



Refractive Index (Hand Held Refractometer)

Overview:

The refractive index of a material has a significant effect on lens design. This is because the required refracting power of a lens is directly related to its refractive index and determines the thickness and curvature of the optical device. The thickness of the optical device is important for both contact lenses and intraocular lens applications. For example the oxygen transmissibility of a contact lens is calculated by dividing the oxygen permeability of the material by the thickness of the lens. Thus a thicker lens will result in a decrease in the oxygen transmission through the lens. The refractive index of a material can be measured using a hand-held refractometer. Eye care professionals commonly use such a device and they are extensively used in a range of other industries.

When a sample is placed on the prism of the instrument light travelling through the sample is slowed compared to the light travelling through air. The result is a bending of the light that is travelling through the sample as it passes through the instrument. The bent light is then focussed on a scale that is magnified and viewed through the instrument eyepiece. The refractive index of the sample is read as the value where the light and dark areas meet on the scale.

Procedure:

Test samples should be flat or capable of being flattened against the prism surface of the refractometer during measurement. The test surface placed against the reference surface should have a smooth finish. Hydrogel specimens should be equilibrated in saline prior to measurement, then lightly blotted to remove excess water from the surface immediately before testing. In the case of hydrogel materials contact lenses can be used as test specimens.

It is important to ensure that the refractometer has reached equilibrium with the ambient temperature. The sample is placed on the prism of the instrument and the illuminating window is pressed firmly against the sample. Satisfactory contact between the test sample and the prism is indicated by a sharp and straight dividing line appearing between the light and dark portions of the field of view. If the sample is not pressed sufficiently firmly against the prism, a faint secondary line may be seen somewhat removed from the sharp line. This is caused by the hydrating fluid and will give a refractive index of 1.336.