



## Teaching Methodology of Chemistry in Pedagogical Institutions of Higher Education

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**Abstract:** This article discusses the ability to observe, explain, use knowledge and skills of chemical processes and phenomena, and solve various practical problems in the formation of chemical competence of non-specialist education students.

**Keywords:** Chemical competence, chemistry major, higher education, nonspecial, chemical process, reaction, substance, students, formation.

### Introduction

As the Republic of Uzbekistan gains its independence and moves forward with bold steps towards taking its rightful place among the developed countries of the world, undoubtedly, the importance of human factors that provide this independence and its bright prospects will increase more and more. . That is why, from the very beginning of our independence, the government of our republic has been paying special attention to the issues of training specialists and providing education to young people. In particular, Presidential Decree No. PF-5847 of October 8, 2019 on approving the concept of development of the higher education system of the Republic of Uzbekistan until 2030, PQ-4805 of August 12, 2020 —Chemistry and the adoption of the President's decision on measures to increase the quality of continuous education and the effectiveness of science in the fields of biology and the measures being implemented in order to implement them in life require a radical improvement of the preparation of specialists in acquiring professional knowledge. The introduction of new state education standards based on the competency approach in our country imposes a number of urgent tasks on the teachers of higher education.

### Literature Analysis

In higher education institutions of pedagogy, students of non-chemical majors should learn important and versatile integration of the basics of chemical knowledge, create various interdisciplinary connections, combine theoretical



and practical materials, learn general scientific methods and actively use them in specific situations where research is important. includes the development of relevant skills and the development of independence, initiative, loyalty, perseverance, as well as the development of self-organization and self-management. The goal is represented by a set of competent tasks, the solution of which leads to the achievement of the long-term goal of forming chemical competence. By chemical competence, we mean such an integral quality of a person, which is characterized by a sufficient level of formation of fundamental chemical knowledge and practical skills for their use in future professional activities. The term "competence" (Latin *competere* - to match) means the ability to demonstrate the ability to apply knowledge, skills and abilities to achieve desired results

### **Research Methodology**

The meaning and essence of forming chemical competence is as follows: mastering skills and knowledge instilled with the idea of harmony of man with nature, deepening students' knowledge [2] and developing their chemical thinking; in understanding the unity of the world, in the ability of scientific thinking, in the desire to apply the ability of scientific thinking. in order to direct the formation of personal qualities, acquired knowledge and skills, in order to increase the effectiveness of the educational process, to organize the teacher's pedagogic and students' cognitive activities harmoniously in the process of learning and acquiring knowledge, in order to activate this activity, is a set of systems that allow to determine the effective methods, tools and forms of teaching, their interaction

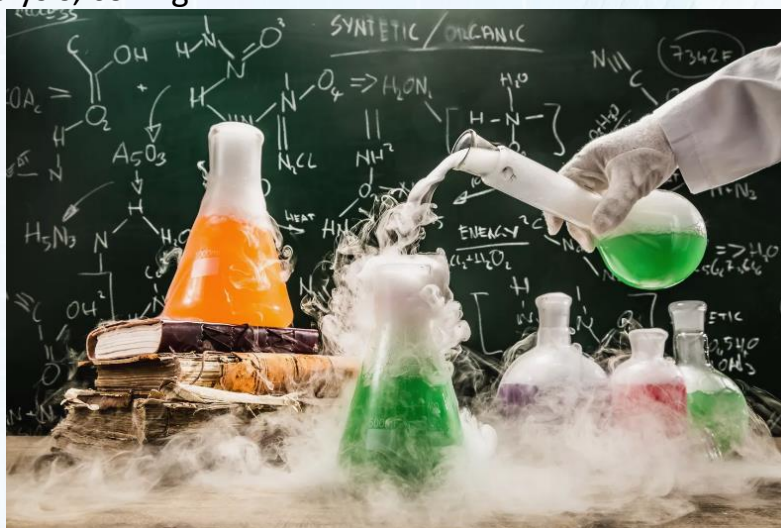
### **ANALYSIS AND RESULTS**

Chemistry is related to other sciences, so it is said to be an interdisciplinary discipline in the scientific field. Among their connections we find physics, mathematics, biology and astronomy, among others. [4]. The student should be able to apply the knowledge, skills and competences acquired in the field of chemistry in solving practical and theoretical problems encountered in his daily life, and at the same time, he must know the following competencies in the field of chemistry:

- observation of chemical processes and phenomena: state of matter, properties of substances, combustion, flame, liquefaction, melting, diffusion, evaporation, recrystallization, sublimation, light, boiling, solidification, separation,



purification, dissolution, filtration, decantation, color separation and isomerism of organic compounds, hydration, dehydration, hydrogenation, dehydrogenation, halogenation, polymerization, hybridization, driving, cracking, pyrolysis, coking.

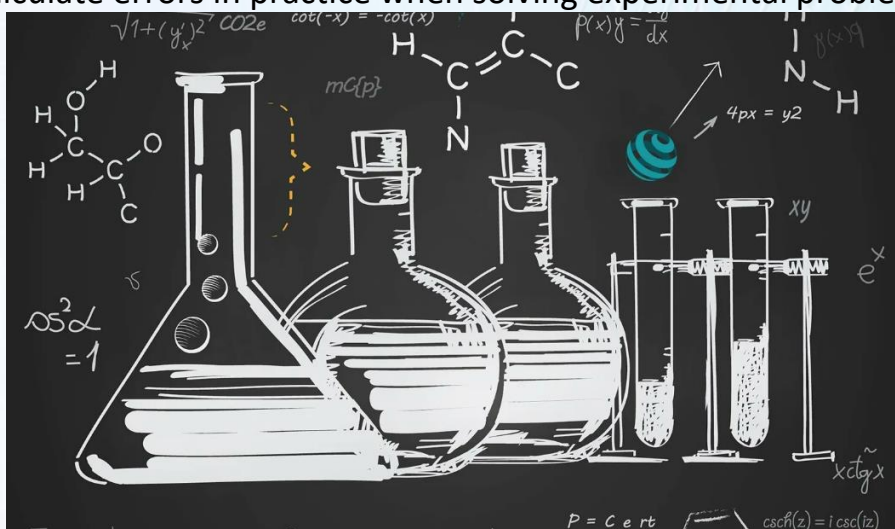


-explanation of chemical processes and events: the conditions for the formation and occurrence of a chemical event, the connection of this event with another event, Avogadro's processes and events, the law of conservation of mass of matter, the law of constancy of composition, the law of equivalence, the periodicity of chemical elements explain organic compounds based on the law, dissociation theory, Butlerov's theory, Markovnikov's rule and reactions related to the properties of organic compounds.





- being able to express elements and formulas in chemical language: chemical reactions, chemical reaction equations, coefficients, types of chemical reactions, creating formulas based on chemical symbols and indices, writing formulas of chemical elements and their compounds based on valence (structural, molecular, electronic and empirical formulas), naming, knowing the definition of chemical concepts and laws, formulas connecting these laws with other laws, units of physical quantities (mass, volume, surface area, density, time), being able to calculate errors in practice when solving experimental problems.



- ability to work with chemical substances and equipment and conduct experiments: chemical glass, polypropylene and porcelain containers, eudiometer, balance, thermometer, cylinder hydrometer, dry fuel, micro-method experimental equipment, device that shows the law of conservation of mass of matter in practice, collecting gases, extracting halogens, showing electrolytic dissociation, determining the rate of chemical reactions, collecting nitrogen, electromagnet stirrer, test tube, tube heater devices, sulfuric acid and nitric acid production models, showing the crystal lattice structure of substances be able to explain the structure of models. To know the purpose of the experiment, to be able to choose, collect and use chemical equipment and tools for the experiment, to write and summarize the conditions and results of the experiment.

- application of chemical knowledge in practice:

- to be able to solve problems related to chemical phenomena using learned concepts, rules, definitions, laws and formulas;
- practical application of the theoretical knowledge acquired from chemistry with the help of experiments;



- being able to apply countermeasures against the consequences of damage from substances;
- use of the acquired knowledge and skills in chemistry in daily life (water purification, salt purification, gas stove burning, stain removal, lime removal, determination of soil composition, the culture of using medicines, the effect of biogenic elements on living organisms, mineral and use of organic fertilizers, knowing how to use chemicals in daily food), (acetic acid, sodium bicarbonate - drinking soda), artificial and synthetic detergents, solvents and fuels, polymer products (plastic containers, rubber products), distinguish between alkalis (gel, household soap, shampoos) and choose a quality product.

We consider chemical competence as an educational outcome expressed by a student's ability and readiness to use chemical knowledge and skills, as well as value relationships to solve various practical problems and tasks. We emphasize the following as the main tasks:

1. formation of students' knowledge about the most important laws of chemistry, the causes of certain problems (acid rain, smoke, etc.), the consequences of the effects of various compounds and production on the environment and human objects;
2. forming an understanding of the role of chemistry in solving developing environmental problems;
3. to develop the ability to consider chemical problems in many ways;
4. to get acquainted with the system of analytical monitoring and chemical analysis of natural objects (soil, water, air) on a qualitative and quantitative level, involving the methods of physical and chemical analysis.

Attracting students to learning is to move them forward. This attracts pedagogues and students to (mutual) joint work [5]. The teacher's help in organizing students' activities consists in summarizing the results obtained by students, stimulating their thinking, reflection and reflection.

### **Conclusions**

In conclusion, an effective means of combining chemical knowledge and professional skills is educational practice and solving chemical-related problems, which help to teach and deepen the mastery of chemistry.

and special attention in training students for certain types of activities is the basis of professional competence. This creates a foundation for students to



master chemistry more deeply. As a result, the effectiveness of the educational process will be increased.

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