B.Sc - II 25/1/22

# Quarter wave (λ/4) Plate & Half wave (λ/2) Plate

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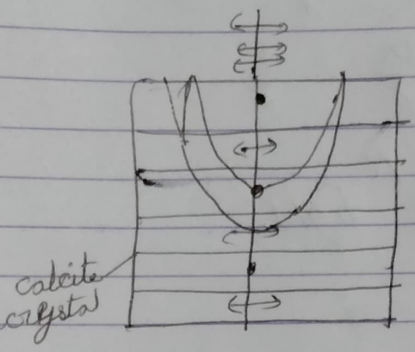
**Retardation plate** =>

A plate cut from double refracting uniaxial crystal, with its optics axis is parallel to refracting surface can be used to introduce a given phase between O-ray and E-ray travelling normally throught it such plate is known as retardation plate




velocity - diff. - Phase diff. or Path difference

Types

(i) Quarter wave Plate

Half wave plate

b) Quarter wave Plate (λ/4)

$\frac{1}{4}$ - O-ray & E-ray

Path difference ($\Delta$) $= d(\mu_o - \mu_E)$

$\Delta = \frac{\lambda}{4}$

Phase difference $= \frac{2\pi}{\lambda} \times \Delta$

$= \frac{2\pi}{\lambda} \times \frac{\lambda}{4 \times 2} = \frac{\pi}{2}$

If thickness of the crystal plate introduces a path difference ($\lambda/4$) or phase difference [$\pi/2$] between o-ray & E-ray, then this plate is called quarter wave plate

ii) Half wave plate ($\lambda/2$)

Path difference - $\lambda/2$

o-ray & E ray

Phase difference $= \frac{2\pi}{\lambda} \times \Delta$

$= \frac{2\pi}{\lambda} \times \frac{\lambda}{2}$

$= \pi$

Plane polarised light.

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