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Beer's Law Lab

Following parts need to be included in the Lab Report

Title page

Abstract

State the objective and the results you obtained with help of the experiment
Items that need to be included

- name of the dye investigated
- experimental absorptivity of the dye
- quote the %relative deviation
- Beer's Law plot (since you need the plot to obtain your results, ε)

Introduction

Points that are listed in the abstract section should be discussed with more detail.
In addition discuss following topics

- Absorption Spectroscopy
- State and explain the Beer's law equation
- Explain how the Beer's Law plot was used to calculate the molar absorptivity
- State that the molar absorptivity is an intrinsic property of the dye. (state the name of the dye)

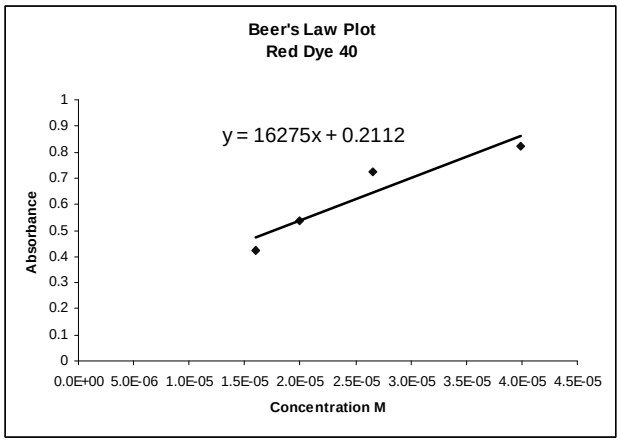
Experimental See ChapterT2-4

Results

State the dye and its original concentration
This is just an example to illustrate the necessary calculations. You need to quote results for your dye.
Allura red dye #40, c = 3.989 M, M stands for mol/L

Include table

	Sample 1	Sample 2	Sample 3	Sample 4
C dye [M]	3.989×10^{-5}	2.6593×10^{-5}	1.9945×10^{-5}	1.5956×10^{-5}
Absorbance	0.824	0.725	0.538	0.424
λ absorption [nm]	505.1	505.1	505.1	505.1



Graph the data points to obtain Beer's Law plot

Draw the best fit line!
Do not connect the points.

Dilution Calculation

Example
Take 1 ml = 0.001L of the stock solution and add 99 ml of distilled water to dilute it.
Your final volume, V_2 adds up to 100 ml or 0.1 L.
$M_1V_1 = M_2V_2$
(3.989 x 10-3 M) (0.001 L) = (M_2) (0.1 L)
$M_2 = 3.989 \times 10^{-5}$ M, this is the new concentration

Molar Absorptivity calculations
$A = \varepsilon b c$
slope = εb
$16275 \ \frac{\text{Abs L}}{\text{mol}} = \varepsilon b$, b is the path length of the cuvet b = 0.685 cm
$\varepsilon = 16275/0.685 \ \frac{\text{Abs L}}{\text{mol cm}}$
$\varepsilon = 23759 \ \frac{\text{Abs L}}{\text{mol cm}}$

Calculate the % relative deviation:

Calculate the deviation
Theoretical value – Experimental value
$= 27000 \ \frac{\text{Abs L}}{\text{mol cm}} - 23759 \ \frac{\text{Abs L}}{\text{mol cm}} = 3241 \ \frac{\text{Abs L}}{\text{mol cm}}$

Calculate % Relative Deviation:
[(deviation)/(theoretical value) x 100%
$= \{[3241 \ \frac{\text{Abs L}}{\text{mol cm}}] / [(27000 \ \frac{\text{Abs L}}{\text{mol cm}}]\} \times 100\%$
= 12.00%

<u>Discussion</u>

Following topics can be discussed
- Dilution error
- Discuss how close your data is to the best fit line
- If your data points do not lie on the line, explain why. Hint dilution error
- The line does not go through point (0,0). Explain why.