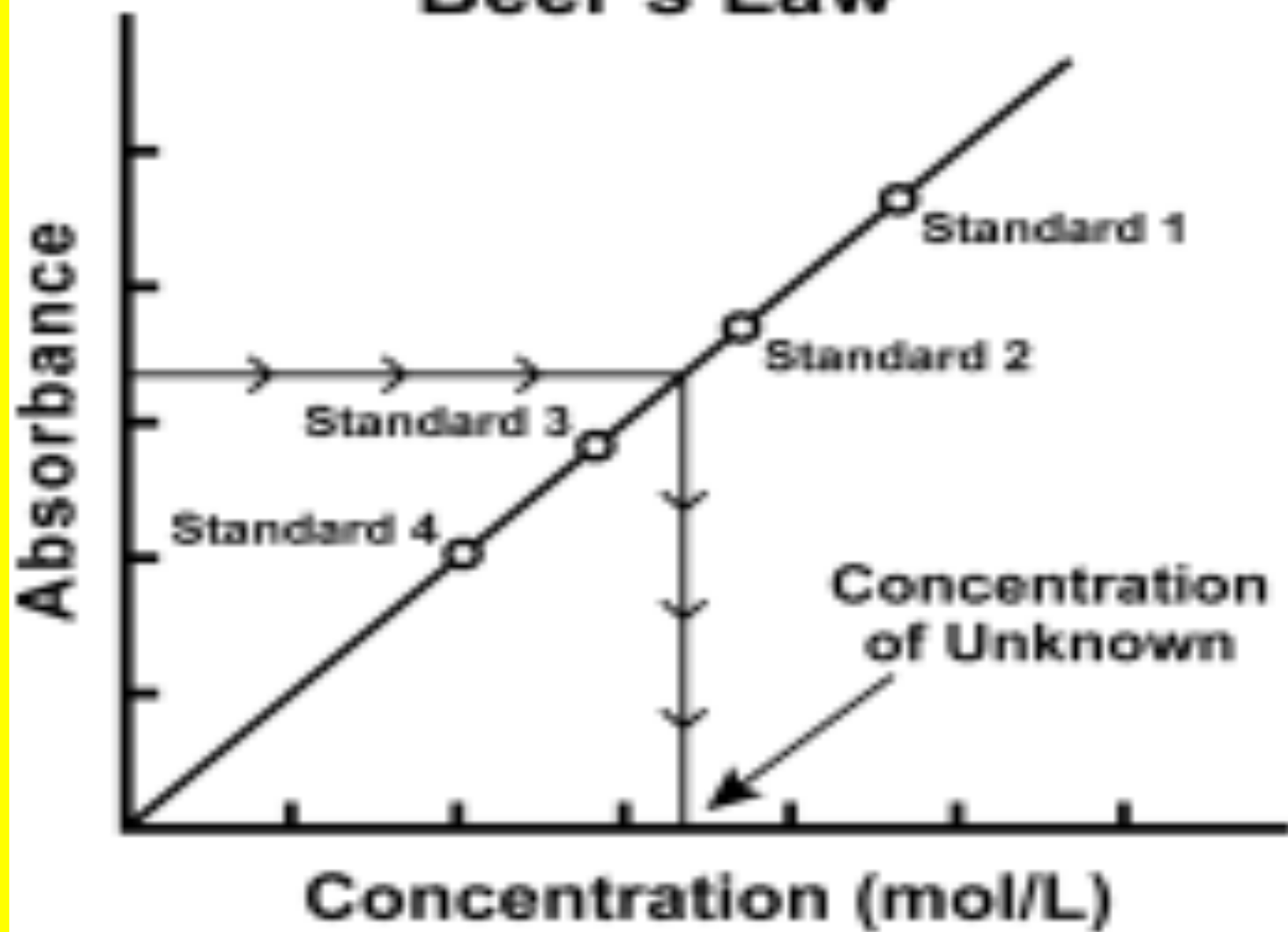# Beer's Law

An Introduction to UV Spectroscopy

Objective

- to determine the concentration of an unknown copper (II) sulfate solution. The $CuSO_4$ solution used in this experiment has a blue color, so Colorimeter users will be instructed to use the red LED. Spectrometer users will determine an appropriate wavelength based on the absorbance spectrum of the solution. A higher concentration of the colored solution absorbs more light (and transmits less) than a solution of lower concentration.

1. Beer's Law is an equation that relates the attenuation of light to properties of a material.
2. The law states that the concentration of a chemical is directly proportional to the absorbance of a solution.
3. The relation may be used to determine the concentration of a chemical species in a solution using a colorimeter or spectrophotometer.
4. The relation is most often used in UV-visible absorption spectroscopy. Note that Beer's Law is not valid at high solution concentrations.

Beer's Law

The amount of absorbed light is proportional to solution concentration.

$$A = \varepsilon L c$$

ABSORBANCE — A

LENGTH OF SAMPLE — L

MOLAR ABSORPTIVITY CONSTANT — ε

SOLUTION CONCENTRATION — c
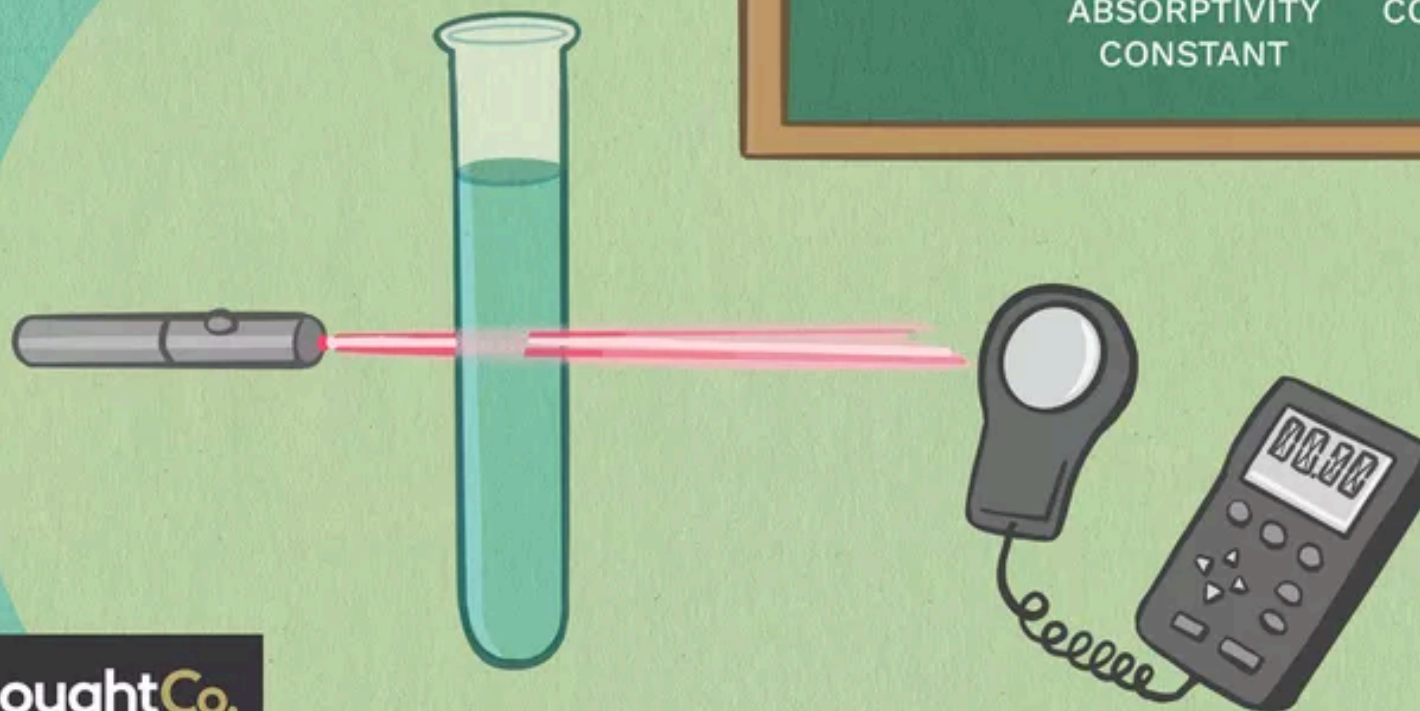
ThoughtCo.

Key Takeaways: Beer's Law

- Beer's Law states that the concentration of a chemical solution is directly proportional to its absorption of light.

- The premise is that a beam of light becomes weaker as it passes through a chemical solution. The attenuation of light occurs either as a result of distance through solution or increasing concentration.

- Beer's Law goes by many names, including the Beer-Lambert Law, Lambert-Beer Law, and Beer-Lambert-Bouguer Law.

The goal of the activity…

1. Your breakout room determines the data you use and the unknown to use as well

2. Open up your data file and check out the Beer's Law Curve

3. Analyze the graph with the stats provided

4. All initial stock concentrations were made by me

5. All solutions to create Beer's Law curve were made by Ss

6. Using the unknown Absorbance, determine the concentration using the curve

7. Show one sample calculation for each type of calculation that be uploaded into the Data Table Doc

8. Answer the questions

DATA
[Data Table] – get an make a copy to your drive

Breakout Room	Data File	Unknown Absorbance
1 and 4	File	2.003
2 and 6	File	0.400
3 and 7	File	0.669
4 and 8	File	0.389