Biodiesel is a good bio-solvent for dissolving polystyrene. In this study, we consider the method of recycling polystyrene by using biodiesel as a solvent and investigate the properties of commercially available fuel blends made from the resulting biodiesel and diesel fuel.

Biodiesel was synthesized from sunflower oil following the method described in [1]. Next, 1 gram of expanded polystyrene was dissolved in 100 milliliters of biodiesel after that commercial fuel blends with diesel fuel B5, B10, and B20, with a biofuel content of 5 %, 10 %, and 20 % by volume, respectively, were prepared from the resulting blend [2].

Properties such as density and viscosity have been studied for the obtained commercial fuel blends. The results of changes in these properties are presented in Table 1.

Analyzing the collected data, it can be concluded that the addition of biodiesel with dissolved polystyrene slightly alters the characteristics of diesel fuel and allows for its continued use. Furthermore, the presented results indicate that the kinematic viscosity of the B20 sample is slightly elevated, but within the acceptable range for summer and interseason commercial diesel grades [3].

Thus, the study of polymer dissolution in motor fuels has become a promising area of research with great significance for solving environmental issues.

Table 1. Fuel properties of different blends

Temperature °C	Density, g/cm^3			Viscosity, mm^2/s		
	15	20	40	15	20	40
B5	0.848	0.844	0.830	6.236	5.266	3.207
B10	0.849	0.846	0.831	5.908	5.160	3.262
B20	0.852	0.848	0.834	6.481	5.472	3.842

References

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PRODUCTION OF ENVIRONMENTALLY FRIENDLY DIESEL FUEL COMPONENTS FROM WASTE VEGETABLE OILS

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Biodiesel (BD) is an environmentally friendly, alternative fuel that can be produced from renewable sources. The synthesis of BD is based on the esterification reaction, the products of which are monoalkyl esters of fatty acids.

Producing biofuels from waste oil eliminates competition between the fuel sector and the food sector of the economy and helps solve waste management problems.

In this work, biodiesel samples were synthesised from waste oil obtained from catering restaurants in Tomsk.

The methodology of BD synthesis used in the work: the feedstock (waste oil) with a mass of 371.6 gm. was uniformly heated to 45.0 °C using a stirrer and an electric cooker.

Varying the amount of catalyst (sodium hydroxide) is an important part of the work. The mass

of sodium hydroxide was 6.5 gm. for sample A, B and 9.1 gm. for sample C.

The catalyst alcohol solution obtained by dissolving sodium hydroxide in ethyl alcohol with a mass of 138.0 gm. was added to the preheated feedstock. The synthesis was continued for one hour [1].

Glycerol, weighing 92.9 gm., was added to the obtained mixture for more efficient separation of BD from glycerol. BD was obtained by settling the resulting mixture in a separation funnel during the day.

Twenty-four hours later, the upper separated phase was selected as the target phase.

Further, unreacted ethyl alcohol was extracted from the obtained target product on a rotary evaporator under vacuum at 49.0 °C for one hour. Using the above-mentioned methodology, BD was obtained from 3 different samples of waste sunflower oil.

The fuel yield by oil for sample A was 97.4 wt. %, sample B was 94.6 wt. %, and sample C was 48.9 wt. %.

Table 1 shows the physico-chemical characteristics of the obtained BD and waste oil samples.

Figure 1 allows a visual comparison of the samples obtained.

Thus, the amount of catalyst directly affects the quality of BD when it is obtained from waste oil. Waste oils have a more acidic environment compared to fresh oils, which can be explained by the formation of fatty acids due to the oxidation of vegetable oil during their use.

Table 1. Physico-chemical characteristics of samples

Sample	Density at 20 °C, gm/cm^3	Kinematic viscosity at 20 °C, mm^2/s
A	0.9210	53.044
B	0.9181	48.669
C	0.8826	8.7453
Feedstock of sample A	0.9206	84.971
Feedstock of sample B	0.9200	81.284
Feedstock of sample C	0,9200	88.353

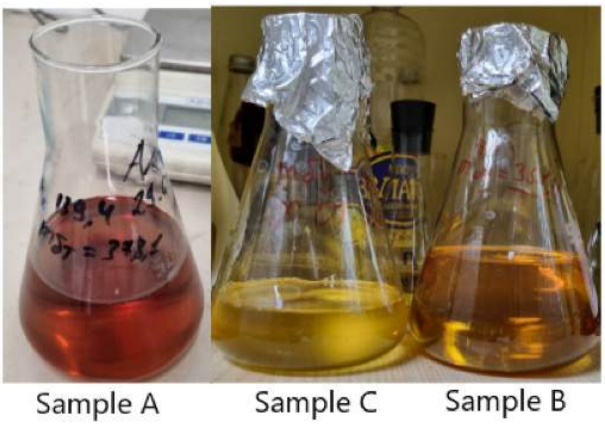

Fig. 1. *Visual comparison of the obtained samples*

The unsatisfactory performance of samples A, B is due to incomplete conversion of oil into fatty acid ethyl esters, due to neutralisation of the alkaline catalyst by the acidic medium.

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SELECTING THE OPTIMAL COMMERCIAL DEPRESSANT

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Diesel fuel (DF) is widely distributed in the territory of the Russian Federation and it is used as fuel for various types of transport and technic. In regions of the country with colder climates, DF is necessary for the stable engines with low-temperature properties, which correspond to the data presented in [1]. The most effective and cost-efficient way to achieve these properties is adding depressant additives to