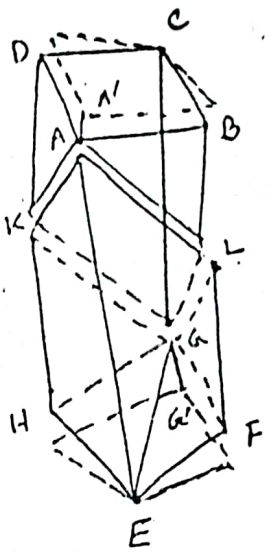
Construction of Nicol prism:



The nicol prism is made in such a way that it eliminates one of the two rays by total internal reflection. It is generally found that the ordinary ray is eliminated and the extra ordinary ray is transmitted through the prism.

A calcite crystal whose length is three times to its breadth breadth is taken. Let A'BCDEFG'H represents the crystal having A' and G' as its blunt corners and A'CG'E is one of the principal section with $\angle A'C G' = 70°$

The face A'BCD and EFG'H are ground in such a way that the angle ACG become = 68° instead of 71°. The crystal is then cut along the plane AKGL as shown in the figure. The two cut surface are grounded and polished optically flat and then cemented together by canada balsam, which refractive index lies between the refractive index of the ordinary and extra-ordinary rays.

Refractive index of ordinary = 1.658.

" " " Canada balsam = 1.550.

" " " Extra Ordinary = 1.486.

Specific rotation:

The specific rotation is defined as the rotation produced by a decimeter (10cm) long column of the liquid containing 1 gram of the active substance in one c.c of the solution.

Therefore, $$S_{\lambda}' = \frac{100\theta}{lc}$$

here,

S_{λ}' = sepecific Rotation at t°c temp. for awave length λ

θ = Angle of rotation.

l = ~~Heng~~ Length of the substance.

c = concentration of the active substance.

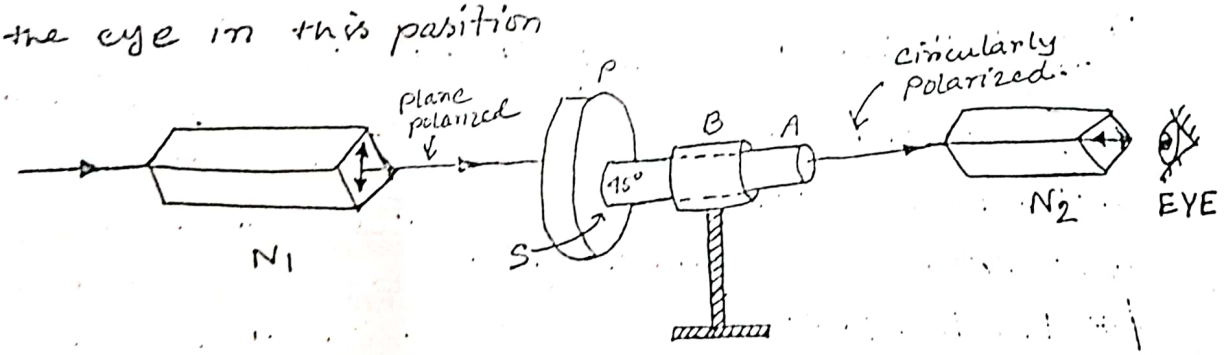
Nicol prism used as Analyzer:

(Shed in army.)

Production of circularly polarized light :-

To produce circularly polarized light the two waves vibrating at right angle to each other and having the same amplitude and time period should have a phase difference of $\pi/2$ or path difference of $\lambda/4$. For this purpose a parallel beam of monochromatic light is allowed to fall on Nicol prism N_1, (plane polarized).

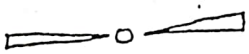
The Nicol prism N_2 is placed at some distance from N_1 so that N_1 and N_2 are crossed. The field of view will be dark as viewed by the eye in this position



A quarter wave plate p is is mounted on a tube. The tube A can rotate about the outer fixed tube B introduced between the nicol prisms N_1 and N_2. The plane polarised light from N_1 falls normally on p and the field of view maybe bright. The quarter wave plate is rotated until the field of view is dark keeping p fixed. A is rotated such that

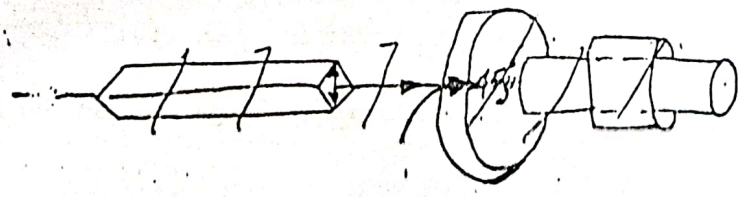
the + mark S on P coincides with zero mark on A. Afterwards, by rotating the quarter wave plate P, the mark is made to coincide with 45° mark on A.

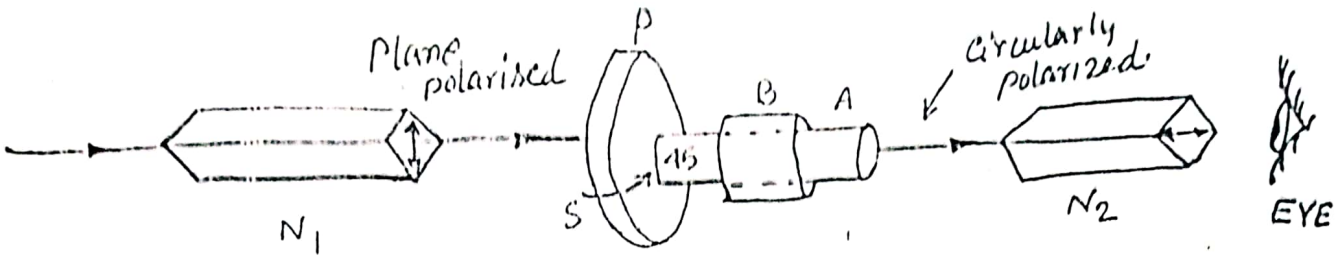
The quarter wave plate is in the desired position. In this case, the vibration of the plane-polarized light falling on the quarter wave plate make an angle of 45° with the direction of the optic axis of the quarter wave plate. So light coming out from the quarter wave plate is circularly polarized. In this case circularly polarized light can be produced.



Production of Elliptically polarized light :-

To produce elliptically polarized light, we need two waves which vibrate at right angles to each other and have unequal amplitude and should have the phase difference of $\pi/2$ or the path difference $\lambda/4$. For this purpose a parallel beam of monochromatic light is allowed to fall on a nicol prism N_1 and after passing through it the light the light becomes plane polarized.





Another nicol prism N_2 is placed at some distance from N_1 so that N_1 and N_2 are crossed and the light of view is dark. A quarter wave plate P is mounted on tube A. The tube ~~producing~~ A can rotate about the outer fixed tube B. The plane-polarized light from Nicol prism N_1 normally falls on quarter wave plate P. Here the field of view is illuminated and the light coming out from the Quarter wave plate is elliptically polarized. In this way, Elliptically polarized light can be produced.

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Specific rotation : आपेक्षिक घूर्णन।

LAURENT'S HALF SHADE POLARIMETER :