

SCIENCE

DISPERSION OF WHITE LIGHT BY A GLASS PRISM

DISPERSION OF LIGHT BY A PRISM

- ❖ **Definition :** When a ray of white light (sunlight) enters a glass prism (denser medium). It emerges out from it broken into seven colours.

This phenomenon, due to which different components of a white light are separated by a denser medium, is called dispersion (separation).

- ❖ **Explanation :** It is due to different velocities of different components of white light in the denser medium.

White light has seven colours, namely, violet indigo, blue, green, yellow, orange and red (remembered by the word VIBGYOR). In air (strictly in vacuum) light waves of all colours have same velocity (3×10^8 m/s).

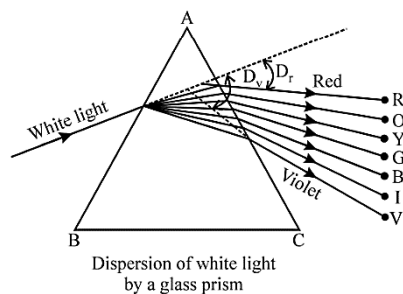
But in a denser medium, their velocities become less and different. Red light waves, being longest in length, travel fastest and have maximum velocity. Violet light waves, being shortest in length, travel slowest and have minimum velocity in the denser medium.

The refractive index (μ) of a medium for a wave is given by the relation.

$$\mu = \frac{\text{Velocity of wave in air (or vacuum)}}{\text{Velocity of wave in the medium}} = \frac{c}{v} \quad (\text{Wave nature of light})$$

Since v is maximum for red light waves and minimum for violet light waves. μ is minimum for red light and maximum for violet light.

The prism produces deviation (change in direction) in a light wave. The angle of deviation 'D' produced by a prism of angle 'A' is given by $D = (\mu - 1) A$. Red light waves suffer least deviation, whereas violet light waves suffer maximum deviation. [Fig.]



Due to difference in deviation, waves of different colours emerge out from the prism in different directions and are said to have been dispersed (separated).

When the dispersed white light is made to fall on a white screen, we get a seven coloured band or light. This coloured band is called spectrum.