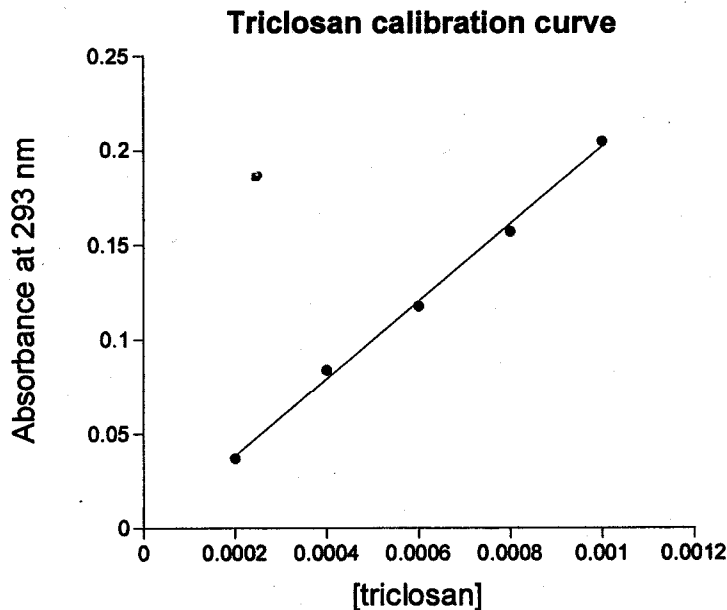


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### Beer's Law Practice Problem

A student prepared a calibration curve by measuring the absorbance of 5 standard solutions of triclosan (a common antibacterial compound) at 293 nm. A cuvette with a pathlength of 5.00 cm was used in the spectrophotometer. The following calibration curve was obtained:



When fitted to a linear function, the following equation was obtained from the graph:  $y = 204.5x$

- 1) Determine the molar absorptivity of triclosan at 293 nm.

$$\text{slope} = \epsilon b = 204.5 \text{ M}^{-1} \text{ (don't forget units!)}$$
$$\text{so } \epsilon = \frac{\text{slope}}{b} = \frac{204.5 \text{ M}^{-1}}{5.00 \text{ cm}} = \boxed{40.9 \text{ M}^{-1} \text{ cm}^{-1}}$$

- 2) The student measured the absorbance at 293 nm to be 0.111 with a 1.00 cm cuvette for a triclosan sample of unknown concentration. What is the concentration of triclosan in the sample?

$$A = \epsilon b C \Rightarrow C = \frac{A}{\epsilon b} = \frac{0.111}{(40.9 \text{ M}^{-1} \text{ cm}^{-1})(1.00 \text{ cm})}$$
$$\boxed{C = 2.714 \times 10^{-3} \text{ M}}$$

- 3) What is the absorbance and transmittance of a triclosan sample with a concentration of 0.00084 M measured with a 5.00 cm cuvette?

$$A = \epsilon b C = (204.5 \text{ M}^{-1} \text{ cm}^{-1})(0.00084 \text{ M})(5.00 \text{ cm}) = \boxed{0.172}$$

$$A = -\log T \Rightarrow T = 10^{-A} = 10^{-0.172} = \boxed{0.673 \text{ or } 67.3\%}$$