Close the sample compartment, wait for the instrument to settle a bit, and record the absorbance of solution 1.

Pull the knob out 2 notches, wait for the instrument to settle, and record the absorbance of solution 5.

Pull the knob out 1 notch, let the instrument settle, and record the absorbance of solution 10. Pull the knob out one final notch, allow the absorbance reading to settle, and record the absorbance of solution 15.

Gently push the knob all the way back in and open the sample compartment and retrieve your cuvettes.

Obtain a sample of the soft-drink unknown from the carboy sitting in the lab. This soft-drink mix has been diluted by a factor of 10 in order to reduce the absorbance of the solution. **Remember this dilution factor in your calculations.**

Measure and record the absorbance of the soft-drink unknown at λ_{max} versus a distilled water reference solution exactly as you did earlier (i.e., repeat steps 1-8 above).

Calculations

Prepare a plot of absorbance versus wavelength (from 400 to 600 nm) for solution number 10. This plot is called a spectrum. Unlike a calibration plot, please connect the data points on your spectrum. This can be done in Microsoft Excel by choosing an XY (scatter) plot with the chart sub-type: "Scatter with data points connected by smoothed lines".

Prepare a plot of absorbance versus concentration for your four standard solutions. Fit a line to this plot, and determine the equation of the best-fit line.

Using the equation of the best-fit line and the absorbance of the unknown soft drink, determine the concentration (in mg/L) of Red Dye No. 40 in the unknown. Don't forget to take the 10-fold dilution into account!

Show all sample calculations in your lab notebook or properly annotated Excel spreadsheet.

Report

In your results section there should be two figures: Figure 1 is the spectrum of FD&C Red No. 40, and Figure 2 is the calibration curve obtained at λ_{max}.

In your discussion, restate your final result (FD&C Red No. 40 concentration). Unfortunately, the mass of FD&C Red No. 40 in this soft drink packet is unknown. Therefore, in order to evaluate the success of your experiment, comment on the quality of the best-fit line (e.g. does there appear to be a lot of scatter in the data? Is the calibration curve linear? Does the y-intercept of the best-fit line have a value close to zero?). Finally, why is a quantitative chemical method important? Well, here's an idea you should comment upon relating the importance of quantitative chemical methods to the toxicity of FD&C Red No. 2, which is currently banned in the U.S., and FD&C Red No. 40. The Acceptable Daily Intake (ADI) is the dietary intake of a food additive which can be safely ingested per day without appreciable risk. If the ADI for FD&C Red No. 40 is 7 mg dye per kg of body mass per day, how many liters of this soft drink would you have to drink before the ADI would be exceeded? Now, compare this to the ADI for FD&C Red No. 2, which is 0.8 mg dye per kg of body mass per day. If the soft drink manufacturer was using the same amount of FD&C Red No. 2 in their product as they did for FD&C Red No. 40, how many liters of this