AIM :

To observe polarisation of light using two Polaroids.

APPARATUS :

A source of light, (say the sun or an electric bulb), two polaroid pieces (e.g. the pieces used in front of digital panel of a calculator).

THEORY :

We know light waves are transverse waves and possesses vibrations perpendicular to the plane of propagation or electric field vector and magnetic field vector variations are mutually perpendicular to each other and also perpendicular to the direcion of propagation of light as shown in Fig. 1?

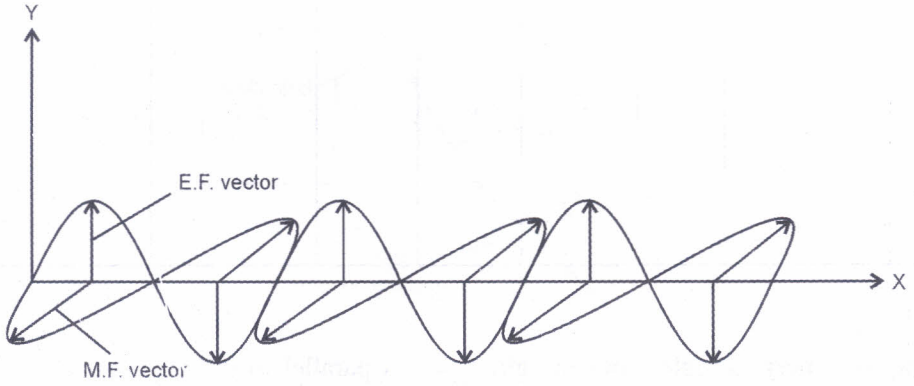
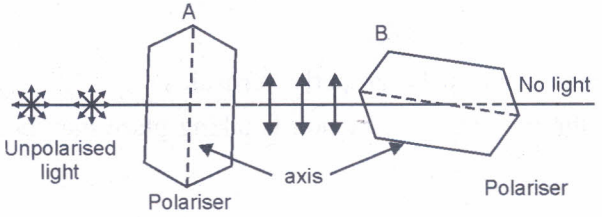


Fig. 1

When a beam of unpolarised light passes through the polaroid, it becomes plane polarised. If another polaroid is placed in front of plane polarised light as the both polaroids are in cross-position (i.e. 90° with each other), then no light will emerge out from the second polaroid i.e. if the axes of two polaroids are ⊥ to each other, intensity of light emerging from second polaroid will be zero. (see Fig. 2)



But, if the axes of two polaroids are **parallel** to each other, then we will observe plane polarised light from the second polaroid (Fig. 3) with maximum intensity.

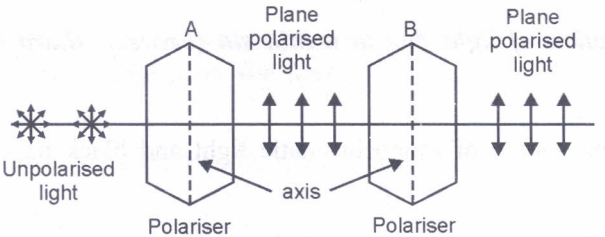


Fig. 3 : Two polarisers are kept with axes parallel to each other

Polaroid is made of tourmaline crystals sandwitched between cellulose films.

PROCEDURE :

1. Allow a beam of light to fall on Polaroid A. Light with vibrations parallel to plane of transmission will be observed. The intensity of light will fall or will change.
2. Rotate the polaroid about its axis, no change in intensity of light will be observed.
3. Hold another polaroid B with its axis parallel to A, no change in intensity of light will be observed.
4. Rotate the polaroid B with respect to polaroid A, when axis of B is perpendicular to the axis of A, no light will be visible through the combination.

PRECAUTIONS :

(i) Polaroids should be of good tourmaline crystal.

(ii) Light source should be of ordinary white light.

(iii) Polaroids should be properly set for perpendicular angle and parallel angle.

SOURCES OF ERROR :

(i) The polaroids may not be of good quality.

(ii) Polaroids placed may not be properly (perpendicular or parallel).