EUROPEAN JOURNAL OF LIFE SAFETY AND STABILITY (EJLSS)
ISSN 2660-9630
www.ejlss.indexedresearch.org Volume 12, 2021 ||

Research of the Process of Separation of Carbon Waste in the Central Energy Region

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Abstract: *The aim of our research is to develop a comprehensive technology for the disposal of oil sludge, from researching the characteristics of oil sludge and the physico-chemical basis of the process to issuing practical recommendations for a feasibility study for the construction of a pilot plant for the utilization of oil sludge. Studies have been conducted to determine the influence of various factors on the separation of oil sludge in the field of centrifugal forces. Experimental work was carried out in laboratory conditions to determine the effectiveness of various schemes for including hydrocyclones.*

Keywords: *Oil sludge, hydrocyclone, centrifugal field, utilization, integrated technology, component composition, physico-chemical characteristics, liquid phase, solid phase*

Date of Submission: 06-11-2021 ***Date of Acceptance: 09-12-2021***

The oil industry is one of the major sources of environmental pollution. The production activities of oil refineries and oil and gas companies inevitably have an anthropogenic impact on the environment, so environmental issues and the rational use of natural resources are important. Oil sludge is one of the most dangerous pollutants of almost all components of the natural environment - surface and groundwater, land cover, atmospheric air. In accordance with this, urgent measures are required to correct the existing environmental situation at the enterprises of the industry.

The problem of eliminating waste accumulated as a result of the activities of the oil and gas complex enterprises is quite acute today, which is primarily associated with a significant increase in production volumes. The development of efficient recycling methods will make it possible to convert environmentally harmful compounds into valuable and safe products.

The aim of our research is to develop a comprehensive technology for the disposal of oil sludge, from researching the characteristics of oil sludge and the physico-chemical basis of the process to issuing practical recommendations for a feasibility study for the construction of a pilot plant for the utilization of oil sludge. The task was set to develop such a process, which, on the one hand, satisfies current trends in the creation of highly efficient, environmentally friendly technologies and, on the other hand, is cost-effective.

The results of studies to determine the physicochemical characteristics and component composition of oil sludge samples from the Bukhara oil refinery are shown in table 1.

Table 1. Physico-chemical characteristics and component composition of oil waste

Indicators	Oil waste	
	Oil sludge	Oil contaminated soil
Density, $кг/м^3$	1250	1660
Component composition, mass. %:		
Organic part	82	23
Water	10	1.5
Mineral part	8	75.5
Pour point, ºC	+40	+36

To study the separation process and to create a hydrocyclone apparatus for separating oil sludge in the field of centrifugal forces, we conducted experiments in two stages.

Stage 1 - the creation of a hydrocyclone for the separation of oil sludge after a centrifuge.

Stage 2 - the creation of a hydrocyclone, which in its characteristic and dividing ability completely replaced the centrifuge.

The calculation of the hydrocyclone for the required separation of oil sludge was reduced to determining the optimal diameter of its cylindrical part. The diameters of the nozzles are connected by certain ratios with the diameter of the hydrocyclone. During the experiment, the diameters of the nozzles are specified.

As experiments have shown, oil sludge contains on average up to 8% (mass) of solid phase. The experiments at the experimental plant are reduced to determining the influence of the particle size distribution of mechanical particles on the process of separation of oil sludge in order to determine the number of necessary stages of an industrial plant. [1]

The installation consists of a centrifugal pump 1 - for supplying oil sludge from the tank 10 to the injection mixer 4, pressure gauge 2 - for controlling the supply pressure, glass rotameter 3 - for controlling the flow of sludge, pipe 6 - for supplying the suspension to the hydrocyclone, hydrocyclone 7 - for separation suspension, funnel 8 with a filter baffle mounted on tank 9 for filtering the condensed suspension and sampling, tank 5 for collecting clarified hydrocarbons (Fig. 1).

A sample for laboratory analysis is taken from funnel 8.

Studies have been conducted to determine the influence of various factors on the process of separation of oil sludge in the field of centrifugal forces using the following method.

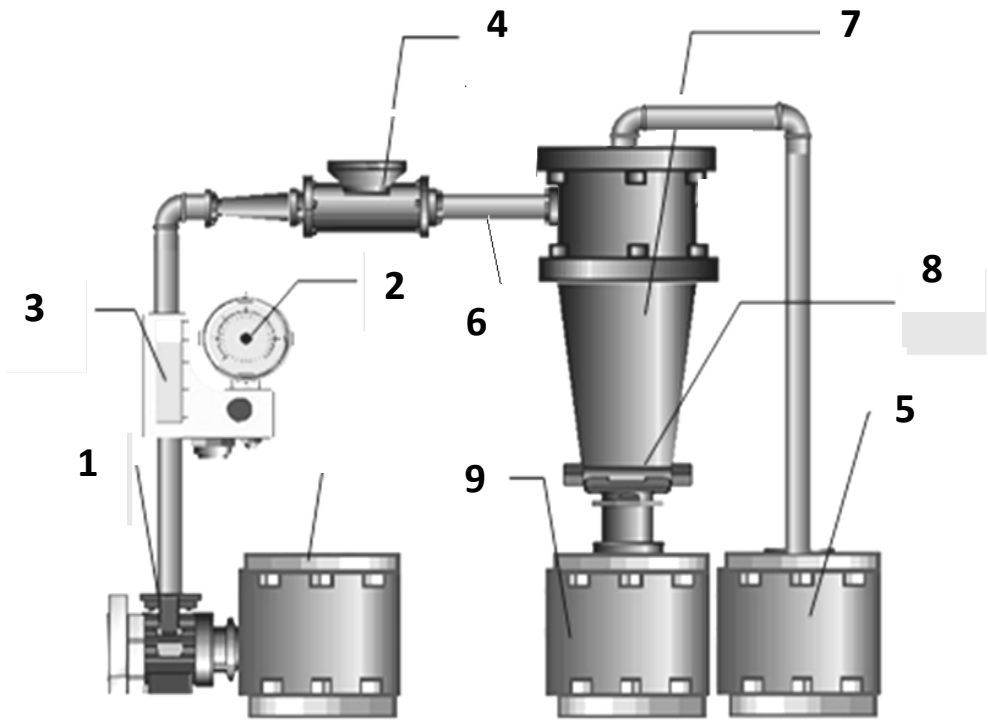
Oil slurry of a certain concentration was poured into the tank 10 and the centrifugal pump 1 was turned on. Its flow rate was controlled using a glass rotameter 3.

After separation in the hydrocyclone 7, solid mechanical impurities were filtered through a filter baffle installed in the funnel 8. The filtered liquid part was collected in a container 9, and clarified oil products through a drain pipe enter a tank 5.

After a certain time, a new portion of oil sludge was poured into the circulation tank. If necessary, appropriate adjustments were made to the research methodology.

After the establishment of a stationary mode of operation, simultaneous sampling was carried out from the drain, sand and initial flows. The samples were determined by the content of the solid phase and its particle size distribution.

Fig. 1. Laboratory installation for the study of the separation of oil sludge in the field of centrifugal forces.



The efficiency of the separation process was judged by the value of the maximum grain carried away by the discharge stream.

The solids content in the suspension sample was determined by the concentration of suspended solids by filtration through a dense paper filter. The granulometric composition of the solid particles remaining in the clarified liquid was controlled by microscopic analysis.

The efficiency of separation of oil sludge is largely determined by the scheme of interaction of technological flows, the real hydrodynamic situation in the apparatus. The design of the installation should ensure maximum productivity, promote the complete separation of oil sludge, obtain the target components of high quality, completely eliminate or minimize undesirable phenomena such as longitudinal mixing, caking of the material, bypassing, uneven flow rates over the cross section of the apparatus.

Currently, a large number of devices for separation of the suspension have been developed, which differ from each other in design and technological parameters. [2]

The analysis indicates their insufficient efficiency due to low productivity, high energy and metal consumption, and violations of the hydrodynamic conditions of the interaction of technological flows.

The development of a comprehensive technology for the utilization of oil sludge requires an investigation of the characteristics of the oil sludge and the physicochemical basis of the process and the issuance of practical recommendations for the feasibility study for the construction of a pilot industrial installation for the disposal of oil sludge. The task is to develop such a process, which, on the one hand, satisfies current trends in the creation of highly efficient, environmentally friendly technologies and, on the other hand, is cost-effective.

According to the results of tests of hydrocyclone apparatuses, it can be noted that when the apparatus operated on the separation of oil sludge in one hydrocyclone apparatus, it was not possible to obtain the maximum possible efficiency simultaneously by thickening the solid phase and clarified liquid. In this regard, experimental work was carried out in laboratory conditions to determine the effectiveness of various schemes for including hydrocyclones (Fig. 2).

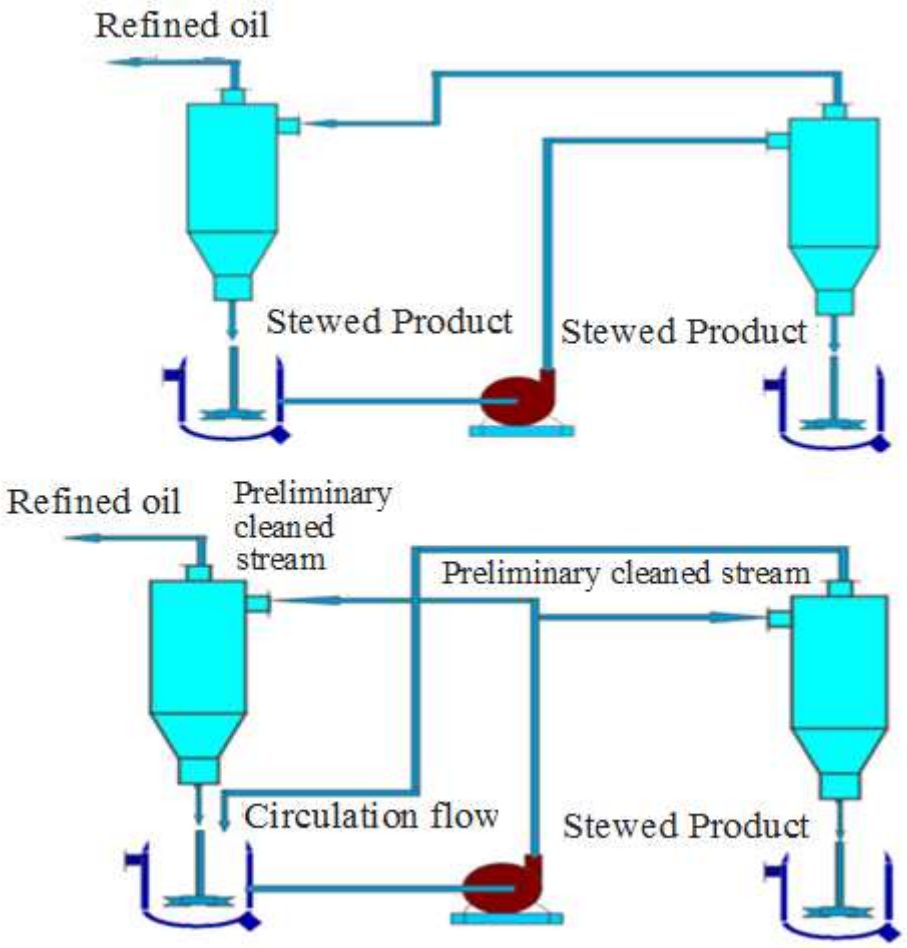


Fig. 2. Schemes of serial and parallel connection of hydrocyclones

It should be noted that these schemes have a common drawback - the appearance of circulating flows.

The proposed technological system allows you to work with all types of oil sludge containing, along with water and solid particles, both light hydrocarbons ("floating" oil sludge) and heavy hydrocarbons (bottom sediments). In addition to the disposal of sludge from sludge ponds, on the instructions of the Customer, the system can also be designed for the disposal of other types of oil-contaminated solid products, such as “oil-polluted” lands of emergency oil spills on relief and bottom slurry deposits of crude oil storage tanks.

LITERATURE

1. K. A. Dzhuraev, A. S. Aminova, S. A. Gaibullaev. The main methods of neutralization and utilization of oil waste // Young scientist. - 2014. - No. 10 (69). -WITH. 136-137.

2. K.K. Zhumaev, A. Yu. Shomurodov. Research and development of an integrated technology for the separation of oil sludge in the field of centrifugal forces // "Science and Education" scientific electronic journal 3rd edition 2020 June 149-155 pp

3. Zhumaev K.K., Rakhimov BB, Rustamov ES, Shomurodov A.Yu. Research on the separation of oil sludge in the field of centrifugal forces Young scientist. Monthly scientific journal. Kazan, 2013. No. 5. Part I pp. 60-62

4. Zhumaev KK, Makhmudova NS, Shomurodov A.Yu., Yakhyaev N. Sh. Mathematical model of the process of phase separation of oil sludge under the influence of centrifugal force. Mathematical model of the process of phase separation of oil sludge under the influence of centrifugal force Year 2020, volume: 10, issue 11, pp.539-544

5. Zhumaev Қ.K., Tursunov B.Zh., Shomurodov A., Mukhiddinov Zh.Zh. Neft shlaming atrof muҳitga taysiri Science and education February 2021 / Volume 2 Issue 2, pp 115-120

6. Zhumaev Қ.K., Tursunov B.Zh., Shomurodov A., Masudov M.M. Neft shlamlarini ambarlarda yiғilishining talili Science and education February 2021 / Volume 2 Issue 2, pp 181-185

7. Maxmudova N.S., Gaybullaev S.A., Zaripov M.X. Unconventional methods of utilization of sour gases. Proceedings of the International Conference "Innovations in oil and gas industry, modern energy and its problems" (May 26, 2020) Tashkent 2020. pp 717-719.

8. Synthesis of Styrene-Based Copolymers and Study of their Thermal and Thermo-Oxidative Stability. S.F.Fozilov., B.A.Mavlonov., Sh.A.Mavlonov., D.F.Asadova., A.F.Gaybullayeva. IJARSET International Journal of Advanced Research in Science, Engineering and Technology Vol. 7, Issue 9 , September 2020.pp 14897-14906

9. Khodjayeva N. S., Mamurova D. I., Nafisa A. IMPORTANCE IN PEDAGOGICAL TECHNIQUES AND EDUCATIONAL ACTIVITY //International Engineering Journal For Research & Development. – 2020. – Т. 5. – №. CONGRESS. – С. 5-5.

10. Aminov, A. S., Shukurov, A. R., & Mamurova, D. I. (2021). Problems Of Developing The Most Important Didactic Tool For Activating The Learning Process Of Students In The Educational Process. *International Journal of Progressive Sciences and Technologies*, *25*(1), 156-159.

11. Мамурова Д. И. и др. УЧЕБНАЯ ДЕЯТЕЛЬНОСТЬ СТУДЕНТОВ ПО РЕШЕНИЮ РАЗЛИЧНЫХ ДИДАКТИЧЕСКИХ ЗАДАЧ В РАЗВИТИИ ПРОСТРАНСТВЕННОГО ВООБРАЖЕНИЯ СТУДЕНТОВ //European science. – 2021. – №. 2 (58). – С. 29-31.

12. Djalolovich Y. N. et al. IMPROVING THE PROFESSIONAL TRAINING OF FINE ART TEACHERS //European science. – 2021. – №. 2 (58). – С. 44-46.

13. Мамурова Д. И., Мамурова Ф. И. Соотношения навыков черчения с опытом психологического исследования //Вестник по педагогике и психологии Южной Сибири. – 2015. – №. 1.

14. Мамурова Ф. И., Мамурова Д. И. КОМПЬЮТЕР ГРАФИКАСИ ФАНИНИ ЎҚИТИШ ҲОЛАТИ //TULAGANOV AA. – С. 145.

15. Mamurova, Dilfuza Islomovna. "The role of graphics programs in improving the learning process using information technology." *EFFLATOUNIA-Multidisciplinary Journal* 5.2 (2021).