

FEASIBILITY EVALUATION OF ADDING VEGETABLE OIL TO STRAIGHT-RUN DIESEL FRACTION DURING ZEOFORMING

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Currently, there is a need to search for alternative fuel sources, which is due to the tightening of environmental requirements for commercial oil products, in particular for low-freezing diesel fuels (DF) [1, 2].

The processing of straight-run DF with the involvement of vegetable oil, as an environmentally friendly component, on a zeolite catalyst can be an effective solution for obtaining more environmentally friendly, low-freezing DF.

The purpose of this work is to study the feasibility of adding vegetable oil as a blend component for DF during processing on a zeolite catalyst.

The process of DF and 10 % vol. sunflower oil co-processing was carried out on a laboratory catalytic unit “CATACON” with the following technological parameters: process temperature 375 °C, pressure 0.35 MPa, feedstock consumption 0.5 ml/min.

To study the feasibility of adding sunflower oil to DF, low-temperature characteristics (cloud point, cold filter plugging point (CFPP), pour point) were determined, as well as the group composition of the processed products of pure DF, as well as DF and 10 % vol. sunflower oil blend.

It should be noted that previously, to stabilize the resulting processed products, a light fraction was removed from them (boiling point up to 150 °C). All characteristics have been assessed for stable products.

The results of determining the low-temperature characteristics showed that both processed products do not become cloudy and do not freeze at temperatures below –70 °C. The CFPP of the DF processing product practically does not change when sunflower oil is added as a blend component to the processed

feedstock. The CFPP for the processed product of pure DF was –47 °C, and for the blend product processing –46 °C. According to the results of CFPP determination, both products conform the requirements for the DF grade Arctic [3].

At Figure 1 presents the results of the group composition determining of the products obtained during processing on a zeolite catalyst.

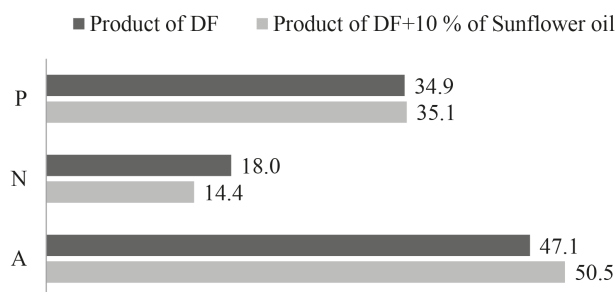


Fig. 1. Group composition of products (%wt.)

A – aromatic hydrocarbons, N – naphthenic hydrocarbons, P – paraffinic hydrocarbons

It can be seen from the obtained results that with the co-processing of DF and sunflower oil in the resulting product, the aromatic hydrocarbons content increases, the content of naphthenic hydrocarbons decreases, and the paraffinic hydrocarbons content practically does not change.

Thus, it can be concluded that the co-processing of straight-run DF and vegetable oil on a zeolite catalyst is expedient, since the resulting product conform the requirements for CFPP for the DF grade Arctic, and the oil involvement will increase the fuel production with improved environmental characteristics.

References

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