

MEASUREMENT OF SURFACE TENSION OF LIQUIDS

MED 18.05



Material:

Item-no.	Qty.	Description
DS090-3K	1	Claw base "Sepp", 260 x 220 mm
P7240-1G	1	Support rod, round, L=500 mm, D=10 mm
DS400-3K	1	Bosshead cross-pattern, Demo, green
DS504-2K	1	Sliding saddle, height adjustable
DS103-1T	1	Platform on support, small
DM880-1R	1	Ring for measuring surface tension
C1000-1G	1	Beaker glass, 600 ml, low form, Borosilicate
DM725-ND	1	Newtonmeter "inno" 20 N / 2000 g
P3120-5B	1	S-shaped assembly platform

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Purpose

Measuring the surface tension

Preparation

- the 500 mm support rod is clamped into the claw base
- the bosshead cross-pattern is fixed on the top of the support rod
- the height-adjustable sliding saddle is positioned in the centre of the claw base
- the small platform is inserted into the sliding saddle
- the beaker is filled with water (about 3 cm)
- the Newtonmeter is placed on the S-shaped assembly platform
- the weighing bar (hook points downwards) is clamped to the bosshead cross-pattern
- we set the measuring range of the Newtonmeter to "mN"

Experiment

The ring is hung on the dynamometer.
The height of the ring is adjusted with the bosshead so that it hangs horizontally and calmly around 5 mm above the water surface.
The Newtonmeter is tared (set to zero).

With the screw of the height-adjustable sliding saddle, we turn the platform and the beaker upwards until the ring is immersed in the water. Then we lower the unit again, but very slowly. Observe the display on the Newtonmeter.

The highest force that occurs is the tear-off force, which we try to determine.

Force measured: mN

Ring diameter: 0,19 m (D = 60 mm)



The tear-off force results from the surface tension σ and the ring diameter u to $F = 2 \cdot \sigma \cdot u$ ($u \cong 19\text{cm}$) - σ can be given in N per cm or converted to N per m

$$\sigma = F / (2 \cdot u)$$

Note

You can also first calculate the force with the value $0.072\text{N} / \text{m}$ for the surface tension between water and air and then carry out the measurement.

If detergent is added or the water is contaminated, the surface tension is reduced.

Of course, this experiment can also be carried out with other liquids

Values for surface tension in mN/m at 20 °C

Ethanol	22,55
Methanol	22,60
Acetone	23,30
Water	72,75
Mercury	476,00