**Answer on Question #49793 – Chemistry – Physical Chemistry**

**Question:**

Describe law of absorption in photo chemistry.

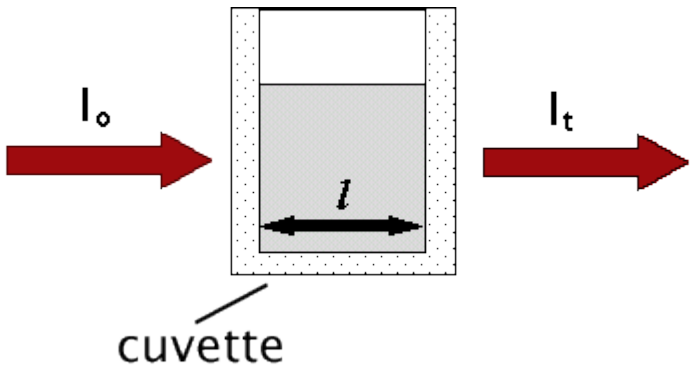
**Answer:**

To begin a photochemical process, an atom or molecule must absorb a quantum of light energy from a photon. When this occurs, the energy of the atom or molecule increases above its normal level. The atom or molecule is now in an excited (or activated) state. If a quantum of visible or ultraviolet light is absorbed, then an electron in a relatively low energy state of the atom or molecule is excited into a higher energy state. If infrared radiation is absorbed by a molecule, then the excitation energy affects the motions of the nuclei in the molecule.

After the initial absorption of a quantum of energy, the excited molecule can undergo a number of primary photochemical processes. A secondary process may occur after the primary step. The absorption step can be represented by $M \xrightarrow{light} M*$ where the molecule M absorbs a quantum of light of appropriate energy to yield the excited M* molecule.

**The Beer-Lambert Law**

The absorption of photons of light is described by the Beer-Lambert Law, a relationship that indicates a decrease in intensity as a beam passes through a medium that can absorb it. Consider a parallel beam of monochromatic light of initial intensity, $\mathbf{I_o}$, passing through a homogeneous absorbing medium




*Schematic representation showing that light of initial intensity, $I_o$, passing through an absorbing medium in a cuvette with light path, l, will emerge with a final intensity, $I_t$*

Another way of expressing this information is to use the Beer-Lambert Law. It states that the absorbance, A, of a molecular species is linearly related to the path length (centimeter), ***l*,** the absorber concentration (moles/liter), **c**, and the proportionality constant, $\varepsilon$ , called the molar extinction

coefficient of the absorbing molecular species (liters/mole-cm) [a measure of how strongly a chemical species absorbs light at a given wavelength].

$$A = \varepsilon\, cl$$