



PHYSICS

BOOKS - NN GHOSH PHYSICS (HINGLISH)

DISPERSION

Examples

1. The refractive indices of crown glass for blue and red light are 1.523 and 1.513, respectively

and of dense flint glass, 1.773 and 1.743, respectively. Calculate the dispersive power of the material. What must be the angle of a flint glass prism which may be combined with a crown glass prism of angle 5° so that the combination produces dispersion without deviation? What dispersion does the combination produce?



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2. Calculate the dispersion and deviation (mean) produced by a flint glass prism placed in the position of minimum deviation with respect to the mean colour. The angle of prism is 60° . Also calculate the dispersive power of the prism. Index of refraction of flint glass for blue light = 1.667 and that for the red light = 1.643.



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1. The dispersive powers of crown and flint glasses are 0.03 and 0.05, respectively. If the difference between the refractive indices for red and blue is 0.014 crown glass and 0.023 for flint glass, calculate the angle of a flint glass prism which would produce a net deviation of 5° with a crown glass prism of 3° .

[Hint: Net deviation $= (\mu - 1)A + (\mu' - 1)A'$]



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2. A direct vision spectroscope consists of three crown glass prism and two dense flint glass prisms placed alternately with their refracting edges turned in opposite directions. Calculate the net dispersion produced by the prisms. Angle of flint glass prism = 10°

Numerical Examples in Physics

| | Crown glas | Flint glass |
|--------------------|------------|-------------|
| $\mu(\text{red})$ | 1.513 | 1.645 |
| $\mu(\text{blue})$ | 1.523 | 1.665 |



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3. A direct vision prism is made up of two prisms, one of flint glass and the other of crown glass. The flint glass prism has an angle of 10° and mean index of refraction 1.650 .

What must be the angle of the crown glass prism if its mean index of refraction is 1.5137?

The dispersive powers of flint and crown and glass are 0.0296 and 0.0175, respectively. Find also the angular separation of red and blue lights on emergence.



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4. A prism produces deviation of red light by $34^\circ 46'$ and of blue light by $35^\circ 52'$. Calculate the dispersive power of the material of the prism.

[Hint: $\omega = \frac{D_b D_r}{D}$, $D = \frac{D_b + D_r}{2}$]



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5. In a direct vision spectroscope there are four crown glass prisms of angle 5° each and three flint glass prisms. The dispersive powers

of crown and flint glass are 0.03 and 0.05, respectively and their refractivities are 0.518 and 0.655. Calculate the dispersion produced and the angle of the flint glass prisms required for no deviation.



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6. A prism of angle 60° is made of glass of refractive index 1.50 for red and 1.56 for violet. Find the angular separation of these rays when a narrow pencil of composite light is

incident at minimum deviation.

$$[\text{Hint : } u = \frac{\sin(A + \delta_m) / 2}{\sin A / 2}]$$



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7. A direct vision spectroscope is made of two crown glass prisms each of which has an angle of 5° and two flint glass prisms. The dispersive powers of crown and flint glasses are 0.03. and 0.06 and their mean indices of refraction are 1.500 and 1.600 respectively. Calculate the

dispersion produced by the compound prism.

What are the advantages of using two of each?



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