**Matter and Minerals**
**Fall 2005**


**Chemistry Workshop**
**Week 5**


*We will meet in Lab II, 1241 on Thursday of Week 5,*
*from 9 a.m. – 12 noon*


**Prepared and Presented by**
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## Workshop Goals

- Learn to prepare an aqueous stock solution of desired concentration starting from a solid.
- Learn to do serial dilutions, starting from a stock solution of known concentration.
- Learn to use the pH meter and the associated software.

**Since this is a skill building workshop, each activity must be done individually.**

### Part I:
Your task is to prepare 100.00 mL of 0.100 M copper(II) sulfate hexahydrate ($CuSO_4.6H_2O$) solution.

Pre-lab:
- Calculate the mass of copper(II) sulfate hexahydrate you need.
- What kind of a balance would you use and why?

Lab exercise:
Weigh out the required mass of copper(II) sulfate hexahydrate. Carefully transfer the solid into a 100 mL volumetric flask following instructions given in lab. Prepare the solution up to the 100 mL mark. Label this as the "stock solution" and with your name.

Prepare the following series of dilutions starting from your stock solution. Label them accurately.

| Volume of stock solution | Size of the volumetric flask to be used |
|---|---|
| 25.00 mL | 100 mL |
| 10.00 mL | 50 mL |
| 5.00 mL | 25 mL |
| 2.00 mL | 10 mL |

- What lab equipment did you use to obtain the desired volume of stock solution?
- Are there other options you could have used?

- Take the stock solution and the four diluted solutions to a spectrometer. Record an absorption spectrum using the stock solution. Select a wavelength for measuring absorbance (instructions given in class).

- What is the wavelength you selected and why?

- Record the absorbance of each of the solutions you prepared at the wavelength you selected.

- Prepare a standard calibration graph using the above data. Use Microsoft Excel (available in the CAL) for this purpose.

- You are also provided with an "unknown" solution containing some copper(II) ions. Record an absorption spectrum of this solution and determine the absorbance at the selected wavelength. Use the above information to determine the concentration of copper(II) ions in the "unknown" solution.

## Part II:

You are provided with 4 "unknown" solutions (solutions A, B, C, and D). Your job is to determine their acidity by determining the pH value.

- Using a fresh piece of pH paper each time, determine the pH of each of the unknown solutions.
- Based on the pH values, determine how you are going to calibrate your pH meter (instructions given in class).
- Calibrate the pH meter before you take the pH reading of each unknown solution. Record the pH of each unknown.
- Determine if the unknown solutions are acids (pH is less than 7), bases (pH is higher than 7) or neutral solutions (pH is equal to 7).
- Use a table to present your data.

**DO NOT LEAVE THE LAB UNTIL ALL YOUR WORK IS CHECKED BY THE INSTRUCTOR.**