The absorbance of an electronic transition depends on two external factors.

1. The absorbance is directly proportional to the concentration \((c)\) of the solution of the sample used in the experiment.

\[ A \propto c \]

2. The absorbance is directly proportional to the length of the light path \((l)\), which is equal to the width of the cuvette.

\[ A \propto l \]

Combining the two relationships,

\[ A \propto cl \]

This proportionality can be converted into an equation by including a constant.

\[ A = \varepsilon cl \]

This formula is known as the **Beer-Lambert Law**, and the constant \(\varepsilon\) is called **molar absorptivity** or **molar extinction coefficient** and is a measure of the probability of the electronic transition. The larger the molar absorptivity, the more probable the electronic transition. In UV spectroscopy, the concentration of the sample solution is measured in \(\text{mol L}^{-1}\) and the length of the light path in cm. Thus, given that absorbance is unitless, the units of molar absorptivity are \(\text{L mol}^{-1} \text{cm}^{-1}\). However, since the units of molar absorptivity is always the above, it is customarily reported without units.

**Contributors**

- Gamini Gunawardena from the OChemPal site (Utah Valley University)