GROUP COMPOSITION OF DIESEL FUEL AS A FACTOR OF DIFFERENT SUSCEPTIBILITY OF LOW-TEMPERATURE ADDITIVES

I.A. Bogdanov, A.A. Altynov
Scientific adviser – PhD, associate professor M.V. Kirgina
Linguistic advisor – PhD-student I.A. Bogdanov

National Research Tomsk Polytechnic University
634050, Russia, Tomsk, 30 Lenin Avenue, bogdanov_ilya@mail.ru

The use of low-temperature additives is one of the easiest to use and economically feasible way to produce winter and arctic diesel fuel in Russia. However, the peculiarities of the additives mechanism action, as well as the mutual influence of their components and various groups of diesel hydrocarbons, are the reason for the impossibility of creating universal additives and their concentrations.

The aim of the work was to assess the effect of the group composition of diesel fuel on the susceptibility of low-temperature additives.

The investigation was conducted for two diesel fuel samples and two low-temperature additives. For the investigated samples, the group hydrocarbon composition was determined according to the method given in [1]. The results are presented in Table 1.

Also for the samples were determined: cloud point (CP) according to the method given in [2]; cold filter plugging point (CFPP) according to the method given in [3]; pour point (PP) according to the method presented in [4]. The results of determining the low-temperature properties of diesel fuel samples are presented in Table 2; the samples with the additives in the concentrations recommended by the manufacturers are presented in Table 3. Also, Table 3 shows the calculated values of changes in the low-temperature properties of the samples with or without additives.

From the results presented in Tables 1–3, it follows that an increase the content of paraffins and aromatics hydrocarbons in diesel fuel reduces the action effectiveness of the additives on the pour point and the cold filter plugging point. This conclusion is explained by the mechanism of action of depressor additives [5].

Investigated additives do not have a significant effect on diesel fuel cloud point (change CC, when using an additive, is within the error of the used determination methods), from which it follows that additives are depressant and do not have a dispersing effect.

Table 1. Group composition of diesel sample

Diesel sample	Hydrocarbon content, % wt.		
	Aromatics	Naphthenes	Paraffins
1	22.6	31.1	46.3
2	21.7	34.6	43.7

Table 2. Low-temperature properties of diesel fuel samples

Diesel sample	CP, °C	CFPP, °C	PP, °C
1	–12	–24	–45
2	–13	–17	–29

Table 3. Low-temperature properties of diesel fuel samples with additives

Diesel sample	Additive	PP	ΔPP	CFPP	ΔCFPP	PP	ΔPP
		°C					
1	A	–13	**1**	–34	**10**	–57	**12**
2		–16	**3**	–28	**11**	–57	**28**
1	B	–13	**1**	–32	**8**	–53	**8**
2		–16	**3**	–33	**16**	–50	**21**

References

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ARC DISCHARGE PLASMA AS A WAY TO OBTAIN SILICON CARBIDE

O.A. Bolotnikova
Scientific adviser – Candidate of Engineering Sciences, Associate Professor of Automation and Robotics Division, A.a. Pak

National Research Tomsk Polytechnic University
634050, Russia, Tomsk, 30 Lenin Avenue, bolotnikovaoa@gmail.com

Silicon carbide due to a number of physicomechanical, physicochemical and electrophysical properties attracts the attention of researchers in all the world. Silicon carbide is characterized by high hardness, high thermal conductivity, corrosion and radiation resistance, specific optical and biological characteristics [1]. On the one hand, a silicon carbide coating increases resistance to oxidation of carbon fibers; on the other hand, carbon fibers can used as a reinforcing additive at the process of creating SiC ceramics with increased crack resistance [2]. Thus, the current scientific production task is to develop methods for obtaining dispersed materials consisting of silicon carbide and carbon fibers. Currently, such composites are obtained by various methods. Among the drawbacks of the methods are the need to create a protective atmosphere that prevents oxidation of the initial components at the synthesis stage and significant duration of the process. A possible alternative could be the synthesis of the material in the arc plasma. DC arc plasma method in air atmosphere has been successfully used in recent years for obtaining carbon nanotubes. This paper shows the possibility of obtaining the cubic silicon carbide and carbon fibers phase material, as a processing result of the silicon and carbon powder precursor due to DC arc discharge treatment.

In order to implement the process of electric arc synthesis, a laboratory experimental plasma-chemical DC reactor was assembled. As a power source was used rectifier-inverter welding transformer brand Condor Colt 200. Graphite electrodes were connected due to power lines to the power source. The arc discharge was initiated by the short contact of the electrodes; operating current and voltage were fixed during the working cycle directly with a voltmeter and ammeter [3].

A series of experiments was accomplished using the experimental setup described above.

Typical X-ray diffraction pattern of the obtained material as a result of experiments series is shown in fig. 1. Qualitative analysis was performed by comparing the position of the diffraction maximum on the 2θ axis of the obtained picture with the reference data given in the PDF4+ database.

It should be noted that the qualitative analysis results of the X-ray diffraction patterns of the obtained materials are unchanged and valid for all the products obtained; the results of quantitative

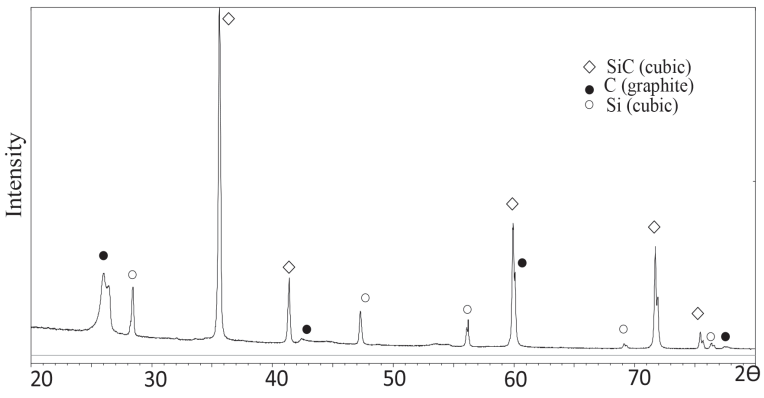

Fig. 1. *Typical X-ray diffraction pattern (CuKα)*