Ques 1-

At definite wave length, an absorber when placed in a cell of 1 cm pathlength absorbs 20% of the incident light. If the absorptivity of the absorber at this wave length is 2.0. Find out its concentration.

Solution:- Pathlength = 1 cm

Absorptivity (a) = 2.0

Absorption = 20%.

consider $I_0 = 100\%$.

$I = 80\%$.

$\therefore A = \log_{10} \frac{1}{T} \Rightarrow \log_{10}\left(\frac{I_0}{I}\right)$

$= \log \frac{100}{80} \Rightarrow 0.0969$

Now $A = a\,c\,l$

$0.0969 = 2 \times c \times 1$

$c = 0.04845$ gm/L

Since Here discuss about absorptivity unit L/gm-cm

Ques-2 A compound having concentration 10^{-3} g/L resulted absorbance value 0.20 at λ_{max} = 510nm using 1.0 cm cell. Calculate its absorptivity and Molar absorptivity values. Molecular weight of compound is 400.

Soln:

Concentration = 10^{-3} g/L

Absorbance (A) = 0.20

path length (l) = 1.0 cm

Find out a, ϵ

To calculate absorptivity

$$A = a\,c\,l$$

$$0.20 = a \times 10^{-3}\ \text{g/L} \times 1.0\ \text{cm}$$

$$a = \frac{0.20}{10^{-3}\ \frac{\text{g}}{\text{L}} \times \text{cm}}$$

$$\boxed{a = 200\ \text{L/gm-cm}}$$

To calculate Molar absorptivity ϵ

$$A = \epsilon\, c_m\, l$$

$$0.20 = \epsilon \times \frac{10^{-3}}{400} \times 1.0$$

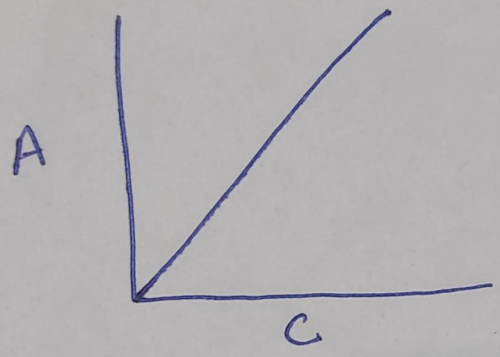
$$\epsilon = \frac{0.20}{2.5 \times 10^{-5}} = 0.8 \times 10^{5}\ \text{L/mol-cm}$$

Ques.3.

A student prepared a calibration curve by measuring of the absorbance of five standard soln of a compound at 300nm. A curette with a path length of 5cm was used in the stratosphere the slope if the curve was 300 L/mol the molar absorptivity of the compound is

---

Ans.



$y = mx + b$

Here $b = 0$

$mx = y$ we can write

$m = \frac{y}{x}$

$\text{Slope} = \frac{A}{C}$ — (1)

As we know that

$A = \varepsilon C l$

$\Rightarrow \frac{A}{C} = \varepsilon \cdot l$

$\Rightarrow$ from eqn (1)

$\text{Slope} = \varepsilon \cdot l$

According to question

$300 = \varepsilon \cdot 5$

$\varepsilon = \frac{300}{5}$

$= 60 \text{ L/mol-cm}$