

CHEMISTRY AND TECHNOLOGY OF FUEL AND HIGH-ENERGY SUBSTANCES

Pp. 6–11

Kotik A. D., Kramskoy N. V., Dyakova S. P., Kritskiy V. V., Sinkova V. K.
(OAO “VNIPIneft”, Moscow)

Development of Engineering Solutions on Upgrading Quality of Products up to Standard Requirements at Design Capacity at Gas Processing Plants

Keywords: associated petroleum gas; gas processing plant; amine treatment unit.

Abstract. The article is dedicated to development of engineering solutions to upgrade the quality of treated associated petroleum gas as required at design capacity of the unit due to changed composition of supplied gas. Comparative analysis of operation of the unit has been performed using gas composition assumed as engineering documentation was developed and gas composition that has changed in the course of time. Engineering have been developed to optimize the operation of amine treatment section. Design models of gas amine treatment unit have been created in specialized software environment. Approaches to selection of process configuration of gas treatment unit have been defined in order to ensure required quality of products at changed composition of associated petroleum gas supplied to processing. Evaluation of economic efficiency of this project has been checked. Taking into account widespread use of amine treatment units at Rosneft’s gas processing facilities it shall be recognized that developed engineering solutions may be extrapolated to similar units

Pp. 12–18

Vostrikova Y. V., Gershun A. V., Kapustin V. M., Cherednichenko R. F.
(Russian State University of Oil and Gas named after I. M. Gubkin, Moscow)

Reducing Coke Formation at Visbreaking Units with the Introduction of a Passivator

Keywords: visbreaking, coke formation, coke deposition, thermal treatment of hydrocarbon raw materials, passivator (passivating agent), tar.

Abstract. Based on the analysis of the use of the developed additives to reduce the deposition of coke on a metal plate in the process of tar visbreaking, the effectiveness of sulfur-containing and phosphorus-containing reagents was determined.

Under laboratory conditions, the influence of sulfur-containing, phosphorus-containing compounds, reagents containing nitrogen and oxygen-containing compounds in their composition on the process of coke deposition on a metal plate during visbreaking was studied.

The process of tar coke deposition in the process of visbreaking in the presence of developed passivators, in the amount of 5, 10, 15 ppm, was studied during preliminary treatment of the reactor and metal plate for 24 hours.

The study of the process was carried out on a laboratory batch coking unit with appropriate temperature conditions. It is shown that the use of the developed reagents (P-1, P-2, P-3, P-4) in the process of tar visbreaking, it helps to reduce the adhesive ability of the metal to coke deposition, depending on the concentration, during the pre-treatment time of 24 hours.

Pp. 20–24

Zhumlyakova M. A.¹, Morshanskaya Yu. A.¹, Ishcheykina A. I.¹, Galkina O. V.¹, Eremin M. S.¹, Khoroshev Yu. N.²

(¹ JSC “Middle Volga Oil Refining Research Institute” (JSC “MidVolgaNIINP”), Novokuybyshevsk; ² LLC “Novokuibyshevsky plant of oils and additives” (LLC “NZMP”, Novokuibyshevsk)

Evaluation of the Effectiveness of the Developed Package of Additives PH-SL for Engine Oils for Modern Gasoline Engines

Keywords: experimental additive package, imported additive package, engine oil level, API SL/CF, colloidal and operational properties, monitoring of qualitative changes.

Abstract. Comparative evaluation of the experimental and imported additive packages in the composition of API SL/CF engine oil was carried out. It was found that the experimental package of PH-SL additives in the composition of engine oil has a stable colloidal structure, surpasses the imported package in terms of thermal oxidative stability and tendency to varnish formation and is on par with it in terms of tribological characteristics.

During the monitoring of qualitative changes in the state of oxidized oils, including using the method of IR-Fourier spectrometry, it was found that oil with an experimental additive package has an advantage in changing the kinematic viscosity of oxidized oil and the degree of activation of detergent additives compared with oil containing an imported additive package.

Based on the results of comparative tests on colloidal and operational properties, it was found that the experimental additive package is at the level of an imported analog. The effectiveness of the use of an experimental additive package instead of imported in the compositions of API SL/CF engine oils has been confirmed.

Pp. 26–31

Novotorzhina N. N., Sujayev A. R., Kazimzadeh Sh. K., Safarova M. R., Gakhramanova G. A., Mustafayeva Y. S.

(Academician A. Guliyev Institute of Chemistry of Additives, Baku)

Synthesis of EP Additives Based on Toluene Sulfochloride and Methyl-, Allyl Xanthogenates

Keywords: xanthates, extreme pressure additives, sulfonic acids, transmission oil.

Abstract. The article is devoted to the current problem, the synthesis of new additives for transmission oils. The authors have synthesized *p*-toluenesulfomethyl- and allylxanthates, previously undescribed in the literature, obtained by the reaction of *p*-toluenesulfochloride with methyl- and allylxanthates. Particular attention is paid to the synthesis and structural proof of the synthesized compounds by studying their elemental analysis, physicochemical properties, and IR spectra. The main content of the study is devoted to the study of synthesized compounds as extreme pressure additives for transmission oils. The authors present comparative tests of the extreme pressure properties of *p*-toluenesulfomethyl- and allylxanthates, with the known extreme pressure additive LZ-23k, as well as with the aroxycarbonylmethylisopropylxanthate and allyloxymethylisopropylxanthate described in the literature, carried out on a four-ball friction machine (FBM) The analysis of the study data showed a high extreme pressure efficiency of the synthesized compounds. The dependence of the extreme pressure properties of the compounds on their structure is shown. This article may be useful to specialists in the field of synthesis of extreme pressure additives for transmission oils.

PETROLEUM PRODUCTS: COMPOSITION, PROPERTIES AND APPLICATION

Pp. 32–41

Safronov E. M.¹, Bugaev E. S.^{1,2}, Zuikov A. V.^{1,2}, Ershov M. A.^{1,2}, Kapustin V. M.¹

(¹ Gubkin Russian State University of Oil and Gas (SRU), Moscow; ² LLC “New Technologies Watch Center”, Moscow)

Analysis of Petroleum Product Production and Consumption Prospects in the Russian Federation

Keywords: automobile gasoline, diesel fuel, jet fuel, forecasting, consumption and production of petroleum products, exports, adaptivity of refineries.

Abstract. The paper presents an analysis and evaluation of the production and consumption of major petroleum products in the Russian Federation. It also considers scenarios for changes in the production and consumption of major fuels, taking into account the current ratio of exports and imports of petroleum products and the analysis of car sales for 2020–2022. Examples of modernization and new development of oil refineries and changes in trade and economic cooperation with foreign countries are given. Presented options for improving the adaptability of enterprises to the challenges of the external market and the possibility of converting middle distillates and fuel oil into automobile gasoline and jet kerosene.

Pp. 42–45

Nagiyeva E. A., Kazim-zadeh A. K., Mammadova R. A., Nasirova S. I.

(Institute of Chemistry of Additives named after acad. A. M. Guliyev of Azerbaijan, Baku)

Medium Alkaline Alkylphenolate Additives

Keywords: alkylphenol, ammonia, monoethanolamine, benzylamine, allylamine, formaldehyde, multifunctional additives.

Abstract. The article presents the results of research on the synthesis of medium alkaline alkylphenolate additives. Additives are calcium salts of the condensation products of alkylphenols with formaldehyde and ammonia or various amines (monoethanolamine, benzylamine and allylamine) have been synthesized and studied.

The physicochemical and functional properties of the synthesized products were studied by standard methods. It has been shown that all aminomethyl derivatives of alkylphenols have multifunctional properties and are superior to their analogs ИХП-101, ИХП-109 and ВНИИПП-370 in terms of their functional properties.

In addition, the additives obtained on the basis of nonylphenol in terms of anticorrosion and antioxidant properties are somewhat superior to those obtained on the basis of alkylphenol (C₈–C₁₂) due to their homogeneous composition.

Thus, all synthesized compounds are multifunctional, and additives containing a secondary nitrogen atom (calcium salt of dialkyldioxybenzylamine) and a benzyl radical at the nitrogen atom (calcium salt of N-benzylalkyldioxybenzylamine) have the highest antioxidant efficiency.

CHEMOTOLOGY

Pp. 46–48

Lashkhi V. L., Chudinovskikh A. L.

(JSC Firm “NAMI-CHEM”, Moscow)

Principles of Development of a Set of Methods for Assessing Additives to Oils

Keywords: oil additives; test complex; model; modeling plants; qualification assessment.

Abstract. To ensure the required level of performance, modern oils, as a rule, contain the required amount of additives. When developing and testing additives, before their introduction into the oil, a preliminary, comprehensive assessment is necessary. The article discusses the trend of general aspects of the evaluation of additives to oils for automotive technology.

Sosnina D. V., Altynov A. A., Bogdanov I. A., Kirgina M. V.

(National Research Tomsk Polytechnic University, Tomsk)

Production Components of Motor Fuels by Processing Blends of Straight-run Diesel Fraction and Sunflower Oil on a Zeolite Catalyst

Keywords: diesel fraction; sunflower oil; catalytic processing; zeolite catalyst; fuel biocomponents.

Abstract. The development of processes for the co-processing of vegetable oils and petroleum hydrocarbons, the purpose of which is to production components of motor-fuels, is an important direction in the development of the fuel and energy industry. An important stage in the planning and implementation of such processes is the selection of a catalyst. Recently, zeolites of various structures and modifications have become very popular as catalysts.

In this work, processing on a zeolite catalyst of the ZSM-5 type of a straight-run diesel fraction and a blend of a diesel fraction with 50% vol. sunflower oil, were implementation. Regularities of the effect of sunflower oil involvement in processing on a zeolite catalyst on the composition and properties of the obtained products are revealed. It has been established that the products of joint processing of sunflower oil and straight-run diesel fraction on a zeolite catalyst meet to the arctic brand of diesel fuel in terms of low-temperature properties. It is shown that the obtained product of processing on zeolite is a promising blending component for the production of low-freezing diesel fuels. The received results indicate the feasibility of joint processing of vegetable oils and straight-run diesel fractions on zeolite catalysts. The involvement of vegetable oils in processing will expand the pool of feedstock for the production of motor-fuel components.