Design Your Own Experiment	Name:
Determining the Molarity of a Saturated Solution	Section:

In this unit, we have been studying the properties of solutions. The concentration of a solution can be reported in several ways. Solubility charts report solution concentration using the units g solute/100 mL solution. Molarity (M) is another unit used to indicate the concentration of a solution. The equation for molarity is:

$$M = \frac{moles\ of\ solute}{L\ of\ solution}$$

In this experiment, you will be given a sample of a known solute (your instructor will identify the solute to be used). The purpose of this experiment is to investigate the relationship between the amount of solute in a saturated solution and the molarity of the solution.

Preparations

Problem

What is the molarity of a saturated solution at room temperature?

Objectives

- Designing and carrying out an experimental procedure
- Appropriately recording data
- Determining the molarity of a saturated solution

Possible Materials

Solute (~50 g)
Stirring rod
Beaker
Rubber policeman
Graduated cylinder
Weighing dishes
Balance
Filter paper
Evaporating dish
Watch glass
Dropper pipet
Funnel
Hot plate or Bunsen burner
Water (~100 mL)

Safety Precautions

Wear safety glasses when working with glassware. Dispose of broken glassware in the proper containers. Remember that hot glass looks cold—move glassware that has been heated with caution. Do not touch the surface of hot plates. Consult the Material Data Safety Sheet for the solute used.

Roles Record the names, and make sure this information is included in your lab report.

Project Manager _____
- Reads directions, keeps track of time, keeps group on task

Quality Control Manager _____
- Monitors data collection, checks calculations, checks data quality

Materials Manager _____
- Gets and returns materials, supervises sharing of materials

Plan the Experiment

1. As a group, plan and write out a step by step procedure to determine the molarity of a concentrated solution.
2. What is your experimental variable? What variables will be held constant?
3. What will you need to measure?
4. How much solute and solvent (i.e., water) will you need?
5. Design a table in your laboratory notebook so that it is ready to use as your group collects data.

Check the Plan

1. Read over your entire plan to make sure that all steps are in a logical order.
2. Does the data table have a place to write down all the information you will need to record?
3. How can you demonstrate that the solution was saturated?
4. Do you know how to use all the equipment you will need?
5. Consult with your instructor. After reviewing your procedure, your instructor will discuss any safety precautions that are specific to your experiment.
6. Incorporate any necessary changes to your plan. If significant changes are made, consult again with your instructor before proceeding.

Doing the Experiment

1. Read through the entire procedure carefully.
2. Put on your safety goggles.
3. Follow the procedure as written. Do not make any changes to the procedure your group developed without first getting your instructor's permission.
4. Dispose of materials according to your instructor's directions.

Analyze and Apply

1. Calculate the molarity of a solution that contains 17.54 g of KCl in 2.00L of solution.
2. What mass of $C_6H_{12}O_6$ would be required to prepare 2.00L of a 1.50 M solution?
3. What is the relationship between temperature and the molarity of a saturated NaCl solution?
4. Under what circumstances might we prefer to express solution concentrations in terms of g solute/mL solution? % solutions? Molarity?
5. Prepare a flowchart or a concept map that describes how to prepare a solution of a certain molarity. (Suggestion: Look at Figure 13-17 in your textbook.)

Remember to include an appropriate conclusion in your report. Refer to the handout for guidelines.