

The surface tension of water by the pull of microscope slide

Purpose:

The purpose of this experiment is to measure the surface tension of the water by the pull of microscope slide.

Apparatus:

Slide glass of microscope, calipers, micrometer screw gauge, two bulldog clips, cotton, tweezers, beaker, filter paper, an Archimedes' bridge such as is used in density experiments, a torsion balance.

Method:

- Measure the length L of the slide with calipers and the thickness t with micrometer screw gauge.
- Clean the part of the slide that is to be immersed, and also the beaker, with successive washings in nitric acid, caustic soda, and tap water.
- Suspend the slide from one arm of the balance by means of two pieces of cotton connected as shown in the diagram. ABC is a continuous length, attached to the slide at A and C by means of two small bulldog clips (or, alternatively, by sealing-wax). The arrangement is easy to adjust the slide to be horizontal.
- Pour water into the beaker until the bottom face of the slide is just immersed. Adjust the counter poise mass so that the pointer is at a

convenient mark on the scale.

- Now remove the bridge and slowly lower the beaker until the slide just breaks away from the surface. Do this several times until you can note exactly the scale reading when the slide breaks away.
- Remove the beaker, dry the slide with filter paper and then place masses in the scale pan until the pointer is again depressed to exactly the same reading as when it broke away from the water surface.
- Counterpoise the slide by adding masses to the other scale pan.
- Pour water into the beaker until the bottom face of the slide is just clear of the water when the balance beam is horizontal.
- Lower the balance beam until the face just touched water surface and then add masses to the other scale pan until the face just swings clear of the water.
- Record the temperature of the water.

Readings & Results

let σ = surface tension of water.

L = length of the microscope slide.

t = thickness of the microscope slide.

w = weight of slide in the air.

Hence $\sigma (2L + 2t) = F - w$

$$\sigma = \frac{F - w}{(2L + 2t)} \text{ Nm}^{-1} \text{ at } C^{\circ}$$

Discussion:

- 1- What is the surface tension? What is depending on?
- 2- What is the relation between the liquid type and the surface tension?
- 3- What is the relation between the temperature and surface tension?
- 4- Write a Table includes value of surface tension for water that varied with temperature?
- 5- Write a table includes values of surface tension for many liquids?