

Ministry of Science and Higher Education of the Republic of Kazakhstan
NJSC "Korkyt Ata Kyzylorda University"

APPROVED

Chairman of the Academic Quality Committee
of the Institute of Natural Sciences

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MODEL OF GRADUATE

for the educational program 8D01515 – «Chemistry»

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INTRODUCTION

The development of the graduate's competency model is aimed at answering the question of what professional tasks a specialist of a certain level (position), of a certain profile should be able to solve within the implementation of the main directions of the Bologna Process. The formation of a modern model of a university graduate that meets the needs of stakeholders and all interested parties is the main strategic goal of Korkyt Ata Kyzylorda University and is provided with the necessary personnel, educational-methodological, informational, and material-technical resources. The university implements a targeted personnel policy and systematic improvement of the material and technical base to ensure quality training of master's graduates in demand in the labor market.

Legal and regulatory framework. The educational program 8D01515 – «Chemistry» has been developed on the basis of the following regulatory documents:

1. "Rules for Organizing the Educational Process on Credit Technology of Education" – approved by Order of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152 (with the latest amendments).

2. "Model Rules of Activity of Organizations of Higher and (or) Postgraduate Education" – approved by Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595.

3. "National Qualifications Framework" – approved by the joint order of the Acting Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated September 24, 2012 No. 373-Ө-М and the Minister of Education and Science of the Republic of Kazakhstan dated September 28, 2012 No. 444 (in a new edition by Protocol No. 1 dated August 25, 2025).

4. Professional Standard "Teacher" – approved by Order of the Minister of Education of the Republic of Kazakhstan dated February 24, 2025 No. 31.

5. "State Compulsory Standard of Postgraduate Education" – approved by Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2 (with amendments introduced by Order No. 90 dated March 4, 2025).

6. Industry Qualifications Framework of the "Education" sphere – approved by Protocol No. 3 dated November 27, 2019.

1. DESCRIPTION OF THE EDUCATIONAL PROGRAM

Code and name of the field of education, profile of the educational program of higher education: 8D01 Pedagogical Sciences

Code and name of the direction of training: 8D015 Training of teachers in natural science subjects

Educational program: 8D01515-«Chemistry»

Area of professional activity: researcher, head of a research group of research institutes and universities of pedagogical profile; teacher of a university, secondary vocational schools; head of departments and divisions of state educational services.

Types of professional activity: educational (pedagogical), educational-upbringing, educational-technological, social-pedagogical, experimental-research, organizational-managerial, information-communication.

Brief description of the educational program: In the structure of qualities of a doctoral student of 8D01515 – «Chemistry», the leading role is played by his professional competence as a scientist and teacher, which includes: a high level of knowledge and skills in research work, methodological culture, culture of scientific activity, information culture, culture of educational activity, speech culture and political culture.

The work of a doctoral student presupposes the function of "acquiring knowledge". From the first year, the doctoral student is involved in the research activity of his scientific specialty, his dissertation research, which presupposes mastery of the material, establishing interrelations, drawing analogies and giving examples. In subsequent years, the educational and methodological culture as a teacher is formed on the basis of knowledge of pedagogical technologies, methods, forms and techniques of teaching, the ability to determine specific pedagogical tasks, conduct classes of various types (lectures, laboratory), and manage the educational activities of students. The doctoral student as a researcher is focused on the search and derivation of truth. For this, he must think abstractly, systematically, be able to make extensive systematizations, put forward new conceptual solutions, and be a strong methodologist.

The implementation of the EP «8D01515 – Chemistry» is based on a competency-based approach in education, aimed at forming the professional competence of a doctoral graduate, i.e. doctoral graduates must not only possess fundamental theoretical knowledge and knowledge of research activities, but also possess pedagogical skills, a desire to develop their creative potential, the ability for self-realization in relevant activities, and the ability to use their own capabilities to solve scientific and pedagogical tasks in specific situations.

2. COMPONENTS IN FORMING THE MODEL OF GRADUATE

2.1. Goal of the Educational Program - Training of a highly qualified chemistry teacher and scientist with high social and civic responsibility, capable of carrying out professional activities.

2.2. Objectives of the Educational Program. The doctoral graduate must solve the following tasks in accordance with the types of professional activity:

- in the field of educational activity:
 - teaching in general education, vocational-technical and higher educational institutions;
 - implementation of methodological knowledge and applied skills in a specific situation, including online;

- formation of the ability for self-improvement and self-development, the need and skills for independent creative acquisition of new knowledge throughout active life.

- in the field of professional activity:

- training specialists with a high level of professional culture, including a culture of professional communication, with a civic position;

- training specialists capable of formulating and solving modern scientific and practical problems;

- training specialists capable of successfully carrying out research work in the field of chemistry, education, and in various enterprises and organizations;

- tolerance in relations with students, colleagues, and parents.

- in the field of managerial activity:

- acquisition of skills in organizing and conducting scientific research, managerial activity in various educational organizations.

- in the field of scientific activity:

- creating favorable conditions for the upbringing and development of students and providing them with pedagogical support for full-fledged life activity.

- in the field of experimental-research activity:

- deepening theoretical and practical individual training in the field of education, chemistry, and related sciences.

2.3. General and Professional Competencies

General Competencies (GC):

- readiness to independently acquire new knowledge necessary for professional activity;

- ability to participate in scientific discussions in an academic and professional environment, as well as to publish initial research results in academic publications of various levels;

- ability to take responsibility for the results of professional activity;

- ability for successful and positive business communication in the state and other languages;

- sociability, tolerance, oratorical skills;

- high degree of activity in the development and application of new methods, forms, and means of education and upbringing;

- ability to freely express one's thoughts, adequately using a variety of language tools.

Professional Competencies (PC):

Code	Content of Competency
PC1	Knows the methods of scientific research and their classification, basic concepts of research work, methods of proving theories.
PC2	Is able to determine the methodological foundations of the learning process,

Code	Content of Competency
	regularities of the learning process, content of learning, course and results of the learning process.
PC3	Has mastered the methodological foundations of applying green chemistry in the educational process in the context of sustainable development.
PC4	Has mastered the methodological foundations of applying modern natural science concepts in chemical education.
PC5	Is able to analyze new and complex ideas in the field of modern natural science concepts.
PC6	Has mastered innovative methods of chemical education, methods and techniques of teaching students of higher educational institutions and secondary schools.
PC7	Is able to plan, organize, and conduct research work.
PC8	Is able to interpret experimental data and formalize research results.
PC9	Has skills in scientific communication and public presentation of research results.
PC10	Is able to develop and implement innovative educational technologies in teaching chemistry.
PC11	Is able to provide expert evaluation of scientific projects and research works.
PC12	Is able to manage research work of students.
PC13	Is able to systematically present research results and defend scientific conclusions with arguments.

2.4. Matrix of Correspondence between Learning Outcomes and Formed Competencies

Learning Outcomes (ON):

ON1: Master academic writing skills for effective communication in a scientific environment.

ON2: Demonstrate the ability to think, design, implement, and adapt a significant research process with a scientific approach.

ON3: Master the scientific and methodological foundations of improving chemical education using modern didactic approaches and artificial intelligence technologies, and be able to develop independent development strategies aimed at planning the professional development of a teacher.

ON4: Analyze new and complex ideas in the field of modern natural science concepts.

ON5: Promote in an academic and professional context the technological, social, or cultural development of society based on knowledge of green chemistry and green chemical education.

Correspondence Matrix:

Competency	ON1	ON2	ON3	ON4	ON5
GC1/OK1	+				
PC1/ΠΚ1		+			
PC2/ΠΚ2			+		
PC3/ΠΚ3					+
PC4/ΠΚ4			+	+	
PC5/ΠΚ5		+	+	+	
PC6/ΠΚ6			+		
PC7/ΠΚ7		+	+	+	
PC8/ΠΚ8		+	+	+	
PC9/ΠΚ9		+	+	+	
PC10/ΠΚ10		+	+	+	
PC11/ΠΚ11		+	+	+	
PC12/ΠΚ12		+	+	+	
PC13/ΠΚ13	+	+	+	+	+

2.5. Personal Qualities of the Specialist

- striving in professional activity to meet the modern requirements of the information society;
- understanding the role and possibilities of information technologies in the development of society and the education system;
- ability to design and use new information technologies and their tools in professional activity;
- mastery of information technologies and their methods;
- skills of critical analysis, evaluation, and comparison of various scientific theories and ideas;

- skills in planning and forecasting research results;
- ability to conduct patent search and transfer scientific information using modern information and innovative technologies;
- awareness and understanding of the social responsibility of science and education;
- skills of oratory and public speaking at international scientific forums, conferences, and seminars;
- skills of scientific writing and scientific communication;
- fluency in a foreign language for scientific communication and international cooperation;
- responsible and creative attitude to scientific and scientific-pedagogical activity;
- leadership and team management skills;
- use of educational technologies and applied methods for designing the educational process in higher and postgraduate educational institutions, ensuring lifelong learning opportunities.

3. CONCLUSION

The presented Model of Graduate reflects modern requirements for the training of Doctors of Philosophy (PhD) in the educational program 8D01515 – «Chemistry». It takes into account updated learning outcomes (ON1–ON5), professional competencies (PC1–PC13), as well as new disciplines such as "Didactics of Chemistry and Artificial Intelligence", "Application of Green Chemistry for Sustainable Development", "Environmental Aspects of Chemical Education". The model is aimed at forming a competitive specialist capable of carrying out research and pedagogical activities in the context of digitalization and sustainable development.