Class 11th | Chemistry

प्रारंभ BATCH

Unit : 1

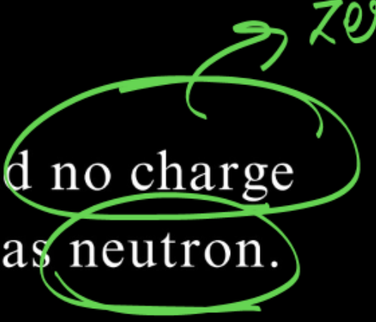
Structure of Atom

Lecture - 4

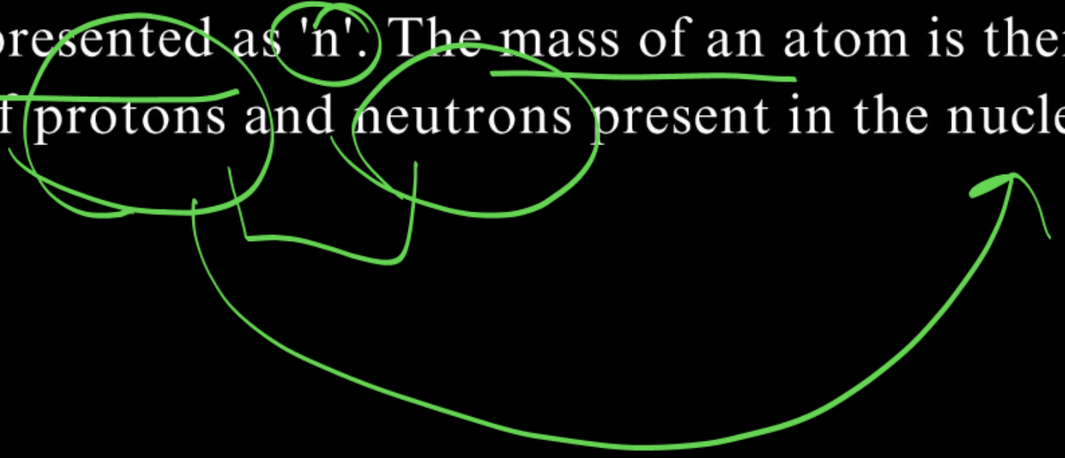
winner → Sab

Discovery of Neutrons

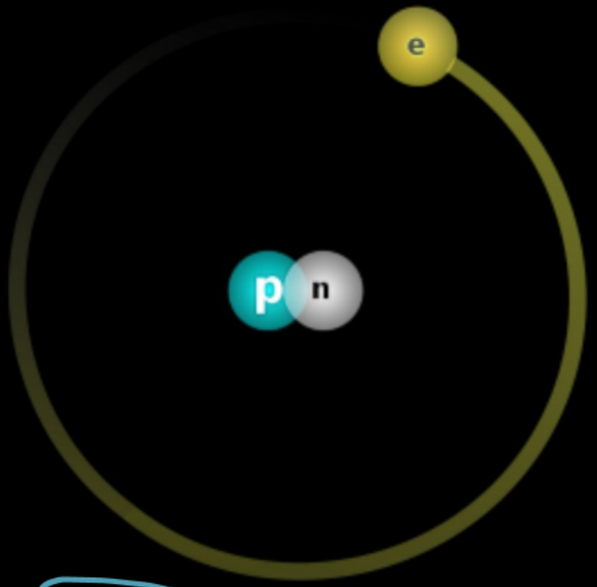
- In 1932, J. Chadwick discovered another subatomic particle which had no charge and a mass nearly equal to that of a proton. It was eventually named as neutron.



- Neutrons are present in the nucleus of all atoms, except hydrogen.
- In general, a neutron is represented as 'n'. The mass of an atom is therefore given by the sum of the masses of protons and neutrons present in the nucleus.



Neutrons are the neutral particles.

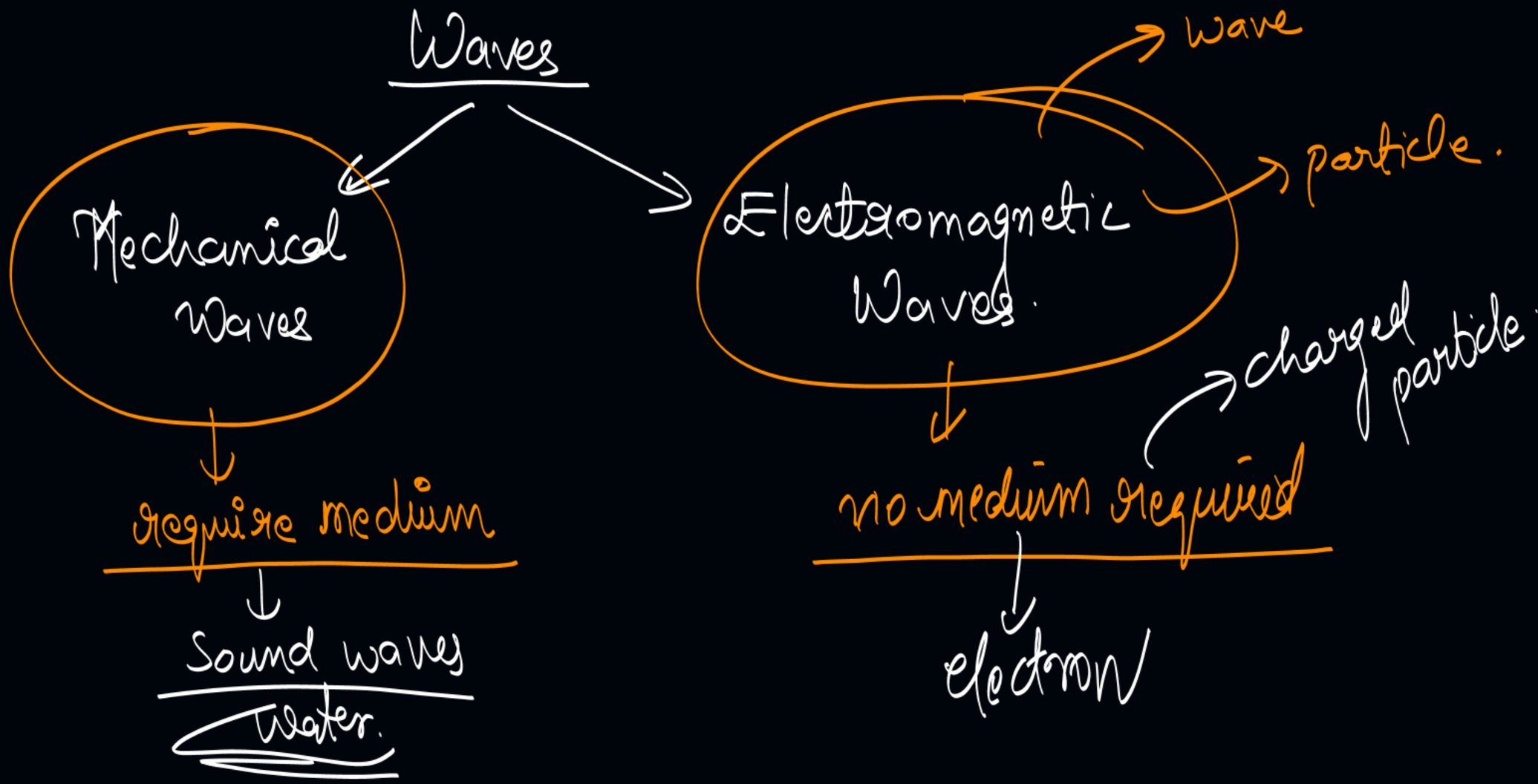


Neutron	0	1.6750×10^{-24} g

Bohr's Atomic Model

In 1913, the Danish scientist Niels Bohr proposed an improvement.

In his model, he placed each electron in a specific energy level.


Waves
Mechanical Waves
require medium
Sound waves
water.
Electromagnetic Waves.
wave
particle.
no medium required
charged particle
electron

Development leading to Bohr's Atomic Model

- Dual character of the electromagnetic radiation which means that radiations possess both wave like and particle like properties, and Experimental results regarding atomic spectra.

- In an atom, it was realised that the attraction between the electrons and the protons should make the atom unstable.

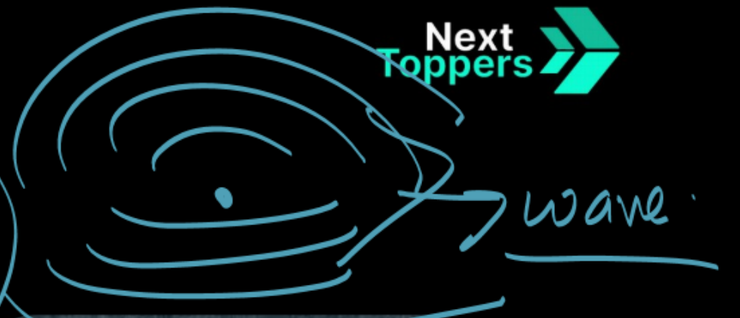
- Bohr proposed a model in which the electrons would stably occupy fixed orbits, as long as these orbits had special discrete locations.

प्रारंभ BATCH

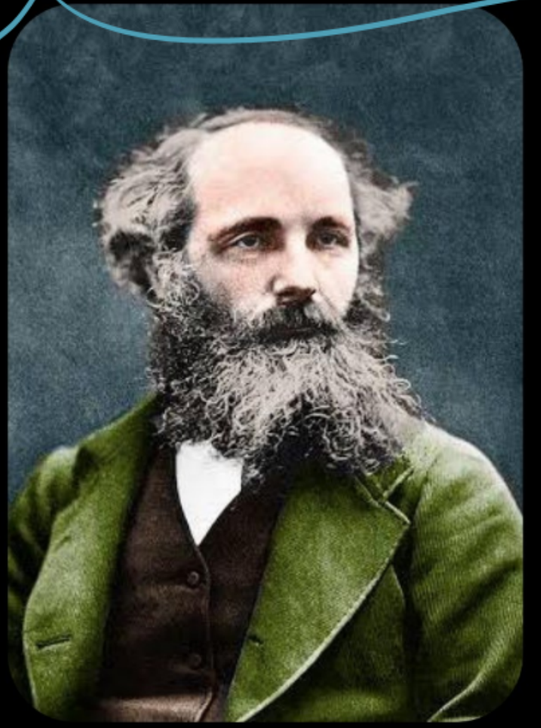
Repeat = Killer

Next Toppers

Wave Nature of Electromagnetic Radiation

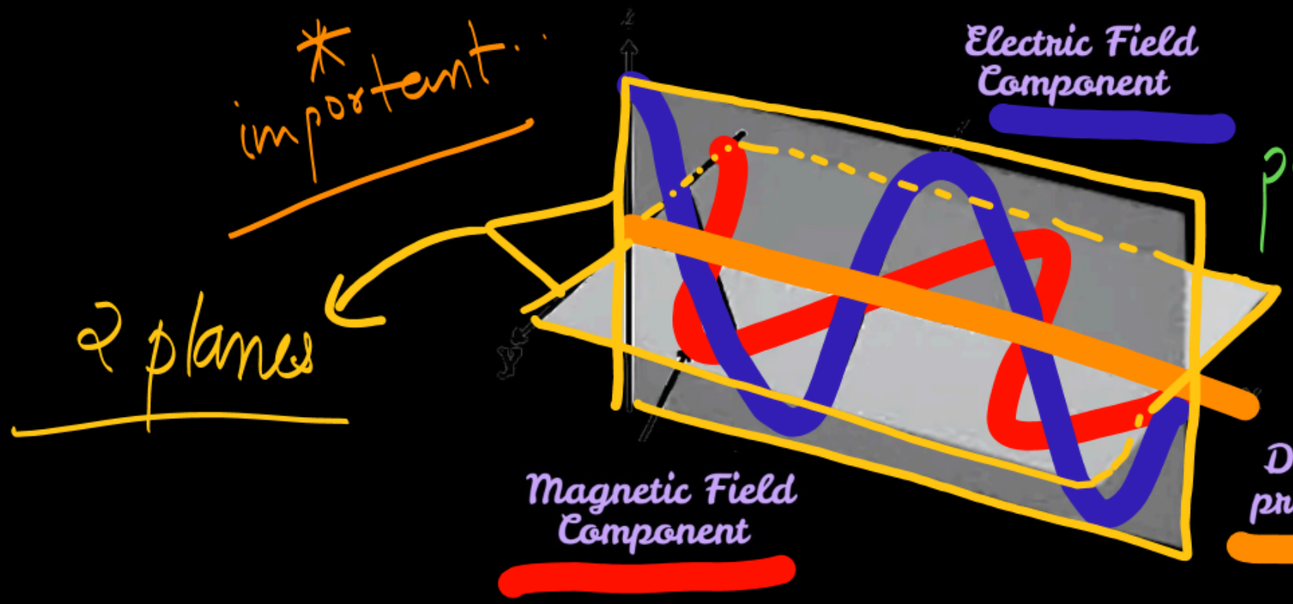


- James Maxwell (1870) was the first to give a comprehensive explanation about the interaction between the charged bodies and the behaviour of electrical and magnetic fields on macroscopic level.
- He suggested that when electrically charged particle moves under accelaration, alternating electrical and magnetic fields are produced and transmitted.
- These fields are transmitted in the forms of waves called electromagnetic waves or electromagnetic radiation.



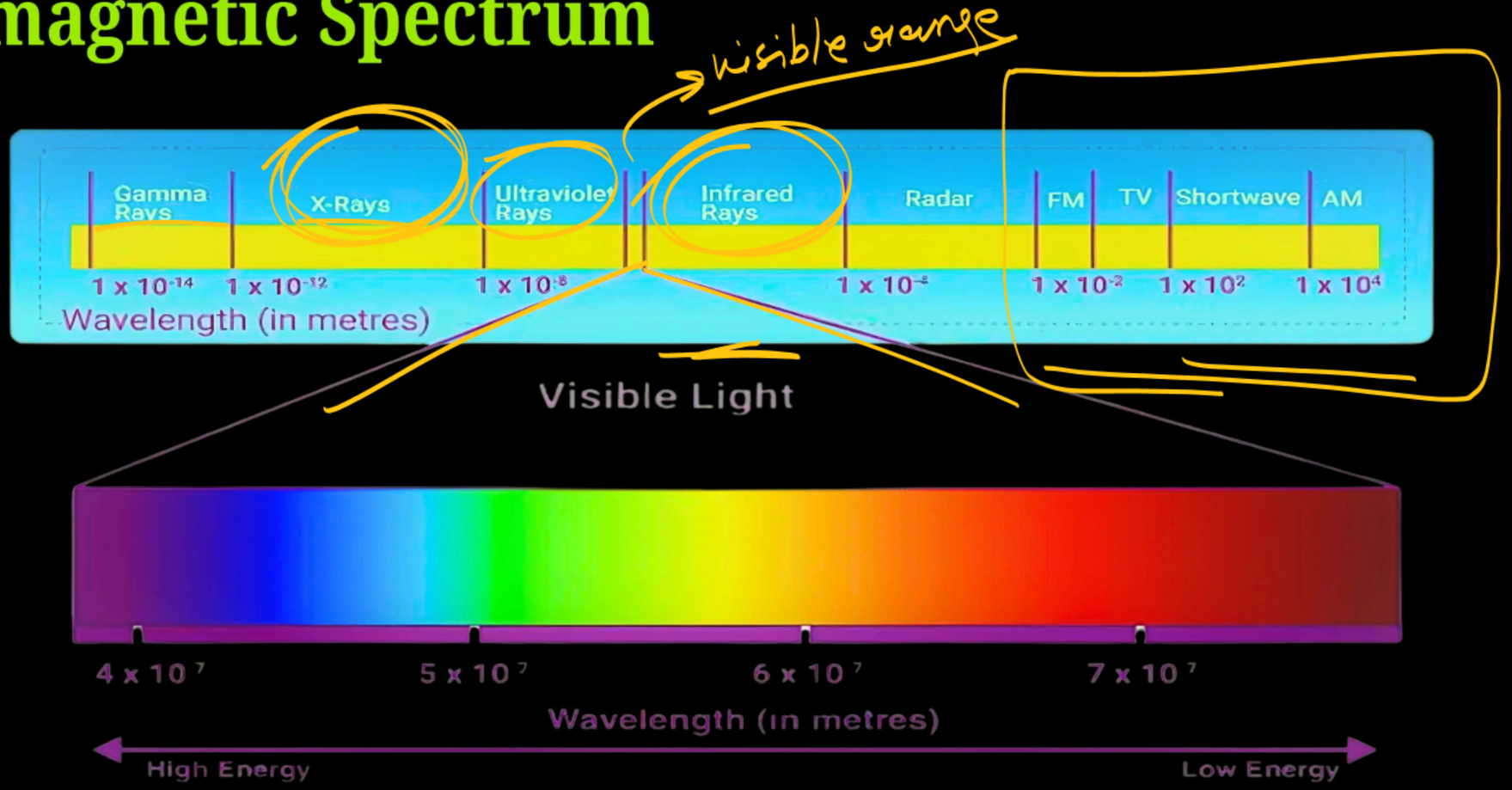
Killian

- When electrically charged particle moves under acceleration, alternating electrical & magnetic feilds are produced & transmitted.
- *The electric and magnetic field components of an electromagnetic wave.*
- *These components have the same wavelength, frequency, speed and amplitude, but they vibrate in two mutually perpendicular planes.*



important
2 planes
perpendicular
electricfeild
Direction of propagation
magnetic feild

Electromagnetic Spectrum



Wavelength decreases, Frequency increases , Penetrating power increase

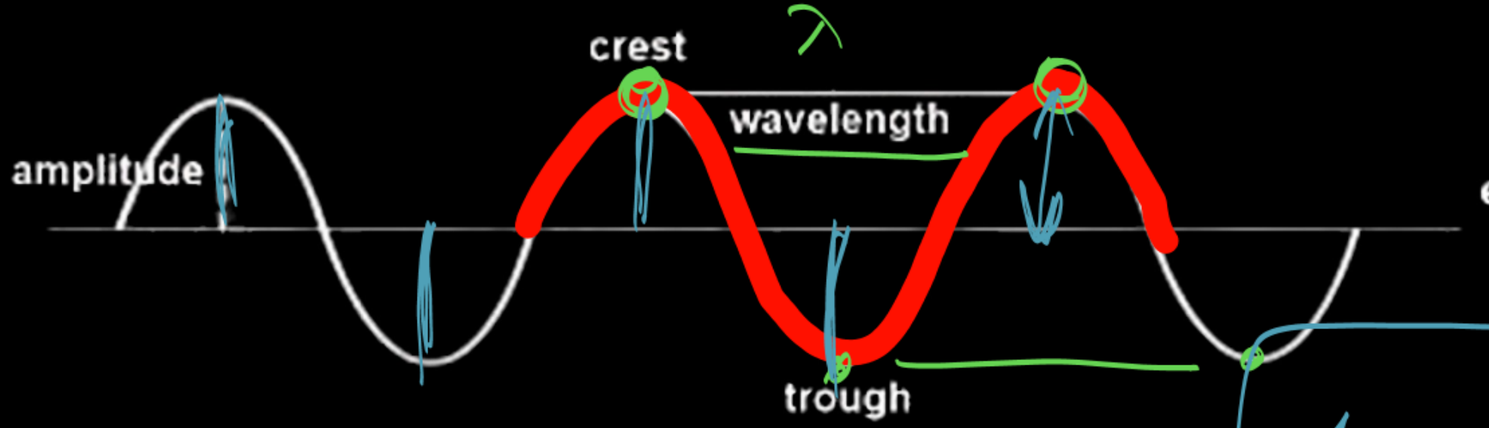
Electromagnetic Spectrum

- Wavelength (λ) It is defined as the distance between two consecutive crests or troughs. SI Unit = metre
- Frequency (ν) It is defined as the number of waves passing through a point in one second. The SI units of frequency are Hertz (Hz or sec 1) 1Hz = 1 cycle/sec.
- Velocity (c) It is the linear distance travelled by the wave in one second. It is represented by c. Its units are cm/sec or m/sec.
- Amplitude It is the height of the crest or depth of the trough. Its units are cm or metre.
- Wave Number ($\bar{\nu}$) It is defined as the number of waves per unit lengths. It is reciprocal of the wavelength. Unit = m^{-1} or cm^{-1}

$$\bar{\nu} = \frac{1}{\lambda}$$

Electromagnetic Spectrum

1 sec → ?? waves passed



1 cm → ?? waves
↓
wavenumber

Wavelength and frequency are inversely related to each other

Speed of light (3×10^8 m/s) ⟶ $C = \lambda\nu$ ⟵ Frequency

Wavelength ↑

As wavelength increases, frequency decreases
As wavelength decreases, frequency increases

Electromagnetic Spectrum

Killian?

- Different kinds of units are used to represent electromagnetic radiation.
- These radiations are characterised by the properties, namely, frequency (v) and wavelength (Λ).
- In vaccum all types of electromagnetic radiations, regardless of wavelength, travel at the same speed, i.e., 3.0×10^8 m/s (2.997925×10^8 m/s , to be precise). This is called speed of light and is given the symbol c.

Properties of electromagnetic wave

- The oscillating electric and magnetic fields produced by oscillating charged particles are perpendicular to each other and both are perpendicular to the direction of propagation of the wave.

- Unlike sound waves or waves produced in water, electromagnetic waves do not require medium and can move in vacuum. It is now well established that there are many types of electromagnetic radiations, which differ from one another in wavelength (or frequency). These constitute which is called electromagnetic spectrum.

Next Toppers

Khatam !
Tata !!
Bye-Bye !!!

Fir Mileinge...

Killiar.

Tomorrow
@
at 8 p.m.