Ann. For. Res. 65(1): 5339-5347, 2022
ISSN: 18448135, 20652445

ANNALS OF FOREST RESEARCH
https://www.e-afr.org/

WAYS TO DEVELOP CREATIVE ABILITIES OF STUDENTS IN CHEMISTRY

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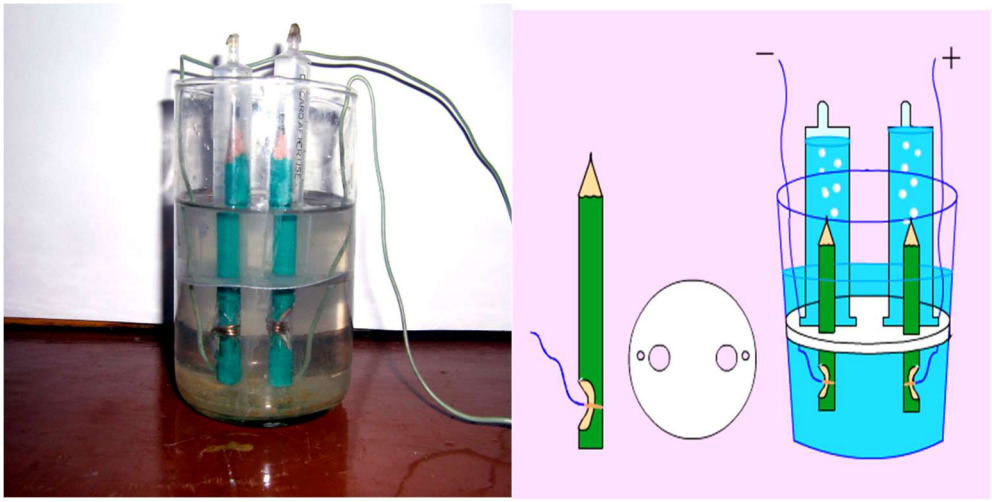
The correct Organization of practical work in achieving educational results that meet the requirements of the national program, the correct choice of strategies for the development of practical skills of students is an urgent issue facing a skilled educator. After all, readers, on the basis of theoretical knowledge, know, visualize and understand the essence of various natural objects, phenomena and processes, natural phenomena and processes that they observe in everyday life received terms, concepts and general laws on Sciences explains, applies in practice, relying on knowledge, skills and abilities. In the 21st century, it became increasingly clear that research skills and abilities are necessary not only for people whose life is associated with scientific activity, but also for everyone. The ability of students to find the necessary information from various sources of information, apply it in their personal and professional activities, apply the knowledge, skills and abilities acquired in the natural sciences to solve problems arising in their personal, professional and social activities, compliance with safety rules and rational use of various equipment; applied to the sustainable development of its own marriage and living territory the mobilization of their skills shows the importance of developing their creativity. Obtaining hydrogen by electrolysis As an electrode for electrolysis, it is possible to use a black pencil (it is advisable to take a solid pencil of the"T" brand or graphite inside an old battery), on which the back part is engraved and a copper wire is connected, until the graffiti comes out. In the absence of test tubes for gas collection, a 10 ml syringe can be used. Having made a circle from a piece of plywood or plastic, an electrolyzer is assembled (fig.

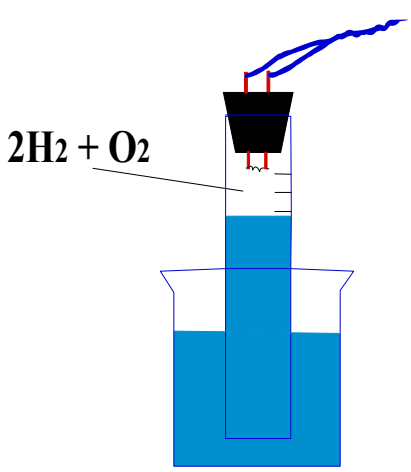
Figure 1. Electrolysis Assembly using a syringe and pen



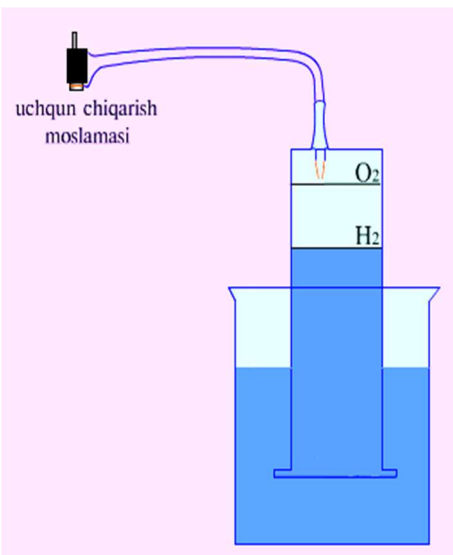
2-3 teaspoons of laundry soda (Na2CO3) are added to the water in the glass. The solution is filled into the syringes and placed in a solution in a glass with a swab, which is hidden with a finger. Placing a water-filled test tube or syringe in a bun can be a bit of a hassle. To do this easily, a thin rubber or polyethylene flute is inserted into the Nina, taking a 10 ml syringe, and through the flute, air is drawn into the container, which is placed in the water. A catheter tube installed in a syringe can also be used for this purpose (the same can be done when collecting other gases over water). 4-6 batteries are connected by straightening the LED poles. Then one of the wire connected to the Pens is connected to the pole "plus", the other to the pole "minus". As the electrolysis process goes, hydrogen (-) is released in the cathode and oxygen in the anode (Q). It is possible to know that the water in the syringe or test tube is completely squeezed out, filled with hydrogen. It can be taken and burned in a bunched form and checked. Such a reaction can also be carried out with a solution of table salt (sodium chloride). Only in this, a yellowish green gas chlorine is released in the anode. Chlorinated water is formed if the chlorine test tube is rinsed with a finger under running water along with a little solution and shaken well. It is a whitening property and, for example, discolors when added to an ink solution.

Perform experiments on the law of permanence of substance content One of the most public, understandable and accessible experiments in the study of the law of constancy of the composition of a substance consists in detonation of a thicker gas (a mixture of 1 volume of oxygen and 2 volumes of hydrogen) collected by compressing water and observing that gases have fully reacted. This experiment is performed on the evdiometer instrument. Currently, there are several different evdiometers that are widely used, differing from each other with a spark plug device designed to blow up a mixture of gases inside a berk container. The simplest appearance is when two copper wires are installed in a plug inserted into a cylinder, which are connected by a thin wire (Figure 2), and when connected to an electrical network, a thin wire is disconnected, giving a spark, and detonates the mixture.

Figure 2. Evdiometer

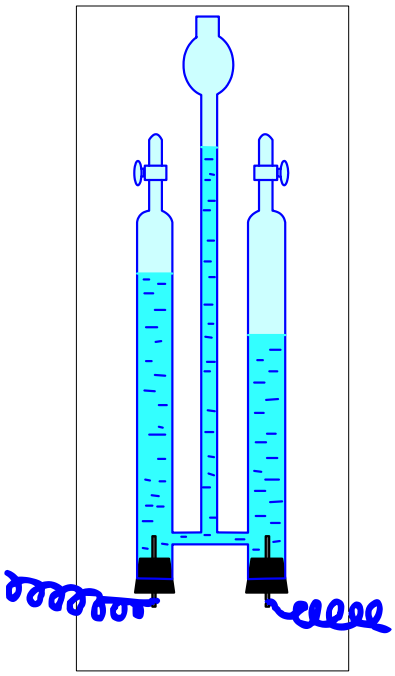


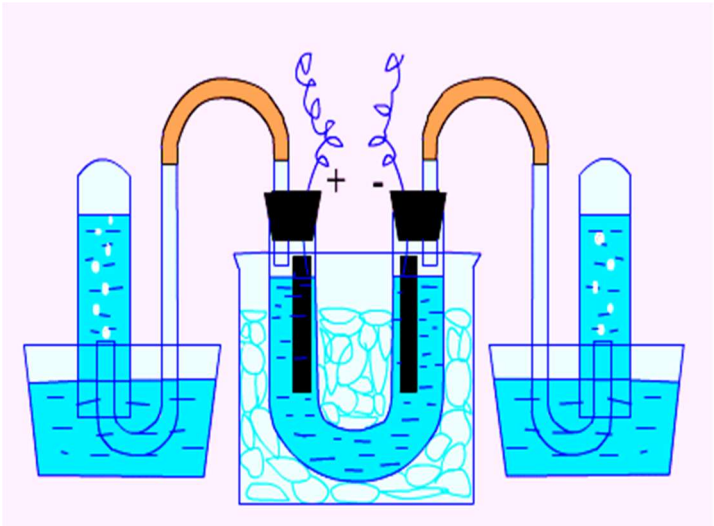
Only the disadvantage of such an evdiometer will have to replace the burned wire every time. To eliminate such a defect, an inductor can be used for the purpose of spark extraction (IV-50 (gives a spark with a length of 50 mm), IV-100), but not all chemistry laboratories find an inductor. This experience can also be successfully accomplished by taking advantage of the opportunity it has.
To do this, take a 10 ml syringe and thread two insulated thin wires open only at the ends of its nina-mounting end, and then heat the tip of the syringe in a flame and solder it so that no air enters (or it is also possible to hide it with a rubber stopper). A spark plug device from the burner (lighter) is installed on the second end of the wires and a spark formation is checked by pressing several times, if necessary, the spacing of the ends of the wires remaining in the syringe is adjusted by bringing them closer or away. By filling the syringe with water, it is placed in a glass with water, and by squeezing out the water, 2 volumes of hydrogen and 1 volume of oxygen are collected in the syringe (determined using scales). It is recommended to harden the glass even more firmly (fig.
Figure 3. Evdiometer made of syringe and lighter



Then, by pressing the spark plug device, the mixture is detonated and it can be observed that the water rises into the syringe. Of the more important comforts of the tool, there will be no risk of splashing cracked glass particles present in a bottle of evdiometers, and further detonation is also possible with a wire extension.
It can be shown that water is made up of 2 volumes of hydrogen and one volume of oxygen, even in reverse to the process of water synthesis, that is, by electrolysis. Various devices can be used to demonstrate this experience (fig.

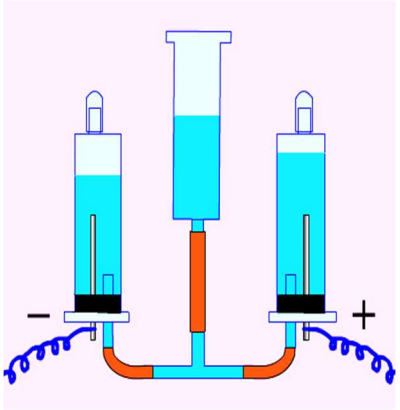
Figure 4. Water electrolysis devices





It is possible to electrolysis of water with a special place in a chemical laboratory, making devices for synthesizing water using disposable syringes. To assemble the water electrolysis device, the tip of the two syringes is hermetically sealed using the sheath of the syringe nozzle (if necessary, cut in half and heated to a tightly closing state). The tip of the third syringe is directed down and fixed in the middle. The rubber of the syringe piston can be used as a stopper. The middle of the rubber is pierced, a glass flute is installed, and an electrode from a nail or wire is installed next to it. Such a stopper is installed in syringes on two edges. A rubber flute is put on the tip of the syringe in the middle, and the tubes from all three syringes are connected through a triple flute (troinik) (fig.

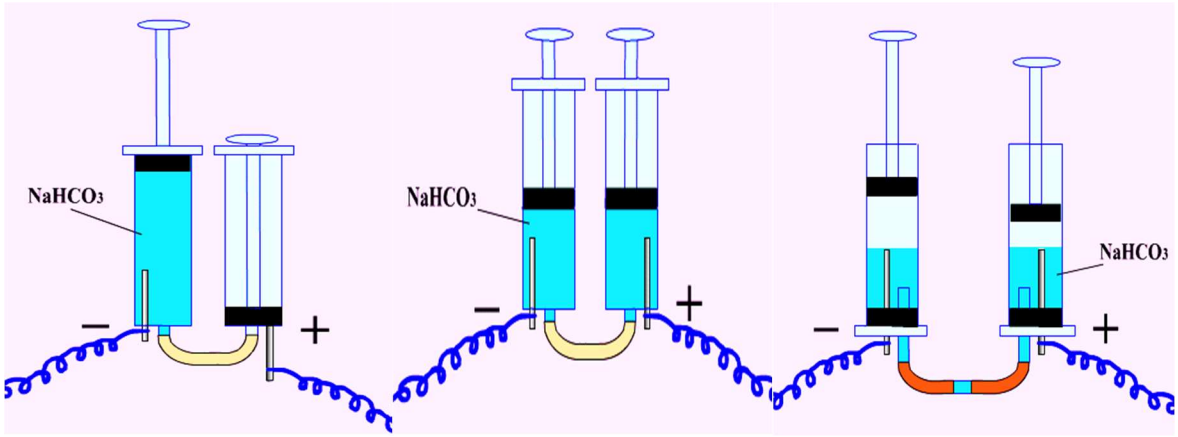
Figure 5. Device for electrolysis of water made from syringes



When the device is ready, the syringe tips on the two sides are opened and an alkali or soda solution is poured from the syringe in the middle. When the two side syringes are full, the ends are suspended with a prepared sheath, and the electrodes are connected to a battery or other irreplaceable current source. In the cathode, it is possible to observe the gas output in twice the volume than in the anode. This instrument is similar to the water electrolysis instruments used a lot in the laboratory, and the resulting gases are collected at the expense of compressing the water into a container in the middle.

The process of electrolysis of water can also be performed on an improved and convenient instrument assembled from two syringes. To do this, two syringes are taken and the syringe is checked for free movement by clogging the piston. The second side of the syringes is closed with a rubber stopper (or rubber of the syringe piston) on which the glass flute is inserted. Glass tubes are connected to each other by a rubber flute. An iron wire or syringe nozzle acting as an electrode is inserted into the rubber stopper (the nina hole must be pricked and hidden, otherwise it will not be hermetic). When the tool is ready, the syringe Pistons on one side are taken out, the piston of the other is lowered to the end and filled by an open standing syringe, placing a solution of drinking soda. Then, when the piston is lowered to half of the blockage, the second syringe piston also rises to half if the instrument is hermetically assembled. Porshens are lowered until they reach the solution, leaving no air in the meantime (fig.

Figure 6. Water electrolysis device and its use

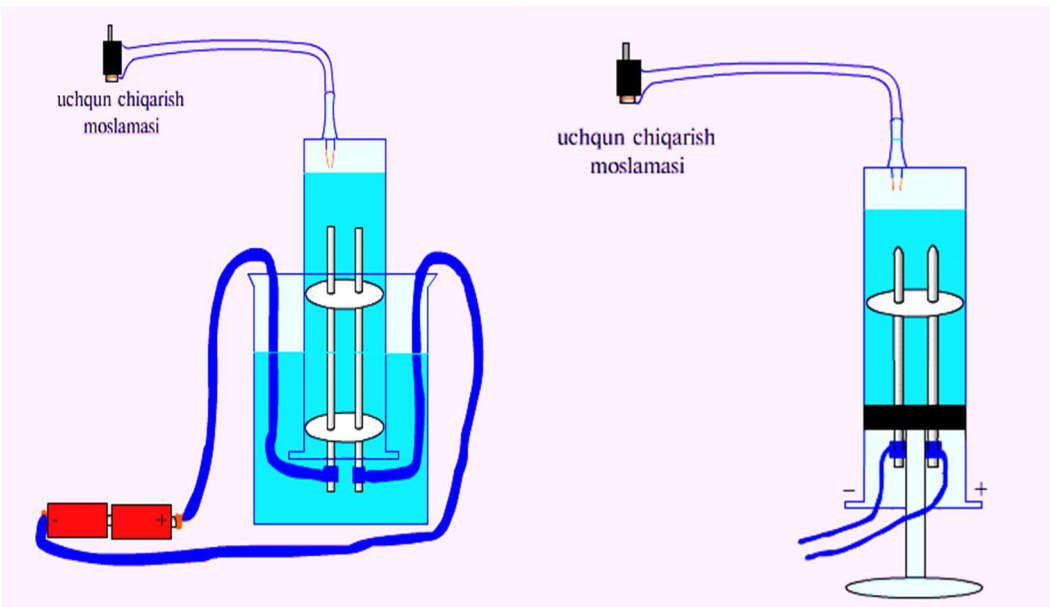


After making sure that both syringe Pistons touch the fold solution, the electrodes are connected through wire conductors to the poles of the battery of 2-4 pocket lanterns. Depending on the elevation of the porshenes, two volumes of hydrogen can be observed on the cathode side and one volume of oxygen accumulation on the anode side. Above we got acquainted with how to make a simple evdiometer using a syringe. Even in conditions when it is not possible to obtain oxygen and hydrogen gases separately, it is possible to assemble using a device, a single syringe, which allows you to observe the explosion of a "thicker gas". With this instrument, the electrolysis and synthesis

of water can be observed sequentially. To do this, two iron wires (the Nina of the syringe) are installed above the lower part of the evdiometer, which you prepared from the syringe, so that they do not touch each other. They act as electrodes. Instead of water, a solution of alkali or drinking soda is taken. The second end of the wires connected to the electrodes is connected to the battery poles. A mixture of released hydrogen and oxygen is collected in the upper part of the syringe by squeezing out the water. Once a mixture of the required amount of gases is formed, the current is disconnected from the source. Then the spark generating device is launched.

Iron electrodes can also be installed in the rubber stopper of the syringe piston. When electrolysis is carried out, electrodes are also moved along with the piston due to the formation of a mixture of gases (fig.

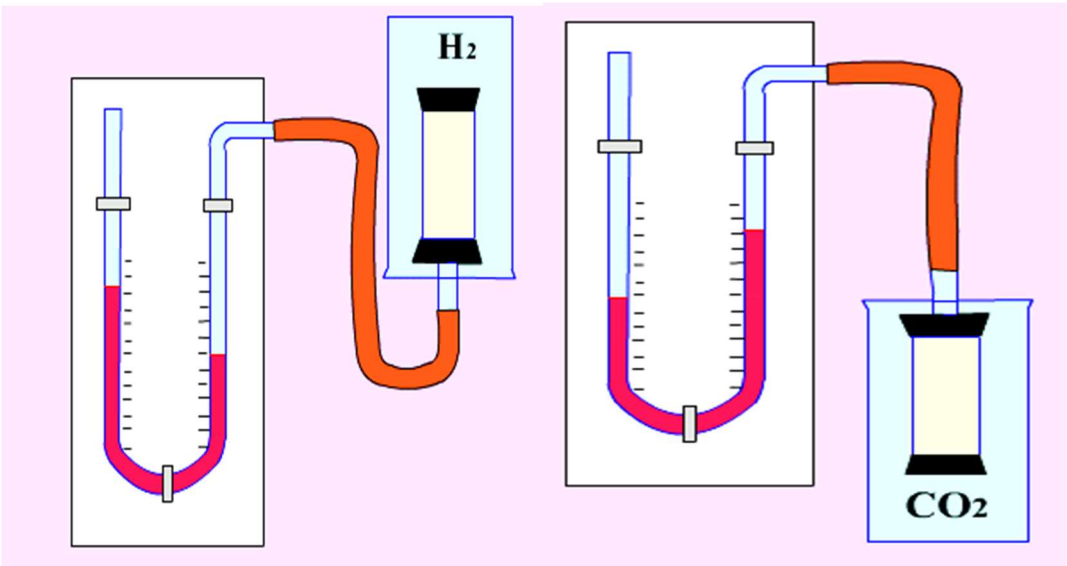
Figure 7. Device for electrolysis and synthesis of water



These instruments are different from the glass evdiometer and do not sag, forming fragments even if they burst as a result of an explosion. Since the electrodes are placed much closer to each other, the process also goes much faster on the pocket lantern battery. Well, the tool also has an advantage in terms of safety (it is not only useful to take a mixture of gases in large quantities). Using this tool, it is possible to carry out an experiment even at home (since in this way a thicker gas can be easily generated). The experience can be repeated many times in a short time without waste.

Monitoring the diffusion of hydrogen and carbon dioxide The diffusion of small gases with a molecular mass faster than large ones can be observed by wearing a glass filled with hydrogen in a porous cylinder with an overturned. To do this, with the help of a conductive flute, a colored solution is connected to the porous cylinder, which is filled with it simon flute (fig.

Figure 8. Monitoring the diffusion of hydrogen and carbon dioxide



When a glass filled with hydrogen (light gases from the air) is placed in a porous cylinder, the level of the solution decreases by increasing the pressure on the side where the conductive flute is connected due to the fact that the hydrogen quickly diffuses and passes through the porous cylinder. When performing the same experiment with heavy gases from the air (for example, with carbon dioxide collected straight into the glass), the air diffuses faster, reducing the pressure on the side to which the flute is connected, and the solution level rises.

If there is no porous cylinder in the laboratory to perform this experiment, it can be used instead by making a cylinder out of notebook paper. To do this, the paper is rolled into a test tube or wide tube in 12-15 layers, and the edge of the paper is glued with starch glue. Taking out the test tube from the paper tube, one end of it is suspended with a rubber stopper. The paraffin is melted and poured so that there is no open space between the paper and the stopper. A rubber stopper with a glass flute is inserted into the second end of the paper flute, and the side of it is also paraphrased. The finished paper cylinder can be used in place of the porous cylinder. A straight glass tube can be brought into shape by heating it in the flame of an alcohol lamp.

Chemical reaction Energy Studies

In general secondary educational institutions, the occurrence of chemical reactions is explained on the basis of such signs as deposition, gas discharge, discoloration, the appearance of smell, temperature changes. In doing so, the exothermic and heat absorption-induced changes of processes accompanied by heat release are called endothermic reactions and are limited to the study of thermal effects and thermochemical equations of chemical reactions.

It is known that the science of the conservation of energy and its transformation from one species to another – the basics of thermodynamics-is covered in the school physics course. This provides preliminary information about the thermodynamic system and its components, systems

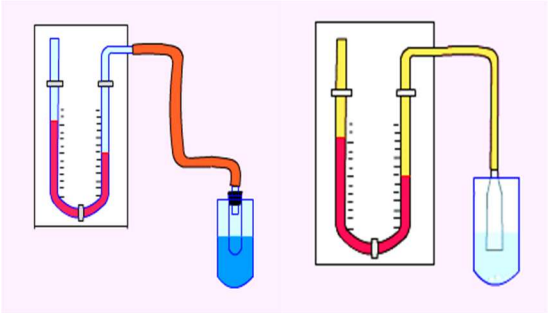
differentiated according to their energetic communication with the environment and their parameters, dialectic of energy and working relationships.

For the onset of a chemical reaction, the energy supply of material particles (activation energy and overcoming or lowering the reaction energy barrier), which are its participants, are served by parameters (temperature, pressure and volume) that represent the state of the system. While the study of the speed of chemical reactions and the factors influencing it has shaped chemical kinetics, it is known that applying the law of conservation of energy to chemical processes, determining the direction of processes and the boundaries of their occurrence laid the foundation for chemical thermodynamics.

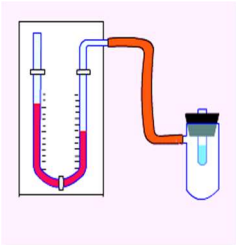
Famous English physicist, public figure and historian of science Dj. Bernal "modern chemistry stands on three whales – the structural theory of substances, chemical thermodynamics and chemical kinetics..."when he said, he was certainly right. New curricula and programs of secondary special and vocational educational institutions provide an opportunity to include chemical thermodynamics information in the content of Chemical Education, and, consequently, to further strengthen the inter – subject communication of chemistry and physics. In chemical processes, new changes occur in the composition, structure and properties of substances. Such changes are reflected in its energy reserve with a certain amount of system energy flowing out (exothermic processes) or being absorbed from the external environment into the system (endothermic processes). It is possible to form and develop chemical thinking, which is a component of the modern scientific worldview, through the highly effective use of the data of Sciences – Chemistry and physics, which are actively involved in the creation of a general and holistic scientific picture of the universe. In this case, the study of chemical reactions and their energy plays an important role, which is the basis for changing the composition and properties of substances. Among the chemical data studied in the system of continuing education, materials related to the energy of chemical reactions are of significant theoretical and practical importance.

In the laboratory, a simple thermoscope is used to monitor the release or absorption of heat as a result of a chemical process. This tool can be assembled without difficulty. To do this, a colored solution is placed inside the simon flute, and it is fixed on a piece of wood or cardboard (plastic) on which scales are placed. A rubber flute is installed on one end of the simon flute, which is connected by a stopper with a small test tube. If the tool is not hermetic, the intended result cannot be obtained. When the test tube is lowered into the container where the reaction is going, the air pressure inside the test tube increases under the influence of the temperature released by the reaction and presses on the colored liquid inside the flute. When heat is absorbed as a result of the reaction, on the contrary, the pressure decreases, and the solution inside it simon flute rises. This tool can also be assembled by hermetically placing an ampoule emptied of the drug at the end of the polyethylene nozzle of the suspension syringe and installing the flute on a piece of wood or cardboard in the same position as it was in simon (fig.

Figure 9. Monitoring of heat separation or absorption in chemical reactions



Or it can also be shaped into a simon by heating the glass tube in an alcohol lamp. The U-shaped part of the flute is filled with a colored solution (even if it is an ink solution) and the sensitivity of the instrument is checked by heating the ampoule by hand.
Slightly modified views of the thermoscope are now also produced at the factories. The difference between these instruments is that it is connected to a simon flute test tube (fig.
Figure 10. Thermoscope



The disadvantage of this instrument is that the external test tube is large in size, there is little pressure change inside it, and the sensitivity of the instrument is reduced. However, since the container is located outside, the outside temperature also negatively affects the sensitivity of the instrument.

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