

Diluting a Standard Solution Lab

Pre-Lab Questions

Read p. 386–388 in your textbook. Complete p. 388 # 13, 16 before the lab. The pre-lab questions will count towards your overall lab mark.

Safety Precautions

- ★ Copper(II) sulfate pentahydrate is poisonous. Wash your hands at the end of this lab.
- ★ Wear safety goggles at all times.
- ★ If you spill any solution on your skin, call your teacher and flush your hands immediately with a lot of cool water.
- ★ Pipettes are expensive! If you break it, you buy it! So be careful as you use it.

Materials

- ★ Concentration of stock Copper(II) sulfate pentahydrate solution: 0.500 mol/L
- ★ 100 mL volumetric flask
- ★ Pipette
- ★ Pipette pump
- ★ Medicine dropper
- ★ Stopper
- ★ Calculator
- ★ Water bottle

Procedure

1. Show your answers to the Pre-Lab Questions to your teacher. Once your teacher has approved the pre-lab calculations, use that knowledge to dilute your solution.
2. Calculate the volume of a 0.500 mol/L copper(II) sulfate pentahydrate solution that you will need to prepare 100 mL of either 0.02 mol/L, 0.06 mol/L or 0.1 mol/L solution as provided to you by your teacher. My final concentration as provided by my teacher is: _____ mol/L.
3. Choose an appropriate pipette for the volume you calculated. Transfer this volume of the standard solution to a clean 100 mL volumetric flask. Make sure that the pipette is set on the side of the flask.
4. Dilute your solution with water to the meniscus of the flask. Remember; add water, drop by drop, until the bottom of the meniscus (the curved surface of the solution) touches the graduation mark.
5. Cap the flask with a stopper and come up to the front of the class and compare the colour intensities and concentrations of your diluted solution to the ones prepared in front of the class. Note any patterns.
6. Once you have completed your lab, dispose of the contents in the waste beaker at the front of the class. Wash and clean equipment thoroughly and set to dry on cart.

Lab Analysis, Questions and Write-up

Answer the following questions and submit one lab report per group. Make sure all names are on it!

My final concentration as provided by my teacher is: _____ mol/L.

1. How would the concentration of the dilution have been affected if you had not used a clean, dry volumetric flask?
2. What sources of error could have affected the concentration of the solutions you prepared? How large of an effect do you think these errors had?
3. Based on your observations, how is the appearance of a coloured solution related to its concentration? Explain your reasoning.
4. Calculate the volume of a 0.500 mol/L copper(II) sulfate pentahydrate solution that you will need to prepare 100 mL of either: a) 0.02 mol/L b) 0.06 mol/L c) 0.1 mol/L solution
5. How would your answers to number 4 change if the original concentration of stock solution was changed by your teacher to 0.400 mol/L instead of 0.500 mol/L
6. Research, using the internet, to find out how the intensity of the colour of a solution can be measured quantitatively. Describe one method in your own words and provide references for your answer.

DUE DATE: