Experiment 3B: Procedures

There are four parts to this experiment.

1. Use the technique of serial dilutions to make a total of 5 solutions (stock plus 4 diluted solutions).
2. Take a spectrum of the stock solution and chose a λ where A ≃ 1 and record A
3. Record A at that λ for the other dilutions and the blank.
4. Record A for the two unknown solutions.

Serial Dilutions

1. Make a stock solution of CuSO4(aq) with a concentration ≃ 0.2M - record everything to the correct number of sig figs based on your equipment
    - Calculate approximate mass of $CuSO_4.5H_2O$ to make 50 mL of 0.2M $CuSO_4$(aq).
    - Weigh around that mass, quantitatively transfer to 50 mL volumetric flask, record exact mass in workbook
    - Dilute to volume, this is your standard solution (remember to **swirl** and dissolve the solid while the flask is about 2/3rds to the mark)
2. Fill cuvette 3/4ths full with standard solution and label cap with number 1
3. Transfer remaining standard solution to clean and dry 100 ml beaker
4. Clean the 50 mL volumetric flask with DI (DeIonized) water, you do not need to dry
5. Using 25 mL pipette transfer 25 mL stock solution from the 100 mL beaker to the 50 mL volumetric flask. **Do not blow out the last bit of solution**.
    - If the pipet is wet you should blow it out with a bulb before transferring 25 mL (do this over a waste container). If there is still some solution in it you should suck in a small amount of the solution you transfer and wet the sides with that solution so that any fluid adhering to the walls is the solution you are transferring.
6. Dilute the solution in the 50 mL volumetric flask to volume with water and this will become the second solution of your serial dilution
7. Discard the remaining solution in the 100 mL beaker to a 600 mL waste container.
    - be sure you placed some of this solution in a cuvette and labeled it (step 1)
    - Wash and dry beaker, you will reuse it
8. Pour the solution in the 50 mL volumetric flask (step 6) into the dry 100 mL beaker and repeat steps 2-7 using a new cuvette and labeling each cuvette 2,3,4,5 for each of the successive half dilutions.

Experiment 3B: Procedures

Obtain Spectrum

1. Calibrate the spectrometer
    - Warm spectrometer as directed on LabQuest
    - Fill cuvette 3/4ths full of solvent (water), cap and label the cap 0 (zero)
    - Place in cuvette in the cavity so the light path goes through the clear side (line up the arrows)
    - From Experiment menu choose Spectrophotometer/calibrate
    - Follow the instructions until the calibration is OK.
    - Keep this "blank" solution in the cuvette until the experiment is over, as you may need to recalibrate the spectrometer
2. Generate a spectrum
    - After calibrating spectrometer place stock solution (cuvette #1) into cuvette cavity
    - Click <Collect> and once the spectrum is displayed click <Stop>
    - To store spectrum go to the experiment menu and choose "Store Latest Run"
    - **Use Export** to save as csv to a flash drive
    - Choose a wavelength for Beer's Law plot where A=1 for the stock solution, write this down in your data sheet

Generate Beer's Law plot

1. Calibrate the spectrometer if needed (you can read the absorbance of the blank (solvent), if it is zero at the wavelength you are measuring you do not need to recalibrate.
2. Place each cuvette into the spectrometer and read the absorbance at the chosen wavelength (where A ≃ 1 for stock).
    - Record values at that wavelength in data sheet
    - You should have 6 values (5 for each of the solutions, and the blank, which should read 0)
    - Each solutions absorbance should be around 1/2 of the value of the previous one that was diluted in half to make it

Measure Absorbance of Unknowns

1. Measure the absorbance of 2 unknowns at the chosen wavelength
2. Record values in data sheet