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APPLICATION OF INTERACTIVE METHODS IN A LABORATORY LESSON DEDICATED TO THE STUDY OF CAPILLARY PHENOMENA

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Confucius 2500 years ago: I remember what I heard, I remember what I saw, I understand if I do it independently.

ABSTRACT:

At present, in the adaptation of the students of the 1st stage to the modern education system, increasing their tendency to independently master knowledge – is the account of the tasks of the First Order of the current education.

In connection with the transition of education in Uzbekistan to the credit-module system, in a short period of time, along with the development of large volumes of educational information, students are subject to high demands on their level of knowledge and quality.

INTRODUCTION:

For the fulfillment of such requirements, it is necessary that they accelerate their joint activities between the pupil-pupil and the teacher on the basis of interphase.

"Interaktiv" (Interactive) is an English word,

"interact"-"inter"-this is mutual, "act" - this means" to act", that is, to act among themselves".

Interactive education is:

- A system of techniques based on constant communication;
- Joint study and active participation.

"Interaktiv "(Interactive) is an English word, which means" interact " - "inter" - this is mutual," act "- this is" act", that is, act interactively".

Interactive education is:

- A system of techniques based on constant communication;
- Joint study and active participation.

We recommend to the students a brief description of the following laboratory work performance and literature for further reading before the implementation of the above requirements is carried out by the students of the laboratory work on the topic "study of Capillary phenomena".

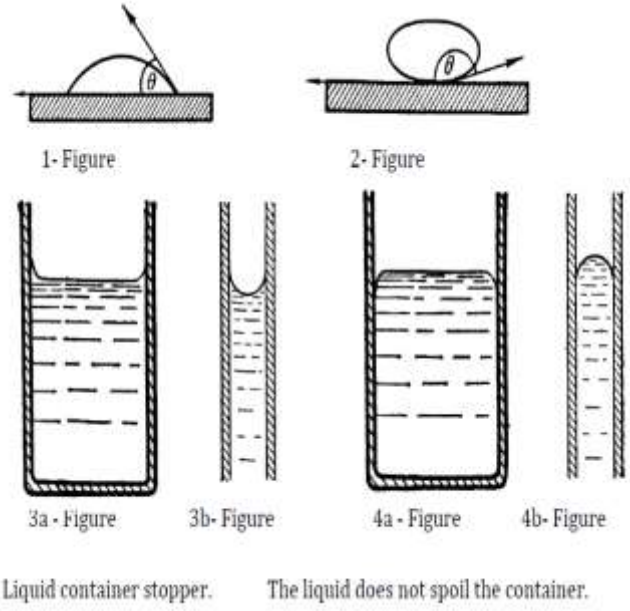
Purpose of the study: to examine the capillary phenomena and on the basis of it, to determine the diamenr of the capillary tubes.

Suitable tools:capillary tubes of different small diameters and various liquids that dilute and hollamovch Ulfr, shtagensirkul, Maple lineyka.

Briefly the theory.

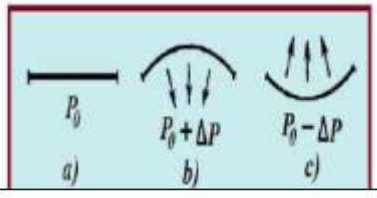
As you know, the free surface of the liquid in a thin cylindrical container becomes slightly curved. The curvature of the surface of the liquid is called Mesic (in Greek "meniscus" means half a month).

The Shape of the meniscus is different, depending on the difference between the forces of interaction of liquid molecules with the vessel wall molecules, whether they are submerged or convex. In the first case, the boundary angle (the angle in the urinal transferred to the surface of the liquid by the vessel wall) is smaller than the acute 900, the liquid injector (Figure 1), if greater than 900, the liquid injector will not be (Figure 2).



If the force of impact of liquid molecules on the vessel wall is greater than the force of interaction of liquid molecules with the vessel wall in the IUD, the surface of the liquid forms the submerged meniscus (pictures 3a, 3b).

If the liquid is poured into a thin tube, the curvature of the liquid surface next to its wall occurs (Figure 3a). This curvature of the surface is called a meniscus. In a thin capillary, the liquid becomes a solid medium, in the tube the liquid rises, and the meniscus becomes a wreck (Figure 3b). If the liquid does not humidify the solid body, a decrease in fluid occurs near the wall of the tube, and the meniscus becomes convex (figure 4b). The reason for this is the additional pressures formed on the surface of the liquid (Figure 5).



5-picture. a) the surface of the slime is flat, b) convex c) pressure exerted on the body under the surface of the liquid when it is submerged.

Capillary tubes into tubes, the inner diameter of which can be compared with the curvature of the liquid meniscus (if the Latin capillars - means hair).

As capillary phenomena, it is said that the properties of liquids in thin tubes to rise or rust.

The surface of the liquid in the capillary tube is meniski: it is submerged for diluting liquids, and for non-diluting liquids it is convex. Choleric liquids rise in the capillary (water in a glass tube). and the humidifier liquid (mercury in a glass tube) goes down.

Let's prove the formula for calculating the height of the hopper in the capillary or the height of the decrease in the hopper fluid.

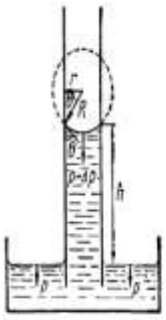
If the capillaries are lowered into a liquid container and the liquid flows through the wall of the capillaries, then under the influence of additional pressure formed on the surface of the liquid, the liquid rises to a height h along the capillaries (Figure 4).

If the liquid does not humidify the wall of the capillaries, then the liquid levels decrease to H. The reason for this is the curvature of the liquid surface and the presence in the body of additional pressure. This pressure

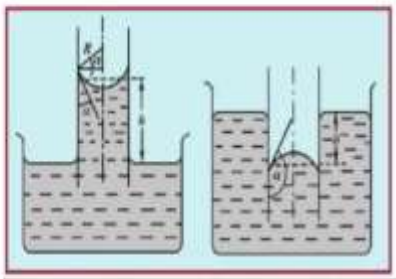
$$\Delta p = \pm \frac{2\alpha}{R} (1)$$

This expression was theoretically derived in 1805 by the French physicist and mathematician Laplas. (1) the expression for Shuninh refers to the Laplace formula here: — surface tension of the liquid, R is the curvature of the surface.

If the surface of the liquid is submerged, the additional pressure will be negative, and the liquid will rise upwards along the capillaries. Because the surface of the liquid in a wide container does not affect the additional pressure (Figure 4 - a). If the surface of the liquid is convex, the additional pressure is positive, which leads to a decrease in the volume of the liquid along the capillaries (Figure 4)



4- Figure



5a- Figure 5b- Figure

The surface of the plastering liquid in the capillary consists of a contoured circle with a boundary (Figure 4). The strength of the surface tension that affects it

$F = \alpha 2\pi r = 2\alpha\pi r$ equal to, when mensk is in the wreckage is moved to the fall of the vertical Strait and the coldness is shown. If I'm a menisk blister, then the coldness in the capillaries will pass, because the vertical kiss is in the direction of the bottom.

When the capillary coldness is in balance this, $F = 2\alpha\pi r$ the strength of the surface tension is the weight of the liquid that rises in it $P = mg = \rho Vg = \rho Shg = \rho g\pi r^2 h$ must be equal to, i.e.

$2\alpha\pi r = \pi\rho ghr^2$ (2)

From this, the height of the ascent of the liquid in the capillary would be equal to:

$$h = \pm\frac{2\alpha}{\rho gr} \quad (3)$$

ρ- liquid density; g - free fall acceleration; r- capillary tube inner tube.

These (3 and 4) expressions (+) are for those cases when the liquid container is completely humidified and (-) is not completely humidified. (3) the following expression is appropriate while for cases where a liquid container is partially moulded and moulded. 3 - capillary tube from the picture R-radiusi and R menisci muasabat between

$R = \frac{r}{\cos\theta}$ for being:

$$h = \pm\frac{2\alpha\cos\theta}{\rho gr} \quad (4)$$

(3) and (4) Borelli - Jyuren formula called capillary tube is fully positioned for lifting and lowering height in it of diluting and non-diluting liquids.

Thus, the height of the ascent or decrease of the liquid in the capillary is opposite to the radius of the capillary.

Capillary phenomena are of great importance in nature and technique. For example, nutrient solutions rise along the capillaries that form the wall of the tumor cells. In soil capillaries, water rises from the depths to the surface layer of the soil, etc.

We recommend that students use the following “Insert” method in mastering the materials related to Mazu from the “teaching methodology” and additional literature.

Provides systematization of information, heard reports received during independent reading(Table 1):

- Confirmation, identification, deviation, observation of the received information;
- Helps to formulate the ability to link the data that you have previously mastered.
- As a result of careful reading of the acquired knowledge, it provides for its pureness.

They get acquainted with the rule of filling out the Insert Table. A separate choir student fills in themselves.

In the process of reading, they systematize the data obtained separately themselves - they “enter” into the table columns according to the following characters specified in the text:

"V" - corresponding to the information I know;
"- "- contrary to the information I know;
“ + "- new information for me;

"?" - it is incomprehensible to me or it is required to identify information, fill in.

Table 1"INSERT" table

V	+	–	?

At the beginning of the new lesson, a representative from each small group of 4-5 students will make presentations on the topic for 5-7 minutes. During the presentation, questions will be asked by students and educators. After the presentation, small groups were evaluated in the" soul of the one who fell on the ship " printsip(the price that the presenter received also belongs to the small group).

Table 2 Sample questions for small group presentation

№	Sample questions
1	How is the internal pressure of liquids formed?
2	Tell us about the surface tension of liquids and the free energy of the liquid surface.
3	What additional pressure under the curved surface of the liquids is dressing? Describe the essence of the LaPlace formula.
4	Bthing speaking of capillary phenomena. Where are the capillary phenomena in agriculture three?
5	Tell the essence of the formula Borelli-Jyuren. If the liquid dilutes the Solid, what shape does it take?
6	What if the liquid does not solidify?
7	When does the liquid humidify or humidify the solid body?
8	How to say that the capillary is a tube?
9	What phenomenon is said to be a capillary phenomenon?
10	What is the height at which the liquid level in the capillaries rises?
11	How does the height of the rise of the liquid level depend on the capillaries radius?
12	What is the practical significance of capillarity?
13	Did you observe the phenomenon of capillaries in marriage and technique?

3. Microkeys assignments that guide small groups in carrying out laboratory work

1. Take a well-groomed glass plate with a surface and drip it from the liquids in the centipede yrd and observe it.
2. Take different capillary tubes and observe capillary phenomena in them.
3. (3) using the formula, determine the diameter of the various capillary tubes.
4. Work out the table of results obtained and write the results measured on it(Table 3).
5. Also note the measurement error in your drawing chart.

Table-3 Table of measurement results

T/r	Order of capillary tubes the number.	The height of water absorption in capillary tubes (h).	Relative error $\Delta d / \langle d \rangle$
1			
2			
3			
4			

4. Fill out the 4-th table below (I know, I want to know, I found out) on the laboratory work.

Table 4 I KNOW, I WANT TO KNOW, I FOUND OUT SCHEDULE

I KNOW,	I WANT TO KNOW,	I FOUND OUT

At the end of the lesson, the teacher observes the achievements of the students, complements their shortcomings and announces the tactile points they received.

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