UV/Visible spectroscopy
Electronic Excitation by UV/Vis Spectroscopy:

- X-ray: core electron excitation
- UV/vis: electronic excitation
- IR: molecular vibrations
- Radio waves: Nuclear spin states (in a magnetic field)
Many molecules have chromophores that absorb UV

Involves electronic transitions

Useful because timescale is so fast, and sensitivity high.

\[ \text{e.g.} \quad \text{wavelength } 300 \text{ nm } \approx 10^{15} \text{ s}^{-1} \text{ frequency} \]
\[ \text{Time for absorption } \approx 10^{-15} \text{ s time scale} \]

Kinetics, esp. in biochemistry, enzymology
Rate constant determination

- Plot of Absorbance Vs Time

Absorbance of light at a given wavelength is the sum of the absorbance of the different complex ions in solution. It can be seen that

\[ \frac{c}{c_0} = \frac{A - A_{\infty}}{A_0 - A_{\infty}} \]

- \( A_0 \) – initial absorbance (t=0),
- \( A \) – final absorbance, at infinite time.
- \( c \) – concentration at time \( t \)
- \( c_0 \) – initial concentration

A plot of \( \ln \left[ \frac{A - A}{A_0 - A} \right] \) vs. time will give a straight line with slope \(-k\), for a first order or pseudo first order reaction.
A common use: Enzyme kinetics

E.g: Effect of enzyme concentration on rate of reaction

- Enzyme assay of varying enzyme concentrations

- Absorbance measured at wavelength of maximum absorbance

- Plot of Absorbance Vs Concentration to compute \( \epsilon \). \(( A = \epsilon C / )\)

- Calculate and plot the reaction rate as a function of enzyme concentration.