



# FAN, TA'LIM VA AMALIYOT INTEGRATSIYASI

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## *INTEGRATIVE APPROACH TO CREATING THE STRUCTURE AND CONTENT OF THE CHEMISTRY TEACHING METHODOLOGY COURSE*

### Abstract

This article describes in detail the importance and integration of chemistry, pedagogy, and psychology in determining the structure and content of the chemistry teaching methodology course. Based on the integrative approach, the process of creating a new pedagogical science of chemistry teaching methodology is based on the theoretical aspect.

Key words: chemistry, pedagogy, psychology, chemistry teaching methodology, integration.

Based on the demand of the society, secondary general education schools should provide elementary knowledge of the basics of science, take into account the interests and abilities of the growing generation, form worldviews at the level of development of science and technology, prepare them for political and social life, as well as aesthetic taste, it is necessary to ensure that they grow spiritually and physically perfect. Therefore, the future of any country directly depends on the results of selfless work of teachers [1].

In order to be worthy of the great title of teacher, a person should feel the deep meaning of this word. The teacher forms the future generation, educates and brings it to adulthood, so it is necessary for him to be able to identify all the processes on this path in time. Political literacy is also important for a teacher.



A teacher should be a master of his profession. However, unlike other chemical specialists, it is not enough for a chemistry teacher to have perfect chemical knowledge and skills. In order to effectively convey his knowledge to students, he needs to know the students well and get into their psyche, and perfect the teaching methods. It is necessary to acquire, to have a complete idea of the intended goal of teaching, to know well the means and ways of achieving it.

Any subject teacher should have the basis of didactic knowledge of the subject he/she is teaching, master the general methods of imparting knowledge, be aware of the features of students' thinking, and have life experience. It is necessary for the teacher to work on himself, to constantly increase his knowledge, to search for new methods of teaching, to improve the educational process. For students, a teacher should be not only a simple informer, but also an example in all aspects.

Modern secondary schools perform three important tasks in the teaching process: education, upbringing and development. Each of these tasks is the object of study of a separate system of scientific knowledge. The task of teaching is studied by didactics, the task of education is studied by the theory of education, and the task of development is studied by psychology. Chemistry itself is a system of complex concepts. Only due to their scientifically based mutual integration, a new chemistry teacher methodology system will be established.

In order to recognize the methodology of a chemistry teacher as a science, it is necessary to consider all the above systems as its components. Because these systems form the pedagogical and psychological basis of the chemistry teacher's methodology. Based on this, in the current period, the methodology of the chemistry teacher is considered as a pedagogical science that provides education and training to students and develops their worldviews.

Taking into account students' age, individual interests, abilities, and society's requirements, applying scientific and technical achievements to the teaching process, helps students to become well-rounded in all aspects. The teaching of chemistry teacher methodology in pedagogical higher education institutions serves to implement the professional training of students. The level of methodical knowledge acquired by the teacher, his ability to teach, the efficiency of the lesson and his reputation among the students determine it.

The science of chemistry teaching methodology is inextricably linked with psychology and pedagogy, as well as other natural, social and humanitarian sciences. In the methodology of teaching chemistry, philosophical, political, economic concepts are widely used, based on pedagogical and psychological knowledge. It is impossible to teach chemistry without knowing the laws of the teaching process and the psychology of learning.

The main task of the methodology of teaching chemistry as an educational subject is to equip future chemistry teachers with the necessary knowledge and skills when working in high school. The subject of the methodology of teaching chemistry teaches future chemistry teachers how to organize their scientific educational activities at school, taking into account the issues of technical safety and environmental protection.



The methodology of teaching chemistry is studied in a certain sequence, in the form of a system.

Initially, the essence of teaching, education and development tasks will be revealed in terms of dominance during the entire course of the high school chemistry subject. In the next stage, the organization of the chemistry teaching process will be introduced. The structural elements of the educational course at this stage are: teaching methods, tools and forms, teacher's speech. These are interrelated and are considered from the point of view of the three tasks of teaching.

Studying the methodology of teaching chemistry is not limited to lectures, but also implies the formation of skills and qualifications of future chemistry teachers to be able to demonstrate chemical experiments and conduct practical training and laboratory experiments. In addition, they are given the skills to teach subjects in the school program, solve math problems, plan and conduct lessons.

As in any other subject, the methodology of teaching chemistry has its own development history.

The appearance of the first scientific ideas and views on the methodology of teaching chemistry dates back to the 18th century. Simultaneously with the emergence and development of the science of chemistry, the methodology of teaching chemistry was also created and developed.

Russian scientist M. V. Lomonosov was the first one who took care of educating mature people who knew chemistry. M. V. Lomonosov shows the tasks, content and methods of chemistry in the work "Introduction to Chinese Physical Chemistry" developed from an atomistic point of view. He believed that it is necessary to use the methods of chemistry in teaching chemistry, especially the experiments that lead to the qualitative and quantitative study of substances and processes. At the same time, Lomonosov paid special attention to mathematical and physical methods in studying chemistry.

The development of the methodology of teaching chemistry is directly related to the level of development of the science of chemistry, the great chemists of all times were engaged in teaching their theories and laws. A. Lavoisier, J. Dalton, S. Canissaro and others made a significant contribution to the development of chemistry teaching methodology.

D. I. Mendeleev's discovery of the "Periodic Law" marked an important stage for chemical methodology. After his textbook "Elements of Chemistry" written on the basis of the periodic law was published, the elements began to be studied according to the groups of the periodic table. This method is the basis of studying inorganic chemistry even today. In D.I. Mendeleev's methodology, clearly formed goals and tasks of chemistry teaching can be seen. He spoke against dogmatic teaching and emphasized the need for a positive approach to teaching students based on scientific conclusions. D. I. Mendeleev touches on the need to reveal the constant connection of chemistry with industry and agriculture. He focuses on experimenting. In his opinion, it is appropriate to teach the substances used in practice.

Another opponent of dogmatic education was A. M. Butlerov, who also paid a lot of attention to the methodological problem. The methodology he created is based



on the development of the idea of the material unity of the world. He explains this on the basis of the "Chemical Structure Theory" of organic compounds, which comprehensively reveals the interrelationships between various organic compounds. He clearly explained his methodical views and ways in his textbook "Introduction to the perfect study of organic chemistry".

In the peoples of Central Asia, in particular, in the territory of our Republic, until the beginning of the 20th century, there was no institution dealing specifically with the theory of teaching, including the theories of the methodology of teaching Chemistry. Such an institution began to operate in the capital of our republic by 1929. Currently, the Institute of Scientific Research of Pedagogical Sciences named after Kori Niyazi and the higher educational institutions connected to it are actively contributing to the creation of modern methodical methods and improving the methodical skills of teachers.

For the first time, in the 1920s, chemistry was included in the curriculum of general education schools as a compulsory subject, and chemical methodology became a separate field of pedagogical sciences. Among the scientists who made a significant contribution to chemical science and the methodology of teaching chemistry during this period, V.N. Verkhovsky, S.I. Sazonov, K. YA. Parfyonov, L. M. Smorgonsky, P. P. Lebedov, Ya. Yes. Goldfarb, N. L. Glinka, Yu. It is permissible to mention V. Khodakov and others.

During this period, the problem of creating a chemistry school curriculum arose. Two commissions worked to solve this task, Petrograd (led by V.L. Verkhovsky) and Moscow (led by P.P. Lebedov) commissions. They designed two very different programs.

The main goal of Petrograd authors was to increase students' thinking activity, direct and develop their interest in knowledge. For this purpose, the idea was given to classify substances and use the periodic law in the process of generalization at the end of the course. Time was allocated for demonstrable experiments, laboratory work, as well as practical training. The main focus was on chemical symbolism, which serves as a tool for in-depth study of the content of the chemistry course. According to the authors, it is necessary for a student who takes a chemistry course to be able to apply the acquired knowledge in practical activities.

The program had the following shortcomings: the concepts of atoms and molecules were not given, and the recommended educational literature was mostly translated literature. Nevertheless, for this program in 1938, V.N. Verkhovsky was awarded the degree of Doctor of Pedagogical Sciences without defense.

The Moscow project was based on the idea of practical application of chemistry in the national economy. The program is covered in an approach to scientific research. In it, practical work on the extraction of various substances was presented, and special attention was paid to the quantitative study of processes.

Disadvantages of the Moscow project: there is no clear systematic structure, the law, theory and concepts are only listed, and the periodic law is not studied.

The further structure and content of chemistry teaching were made based on the development of chemistry and the demand of the time, and certain changes were made.



In particular, in connection with the new reform in the field of education, the schools of our republic have to solve the problem of strengthening the professional direction and educational function of chemistry education, and the effective use of computers in teaching processes. At the same time as providing students with the basics of science, it was set as an important task to bring their worldviews to the level of developed countries.

In the formation and development of the methodology of teaching chemistry as a science, the main task of the teacher is to educate students to treat chemical evidence with respect, to conduct the explanation in the sequence of modern theories. Methodological ideas about the wide use of chemical experiments as an advanced method of chemical science are also important. Using these ideas, a new system of chemical methodology, enriched with pedagogical knowledge, was created by the next generations and is currently used in secondary school education [2-4].

Therefore, chemistry teaching methodology can be considered as a science that emerged as a result of mutual integration of chemistry, pedagogy and psychology.

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