Refractive Index

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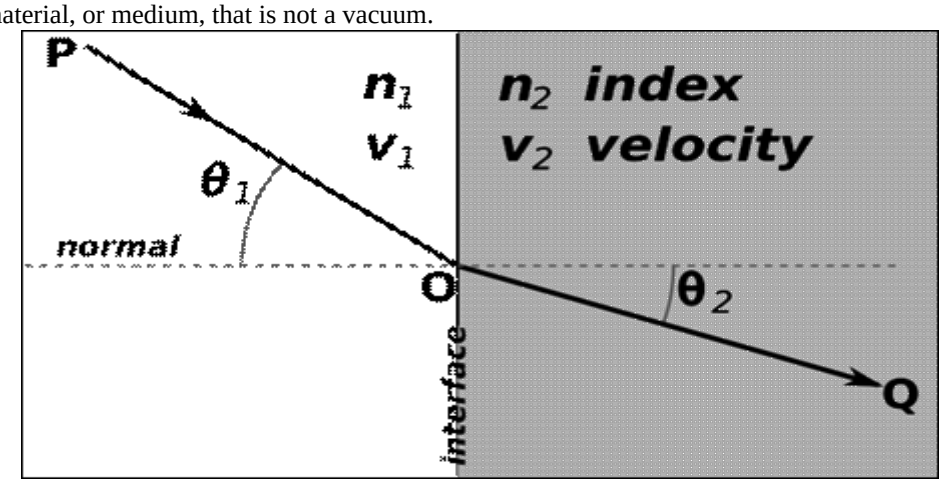
Introduction to Refractive indices

What is a refractive index?

A particular substance's index of refraction or refractive index (R.I.) is equal to c (customarily, the speed of light traveling in empty space) divided by the speed of light traveling in that particular substance. Light travels fastest in empty space -- approximately 300,000,000 meters per second. Since the speed of light is reduced when it travels through transparent gasses, liquids and solids, the refractive index of these substances is always greater than 1. Light travels slower through any given material, or medium, that is not a vacuum.



More precisely, the refractive index is constant for any given pair of materials, and can be defined as

speed of light in material 1
speed of light in material 2

This is usually written 1n2 and is the refractive index of material 2 relative to material 1. The incident light occurs in material 1 and the refracted light occurs in material 2. If the incident light is in a vacuum, then this value is called the "absolute refractive index" of material 2.

Refractometer

A refractometer measures the extent to which light is bent (i.e. refracted) when it moves from empty air into a sample and is typically used to determine the index of refraction (aka refractive index or n) of a liquid sample.

The refractive index is a unitless number, between 1.3000 and 1.7000 for most compounds, and is normally determined to a precision of five digits. Since the index of refraction depends on both the temperature of the sample and the wavelength of light used, these should both be indicated when reporting the refractive index.

The refractive index is commonly reported among a liquid sample's characteristics, in much the same way that melting points are routinely used to characterize solid compounds. Refractive indices are also commonly used to:

- Help identify or confirm the identity of a sample by comparing its refractive index to known values.

- Assess the purity of a sample by comparing its refractive index to the value for the pure substance.
- Determine the concentration of a solute in a solution by comparing the solution's refractive index to a standard curve.

Refractive index of different materials

By definition, the refractive index of a vacuum is 1. In practice, air makes little difference to the refraction of light since it has an absolute refractive index of 1.0008. Therefore, the value of the absolute refractive index is often used on the practical assumption that the incident light is in air.

Material	Absolute Refractive Index
Air	1.0008
Water	1.330
Glass, soda-lime	1.510
Diamond	2.417
Ruby	1.760

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Reference Links:

- http://www.searchnetworking.techtarget.com/definition/wavelength
- http://www.physics.info/refraction
- http://www.unmuseum.org/speed.htm

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