



PHYSICS

BOOKS - NN GHOSH PHYSICS (HINGLISH)

POLARIZATION

Example

1. At what angle must a beam of light on the surface of water , which has an index of

refraction of 1.33 for the given light, so that the reflect light may be plane polarized?



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2. Calculate the phase difference introduced by a quartz plate of thickness 20 micron between ordinary and extraordinary light.

Given $\mu_o = 1.5443$, $\mu_e = 1.5533$ and $\lambda = 6000\text{\AA}$.

Which light travels faster in quartz?



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3. Calculate the thickness of a quarter-wave plate for light of wavelength 4000\AA for which $\mu_o = 1.5632$ and $\mu_e = 1.5541$.



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4. Show that when a ray of light is incident on the surface of a transparent medium at the polarizing angle, the reflected ray and the refracted ray are at right angles to each other.



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Exercise

1. The index of refraction of glass, for sodium light is 1.63. At what angle must a beam of sodium light fall on the surface of a glass slab so as to be plane polarized by reflection?



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2. For a slab of flint glass, the angle of polarization is found to be $57^\circ 24'$. Calculate the refractive index of flint glass.



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3. A ray of light is incident on the surface of a glass plate of index of refraction 1.55 at the polarizing angle. Calculate the angle of refraction.



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4. Calculate the thickness of a quartz quarter-wave plate for sodium light ($\lambda = 5893\text{\AA}$) given that the index of refraction of quartz for ordinary and extraordinary rays are 1.5442 and 1.5533 respectively.



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5. Calculate the phase difference introduced by a calcite crystal plate of thickness 30 micron between ordinary and extraordinary

light of wavelength 6000\AA . Given that

$$\mu_o = 1.554 \text{ and } \mu_e = 1.547.$$



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6. You have to design a half-wave plate of quartz crystal for light of wavelength 5800\AA .

Calculate the thickness of the plate required for

the purpose if

$$\mu_e = 1.5508 \text{ and } \mu_o = 1.5418.$$



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7. A sheet of cellophane acts as a half-wave plate for light of wavelength 4000\AA . If the index of refraction did not change with wavelength, how would the sheet behave with respect to light of wavelength 8000\AA ?



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