

1.5 Determination of refractive index

The refractive index (n) of a substance is the ratio of the velocity of light in a vacuum to its velocity in the substance. It varies with the wavelength of the light used in its measurement and with the temperature. It is, therefore, necessary to specify these

conditions (n_D^{20}). In practice it is usually convenient to measure the refraction with respect to air and the substance, rather than with respect to a vacuum and the substance, since, for pharmacopoeial purposes, this has no significant influence on the observed values.

The refractive index may also be defined as the ratio of the sine of the angle of incidence to the sine of the angle of refraction.

The measurement of the refractive index is employed for pharmacopoeial purposes mainly to establish the identity of liquid substances. It may also be used to test the purity of such substances.

Refractive indices are usually stated in terms of sodium light of wavelength 589.3 nm (line D) at a temperature of $20 \pm 0.5^\circ\text{C}$ (n_D^{20}).

The accuracy of the measurement should be related to the requirements of the monograph. For pharmacopoeial purposes it is usually adequate to express the refractive index to three decimal places.

Apparatus

Commercial refractometers are normally constructed for use with white light but are calibrated to give the refractive index in terms of the sodium light of wavelength 589.3 nm (line D).

The optical parts of the apparatus should be kept brilliantly clean. The working surfaces of prisms should be free from scratches.

Subject to the directions given above, the manufacturer's instructions relating to a suitable light source should be followed.

The instrument should be calibrated against a standard provided by the manufacturer; the temperature control of the liquid being examined and the cleanliness of the prism should be checked frequently by determining the refractive index of distilled water, which is 1.3330 at 20°C and 1.3325 at 25°C .