01 Introduction to Spectrophotometry (5981990)

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

Description

Open and read the following file: Spectroscopy Info

Instructions

Objective: To determine the concentration of an unknown solution using spectroscopy and Beer's Law.

Materials: 100 mL volumetric flask, 10 mL graduated pipet, pipet pump, 50 mL beaker, spectrophotometer, cuvettes, Chem wipes, distilled water, Ruler, Red 40 solutions of known concentration, Red 40 of an unknown concentration.

Procedure:

1. Turn on the spectrometer and let it warm up for 15 minutes. Set the wavelength to 504 nm.

Absorbance Spectrum of 1 mM Allura Red AC

Allura Red A
(FDC Red #4
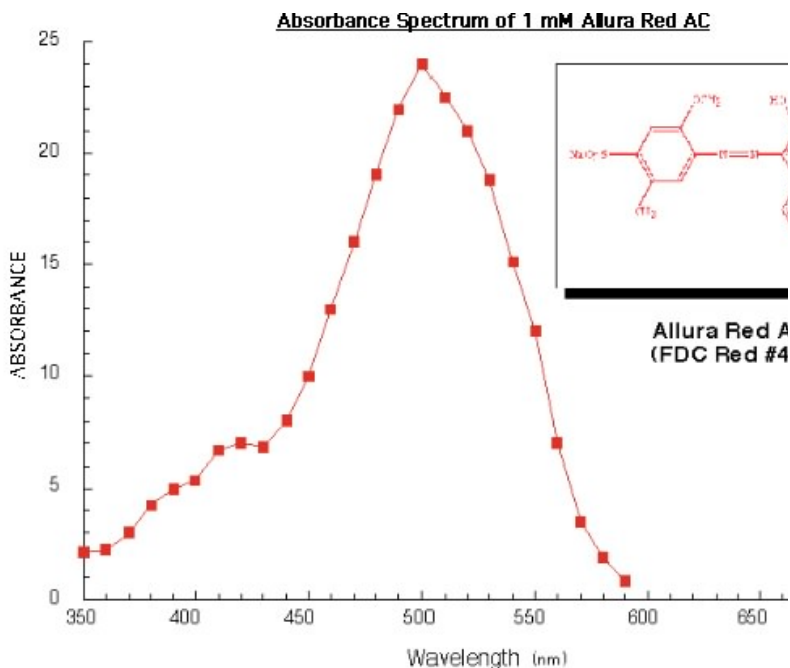
2. Using a 100 mL volumetric flask, distilled water, graduated pipet, pipette bulb, 50 ml beaker, and the 1.0 M solution of Red 40, make up a solution of your choosing that is different from one of the dilutions provided and is more than 0.010 M and less than 0.070 M.

3. Fill a cuvette just over half full with distilled water and place it into the spectrophotometer and press the green "0 Abs/100% T" button.

4. Measure the transmittance and absorbance for each of the diluted solutions plus the one prepared by you in step 2 by placing the cuvette with the solution to be tested into the spectrophotometer. Rinse the cuvette with a couple of mL of the next solution to be tested before filling the cuvette just over half full and reading the transmittance and

absorbance.

5. Using the iPad app "Data Analysis", make a graph of concentration verses
absorbance and plot a linear regression. Include 0,0 as a data set.

6. Measure the transmittance the absorbance of the unknown solution and determine
the concentration of the unknown using the results of the linear equation found in step
4.

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1.   Question Details   Lab Partners [1837468]   -

Enter the name(s) of your lab partner(s). (If you worked by yourself, enter "none").

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2.   Question Details   Objective and procedure summary [3413760]   -

Restate the objective in your own words using complete sentences. Summarize the steps in your procedure. (Be sure and
include any safety concerns).

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3.   Question Details   Upload Lab Photo [3413757]   -

Upload a photo of the lab apparatus with your face in the photo as you perform some part of the lab. Title the image with a
unique file name before you upload it.(Maybe use your initials and part of the lab title) [Choose File] no file selected   It
must be less than 5 MB in size.

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4.   Question Details   Colors wavelength rank [1576572]   -

Rank the following colors of light from shortest to longest wavelength.

shortest   [- ◊]

               [- ◊]

               [- ◊]

               [- ◊]

               [- ◊]

longest   [- ◊]

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5.   Question Details   Spectroscopy 01 [3103547]

A solution appears red because it absorbs all light except red, but especially the color [   ] since it is opposite red on the color wheel. Colors that are opposite of each other on the color wheel are called [   ] colors.

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6.   Question Details   Spectroscopy 02 [3103548]

Absorbance has an inverse logarithmic relationship to [   ] and a direct linear relationship to [   ].

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7.   Question Details   Spectroscopy 03 [3103549]

In Beer's Law: A = abc, A represents [   ] (one word) ,

a represents [   ] (two words),

b represents [   ] (two words),

and c represents [   ] (one word).

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8.   Question Details   Spectroscopy 04 [3103551]

When is it necessary to zero the spectrophotometer?

☐ after every sample is measured

☐ every five minutes

☐ every time a new wavelength is chosen

☐ after it warms up at least 15 min (and before starting any experiment)

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9.   Question Details   Intro to Spectrophotometry Lab Data [3102822]

	Concentration (M)	Transmittance (%)	Absorbance
1	0.010	4.0✓ [ ]	4.0✓ [ ]
2	0.030	4.0✓ [ ]	4.0✓ [ ]
3	0.050	4.0✓ [ ]	4.0✓ [ ]
4	0.070	4.0✓ [ ]	4.0✓ [ ]
5	4.0✓ [ ]	[ ]	[ ]
6	unknown	4.0✓ [ ]	4.0✓ [ ]

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10.   Question Details   Upload Lab Graph [3414163]   _

Upload a photo of the graph you created in Data Analysis or Logger Lite. [Choose File] no file selected   It must be less than 5MB in size.

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11.   Question Details   Percent Error Spectroscopy Lab [3103251]   _

Enter the concentration of the unknown:
4.0 ✓ [_____] M
This question is a check of accuracy. A red X will probably appear, which means that your answer is not exactly correct. The number of points deducted is a reflection of how close you are to the accepted value.

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12.   Question Details   Molar Absorbtivity [3103529]   _

Enter the molar absorptivity (molar absorption coefficient): 4.0 ✓ [_____] mol/cmL

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13.   Question Details   Upload Calculations (Show Work) [3418656]   _

Upload a photo of your calculations, showing your work. Make sure your name and the date are written on the page. Title the image with a unique file name before you upload it.(Maybe use your initials and part of the lab title and the word Calcs)
[Choose File] no file selected

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14.   Question Details   Observations, Skills utilized and learning [3413764]   _

What observations did you make during the lab? What chemistry concepts, laws, and/or skills were necessary to complete this lab? What did you learn or re-learn? Use complete sentences.

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15.   Question Details   Error discussion [3413763]   _

What are some specific sources of error, and how do they influence the data? Which measurement was the least precise? Does the error make the final value obtained larger or smaller than it should be (give at least one example and trace the steps)? If your calculated percent errors are significant, you must propose valid explanations here.
Instrumental error and human error exist in all experiments, and should not be mentioned as a source of error unless they caused a significant fault. Significant digits and mistakes in calculations are NOT a valid source of error. In writing this section it is sometimes helpful to ask yourself what you would do differently if you were to repeat the experiment and wanted to obtain better precision and accuracy. Use complete sentences.

Assignment Details

Name (AID): **01 Introduction to Spectrophotometry (5981990)**
Submissions Allowed: **5**
Category: **Lab**
Code:
Locked: **Yes**
Author: **Ryan, Matt (** mryan@allsaintsschool.org **)**
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