

DEVELOPMENT OF AN INNOVATIVE AND IMPROVED TECHNOLOGY FOR PROCESSING OIL WASTE FROM JSC “OZENMUNAYGAZ” INTO USEFUL PRODUCTS

A.Zh. Bayzak, Zh.N. Kaynarbayeva, E.A. Tussupkaliyev*, A.A. Espenbetov, G.A. Uskov, K.A. Kadirbekov, M.T. Oshakbayev, D.A. Turgaliyev

A.B. Bekturov Institute of Chemical Sciences JSC, Almaty, Kazakhstan

*Corresponding author e-mail: ersin750806@gmail.com

Abstract. *Introduction.* Oil and gas activities generate oil-contaminated waste, which poses an environmental hazard. The development of effective technologies for its treatment and reuse is an important task. *Objective.* To develop and evaluate the efficiency of a technology for processing oil-contaminated waste from JSC «Ozenmunaigas» to produce treated soil suitable for road construction and technical land reclamation. *Methods.* Pilot-scale industrial tests were conducted using a surfactant, a polymer composite, and technical water. The components were mixed for 10–15 minutes, followed by settling for 20–30 minutes. The concentration of petroleum hydrocarbons was determined using the fluorometric method. *Results.* The concentration of petroleum hydrocarbons decreased from 102,600 to 900 mg/kg, corresponding to a removal efficiency of 99.12%. The resulting treated soil was proposed for use in road construction and technical land reclamation. The developed technology provides effective processing of oil-contaminated waste and reduces the technogenic impact on the environment.

Keywords: oil-contaminated waste, waste processing, petroleum hydrocarbons, surfactants, environmental safety, technical land reclamation

<i>Bayzak Assel Zheniskyzy</i>	<i>Master, e-mail: asel6.03.78@mail.ru</i>
<i>Kainarbayeva Zhaniya Nurbekovna</i>	<i>Master, e-mail: zhaniya.kn@gmail.com</i>
<i>Tussupkaliyev Ersin Adietovich</i>	<i>Candidate of Chemical Sciences, e-mail: ersin750806@gmail.com</i>
<i>Yespenbetov Assylbek Alimbekovich</i>	<i>Doctor of Chemical Sciences, e-mail: yespenbetov@mail.ru</i>
<i>Uskov Grigoriy Alexandrovich</i>	<i>Engineer, e-mail: labfizhim@mail.ru</i>
<i>Kadyrbekov Kairat Kadyrbekovich</i>	<i>Doctor of Chemical Science, Professor, e-mail: kkairati@mail.ru</i>
<i>Oshakbayev Mels Tleuberdiyevich</i>	<i>Doctor of Technical Sciences, Professor, e-mail: o_mels@mail.ru</i>
<i>Turgaliyev Darkhan Abayevich</i>	<i>Engineer, e-mail: darkhanxah@mail.ru</i>

Citation: Bayzak A.Zh., Kaynarbayeva Zh.N., Tussupkaliyev E.A., Espenbetov A.A., Uskov G.A., Kadirbekov K.A., Oshakbayev M.T., Turgaliyev D.A. Development of an innovative and improved technology for processing oil waste from JSC `Ozenmunaygaz` into useful products. *Chem. J. Kaz.*, **2026**, 3(95), 48-57. DOI: <https://doi.org/10.51580/2026-3.2710-1185.28>

1. Introduction

The production activities of hydrocarbon extraction and processing facilities have a certain impact on environmental components. According to the Environmental Code of the Republic of Kazakhstan, natural resource users are required to process oil waste [1].

One of the most important tasks for subsoil users and scientists during the operation of oil and gas fields is environmental protection. In this regard, it is necessary to carry out environmental protection work in the zone of potential impact of subsoil use facilities.

From an environmental perspective, the greatest danger is posed by the contamination of land surfaces and water bodies with petroleum products, as well as the penetration of petroleum products into aquifers [1, 2, 3-5]. The problem of disposing of waste accumulated as a result of the activities of enterprises in the oil and gas sector remains relevant and is linked to a significant increase in the volume of oil and gas production.

In accordance with the principles of sustainable development and the transition of the Republic of Kazakhstan to a “green economy,” the development of effective technologies for the processing oil-containing waste is an important and relevant task. Technologies that reduce the anthropogenic impact on the environment and produce products suitable for further economic use are of particular importance [3–5].

In this regard, the development and improvement of methods for processing oil-containing waste are of scientific and practical interest.

The aim of the study is to develop and evaluate the efficiency of a technology for processing oil-containing waste from JSC “Ozenmunaigas” to obtain purified soil suitable for use in road construction and technical reclamation of disturbed lands.

The scientific novelty of the study lies in the development of an effective method for processing oil waste using an energy-accumulating additive, surfactants, and composite materials, which ensures a reduction in the content of petroleum products and produces a product for further use.

The practical significance of the work lies in the possibility of applying the developed technology for processing oil-containing waste at oil and gas industry facilities, reducing the anthropogenic impact on environmental components, and rationally utilizing the products obtained from the processing.

2. Materials and methods of research

Within the framework of this study, oil-containing waste stored at the landfill of JSC “Ozenmunaigas” was used as the initial material. The sample was taken from the accumulated oil-containing waste intended for processing.

The research involves developing technological solutions for the processing of oil-contaminated waste using an energy-accumulating additive based on composite materials with surfactants, which contain a mixture of oxides of

alkaline-earth metals, including CaO and MgO, to produce materials used in road construction.

The essence of the technology for processing oil-containing waste is that the oil waste is treated, while being mixed, with an energy-accumulating additive based on composite materials with surfactants, which includes a mixture of alkaline earth metal oxides containing Ca and Mg oxides. At the same time, the oxide of the alkaline-earth metal forms a hydroxide with water, as a result of which petroleum products are evenly absorbed by it, producing a dry, storage-stable powdery substance consisting of granules (the size ranges from 2 mm to 15 mm), which, in terms of their chemical composition, are particles of neutralized petroleum waste evenly distributed throughout the product mass. Adding an energy-accumulating additive and petroleum-containing waste from composite materials at the time of mixing makes it possible to obtain materials used in road construction. Composite materials that make it possible to obtain hydroxyl powder are supplied in measured quantities at the moment of mixing the energy-accumulating additive and oil-containing waste. The method is based on the properties of mineral oxide sorbents to increase the specific surface area by 15–30 times and thereby transform into a bulk binding substance with high absorption capacity for high-molecular substances, and in particular for petroleum hydrocarbons, which results in a sharp increase in the specific surface area. During the processing of oil-containing waste, volatile unsaturated hydrocarbons are released into the atmospheric air; their concentration depends on the content of petroleum products in the waste.

The energy-accumulating additive with composite materials based on surfactants is a multi-purpose product that has neutralizing and sorbing properties in relation to crude oil [6–7]. The energy-accumulating additive promotes the decomposition of crude oil and intensifies the natural processes of soil self-purification. Its application contributes to the enrichment of the soil with nitrogen and biologically active compounds, which stimulates the growth of microorganisms and accelerates the decomposition of oil contained in the waste.

The processed product can be used as an additive or as an integral component in the production of the following materials and structures: asphalt concrete mixtures for highways and on-field roads, structural elements of roads, thermal insulation, hydro-barrier, and additional layers of the roadbed, as well as for creating parking areas for equipment and constructing on-site roads, for profiling the surface of solid waste landfills, and others.

The process proceeds with the release of heat, which results in a sharp increase in the specific surface area. The resulting salts provide hydrophobicity and strength to the granules of the reaction product of the EAD with hydrocarbons. Composite materials make it possible to obtain a moisture-absorbing material used for the preparation of concrete mixtures for road pavement.

The processing of oil-containing waste includes four main stages:

- 1) Receipt and placement of reagents for processing oil-containing waste delivered by road transport;
- 2) Physico-chemical analysis and preparation of oil-containing waste from JSC “Ozenmunaigas” for processing on a special concrete site;
- 3) Mixing and blending of the components;
- 4) Unloading of the neutralized soil and physicochemical analysis of the samples.

To obtain a product from recycled waste that can subsequently be used for road construction, special substances – composite materials based on inorganic salts are added at the site during the mixing of the energy-accumulating additive and oil-containing waste.

The addition of composite materials during the mixing of the energy-accumulating additive and oil-containing waste ensures the production of materials used in the construction of field roads. Bone meal or fish meal, containing up to 90% CaCO_3 , can be used as composite materials. The composite materials are delivered in bags of a specified weight, which makes it possible to supply them to the oil-containing waste processing site from a warehouse located under a canopy after weighing them in containers on scales in a specified dosage ratio of 1:3 to the other mixing components. After mixing the oil-containing waste with the EAD and composite materials, water is supplied from water storage tanks using submersible pumps through flexible pipelines or by water tankers. During active mixing, the processes of processing and granulation of the neutralized oil-containing waste take place in accordance with the technology described above.

The final product of processing the neutralized oil-containing waste, with the addition of composite materials, is recycled soil, which is an environmentally safe material used in the construction of on-site roads and in the technical reclamation of soils. Unloading and storage of the recycled soil are carried out using a front-end loader.

The finished processed soil, after the addition of composite materials in the “Horizontal Mixer (SM)”, UNZG, and PTK-INSTEB-ECO-5 units, is transformed into a mixture used in road construction. The resulting mixture is discharged through the mixer’s discharge port into the loader’s bucket, after which it is temporarily stored in a specially designated area or transferred to dump trucks and transported for reclamation work.

To improve the mixing process and accelerate the reactions involved in the processing of oil-containing waste, JSC “Ozenmunaigas” is to prepare oil-containing waste using special equipment, and a site for mixing and blending reagents is to be set up. The preparatory stage involves setting up the work site:

- the site for installing the equipment must have a solid surface with a waterproof coating – 1 area for primary processing measuring 10 x 20 meters and 1 area for placing the equipment measuring 10 x 10 meters;
- the storage area for the energy-accumulating additive with a waterproofing coating – 1 (one) covered site measuring 10 × 30 meters;

- the entrance to the site is equipped with portable truck scales with the capability to print the total weight of the vehicle, ensuring accurate accounting of the oil-containing waste delivered for processing;
- the presence of a water storage tank on the site;
- the removal of oil-contaminated waste is carried out from an unequipped sludge storage facility;
- upon entry to the work site, the oil-contaminated waste is weighed;
- before the tests begin, the oil-contaminated waste is sorted and mechanically cleaned, with foreign objects that cannot be processed being removed;
- uniform mechanical crushing of large soil inclusions is carried out on a specially prepared site.

The main stage:

- cleaning of oil-containing waste by mixing with the addition of an energy-accumulating additive containing surfactants, composite materials, and process water using specialized mixing equipment;
- during the addition, the dosage of the energy-accumulating additive and composite materials with surfactants must be strictly observed.

Pilot-scale tests of a new technology for processing paste-like oil waste with the addition of surfactants and a polymer composite, using a screw mixer, were carried out at the test site of JSC “Ozenmunaigas”.

During the tests, the following materials were used:

1. 0.5 m³ of process water;
2. 1 litre of surfactant, 0.02% polymer composite.

The system for supplying surfactants and polymer composite has been redesigned and connected to the system; at the oil waste processing facility, there is a concrete platform measuring 20 x 30 meters for storing oil waste; changes have been made to the mixer design.

The required amounts of surfactants, polymer composite, and process water have been determined. The possibility of recycling process water with surfactants and collecting it in a tank has been tested.

The content of petroleum products in the oil waste and purified soil was determined by the fluorimetric method using the “Fluorat 02-3M” instrument in accordance with the PNDF 16.1:2.21-98 methodology. The petroleum product content in the initial oil waste was 102,600 mg/kg.

3. Results and Discussion

Figure 1 shows the results of an IR spectroscopic analysis of the used oil-containing waste, which consists of asphalt-resin-paraffin deposits (ARPD). The sample contains signs of moisture, clay, and organic components. Figure 1 shows that the IR spectra have characteristic absorption frequencies for hydrocarbons. The absorption band frequencies in the IR spectra with wavenumbers 722–1462 and 2851–2921 cm⁻¹ are attributed to paraffin components. For aromatic structures with C=C bonds, absorption bands at 1604,

871, and 811 cm^{-1} are characteristic. Absorption bands at 1700–1750 cm^{-1} , typical of CO groups in carbonyl compounds, are absent. O–H-containing components may be present in small amounts. Assigning specific absorption bands to particular functional groups is difficult due to the multicomponent nature of the oil-containing samples under study.

The paraffinic petroleum deposit has a complex hydrocarbon composition with the presence of aromatic, resinous, and, probably, mineral components, which provides an overall characterization of the ARPD. The combination of absorption bands at 2851–2921 and 722–1462 cm^{-1} indicates a significant content of long-chain aliphatic hydrocarbons characteristic of the paraffinic component of ARPD. The band at 1604.9 cm^{-1} indicates the presence of aromatic structures. Overall, the spectrum corresponds to a paraffinic petroleum deposit of complex composition.

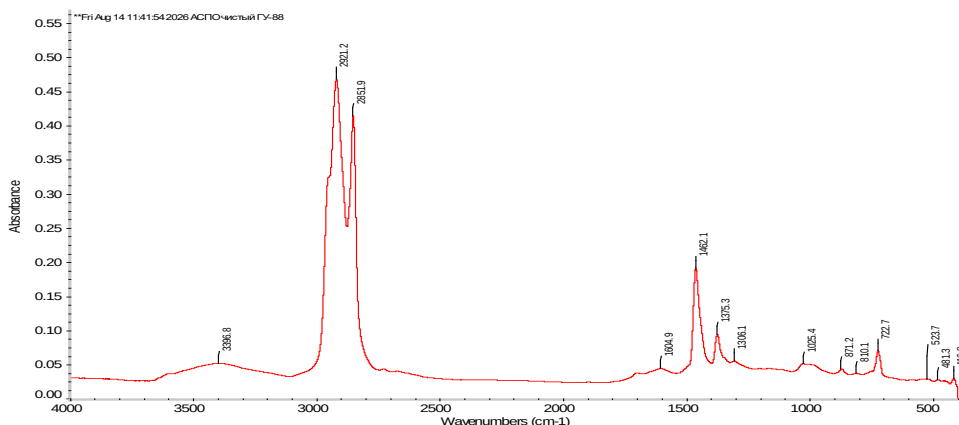


Figure 1 – Results of the IR spectroscopic analysis of ARPD from the NGDU-1 landfill of JSC “Ozenmunaigas”.

The results of the analysis of asphalt-resin-paraffin deposits, presented in Table 1, indicate a significant content of paraffins and saturated hydrocarbons, which contribute to the formation of dense deposits on the process equipment. The detected presence of resins and asphaltenes indicates a complex multicomponent composition of the studied deposits, which should be taken into account when selecting effective methods for their cleaning and preventing their formation.

Table 1 – Results of physic-chemical studies of the asphalt-resin-paraffin deposit from JSC “Ozenmunaigas”

№	Indicators	Content
1	Density, g/cm^3	0,878
2	Pour point, $^{\circ}\text{C}$	35

3	Viscosity at 50 °C	13,8
4	pH	8
5	Total mineralization, g/L	55,9
6	Water content, %	8
	Petroleum products, content, %:	
8	sulfur	0,19
9	resins	16,5
10	asphaltenes	1,37
11	paraffins	24,6
12	saturated hydrocarbons C ₁₂ –C ₁₉	28,6

As a result of the pilot-industrial tests, the efficiency of the technology for processing oil-containing waste from JSC “Ozenmunaigas” was evaluated. The main indicator of the process efficiency was the change in the petroleum product content in the initial oil-containing waste and in the purified soil obtained after treatment. The results of the physicochemical analysis are presented in Table 2.

Table 2 — Content of petroleum products in the initial and purified material

№	Sample name	Petroleum products, mg/kg
1	Initial oil waste	102 600
2	Purified soil	900

As a result of the tests conducted, it was established that the application of the new technology makes it possible to significantly reduce the petroleum product content in oil-containing waste. The petroleum product content in the initial oil-containing waste was 102,600 mg/kg. After treatment using the developed technology, the petroleum product content in the purified soil decreased to 900 mg/kg. The degree of reduction in petroleum product content was 99.12%.

After a series of tests, the optimal technological conditions for the process were established. The mixing time in the reactor-mixer was 10–15 minutes. Upon completion of mixing, settling was carried out for 20–30 minutes, resulting in the separation of the purified soil and the water-oil emulsion. The water-oil emulsion was removed through the drain valve, while the purified soil was discharged through the mixer hatch.

The obtained results demonstrate the high efficiency of the new technology for processing oil waste at the landfills of JSC “Ozenmunaigas.” The necessary additional equipment was connected, and the test results demonstrated positive outcomes.

The obtained purified soil is proposed for use as an additive or component in the production of the following materials and structures: asphalt concrete mixtures for highways and field roads, structural elements of roads, thermal

insulation, waterproofing and additional layers of roadbeds, as well as for the construction of equipment parking areas and on-site roads, profiling the surface of solid municipal waste landfills, and others.

Thus, the results of the pilot and industrial tests indicate the possibility of effectively reducing the content of petroleum products in oil-containing waste, resulting in a product suitable for further use in construction and reclamation work.

4. Conclusion

The results of industrial tests have demonstrated the high efficiency of the new technology for processing oil waste at the landfills of JSC "Ozenmunaigas".

As a result of the tests conducted, the petroleum product content in the oil-containing waste decreased from 102,600 mg/kg to 900 mg/kg, corresponding to a 99.12% reduction in petroleum product content.

The optimal conditions for the technological process were established as a mixing time of 10–15 minutes in the reactor-mixer, followed by settling for 20–30 minutes.

The obtained purified soil is proposed for use in road construction and for the technical reclamation of disturbed lands.

The developed technology for processing oil-containing waste is of practical significance for reducing the anthropogenic impact on the environment, rational use of natural resources, and reuse of the products obtained from the processing.

Funding: This research has been funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (BR27101179).

Conflict of interests: The authors declare that there are no conflicts of interests between the authors to disclose in this article.

"ӨЗЕНМҰНАЙГАЗ" АҚ МҰНАЙ ҚАЛДЫҚТАРЫН ПАЙДАЛЫ ӨНІМДЕРГЕ ӨНДЕУДІҢ ИННОВАЦИЯЛЫҚ ЖӘНЕ ЖЕТІЛДІРІЛГЕН ТЕХНОЛОГИЯСЫН ӨЗІРЛЕУ

Ә.Ж. Байзақ, Ж.Н. Кайнарбаева, Е.А. Тусупкалиев, А.А. Еспенбетов, Г.А.Усков, К.А. Кадирбеков, М.Т. Ошакбаев, Д. Турғалиев*

"Ә. Б. Бектұров атындағы Химия ғылымдары институты" АҚ, Алматы, Қазақстан

Түйіндемe. Кіріспе. Мұнай-газ өндірісінде қоршаған ортаға кері әсер ететін мұнайлы қалдықтар түзіледі. Осы қалдықтарды тиімді қайта өңдеу және қайта пайдалану экологиялық мәселелерді шешудің маңызды бағыттарының бірі болып табылады. Мақсаты. «Өзенмұнайгаз» АҚ-ның мұнайлы қалдықтарын қайта өңдеу технологиясын әзірлеу және оның тиімділігін бағалау, сондай-ақ жол құрылысы мен техникалық рекультивацияда пайдалануға болатын тазартылған топырақ алу. Әдісі. БАЗ, полимерлік композит және техникалық суды қолдану арқылы тәжірибелік-өнеркәсіптік сынақтар жүргізілді. Қоспалар 10–15 минут аралығында араластырылып, кейін 20–30 минут тұндырылды. Мұнай өнімдерінің мөлшері флуориметриялық әдіспен анықталды. Нәтижелері. Мұнай өнімдерінің мөлшері 102 600 мг/кг-нан 900 мг/кг-ға дейін төмендеді, тазарту дәрежесі 99,12%-ды құрады. Алынған тазартылған топырақты жол құрылысында және техникалық рекультивация кезінде пайдалануға ұсынуға болады. Өзірленген технология мұнайлы қалдықтарды

тиімді қайта өңдеуге және қоршаған ортаға түсетін техногендік жүктемені азайтуға мүмкіндік береді.

Түйінді сөздер: мұнайлы қалдықтар, қалдықтарды қайта өңдеу, мұнай өнімдері, БАЗ, экологиялық қауіпсіздік, техникалық рекультивация

Байзақ Әсел Жеңісқызы	<i>магистр, e-mail: asel6.03.78@mail.ru</i>
Кайнарбаева Жания Нурбековна	<i>магистр, e-mail: zhaniya.kn@gmail.com</i>
Тусупкалиев Ерсин Адиетович	<i>т.ғ.к., e-mail: ersin750806@gmail.com</i>
Еспенбетов Асылбек Алимбекович	<i>х.ғ.д., e-mail: yespenbetov@mail.ru</i>
Усков Григорий Александрович	<i>Инженер, e-mail: labfizhim@mail.ru</i>
Кадирбеков Кайрат Адырбекович	<i>х.ғ.д., профессор, e-mail: kkairati@mail.ru</i>
Ошакбаев Мэлс Тлеубердиевич	<i>т.ғ.д., профессор, e-mail: o_mels@mail.ru</i>
Турғалиев Дархан Абаевич	<i>инженер, e-mail: darkhanxah@mail.ru</i>

РАЗРАБОТКА ИННОВАЦИОННОЙ И УЛУЧШЕННОЙ ТЕХНОЛОГИИ ПЕРЕРАБОТКИ НЕФТЕОТХОДОВ АО «ОЗЕНМУНАЙГАЗ» В ПОЛЕЗНЫЕ ПРОДУКТЫ

Ә.Ж. Байзақ, Ж.Н. Кайнарбаева, Е.А. Тусупкалиев*, А.А. Еспенбетов, Г.А. Усков, К.А. Кадирбеков, М.Т. Ошакбаев, Д. Турғалиев

АО «Институт химических наук имени А.Б. Бектурова», Алматы, Казахстан

Резюме. *Введение.* Нефтегазовая деятельность сопровождается образованием нефтесодержащих отходов, представляющих экологическую опасность. Разработка эффективных технологий их переработки и повторного использования является актуальной задачей. *Цель.* Разработка и оценка эффективности технологии переработки нефтесодержащих отходов АО «Озенмунайгаз» с получением очищенного грунта для дорожного строительства и технической рекультивации. *Метод.* Проведены опытно-промышленные испытания с применением ПАВ, полимерного композита и технической воды. Перемешивание осуществляли в течение 10–15 минут с последующим отстаиванием 20–30 минут. Содержание нефтепродуктов определяли флуориметрическим методом. *Результаты.* Содержание нефтепродуктов снизилось с 102 600 до 900 мг/кг, степень очистки составила 99,12%. Полученный очищенный грунт рекомендован для использования в дорожном строительстве и технической рекультивации. Разработанная технология обеспечивает эффективную переработку нефтесодержащих отходов и снижение техногенной нагрузки на окружающую среду.

Ключевые слова: нефтесодержащие отходы, переработка отходов, нефтепродукты, ПАВ, экологическая безопасность, техническая рекультивация

Байзақ Әсел Жеңісқызы	<i>Магистр, e-mail: asel6.03.78@mail.ru</i>
Кайнарбаева Жания Нурбековна	<i>Магистр, e-mail: zhaniya.kn@gmail.com</i>
Тусупкалиев Ерсин Адиетович	<i>к.т.н., e-mail: ersin750806@gmail.com</i>
Еспенбетов Асылбек Алимбекович	<i>д.х.н., e-mail: yespenbetov@mail.ru</i>
Усков Григорий Александрович	<i>инженер, e-mail: labfizhim@mail.ru</i>
Кадирбеков Кайрат Адырбекович	<i>д.х.н., профессор, e-mail: kkairati@mail.ru</i>

Ошакбаев Мэлс Тлеубердиевич

д.т.н., профессор, e-mail: o_mels@mail.ru

Турғалиев Дархан АбаевичИнженер, e-mail: darkhanxah@mail.ru

References

1. Environmental Code of the Republic of Kazakhstan dated January 2, 2021, No. 400-VI (as amended and supplemented as of August 20, 2026). [Electronic resource].
URL: https://prg.kz/document/?doc_id=39768520&show_di=1&pos=8;223 (дата обращения 2026-09-01).
2. Program of industrial environmental monitoring (PEM) of Ozenmunaigas JSC for the fields Zapadny Tenge, Karamandybas, Yuzhny Zhetybay, Aktas, Tasbolat. Aktau, **2025**.
<https://www.ecoport.kz>
3. Liu J.-W., Wei K.-H., Xu S.-W., Cui J., Ma J., Xiao X.-L., Xi B.-D., He X.-S. Surfactant-enhanced remediation of oil-contaminated soil and groundwater: A review. *Science of the Total Environment*, 2021, Vol. 756, Article 144142.
DOI: 10.1016/j.scitotenv.2020.144142.
4. Befkadi A.A., Chen Q. Surfactant-Enhanced Soil Washing for Removal of Petroleum Hydrocarbons from Contaminated Soils: A Review. *Pedosphere*, **2018**, Vol. 28, No. 3, P. 383–410. DOI: 10.1016/S1002-0160(18)60027-X.
5. Huo W., et al. A review on the application of chemical surfactant and surfactant foam for remediation of petroleum oil contaminated soil. *Journal of Environmental Management*, **2019**. DOI: 10.1016/j.jenvman.2019.04.092.
6. Chen H., Wang X., Liang H., Chen B., Yang L., Ma Z., Wang Z. Characterization and treatment of oily sludge: A systematic review. *Environmental Pollution*, **2024**, Vol. 344. Article 123245. DOI: 10.1016/j.envpol.2023.123245.
7. Hasan A.M.A., Kamal R.S., Farag R.K., et al. Petroleum sludge formation and its treatment methodologies: a review. *Environmental Science and Pollution Research*, **2024**, Vol. 31, P. 8369–8386. DOI: 10.1007/s11356-023-31674-3.
8. Hu G., Li J., Zeng G. Recent development in the treatment of oily sludge from petroleum industry: A review. *Journal of Hazardous Materials*, **2013**, Vol. 261, P. 470–490. DOI: 10.1016/j.jhazmat.2013.07.069.