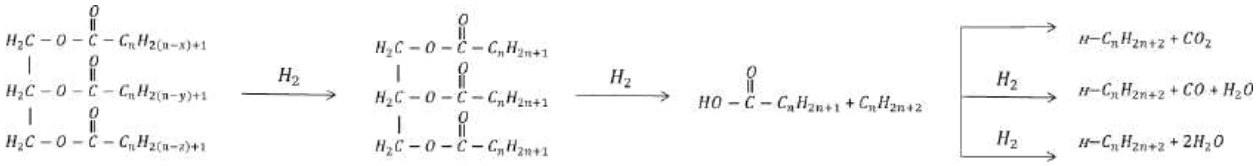

Fig. 1. *Mechanism of vegetable oils conversion on a hydrotreating catalyst*

The obtained results are consistent with the mechanism of vegetable oils conversion on hydrotreating catalysts (figure).

Fatty acids that make up vegetable oils are first hydrogenated during hydrotreating and then undergo thermal decomposition reactions to form predominantly monobasic fatty acids. The resulting monobasic acids, in turn, undergo decarbonization, decarboxylation, and hydrodeoxygenation reactions, resulting in the formation of long-chain n-paraffins. Long-chain n-paraffins undergo cracking reactions, which result in the formation of n-paraffins with a shorter hydrocarbon chain length.

Thus, the work shows the possibility of obtaining fuel hydrocarbons from vegetable oils, in particular, long-chain n-paraffins, which can be used as raw materials for the production of commercial fuels.

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RESEARCH OF YTTRIUM OXIDE POWDER SYNTHESIZED IN PLASMA FROM NITRIC ACID SOLUTION WITH ADDED ORGANIC COMPONENT

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A key focus of materials science is the technologies producing different nanopowders. Such materials have unique properties. Yttria, commonly applied in different ways, offers high light transmission, melting temperature, thermal stability, and mechanical properties when incorporated into ceramics [1].

There are some methods for producing nanosized oxides – laser, chemical, hydrothermal, and sol-gel. All these methods have drawbacks (e. g. multi-stage, time-consuming, non-uniform phase distribution).

Therefore, it is promising to apply gas-discharged plasma for synthesizing metal-oxide powders. It can help to eliminate drawbacks – reduce energy consumption, and boost productivity by incorporating an organic element (e. g. acetone) into the initial solutions.

The study determined the best ratios of acetone and yttrium nitrate $Y(NO_3)_3$ in water-organic nitrate solutions and identified optimal conditions to prevent the formation of unoxidized carbon in the final products, because of the acetone presence.

To carry out the experiments on plasmachemical synthesis some solutions were prepared. It was used the water yttrium nitrate solution of maximum concentration of salt. Then the organic component was added to create water-organic nitrate solution. Prepared solution was treated in gas-discharge plasma of air in accordance with calculated ratio. After solution dispersing, its heating, evaporation of water medium with salt crystallization the stage of thermolysis began. Desired component – yttria

is synthesized as the following stage. After plasma treatment the powder product was collected and prepared for the investigating.

The resulting oxide powder underwent various analyses for basic parameters assessment. All the analyses were done in the TPU Center for Nanotechnologies with the help of licensed and verified equipment (electronic microscopes, BET analyzer, etc.).

The results analysis reveals that the powder obtained is a cubic phase of yttrium oxide with no carbon impurities. It is composed of agglomerated particles with a rounded shape, ranging in size up to 70 nm with 30 % falling within the 40–49 nm range (Fig. 1).

The investigation showed:

- SSA of obtained material is 30 m2/g;
- particle size of 41 nm in average;
- organic component (acetone) increased 4-times of process productivity;
- acetone decreased 8-times of energy consumption for production of 1 kg of product.

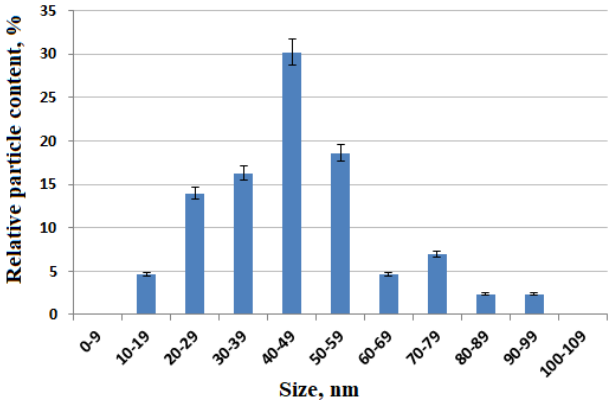

Fig. 1. *Dependence of relative particle content on the powder size*

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INJECTION TEMPERATURE AS A FACTOR IN THE DEPRESSANT EFFECT OF PETROLEUM RESINS

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The addition of petroleum resins to diesel fuel (DF) improves its low-temperature properties due to changes in the structure and chemical properties when mixed. The observed effect depends on the composition of the fuel, the composition and type of petroleum resins, as well as the temperature at which petroleum resins are introduced into the DF.

The object of study in this work is a sample of straight-run DF and benzene resins, as well as mixtures of a sample of straight-run DF and benzene resins in concentrations of 0.0025; 0.0050; 0.0100; 0.0250 and 0.0500 % wt., prepared at resin injection temperatures of 55 and 80 °C.

The DF sample was thermostated in a liquid thermostat for 30 minutes to a given temperature. Then petroleum resins were added to the sample in the studied concentrations and the mixture was stirred. The resulting mixture was cooled to room temperature and left for 24 hours. Then the low-temperature properties were determined.

Cloud point (Cp), Cold Filter Plugging Point (CFPP) and Pour point (Pp) determined according to the method presented in [1–3].

Table 1 presents the results of the low-temperature properties of the studied DF sample.

According to the requirements of the standard [4], for low temperature properties of DF sample does not match any brand (sub standard fuel).

Table 2 shows the effect of the temperature at which benzene resins are introduced into DF on its low-temperature properties at different injection temperatures.