

**PETROLEUM PRODUCTS:
TECHNOLOGY, INNOVATION, MARKET**

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Biodiesel fuel based on inedible fish fats

Keywords: biodiesel, fish fat, fatty acid methyl esters, mixed diesel fuel.

Abstract. Physicochemical properties and fatty-acidic structure of the methyl esters, obtained via triglycerides of fish fats (FME) interesterification, are studied. It is shown that they are close to RME by the main characteristics, and can be used as biocomponents of diesel fuels. Low-temperature properties of fuels can be improved by an addition of depressors on the basis of ethylene copolymers and vinyl acetate.

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Optimization of the carbon dioxide methanation in the presence of water vapor over nanostructured Fe,Ni/ γ -Al₂O₃ catalysts

Keywords: carbon dioxide, methane, water vapor, hydrogen, optimization, regression mathematical model.

Abstract. High man-made emissions of carbon dioxide into the atmosphere cause the need to develop the processes providing a large-scale CO₂ utilization. The proposed methane synthesis system consists in the reacting of carbon dioxide with water vapor over the nanostructured Fe,Ni/ γ -Al₂O₃ catalyst at mild temperatures and atmospheric pressure. The studies of the interaction between carbon dioxide and water vapor were carried out on the laboratory flow-typed unit at isothermal conditions. The GHSV of CO₂ and H₂O ranged within 0.6-0.8 lit/h and 2.5-3.73 lit/h, respectively at temperatures 380, 420 and 460°C and atmospheric pressure at an in-situ regime.

The influence of operating parameters: temperature - Z₁, °C; duration - Z₂, hr; space velocity of CO₂ - Z₃ and H₂O - Z₄, lit/h on the process rate: the methane yield - Y%, represented as a regressive polynomial dependence. The software S-plus - 2000 Professional, developed by Mathworks automated processing of mathematical and statistical analysis of the data for calculating the coefficients of the linear regression and simple correlation coefficients was used for determining the coefficients of the regression equation. Assessment of the regression coefficients significance is confirmed by significant multiple correlation coefficient, t-test, as well as approximation error experience. Assessment of the regression model adequacy was tested by the Fisher criteria, i.e. ratio of the residual / reproducibility variance. Comparing the found values of the Fisher criteria with tabular data at the selected confidence level of 95% and degrees of freedom $f_1 = 5, f_2 = 2$, we see that the calculated criterion value is less than one the tabular. This suggests that the regression equation adequately describes the response surface.

To solve the optimization problem the program MATLAB - 6.5, with modern algorithms for solving linear programming problems was applied. By solving the optimization problem at a temperature 460°C, reaction duration 2.5 hours, the volumetric flow rate of CO₂ and H₂O 0.6 and 3.75 lit/h, respectively the methane yield is found 78.72%.

The Institute of Petrochemical Processes named after YU.G. Mamedaliyev, Azerbaijan NAS

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Complex salts on the basis of diethylamidophosphate sunflower oil acid fraction and their anticorrosive properties

Keywords: Corrosion inhibitor, olive oil, diethylamide, diethylamidophosphate, complex ethanolamine salts.

Abstract. One of the most effective ways of fight against hydrosulphuric corrosion is inhibitory protection. In this work new inhibitors of corrosion of salt of an etilamidofosfat of acid fraction of sunflower oil are received. For synthesis of these salts in the beginning on the basis of triglycerides of sunflower oil and diethanol amide it was received diethylamide. Further, with participation of ortofosforny acid its phosphatic derivative is received. On the basis of this etilamidofosfat complex salts with participation of monoethanolamine, diethanolamine and triethanolamine are synthesized. Anticorrosive ability of these complex

salts in the water-kerosene environment sated with hydrogen sulfide (a volume ratio 9:1) as steel-3 corrosion inhibitors is investigated. Reagents are investigated in 4 concentration (10, 20, 50 and 100 mg/l). Results show that monoethanolaminy salt at concentration of 10 mg/l shows rather low anticorrosive ability, but at 50–100 mg/l anticorrosive activity – high (effect of protection 98,0–99,5%). Diethanolaminy salt at concentration of 10 mg/l shows rather low anticorrosive activity, however at concentration of 50–100 mg/l anticorrosive ability is high (protective effect of 95–97%). At triethanolaminy salts at concentration of 10 mg/l rather low anticorrosive action is registered, At 100 mg/l anticorrosive ability strongly increases (protective effect of 95,0–98,3%). These results can be presented and in the schedule form. In graphics with increase in concentration of reagent inhibitory properties amplify and consequently, and the protective effect of complex salts increases. Also their superficial tension was defined. Water-kerosene (20°C) in the presence of three above-mentioned complexes is estimated by Stalagometric measurements of an interphase tension on border their superficial activity. All three complexes show high superficial activity. The triethanolaminy complex, and the least active-diethanolaminy appeared the most active.

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after academician Yu. H. Mamedaliyev of NASA*

ANALYTIC METHODS FOR OIL and PETROLEUM PRODUCTS

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Recent technical realization of the effusion means of control (analyzers) of gas density

Keywords: analyzer, gas density, effusion.

Abstract. This article is devoted to recent effusion gas density analyzers (effusimeters) and contain classification of these effusive means of control of gas density. The recent technical implementation of the effusive means of control of gas density according to this classification is given in this article.

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Control method of processes of oxidation of engine oils of various basic basis

Keywords: coefficient of absorption of a light stream; evaporability; potential resource; coefficient of resistance to oxidation; oxidation products; thermooxidizing stability.

Abstract. The results of research of processes of oxidation of engine oils of various basic basis are presented under constant conditions of test. The comparative assessment of their thermooxidizing stability is carried out. The coefficient of resistance to oxidation as criterion of thermooxidizing stability considering optical properties and an evaporability of oils at oxidation is offered.

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MATHEMATICAL SIMULATION

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Application of fuzzy set theory methods to decision-making in optimization of oil processing plant operation under insufficient information conditions

Keywords: fuzzy sets, membership functions, heat supply systems, hydraulic and thermo regimes models.

Abstract. The fuzzy set theory approach in determination of the way of the technical system energy efficiency improvement is considered. The membership functions are proposed for adjustment of convective heat transfer coefficients in modeling of the heat flow through the enclosing constructions of the oil processing plant. Membership functions for transformation factors of objects heat consumption and other parameters of oil working equipments are suggested. Given the membership functions for the convective heat transfer coefficients, the membership functions for the quantitative evaluation of the heat loss could be determined.

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Using the mathematical model of isobutane alkylation with olefins for monitoring of alkylation device operation and process personnel training in Ltd. «Gazpromneft - ONPZ»

Keywords: alkylation, hydrocarbons, octane number, mathematical model, trainer.

Abstract. Process parameters of sulfuric acid catalyzed isobutane alkylation with olefins, which realized in process unit 25-12 Ltd «Gazpromneft - ONPZ», were calculated using the mathematical model. The influence of flowrate of butane-butene fraction and concentration of isobutane in the feedstock on contents of isooctanes in the alkylate was quantitatively shown. Feasibility of using mathematical model of isobutane alkylation with olefins as the training hardware was shown. This will allow process operator in oil refinery plant to gain theoretical skills of elimination of operational problems and optimization of plant operation.

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PORTRAITS

To the anniversary of N.N. Grishin – Senior Research Fellow of the 25th State Research and Development Institute of MD of Russian Federation, Honoured Scientist, Prof., Dr.Sci.Tech.