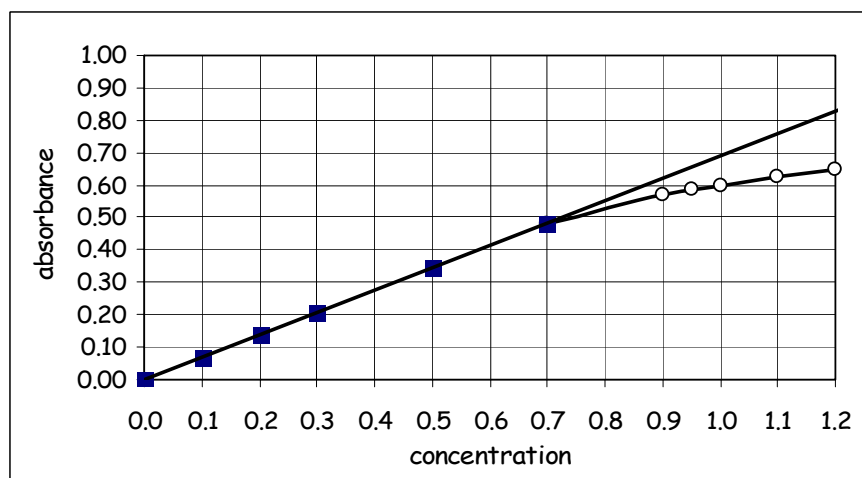


CHM 103 EXAM II

Show all calculations with correct units and significant figures. Write in complete sentences. Pick up a copy of the take-home questions. **Good Luck!!!**

1. A series of solutions in a range of 0 - 0.70 M were used to generate a calibration curve as shown below by the straight line using the square data points on the graph. (25)



For the 0 - 0.70 M concentration range, does Beer's Law hold? Why or why not?

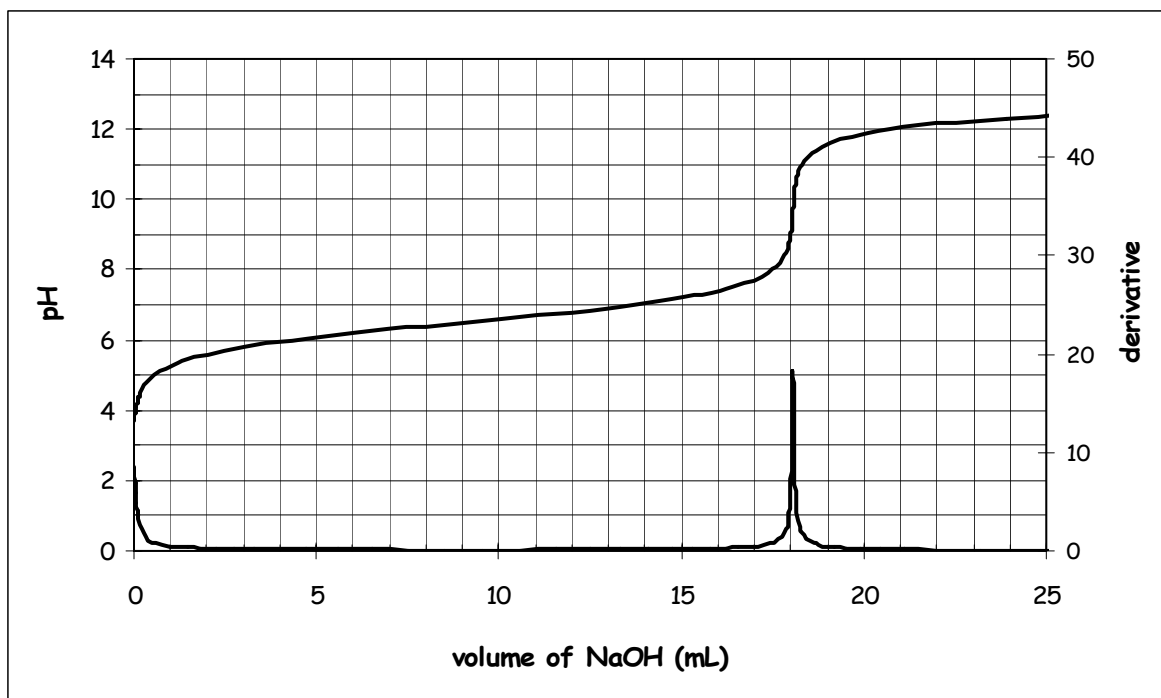
Calculate the molar absorptivity.

Above a concentration of 0.70 M, the circles show how the calibration curve really holds. If an unknown with an absorbance of 0.60 was analyzed, what would the concentration be using Beer's Law? Show on graph in red.

What would the concentration be using the actual measured extended calibration curve? Show on graph in blue.

If you did not want to work outside the range of where Beer's Law holds, what could you do to the sample?

2. A 353-mg sample of weak acid was titrated with 0.271M NaOH. The titration curve generated is given below. (25)



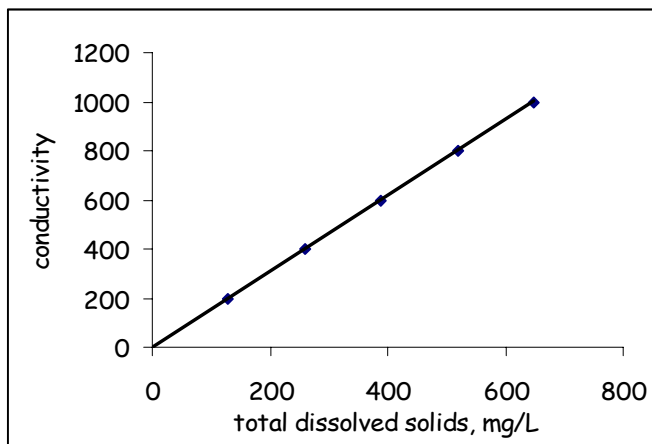
What information is obtained from the first derivative?

Calculate the molar mass of the weak acid.

What is the dissociation constant of the weak acid? Explain how you determined it.

What pH range would you select an indicator to work in this titration?

3. Total dissolved solids in natural waters, such as streams and lakes, can be determined by evaporation of the water after filtration to remove any suspended material. Most total dissolved solids in natural waters are ionic substances; hence total dissolved solids can be determined by conductivity measurement as well as mass. Most natural waters follow the relationship shown below on the graph. (10)



Now if a truck load of urea, a common fertilizer and non-electrolyte, was to fall into a lake, how would it affect the results on the graph? Explain and sketch a line to illustrate.

4. Here are duplicates runs under the same experimental conditions for the kinetics of crystal violet. Explain the difference between run 1 and run 2. Does it make a difference in the rate? (10)

