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Measurement of Refractive Index of Liquids Using Length Standards Traceable to SI Unit

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Abstract

Many workers have published various methods to measure refractive index of various liquids. Mostly, the measurement results are not traceable to SI units. A novel method is developed at CSIR-NPL, India (NPLI) to measure refractive of index of liquids using gauge blocks, metrological microscope and displacement laser interferometer. A vessel with flat bottom is chosen to hold the liquid under test. A pair of gauge blocks of different lengths is fixed in the vessel. The vessel is arranged under a vertically movable microscope. A calibrated displacement laser interferometer is attached to the microscope stage. The microscope is focused to the surface of gauge block before poring liquid. After poring liquid in the vessel, the microscope is moved vertically to regain the focussed image of surface of submerged gauge blocks. The measurement method is simulated mathematically. The refractive index of liquid medium is calculated using this mathematical model. Refractive index of water, isopropyl alcohol is measured. Various error contributing sources are identified. The measurement uncertainty is evaluated.

Keywords

Refractive index; Interferometer; Liquid; Microscope