

Brief information about the project

Name of the project	AP19679889 «Development of technologies for complex processing of heavy oil waste into valuable technical products and fuel distillates».
Relevance	The project's relevance and importance arise from the ongoing depletion of natural reserves of hydrocarbon production, the rise in the cost of their industrial production and processing, and the anticipated scarcity of such resources soon, as well as the demand for alternative sources of resources capable of significantly increasing the economic efficiency of production and improving the overall environmental situation. The domestic oil refining industry is currently confronted with the problem of increasing the depth of oil refining - increasing the share of light-colored oil products at the expense of reducing waste fuel production. Because alternative raw materials and a wide range of fuel and other products based on them are in high demand in the country, the project's tasks are focused on resource conservation and environmental protection.
Purpose	Development of resource-saving technology of complex thermal processing of heavy oil waste based on carbon-containing raw materials into valuable technical products and fuel distillates in the case of used motor oils.
Objectives	<p>I. Technology and raw material base development for the conversion of heavy oil waste into fuel and valuable technical products. Physical and chemical analysis methods are used to describe research objects. Based on the data received, the activator compound (used motor oils) was chosen and analyzed.</p> <p>II. Determination of optimal parameters of thermal balance experiments of heavy oil residues with the participation of used motor oils in a wide concentration range to evaluate the quality of the obtained liquid distillate products:</p> <ul style="list-style-type: none">- the effect of technological parameters of the slow coking of heavy oil residues on the yield and composition of the liquid and solid products formed;- to determine the dependence of the yield, composition and properties of liquid products of the slow coking process on the parameters of the composition and properties of heavy oil residues and used motor oils; <p>III. Analysis of products of the thermal process of conversion of heavy oil residues into fuel distillate and valuable technical products.</p> <ul style="list-style-type: none">- study of the hydrocarbon content of liquid distillates with a boiling point of 180-3200 C using modern physical and chemical methods (chromato-mass-spectrometry, gas-liquid chromatography, etc.);- determination of the main physical and chemical parameters of synthetic liquid fuel (octane and cetane numbers, sulfur content, viscosity, solidification, filtration, clouding point, etc.)- determining the quality of petroleum coke, technical products (scanning electron microscopy, Raman microscopy, BET, etc.) <p>IV. Development and testing of resource-saving technologies and equipment for thermal processing of industrial heavy oil wastes.</p>

	<p>- development of typical laboratory-technological regulations for obtaining various fuel and technical products from heavy oil residues.</p> <p>The laboratory regulations created based on the research are organized and conducted by the Faculty of Chemistry and Chemical Technology of Al-Farabi Kazakh National University in the specialties "Chemical Technology of Organic Substances", "Petroleum Chemistry" and "Oil and Gas", students' research works and master's degrees. can be used during the implementation of projects.</p>
<p>Expected and achieved results</p>	<p>The study of thermolysis of heavy oil wastes was carried out to develop rational ways of complex processing of used motor oils into valuable technical products and fuel distillates. Composition and properties of tar and used motor oils from domestic Kumkol oil field were studied using modern physicochemical methods of research. The group chemical composition of petrol, light gasoil and heavy gasoil fractions produced by coking resin in the presence of a recirculation agent at 500°C was determined. In addition, the work on coking of tar by the recycling agent under different temperature conditions and at different recirculation coefficients and determination of group chemical and hydrocarbon composition of light distillates has been started and is in progress. One article was published in the scientific and technical journal "Oil and Gas", recommended by the Committee for Quality Assurance of Education and Science of the Ministry of Higher Education and Science of the Republic of Kazakhstan. Modern methods of physico-chemical research studied the composition and properties of oil of domestic oil fields and heavy wastes obtained from them, used motor oils. The main trends of changes in the hydrocarbon composition of light distillates obtained taking into account the impact of the recirculation agent - used motor oils.</p>
<p>Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles</p>	<p>Aubakirov Ermek Aytkazynovich, H index: 8 Research ID: A-9677-2015 ORCID: 0000-0001-5405-4125 Scopus Author ID: 55447002200</p> <p>Tashmukhambetova Zheneta Khalilovna, H index: 7 ORCID: 0000-0003-4125-4114 Scopus Author ID: 56459076400</p> <p>Abildin Tleutay Sarsenbaevich, H index: 5 ORCID: 0000-0002-2710-7233 Scopus Author ID: 6506476435</p> <p>Baş Ahmet Deniz, H index: 10 ORCID: 0000-0003-4633-9053 Scopus Author ID: 55210358400</p> <p>Akhmetova Firuza Zhantaskyzy, H index: 1 ORCID: 0000-0002-8869-3053 Scopus Author ID: 57211321422</p> <p>Buzaev Nurdaulet, H index: 0 ORCID: 0000-0002-6097-3117 Scopus Author ID: 57220026541</p> <p>Yelzhas Nurbek Bekzhanuly, H index: 0</p>

List of publications with links to them	E.A. Aubakirov, N. Buzayev, K. Toshtay, Influence of technological parameters on the composition and properties of petroleum coke// Нефть и Газ, - № 5, - Vol. 137, - 2023, p. 133-137
Patents	

