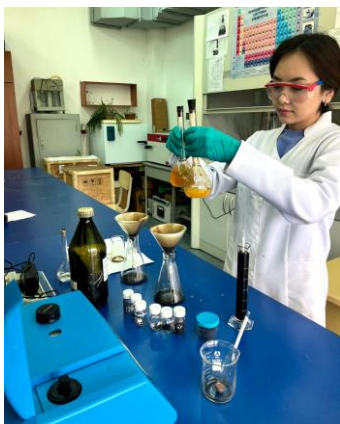


Brief information about the project

Name of the project	AP19678156 “Development of technology for obtaining magnetically controlled organophilic sorbents”
Relevance	<p>The project is dedicated to the development of technology for producing oil and hydrocarbon collectors with a controlled trajectory based on natural sorbents, magnetite and magnetotactic bacteria.</p> <p>Pollution of the environment by liquid hydrocarbons is one of the urgent problems for all mankind. The main source of pollution is tankers engaged in the transportation and delivery of oil. For Kazakhstan as an oil-producing country, this becomes especially topical in the light of the proposals of the President of the Republic of Kazakhstan K.K. Tokayev to open oil exports to Europe by water, through the Caspian Sea.</p> <p>When oil is spilled on the surface of the water, it is of great importance to resolve the issue of removing already adsorbed oil from the surface, since the treatment of oil with other materials: peat, wool, sawdust contributes to its deposition because of an increase in mass. The deposition of this agglomerate poses an even greater danger to the water basin, as it will release toxic substances over a long period. Therefore, measures are needed to remove them from the water surface.</p>
Purpose	Development of technology for obtaining magnetically controlled organophilic sorbents.
Objectives	<ol style="list-style-type: none">1. To obtain sorbents of liquid hydrocarbons and oil based on affordable and cheap raw materials of organic and mineral nature.2. To give magnetically controlled properties to the sorbent obtained by including magnetite particles or magnetotactic bacteria in their composition.3. To conduct a comparative analysis of the sorption properties of composite magnetic sorbents based on organic and mineral raw materials in relation to hydrocarbons and oil.4. To optimize the conditions for purposeful regulation of sorption and magnetic properties of organophilic sorbents based on mineral and organic raw materials.
Expected and achieved results	<ol style="list-style-type: none">1. The conditions for obtaining hydrophobized clays based on raw materials from Kazakhstan, ensuring high oil absorption will be proposed. By modifying the surface of diatomite and vermiculite particles with water-soluble and oil-soluble surfactants, diatomite and vermiculite particles with hydrophobic properties will be obtained, optimal ratios between surfactants, clays and modification modes are determined. The technology of obtaining carbonized sorbents from various types of vegetable raw materials will be proposed: wood (birch activated carbon), corn cobs, nut shells, stems and sunflower press cake.2. Will be determined the conditions for obtaining

	<p>magnetic composites of organophilic sorbents based on clay sorbents and plant raw materials by introducing magnetite particles and magnetotactic bacteria into the sorbent structure.</p> <p>3. Will be studied a comparative analysis of the sorption activity of magnetic sorbents based on diatomite, vermiculite, carbonized vegetable raw materials in relation to liquid hydrocarbons and oil will be carried out, the kinetics of sorption.</p> <p>4. The ways of regulating the hydrophobicity, specific surface area, porosity, sorption, and magnetic activity of composites of hydrophobic sorbents will be developed, magnetite and magnetotactic bacteria using surfactants and polymers will be optimized. A technology for producing organophilic sorbents with magnetic susceptibility based on clay minerals and carbonized plant raw materials.</p> <p>Results achieved</p> <p>The conditions for producing magnetic sorbents based on birch activated carbon (BAC) and clay minerals: diatomite and vermiculite have been optimized. The surface of diatomite and vermiculite was modified using water-soluble cationic surfactants, which ensures a high degree of hydrophobicity of clays. The sorption capacity of magnetic composites based on coals obtained from birch and corn cobs, and clay minerals on a model adsorbate - methylene blue, as well as the adsorption of hexane and oil, was assessed. Research will continue in the direction of imparting magnetic properties to hydrophobized clays and obtaining carbonized sorbents from various types of plant raw materials.</p>
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List of publications with links to them	-
Patents	-



The project participants associate professor Tyusyupova B.B. and 4th year student of specialty 6B05301 - "Chemistry" Khairulla N. are working on obtaining carbonized magnetic sorbents based on corn cobs and oil adsorption on them.



Sorbents based on corn cobs



Carbonized sorbent based on corn cobs



Carbonized magnetic composite based on corn cobs