

## THE SIGNIFICANCE OF CREATING AND USING VIRTUAL LABORATORY CLASSES ON CHEMISTRY

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**Abstract.** *This article highlights the didactic significance of conducting experiments in chemistry and topical issues of creating virtual laboratory classes and their application in the educational process.*

**Keywords:** *chemistry education, chemistry experiment, virtual experiments, learning efficiency.*

It is no secret that in recent years in our country, special attention to education and training of the young generation has become the most important direction of our country. A number of important documents and decisions have been adopted in this regard.

Issues of education and training, science, health care, culture and art, sports development, ensuring that our young people have in-depth knowledge, mastering foreign languages and modern information and communication technologies are our constant priorities. remains [1].

The use of modern and information technologies in the educational system, formation and development of independent thinking and learning skills of our children is one of the urgent tasks facing representatives of the education sector. Among all educational subjects, the use of modern information technologies has a great role in the thorough and effective mastering of chemistry. Pupils' understanding of the content of the given topics is carried out with the help of teaching methods in the assimilation of evidentiary information on the example of chemical concepts, laws, and some substances. In order for all this to be at the level of demand, the use of modern technologies in chemistry education today has a good effect. [2-3].

This article reflects scientific and methodological considerations and recommendations on creating virtual laboratory exercises for chemistry education and their effective use in the educational process.

One of the directions of improving the content of education is the creation of necessary conditions for the formation and development of educational and information sources, which are considered the most important means of independent education for students.

The establishment of a modern education system is closely related to the introduction of information technology achievements into the educational process. This applies especially to new forms and means of teaching based on information and telecommunication technologies. These include e-learning, which requires the active use of e-learning tools. Therefore, today it is important not only to teach future teachers how to use ready-made electronic manuals, but also to teach them methods, ways and means of creating new views. [4-6].

Laboratory work is very important in teaching. The great Russian scientist D.I. Mendeleev gave a very high evaluation to chemical experiment, saying that "Chemical experiment is the art of questioning nature." It is no secret that the supply of reagents and equipment for laboratory work is a problem. But if we take into account that the teacher has 40-

45 minutes to fully cover one subject at school, this time is not enough for each student to complete the laboratory work and record the obtained results. In addition, it is not possible for the teacher to control the safety of the equipment during the laboratory work performed by each student, and if we take into account the cost of the reagent used for each student's performance, it can be understood that the issue is very serious. [7-9].

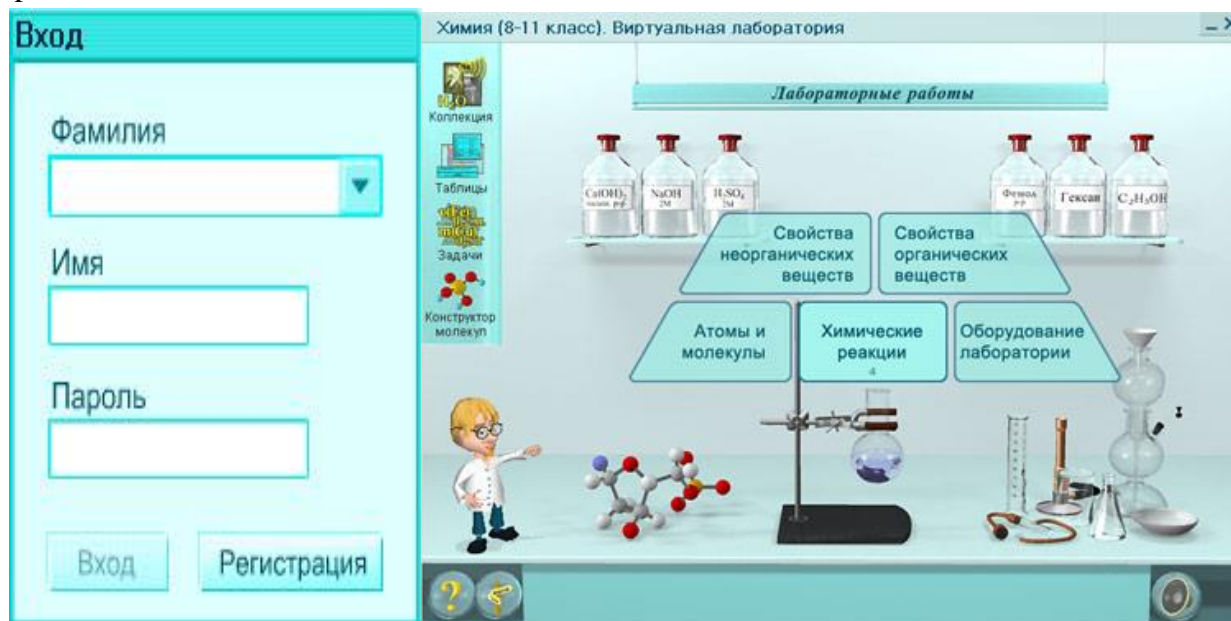


Launching the program

Before starting the program, it is recommended to install it on a personal computer. After starting the program, the main screen will appear on the screen.

How to enter the program:

If you want to enter the electronic program for the first time, you will enter the correct information in your account. If you have worked with this program before, enter your name and personal password and press the login button. Now all your work in the program is saved in a special file.



The main window of the program

When you start the program for the first time, "Kimyogar" will inform you about the purpose and content of the electronic program.

Laboratory works and actions performed in them

The department of laboratory work consists of five parts in total. If you choose any part, the chemist will give you information about the selected part.

In order to carry out laboratory work, it is necessary to perform the following actions: pour liquids, add dry substances, drop by drop, heat chemical containers, fill a laboratory journal, collect tools.



To pour liquids (into a test tube, porcelain dish, chemical beaker), the following steps are performed:

- 1) The test tube is selected using the mouse;
- 2) A container with a reagent is selected;
- 3) If less than the required amount of reagent is taken, 3 parts are repeated again.

Procedure for obtaining from dry substances for reaction.

Taking dry substances (in a test tube, in a porcelain cup, in a chemical glass) is carried out using a spatula. To get the substance:

- 1) A test tube or container is selected;
- 2) A container with a reagent is selected;
- 3) The spatula is selected using the mouse

A pipette is used to drip the solution. How to use it:

- 1) A test tube is selected
- 2) A container with a reagent is selected
- 3) The pipette is selected with the mouse. Heating chemical containers.

A gas burner, an alcohol lamp, an electric plate, and a water and sand bath are used to heat chemical containers. To heat:

- 1) Selection of heater;
- 2) Choosing a heated container

The procedure for filling out the laboratory journal

A laboratory journal is used to prepare a report on the performed laboratory work. To fill out the laboratory log, press the button with the image of the log in the lower right part of the screen. The procedure for filling it out is given in the auxiliary "Help" section. A camera can be used to record observed phenomena and changes in the laboratory journal. To use the camera, press the button with its picture once

The frame created by clicking with will be adjusted to the place where you need to take a picture, and the mouse button will be pressed again.

Collecting tools.

The program recommends a picture of the equipment needed to perform the laboratory work. The given picture is observed carefully. The parts that make up the tool are sequentially executed with one click of the mouse.

Zoom window.

A magnifying glass is used to observe the progress of a chemical reaction more clearly. In it, the main chemical processes of sedimentation, gas release, color formation and other processes can be observed several times enlarged. The magnifying glass is automatically activated during laboratory work when necessary.

During the performance of the selected laboratory activity, the main part of the screen is occupied by the information field for performing the work. In this area, all the tools, equipment and utensils for the work are listed. At the bottom of the screen, the sequence of performing the laboratory is given in text form. Also, the chemist supervises the procedure of the laboratory. If the procedure of performing the laboratory is violated, he will give the necessary instructions in the form of voice.

### **Conclusion:**

Since the study of chemistry is very abstract and difficult, it is important to closely help students to understand the essence of chemistry by conducting experiments.

Advantages and didactic possibilities of virtual laboratories: individual approach to each experiment, rapid and high-quality mastering of experiments, the possibility of performing experiments that are difficult to perform, the possibility of using reagents and equipment sparingly, expanding the imagination of students, improving the quality and efficiency of education, consists of teaching with equal generalization of practical and theoretical knowledge.

The effectiveness of virtual laboratory training largely depends on the ability of teachers and students to work with new information technologies.

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