Specific Gravity

Overview:

The specific gravity of a contact lens material can have an effect on how the lens performs on-eye. It is effectively the density of the material and can be important for both gas permeable and soft lens materials. It can be measured for materials in both the dry and hydrated states, although it is the hydrated state that is the most relevant for the contact lens wearing situation. In the dry state the specific gravity is obtained by simply dividing the weight of a sample by its volume (usually measured on a standard contact lens blank). To determine the specific gravity of a hydrated sample, a more complex procedure is adopted since it is difficult to calculate the volume and weight of an individual hydrated lens.

The volume of hydrated material is measured using the basic principle of displacement. Hydrated material is placed into a special conical flask which is filled with saline. The vessel has a vented stopper that enables excess solution to be removed from the vessel until a fixed volume remains in the vessel. Since the density of saline is known the volume of the sample can be calculated and used to determine the hydrated specific gravity of the material.

Procedure:

It is important to ensure that samples are fully hydrated prior to the testing. The conical flask is filled with saline and after placing the vented top onto the vessel, any excess saline is carefully removed from the outside of the vessel and top. The weight of the vessel full of saline is then recorded. The weight of a hydrated sample is then measured after careful removal of any surface water and this is recorded. The sample is then placed into the conical vessel and any excess water is removed as the vented top is replaced. Again the vessel is weighed and the reading is recorded. These operations enable the volume of saline displaced by the sample to be determined. The specific gravity can then be calculated using the following basic equation.

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

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