

# Chemistry Lab 2 proc

## Part A: Standard Solutions

General notes:

- Ensure that containers are clean and dry
  - Use Kimwipes to clean vials before using the spectrophotometer
  - Stock solution is the most concentrated solution of the dye used
  - Both the sports drink sample and the stock solution are safe to dump in the sink
1. Obtain 35 mL of the Allura Red stock solution in a beaker. this will be the source in which the other level concentration solutions will be made.
  2. Create solutions as described in the table below
    - a. Use graduated pipettes to combine volumes in vials for use in the spectrophotometer.
    - b. Add one component all at once. Put required amounts of dye in all of the vials, then put the water in.
    - d. After capping vials, mix by inverting three times. Label the vials on the cap, not the glass. Avoid getting fingerprints on the glass.

Sample #	Volume dye stock solution (mL)	Volume H <sub>2</sub> O (mL)	Total Volume (mL)	Calculated concentration of dye (mg/mL)	Absorbance
Blank	0	10	10		
1	2	8	10		
2	4	6	10		
3	6	4	10		
4	8	2	10		
5	10	0	10		

## Part B: Standard curve

1. Calculate the dye concentration in each vial.

$$\frac{C_1 V_1}{V_2} = C_2$$

Where  $C_1$  is the concentration of the stock solution,  $V_1$  is the volume of the

stock solution, and  $V_2$  is the new volume of the diluted solution. The output will be of the form  $\text{mg solute/mL solution}$

2. Use the spectrophotometer to find the absorbance values for each vial, and record them.
  - a.  $\lambda_{max}$  should be a constant for the chromophore, so the absorbance wavelength should be the same for all standards
3. Use Excel to create a scatterplot with dye concentration as the independent variable and absorbance as the dependent.
  - a. Insert a trendline and  $R^2$  value
  - b. Include a relevant main title and x and y axis titles

## Part C: Concentration of food dye in a sports drink

1. Obtain a sample of the sports drink containing the dye, and pour 50 mL into a beaker.
2. Measure the absorbance of the sports drink at the previously determined  $\lambda_{max}$ .
  - a. Recall Beer's Law, that a chemical's concentration is proportional to a solution's absorbance.
  - b. We can use this relationship to determine the concentration of our chromophore in the sports drink.
  - c. Note that the A reading must fall within the range of A values in the standard curve.
  - d. Because Beer's Law is only linear to a certain sample concentration, we may have to dilute the sample in order to reduce the concentration.
3. Measure and record the absorbance at the appropriate wavelength. Repeat step 2 as necessary, recording changes made to the sample until the required absorbance range is correct.
  - a. Aim for an A value between the range of A values in the standard curve.
4. Use the linear regression line of the standard curve to calculate the concentration of colored dye in the sports drink sample.