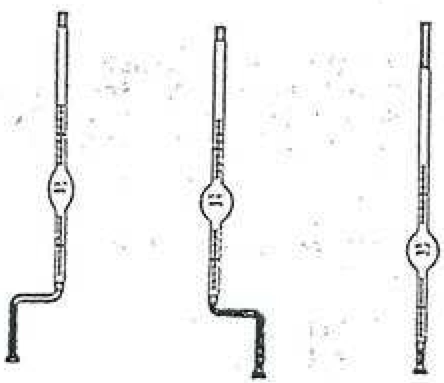
Operating instructions for Traube's Stalagmometer, Cat. No. 4851 10, 4855 00

The surface tension of liquids is determined using a stalagmometer. The instrument consists of a straight tube which widens out in the upper part to form a bulb and narrows to a capillary tube in the part, the opening of which is ground smooth. The printed-on scale permits the various measurements to be made in the same range. The tube, and especially the opening, must be cleaned with a detergent (e.g. Mucasol) before use, and then rinsed with acetone and dried off.



To calibrate, draw water at 20 °C (68 °F) into the tube up to the upper mark, ensure that the instrument is in a vertical position, and then let a specific number of drops (e.g. 20) drip slowly (at most 3 drops per minute) into a lidded weighing glass.

Control the dripping speed, connect a capillary to the upper end of the tube through a rubber hose. Use a screw pinchcock on the hose to adjust the dripping speed. Calibration is repeated after cleaning the tube as many times as required until the weight "g" of the 20 drops of water remains constant.

Then, after drying the tube, the weight "g_1" is determined of the same number of drops of the liquid to be measured. The surface tension of the sample liquid is then

$$\sigma_1 = \sigma \cdot \frac{g_1}{g} \left[\frac{N}{m}\right]$$

If the density ρ_1 of the liquid is known, you can calculate the surface tension directly using the number of drops (n) given on the stalagmometer and the number of drops (n_1) determined between the ring marks 1 and 2:

$$\sigma_1 = \sigma \cdot \frac{\rho_1 \cdot n}{\rho \cdot n_1} \left[\frac{N}{m}\right]$$

Since the temperature coefficient of the surface tension (about 0.3%) is of minor importance in comparison to variations in the results caused by other factors (up to 10%), it is generally sufficient to carry out the experiments at the room temperature (15-20 °C).

For distilled water at 20 °C, the surface tension is:

$$\sigma = 7{,}27 \cdot 10^{-2} \left[\frac{N}{m}\right]$$

and the density:

$$\rho = 0{,}9982 \left[\frac{kg}{dm^3}\right]$$