Report on the work of the dissertation Council

Dissertation Council on chemical processes and production of chemical materials the Kazakh national research technical University named after K.I.Satpayev on specialties (direction of training):

8D07107 – "Chemical engineering of hydrocarbon compounds;

8D07108 – "Basic processes for the synthesis and production of new organic and polymeric materials"

1. Data on the number of meetings held– 3 meetings.
2. Full name of members of the dissertation Council who attended less than half of the sessions: none.
3. List of doctoral student indicating the organization of training:

- Ayazbayeva Aigerim Yerlanovna- KazNITU named after K. I. Satpaev
- Bold Amangul - al-Farabi Kazakh National University
- Nuraly Assiya Mambetkyzy - al-Farabi Kazakh National University

4. Brief analysis of dissertations considered by the Council during their porting year

№	Full name of the Doctoral student	Topics of work	Code and title of specialty
1	Ayazbayeva Aigerim Yerlanovna	"Synthesis and characterization of polyampholyte nano- and microgels based on acrylamide derivatives"	8D07108 – "Basic processes for the synthesis and production of new organic and polymeric materials"
2	Bold Amangul	"Development of anticorrosion coatings for oil field equipment"	8D07101 - "Petrochemistry"
3	Nuraly Assiya Mambetkyzy	«Obtaining and preparing hemosorbent biomass"	6D072100 - "Chemical technology of organic substances"

4.1 Analysis of the subject of the work of Ayazbayeva A.E. "Synthesis and characterization of polyampholyte nano- and microgels based on acrylamide derivatives", submitted for the degree of Doctor of Philosophy (PhD) on speciality 8D07108 – "Basic processes for the synthesis and production of new organic and polymeric materials". Polyampholytes are unique macromolecules containing acid/base or anionic/cationic groups in their main or side chains. They can be used to model the behavior of proteins, polypeptides or polynucleotides. Polyampholyte nano- and microgels are three-dimensional macromolecular polymer networks that swell when exposed to a dispersing solvent. Stimulus-responsive polyampholyte nano- and microgels, which respond adequately to external factors such as temperature, pH, salt composition, solvent, electric or magnetic fields and light radiation, represent tremendous potential for designing "smart" materials in medicine, biotechnology,

nanotechnology, catalysis, the oil industry and environmental protection, among others. Analysis of literature data reveals that polyampholyte nano- and microgels are predominantly pH-sensitive. In contrast, highly charged polyampholyte nano- and microgels, which contain both hydrophilic and hydrophobic groups (thermo- and salt-responsive fragments), remain relatively understudied. This is especially true in the context of their applications in controlled drug release and as thickening agents in the production of oil.

Connection of the dissertation topics with the directions of science development, which are formed by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan in accordance with paragraph 3 of Article 18 of the Law "On Science" and (or) state programs. The work was conducted in the frame of projects "Synthesis and Study of Thermo- and Salt-Sensitive Polyampholyte Nano- and Microgels" for the period 2020-2022 (AP08855552) and "Development of New Thermal and Salt-Resistant Amphoteric Terpolymers for Enhanced Oil Recovery" for the period 2021-2023 (AP09260574) funded by the Ministry of Science and High Education of the Republic of Kazakhstan. It was partly funded by the Horizon 2020 research and innovation program of the European Union Maria Sklodowska-Curie (grant agreement 823883- MSCA-RISE-2018 NanoPol).

Analysis of the level of implementation of the results of the dissertation in practice. The main results of the study are presented in 3 articles published in journals from the list approved by the Committee for Quality Assurance in the Field of Science and Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan, 2 articles indexed in the Scopus and Web of Science, 2 innovative patents of the Republic of Kazakhstan, 3 abstracts of reports were published in proceedings of international conferences.

4.2 Analysis of the subject of the work of Bold Amangul "Development of anticorrosion coatings for oil field equipment" submitted for the degree of Doctor of Philosophy (PhD) on EP 8D07101 - "Petrochemistry"

Today's metal corrosion problems cause significant economic damage. Corrosion protection of oilfield equipment is especially important because the climatic conditions of oil production are harsh. Paint and varnish coatings are most widely used to protect metal structures from atmospheric corrosion. The creation of environmentally friendly, energy- and resource-saving technological processes for metal surface treatment has become possible due to the development of fundamentally new chemical conversion coatings. One of the most common methods of protecting metal structures from corrosion is the application of anti-corrosion coatings. These include various chemical coatings, paints, varnishes and electrochemical galvanic coatings. Currently, corrosion protection by coatings ranks first among all corrosion protection methods in terms of the area of application. The processes of deposition anticorrosive phosphate and zirconium oxide coatings find wide application in the industry for the decision of various technical problems, which is due to the unique functional properties of these coatings, such as high bond strength with a metal substrate, high adsorption capacity; high anti-friction and extrusive properties and low electrical conductivity. The main disadvantages of existing solutions of phosphating are the content of toxic nickel ions, ion nitrite, etc.; high energy intensity, due to high operating temperatures of processes 70-90 °C; the release of hydrogen, which prevents the formation of dense deposition, high sludge formation. In addition, for the implementation of modern phosphating technologies, complex equipment is necessary, and the processes themselves require strict control, since the properties of the formed coatings depend heavily on such parameters as free and total acidity, temperature, concentration of accelerators, etc. The most promising substances that would allow reducing the number of stages, stabilizing phosphating processes, increasing the overvoltage of hydrogen evolution, and reduce the temperature can be ecologically safe organic nitrogen compounds. It should be noted that there are no domestic developments using such technologies. In recent years nanostructured ceramic adhesion coatings have been increasingly used as an alternative to adhesion phosphate layers in world practice. Advantages of new methods are their lower energy intensity and

manufacturability in comparison with phosphating processes. Solutions for these coatings do not require heating, do not require such strict control parameters, easy to use, form much less slurry and more environmentally friendly. Potential consumers of nanostructured ceramic adhesion and adhesive phosphate coatings are chemical, metallurgical, machinebuilding and oil-producing industries. In this regard, the development of new methods for applying adhesive phosphate and zirconium oxide coatings is an actual scientific and applied task.

Connection of the dissertation topics with the directions of science development, which are formed by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan in accordance with paragraph 3 of Article 18 of the Law "On Science" and (or) state programs.

Work is executed in the Department of «Physical chemistry, catalysis and petrochemistry» of the al-Farabi Kazakh National University and at the laboratory of Electrochemistry and nanotechnological processes of JSC «D.V. Sokolsky Institute of Fuel, Catalysis and Electrochemistry». Obtaining anti-corrosion coatings in the object of research, searching in literature sources of scientific research works on coatings with high corrosion resistance and analysis of studies, writing of theoretical and experimental parts of the dissertation, execution of the experimental part of the work, generalization and interpretation of the obtained experimental data and conclusions were carried out by the author independently

Analysis of the level of implementation of the results of the dissertation in practice. According to materials presented in the dissertation, in the dissertation 12 publications have been published in total: 5 articles in journals indexed in Web of Knowledge (Thomson Reuters, USA) and Scopus (Elsevier, Netherlands); 1 article in journals recommended by the Ministry of Science and Higher Education of the Republic of Kazakhstan; 5 publications in collections of international scientific conferences. According to the results of the work in co-authorship, 1 positive decision was also received on the application (a patent for a utility model).

4.3 Analysis of the subject of the work of Nuraly A.M. «Obtaining and preparing hemosorbent biomass", submitted for the degree of Doctor of Philosophy (PhD) in the 6D072100 - "Chemical technology of organic substances".

Carbon chemistry opens up very wide opportunities for the production of carbon material. Due to their unique properties, high chemical resistance, thermal strength and large specific surface area, carbon materials have found application in the tire and rubber industry, as a filler in the chemical and pharmaceutical industries, in the production of heat-resistant composite materials, modified electrodes. A feature of the carbon-silicon hemosorbent is the high content of amorphous silicon dioxide - 30-40% and carbon - 50-60%. There is no such ratio in any sorbent, that is, the product has no world analogues. The sources of sorbing materials are plant residues, their complex use is important given the trend of creating waste-free technologies. In this work, activated rice husk, which is a renewable plant material of Kazakhstan, with sorption properties, was chosen as a raw material for obtaining a biocompatible carbon-silicon hemosorbent. Carbon-silicon hemosorbent has a unique developed porous structure consisting of macro-, meso- and micropores, which ensures selective sorption of toxins, i.e., unlike other sorbents, it removes only harmful substances from the body. During hemosorption, it absorbs and destroys high-molecular endotoxins, viral infections, bacteria, allergens and pathogenic microorganisms. The development of domestic medicines is very relevant due to the high growth of the epidemic that has affected most of the world and the high cost of medical products coming from Europe and the USA. The creation of a carbonsilicon hemosorbent for blood purification opens up the following opportunities: - providing the population with the necessary quantity of highly effective biomedical preparations from locally available raw materials; - ensuring the prevention and treatment of various epidemics of viral, infectious and bacterial origin. The role of carbon sorption materials in medicine is especially important. Due to the developed porous structure, carbon materials are effectively used for detoxification of the body, hemo- and enterosorption, in applied medicine. Due to the above reasons, the relevance of the research topic of the

dissertation work on the creation of a multichannel laminar hemosorbent with silicon carbon is undeniable.

Connection of the dissertation topics with the directions of science development, which are formed by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan in accordance with paragraph 3 of Article 18 of the Law "On Science" and (or) state programs.

The dissertation work was completed within the framework of the project of commercialization of scientific research "No. 0097-17-GK "Creation of domestic production of laminar flow hemosorbents" on the basis of the scientific, technical and production center "Zhalyn".

Analysis of the level of implementation of the results of the dissertation in practice. On the topic of the dissertation, 18 scientific works of the author have been published, including 1 article published in a publication included in the Scopus database; 4 scientific articles in journals presented by the Institute of Scientific Research of the Republic of Kazakhstan, 3 articles in the materials of international scientific conferences, 4 patents, 2 articles in international journals, 3 copyrights, 1 monograph.

5 Analys is of the work of official reviewers (with examples of the most low-quality reviews)

№	Full name of the doctoral student	Reviewers	
		Full name of the first reviewer (position, academic degree, title, number of publications in the Specialty for the last 3 years)	**Full name of the second reviewer** (position, academic degree, title, number of publications in the specialty for the last3years)
1	Ayazbayeva Aigerim Yerlanovna	Mamytbekov Galymzhan Kulamkadyrovich – doctor of chemical sciences, professor in RSE acting on a self-supporting economic basis "Institute of Nuclear Physics", Head of the Laboratory of Radiation-Chemical Processes and Advanced Technologies, Almaty, Kazakhstan, there are more than 5 scientific publications in (Scopus) CiteScore above 35 in the EP 8D07108 – "Basic processes for the synthesis and production of new organic and polymeric materials".	Kaldybekov Daulet Bolatovich - PhD, Senior Lecturer, Department of Chemistry and Technology of Organic Substances, Natural Compounds and Polymers, Faculty of Chemistry and Chemical Technology, Kazakh National University named after al-Farabi, Almaty, Kazakhstan, there are more than 9 scientific publications in (Scopus) CiteScore above 35 in the EP 8D07108 – "Basic processes for the synthesis and production of new organic and polymeric materials"».
2	Bold Amangul	Shaimardan Minavar – PhD, Senior Researcher at National Laboratory Astana, Nazarbayev University, with a Hirsch index (h-index) - 3, has more than 4 scientific publications in Scopus in the PhD program 8D07101 - "Petrochemistry."	Nauryzova Saule – PhD, Associate Professor Kazakh National Technical University named after K.I. Satpayev, with a Hirsch index (h-index) -3, has more than 3 scientific publications in Scopus and publications in Science and Higher Education Quality Assurance Committee of the Ministry of Science and Higher

			Education of the Republic of Kazakhstan in the PhD program 8D07101 - "Petrochemistry."
3	Nuraly Assiya Mambetkyzy	Manapkhan Zhumabek - Ph.D, Senior Researcher, "Institute of Organic Catalysis and Electrochemistry named after D.V. Sokolsky", Hirsch index (h-index - 4), there are more than 5 publications in (Scopus) CiteScore above 35 in the specialty of the doctoral student in the doctoral program 6D072100 - "Chemical technology of organic substances".	Dzheldybaeva Indira Mukhametkerimovna-Associate Professor in the scientific direction 10300 chemical sciences (02.00.00 – Chemistry), leading researcher at the Research Institute of New Chemical Technologies and Materials at Al-Farabi Kazakh National University, Hirsch index (h-index - 3), there are more than 4 publications in (Scopus) CiteScore above 35 in the specialty of the doctoral student in the doctoral program 6D072100 - "Chemical technology of organic substances".

6. Proposals for further improvement of the system of training scientific personnel.Increase the requirements for the work of scientific consultants (especially from Kazakhstan) doctoral student sinterms of the proposed topics of dissertation research and their leadership in the training of scientific personnel.

Data on the considered dissertations for the degree of doctor of philosophy PhD, doctorofprofile

DissertationCouncil	**Code and title of specialty**		
	8D07108 – "Basic processes for the synthesis and production of new organic and polymeric materials"»	8D07101 - "Petrochemistry	6D072100 - "Cemical technology of organic substances"
Dissertationsacceptedfor defense	1	1	1
Includingdoctoralstudents fromother universities	-	1	1
Dissertationswithdrawnfromconsideration	–	–	–
Including doctoralstudents fromother universities	–	–	–
Dissertations that received negative reviews fromreviewers	–	–	–

Including doctoralstudents fromother universities	–	–	–
Dissertationswithanegativedecisionontheresultsofthe defense	–	–	–
Including doctoralstudents fromother universities	–	–	–
Dissertations aimed at completion	–	–	–
Including doctoralstudents fromother universities	–	–	–
Dissertations aimed at repeated defense	–	–	–
Including doctoralstudents fromother universities	–	–	–

Chairman of the dissertation Council **B.S. Selenova**

Scientific Secretary of the dissertation Council **Sh.S. Islam**