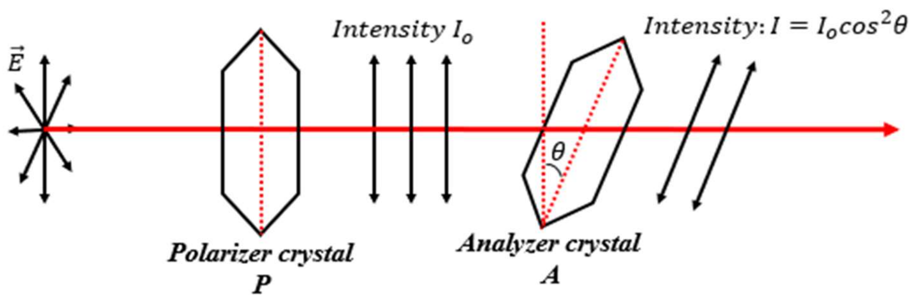
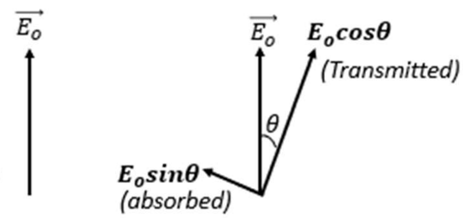


As in previous case, the parallel component light (with amplitude $E_o cos\theta$) are allowed to pass through analyzer and the perpendicular components (with amplitude $E_o sin\theta$) are absorbed.



Then the intensity of light transmitted through the analyzer is:

$$I \propto (E_o cos\theta)^2$$

Or, $I = {E_o}^2 cos^2\theta \dots\dots\dots (2)$

From equations (1) and (2), we get

$$\boldsymbol{I = I_o\, cos^2\theta}$$

or, $\boxed{I \propto cos^2\theta}$ This is Malus law.

Note:

Malus law:

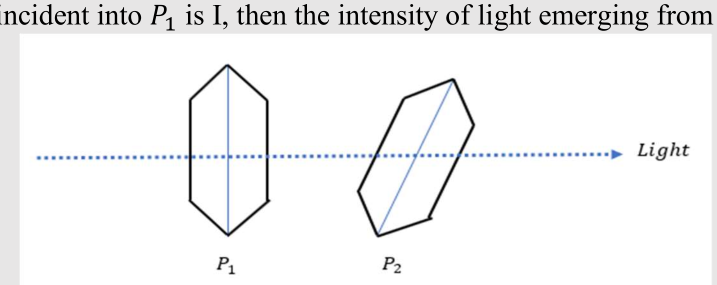
If, $I_1 = intensity\ of\ unpolarized\ light$

$I_2 = intensity\ of\ light\ transmitted\ through\ 1^{st}\ polaroid$

$I_3 = intensity\ of\ light\ transmitted\ through\ 2^{st}\ polaroid$

Then, $I_2 = \frac{I_1}{2}$ and $I_3 = I_2\, cos^2\theta$, where θ is the angle between two polaroids.

1. Two polaroids are oriented with their planes perpendicular to incident light and their transmission axes are oriented at 60^o. Then the percentage of finally transmitted polarized light will be:
   a. 12.5% b. 37.5% c. 62.5% d. 87.5%
2. In the given figure, two Polaroids: $P_1\ and\ P_2$ are oriented at an angle 60^o. If the intensity of unpolarized light incident into P_1 is I, then the intensity of light emerging from P_2 is:



   a. $\frac{I}{4}$ b. $\frac{I}{8}$ c. $4I$ d. $8I$
3. Two polaroids are inclined at angle of 30^o. The intensity of unpolarized light is E. The ratio of transmitted intensity to absorbed intensity is:
   a. 3/8 b. 3/5 c. 3/4 d. 5/3