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ORGANIZATION OF SCIENTIFIC AND RESEARCH ACTIVITIES OF PUPILS IN THE PROCESS OF STUDYING ORGANIC CHEMISTRY IN SCHOOLS**ОРГАНІЗАЦІЯ НАУКОВО-ДОСЛІДНИЦЬКОЇ ДІЯЛЬНОСТІ ШКОЛЯРІВ У ПРОЦЕСІ ВИВЧЕННЯ ОРГАНІЧНОЇ ХІМІЇ В ШКОЛІ****Horynyk Olga***Grozynetsky Lyceum of the Toporiv village council of the Chernivtsi district of the Chernivtsi region, st. Druzhby, 1-A, 60020 Ukraine***Barus Marianna***c.ch.s., as.prof.*

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Abstract. *The manuscript describes the need to find a creative approach to teaching chemistry at school. It is important to find optimal conditions for children's interest in learning, to increase their mental activity, encourage creativity, to achieve not only memorization of basic concepts and rules, but also to achieve understanding of the studied material. The active participation of schoolchildren in research activities not only contributes to a better mastery of the curriculum, but also develops creative abilities, logical thinking, contributes to the education of a schoolchild as a vitally and socially competent independent individual, capable of making the right decisions in life, teaches creatively and practically applies knowledge.*

Key words: *research activity, organization of research activity, research skills, plastic products.*

Introduction.

The scientific research activity of pupils consists of the following elements: teaching pupils the elements of research activity, methods and organization of scientific creativity; scientific research, the implementation of which is carried out under the guidance of teachers [1].

Scientific and research work of pupils can be represented by abstracts, educational projects, reports in lessons, preparation of scientific work for participation in the competition of scientific works. When pupils work on creating essays, they learn to independently use scientific literature, choose the main thing, analyze information. Preparation of research projects develops pupils creativity, promotes pupils cognitive activity, deepens knowledge of the researched topic. Preparation for participation in the competition of scientific works is a scientific and research activity of the highest level. It is an individual form of pupils research activity [2].



Main text

1.1. Scientific and research work of pupils as a factor of self-realization of the individual

To date, for the organization of the educational process, it is necessary to encourage pupils to be more independent in working with educational material, to rely on the preferences and capabilities of pupils. Scientific work is a pupils creative work, where the pupils can demonstrate his independence, knowledge acquired in lessons or outside of it. Properly organized research work brings great benefits, new knowledge and gains from the researched topic.

In order for the research work to have the desired result, the pupils must be interested in its implementation. The pupils work should characterize his knowledge, the pupils should be able to analyze what he has done, draw conclusions, generalize, and apply theoretical knowledge in practice. To achieve success in the creation of research work, pupils and teachers must cooperate [3].

In order to properly organize the scientific and research work of pupils at school, the following principles should be followed:

- scientific research work of schoolchildren at school is the beginning of their scientific work and its continuation in the future;
- the pupils research must correspond to the educational goal, be relevant for society;
- scientific research is a long-term process;
- scientific and research activity - must be carried out under the guidance of the teacher [4].

1.2. Forms and structure of the organization of pupils research work

Forms of research work

- research activity as a component of the educational process: reports, reports, abstracts, pupils projects;
- scientific and research activity that complements the educational process and is carried out outside of school hours: electives, special courses, circles;
- research activities carried out in parallel with the educational process: defenses of research works of the Small Academy of Sciences, tournaments and Olympiads [5].

There are 5 types of creative research works:

- ✓ *abstract* - a work that illuminates issues on the researched topic. The abstract does not contain comparisons, considerations;
- ✓ *descriptive* - creative works that describe the observation of a certain phenomenon;
- ✓ *design* - creative works characterizing the preparation of a project by a group of schoolchildren to solve a given problem;
- ✓ *experimental* - creative works written according to the results of the performed experiment;
- ✓ *research* - creative works, performed according to the developed methodology, on the basis of which the pupils analyzes the research and draws conclusions [6].

When organizing pupils research activities, the following steps should be



followed:

1. Diagnostic stage

This is the initial stage at which you need to find pupils and get them interested in doing research. Pupils must have the desire and ability to prepare a research paper.

2. Theoretical stage (planning stage)

The most important tasks of this stage are formulation of the research problem, identification of sources of information, setting tasks, drawing up a work plan.

The planning stage includes:

- Selection of the field of research
- Selection of the research problem and topic
- Selection of the object and subject of research
- Research hypothesis
- Formulation of the goal and task of the research
- Selection of research methods

3. Practical stage (performance stage)

Following the plan, pupils conduct research, process information, and prepare work. The teacher's task at this stage is to monitor the pupils work, correct mistakes, and develop the basic skills of a researcher.

4. The stage of evaluation of results and protection of research works

Under the guidance of teachers, pupils prepare reports and presentations of their research, defend their works [7].

1.3. Scientifically - research work in chemistry lessons

Chemistry is a natural science. In chemistry lessons and extracurricular time, you can use various methods and tasks for organizing research work:

- search for new ways of solving problems;
- preparation of chemical dictations;
- solving creative tasks;
- independent processing of the topic (pupils look for interesting facts, articles, messages, prepare presentations and report).

To organize research work, teachers can choose tasks based on the level of knowledge of pupils, namely:

- tasks of the algorithmic level (*oriented to pupils with a low level of knowledge*);
- tasks of a partial research level (*for pupils of an intermediate level of knowledge*);
- tasks of a creative level (*increased complexity, which require the detection of cognitive activity*) [8].

Levels of formation of scientific and research skills of high school pupils:

The first level allows pupils to conduct similar experiments.

The second level is determined by the possibility of pupils to conduct experiments and make the first attempts at independent research.

The third level is characterized by a high level of pupils knowledge. Schoolchildren independently perform tasks starting with setting the task and ending with conclusions [9].



The active implementation of scientific and research activity in the educational process creates qualitative prerequisites for increasing pupils interest in the material, develops their creative abilities, and effectively forms the self-educational competence of pupils.

Our experience has been to actively involve pupils in research activities while studying organic chemistry.

So, while studying the topic: "Higher carboxylic acids. Soap, its composition, washing action" we used the method of pupils projects, in particular, we invited pupils to prepare a project on the topic: "Manufacturing soap from a soap base". Pupils prepared not only theoretical material, but also interesting recipes for making soap at home. Both presentations on this topic and samples of soap were demonstrated at the lesson. Pupils were offered soap recipes: brown scrub soap, honey scrub soap, chocolate scrub soap and samples of soap made by themselves at home.

During consideration of the topic: "The importance of natural and synthetic organic compounds. Protection of the environment from organic pollutants" pupils prepared the following essays, which were presented in chemistry classes:

- 1) "Chemical composition of oral care products".
- 2) "Chemical composition of chewing gums".

A group of pupils of the 11th grade of the school's chemistry club completed a project work on the topic "Chemistry in everyday life".

The main issues of the project:

1. Chemical composition of synthetic detergents.
2. Chemical composition of cosmetics.
3. Exposure to hazardous components of household chemicals.
4. Rules for handling household chemicals.
5. Emergency aid in case of poisoning by means of household chemicals.

Pupils prepared reports on these issues and presented a presentation at a circle for pupils of the 10th grade. For confirmation, laboratory work was developed, the task of which was to familiarize and analyze the instructions for household chemicals. The results of the laboratory work confirmed the knowledge gained by the pupils, showed the interest of the pupils in studying chemistry and the desire to work.

1.4. Organization of scientific and research activities of schoolchildren in the process of studying the topic "Synthetic high molecular weight substances and polymer materials based on them"

When studying the topic "Synthetic high molecular weight substances and polymer materials based on them", there are real opportunities to involve pupils in research work, to develop their creative abilities, to enrich pupils chemical experiments with elements of applied chemistry. Information about substances or materials that a person comes into contact with every day is extremely important. This is the kind of knowledge pupils will need later in life when using substances and materials in everyday life.

At home, at work, in transport - you will see plastic everywhere. The packaging of our products, clothes, computers, disposable tableware, mobile phones, stationery and even children's toys are all made of plastic. Therefore, it will be interesting for



every child to have an idea about the types and properties of plastics.

In the lesson, pupils consider the most common polymers, describe the physicochemical properties of polymers, compare the properties of polymers depending on their structure. Pupils get acquainted with samples of plastics, synthetic fibers, rubbers, perform the following laboratory experiments: comparison of the properties of thermoplastic and thermoset polymers; the relationship of synthetic fibers to heating, solutions of acids and alkalis. It is in the lessons and preparing for them that pupils acquire the first skills to compare natural, artificial and synthetic fibers, plastics and rubbers, thermoplastic and thermoreactive polymers; establish cause-and-effect relationships between the composition, structure, properties and application of polymers. Studying polymer synthetic substances in lessons, using polyethylene as an example, schoolchildren investigate the properties of the substance that is the basis of the polyethylene material, analyze its positive qualities: lightness, plasticity, resistance to the action of acids and alkalis, and negative ones: low melting point, weak light resistance. Laboratory research is structured in such a way that each property of a substance is established experimentally. Pupils make their own conclusions about the properties. Based on the study of the properties of the substance, pupils are offered areas of its application.

The scientific and research work of schoolchildren in extracurricular time can be directed to the assessment of quality and safety indicators of plastic products. We selected several samples of children's plastic toys and plastic dishes as research objects. First of all, the pupils familiarized themselves with the possible markers on plastic products, with the established requirements of regulatory documents for plastic products, research methods for polymer products. Schoolchildren learned to evaluate the completeness of the packaging and labeling of the studied objects, to conduct organoleptic tests, to determine the nature of the materials from which the products are made based on their external characteristics, their relation to heating, the nature of their combustion and solubility in organic solvents, solutions of acids and alkalis. Pupils checked the chemical resistance and resistance of coloring of toys to the effects of wet processing, saliva and sweat, determined the resistance of dishes to the household chemical environment, to the action of hot water, resistance to impact, resistance of the pattern to abrasion and detergents, etc.

The results of the scientific research were heard at the conference, and schoolchildren also developed advice that should be followed when buying and using plastic products.

Thus, research work both in chemistry classes and outside of class time gives young researchers ample opportunities to try themselves in scientific research, to see the effectiveness of their own research, and to feel the joy of success. Perception of the received information will form among pupils the culture of buying plastic products not according to advertising, not according to advice, but according to clearly established rules. Therefore, the education system of high school pupils today should be aimed at forming not just performers with a set of relevant knowledge, but researchers who can easily adapt to conditions that are constantly changing, as well as find solutions to problems that accompany them throughout their lives through mastering research skills.



Conclusions. 1. Methodical materials for the organization of scientific research activities were created and their adaptation was carried out on the basis of the school. 2. The method of conducting a lesson on mastering knowledge, skills and abilities with optimal use of independent and experimental work of pupils has been improved.

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