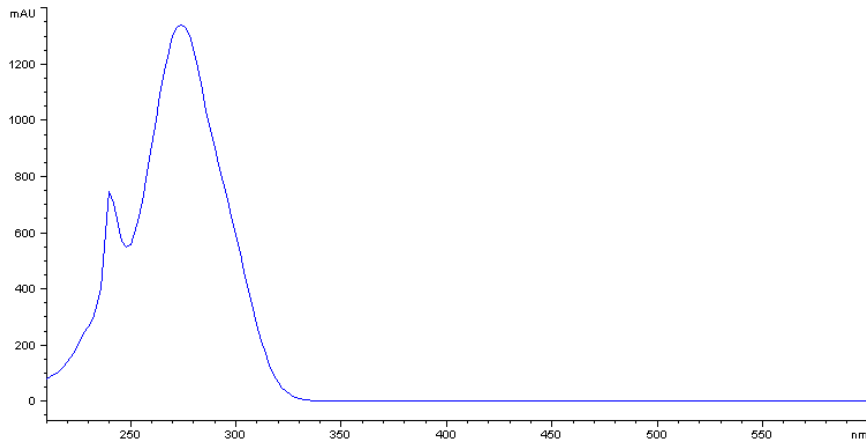
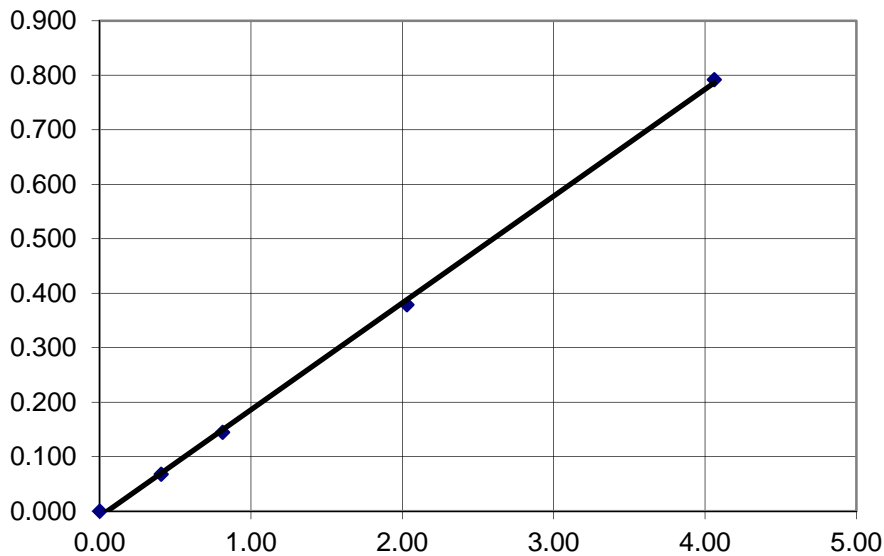


1. Consider the following spectrum



- Label each axis.
- What is the value of λ_{max} ?
- What electromagnetic region of the spectra is lambda-max?
- If the concentration of the substance is 0.00135 M, what is its molar absorptivity at λ_{max} in a standard spectrometer?

2. Consider the following calibration curve for the absorbance of a substance at 254 nm. Concentration units are ppm.

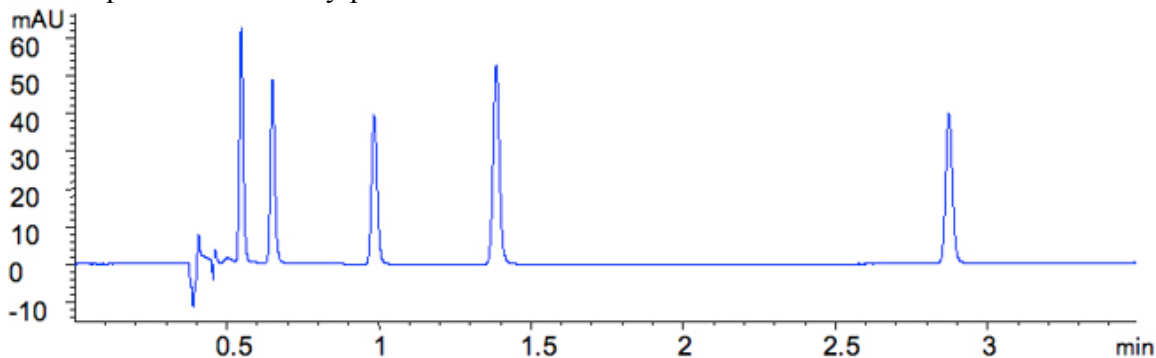


- Label each axis.
- What is the slope and y-intercept of the line?
- If the pathlength is 2.00 cm, what is the absorptivity of the substance?
- If 1.354 g of unknown sample was dissolved in 100.0 mL of solution and the resulting solution had an absorbance of 0.360. What is the %analyte in the original sample?

3. Calculate the following quantities:
 - a. Absorbance from 35.4% T
 - b. Percent transmittance from $A = 0.269$
 - c. The absorptivity of a substance in a 1.00 cm cuvette that transmits 15.9% of the light at 702 nm.

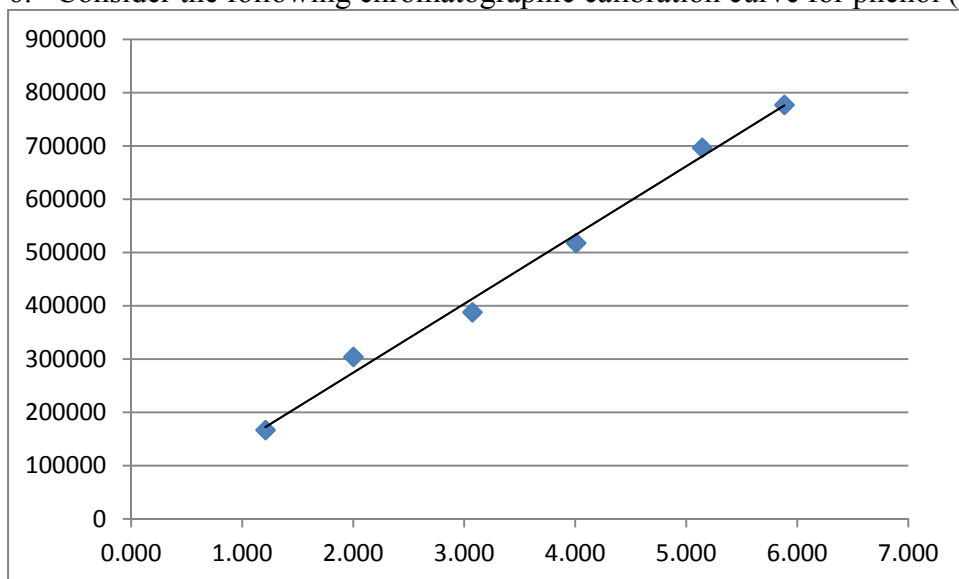
4. Sketch a linear calibration curve made using a copper(II) ion selective electrode.
 - a. Label each axis.
 - b. Suggest a possible reference electrode
 - c. Predict an approximate slope for your line.
 - d. Using the slope you predicted in part C and a y-intercept of 45.5 mV, determine the concentration of a solution with a potential of 84.0 mV.
 - e. How would using a combination electrode change your experiment?

5. Consider the following chromatogram, of a reversed-phase HPLC analysis where the last peak was made by phenol.



- a. How many substances are in the sample analyzed?
- b. What is the dead time?
- c. What is the retention time for the phenol?
- d. What is the adjusted retention time for the phenol?
- e. On the chromatogram, sketch how it would change if a new substance, somewhat but not a lot more polar than phenol, was added.
- f. Suggest a mobile phase for this analysis.
- g. Describe how the chromatogram would look if the sample contained a lower concentration of phenol than the original and only one other detectable substance.

6. Consider the following chromatographic calibration curve for phenol (C_6H_5OH).



The equation of the line is $y = (129173 \pm 5599)x + (16093 \pm 21931)$

- Label the axes.
 - If a solution, when analyzed, gave a signal of 465099 for phenol, what is the concentration of phenol in that solution, with error?
 - If a solution was made by dissolving 4.3709 g of sample in 500.0 mL and then taking a 10.00 mL aliquot and diluting to 250.0 mL to make the solution analyzed in part b, what is the % phenol in the original sample.
7. An unknown solution containing copper(II) ion had an absorbance of 0.354 when measured at 570 nm. When 5.00 mL of this solution was mixed with 5.00 mL of 7.25 ppm standard Cu^{2+} , the resulting solution had an absorbance of 0.544 at 570 nm. What is the concentration of copper in the original unknown solution?
8. A solution was made from 1.549 g of chromium-containing sample diluted to a total volume of 100.0 mL. A 5.00 mL aliquot of this solution was mixed with 15.0 mL of ammonia and diluted to a total volume of 50.00 mL. At 758 nm, the absorbance of this solution was 0.432. A third solution was made using 5.00 mL of the original sample, 2.00 mL of 57.1 ppm Ni^{2+} standard and 15.00 mL of ammonia. This third solution was diluted to a total volume of 50.00 mL. The absorbance of the third solution was 1.081 at 758 nm. What is the %Ni in the solid sample?