Safety Measures

- Copper (II) sulfate ($CuSO_4$) is toxic and harmful to the environment; handle with care and dispose of waste in designated containers.
- Avoid skin contact with $CuSO_4$ as it is a skin irritant. Rinse thoroughly with water if contact occurs.
- Always wear lab-appropriate PPE, including gloves, goggles, and a lab coat.

Materials

- Spectrophotometer (Spectronic 200)
- Cuvettes (1 cm), Pipettes, Beakers, Magnetic stir plate and stir bar
- Volumetric flasks (100 mL), DI water, Solid $CuSO_4 \cdot 5H_2O$

Procedure

Spectrophotometer Setup

1. Turn on the spectrophotometer and initialize it.
2. Set to "Absorbance" mode at $\lambda = 600$ nm.
3. Zero the device using a DI water blank.

Preparation of Calibration Solutions

1. Prepare $CuSO_4$ solutions in concentrations from 0.1 M to 0.5 M.
2. For each solution:
    - Weigh $CuSO_4 \cdot 5H_2O$ and dissolve in 50 mL of DI water in a beaker.
    - Transfer to a 100 mL volumetric flask and dilute to the mark with DI water.

Creating the Calibration Curve

1. Measure the absorbance of each calibration solution using the spectrophotometer.
2. Record data, and create a linear regression plot of absorbance vs. concentration.

Determination of Unknown Concentration

1. Obtain an unknown $CuSO_4$ solution and measure its absorbance.
2. Calculate its concentration using the calibration curve.

Absorption Spectrum Measurement

1. Set the spectrophotometer to wavelengths between 500–700 nm, measuring absorbance at intervals of 20 nm.

Cleanup

- Dispose of $CuSO_4$ solutions in the waste barrel.
- Wash all glassware and wipe down the lab bench.