

МЕДИЦИНА, ПЕДАГОГИКА И ТЕХНОЛОГИЯ:  
ТЕОРИЯ И ПРАКТИКА

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Том 2, Выпуск 4, 30 Апрель

CONDUCTING LABORATORY CLASSES IN CHEMISTRY ON THE  
BASIS OF THE STEAM EDUCATION PROGRAM

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**Anotation:** To conquer high heights in the educational program, to massively add to the science of chemistry and its well-being. Holda, who supported the STEAM education program, developed chemical knowledge acquisition. Copper coating without electrolysis on the surface of iron metal and similar iron products. Coming up with new technologies from interesting experiences. Effective use of chemical knowledge and substances. To make a simple device for determining whether or not to conduct electric current in solutions of a substance.

**Keywords:** Air balloon, ties, zinc fragments, hydrochloric acid , aluminum foil , sodium hydroxide solution, closed container , rubber tubes, iron nail, copper sulfate , sulfuric acid , electronics device.

STEAM TA'LIM DASTURI ASOSIDA KIMYO FANIDAN  
LABORATORIYA DARSLARINI O'TKAZISH.

**Annotatsiya:** Ta'lim dasturida yuksak cho'qqilarni zabt etish, kimyo faniga va uning farovonligiga ommaviy ravishda qo'shilish. STEAM ta'lim dasturini qo'llab-quvvatlagan Holda kimyoviy bilimlarni egallashni rivojlantirdi. Temir metall va shunga o'xshash temir buyumlar yuzasida elektrolizsiz mis qoplamasi. Qiziqarli tajribalardan yangi texnologiyalar bilan chiqish. Kimyoviy bilim va moddalardan samarali foydalanish. Moddaning eritmalarida elektr tokini o'tkazish yoki o'tkazmaslikni aniqlash uchun oddiy qurilma yasash.

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**Kalit so'zlar:** Havo shari, galstuk, rux bo'laklari, xlorid kislotasi, alyuminiy folga, natriy gidroksid eritmasi, yopiq idish, rezina naychalar, temir mix, mis sulfat, sulfat kislota, elektron qurilma.

## ПРОВЕДЕНИЕ ЛАБОРАТОРНЫХ ЗАНЯТИЙ ПО ХИМИИ НА ОСНОВЕ ПРОГРАММЫ ПАР ОБРАЗОВАНИЯ

**Аннотация:** Покорить высокие высоты в образовательной программе, массово пополнить химическую науку и ее благополучие. Хольда, который поддерживал образовательную программу STEAM, разработал программу приобретения химических знаний. Медное покрытие без электролиза на поверхности металлического железа и аналогичных изделий из железа. Придумываем новые технологии на основе интересного опыта. Эффективное использование химических знаний и веществ. Изготовить простое устройство для определения, проводить или нет электрический ток в растворах веществ.

**Ключевые слова:** Воздушный шар, стяжки, осколки цинка, соляная кислота, алюминиевая фольга, раствор гидроксида натрия, закрытый контейнер, резиновые трубки, железный гвоздь, медный купорос, серная кислота, электронное устройство.

## INTRODUCTION.

Below is a step-by-step information on conducting laboratory training, which includes the basis of the STEAM educational program, preparing an air balloon, coating copper without electrolysis on the surface of iron metal and preparing a separator for electrolytes and nonelectrolytes:

1.Let's start by introducing the concept of STEAM and its features to learners. The importance of the STEAM education program lies in the fact that its role today has led to the inclusion of areas such as physics, mathematics, art, engineering.

2.Therefore, the process of making an air balloon layout is demonstrated. Students can be shown to perform by chemical experiment in a simple way when making an air balloon mock-up. The basic substances we need to do this are achieved through a squeezing reaction. Suppose a piece of Zn metal reacts with HCl to squeeze out H<sub>2</sub>. H<sub>2</sub> is a light gas, 14.5 times lighter than air, 22 times lighter than carbonate anhydride, and 14 times lighter than nitrogen. This makes it possible to

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make the desired layout for us. Or it can also be done by applying aluminum foil to the NaOH solution.

3. A copper coating without electrolysis is covered on the surface of the iron metal, explaining the chemical reaction involved in this process throughout the article. We will learn in detail how to apply a solution of copper sulfate to ferrous metal and, over time, the formation of a copper coating.

4. Throughout the article, there is also talk about the preparation and demonstration of a separator device for electrolytes and nonelectrolytes. Students are taught how to set up a simple apparatus using a porous membrane to separate a solution containing electrolytes from a solution containing nonelectrolytes. The role of the separator device in conducting electrolysis experiments was explained. Through this device, we learn about whether simple and precise substances conduct or not electric current from themselves.

Learners are asked to learn the above experiences and enrich their capabilities. The ground is broken for the development of Chemical Technologies by summarizing the main concepts mentioned and discussing the practical application of steam, coating copper without electrolysis and using a separator for electrolytes and non-electrolytes.

In inorganic compounds, specific reaction types and its mechanisms are not perfect, but it should be studied perfectly anyway. The performance of modern laboratory and practical technological work has become an obligation for today.

**Main part.**

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1 - rasm. STEAM ta'lim dasturi.

STEAM is an approach to the educational program that allows children to systematically explore the world, make logical observations of the processes taking place around them, realize the interaction in them, open up something new, unusual and interesting for themselves. By waiting for some kind of novelty, the child develops

curiosity; leads to the identification of an interesting issue for himself, the development of an algorithm for finding its solution, a critical assessment of its results, the formation of an engineering style of thinking. Teamwork forms the skills of working in the team. All this makes it possible for the child to take development to a higher level and choose the right profession in the future. The use of information retrieval, processing and practice forms the basis of the STEAM – training program.

We know that every work that children do with their own labor is a source of prosperity. Therefore, it is necessary to motivate students to hard work and make them prone to indoctrination. Only then will they begin to look for a positive solution to their surrounding problems. The worldview, the circle of thinking changes, forms and grows. The science of chemistry is a very interesting science and keeps many secrets in itself. It must be understood and shown in a practical way, tied to life. Only after that we are considered to have achieved the goal.

## **Making an air balloon layout.**

Necessary equipment and reagents: rubber ball, plastic cup, glue, Virus flask, rubber pipes, stopper bottle for acid injection, stopper, hydrochloric acid (HCl), zinc (Zn),

The procedure for going to work: first we cut the plastic glass to the desired size and tighten 4 ties through glue. In the Virus flask we install a stopper installed in a glass Everyone with a load of 40 gr from Zn. We die a rubber tube into the Virus flask and attach it to the rubber balloon through a stopper. Through the glass

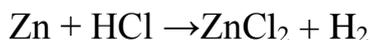
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varyonka we put 45 gr of the density 1.64 g/cm<sup>3</sup> HCl acid. As a result, the following reaction goes away, and the vadarod is released.



2 - rasm. Kimyoviy tajriba asosida havo shari maketini yasash.

The separating H<sub>2</sub> is collected into a rubber sphere. After the rubber ball of a certain size is filled with H<sub>2</sub>, we glue our glass screw with glue, which we prepared by tying the mouth, to the side.

As a result, the reason that H<sub>2</sub> is lighter than air is elevated. (Figure 2)

If the above substances are not found or not, then we can also use aluminum foil and sodium alkali. The procedure for adjusting substances is as follows:

1. We are connected to a closed container through gas-conducting tubes and put a solution of sodium hydroxide into it. The sodium alkali solution that we put in should be

in the equivalent amount to the aluminum foil that we put in. For example, for 50 gr of aluminum, we need to apply how much alkali solution.



$$50\text{gr} \text{-----} x =$$

$$9\text{g/ekv} \text{-----} 40\text{g/ekv}$$

Or

$$\frac{E1}{E2} = \frac{M1}{M2}$$

according to the formula;

$$\frac{50\text{g}}{x} = \frac{9\text{g/ekv}}{40\text{g/ekv}}$$

So according to the calculation

$$x = \frac{50 * 40\text{g/ekv}}{9\text{g/ekv}} = 22.2(2)\text{g}$$

We pour a total of 22.2 g of sodium hydroxide into a closed container, forming a solution in water.

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2. After we put sodium alkali, we put aluminum foil in it accordingly, as we have already cited as an example above.

3. After we put the aluminum foil, we close the mouth of the container. In a closed system, the reaction goes, and with an intensity, the vapor begins to separate.

4. Through a rubber tube that we pass through a closed container, we fill the balloon with a vapor. We close the ball valve, which is filled with vapor, tie it and tie it with a tie on all four sides, giving shape to a plastic cup. And one end of the ties we glue through the glue to the ball filled with vapor. Our balloon is ready. We can attach it to any heavy object by tying it through a thread longer than the bottom or side.

## **Electrolysis-free coating of copper on an iron metal surface**

Necessary equipment and reagents: iron metal, nail sample from iron, sulfuric acid, copper sulfate solution, alcohol lamp.

Work progress:  $H_2SO_4$ ,  $CuSO_4$  and an alcohol lamp are assembled on the table. By heating 2 ml of 50 ml of  $H_2SO_4$ , a metal or a nail made of it is lowered into the liquid. After a certain time has elapsed, transfer 50 gr to a 40% solution of  $CuSO_4$ . After some time, we observe that the color of the metal has changed to yellow.

The advantage of experiments like this is that it is considered simple and safe as opposed to electrolysis. It is necessary to work only when working with acid, taking precautions. The school can also be shown to students as an exhibition experience.

## **Making separators for electrolytes and nonelectrolytes.**

Necessary equipment: lamp for 18 w, copper wire, battery 2 PCs, plastic box (square shape), electrodes (copper, graphite)

When making a device, the following works must be carried out.

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3 - rasm. Elektrolit va noelektrolitga  
ajratuvchi asbobni yasash jarayoni

P On the back of the plastic box, we cut off the place worthy of the location of the batteries. We attach the batteries to the copper wire with a current passing through. We divide one of the positive and negative charges emanating from it into two, and connect the current emanating from it to the lamp.(Figure 3.)

The connected lampshade is attached to the front of the plastic box.

1. We attach two electrodes from the current wire in one direction, which goes to the bulb. The result is a device in which we can determine whether or not an electric current passes through the solution of substances.

## CONCLUSION

Throughout the article , it can be concluded that there are too many types of chemical reactions. We can use them profitably , efficiently. To do this, you should not stop searching.

In conclusion, the research and development of experimental technologies plays a decisive role in the development of innovation and development in various fields. These technologies have the potential to revolutionize our way of living, working and interacting with the world around us. However, it is important to act carefully and take into account the moral, social and environmental consequences of these achievements. By continuing to invest in research and development and developing cooperation between scientists, engineers and policymakers, we can take advantage of all the possibilities of experimental technologies for the benefit of society. At the same time, with the help of chemical experiments, it can be both difficult and useful to prepare new devices. To achieve successful results, careful planning, accuracy and attention to detail are necessary. By following appropriate security protocols, using appropriate materials and techniques, and carefully monitoring the experience, researchers can create innovative devices with the potential to develop scientific knowledge and technological capabilities. In general, the process of preparing new devices through chemical experiments is an exciting and important aspect of scientific research.

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## REFERENCES

1.Hadinugrahaningsih T., Rahmawati Y., Ridwan A. Developing 21st century skills in chemistry classrooms: Opportunities and challenges of STEAM integration //AIP Conference Proceedings. – AIP Publishing, 2017. – Т. 1868. – №.

2.Rahmawati Y. et al. Students' engagement in education as sustainability: implementing an ethical dilemma-STEAM teaching model in chemistry learning //Sustainability. – 2022. – Т. 14. – №. 6. – С. 3554.

3.Zhu B. et al. Fuel cells based on electrolyte and non-electrolyte separators //Energy & Environmental Science. – 2011. – Т. 4. – №. 8. – С. 2986-2992.

4.Xu Y., Lebrun R. E. Comparison of nanofiltration properties of two membranes using electrolyte and non-electrolyte solutes //Desalination. – 1999. – Т. 122. – №. 1. – С. 95-105.

5.Xoliqulov Hamro Jasur o`g`li , Pardayev Ulug`bek Xayrullo o`g`li U. et al. Maktab laboratoriyalarida haydash usuli yordamida azeotrop bo`lmagan aralashmalarni ajratish. Haydash asbob–usukunalari bilan ishlashda o`ziga xos imkoniyatlardan foydalanish //SCHOLAR. – 2023. – Т. 1. – №. 30. – С. 110-116.

6. Tilyabov Maxsudjon Umurzokovich Pardayev Ulug`bek Xayrullo o`g`li, Xoliqulov Hamro Jasur o`g`li. The importance of improving chemistry education based on the STEAM approach// Integration of science and education. – 2024. – Т. 3. – №. 1. – С. 56-62.

7.Xoliyorova S., Tilyabov M., Pardayev U. Explaining the basic concepts of chemistry to 7th grade students in general schools based on steam //Modern Science and Research. – 2024. – Т. 3. – №. 2. – С. 362-365.

8.Ergashovich S. I. Preparation for the International Assessment System Using Modern Methods in Teaching Students in the General Secondary Education System //International Journal on Integrated Education. – Т. 3. – №. 12. – С. 300-305.

9.Soroko, N. V., Mykhailenko, L. A., Rokoman, O. G., & Zaselskiy, V. I. (2020). Educational electronic platforms for STEAM-oriented learning environment at general education school.

10.Hsiao P. W., Su C. H. A study on the impact of STEAM education for sustainable development courses and its effects on student motivation and learning //Sustainability. – 2021. – Т. 13. – №. 7. – С. 3772.