

Spectrophotometry and Beer's Law

Prelab

7

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Name

1:00

Time

M T W R F

1. Write the mathematical expression for Beer's law and explain each symbol in the expression.

$$A = \epsilon b C$$

C = concentration

A = absorbance

ϵ = molar absorptivity

b = length of light path

2. Use Figure 7.2 to estimate the approximate wavelength of maximum absorption for an aqueous solution of each of the following:

- a. Hemoglobin (the molecule that gives blood its color)

675 nm

wavelength

- b. Chlorophyll (the pigment that gives algae their color)

490 nm

↳ green

↳ red & violet

3. Fill in the following for the correspondence between % transmittance and absorbance:

100.0 % T = 0 absorbance

1.00 absorbance = 10 % T

50.0 % T = 0.30 absorbance

0.50 absorbance = 31.6 % T

A =

1. = 10%

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4. A solution has 21.7% transmittance in a cell with a path length of 1.00 cm. If the material responsible for the absorption of light has a molar absorptivity $\epsilon = 38.7$ (L/mole-cm) at the wavelength used, calculate the concentration of this solution in mole/L. (Show all work.)

$$21.7\%$$

$$1.00 \text{ cm}$$

$$\epsilon = 38.7$$

100-

$$A = \epsilon b c$$

$$\% T \rightarrow A$$

$$0.6635 = 38.7 \cdot 1 \cdot c$$

$$1.71 \cdot 10^{-2} \text{ M}$$

$$0.017145743 = c$$

$$1.71 \cdot 10^{-2}$$