Hydrometer

Hydrometer is considered the simplest and the fastest method in determination of specific gravity (or the density) of a liquid. The specific gravity of a liquid is defined as the ratio of the density of the liquid to the density of water. The operation of a hydrometer is based on the Archimedes principle that a solid suspended in a fluid will be buoyed up by a force equal to the weight of the fluid displaced by it. Thus, the lighter the liquid (that is, the less its specific gravity), the deeper the body sinks because a greater amount of liquid is required to equal the solid weight. A hydrometer is usually made of glass and consists of a cylindrical stem and a bulb weighted with mercury or lead shots to make it float upright. The liquid to be tested is poured into a tall container, often a graduated cylinder.

The hydrometer is gently lowered into the liquid until it floats freely. The point at which the surface of the liquid touches the stem of the hydrometer is noted. Hydrometers usually contain a scale inside the stem, so that the specific gravity can be read directly.

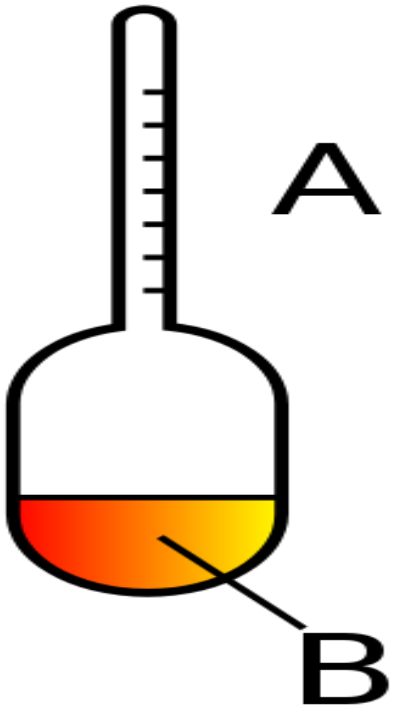

Fig. 1: Schematic drawing of a hydrometer. The lower the density of the fluid, the deeper the bulb B sinks. The depth is read off the scale A.

The hydrometer sinks deeper in low density liquids such as kerosene, gasoline, and alcohol, and less deep in high density liquids such as salty water or sea water, milk, and acids.

(Laboratory picture of a hydrometer)

Usual hydrometers to be used with denser liquids to have the mark 1.000 (for water) near the top of the stem, and those for use with lighter liquids to have the mark 1.000 near the bottom. In many industries a set of hydrometers is used (covering specific gravity ranges of 1.0 – 0.95, 0.95 – 0.9 etc.) to provide more precise measurements.

Teachers may suggest students to make a brief idea about scientific instruments in physics depicting the advancements in the subject.