

Date:- 2021/03/04

PHY 1701 (Engineering Chemistry).

Lab Manual & Record

Reg No:- 20BDS0405

INTEGRATED OPTICS- REFRACTIVE INDEX.

Apparatus Available:-

- Spectrometer
- Spirit Level
- Magnifying glass
- Glass prism
- Sodium Vapour Lamp.

SLO:

✓ To determine the refractive index of the glass prism using a spectrometer.

Refractive Index of prism:-

$$\mu = \frac{\sin\left(\frac{A + \delta_{\min}}{2}\right)}{\sin\left(\frac{A}{2}\right)} \quad (\text{No units}).$$

where $A \rightarrow$ Angle of prism.

$\delta_{\min} \rightarrow$ Angle of minimum deviation

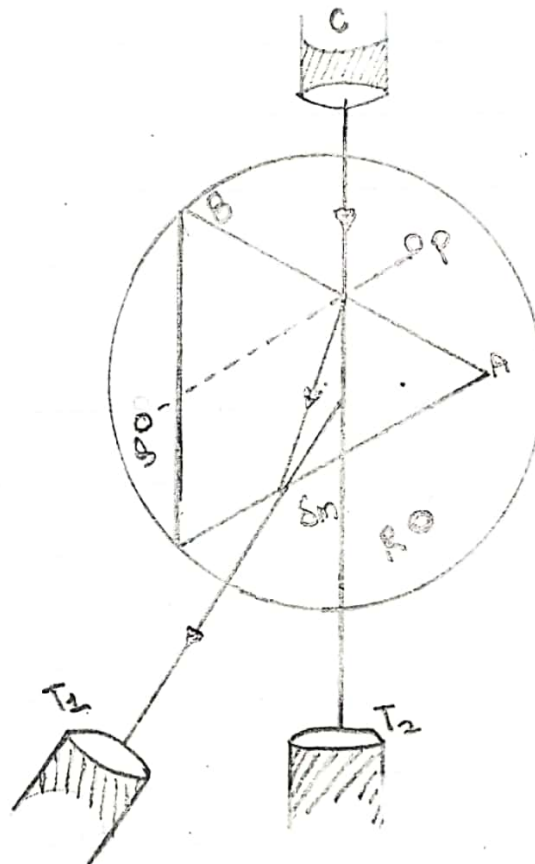


Fig:- Determination of Minimum Deviation.

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Tabulation:

Least Count = $1' = \left(\frac{1}{60}\right)^\circ$

Angle of prism, A (as obtained earlier) = 60°

Vernier	Reading for minimum deviation position (R_1)			Reading for direct ray (R_2)			$S_m = R_1 - R_2$	μ
	MSR	VSR	TR	MSR	VSR	TR		
A	128°	25'	128.42	180°	11'	180.18	51.76	1.656
B	308°	10'	308.17	1°	9'	1.15 = 361.15	52.98	1.667

Average $\mu = 1.6615$

Sample calculation,

For Vernier A,

For direct ray, MSR = 180°, VSR = 11', LC = 1'

Total reading = MSR + VSR \times LC = $180 + 11 \times \frac{1}{60} = 180.18$

For minimum deviation position, MSR = 128°, VSR = 25'

Total reading = MSR + VSR \times LC = $128 + 25 \times \frac{1}{60} = 128.42$

For Vernier B,

$S_m = 51.76^\circ$

$\mu = \frac{\sin\left(\frac{A + S_m}{2}\right)}{\sin\left(\frac{A}{2}\right)} = \frac{\sin\left(\frac{60 + 51.76}{2}\right)}{\sin\left(\frac{60}{2}\right)} = 1.656$

For direct ray, MSR =
Similarly,

for B, $S_m = 52.98^\circ$

$\mu = 1.667$

Mean $\mu = \frac{\mu_A + \mu_B}{2} = \frac{1.656 + 1.667}{2} = 1.6615$

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RESULT:

The refractive index of the prism is: - 1.66