ROQED PHYSICS LAB

Measurement of the surface tension of water by the methods of dropping off and raising the liquid in the capillary

Purpose of the work: to determine the coefficient of surface tension of water by the method of dropping off.

Devices and materials:
000 - stand
001 - foot
017 - syringe,
060 - vessel for collecting drops.
tripod

Theoretical part:
To measure the surface tension,used **the drop-off method is**.
The experiment is carried out with a syringe containing the test fluid. Press the plunger of the syringe so that drops slowly fall from the opening of the narrow end of the syringe. Before the moment of droplet separation, the gravity $\mathbf{F_{heavy}}$**= m of the** $\mathbf{_{droplet}}$·g is equal to the surface tension F, the boundary of the free surface is the droplet circumference.

$$l = \pi \cdot d_{drops}$$

Therefore:

$$\sigma = \frac{F}{l} = \frac{m_{капли} g}{\pi d_{капли}}$$

Experience shows that $\mathbf{d_{drops}}$ **= 0.9d, where d** is the diameter of the channel of the narrow end of the syringe.

The droplet mass can be found by counting the number of droplets **n** and knowing the mass of all droplets **m**.
The droplet mass m will be equal to the mass of the liquid in the syringe. Knowing the volume of the liquid in the syringe **V** and the density of the liquid **ρ,** you can find the mass **m = ρ · V**

On the board
1. Place the tripod on the table, fix the foot on it and the syringe in it.

Work progress:

1. Assemble the installation shown on the board.

2. Start the simulation.

3. Draw 1 ml into the syringe. water.

4. Slowly dispense the entire volume of water from the syringe, drop by drop. Count the number of drops **n** in 1 ml and record the result in Table 1.

5. We can assume that 1 ml. water = 1 gr. Draw up a formula to find the mass of one drop.

$m = \frac{v}{n}$

6. Make a formula to calculate the surface tension (d is the diameter of the syringe channel)

$$\boldsymbol{\sigma} = \frac{mg}{\pi d}$$

7. Repeat the experiment with 2 ml and 3 ml of water.

8. Compare the obtained result with the table value of the surface tension.

9. Table

№ experience	liquid volume in the syringe	n	d, m	Surface tension σ, N / m	σ_{with} (N/ m)	σ_{tab} (N / m)

	(ml)					
1	1		$2.5 * 10^{-3}$			0.072
2	2					
3	3					

10. Conclusion:

A. The surface tension depends on the density of the liquid and the temperature.

In. Surface tension depends on the density of the liquid and does not depend on its temperature.

C.The surface tension of a liquid depends only on temperature and does not depend on the density of the liquid.