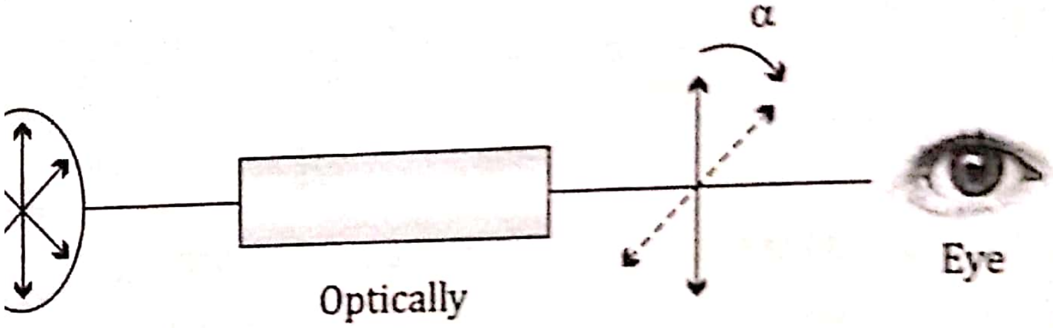
## 3.2. Optical Activity :

The compounds which rotate the plane polarised light are called **optically active** and the phenomenon is known as **Optical isomerism.**

Before discussing optical isomerism, let us discuss the following terms.

## 3.3. Plane Polarised Light :

An ordinary ray of light vibrates in all the directions perpendicular to it's path of propagation. When this light is passed through a Nicol prism* the light coming out of Nicol prism has vibrations only in one plane. Such a light is called plane polarised light and the plane along which vibrations occur is known as plane of polarisation.




**e polarised light.**

(*v*) Wavelength of the light used

(*vi*) Temperature of the solution.

## 3.4. Specific Rotation :

The optcal activity of a substance is expressed in terms of specific rotation $[\alpha]^t_\lambda$ which is characteristic of a compound like melting and boiling point. It is a constant quantity of a particular substance and given by the following relation :

$$[\alpha]^t_\lambda = \pm\frac{\alpha}{l \times c} \quad ...(3.1)$$

where $\alpha$ = Observed rotation in degrees

$l$ = Length of polarimeter tube in decimeter

$c$ = Concentration of substance in gm per mol of solution

$t$ = Temperature of experiment

$\lambda$ = Wavelength of light used.

In equation (3.1) if $l = 1$ and $c = 1$, hence

$$[\alpha]_{\lambda}^{t} = \alpha \qquad \text{... (3.2)}$$

Thus, specific rotation is defined as the optical rotation produced by a compound when plane polarised light passes through one decimeter length of solution having concentration one gram per millilitre. Generally sodium lamp is used as light source to get monochromatic light called D line of sodium ($\lambda$ = 589 nm). As the specific rotation also depends upon the nature of solvent, it is also mentioned while reporting the specific rotation. *i.e.*

$$[\alpha]_{D}^{t} = \pm \frac{\alpha}{l \times c} \text{ (solvent)}$$

Thus, specific rotation of cane sugar can be expressed as :

$$[\alpha]_{D}^{20} = +\ 66.5^{\circ} \text{ (water)}$$

In the above expression D stands for D line of sodium, 20°C is the temperature of experiment, + sign indicates dexorotation and water is the solvent used.