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 $35\,\mathrm{mL}$ 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 $H_2O\,(\mathrm{mL})$	Total Volume (mL)	Calculated concentration of dye $(\mathrm{mg/mL})$	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.

$$\frac{C_1V_1}{V_2} = C_2$$

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 $\mathrm{mg\,solute/mL\,solution}$

2. Use the spectrophotometer to find the absorbance values for each vial, and record them.
   a. λ_{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 $50\,\mathrm{mL}$ into a beaker.
2. Measure the absorbance of the sports drink at the previously determined λ_{max}.
   a. Recall Beer's Law, that a chemicals 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.