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Ecological nanotechnological achievements of Russian Academy of Sciences for fuel and energy complex

Keywords: Russian Academy of Sciences (RAS), Department for nanotechnologies and information technologies (DNIT) of RAS, fuel and energy complex (FEC), nanotechnologies, nanomaterials, ecology, oil and gas nanotechnologies.

Abstract. Russian Academy of Sciences which celebrates 291th anniversary February 8, 2015, is the leading scientific Russian organization in the field of fundamental and applied researching. In the article are discussed the part of ecological nanotechnological products of academician institutions which are developed for fuel and energy complex, including for hydro-conversion of heavy residues at the nanoscale catalysts, blocking inflows of water in wells and the production of new fracturing fluids and well targeted transport of substances, nanostructured steels for pipeline transport and shipbuilding, modeling of processes at oil and gas objects, resource innovative development strategy of the Russian economy, clean deep processing of hydrocarbon raw materials, search of hydrocarbons with low-frequency field sources in magneto-telluric sounding, non-destructive testing of thermal power equipment, the study of physical and chemical properties of rocks at the nano- and micro-level by methods of molecular and cluster dynamics and kinetic models.

(Center for Fundamental Researching of Physical and Technical Department of National Research Center «Kurchatov Institute», Moscow)

Gureev A.A.

Modification of road binders properties with polymers

Keywords: asphalt concrete coverings quality, petroleum road binders.

Abstract. The article shows the approximate financial technological losses from the operation of modern Russian roads. It is proposed to use the same terminology for bituminous materials. Possible future effective ways and ways out of the situation and, among the main - the need for the development and widespread use of advanced polymer-modified binders (PMB). When covering the main types of polymers used today, summarizes some of the features offered and the scientific and technological basis for expanding their range. It paid particular attention to the feasibility of development of regulation sedimentation stability of the PMB. As one of the ways of such regulation drawn attention to efficient technology "stitching" of the polymer molecules and asphaltene structure of oil residue.

(Research and Education Center "Bituminous materials" Russian State University of Oil and Gas named after I.M. Gubkin, Moscow)

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

Nikitin A.A., Karasev E.N., Dutlov E.V. Piskunov A.V., Borisanov D.V.

Development of the method for increasing the production of winter diesel fuel at JSC "Slavneft-YANOS"

Keywords: diesel fuel for cold and arctic climate, jet fuel, dewaxing, ballast fractions.

Abstract. The present article describes the method of increasing the production of diesel fuel for cold and arctic climate (winter diesel fuel) by means of directing the ballast fractions which already have the required low temperature properties to bypass the dewaxing unit.

Advantages of the method: the production of winter diesel fuel increases, jet fuel fractions are released; dependence on the import reduces; 60% of the feed is not subjected to dewaxing where the cracking takes place; hydrogen and power consumption decreases; the reaction expedites due to the increase of initial components concentration; minimal capital expenditures.

The present method was introduced at JSC «Slavneft-YANOS» in October 2014. It enabled the Refinery to produce winter diesel fuel up to 140 thousand tons per month at the dewaxing unit capacity equal to 60 thousand tons per month.

(JSC «Slavneft-YANOS», Yaroslavl')

Efremov A.A., Peskov V.E., Roytman E.V., Frolov A.Yu.

Performance properties of gasoline RON-95-K5 generated with octane additive "OCTA" E402

Keywords: automobile gasoline, octane additive "OCTA" E402.

Abstract. According to comparative tests of gasoline RON-95-K5 generated with octane additive "OCTA" E402 and commercial gasoline LUKOIL RON-95-K5 on fifth environmental class car found that: the additive does not adversely affect its physicochemical environmental and performance characteristics of gasoline; and meets the requirements of Euro 5 regarding environmental performance of the car.

(NPO "CHEMEVROPROM", Moscow)

Taushev V.V., Khayrudinov I.R., Telyashev E.G., Tausheva E.V., Sultanov F.M., Taushev N.A., Nizamova G.I.

Technology of oil residues delayed coking for fuel coke production

Keywords: delayed coking technology, oil residues, fuel and conventional cokes, under-reactor bunker, coking in coke cake.

Abstract. The proposed delayed coking technology is intended for production of 'shot-type' and ordinary (conventional) coke produced at the same time on one unit, and the cycle of the process includes the step of coking in the mode of production of "shot-type" coke, stage of reactor preparation for coking in a mode of production conventional coke, coking stage in the mode of obtaining conventional coke and stage of reactor preparing for coking in the mode of production of "shot-type" coke which is carried out successively in the same reactor with the above steps followed by transferring to a second reactor, then the process cycle is repeated. Coking stage is carried out at a temperature of 505–530°C for 6–8 hours under a pressure of not more than 0.2 MPa and discharge of "shot-type" coke from the reactor is carried out into a under-reactor bunker at a temperature of 390–420°C under a pressure of water steam or inert gas after coke steaming in a reactor wherein the under-reactor bunker is performed with internal insulation and mounted pressure-tight with respect to the reactor, wherein the coke cooling by water is carried out in the under-reactor bunker.

The new technology allows to reduce coking cycle by half during fuel coke production, when combined process for producing fuel and conventional coke - by 30%, to mechanize the process of cleaning the reactor, to improve the environmental performance of the process.

Mikishev V.A., Trukhina A.A., Andriyanov M.V., Glazkova M.S.

The industrial experience the unit of synthesis MTBE in the Angarsk Petrochemical Company

Keywords: methyl tert-butyl ether, octane additives, motor gasoline, esterification.

Abstract. It is presented the results of operating experience of the unit of MTBE production projected in JSC "Angarsk petrochemical company". The degree of conversion of isobutylene depended from applied different catalyst systems. It is shown that the replacement of the catalyst allowed to increase the production of MTBE at 15–20%, reduced the loss of isobutylene in butane-butylene fraction after reaction.

(Angarsk petrochemical company)

CHEMMOTOLOGOS

Lashkhi V.L., Chudinovskikh A.L., Salutenkova V.A. **Oil as complicated colloidal system**

Keywords: colloidal system, disperse phase, dispersive environment, micellar structure, motor oil.

Abstract. Observed is the behaviour of motor oil from positions of colloidal system, for which formation of micellar solutions in a wide range of temperatures is common. Temperature growth causes transition of a system from above-micellar into micellar and further into molecular state. Thus, properties of oils being directly tangled up with a colloidal state and features of its change. During oil operation a complication of colloidal structure occurs, because of active disperse phase accumulation within the working oil.

MATHEMATICAL SIMULATION

Ivanchina E.D., Ivashkina E.N., Platonov V.V., Dolganova I.O., Glik P.A., Krutey A.A.

The creation and application of computer simulation system for optimization of multistage production of linear alkylbenzenes

Keywords: LAB, Computer simulation system, alkylation, catalyst of alkylation, reactor of dehydrogenation.

Abstract. The article is considered methodological aspects of the development and application of computer simulation system for optimization of multistage petrochemical production, it operating in a high degree of flammability, explosive and toxic catalyst. Example is described a complex process of obtaining linear alkylbenzenes LLC "KINEF." It is shown that the creation of a computer modeling system consists of a successive steps of forming schemes of chemical reactions, making kinetic model and the model of the reactor, realization of theoretical and experimental studies, the establishment of conformities of change in the mode of the reactor and the issuance of recommendations for improving the efficiency of the use of resources of raw materials and the catalyst.

(National research Tomsk polytechnic university; LLC "PA "Kirishinefteorgsintez")