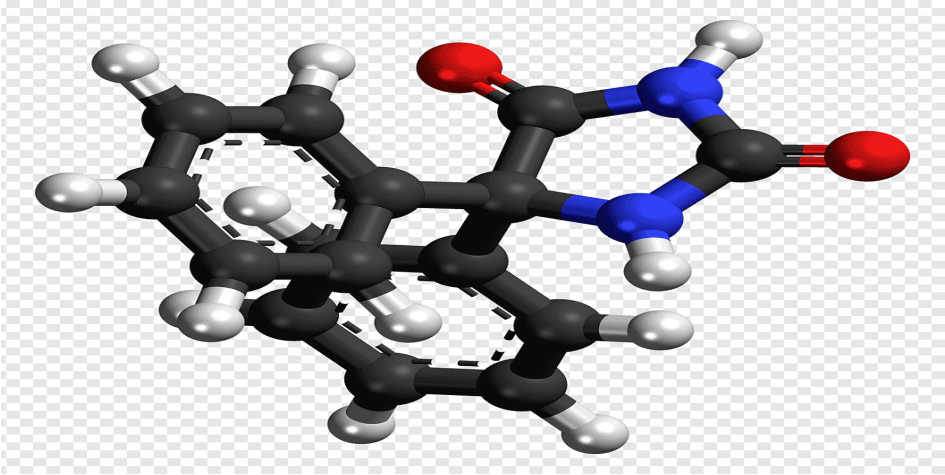
Organic Identification



Lecturer: Shaymaa Adil Mohammed

Visible and Ultraviolet Spectroscopy

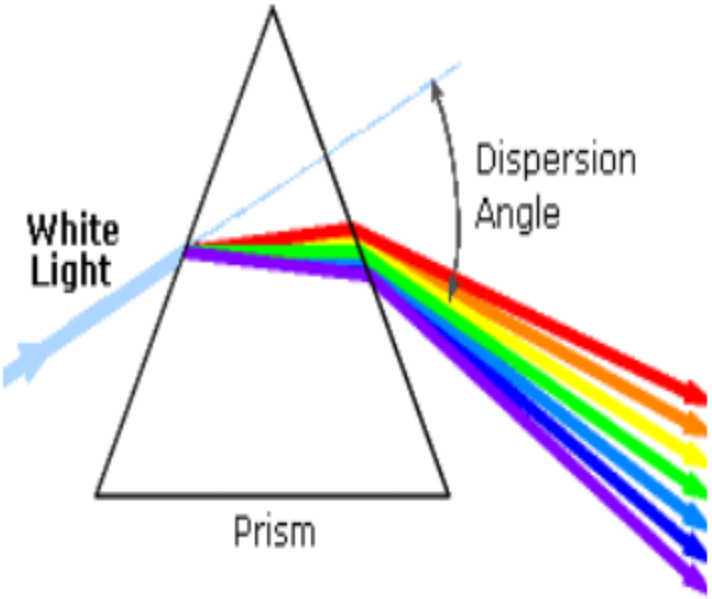
UV-Vis spectra

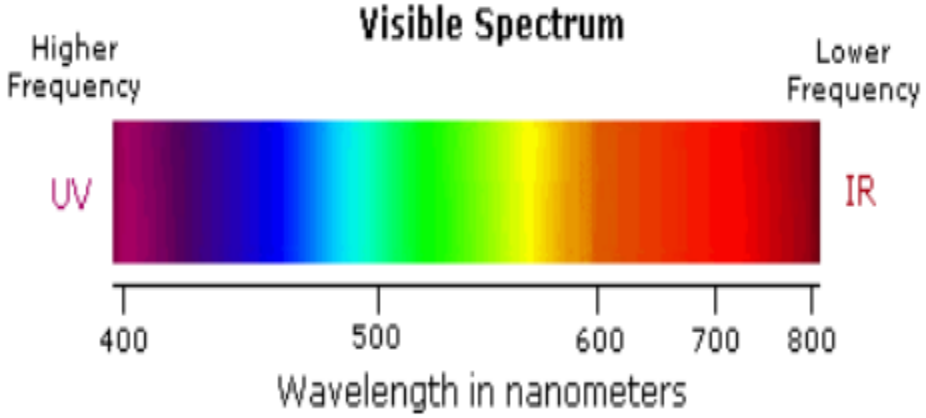
1. Basic principles
2. QM of interaction between light and molecules
3. Absorption spectroscopy of electronic states
4. Instrumentation - spectrophotometry
5. Spectroscopic analysis of biopolymers
6. Effect of conformation on absorption

A very brief history of the study of light

1. *Sir Isaac Newton 1672:*

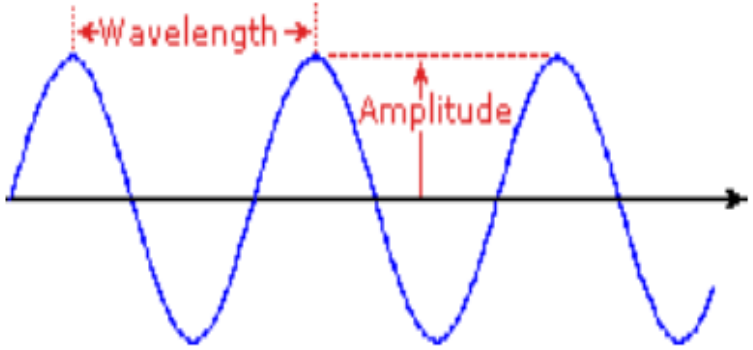
Showed that the component colors of the visible portion of white light can be separated through a prism, which acts to bend the light (refraction) in differing degrees according to the wavelength. Developed a "corpuscular" theory of light.





2. Christian Huygens 1692:

Developed a wave theory of light



3. Hans Christian Oersted 1820

Showed that there is a magnetic field associated with the flow of electric current

4. Michael Faraday 1831

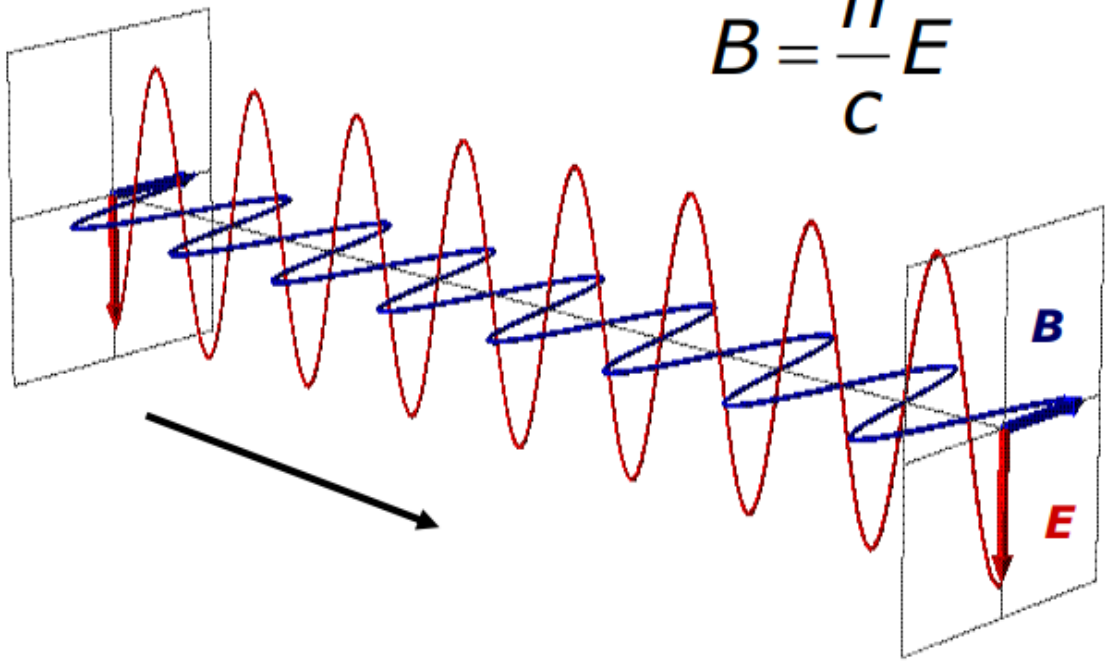
Showed the converse i.e. that there is an electric current associated with a change of magnetic field

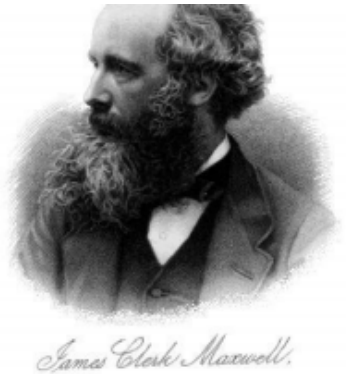
5. James Clerk Maxwell: (1831-1879)

Published his "Dynamical theory of the electromagnetic field" which combined the discoveries of Newton, Young, Foucault, Oersted and Faraday into a unified theory of electromagnetic radiation

Light consists of electromagnetic transverse waves of frequency ν and wavelength λ related by $\lambda\nu = nc$ where n is the index of refraction of the medium and c is the speed of the light in vacuum $c = 3 \times 10^{10}$ cm/s

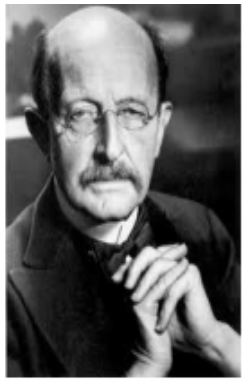
$$B = \frac{n}{c} E$$





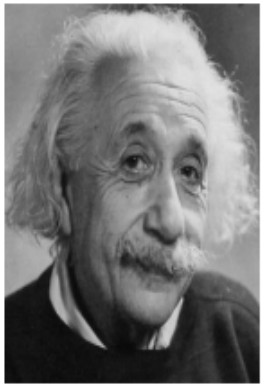
6. Max** Karl Ernst Ludwig **Planck: (1858-1947) ***NP: 1918***

Explained the laws of black body radiation by postulating that electromagnetic radiation is emitted at discrete energetic quanta $E = h\nu$, where Planck constant h = 6.6256 *10^{-34} Js.



7. Albert Einstein: (1879-1955) ***NP:1921***

Explained the explained the photoelectric effect by assuming that light is adsorbed at discrete energetic quanta $E = h\nu$, photons.



8. Louis** Victor Pierre Raymond **de Broglie: (1892-1987) ***NP:1929***

Introduced properties of electromagnetic waves to all particles – the wave-corpuscular dualism of quantum physics. A freely moving particle of momentum p has wavelength $\lambda = h/p$.