References

1. *Fatahian R., Noori M., Khajavi R. Exrtaction of sericin from degumming process of silk fibres and its application on nonwoven fabrics // International Journal of Advanced Chemistry. – April. – 2017. – 5 (1) : 25. – DOI:10.14419/ijac.v5i1.7416https://www.researchgate.net/publication/315943062_Exrtaction_of_sericin_from_degumming_process_of_silk_fibres_and_its_application_on_nonwoven_fabrics.*
2. *Haggag K., El-Sayed H., Allam O.G. Degumming of SilkUsing Microwave-Assisted Treatments // Journal of Natural Fibers. – December. – 2007. – 4 (3) : 1–22. – DOI:10.1300/J395v04n03_01 https://www.researchgate.net/publication/254369913_Degumming_of_Silk_Using_Microwave-Assisted_Treatments.*

THE EFFECT OF SULFUR CONTENT ON THE EFFECTIVENESS OF DEPRESSANT ADDITIVES

S. I. Bartuli, M. I. Eliseeva, Y. P. Morozova
Scientific supervisor – expert Y. P. Morozova
Language advisor – expert Y. P. Morozova

National research Tomsk Polytechnic university
634050, Russia, Tomsk, 30 Lenin Avenue
m.eliseeva@gmail.com

Diesel fuel (DF) is one of the most common products of the oil industry. The main consumers of DF are railway, freight, water and motor transport, as well as military and agricultural equipment. In accordance with [1], there are summer (S), interseasonal (E), winter (W) and arctic (A) brands of DF, the characteristics of which vary depending on the climatic conditions of the regions of Russia.

The use of depressant additives is the simplest and least expensive way to reduce the cold filter plugging point (CFPP) of DF, as well as to bring this property to the values required in [1].

The effectiveness of depressant additives is related to the hydrocarbons contained in the fuel, in particular, heterogeneous sulfur compounds. The sulfur content in the fuel varies, but is strictly standardized and, according to [1], should not exceed 2000 mg/kg. Therefore, it is necessary to analyze how the effectiveness of the additive will change with different sulfur content in the DF sample.

Two samples were used in the work – DF1 and DF2 and 5 different depressant additives (D1, D2, D3, D4, D5). During the study, 10 mixtures of DF with additives were prepared.

At the first stage of the work, such properties of DF as sulfur content and CFPP were determined. The obtained data are presented in Tables 1 and 2.

According to the data presented in Table 1, it is clear that DF2 sample corresponds to all brands of DF, and DF1 sample does not correspond to any of the brands.

According to the data presented in Table 2, it is clear that both samples of DF according to CFPP correspond only to grade S.

Then depressant additives were added to the DF samples and the CFPP values were determined similarly. The obtained data are presented in Table 3.

Based on Table 3, it can be seen that after adding D5 to DF1; D4 and D5 to DF2, the samples began to correspond to grade E. After adding the remaining additives, DF grade began to correspond to grade W.

Changes in the CFPP of mixtures of DF samples with additives relative to DF samples without additives are presented in Figure.

Based on Figure, it can be seen that the D3 additive had the greatest effect on DF1, and the D2 additive had the greatest effect on the DF2 sample. It is also worth noting that the average change in

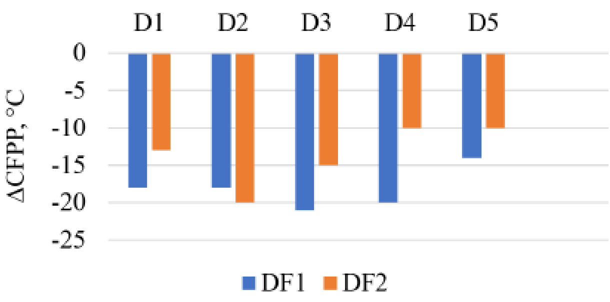

Fig. 1. *Change in CFPP of DF samples with additives*

Table 1. Sulfur content in the studied DF samples

Sample	Sulfur content, mg/kg
DF1	2935
DF2	19

Table 2. CFPP of the studied samples of DF

Sample	DF1	DF2
CFPP, °C	–9	–13

Table 3. CFPP of mixtures of DF samples with additives

Additive	D1	D2	D3	D4	D5
Sample	DF1				
CFPP, °C	–27	–27	–30	–29	–23
Sample	DF2				
CFPP, °C	–26	–33	–28	–23	–23

CFPP is better when adding additives to sample DF1 and was 18.2 °C. For DF2, the average change in CFPP was 13.6 °C.

Thus, we can conclude that for the studied DF samples there is the following dependence of the effectiveness of the additive on the sulfur content: the higher the sulfur content, the greater the effectiveness of the additive.

References

1. *USS 305-2013. Diesel fuel. Technical specifications. – Moscow : Standartinform, 2014. – 12 p.*

CHANGES IN THE COMPOSITION OF ATMOSPHERIC OIL FRACTIONS DURING PROCESSING ON A ZEOLITE CATALYST

E. S. Chebanova, A. O. Efanova
Scientific supervisor – assistant professor M. V. Kirgina
Language supervisor – assistant professor M. V. Kirgina

Tomsk Polytechnic University
esc14@tpu.ru

Processing on a zeolite catalyst allows to improve the basic physicochemical properties of petroleum products to levels that meet the standards. Let us say, in [1], a diesel fuel (DF) and the product of its upgrading on a zeolite catalyst of the ZSM-5 type were studied. It has been shown that during processing on a zeolite catalyst, the basic physicochemical properties of diesel fuel can be improved and an Arctic grade of diesel fuel can be obtained [2].

Besides, during catalytic processing, the group composition of the sample was changed: the content of aromatic hydrocarbons and naphthenes increased, while the concentration of n-paraffins decreased. These modifications are associated with changes in the structure of hydrocarbons and the formation of other classes of organic substances.

The purpose of the work is to analyze the composition of atmospheric oil fractions during processing on a zeolite catalyst.

Test samples were atmospheric oil fraction (AF), obtained as a result of simple oil distillation from a field in the Tomsk region and its processed product (PAF) on a zeolite catalyst using a CATACON installation under a pressure of 0.35 MPa, at a temperature of 375 °C and raw material consumption of 3 h^{-1}. Both samples were subjected to chromatography-mass spectrometric analysis on a gas chromatograph. The results of chromatography-mass spectrometric analysis are presented in the Table.

Based on the data presented in the Table, it can be noted that the concentration of n-paraffins decreased 8 times, from 24.93 to 3.46 % wt., but at the same time the content of iso-paraffins increased as a result of catalytic processing from 14.73 to 16.3 % wt. The amount of naphthenes decreased from 20.85 to 15.59 % wt. The amount of olefins increased by 20.75 times, from 0.04 to 0.83 % wt., and alkynes by 3 times – from 0.03 to 0.09 % wt. The content