6B05301 – ХИМИЯ

The purpose of the educational program: Training of personnel to solve urgent problems in the field of chemical production and science.

VISION, MISSION, PROGRAM GOAL, VALUES, ATTRIBUTES OF A UNIVERSITY GRADUATE

Vision:

An intellectual platform that develops teachers who can manage in a rapidly changing world.

Mission:

Formation of teacher leaders who are able to create, develop and disseminate advanced knowledge and values in the field of education for the benefit of the country and the world.

Program goal:

The university aims to become a hub for innovative methods of teaching, learning and research, as well as the development of rural education in Central Asia.

Values:

Integrity, dedication to one's work, caring for others

University Graduate Attributes::

- Self-taught, able to reflect and explore their practice
- Have moral and ethical qualities and are responsible
- They have deep subject, digital knowledge and a broad intellectual outlook
- Creative and critical thinking, collaborative and communicative
- Practice leadership in teaching and learning, and are adaptable to rapidly changing environments
- Diverse, inclusive and for equality of opportunity in society
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RATIONALE OF THE EDUCATIONAL PROGRAM

One of the priority areas for the development of the Republic of Kazakhstan is the development of competitive production of the chemical industry, aimed at the production of high-tech, experimental and innovative products. In the structure of the production of the chemical industry in Kazakhstan, 64% is occupied by basic chemistry, which occupies about 21% of inorganic acids, alkalis and their salts, explosives, as well as varnishes and paints, agrochemistry (mineral fertilizers and pesticides), petrochemicals is represented by one large enterprise and is 10 % of the total production of the chemical industry. Consumer chemistry, represented by enterprises producing detergents and cleaning products, is 5%.

The volume of production in the chemical industry for January-February 2024, the volume of production in value terms amounted to 155.3 billion tenge, which is 3.1% higher than the figure for the same period in 2023. In the production of chemical products, the main share is made up of other inorganic substances - 52.9%, fertilizers and nitrogen-containing substances - 16.5%, dyes and pigments - 7.2%, other chemical products - 4.9%, plastics in primary forms - 4 .5%, other basic organics - 4.2%, industrial gases - 4%, pesticides and other agrochemicals - 3.1%, coatings - 1.9%. The physical volume index was 125.3%. The main reason for the growth is mainly the increase in consumer demand in the chemical and related industries. The following products show the greatest growth in production volumes in physical terms: - chromium trioxide (+40.7%), sodium bichromate (+32.2%), chromium oxide (+20.1%), phosphorus (+55.8%) , paint putties (+57.7%), sulfuric acid in monohydrate (+1.6%), phosphorus fertilizers (+20.9%), nitrogen fertilizers (+2.7%), polyurethanes in primary forms (+23 .3%), styrene polymers in primary forms (+15.1%), hypochlorites (+10.2%), detergents (+5.8%), polymer-based paints and varnishes (+2.9%) , which is due to the growth of consumer demand in the chemical industry, metallurgy, construction, agriculture and utilities, etc. In January 2024, the volume of exports of chemical products in value terms compared to the same period in 2023 decreased by 19.6% and amounted to $109.7 million. The main export countries are Russia

(30.9%), Poland (8.1%), Morocco (7.4%), Uzbekistan (+7.2%), India (4.5%). Imports of chemical industry products for January 2024 compared to the same period in 2023 show a decline of 26% in value terms to $265.4 million. Main importing countries: Russia (36.2%), China (13.3%), Germany (8.0%). The market volume of chemical products in January 2024 amounted to 332.4 million US dollars (150.0 billion tenge), which is 13.6% lower compared to the same period in 2023. It should be noted that despite the increase in production (+ 8.9%), there is a decrease in exports (-26%) and imports (-19.6%), which is associated with a lull in the world market. The share of OTPs increased by 13.4 percentage points. and amounted to 20.2%. The share of imported products amounted to 79.8%. The largest volume of production of chemical products in January-February 2024 is noted in the following regions: Zhambyl (27.2%), East Kazakhstan region (21.9%), Aktobe (9.4%), Karaganda (9.1%), Mangistau (6.5%).

Specialists in this industry can work in many industries and industries, so the demand in the labor market is very high. Thus, we can conclude that it is easy to find a job as a chemist, since this profession is in demand.

https://qazindustry.gov.kz/ru/analytics

FEATURES OF THE EDUCATIONAL PROGRAM

Academic mobility	Niide University (Niide, Türkiye)
	Karaganda State University named after E.A.Buketov (Karaganda. Kazakhstan)
	South Kazakhstan State University named after M.Auezov (Shymkent. Kazakhstan)
	Balikesir University (Balikesir, Türkiye)
Additional education (Minor)	Chemist – teacher specialist in assessing and reducing the impact of certain chemicals used in household and work on the environment.

Coincidence with similar EPs of leading universities of near and far abroad

Utah Valley University (USA) - 59.1%
University of Delaware (USA) - 51.3%
Sogang University (Korea) - 24.3%

POTENTIAL DIRECTION AND GRADUATE JOBS

KazNWTTU students have the opportunity to be competitive in the labor market during their studies or acquire additional competencies to meet personal needs. To do this, students are offered a choice of one of the Minor programs.

The list of additional programs, their brief description, the composition of subjects and the educational results that they provide are given in the catalog of additional education programs "Chemist-Teacher" (Minor). Types of professional activity:

Bachelor of Science in the educational program 6B05301-Chemistry can perform the following professional activities.

- research: performance of scientific research on profile disciplines about various scientific and research and production institutions (chemistry, biochemistry, etc.);
- design: implementation of general and specialized developments in design and design organizations (ecology, technology, chemical production);
- educational: training and development of students, organization of the learning and

upbringing process, design, diagnostics, teaching in technical and vocational educational institutions; implementation of methodological knowledge and applied skills in specific situations.

- production and management activities in state structures at various levels (education departments, akimats, laboratories of the chemical and biological direction);
- organizational and technological activities in the production of chemical and biological and ecological profile (SES, production for the processing of agricultural and mineral raw materials, etc.).

Employment opportunities:

Organizations where a graduate of this EP can get a job:

1) scientific organizations: research centers in the field of chemistry, biochemistry;
2) educational institutions: in colleges, institutions of technical and vocational education, a chemistry teacher;
3) management organization: government bodies that use chemical and biological research methods in their work, organizations of various forms of ownership.

AREAS OF PROFESSIONAL COMPETENCE

Areas of professional competence 1

Able to systematically and critically apply fundamental knowledge of chemistry to solve professional problems and master the methods of self-learning and self-development in the framework of professional activities;

Areas of professional competence 2

Able to carry out advanced scientific research using physicochemical, chemical methods.

Areas of professional competence 3

Able to take part in the implementation of various projects, showing the ability to work in a team, interact effectively, make informed decisions.

LEARNING OUTCOMES OF THE EDUCATIONAL PROGRAM

LO 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LO 2 – Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LO 3 – Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

LO 4 – They have the skills to conduct research work, are able to analyze the results of research in the subject area.

LO 5 – Students master the basics of the theory of fundamental sections of inorganic and organic chemistry; are able to substantiate the laws and causes of changes in the structure and properties of chemicals, aliphatic, cyclic and macromolecular compounds.

LO 6 – Possesses the skills of conducting chemical experiments and interpreting their results.

LO 7 – On the basis of fundamental theoretical knowledge, they are able to evaluate the possibilities of physical and chemical methods, reasonably choose the appropriate method for a specific practical task, competently use modern analytical equipment when conducting experiments, mathematically process research results, synthesize organic compounds, conduct a qualitative and quantitative analysis of organic compounds.

LO 8 – They are able to demonstrate knowledge of the basic concepts and laws of physical chemistry, apply physical methods to study the structural characteristics of molecules, chemical and physical processes in gaseous and condensed media, reasonably select the optimal method for qualitative and quantitative analysis of a substance.

LO 9 – Possess theoretical knowledge and practical skills of analysis by physicochemical and chromatographic methods; are able to competently use modern analytical equipment when conducting experiments in their professional activities.
LO 10 – They are able to critically analyze and systematize the results of a study or test, incl. with the subsequent presentation of materials in the form of scientific reports, publications and presentations.
LO 11 – Existing experimental methods and technologies for obtaining chemical and nanochemical substances are analyzed from the point of view of their safety for the environment and humans.
LO 12 – They know the basic methods of searching and summarizing the information necessary to complete a thesis and professional tasks.

Comparison matrix of learning outcomes for the EP with the attributes of a graduate

	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12
GA1		+	+	+	+	+	+	+	+	+	+	+
GA 2	+								+	+	+	+
GA 3	+					+	+			+		
GA 4	+								+			+
GA 5		+	+	+	+	+	+	+	+	+	+	+
GA 6	+		+					+				

NORMATIVE REFERENCES

The program was developed on the basis of the following legal acts:

1**.** Sectoral qualifications framework for the field of chemical production, approved by Protocol No. 1 of the meeting of the sectoral tripartite commission on social partnership and regulation of social and labor relations under the Ministry of Health and Social Development of the Republic of Kazakhstan dated August 16, 2016.

2. State obligatory standard of higher and postgraduate education, approved by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2. Registered with the Ministry of Justice of the Republic of Kazakhstan on July 27, 2022 No. 28916.