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THE DIRECTIONS FOR RATIONAL USE OF RESIDUAL PRODUCT OF THE PROCESS «UNICRACKING»

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Introduction. *The possibility of obtaining white oils from petroleum raw materials is considered. The properties of the residual product of the hydrocracking process purified with activated clay are studied. The possibility of using the adsorption method of purification in the production of white oils is shown.*

The residual product of the hydrocracking process of vacuum gasoil obtained by the "Unicracking" technology is a complex mixture of high-boiling compounds, consisting mainly of paraffinic and naphthenic hydrocarbons with ultra-low sulfur content. This product can be used not only as a component of low-sulfur fuel oil, but also as a raw material for the production of lower olefins [1], which are the raw material base of the modern petrochemical industry; obtaining base oils corresponding to group III according to API classification [2]; and greases [3].

One of the perspective areas of complex processing for refining residual product of the process "Untracking" is the production of white oils. These oils can be used both for technical purposes and in medicine, pharmacology and cosmetology. The most important indicators of the white oils quality, in addition to kinematic viscosity, density and flash point, are: pour point, color and content of aromatic hydrocarbons. White oils should be a colorless oily, transparant, non-fluorescent, odorless and tasteless liquid.

To prepare white oils, the residual product of the "Unicracking" process must be dewaxed and thoroughly cleaned. The traditional method of producing white oils is sulfuric acid purification of oil fractions. But this method is not effective for the purification of the studied raw materials. White oils can be obtained by deep hydrogenation of the residual product of the hydrocracking process [4]. However, the implementation of this technology requires large investments.

One of the most effective and relatively simple ways to obtain white oils from the residual product of the hydrocracking process is the adsorption purification method.

One of the most important technical indicators for white oil is the percentage distribution of hydrocarbons. Special requirements are imposed on the content of aromatic hydrocarbons, since they are toxic. Technical white oils should contain aromatic hydrocarbon less than 7% of the total mass, and medical white oils should contain less than 0.1%. Another important indicator is color in accordance with ASTM D 1500. For both technical and medical white oils, this indicator, as determined by ASTM D 1500, should be less than 0.5 [5].

To achieve these indicators by adsorption cleaning of the residual product of the vacuum gas oil hydrocracking process, it is necessary to select an effective adsorbent. In industry, bleaching clays are used as adsorbents. Adsorption cleaning can significantly improve the color and storage stability of oils and fats. Different classes of bleaching clays are used for cleaning.

The first group forms a class of highly active, mainly based on montmorillonite, selected HPBE clays (high performance bleaching earth). This group includes, in particular, acid-activated montmorillonites, and acid activation is carried out in an expensive way: by dealumination of unburned clays with concentrated acids at high temperatures. Using this method, the selected clays are obtained with a very high specific surface area and a large pore volume. The disadvantage of these highly active bleaching clays is that due to acid dealumination, large amount of acidic, salt-rich wastewater accumulates during production, which can only be treated or disposed of using expensive processes.

Another group forms a class of naturally active clays. These natural bleaching clays have been used for cleaning fats and oils for hundreds of years. These naturally active systems (also known as floridine or fuller's earth) can be obtained at a very low cost. However, they have very little bleaching ability, so most of them are not suitable for cleaning difficultly bleached oils and fats.

The trade-off between low production costs and acceptable activity is represented by the third class of bleaching clays, the so-called surface-activated SMBE systems (surface modified bleaching earth; surface-activated bleaching clays). Here, small amounts of acid are introduced into the naturally active unburned clay and this achieves "in situ" activation. For this method, unburned clays containing attapulgite and hormite are used. They have a very high specific surface area for natural unburned clays: from about 100 to 180 m^2/g, and the pore volume from about 0.2 to 0.35 ml/g. Since the salts formed during acid activation, or the unreacted

portion of the acids are not washed out, they remain on the product and at least partially also precipitate in the pores. Because of this, acid-activated bleaching clays usually do not achieve the same efficiency as is achieved with highly active bleaching clays (HPBE) obtained by acid dealumination. However, the simple production method allows for relatively economical production, since acidic wastewater does not accumulate. [6].

Studies have shown that the adsorption purification of the residual product of the hydrocracking process using active clay can produce white oil. The properties of the purified product are shown in the table.

Table. – The properties of the purified product

Parameter	Value
Kinematic viscosity at 40°C, mm^2/sec	40,82
Kinematic viscosity at 100°C, mm^2/sec c	6,88
Viscosity index	127
Refractive index at 50°C	1,4558
Refractive index at 20°C	1,4661
Colour, units (ASTM D 1500)	0
Density at 20°C, kg/m^3	842,0
Acid value, mg KOH/gr.	0,0014
Group composition, % by weight.:	
– paraffin-naphthenic hydrocarbons	99,72
– 1 group of aromatic hydrocarbons	0,27
– 2 group of aromatic hydrocarbons	0
– group of aromatic hydrocarbons	0
– group of aromatic hydrocarbons	0
– resins	0,01

Based on the quality indicators of the resulting product, we can conclude that this oil is suitable for technical needs. During the adsorption process on activated clay, the adsorbent is tarred and it changes its color from white to coal-black. In this regard, there is a need for further purification and regeneration of the adsorbent [7].

Conclusion. One of the promising and relatively simple ways to obtain technical white oils is the adsorption purification of the residual product of the vacuum gas oil hydrocracking process using active clays. The resulting product can be used as technical white oils.

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