

Worksheet of the student

Registration No.: 12011241

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Aim: To investigate the intensity of light coming through two crossed Polaroids and to verify the Malus' law.

Apparatus Required: Light source, Power meter, Polaroids (Polarizers).

Observations table:

Maximum Intensity (Polarizer and analyzer axis are parallel) $I_0 = 50$

S. No.	Analyzer Rotation with respect to polarizer	Ammeter Reading (I_p)	Experimental relative intensity I_p/I_0	Theoretical relative intensity I_{th}/I_0
①	0°	50	1	1
②	15°	46.65	0.933(0.93)	0.93
③	30°	37.50	0.75	0.75
④	45°	25.00	0.5	0.5
⑤	60°	12.50	0.25	0.25
⑥	75°	3.35	0.067(0.06)	0.067(0.06)
⑦	90°	0	0	0
⑧	105°	3.35	0.067(0.06)	0.067(0.06)
⑨	120°	12.50	0.25	0.25
⑩	135°	25	0.5	0.5
⑪	150°	37.50	0.75	0.75
⑫	165°	46.50	0.933	0.93
⑬	180°	50	1	1

Graph: Experiment relative intensity and Theoretical relative intensity Vs Analyzer rotation

Calculations: Experimental value of Relative Intensity = $\frac{I_p}{I_0} = \frac{50}{50} = 1$

a) $\frac{I_p}{I_0} = \frac{46.65}{50} = 0.93$, b) $\frac{I_p}{I_0} = \frac{3.35}{50} = 0.067$
(corr)

Theoretical value of relative

Intensity = $\frac{I_{th}}{I_0} = \cos^2 \theta_1 = \cos^2 0 = 1$

$\cos^2 30^\circ = \cos^2 150^\circ = 0.75$

$\cos^2 45^\circ = \cos^2 135^\circ = 0.5$, $\cos^2 90^\circ = 0$

$\cos^2 60^\circ = \cos^2 120^\circ = 0.25$

Learning Outcomes (what I have learnt):

1) I learned about the Malu's law

$$I = I_0 \cos^2 \theta$$

2) I learned about the position of the axis of the analyzer (θ) with respect to the axis of polarizer and the polarization intensity.

3) And i learned about the use of polarizers, Light source , power meter.

4) By this i learned the concept of Polarization of light.

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Scale

x-axis unit = 15°

y-axis unit = 0.1

