\_\_\_\_\_

**\*\*SAFETY\*\*:** Normally in the chemistry laboratory there is no eating or drinking. However, for this lab we will taste Kool-Aid solutions in order to learn about concentration. Special care must be taken so that nothing becomes contaminated.

**Hypothesis:** (Which concentration will be ideal?)

**Procedure:**

1. Obtain 5 plastic cups. With the Sharpie marker, label the cups with the following concentrations:

0.1 M, 0.3 M, 0.5M, 0.7M, and 1.0 M.

2. Each group member will be responsible for making at least one solution. Decide who is making which solutions. If you have less than 5 people in your group, someone will make 2 solutions.

2. Mark the 0.1 L mark on the plastic cup by drawing a line with the marker.

3. Weigh out the correct amount of sugar in each cup by putting your cup on the balance, correct the mass to zero, and putting the correct mass of sugar into the cup.

4. Add Kool Aid to the cup until you have 0.1 L of solution (fill it up to the line you drew).

5. Stir with a popsicle stick.

6. Observe and taste the solutions you have made. You can have a "designated taster" or you can pour a little of the solution into separate cups for each group member to taste. *Record how each solution looked and tasted. Rate the taste of the solution on a scale of 1 to 5. (5 being the best)*

|  |  |  |  |
| --- | --- | --- | --- |
| **Concentration** | **Color** | **Taste** | **Rating (circle one)** |
| 0.1M |  |  | **1 2 3 4 5** |
| 0.3M |  |  | **1 2 3 4 5** |
| 0.5M |  |  | **1 2 3 4 5** |
| 0.7M |  |  | **1 2 3 4 5** |
| 1.0M |  |  | **1 2 3 4 5** |

**Results/Data**