

Chapter 06

Structure of atom

Introduction:

Spectrum:

We need to understand the nature of light, colored flames and their characteristics. There are seven colors in a rainbow namely VIBGYOR; Violet, Indigo, Blue, Green, Yellow, Orange and Red. You can find the colors spreading continuously and the intensity of each color varies from one point to the other. Coming to the wave nature of a light. When you throw a stone into a still pond, you observe ripples.

You observe these ripples are transmitting the disturbance in the form of waves on the surfaces of water. Similarly, sound waves are produced when something vibrates.

Ex:

There is a skin on **Tabla**, where a tabla artist hits the skin, which causes vibration in the skin. Consequently, it makes a particular sound.

Similarly, think of a **Flute**. When a flutiest blows air, the air column in the flute vibrates and produces sounds. Electromagnetic waves are produced when an electric charge vibrates.

This process continues with both fields being created and are perpendicular to each other at right angles to the direction of propagation of wave. So an electric field and a magnetic field are produced at right angles to each other and are also right angle to the propagation of the wave.

Characteristics of an electromagnetic waves:

Wavelength is represented by ' λ '. The wavelength of the wave is the distance from one wave peak to the next. Another term to describe a characteristic of an electromagnetic wave is frequency. Frequency is represented with a letter ' ν '. The

frequency of a wave is simply the number of wave peaks that pass by a given point per unit time. When we are saying per unit time, we express the units as $1/s$ or s^{-1} .

The relation between frequency and wavelength is $\lambda \propto \nu$.

The entire range of electromagnetic wave frequencies is known as electromagnetic spectrum. It consists of continuous range of wavelengths with ' γ ' waves at the shorter wavelength to radio waves at the longer wavelength.

Consider, you are heating an iron rod on flame. When you heat an iron rod some of the heat energy is emitted as light. So, as the iron rod is heated, the temperature of iron rod increases. Iron rod turns to red followed by more increase in temperature makes it glow in orange colour then comes to yellow, blue or even white if the temperature is high enough.

Increase in temperature causes different wavelengths or frequencies to be emitted giving different colours to the iron rod.

