

technological purposes; the rule “environmentally friendly is economic” (the conservation of natural resources is finally profitable both in social and economic relationships); the laws of component-ecological balance, territorial-ecological balance, internal dynamic equilibrium; “iron laws” of nature conservancy of P. Ehrlich; the principle of uniqueness; the principle of reasonable sufficiency and tolerability of risk; the principle of information insufficiency; the principle of instinctive denial-acknowledgement; the principle of illusive prosperity or euphoria over first successes; the principle of remoteness of events; the rule of economic-ecological perception of J. Staikos; the law (aphorisms) of B. Commoner (everything is connected with everything; everything should get somewhere; the nature “knows” better; nothing is given for free).

References:

1. Reimers N.F. Ecology – M., 1994.
2. Shadrikov V.D. Psychology of human activity and ability – M., 1996.

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GOALS, TYPES, PROBLEMS AND PROFESSIONAL-SPECIALIZED GRADES FOR SPECIALITY “MACHINES AND APPARATUSES OF CHEMICAL INDUSTRIES” FOR 3RD GENERATION EDUCATIONAL STANDARD

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1. Goals of higher professional education for direction of “Energy- and resource saving processes in chemical technology, oil chemistry and biotechnology” of specialty “Machines and apparatus of chemical industries” in education and personality training.

1.1. In the field of education goals of higher professional education for direction of “Energy- and resource saving processes in chemical technology, oil chemistry and biotechnology” of specialty “Machines and apparatus of chemical industries” are:

- training in the foundations of human, social, economic, mathematical, scientific, general engineering and professional knowledge, enabling the graduate to work successfully in the chosen field, have a universal and specialized professional competence, contribute to their social mobility and stability in the labor market, successful career, that, in general, should provide economic and technological security of the Russian Federation in the field of advanced technologies.

1.2. In the field of personality training goals of higher professional education for direction of “En-

ergy- and resource saving processes in chemical technology, oil chemistry and biotechnology” of specialty “Machines and apparatus of chemical industries” are:

- formation of social and personal qualities of graduates: dedication, organization, hard work, responsibility, citizenship, patriotism, communication, tolerance, strengthening morality, creativity, obscure needs, cultural, linguistic and adaptive research, scientific and professional ethics, perseverance in achieving objectives ability of arguments to defend their professional interests and the interests of its professional staff, endurance and physical training.

Graduates professional activity area

Graduates of direction of “Energy- and resource saving processes in chemical technology, oil chemistry and biotechnology” of specialty “Machines and apparatus of chemical industries” professional activity area includes: scientific and project developing institutions, production, technological and machine building plants, project design bureau, production labs, institutions of equipment certification, government environment and ecological control and monitoring organs, education facilities of different forms of ownership. Graduate of specialty “Machines and apparatus of chemical industries” can work on any post allowed by Russian Federation law and departmental documents for people with higher professional education concerning training area and work experience.

Professional activity objects

Professional activity objects of graduates of direction of “Energy- and resource saving processes in chemical technology, oil chemistry and biotechnology” of specialty “Machines and apparatus of chemical industries” are:

- technological plants, production and production equipment of main chemistry (production of mineral acids, alkaline, salts, fertilizers, carbon, soot, chemicals, etc.);

- technological plants, production and production equipment of processing of carbon materials (oil refineries, gas plants, coal and coal shale processing plants);

- technological plants, production and equipment of heavy and precise organic synthesis (production and processing of plastic masses, artificial and synthetic fibers, elastics, rubbers and rubber products, artificial resins and glues, etc.);

- technological plants, production and equipment of heavy and precise organic synthesis (production of silicon materials, semi-products and dyes, artificial liquid fuel, pesticides, herbicides, pharmaceuticals, surfactants and detergents, etc.);

- processing, manufacturing and manufacturing equipment of energy materials (manufacture of gunpowder and explosives, solid and liquid rocket fuels, etc.);

- processing, manufacturing and manufacturing equipment and recycling of nuclear fuel;

- processing, manufacturing and manufacturing equipment of ultrafine and nanomaterials;
- processing, manufacturing and manufacturing equipment and disposal of chemical weapons;
- processing, production equipment and production of microbiological synthesis (production of protein-vitamin concentrates, yeast, alcohol, lysine, etc.);
- processing, production and equipment to protect the environment from harmful gas emissions, contaminated wastewater reclamation and recycling of solid industrial and domestic waste;
- processing, manufacturing and equipment manufacturing of construction materials and products (cement, bricks, ceramics, glass, concrete and concrete products, etc.).

Professional activities of graduates

- production and technological activities;
- design activity;
- research activity;
- scientific and pedagogical activity;
- organizational and managerial activities.

Specific types of professional activity, for which mainly graduate is prepared must determine the content of its educational program, developed by higher education institution in conjunction with interested employers.

The objectives of the professional activities of a specialist

Preparing graduates is a multi, interdisciplinary nature, provides an opportunity to activities related to the solution of fundamental problems in the area of chemical plant and of technology: search for new competitive on the world market design technology and environmental equipment, implementation of modern and advanced technologies and production processes of various products to ensure reliability, durability and safety of the technological schemes and equipment.

The graduate is prepared for an independent professional activity in the following areas:

a) industrial-technological

- maintenance, repair and installation of technological equipment, and environmental chemical, petrochemical and microbiological production;
- development of manufacturing, repair and installation of technological and environmental equipment for engineering companies, assembly companies, repair and assembly of mechanical parts of the industrial enterprises;- испытание, сертификация технологического и природоохранного оборудования в испытательных лабораториях, сертификационных центрах, монтажных площадках;
- environmental protection technology and equipment from the effects of the environment;
- implementation of measures to ensure product quality;
- monitoring of technological discipline;

- maintenance of technical documentation for production and technological activities of enterprises and environmental systems.

b) design

- design of technological and environmental systems;
- design of manufacturing technology and environmental equipment;
- sketch development, technical and work projects of technological and environmental equipment;
- development of project documentation for installation process of technological and environmental equipment;
- development and revision of Standards, RTM, RD and technical conditions on the technological, environmental equipment and technological processes;
- development of project documentation of repair work to restore the technological and environmental equipment;
- project development of protection of technology and environmental equipment from the effects of the environment;
- protection of copyright of design and technology innovations by Russian Federation and international patents;
- development of business plans, feasibility studies for new design solutions.

c) Research

- conducting research on the study of the newly established equipment, study the processes occurring in the equipment;
- analysis and synthesis of scientific research using modern science and technology of domestic and foreign experience in the area of chemical plants and of Technology;
- systematic search and preliminary analysis of the scientific and technical information in the area of chemical plant and of Technology for research and practice, and patent support of basic and applied research in the field of modern chemical plant, machine and apparatus building and of Technology;
- mathematical modeling of technological processes and equipment based on custom developed and standard software packages;
- conducting research on advanced search methods, techniques and technologies of environmental protection technology and equipment from the effects of the environment;
- preparation and conduct of scientific workshops, scientific and technical conferences, the preparation and editing of scientific publications;
- definition of economic efficiency of research and scientific and industrial work;
- popularization of new knowledge in the chemical plants, machines and apparatus of chemical technology by the means of the Internet, through publications in national and foreign periodicals, during educational activities.

d) scientific and pedagogical

- preparing and conducting lectures, seminars and workshops, the leadership course and diploma design, organization of work practices of graduates;
- organization of research work of students in university courses in high school;
- preparation and issuance of educational and methodical literature on the relevant field of expertise;
- training of industrial enterprises, design and engineering organizations use sophisticated software and methodical complexes aided design and research.

f) organizational and managerial

- organization and management of teams of technology, engineering companies and environmental systems;
- organization and management of the research, design organizations and units;
- organization and management of machine-building enterprises, specializing in the production of chemical equipment;
- organization and management of assembly companies, specializing in the installation process and environmental equipment;
- organization and management of repair companies who specialize in the repair process and environmental equipment;
- organization of work on the design of technological and environmental systems, installation and repairs;
- organization of work on testing, certification and standardization of equipment, development and revision of Standards, RTM, RD and technical terms;
- organization works for the safe management of production processes, installing and repairing equipment, environmental monitoring and supervision;
- oversee compliance with the safe conduct of work in the industrial, technological and environmental control;
- organization of work on product quality control.

Requirements for basic education training program

Graduated in direction of «Energy-and resource-saving processes in chemical technology, oil chemistry and biotechnology» of specialty «Machines and apparatus of chemical industries» with qualifica-

tion «**Specialist**», in accordance with the objectives of the basic educational program, facilities and types of professional activity should have the following **professional specialized expertise**: basic knowledge of the kinetic regularities of mechanical, hydromechanical, thermal, mass, chemical processes; ability to synthesize the technological scheme of production of various materials and products, to calculate material and energy balances, utilization of raw materials; ability to formulate terms of reference for the development of technological and environmental equipment; design sketch, technical and working projects for equipment; knowledge of construction materials and their grades, the elementary base of equipment, methods of calculation for strength, stability of the basic elements and components of equipment; knowledge structures, the application of the principle and basic performance characteristics of machines and apparatus for chemical production, machinery, machines and automatic lines for chemical production; knowledge of basic techniques and principles of technological schemes of waste gas, waste water, disposal and recycling of industrial and municipal solid waste; knowledge of technology of repair and installation of technological and environmental equipment; ability to formulate terms of reference, sketch design, technical and working drafts of chemical-technological and environmental systems; knowledge of methods and techniques of environmental protection technology and equipment from the effects of the environment; the ability to make business plans, feasibility studies on the development, manufacturing and production equipment, design, installation and operation of chemical-technological industries, and environmental systems. Mentioned objects, types and purposes of professional activities confirm the difficulty of developing a single unified government educational standard of higher professional education for direction «Chemical Engineering and Biotechnology», for which can be related the specialty «Machines and apparatus of chemical industries».

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