

Action of Nicol as Analyzer is —

Nicol prism can also be used as an

analyser i.e. to detect whether a given light is plane polarised or not.

Let us suppose that a plane polarized light be made incident on one face of a Nicol, so that the direction of its vibration of amplitudes makes an angle  $\theta$  with the principal section of Nicol. The two resolved components  $a \cos \theta$  and  $a \sin \theta$  are respectively parallel and perpendicular to the principal section of the Nicol. The component  $a \cos \theta$  which is parallel to the principal section will be freely transmitted as E-ray while the component  $a \sin \theta$ , which is perpendicular to the principal section of Nicol will behave as the O-ray and will be cut off by the total reflection.

If, Now Nicol is rotated with the ordinary rays as axis, the value of  $\theta$  will change. When  $\theta = 0$  i.e. when the principal section of Nicol is ~~perpendicular~~ ~~to the refraction~~ parallel to the vibration of incident light. The amplitude of the transmitted component will be  $a$ , which is maximum and hence the field would be bright. But when  $\theta = 90^\circ$  i.e. when the principal section of Nicol is perpendicular to the ~~aligned~~ refraction of incident light. The amplitude of transmitted component is zero and the field will be dark.

Thus, it can be concluded that if the incident light be plane polarised, the intensity of the light transmitted through the Nicol will be greatest in one position and is zero in other position. If the incident light be unpolarised or common light, then for any position of Nicol, the vibration of the incident light can be resolved parallel and perpendicular to its principal section and the resultant amplitude of these two perpendicular components will always be equal.

The parallel components will pass through the Nicol, while the perpendicular components will be refused transmission and the field remain equally bright. The transmitted light will be plane polarised whose vibration will remain parallel to the principal section of Nicol.

Thus, by using Nicol, we can detect whether the given light is plane polarised or unpolarised.