

## 1. Double Refraction of Light :-

When a ray of unpolarised light is passing through calcite crystal then it is split up into two refracted rays one of the refracted rays ~~one~~ follows the laws of refraction and hence it is called ordinary ray (o-ray) whereas the other refracted ray does not follow the laws of refraction known as extra-ordinary ray (e-ray). When it is viewed through the crystal and such phenomenon is called Double Refraction which is demonstrated below :-



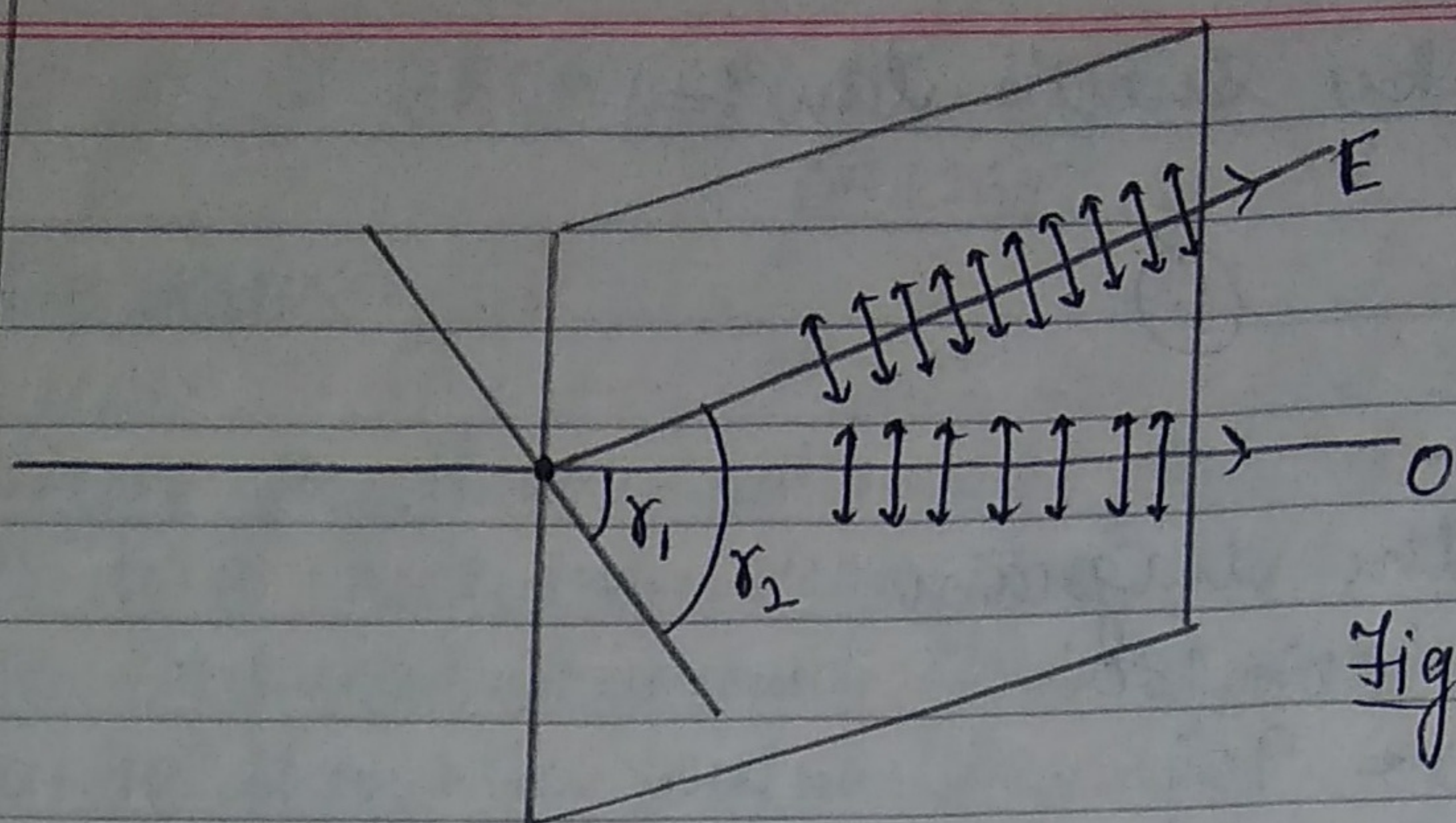


Figure ①

This phenomenon may be observed by the help of following experiment

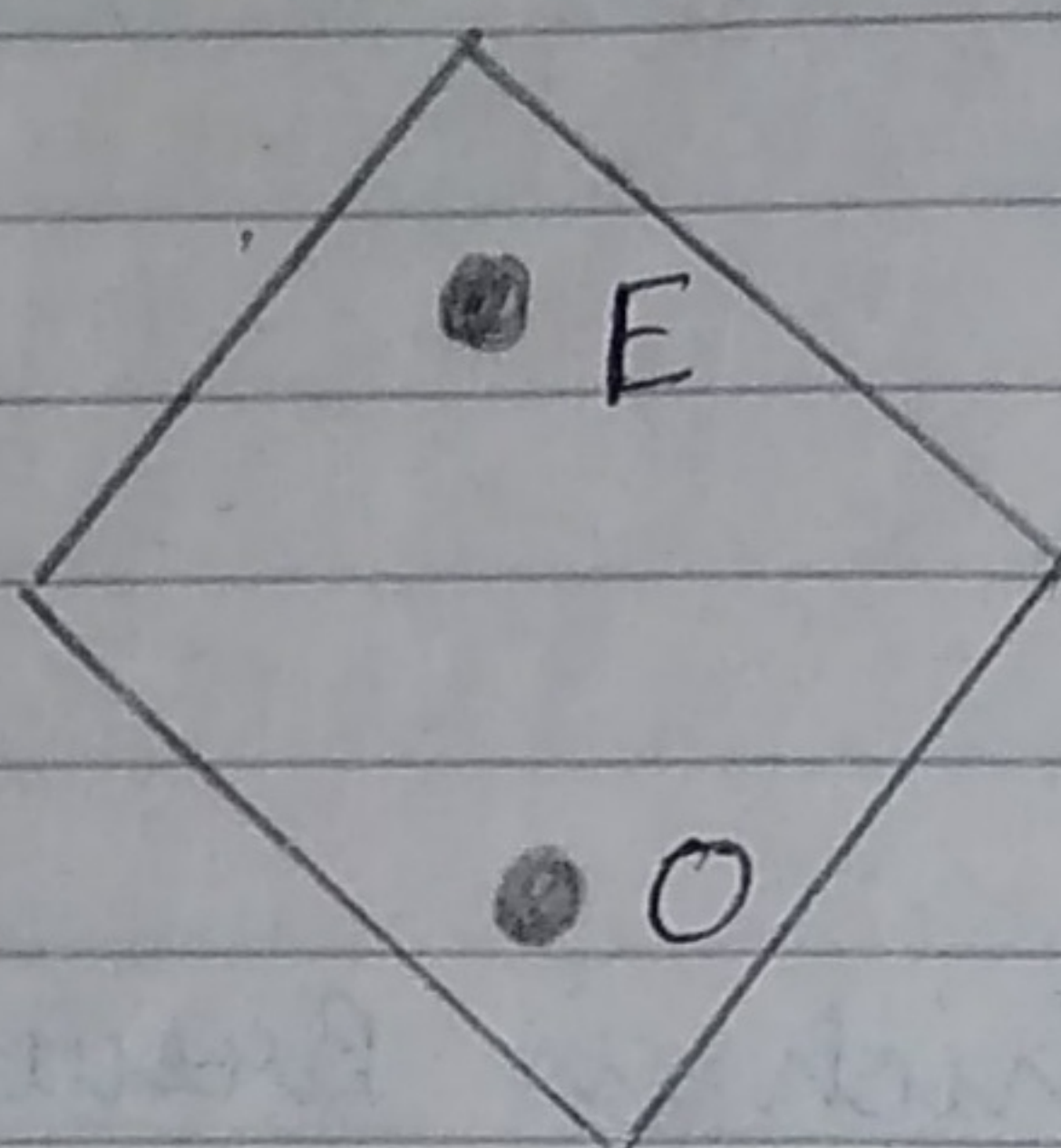


Figure ②

An ink spot mark on a white paper and a calcite crystal is placed over it then two images of ink spot are observed which images are called O-ray and E-ray. If the crystal is rotated slowly about a vertical axis then it is observed that one image remains fixed and the other image rotates with the rotation of the crystal.

The fixed image is called O-ray whereas the other image is called E-ray.

If  $\mu_o$  and  $\mu_e$  be the refractive indices of O-ray and e-ray then by Snell's law -

$$\mu_o = \frac{\sin i}{\sin r_1}$$



and  $\boxed{\mu_e = \frac{\sin i}{\sin r_2}}$

It is to be noted that  $r_1 < r_2$

$\therefore \boxed{\mu_o > \mu_e}$

i.e. It means that the velocity of o-ray through the calcite crystal is less than that of e-ray and such calcite crystal is called uniaxial negative crystal.

But there is another crystal Tourmaline then in this crystal  $\mu_e > \mu_o$  and such crystal is called positive crystal.