

Quantitative Reactions & Analysis Post-Lab Questions

Please include your properly formatted table and graph, and please write your answers to the following questions in paragraph form. Submit this file as a PDF to Gradescope.

- 1) Make a table of your calibration curve data below and plot your calibration curve in Excel. Paste your graph below the table. Both table and graph should have proper formatting (remember your formatting rules from Data and Graphics).

Table 1. Calibration Curve of CuSO₄ Solution

Concentration of CuSO ₄ (M)	Absorbance at λ_{max}
1.000×10^{-2}	1.413
5.000×10^{-2}	0.690
2.500×10^{-2}	0.328
1.250×10^{-2}	0.166

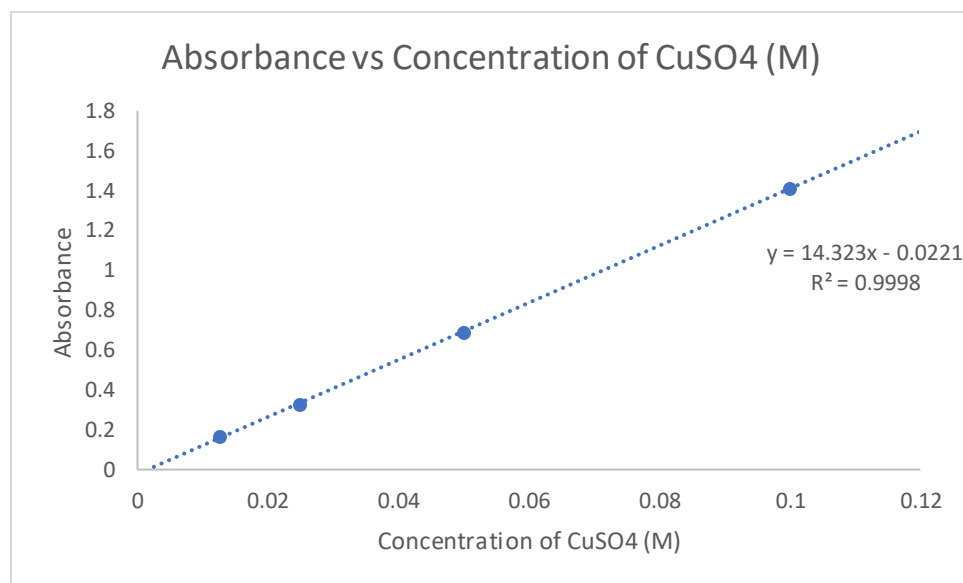


Figure 1. Graph of Calibration Curve

- 2) Compare the two calculated concentrations of unknown copper sulfate solution (calculated from the yield of the reaction vs. calculated using your Beer's Law plot). Which one is likely to be more accurate? Why is it more accurate and/or why is the other less accurate?

The concentration calculated using the Beer's law plot is likely to be more accurate than the concentration calculated from the yield of the reaction for several reasons. The Beer's law plot uses multiple trials (or points) to generate a trendline with a coefficient of determination of 0.9998, which is very accurate. The chemical reaction, on the other hand, is only one trial, and has a higher likelihood of human error since there could have been a certain amount of unreacted reagents and we can't make sure that all the water was evaporated before weighing the mass.

- 3) Should we force the trendline for the plot of absorbance vs. concentration through the origin (0,0)? Why or why not? In your answer, please consider the theoretical y-intercept based on Beer's Law.

We should not force the trendline through the origin. Although the theoretical y-intercept according to Beer's law should be 0, that does not account for slight deviations in the testing environment no matter how ideal they may be, which may impact the observed results. Since the trendline is supposed to show the trend of our observed results, forcing it through a predicted point would not make sense.