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NEW CATALYSTS OF «SYNTHETIC OIL» AND ITS DISTILLATES ENNOBLEMENT

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The process of coal distillates hydrotreatment on Mo–Hu/Ni–Re and So–Hu/Ni–Re catalysts has been studied in the given work. As research results show the maximum exit of liquid products - 51,0–56,0 mass.% is observed on the 5% Mo–Hu, 7% Co–Hu/Ni–Re catalysts. Besides, there is an increase in a portion of gasoline fraction in a liquid product up to 29,5% on the 5% Mo–Hu/Ni–Re catalyst, and up to 21,7 mass.% on the 7% So–Hu/Ni–Re. The exit of liquid products increases up to 60,8 mass.% and exit of gasoline fraction increases up to 32,8 mass.% at simultaneous depositing of these catalysts. The content of paraffin hydrocarbons has decreased from 35,8 to 28,3%. The quantity of isoparaffin hydrocarbons in the synthetic oil hydrogenized on deposited 5%Mo-Humate Ni-Re has increased up to 36,2%. To all appearance, during the hydrogenation there is a process of isomerizating. The olefinic, cyclo-olefinic and diene hydrocarbons are present also at the hydrotreated benzine.

Keywords: coal, hydrotreating, catalyst, coal distillate, gasoline fraction

Along with a continual growth in production of oil and gas all over the world, an intersst towards coal, as an alternative source of motor fuels, oil-chemical material and chemical substances arises. Therefore, one of the important directions in modern biochemistry is the development of industrial means to receive practically important oil-chemical, chenmical products from natural organic materials that allow us to avoid usage of ecologically-dangerous substances.

A development of new technologies of processing solid fuel in order to receive fluids, and also a selection of new types of catalysts that posses a high activity and selectivity level and work in mild conditions is a significant problem of modern days [1].

During the recent years, in accordance to the European standards, the following requirements are placed towards motor fuels: benzol content must not exceed 1% of mass, sulphur – 0,05% of mass, olefines – 20% of mass, polycyclic aromatic hydrocarbonss – 11% of mass. The composition of coal distillate preserves unstable nitrogen, oxigen-full compounds, ans also desaturated hydrocarbons that are able to polymerize, so a selection of new types of catalyst, on which processes of hydic cleaning (hydroprocessing) in mild conditions can take place, becomes urgent.

Bibliographic data [2-3] on hydrocleaning and hydrocracking of coal distillates state that that world practice uses sulphured catalysts that are based on Mo–Co–Ni–W, placed on Al_2O_3, SiO_2 and other carriers.

Catalysts with pore radius of more than 100 nm are more active and stable in ennoblement of hydrocarbon materials.

Based on a rich experience of work with skeleton catalysts, we have suggested to use them in hydric cleaning of hydrocarbon materials. Modified skeleton catalysts, based on alloys of Ni-Al are widely used on enterprises of chemical and oil-processing industry.

This work presents the results of studying process of hydroprocessing coal distillates on Mo, Co–Fy/Ni–Re catalysts. The process of hydration and hydro-cleaning of «synthetic oil-1» that is received after liquefaction of coal on placed Mo–Humate and Co-Humate/Ni–Re catalysts was carried out in the catalyst «duck». The results are provided in Table 1.

Table 1

Hydration of «synthetic oil-1» on Mo–Hu and Co–Nu/Ni–Re catalyst
(T = 293 K, mkat = 1г, P_{H2} – atmosphere)

Output of fluids, mass,%					Remains, mass,%	Losses, mass,%
Catalyst	under 453K	453–523K	523–593K	∑		
Ni-Re	20	17,7	2,9	40,6	53,0	6,4
3% Mo–Hu/Ni–Re	17,5	10,0	17,0	44,5	46,1	9,4
5% Mo–Huy/Ni–Re	29,5	10,2	11,3	51,0	45,7	3,3
7% Mo–Hu/Ni–Re	25,1	10,7	14,3	50,1	45,0	4,9
3% Co–Hu/Ni–Re	16,3	7,2	21,0	44.5	46,1	
5% Co–Hu/Ni–Re	18,8	12,3	12,2	43,3	48,0	8,7
7% Co–Hu/Ni–Re	21,7	12,6	21,7	56,0	37,3	6,7
5%Mo–Hu + 7%Co-Hu/Ni–Re	32,8	13,8	14,2	60,8	34,2	5,0