

Time: By 8th July' 21

1. A solution of Tryptophan has an absorbance at 280 nm of 0.54 in a 0.5 cm length cuvette. Given the absorbance coefficient of Tryptophan is $6.4 \times 10^3 \text{ Lmol}^{-1}\text{cm}^{-1}$. What is the concentration of the solution?
2. A solution of thickness 2 cm transmits 40% incident light. Calculate the concentration of the solution, given that $\epsilon = 6000 \text{ dm}^3\text{mol}^{-1}\text{cm}^{-1}$.
3. A solution shows a transmittance of 20%, when taken in a cell of 2.5 cm thickness. Calculate its concentration, if the molar absorption coefficient is $12000 \text{ dm}^3\text{mol}^{-1}\text{cm}^{-1}$.
4. Calculate the molar absorptivity of a $1 \times 10^{-4} \text{ M}$ solution, which has an absorbance of 0.20, when the path length is 2.5 cm.
5. The concentration of yeast t-RNA in an aqueous solution is 10 M. The absorbance is found to be 0.209 when this solution is placed in a 1 cm cuvette and 258 nm radiations are passed through it.
 - (a) Calculate the specific absorptivity, including units, of yeast t-RNA.
 - (b) What will be the absorbance if the solution is 5M?
 - (c) What will be the absorbance if the path length of the original solution is increased to 5 cm?
6. Calculate the molar absorptivity of a $5 \times 10^{-4} \text{ M}$ solution, which has an absorbance of 0.17, when the path length is 1.3 cm.
7. A CaCO_3 solution shows a transmittance of 90%, when taken in a cell of 1.9 cm thickness. Calculate its concentration, if the molar absorption coefficient is $9000 \text{ dm}^3\text{mol}^{-1}\text{cm}^{-1}$.
8. Extinction coefficient of NADH at 340 nm is $6440 \text{ Lmol}^{-1}\text{cm}^{-1}$, whereas NAD does not absorb at 340 nm. What absorbance will be observed when light at 340 nm passes through a 1 cm cuvette containing 10 μM NADH and 10 μM NAD.
9. A $1 \times 10^{-4} \text{ M}$ solution of an analyte is placed in a sample cell with a path length of 1 cm. When measured at a wavelength of 350 nm, the solution's absorbance is 0.139. What is the analyte's molar absorptivity at this wavelength?
10. The absorbance of a Cu sulphate solution containing 0.5 mg Cu/mL was reported as 0.350 at 440 nm.
 - (a) Calculate the specific absorptivity, including units, of Cu sulphate on the assumption that a 1 cm cuvette was used.
 - (b) What will be the absorbance if the solution is diluted to twice its original volume?