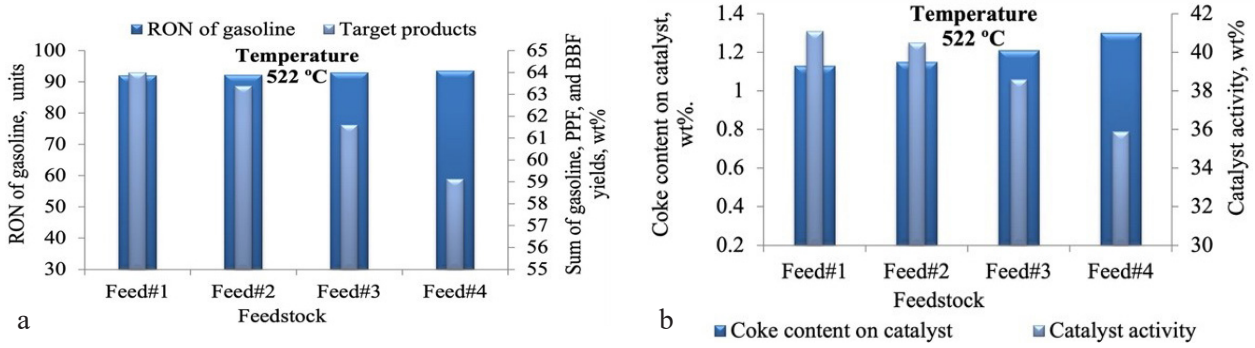

Fig. 1. *Effects of the changes in the feedstock composition on (a) RON of gasoline, sum of gasoline, PPF, and BBF yields (b) coke content on the catalyst and catalyst activity*

35.9 %) for Feed#1–4 as seen in Fig. 1b. In conclusion, physicochemical properties of feedstocks, particularly their SAR contents when heavy oil fractions such as extracts are involved, are a more efficient technique to forecast techno-economic parameters to optimize the FCC process.

References

1. *Chernysheva E. A., Piskunov I. V., & Kapustin V. M. // Pet. Chem. 60, 1–15 (2020). https://doi.org/10.1134/S0965544120010053.*
2. *Nazarova G., Ivashkina E., Ivanchina E., Oreshina A., Vymyatnin E. // Fuel Processing Technology. 217 (2021) 106720. https://doi.org/10.1016/j.fuproc.2020.106720.*

DEVELOPMENT OF RECIPES FOR BLENDING FUEL COMPOSITIONS FROM DIESEL FUEL AND BIODIESEL FROM USED VEGETABLE OIL

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Biodiesel is an alternative type of fuel consisting of monoalkyl esters of fatty acids obtained by the transesterification reaction during the chemical interaction of vegetable oil or animal fats with alcohol. Biodiesel is a proven type of fuel with more than twenty years of operational history in Europe and the USA [1].

In this work, biodiesel was synthesized. Waste oil, received from one of the catering enterprises of the Tomsk city was used as a feedstock.

The synthesis of biodiesel was carried out according to the methodology presented in [3]. The yield was 67,84 % by oil weight.

Six investigation samples were prepared from the obtained biodiesel and winter diesel fuel bought at a retail fuel station in Tomsk: B – 100 % vol. of biodiesel; D – 100 % vol. of diesel fuel; B5 – 5 % vol. of biodiesel and 95 % vol. of diesel fuel; B10 – 10 % vol. of biodiesel and 90 % vol. of diesel fuel; B15 – 15 % vol. of biodiesel and 85 % vol. of diesel fuel; B20 – 20 % vol. of biodiesel and 80 % vol. of diesel fuel.

The following characteristics were determined for the obtained samples: density, kinematic viscosity, cloud point, pour point. Table 1 shows the results.

Technical requirements for commercial diesel fuel according to [2] are presented in Table 2.

Thus, according to [2], fuel blends of B5, B10 composition meet the requirements for the winter grade of diesel fuel in terms of studied characteristics. Further increase of biodiesel content leads to increase of kinematic viscosity and density. This makes the B15 and B20 blends meet the requirements for the inter-seasonal diesel grade. In addition, with increasing biodiesel content in the blends, the resistance of the blend to sub-zero temperatures decreases.

Table 1. Characteristics of fuel blends

Characteristic	B	D	B5	B10	B15	B20
Density at 15 °C, g/cm^3	0.888	0.826	0.829	0.830	0.838	0.841
Kinematic viscosity at 20 °C, mm^2/s	15.660	3.569	4.428	4.888	5.330	5.477
Cloud point, °C	–4	–35	–33	–32	–31	–30
Pour point, °C	–9	–61	–58	–55	–53	–48

Table 2. Requirements for commercial diesel fuel

Characteristic	Summer fuel	Interseason fuel	Winter fuel	Arctic fuel
Density at 15 °C, g/cm^3, not more	0,863	0,863	0,843	0,833
Kinematic viscosity at 20 °C, mm^2/s, not more	3,0–6,0	3,0–6,0	1,8–5,0	1,5–4,0

References

1. *Mazanov S. V. Isobaric heat capacity of the reaction mixture and technological regularities of biodiesel production under sub- and supercritical fluid conditions in a flow reactor in the presence of a heterogeneous catalyst: dis. for the Candidate of Technical Sciences: 01.04.14. / Sergey V. Mazanov. – Kazan: 2015. – 170 p.*
2. *USS 305-2013 Diesel fuel. Technical conditions. Diesel fuel. Specifications. – Moscow: Standartinform, 2013. – 12 p.*
3. *Belozertseva N. E., Sosnina D. V., Balzhanova A. T., Bogdanov I. A., Kirgina M. V. Investigation of the influence of the parameters of biodiesel fuel synthesis by transesterification reaction on the yield and key characteristics of the product // Proceedings of the St. Petersburg State Technological Institute (Technical University). St. Petersburg, 2021. – P. 23–29.*

COPPER (II) COMPLEX DERIVED FROM THE CYCLOHEXYL CONTAINING SCHIFF BASE WITH A POTENCY AGAINST COVID-19

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Schiff bases are actively applied ligands for coordination chemistry. As such, these compounds are in the focus of many researchers thanks to their facile design and synthetic availability through a facile condensation reaction between the aldehyde or ketone and primary amine functionalities. Of one of their practical applications, Schiff bases as well as their metal complexes have extensively been used as antimicrobial and antiviral agents. Furthermore, it was revealed that complexation of Schiff bases toward metal cations improves their biological properties [1].

In the context of our comprehensive studies on salicylaldehyde derived Schiff bases [2] and their complexes with different metal cations, we focused on a mononuclear discrete homoleptic copper (II) complex [CuL_2] (HL = *N*-cyclohexyl-3-methoxysalicylideneimine), which was readily obtained from a mixture of $Cu(OAc)_2$, cyclohexylamine and 3-methoxysalicylaldehyde in EtOH (Scheme 1) [3]. The final product was obtained as single crystals suitable for an X-ray diffraction analysis.

Complex [CuL_2] was probed as a potential inhibitor toward a set of the COVID-19 proteins using a molecular docking approach. It was found that complex [CuL_2] inhibits all the examined proteins (Table 1), of which the best activities of –10.4, –8.7 and –8.6 kcal/mol were revealed for nonstructural protein 14 (N7-MTase), papain-like protein (PLpro) and Main protease (Mpro), respectively.