

(13a.) Lab - Making Simple Solutions

Learning Objective:

- To compare the concentration of a solution to explain the effect on the rate of reaction.
- To calculate the amount of a substance (solute) needed to make a concentrated solution at a given volume.

Purpose: To develop the practical skill of calculating and creating solutions with different concentrations that can be directly applied to real-world scenarios. By understanding the process of measuring a specific mass of solute and adding it to a precise volume of solution, you will gain the ability to create customized solutions to suit your specific needs and budget. By solving word problems in chemistry, will enhance your critical thinking and problem-solving skills, which are valuable in understanding product labels.

Materials:

(2) plastic cups ~ Measuring teaspoons ~ Kool-aid as your solute ~ Scale ~ Sample Cups ~ (3) Flasks

Procedures:

1. Use (1) cup, label it mixing cup and a second cup, label it transfer cup. You will use these cups to create each solution that corresponds to a calculation listed in the table below.
2. In the following tables below to help you calculate how much mass of solute you need to make the indicated solutions. The total volume you will make for each cup is 200 mL.

Calculating Concentration:

• mass solution = mass solute + mass solvent	1 ml = 1 g
---	-------------------

$$\% \text{ Solution} = \frac{(\text{mass of Solute}) \times (100)}{\text{mass of Solution}}$$

$$\text{mass of Solute (g)} = \frac{(\% \text{ Solution}) \times (\text{mass of Solution})}{100}$$

Calculations	Calculations (Show your work)
Cup 1: How many grams of solute will you need to make a 5% solution using 200ml?	
Cup 2: How many grams of solute will you need to make a 10% solution using 200ml?	
Cup 3: How many grams of solute will you need to make a 15% solution using 200ml?	

Procedures (cont):

- BEFORE YOU MAKE YOUR SOLUTIONS, WASH YOUR CUPS WITH SOAP & WATER.**
Then, use your designated mixing cup (red cup) to create each of the following solutions, ensuring that you rinse out the designated mixing cup each time after each situation. If you do not have a food scale, use measuring teaspoons and the following conversion: **(1) teaspoon of Solute = (6) grams**
(1) ml of solution = (1) gram
- Use a spoon to dissolve the solute in water and **record the time it takes for the solute to completely dissolve at each concentration** and make the 5% solution, the 10% solution, and the 15% solution.
- After dissolving the solution, take a small sample for each person (**KEEP YOUR SAMPLE CUP**), take a sip, and pour the rest into a flask and take a picture of your solution for comparison.

Data & Observations:

Solution Concentration	Amt of Solute / Amt of water	Time to Dissolve	<u>Write In Your Taste Test</u> Watery ~ Perfect ~ Too Sweet			
			Person #1	Person #2	Person #3	Person #4
5%						
10%						
15%						

Analysis

- How does the concentration of a solution affect its properties, and how can you determine which is more concentrated between a 5% solution and a 10% solution. Provide a detailed explanation to support your answer.
- What methods can you use to effectively increase the concentration of a solution? Consider all the factors involved and propose an effective way of achieving high concentration in a solution.
- How does temperature affect the solubility of sugar, and what conclusion can be drawn about solubility and concentration of a saturated sugar solution at 30 degrees Celsius based on the chart.

