

Answer on Question #65984, Physics / Optics

In an experiment for determination of refractive index of glass of a prism by $i - \delta$, plot, it was found that a ray incident at angle 35° , suffers a deviation of 40° and that it emerges at angle 79° . In that case which of the following is closest to the maximum possible value of the refractive index?

Find: $\mu - ?$

Given:

$$i = 35^\circ$$

$$\delta = 40^\circ$$

$$e = 79^\circ$$

Solution:

Refractive index:

$$\mu = \frac{\sin\left(\frac{\delta_{\min} + A}{2}\right)}{\sin\frac{A}{2}} \quad (1)$$

$$\delta = i + e - A \quad (2)$$

$$\text{Of (2)} \Rightarrow A = i + e - \delta \quad (3)$$

$$\text{Of (3)} \Rightarrow A = 74^\circ \quad (4)$$

$$\text{For minimum deviation: } i = \frac{35^\circ + 79^\circ}{2} = 57^\circ \quad (5)$$

$$\delta_{\min} = 2i - A \quad (6)$$

$$\text{(3) and (5) in (6): } \delta_{\min} = 40^\circ \quad (7)$$

$$\text{(4) and (7) in (1): } \mu = \frac{\sin 57^\circ}{\sin 37^\circ} \quad (8)$$

$$\text{Of (8)} \Rightarrow \mu = 1.4$$

Answer:

1.4