2017 Ph H1 Q12

Section: Particles and Waves

Topic: Refraction of Light

Question Summary

Red light passes from a liquid into a transparent solid. The liquid and solid have the same refractive index for this light. What happens to the speed and wavelength of the light on entering the solid?

Worked Solution

Refractive index n = c/v. If n is the same in both media, then the speed v is the same in both.

Across a boundary, the frequency f of light does not change.

Since v = fλ and v is unchanged while f is unchanged, the wavelength λ is also unchanged.

Final Answer

E — No change in speed; no change in wavelength

Revision Tips

• If n1 = n2 then v1 = v2. Frequency stays constant at a boundary.

• Only when n changes do speed and wavelength change; frequency never changes.