

## Pre-Lab Assignment

1. Read over both lab procedures note any questions you might have about the procedure. Note: we will be doing both as one lab in one class.
2. List the safety precautions you will take when conducting this lab.
3. Identify the WHMIS symbol used in this lab.
  - a. Draw the symbol
  - b. Label the symbol with its class and description
4. Examine appendix C3. On page 797.
  - a. Identify each piece of equipment you will be using in this lab
  - b. Draw and label each. Make a note of when you will use it in the lab.
  - c. Explain what a meniscus and a meniscus finder are. Explain how to use the meniscus finder.
  - d. For the balance in this lab, we will use an electronic one. Draw a picture of an electronic balance and write out the steps to using it (p. 799).
  - e. Along with your diagram of the 10mL volumetric pipette (used in investigation 5.3) include the procedure for using it. (p. 800, 801)

## Investigation 5.2: A Standard Solution from a Solid

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### REPORT CHECKLIST

- |                                  |                                 |                                  |
|----------------------------------|---------------------------------|----------------------------------|
| <input type="radio"/> Purpose    | <input type="radio"/> Design    | <input type="radio"/> Analysis   |
| <input type="radio"/> Problem    | <input type="radio"/> Materials | <input type="radio"/> Evaluation |
| <input type="radio"/> Hypothesis | <input type="radio"/> Procedure |                                  |
| <input type="radio"/> Prediction | <input type="radio"/> Evidence  |                                  |

In this investigation, you will practise the skills required to prepare a standard solution from a pure solid (Appendix C.4). You will need these skills in many investigations in this course.

### Purpose

The purpose of this investigation is to acquire the skills required to prepare a standard solution starting with a pure solid.


### Materials

- lab apron
- stirring rod
- eye protection
- wash bottle of pure water (distilled)
- copper(II) sulfate pentahydrate  $\rightarrow \text{CuSO}_4 \cdot 5\text{H}_2\text{O}(\text{s})$
- 100 mL volumetric flask with stopper
- 150 mL beaker
- small funnel
- centigram balance
- medicine dropper
- laboratory scoop
- meniscus finder



Copper (II) sulfate is harmful if swallowed.

### Procedure

1. (Pre-lab) Calculate the mass of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}(\text{s})$  needed to prepare 100.00 mL of a 0.05000 mol/L solution.
2. Measure the calculated mass of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}(\text{s})$  in a clean, dry 150 mL beaker. (See Appendix C.3 for tips on using a laboratory balance. See Appendix C.4 and the Nelson Web site for tips on preparing a standard solution from a solid reagent.) 
5. Dissolve the solid in 40 mL to 50 mL of pure water. Use a stirring rod to help dissolve the solid. Be sure to rinse the stirring rod over your beaker of solution to ensure that no solute is lost.
6. Transfer the solution into a 100 mL volumetric flask. Rinse the beaker two or three times with small quantities of pure water and transfer the rinse water into the volumetric flask.
7. Add pure water to the volumetric flask until the volume is 100.00 mL. Use the dropper and meniscus finder for the final few millilitres to set the bottom of the meniscus on the calibration line.
6. Stopper the flask and mix the contents thoroughly by repeatedly inverting the flask.  
**Note:** Store your solution for the next investigation.

# Investigation 5.3: A Standard Solution by Dilution

## REPORT CHECKLIST

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|----------------------------------|---------------------------------|----------------------------------|
| <input type="radio"/> Purpose    | <input type="radio"/> Design    | <input type="radio"/> Analysis   |
| <input type="radio"/> Problem    | <input type="radio"/> Materials | <input type="radio"/> Evaluation |
| <input type="radio"/> Hypothesis | <input type="radio"/> Procedure |                                  |
| <input type="radio"/> Prediction | <input type="radio"/> Evidence  |                                  |

In this investigation, you will practise a very common laboratory procedure: preparing a standard solution from a more concentrated or stock solution.

## Purpose

The purpose of this investigation is to acquire the skills required to prepare a standard solution by diluting a stock solution.

## Materials

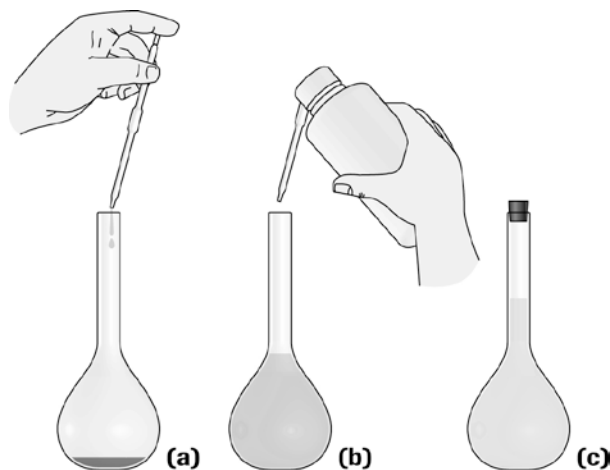
- lab apron
- eye protection
- 0.05000 mol/L  $\text{CuSO}_4$  (aq) stock solution
- 150 mL beaker
- 10 mL volumetric pipette
- pipette bulb
- wash bottle of pure water
- 100 mL volumetric flask with stopper
- small funnel
- medicine dropper
- meniscus finder



Copper (II) sulfate is harmful if swallowed. Wear eye protection and a laboratory apron. Use a pipette bulb. Do not pipette by mouth.

## Procedure

1. (Pre-lab) Calculate the volume of a 0.05000 mol/L stock solution of  $\text{CuSO}_4$  (aq) required to prepare 100.0 mL of a 0.005000 mol/L solution.
2. Measure the required volume of the stock solution using a 10 mL pipette. (See Appendix C.3, Appendix C.4, and the Nelson Web site for tips on pipetting and preparing a standard solution by dilution.)
3. Transfer the required volume of the stock solution into the 100 mL volumetric flask (**Figure 1(a)**).
4. Add pure water until the final volume is reached (**Figure 1(b)**). Use the dropper and meniscus finder for the final few millilitres to set the bottom of the meniscus on the calibration line.
5. Stopper the flask and mix the solution thoroughly (**Figure 1(c)**).



**Figure 1**

- (a) The appropriate volume of  $\text{CuSO}_4$  (aq) is transferred to a volumetric flask.
- (b) The initial amount of copper (II) sulfate solute is not changed by adding water to the flask.
- (c) In the final dilute solution, the initial amount of copper (II) sulfate is still present, but it is diluted.

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