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RECEIVING OIL COKE ON THE BASIS OF HEAVY RESIDUAL OIL FROM THE CHEMICAL WORKS "POLYMIR" (OJSC "NAFTAN")

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Heavy residual oil (HRO) as a by-product of hydrocarbon pyrolysis, is a mixture of various groups of hydrocarbons, mainly aromatic, with a boiling point above 160^{0}C. At present this product does not find rational use. It is used as boiler fuel. This article presents the results of a study on the possible use of HRO as a raw material for the production of petroleum coke.

The creation of a raw material base for the production of electrodes is one of the current directions in the industry, as coke with a sulphur content of up to 1% is used in the production of graphitized electrodes, purchased by import [1,2].

Needle coke is used to produce high quality graphite electrodes. Electrodes should have high mechanical strength, electrical conductivity, low sulphur content and low thermal expansion coefficient (TEC) [3].

This study assesses the suitability of use of heavy residual oil from the Polymir plant of OJSC Naftan to produce petroleum coke and petroleum pitch.

The heavy residual oil from "Polymir" plant of OJSC "Naftan" has been studied taking into account several points connected with the suitability of raw materials use for oil coke production. The main quality markers of raw materials for oil coke production are the composition and molecular structure of all its components. The composition of raw materials and the molecular structure of its components depend on the reactivity of raw material, quantitative and qualitative indices of the coking process and the main operational properties of the obtained coke.

The chemical composition of raw materials is determined by simple methods of chemical analysis. However, data on molecular structure are still extremely insufficient. But data on the structure of high-molecular oil compounds which are available at this moment in some cases can be considered orientative when solving certain scientific and practical problems [4].

A very important characteristics in the analysis of coking feedstocks is the amount of carbon residue. Conradson method is usually used and feedstock is heated in a standard gas-heated instrument [5]. Toluene insoluble substances/a-fraction asphaltenes are determined by the Marcusson method. Also, the pitch of the pyrolysis resin was extracted with a mixture of aliphatic and aromatic solvents to study its suitability for coking feed.

Initially, a heavy pyrolysis resin was dispersed in Engler. Essence of method lies in separation of oil product into its component fractions due to their different final boiling points. The results obtained show that about 1-1.5% hydrocarbons contained in the HRO boil at temperatures up to 180 ° C. The largest amount of hydrocarbons boil in the range 180-210 ° C (the so-called "blue-green oil"). Fractions boiling in the ranges 210-220 ° C, 210-230 ° C, 210-240 ° C make up 15%.

Thus, at the fractional distillation of HRO about 50% is the solid vat residue (pitch).

The next step was to determine toluene insoluble substances/a-fraction. The method is based on different solubility of pitch components and consists in treatment of weighed sample with toluene followed by weighing of filtered and dried undissolved residue. Three pitch weighed samples were taken for analysis with boiling temperature intervals of 220 - end of boiling, 230 -end of boiling, 240 - end of boiling.

The results showed that the content of substances insoluble in toluene in the tested samples is minimal and makes up 0.2% wt. For each fraction tested. Thus, the raw material is suitable for producing petroleum coke, including needle coke, as according to the current standards, the content of α-fraction should not be more than 8-11 wt%.

The pakes were extracted with a mixture of solvents. Essence of method is in extraction of pitch with mixture of aliphatic and aromatic solvents for subsequent coking of extract. Mixture of nefras and solvent with end boiling point in the range 130-185 °C was used as mixture of aliphatic and aromatic solvents. The ratio of mixture of nefras and solvent and resin residue was 2:1 - 3:1 by weight.

During the study, it was found that with the increase of the solvent content in the solvent mixture and with the increase of the extraction time, the amount of insoluble residue also increased, so that the quality of the resulting coke would decrease.

As the extraction temperature increases, the yield of the insoluble residue also increases, which will adversely affect the yield of the possible coke produced.

The isolation of asphaltenes by Marcuson method showed that the weight of asphaltenes was 1.5 g or 15% by weight for the 220-fbp fraction, 17% for the 230-fbp fraction and 20% for 240-fbp fraction..

The obtained data are consistent with the norms for asphaltenes content in the raw material for production of needle coke.

The presented results of the study suggest that heavy pyrolysis resin can be used as raw material for production of petroleum coke for electrode industry.

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