STUDY OF THE THERMAL CONVERSION OF HEAVY PARAFFINIC OIL IN THE PRESENCE OF AN ADDITIVE BASED ON FERROSPHERES OF ENERGY ASHES

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Stocks of light and medium oil are rapidly declining, and now some oil refineries are faced with the need for heavy oil refining processes.

Resins and asphaltenes are high molecular weight components of heavy hydrocarbon feedstocks, they play an important role, largely determining its physicochemical properties.

Purpose of the research: Investigation of the thermal conversion of heavy paraffin oil in the presence of an additive based on ferrospheres (FS) of energy ashes.

Object of study: Fuel oil of heavy paraffinic oil from the Zuunbayan field (Mongolia) with a high resin content and solid paraffins.

As additives, we used magnetic fractions of ferrospheres, mainly consisting of magnetite. We chose the ferrospheres because they contain iron oxides, which can act as initiating or catalytic additives depending on the conditions [1]. In addition, ferrospheres are affordable and cheap raw materials, which are significantly cheaper than most heterogeneous catalytic systems. Also, the use of ferrospheres allows to partially solve the problem of utilization of ashes of thermal power plants.

Thermolysis was carried out in a tube furnace at a temperature of 450 °C for 2 hours.

The material composition was determined to obtain ideas about the transformations of fuel oil components during thermolysis (Fig. 1).

In the process of thermolysis of fuel oil with the addition of ferrospheres, the yield of tar in products decreases by more than 2 times in comparison with thermolysis products without ferrospheres and by almost 3.5 times in comparison with the initial fuel oil. The addition of ferrospheres allows one and a half times to reduce the yield of asphaltenes and increase the yield of oils by 6 % wt.

Figure 2 shows the fractional composition of thermolysis products in terms of the feedstock. In the resulting products, the yield of gasoline fractions is 6.4 % wt. and 2.7 % wt., diesel – 21.6 % wt. and 24.2 % wt. for thermolysis products obtained without FS and in the presence of FS, respectively.

The introduction of FS does not significantly affect the overall yield of fuel fractions, but in this case, the content of tar-asphaltene components in the thermolysis products decreases and the total yield of hydrocarbon components increases from 73.4 to 80.1 % wt. (see oil output in Fig. 1). The proportion of hydrocarbon components increases due to fractions with a boiling point of more than 360 °C.

Changes in the material composition have a positive effect on such consumer qualities of the products [2] as viscosity, because the presence of resinous asphaltene components and hard paraffins affect these indicators.

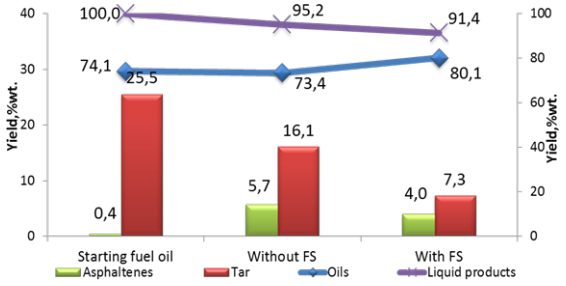

Fig. 1. *The material composition of thermolysis products*

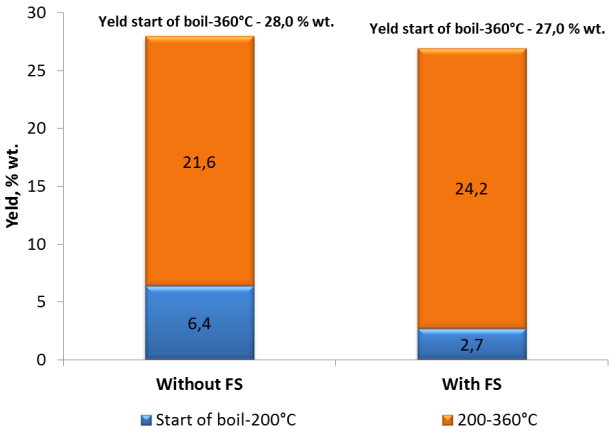

Fig. 2. *Fractional composition of thermolysis products*

References

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