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Liquid-Phase Separation Of Oil Sludges In The Field Of Centrifugal Forces Using A Deemulgator

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ABSTRACT

The process of separation of oil sludge, which is obtained after cleaning the oil refining units of the Bukhara oil refinery, is presented. Methods of obtaining petroleum liquid raffinate using several experimental laboratory installations for liquid-phase separation of oil sludge in a centrifugal force field with the use of a deemulgator "Disolvan-4411" and sawdust from the processing of old furniture of local raw materials are used. The composition and amount of heavy sediment and clarified oil products from oil sludge were obtained

KEYWORDS

Utilization, oil sludge, raffinate, centrifugal force, hydrocyclone, deemulgator.

INTRODUCTION

The oil sludge of the Bukhara Oil Refinery is a multiple emulsion. For oil emulsions, the most important indicator is their stability, i.e. the ability not to break down for a certain time and not to separate into two immiscible phases [1,2].

Currently, a promising direction of processing and utilization of the upper layer of the sludge accumulator of the Bukhara Oil Refinery or

emulsion oil slurries is their physical or physico-chemical treatment in order to extract the oil part and separate water and solid residues [3,4].

To date, the objects of research have been selected oil sludge from a number of local refineries, which differ in their technological origin, the accumulation period and the oil product part [5,6].

The purpose of our research is to develop a method for producing petroleum refined products using two experimental laboratory installations for liquid-phase separation of oil sludge in the field of centrifugal force using a demulsifier "Disolvan-4411" and sawdust from the processing of old furniture of local raw materials [7,8].

METHODS

The research was carried out on two experimental laboratory installations:

- 1) Laboratory installation for studying the separation of oil sludge in the field of centrifugal forces using the "Dissolvan-4411" demulsifier.
- 2) Laboratory installation for serial connection of hydrocyclones for liquid-phase separation of oil sludge in the field of centrifugal force.

Let's consider the methods of liquid-phase separation of oil sludge gradually:

- 1) Studies of the separation process and the creation of a hydrocyclone apparatus for separating oil sludge in the field of

centrifugal forces using the Dissolvan-4411 demulsifier were conducted in two stages.

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

Stage 2 – creation of a hydrocyclone for liquid-phase separation of oil sludge, which, by its characteristics and dividing capacity, completely replaced the operation of the centrifuge.

A pilot laboratory unit for liquid-phase separation of oil slurries in the field of centrifugal forces using the Dissolvan-4411 demulsifier has been installed at the Bukhara Institute of Engineering and Technology.

The resulting prototype is an oil raffinate, which contains an average of up to 8 % (mass) of the solid phase. Studies on a pilot laboratory installation of liquid-phase separation of oil sludge are reduced to the determination of liquid and solid phases [9,10].

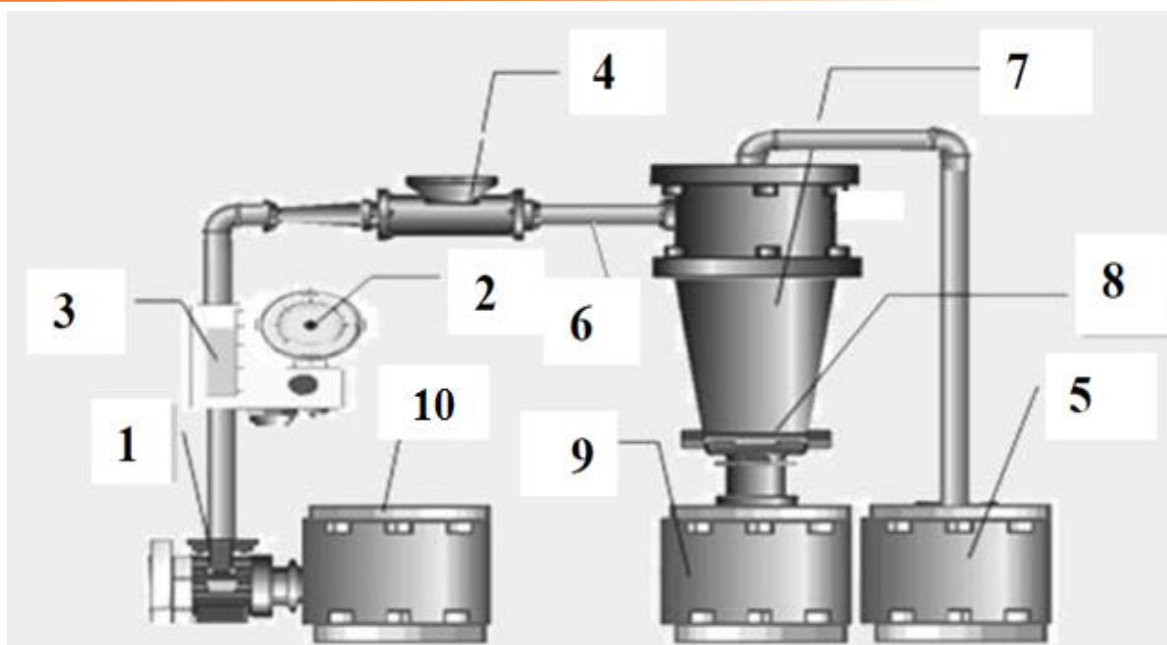


Fig. 1. Laboratory installation for studying the separation of oil sludge in the field of centrifugal forces using the "Dissolvan-4411" demulsifier.

The oil sludge in the amount of 100 kg for testing is sent to a laboratory liquid-phase separation unit. Let us consider the studies of liquid-phase separation of oil sludge in the field of centrifugal forces using the "Dissolvan-4411" demulsifier according to the following method. In the amount of 100 kg of oil sludge, which was obtained, was poured into a cylindrical container (storage) at the Bukhara Oil Refinery 10 and then, using a centrifugal pump 1, the raw materials are sent to the hydrocyclone 7. The flow of oil sludge was controlled using a glass rotameter 3. Through 4 mixer, the demulsifier "Disolvan-4411" is fed in an amount of 0.1% of the total mass of raw materials. Liquid-phase separation of oil sludge in a hydrocyclone 7 solid mechanical impurities at a certain speed, when the wall of the hydrocyclone was in contact, the process of destruction of the emulsion film was observed and then filtered through a filter partition installed in the funnel 8. Experimental samples for laboratory analysis

were taken from the funnel 8. The filtered liquid part was collected in a cylindrical container 9, and clarified petroleum products through the drain pipe entered the container 5. After about 2-3 hours of time, a new portion of oil sludge was poured into the circulation tank. If necessary, appropriate adjustments were made to the research methodology.

RESULTS AND DISCUSSION

After the laboratory installation of separation of oil sludge in the field of centrifugal forces using the "Dissolvan-4411" demulsifier, a heavy sediment and clarified products were obtained.

Heavy sediment is a mixture of resinous-asphaltene substances and solid mechanical impurities. In heavy precipitation, the amount of resinous-asphalt substances and solid mechanical impurities are shown in table No. 1.

Table №1

Indicators	Composition of heavy sediment	
	Resinous-asphalt substances	Solid mechanical impurities
Mass. raw materials, %	12	88

Clarified products are a mixture of light petroleum products. In the composition of clarified products, the amount of light petroleum products is shown in table No. 2. **Table №2**

Indicators	Composition of light petroleum products	
	Gasoline-kerosene fraction	Diesel fuel
Mass. raw materials, %	37	63

After the first experimental laboratory installation of liquid-phase separation of oil sludge in the field of centrifugal forces using the demulsifier "Disolvan-4411", it is then directed to the next experimental laboratory installation for serial connection of hydrocyclones.

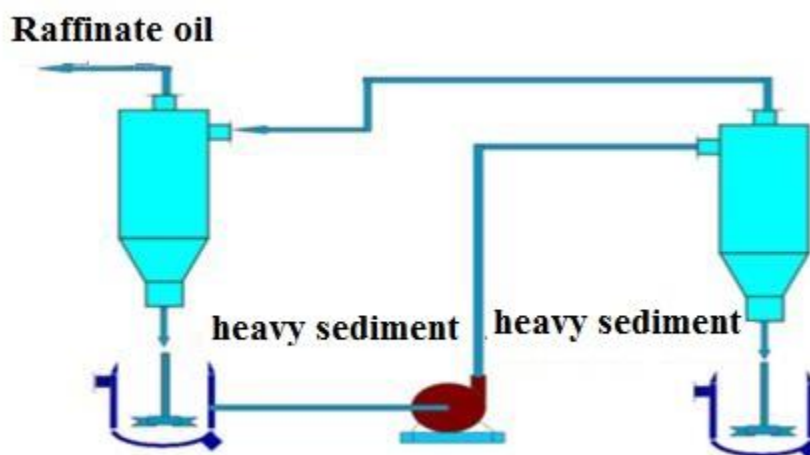


Fig. 2. Diagram of a laboratory installation for serial connection of hydrocyclones for liquid-phase separation of oil sludge in the field of centrifugal force.

A pilot laboratory installation for serial connection of hydrocyclones was installed at the production enterprise of Bukhara Prosper Invest LLC (Fig. 2). A heavy sediment was

obtained in the production enterprise of Bukhara Prosper Invest LLC, then sawdust was added for further separation of oil slurries into liquid and solid solution.

At the experimental laboratory installation of serial connection of hydrocyclones for liquid-phase separation of oil sludge, oil sludge was poured 6 times in a composition that contains sawdust in the place of the "Dissolvan-4411" demulsifier. The experiments were carried out for 3 days at the production enterprise of Bukhara Prosper Invest LLC.

According to the results of tests of hydrocyclone devices, it can be noted that the device worked on a liquid-phase separation of oil sludge in the field of centrifugal force in which an unconventional deemulgator was introduced, that is, "Sawdust" in approximately 0.01% of the total mass of raw materials. After many tests in a single hydrocyclone apparatus, it was not possible to

simultaneously obtain the maximum possible efficiency due to the thickening of the solid sediment and the clarified liquid.

After the laboratory installation of oil sludge separation in the field of centrifugal forces of sequential connection of hydrocyclones with the use of the Sawdust demulsifier, a heavy sediment was obtained.

Heavy sediment is a mixture of resinous-asphaltene substances and solid mechanical impurities. In heavy precipitation, the amount of resinous-asphalt substances and solid mechanical impurities are shown in table No. 3.

Table №3

Indicators	Composition of heavy sediment	
	Resinous-asphaltene substances	Solid mechanical impurities
Mass. raw materials, %	3	97

As can be seen in Table No. 3, the amount of resinous-asphaltene substances in the heavy sediment decreased by 3% from 12% due to the use of the Sawdust demulsifier. This demulsifier gave us the advantages of separating resinous-asphaltene substances from heavy sediment.

CONCLUSION

1. Samples were obtained after the first laboratory installation of liquid-phase separation of oil sludge in the field of centrifugal forces using the Dissolvan-4411 demulsifier at the Bukhara Institute of Engineering and Technology. The obtained

samples will also be sent for spectral analysis.

2. Samples were obtained after the second laboratory installation of liquid-phase separation of oil sludge in the field of centrifugal forces from the serial connection of hydrocyclones using the Sawdust demulsifier at the production enterprise of Bukhara Prosper Invest LLC. The obtained samples will also be sent for spectral analysis.
3. From the above-mentioned studies, which were carried out on two experimental laboratory installations for liquid-phase separation of oil slurries in the field of centrifugal force using demulsifiers,

petroleum raffinate was obtained, which can be used to obtain light fractions.

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