

PHYSICS - X-PART-1 CLASS 39



5 REFRACTION OF LIGHT

Fill three fourth of a transparent vessel with water as shown in the figure. Add one or two drops of milk into it. Fill the portion of the vessel above water with smoke. Close the vessel using an OHP glass sheet. Allow the light from a laser torch to pass through water as shown in the figure. Observe the path of light.

- Which are the media involved here?

**Air and Water**

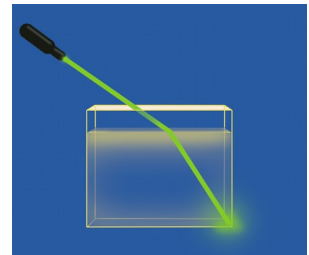
- What happens to the path of the light?

**Path of the light undergoes deviation**

- Where does the deviation of the ray take place?

**At the point on the surface where the media get separated.**

- \* The ray of light entering water undergoes a deviation at the point on the surface where the media get separated.



**Speed of light and optical density**

| Medium  | Speed of light (m/s)                |
|---------|-------------------------------------|
| Vacuum  | $3 \times 10^8$ m/s                 |
| Water   | $2.25 \times 10^8$ m/s              |
| Glass   | $2 \times 10^8$ m/s (approximately) |
| Diamond | $1.25 \times 10^8$ m/s              |

- \* The speed of light through various media differs.

The characteristics of each medium influence the speed of light that passes through the respective medium. Optical density is a measure that shows how a medium influences the speed of light passing through it.

- \* As the optical density of a medium increases, the speed of light through it decreases and vis-versa.

\* Can the media given in the table be arranged in the increasing order of their optical densities?

decreases ← Optical density → increases

Air < Water < Glass < Diamond

increases ← Speed of light → decreases

### Refraction of Light

It is the difference in the optical densities that causes the deviation. When a ray of light entering obliquely from one transparent medium to another, its path undergoes a deviation at the surface of separation. This is refraction.

### Worksheet

Place a pencil in an inclined position in a glass trough and fill three fourth of the trough with water. Don't you see that the position of the portion of the pencil under water has changed? What may be the reason?

