# SCIENTIFIC AND PEDAGOGICAL BASES OF CONDUCTING CHEMICAL EXPERIMENTS AT SCHOOL

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## ABSTRACT

This article mainly provides the theoretical basis for the application of pedagogical experience in the teaching of chemistry by pedagogical teachers.

***Keywords: pedagogical skills, reaction rate, chemical equilibrium, chemical experiment, temperature, chemical formula.***

Bringing up the young generation, which is the future of independent Uzbekistan, is a process of internal conflict that requires great attention. Therefore, the teacher should follow the formation process of the student with great enthusiasm and care. He or she must have the pedagogical knowledge and skills to manage the pedagogical process. Only then will the teacher understand the essence and dialectic of pedagogical phenomena, the method of pedagogical work, profession and technology, and professional pedagogy. A teacher with pedagogical knowledge and skills must first know the methodological foundations of pedagogy, the laws and factors of personal development, the essence, goals and objectives of the national training program. Many educators working in the education system are becoming more and more aware of the need and importance of pedagogical skills in education and upbringing [1-3]. To date, a number of researchers note that the level of scientific theoretical, scientific-practical and scientific-methodological research in chemistry, especially in inorganic and organic chemistry, has decreased due to inappropriate use of methodological materials. brought and evaluated. The problem of didactic principles in the educational process has always been in the focus of attention of educators around the world. Along with the achievements of experts in this area, it should be noted that the scientific basis of the methodology in the system of educational principles has not yet been fully developed. There is a need to define the principles of education, as well as other didactic categories, in accordance with the requirements of the modern level of development of pedagogical science and the quality of education of the younger generation [5-6].

Analysis of the pedagogical literature shows that the principles of education change with the change of social life, the development of pedagogical science, that is, some didactic principles are replaced by new didactic principles. Analyzes show that each principle of education is included in the list of principles of education by this or that specialist or scientist.

For example, natural compatibility, exhibitionism, sequences in education by Ya.A. Komensky, consciousness in education by K.V. Yelnitsky, interdisciplinary connection in education by,I.A.Lashkaryova , historical in education by S.M Mikhailov, problematic issues in education by M.I .Mahmutov unity of education and upbringing by S. Rajabov, if we analyze the scientific didactic work by I.T Ogorodnikov, ideological, historical by M.A Danilov, the didactic doctrine of Comenius, he introduced the following principles into the following system of didactic principles:

1) awareness and activity in education; 2) system in education; 3) natural compatibility in education; 4) thorough teaching in education; 5) sequence in education; 6) demonstration in teaching; 7) continuity of theory and practice in teaching [4-6].

Ya. A. Komensky was one of the first to emphasize the need for demonstration in teaching and developed a scientific and practical basis for the implementation of demonstration in the educational process. German

scientist A. Disterveg noted that the principles of education are the requirements and rules for the teacher and the student, as well as the content of education. In the late nineteenth and early twentieth centuries, Russian scholars K.V. Elnitsky noted that the system of principles of education consists of the principles of basicity in education, consistency in teaching, demonstration, unity of theory with practice, thorough mastery, consciousness, independence, teaching the relationship of the studied object with another object. By 1916, Skvortsova emphasized that the principles of consistency, demonstration, awareness, individual teaching, and activity in education were the basic didactic principles in education [6].

In the 20s of the XX century, Russian pedagogical theorists Sh.I. Ganelin, A.P. Pinkevich in their works expressed their views on the importance of didactic principles and their types, the system of didactic principles. The system of didactic principles created by A.P Pinkevich includes the following principles: 1) the relevance of education to life; 2) creative nature of the educational process; 3) independence in education [4].

In the 30s of the XX century, the main task of pedagogical theorists and practitioners was to ensure that students thoroughly master the basics of science.

Based on this, E.M Medinsky proposed the following set of educational principles: 1) systematization in education; 2) awareness in education; 3) the connection of theory with practice in education; 4) educational upbringing; 5) the leading role of the teacher in education; 6) the principle of technology in education [3].

In the late 1930s, S.N. Rives argued that the following basic didactic principles should be present in the educational process: systematic, demonstrative, consistent, conscious, active, thorough. The above system of educational principles is aimed at students to thoroughly master the system of knowledge about the basics of science. N.G Kazansky highlighted the importance of the principles of consciousness, demonstration and consistency in education. In contrast to others, S.M. Mikhailov noted the following system of educational principles as the main didactic principles of the educational process: 1) the principle of demonstration in education; 2) the principle of historicity in education; 3) the principle of learning in education; 4) the principle of establishing the relationship of the studied object with other objects; 5) the principle of determining the relationships between objects [6]. According to M.N. Skatkin, the main principles of the educational process are: the educative principle of education, the scientific principle in education, the principle of systematization in education, the principle of demonstration, the principle of connection of theory with practice, the principle of thorough knowledge, the principle of consciousness and activity [5]. Textbooks and methodical manuals edited by didactic scholars S.Rajabov, A.Munavvarov, I.Tursunov, O.Rozikov, who worked and are working in the country, state that the following principles of education are basic: the principle of science in education, the principle of connection of education and upbringing, demonstration, compatibility in education, the principle of connection of theory with practice, the principle of thorough mastery in education, the principle of consciousness, the principle of activism and individual teaching in education. According to the Polish scientist V. Okon, the following system of educational principles will increase the efficiency of the educational process: the principle of efficiency in education, the principle of independence in education, the principle of individual teaching in education, the principle of connection of theory and practice, compatibility and systematization [6].

It is known that the XX-XXI centuries are interpreted as the century of the world scientific and technological revolution, the future and development of pedagogical science is studied and developed in a complex way with the achievements of advanced world pedagogy.

Indeed, in recent years, advanced experience in this field in developed foreign countries, such as: A. in the UK. Froyil, J. in France. Demlo, Z. in Japan. Hatayama et al. Make a significant contribution to educational

principles, particularly didactic principles. According to them, the principles and laws of public and private schools should be based on: 1) scientific in education; 2) systematicity and consistency; 3) awareness and activity in education; 4) thorough and solid acquisition of knowledge in education; 5) taking into account the age and individual characteristics of students in education; 6) compliance; 7) demonstration in education; 8) the connection of theory with practice; 9) independence and free thinking in education; 10) incentives in education.

Among the publications published in recent years, B. G. Likhachev's views are noteworthy [13]. He divided the known and existing principles into two groups, namely, the principles of organization of educational processes and the principles of management of educational activities. However, no authoritative publication mentions the historical principle of teaching and the historical position of historical materials in the educational process.

The opinion of the well-known chemists-methodologists G.I Shelinsky and A.D Smirnov is an exception. They are the basic principles of education: 1) scientific; 2) comprehensibility; 3) consistency and structure; 4) purposefulness; 5) historicity; 6) listed the connection with the practice.

The formation of important concepts in the teaching of chemistry at school requires the implementation of the theory through the organization of practice. To do this, they must have an in-depth knowledge of the technique and methodology of conducting experiments. Professor V, N, Verkhovsky was the first to provide information on "The structure of the chemical laboratory and the general methods of work in it" and the details of the experiments in the textbook "Techniques and methods of conducting chemical experiments in the school."

In doing so, he scientifically demonstrates that the teacher's ability to experiment is not based on nature's beliefs: it is based on mastery. Proper organization on the basis of educational standards. 2. Skills in working with substances and equipment. 3. Must have skills in working with substances and equipment. .Experimentation, filtration, precipitation, recrystallization, sublimation, extraction,

At the same time, the Russian methodologist K.Ya. Parmenov in his textbook "Experimental work of students in chemistry" considers the content and methods of independent work of students in the chemistry laboratory: from chemistry. Educational experiment; frontal laboratory work; practical work of students; equipment for laboratory classes and practical training; After that, based on the above information, the great Methodist scholar P.A Gloriozov prepared his textbook "Practical training in the course of high school chemistry." provided details and guidelines for conducting about thirty practical sessions. According to these scientific theories, experimental experiments in school chemistry courses depend on the method chosen by the Methodist teacher, and the experiments should be gradually shifted from simple to complex. Knowledge of the general properties of the substance used in the experiment, ie the physical properties. 3. Knowledge of the technique of the experiment. 4. Knowledge of the theoretical basis of the experimental methods. .6. Theoretical and practical knowledge of the types of indicators and their ions in the determination of the solution medium. 7. Knowledge of the methods of washing and drying of sediments formed on the basis of experience. Full knowledge of the basics of y. 9. Knowledge of filtration, washing, drying of sediments. 10. Methods of simple and vacuum disposal of substances. should be directed to independent execution. For example: How to get hydroxides from oxides?

To do this, perform the following experiment and draw a general conclusion.

Experiment 1: Three glasses are given, all of which are filled with 50 ml of water. We treat them with the following oxides: 1. sodium oxide; 2. copper oxide; 3. calcium oxide; Prove these formed hydroxides on the basis of indicator theory.

Experiment 2: Take a cup of Forfor and put a piece of calcium oxide in it, then slowly add a drop of distilled water to it. Prove what happens by the reaction equation.

Experiment 3: Take a test tube, pour a solution of aluminum chloride in it, add sodium carbonate on the end, a white precipitate is formed. Prove this substance by subtraction of molecular and ionic equations. soak it in a solution of sodium hydroxide and heat it slowly, making sure that the resulting gas is released and that water vapor is formed by wetting the walls of the test tube.

Prove it by the smell of the exhaust gas and the blue color of the indicator.

Experiment 5. Prove that a new salt is formed by the interaction of different salts. Put silver chloride solution in a beaker, pay attention to its color, then drip a solution of sodium chloride solution on it and observe the formation of turbid precipitate and remove the precipitate from the solution. determine which substance is precipitated by giving the ionic form of the equations.

Experiment 6: Experiments on reactions based on the detection of discoloration of the solution. To do this, take manganese (potassium permanganate solution), bring it to an acidic medium, divide it into several solutions and drop them in the following substances; 2.sodium sulfite; 3.ammonium persulfate solution. Prove the color loss in this experiment by the reaction equations.

After that, it is based on teaching students the experiments on the qualitative determination of substances. We will do this on the basis of the following experiments:

Experiment 1: How do we determine if a solution contains carbonate ions? Any substance is at your disposal.

Experiment 2: Prove experimentally that a given substance contains chlorine anions.

Experiment 3: Based on the experiment, a silver chloride precipitate is obtained, and the teacher asks the students to dissolve the precipitate. how students can write this reaction equation.

Therefore, the Methodist teacher explains to the students the methods of synthesis of substances and the pedagogical aspects of the method of its transfer as follows: 1.Students analyze the method of synthesis; 2. Must know the physical and chemical constants of substances needed in synthesis; 3. Must be able to write the equations of synthesis reactions; 4. They should know how to write reaction mechanisms; 5. They should be able to calculate how much substance to take in synthesis and calculate the yield of the reaction; 6. The experiment should be performed individually; 7. They should be able to fully observe the synthesis process; 8. They have to complete the synthesis process; 9. Proper filtration, washing, drying and extrusion of the obtained material must be carried out correctly; 10. It is explained that once the purification process is complete, it is necessary to calculate the reaction yield by placing the substance in the incinerator; 11. The physical and chemical constants and properties of the synthesized substance are studied and a general conclusion is drawn.

Today, in the process of studying foreign experience, many methods and strategies are introduced in the formation of talented, independent-minded students, which serve to form or develop the student's creative qualities based on the experience of foreign countries. The didactic significance of these methods and strategies is that they force students to think deeply about the learning materials.

Case-study technology is especially important. At the same time, case-study technology plays an important role in the development of problem-solving and problem-solving tasks. The technology has been used successfully in educational practice in foreign countries for almost 150 years.

In fact, the case study teaches students to study and analyze any meaningful situation. It is based on elements that reflect the general essence of the process of solving a particular problem situation. These are:

forms of education, teaching methods, teaching aids, methods and tools for managing the educational process, methods and tools of scientific research on problem solving, methods of data collection, their study and tools, methods and tools of scientific analysis, methods and means of educational communication between teacher and student (student), learning outcomes. As a result, the following skills are formed among students: [2-5].

1. Develop analytical skills and critical thinking.
2. Ensuring unity of theory and practice.
3. Demonstrate different perspectives on the problem.
4. Making decisions and providing feedback on its consequences.
5. Develop the skills to evaluate alternatives in the face of uncertainty.

In the current educational process, the modern educator must carry out the following processes in the formation of creative skills of the teacher: holds. They are: 1) personal qualities of the teacher; 2) professional knowledge; 3) professional qualities; 4) personal pedagogical skills; 5) organizational skills; 6) communicative skills; 7) gnostic skills; 8) creative qualities. We will show. In addition, in improving the quality of teacher education, the presence of important components of pedagogical skills for the successful implementation of innovative activities and its implementation through the following methods and techniques: 1) didactic ability; 2) academic ability; 3) perspective ability; 4) speech ability; 5) organizational ability; 6) authoritarian ability; 7) communicative ability; 8) pedagogical creative imagination; 9) ability to distribute attention. According to many Methodist scholars, in addition to these, the teacher's striving for a noble goal, diligence, perseverance, humility, honesty, loyalty, exemplary behavior, gait, self-control, We recognize that his appearance, in short, the acquisition of qualities and qualities in accordance with national and universal moral standards are important factors that ensure his readiness for professional activity and the effectiveness of the educational process. [3-5].

The constantly evolving chemistry and pedagogical education in line with modern developments, a new approach to the professional training of students, the orientation of future teachers to pedagogical, cultural, educational, research activities; the need to ensure the achievement of educational outcomes through the acquisition of cultural, general, professional competencies in the field of science. It was shown that the integrative methodology of ensuring the quality of professional training of students based on the basics of chemistry is realized through the theoretical and methodological integration of teaching chemistry. It was found that the content of vocational training on the basis of chemistry is the formation of innovative educational paradigms, trends in the development of theory and practice of chemistry education, the formation of chemical-methodical competence related to the acquisition of scientific competencies.

The need for teachers in chemical-methodical competence in the formation of innovative abilities requires teachers of chemistry to acquire not only general cultural and general, but also special (due to the specifics of chemistry, scientific) competencies. through the formation of chemical concepts.

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