VEGETABLE OILS, PROMISING FEEDSTOCK OF THE HYDRO-REFINING PROCESS

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The world economy is significantly dependent on oil production, as a huge amount of goods consumed by people are produced from petrochemicals. But oil is a non-renewable resource and with the same volume of production, according to scientists, it will end in 35 years [1]. Many scientists believe that oil can be replaced with hydrogen or fusion energy, but the development of these technologies is too slow. Based on this, the demand for alternative and at the same time renewable energy sources has sharply increased in order to partially or completely fill the shortage of oil.

This work is devoted to the study of the properties of various vegetable oils with a view to their further use as feedstock for the process of hydro-refining, and the production of so-called "Green" hydrocarbons.

Four types of oils were studied in the work. The choice of sunflower and corn oil is due to their greatest distribution on the territory of the Russian Federation, the choice of rapeseed oil is due to the existence of previously carried out work on its use as a feedstock to produce hydrocarbons. The choice of grape seed oil is due to the rapid development of the wine industry in the Russian Federation, caused by the geopolitical situation and the need for import substitution. To select the optimal vegetable oil, the characteristics presented in Tables 1 and 2 were determined.

From the results presented in Tables 1 and 2, sunflower oil has the lowest dynamic and kinematic viscosity at 15 °C and 20 °C, that is, under normal conditions. At 40 °C, the density and viscosity values for all oils differ slightly.

For processing, it is economically advantageous to use vegetable oil with the lowest viscosity and density, since it is most advantageous to pump it, however, in the case of a slight heating of the oil, there will be no significant difference, which indicates the prospects of processing all the oils considered in order to obtain "Green" hydrocarbons.

Table 1. Results of determination of vegetable oil density (gm/cm^3)

Property		Oil			
		Rapeseed	Maize	Sunflower	Grape
Density	15 °C	0.920	0.919	0.921	0.921
	20 °C	0.917	0.916	0.917	0.918
	40 °C	0.904	0.905	0.905	0.905

Table 2. Results of determination of vegetable oil viscosity (kinematic – mm^2/s, dynamic – mPa/s)

Viscosity		Oil			
		Rapeseed	Maize	Sunflower	Grape
Dynamic	15 °C	82.337	83.874	76.521	83.390
	20 °C	64.770	66.397	63.687	65.826
	40 °C	29.784	30.590	30.230	30.925
Kinematic	15 °C	89.482	91.252	83.126	90.517
	20 °C	70.616	72.476	69.457	71.690
	40 °C	32.946	33.816	33.420	34.156

References

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INVESTIGATION THE EFFECT OF HETEROATOMIC COMPOUNDS IN DIESEL FUEL ON THE EFFECTIVENESS OF DEPRESSORS

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The fluidity of diesel fuel (DF) at negative temperatures is determined by low-temperature characteristics, such as: cloud point (Cp), cold filter plugging point (CFPP) and pour point (Pp). The using of winter and arctic grades of diesel fuel (CFPP not higher than –25 and –45 °C, respectively) makes it possible to ensure stable and uninterrupted operation of equipment in extreme conditions. Depressant additives (depressors, DA) are introduced into DF to achieve the best low-temperature characteristics. The use of depressors prevents the enlargement and association of n-paraffin crystals that are part of the fuels. The improvement of low-temperature properties occurs due to the adsorption of additives on n-paraffin crystals or their co-crystallization.

From the literature data, it`s known that the quality and various properties, including low-temperature ones, of petroleum fuels are also determined by the content of heteroatomic compounds in their composition [1]. The effect of heteroatomic compounds on the low-temperature properties of fuels has been poorly studied, so this topic is of great interest.

The aim of this work is to evaluate the effect of a depressor additive on the low-temperature properties of a DF sample for further work on the study of the effect of heteroatomic compounds on the effectiveness of depressor additives. The object of the study is a commercial DF and two different depressors.

The low-temperature properties presented above: Cp, CFPP, Pp of the DF sample under study were determined in accordance with the requirements [2]. Then two depressor additives were introduced and the characteristics of the resulting blends were determined in a similar way. The obtained results are presented in the Table.

Based on the Table, it can be seen that the studied DT sample meet to the Arctic DF brand.

Table 1. Low-temperature properties of the DF sample and it`s blends with additives

Sample	Cp, °C	CFPP, °C	Pp, °C
DF	–35	–45	–46
DF + DA1	–37	–45	–54
DF + DA2	–37	–45	–54

The addition of both additives to DF sample had a significant positive effect on Pp (Pp decreased by 9 °C).

The introduction of additives into the fuel sample under study had practically no effect on the CFPP. The effectiveness of depressor additives, i.e. the susceptibility of DF to them, is determined by the composition of the sample itself. For the study, a commercial DF was used, which may already contain various impurities and additives in its composition, because of which the additional introduction of a depressor didn`t have the expected effect.

Thus, it has been experimentally established that depressor additives from different manufacturers have the same effect on the low-temperature properties of the DF sample under study. It can be concluded that the introduction of the studied depressor additives has a positive effect only on the Cp and Pp of the DF sample.