

STATION 15

DISAPPEARING TEST TUBE: EXAMINE THE TWO BOTTLES CONTAINING A LIQUID AND A TEST TUBE. THE LIQUID IN BOTTLE 1 IS WATER AND THE LIQUID IN BOTTLE 2 IS GLYCEROL.

Light travels at a speed of 2.998×10^8 m/sec (186,282 miles/sec.) in a vacuum. In liquids, the speed of light is about 24 to 37% slower. When looking at an angle into water, the velocity difference results in the bending of light with the illusion that objects appear farther away than they actually are. The ratio of the speed of light in a vacuum to the speed of light in a liquid can be measured by determining the angle of refraction of the light. This ratio is called the refractive index. The refractive index of a liquid is easy to measure to high precision and is an undervalued property that is extremely useful for identification purposes.

refractive index

glycerol 1.47

Pyrex 1.47

water 1.34

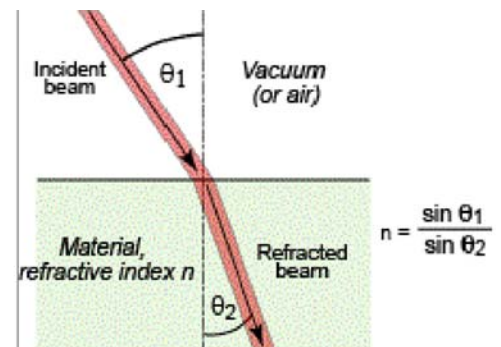
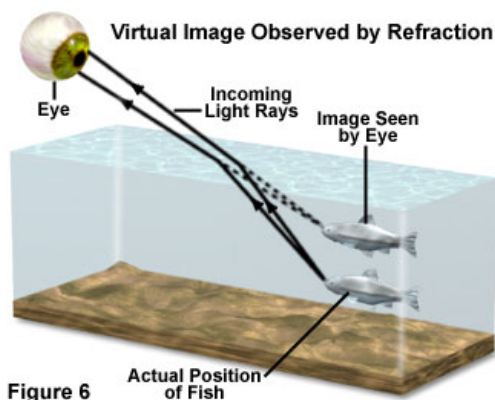


Figure 1. Refraction and the refractive index, n .

Is there a connection between the refractive indexes of the glass and liquid?

Concepts and Answer.

Pyrex and glycerol have almost the same refractive indexes. Since they bend the light the same amount, the Pyrex becomes virtually invisible in the glycerol. On the other hand, water and Pyrex have different refractive indexes and the Pyrex is easily observed in the water.

