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RECEPTION OF ECOLOGICALLY CLEAN DIESEL FUEL BY THE OZONOLYSIS METHOD OF MIDDLE-DISTILLATE OIL FRACTIONS

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The diesel fractions of the «Zhanazhol» deposit oil and commercial diesel fuels have been chosen as the object of researching. Physical and chemical characteristics of the researching object are defined: density at 20°C – 798,6 kg/m³, Iodic number – 28,88, S – 0,1002 %, (°C) T_{filter} – (–36,1), T_{turbid} – (–31,0), T_{freez} – (–42,2), Fractional composition: (°C) 10% – 147, 50% – 217, 90% – 275. The cetane index (by formula) – 51,7, the cetane index (by nogram) – 51,5.

Thiophene compounds and polycyclic aromatic structures in their composition demanding a high pressure and the hydrogen pressure hinder to effective process of such diesel fractions hydroforming.

In our opinion, in connection with above mentioned, there is actual searching of alternative ways of simplification and optimization of the given kind of raw materials reprocessing, i. e. ways which largely would allow to cut expenses on them ennoblement, by way of the specified components (sulphurous compounds, olefins, polycyclic aromatic hydrocarbons) transfer in other classes compounds which can be valuable products for the further reprocessing. Preliminary ozonizing of raw materials can be one of such methods.

The temperature and ozone specific expense influence to physical and chemical characteristics of diesel fuels are defined.

Generalization of the received data on physical and chemical characteristics was spent in comparison with the data on direct hydrogenation and ozonolysis of diesel fractions. With increase of an ozone-air mixture rate the cetane number raises: 51,9 < 52,6 < 54,5 < 54,6 < 54,8 < 54,9 < 55,01 < 55,02 < 55,05. Conversely, in the process of ozonizing the density decrease is observed: 0,803 > 0,801 > 0,800 > 0,799 > 0,798 > 0,797. Iodic number, accordingly, in initial diesel fuel – 28,8, after hydrogenation – 28,0, and after ozonizing has considerably decreased – 26,4 (0,125 l/min, 30 min) > 22,0 (0,5 l/min, 60 min) > 26,4 (0; 1,24 l/min, 30 min). The improvement of diesel fuel fraction composition is observed in connection with alteration of cetane number. At ozonizing initial temperature of boiling of all diesel fractions has in-

creased, °C: 147 < 160 < 167 < 169 < 171 < 174 < 179, and the density, on the contrary, decreases: 0,803 > 0,801 > 0,800 > 0,799 > 0,798 > 0,797. Iodic number decreased after ozonizing – 21,2.

As the results of researching show, the content of sulphur decreases from 0,1 to 0,04 weight. % at realization of ozonizing process in optimum conditions (0,125 l/min, 60 min) on Ni-Re catalyst.

Further the cycle of experimental researches on an establishment of ozonizing process parameters influence on change of diesel fuels functional groups is spent. Initial composition of once-run diesel fraction and commercial diesel fuels taken by the object of research have defined by the method of infrared spectroscopy. The IR-spectrum of once-run fraction from a «Zhanazhol» deposit is determined in the following absorption areas: 3000–2800 cm^{–1} interval (alkanes), 1460,29 cm^{–1} interval (arenes), 1377,63 cm^{–1} (methylbenzenes), 722,55 cm^{–1} (cis-dienes). The IR-spectrum of commercial diesel fraction is determined in the following absorption areas: 3000–2800 cm^{–1} interval (alkanes), 1377,41 cm^{–1} (methylbenzenes), 812,63 cm^{–1} (alkylchlorides), 722,48 cm^{–1} (cis-dienes), 699 cm^{–1} (alkylbromides), 740,98 cm^{–1} (cis-dienes). Analyzing composition of synthetic diesel fuel we have found out that hydrocarbons of normal structure which nuclear number is equal C₁₄–C₁₅ and C₁₂–C₁₃ is included into its composition together with C₁₀–C₂₄ hydrocarbons.

Thus, the conducted researches have shown possibility of preliminary transformation of the once-run diesel fraction basic components in compounds of other classes under the effect of ozone that will exert positive influence on the process of diesel fuels hydroforming.

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THE «KENDERLYK» DEPOSIT SLATE OXIDATION BY THE NITRIC ACID AND THE AIR OXYGEN

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The present work is devoted to oxidation (by the air and the nitric acid) of combustible slates of the «Kenderlyk» deposit which are notable for big ash content (up to 75%). The enriched slate with organic mass (SOM) on the order of 53–55% was used for oxidation.