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EVAPORATION AND CRYSTALLIZATION OF SMALL VOLUMES OF BIOLOGICAL FLUID AND CHANGES IN ITS CONTENT (NACL)

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Abstract: The method of evaporation and crystallization of biological fluids for diagnostic purposes is now widely used, and much attention is paid to the study of the prospects of analysis. Increasing the use of biological fluid (saliva) in clinical analysis can help speed up the diagnosis.
The main directions of research on the evaporation and crystallization of biological fluids (saliva) (the disappearance of the liquid system during the transition to the solid phase) depend on the substances present in the liquid and their amounts. to study the possibility of informing the process of intermolecular composition of biological fluids, which occurs during the dehydration process.

Keywords: Biological fluid, evaporation, form element, crystallization.

Relevance of the study. Biological fluid is a complex tool that reflects the dynamic stability of the body's internal environment, however, oral fluid can have different, physicochemical and biological properties under the influence of various factors and is one of the indicators of the body's reactivity. An important argument for the use of fluid in diagnosing the functional state of the body is the simplicity of the process of obtaining biological fluid.

Numerous scientific findings have led us to conclude that human body fluids (saliva) are a unique substance with great potential for use in basic research and medical diagnostics.

The widespread use of physical changes in the evaporation of biological fluids and methods for estimating the solid phase in laboratory diagnostics, as well as the availability of information, is one of the current problems under study.

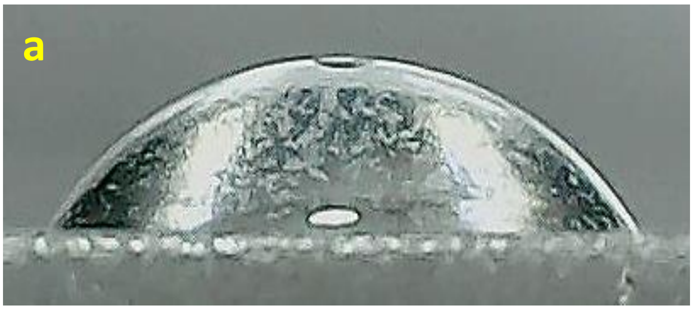
The purpose of the study. Currently, the method of evaporation and crystallization of biological fluids for diagnostic purposes is widely used, and a great deal of attention is paid to the study of the prospects of analysis. Increasing the use of biological fluids (saliva) in clinical analysis can help speed up the diagnosis.

Typically, when using this method, the physical processes that take place during the evaporation of a certain amount of biological fluid (saliva) under test, which takes the form of droplets, and the sediment in the form of a solid phase formed after evaporation (facies) morphology is studied. Biological fluid (saliva) can be a source for studying human DNA and clinical analysis in the body because the composition of certain molecules in saliva reflects their concentration in the blood. Using saliva for various laboratory tests, especially in children and the elderly, is much simpler, safer, and cheaper than using blood for testing.

The main directions of research on the evaporation and crystallization of biological fluids (saliva) (the disappearance of the liquid system during the transition to the solid phase) depend on the substances present in the liquid and their amounts. and to study the possibility of informing the process of intermolecular composition of biological fluids, which occurs during dehydration.

Research method. Every day, a person excretes 1-1.2 liters of body fluids (saliva). The main components of biological fluid (saliva) are water, mucus, proteins and inorganic substances. Human saliva contains 99.4% water and 0.6% various substances (dry matter). The dry residue contains about 0.2% inorganic and 0.4% organic matter. Inorganic substances in biological fluids (saliva) contain sodium, potassium, calcium, and other trace elements. Organic matter in biological fluids (saliva) consists mainly of proteins and salts. The following method has been developed to study the evaporation of biological fluids and the structure of the solid phase. Biological fluid with a volume of 1 mm^3-10 mm^3 is dropped horizontally on a flat glass. The diameter of one drop is in the range of 2-5 mm, and the temperature is observed at a temperature of 22 °C and without changing the relative humidity. Methods for evaluating the evaporation process and solid phase of biological fluid (Figure 1 (a) - view from the horizontal position, Figure 1 (b) - view from the vertical position) are widely used in laboratory diagnostics [1.2] .

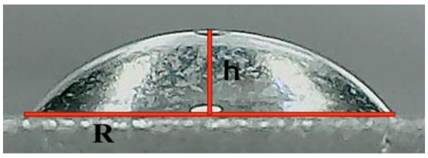
The process was first studied by placing a biological liquid in a glass beaker in the form of a drop, and from the initial appearance, i.e., from the evaporation process to the solid phase. If a drop of liquid is placed on the surface of a clean glass window, its height decreases during evaporation, the diameter of the base does not change during drying. Takes the view state in Figure 2 (b).



1- picture

To study this process, we used a modern biological microscope that can meet the requirements of the time, the main function of the microscope is not only to show the object in an enlarged view, but also to take pictures, transfer the captured object to the screen, Determining the parameters consists of creating a video image.

The size of a rainbow-shaped biological fluid (saliva) is determined by its height and the radius of its base.



To calculate the volume of a rainbow-shaped biological fluid (saliva) rising into the air as a result of evaporation from the surface in a unit of time, we can include the following formula

$$\upsilon = V/t$$

υ −volumetric velocity formed by the evaporation of biological fluid (saliva),
V −The volume that evaporates from a rainbow-shaped sample,
t −the time required for a certain volume of biological fluid to evaporate.

From our observations, it can be seen that the sample dripped on the glass began to form shaped elements from the edge to the middle.

After mixing the biological fluid (saliva) and the substance contained in it (a mixture of 0.9% NaCl), the rate of formation of the form element in it was determined.

$$\vartheta = S/t$$

we can get by the formula
S −the distance from the end point of the sample to the center
t −the time taken for the droplet-shaped sample to form a droplet on the glass.

Object of inspection. The object of our study was a sample of a mixture of NaCl with a concentration of 0.9% in the amount of biological fluid (100% Biological fluid (saliva)) in the human body (50% of this biological fluid (saliva)), and pure 0.9%. Taking a sample of NaCl, a drop of it was dropped on a glass beaker using a pipidka, and the processes that take place in it, that is, the volume of liquid that evaporates from its surface over time and the formation of shaped elements, are connected to a computer. The following results were obtained by observing under a microscope (horizontal and vertical position).

The result of the inspection.

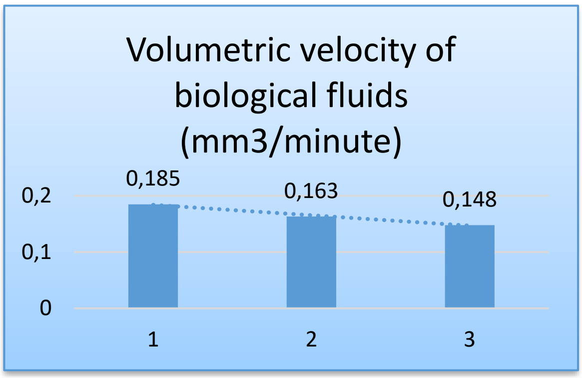
Amounts of biological fluid and NaCl solution	The central height of the drop (mm)	The radius of the base (mm)	the time required for a certain volume of biological fluid to evaporate (minutes)

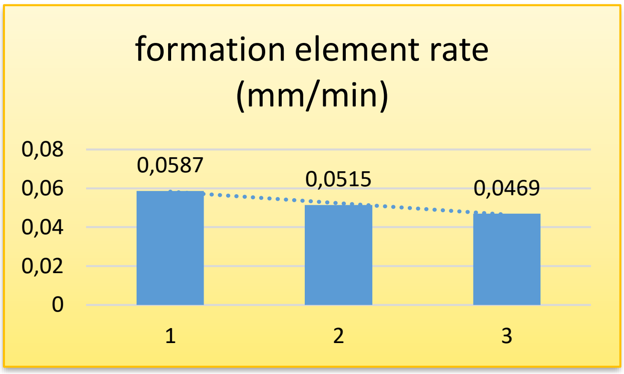
100% saliva, 0.9% concentration NaCl is not present.	0,899	2.112	36
50% saliva, 50% NaCl in 0.9% concentration	0,899	2.112	42
100% NaCl, 0.9% concentration, no saliva.	0,899	2.112	45

Using the data in the table, we determine the volume of the biological fluid and the volume rate formed by the evaporation of the biological fluid using the above formulas and the rate of formation of the form element.

Volumetric velocity of biological fluids			
Amounts of biological fluid and NaCl solution	drop size (mm^3)	the time required for a certain volume of biological fluid to evaporate (minutes)	Volumetric velocity of biological fluids (mm^3/minute)
100% saliva, 0.9% concentration NaCl is not present.	6,68	36	0,185
50% saliva, 50% NaCl in 0.9% concentration	6,68	42	0,163
100% NaCl, 0.9% concentration, no saliva	6,68	45	0,148

the rate at which a formal element is formed			
Amounts of biological fluid and NaCl solution	The radius of the base (mm)	the time required for a certain volume of biological fluid to evaporate (minutes)	formation element rate (mm/min)
100% saliva, 0.9% concentration NaCl is not present.	2.112	36	0,0587
50% saliva, 50% NaCl in 0.9% concentration	2.112	42	0,0515
100% NaCl, 0.9% concentration, no saliva	2.112	45	0,0469





It can be seen that as a result of changes in the amount of a substance present in a biological fluid, its rate of dehydration and solidification, that is, the rate of formation of the element and the rate of volume of the liquid, decreases.

Conclusions. In the study of the process of dehydration of biological fluid droplets, the study of changes in its volume and surface was carried out experimentally for the first time, and as a result the amount of substance (0.9% NaCl solution) in biological fluid (saliva) As a result of the change, the volume of fluid leaving the dehydration process decreased, and the time of the dehydration process increased, but the volume rate also decreased.

The transition of biological fluid (saliva) to the solid phase, ie the process of formation of the form element, the formation of the form element as a result of the addition of the substance contained in it (0.9% NaCl solution). It was observed that the process of formation takes less time and the rate of formation of the form element is higher.

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ДОЛГОВРЕМЕННАЯ РЕЛАКСАЦИЯ ФОТОЭЛЕКТРЕТНОГО СОСТОЯНИЯ ФОТОВОЛЬТАИЧЕСКИХ ПЛЕНОК CdTe:(Ag, Cu, Cd) И Sb_2Se_3:Se

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Аннотация. Приводятся результаты экспериментальных исследований долговременной релаксации фотоэлектретного состояния (ФЭС) в пленках CdTe:(Ag, Cu, Cd) и Sb_2Se_3:Se. Показано, что в активированных пленках ФЭС обусловлено с глубокими примесными уровнями или комплексами, в которых входит примесные атомы и собственные дефекты.

Ключивые слова: тонкие легированные пленки, аномальное фотонапряжение, фотоэлектретное состояние, долговременная релаксация.

Исследование долговременной релаксации аномального фотонапряжения (*АФН*) при темновой деполяризации фотоэлектретов от условий поляризации является наиболее существенным при анализе процессов, лежащих на основе образования фотоэлектретного состояния (*ФЭС*) без внешнего поля в полупроводниковых пленках [1-3]. В данной работе рассмотрены релаксационные процессы в пленках CdTe:(Ag, Cu, Cd) и Sb_2Se_3:Se, для чего снимались деполяризационные кривые аномального и фотоэлектретного напряжений в темноте в режиме холостого хода после фотополяризации.

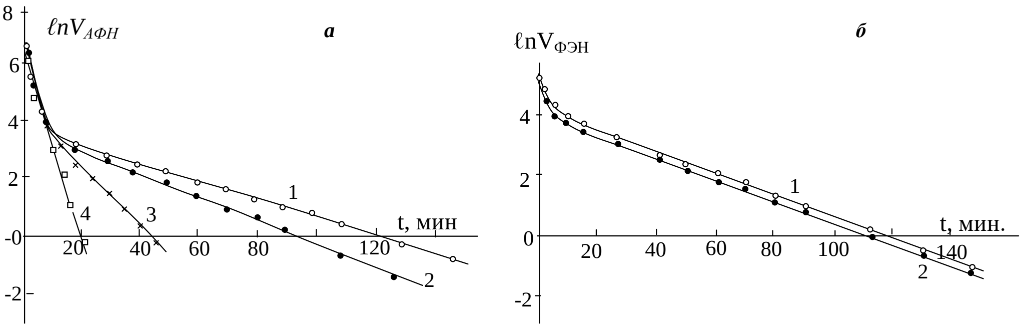

Рис.1. Кривые релаксации $V_{АФН}$ для $АФН$ пленок $CdTe:Ag$ (1, 2, 3), $CdTe$ (4) (***а***) и кривые деполяризации «чистого» $V_{ФЭН}$ для двух $АФН$ пленок $CdTe:Ag$, полученных одновременно (***б***). $T = 293\ K$.

На рис. 1,*а* приведены в полулографимических координатах зависимости $V_{АФН}$ от времени релаксации для пленок $CdTe:Ag$ (1, 2, 3) и $CdTe$ (4). Кривые 1 и 2 соответствуют релаксацию $V_{АФН}$ в пленках $CdTe:Ag$ в воздухе и в вакууме 10^{-2} *мм.рт.ст.*., а кривая 3 представляет собою релаксацию фотонапряжения этой же пленки после неполной её фотополяризации (время поляризация $2-3\ с$). Кривая 4 характеризует ход релаксации $V_{АФН}$ контрольного нелегированного образца, полученного одновременно с активированными