

CHEMISTRY AND TECHNOLOGY OF FUEL AND HIGH-ENERGY SUBSTANCES

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Overview of domestic developments in the field of anti-wear additives for diesel fuels with low sulfur content

Keywords: anti-wear additive; fatty acids; diesel fuel; lubricity; esters; amides; amines.

Abstract. The analysis of the production volumes of diesel fuel with a low sulfur content in Russia is carried out. The need of diesel fuel manufacturers for anti-wear additives has been determined, taking into account the forecast of the Ministry of Economic Development until 2030. The domestic patents for anti-wear additives for diesel fuel are considered in detail and the best indicators of lubricity for each invention are given. The analysis of the dynamics of registration of domestic inventions on the method of obtaining anti-wear additives for the period from 2005 to 2020 is carried out. The article also shows the dependence of the lubricating ability of diesel fuels on the concentration of an anti-wear additive in the fuel and its composition. This review can be used by scientific and project groups when formulating a research hypothesis or for conducting a patent search. The article will be useful when preparing an application for intellectual property protection in this direction. In addition, the results of the review can be used in the formation of a feasibility study of an investment project and in the study of the domestic market of anti-wear additives for diesel fuel hydrotreating.

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Aromatic hydrocarbons of Azerbaijani oils and their impact on the performance of lubricating oils

Keywords: high quality motor oils; additives; API; Balakhany oil; alkyl naphthalenes.

Abstract. The production of high-quality motor oils is carried out using base oils of the II and III groups by API, hydrocracking and hydroisomerization oils, IV group oils and synthetic oils. Synthetic oils are considered the best oils, but they have some disadvantages: they contain isoparaffinic hydrocarbons, their low polarity or its complete absence creates insufficient adhesion of the oil to metal surfaces and the oil flows into the crankcase. These disadvantages are leveled by the addition of 5–10% synthetic alkylnaphthalenes to the oil. The article presents the qualities of motor oils from the developed at the Institute of Petrochemical Processes of ANAS, where a highly refined base oil (15–65%) from Balakhany oil, containing natural alkyl-naphthalenes (3–5%) and a concentrate of Lubrizol additives, was used as the base component. Sample testing was carried out at the Forschungszentrum (FVTR GmbH), which is a recognized scientific center in the field of energy technology, the center has a high level of expertise and direct access to new results and trends in international research. The samples have been shown to have good antiwear and antioxidant properties, according to these indicators, at the level of Mobil 1×1 5W30 oil containing synthetic AN.

PETROCHEMISTRY: TECHNOLOGY, PROCESSES

Pp. 24–30

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The marginality of processing straight-run fractions of a modern oil refinery

Keywords: marginality; aviation kerosene; diesel fuel; gasoline; primary processing; excise duty; products yield.

Abstract. The dynamics of prices since 2017 according to the data of Saint Petersburg International Merchantile Exchange (SPIMEX) for mass fuels produced by modern refineries is considered. The dynamics of changes in excise taxes on fuels since 2017 is considered. Gasolines, summer inter-season, winter and arctic diesel fuels, jet fuels production features are analyzed. It is demonstrated that the total sulfur content in gasolines and diesel fuels must comply with the Euro 5 level, that is, no more than 10 ppm. The content of total sulfur in jet fuel TS-1 is significantly higher - no more than 0.2%, therefore, methods of its treatment cost less. The yields of various fuels during treatment and bringing straight-run fractions to the requirements of GOST are given. It is demonstrated that jet fuel has the highest yield during treatment. The net cost of marketable fuels obtained from 1 ton of straight-run components has been determined, excluding excise taxes. It is demonstrated that the highest-marginal product is jet fuel. The volume of jet fuel production by the leading oil refineries of the Russian Federation is given.

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Comparative research of furnace tube of steam reforming

Keywords: reformer tubes; steam reforming; creeping; deformation; high temperature and pressure.

Abstract. This article describes comparative analyses of parallel research of reformer tubes, removed from furnace at one of Hydrogen Production units at Slavneft-YANOS PJSC, performed by company Schmidt + Clemens and specialists of Slavneft-YANOS PJSC.

PETROLEUM PRODUCTS: COMPOSITION, PROPERTIES AND APPLICATION

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Dependence of properties of bituminous binders on composition of raw materials and conditions of oxidation

Keywords: bituminous raw materials; dark bottoms of oil refining; change in the group composition; thin film chromatography (TLC).

Abstract. Bitumen is a complex and specific in its composition organic materials, the physicochemical, chemical, adhesive and other properties of which significantly depend on their group composition and the ratio of hydrocarbon fractions included in them. These properties, in turn, are directly related to the

composition of the feedstock, which is determined by the level (depth) of processing of oil shoulder straps and the methods of oxidation and compounding of refined products of different levels. This work evaluates the group composition of the initial bituminous raw material and its changes during oxidation under various conditions. The study showed that the oxidation process is dominated by the processes of thermal oxidative destruction, leading to the decomposition of fractions of saturated hydrocarbons into aromatic, resinous and partially aromatic fractions into asphaltenes prone to agglomeration. The results of the study expand knowledge about the development of the potential for regulating the properties of commercial bitumen and polymer-bitumen binders based on them by varying the composition of oil strands supplied for oxidation. The data obtained were used to optimize the production processes of LLC "BITUM", Salavat, for the purpose of large-scale production of commercial bitumen and PMB. The binders produced were used in 2018-2019 for the production of asphalt concrete and polymer-asphalt concrete mixtures and the device of coatings based on them in the Volga Federal District.

CHEMOTOLOGY

Pp. 48–58

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Two-stroke gasoline engine lubricants

Keywords: engine oils; two-stroke engines; performance characteristics; standards; synthetic oils; polyisobutene; engine test methods.

Abstract. The article considers the design and lubrication of small 2-stroke engines installed on snowmobiles, quad bikes, motorcycles and drones. The compositions of the 2-stroke engine oils, base oils and additives, actual specification JASO, NMMA, API, TISI and ISO are analysed. Concern the short characteristics of JASO engine test methods.