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Overview handling of used oils. Part II. National experience organization of collection and refining (recycling) used oils

Keywords: used oil, waste oil, experience, waste, oil, treatment, collection, recycling, recovery, regeneration, country, resource, security, industry.

Abstracts. Currently, the Russian Federation has been a fundamental change in the basic normative legal acts governing the treatment of waste, including the results from the operation of petroleum products. With regard to the lubricants we are talking about used oil, the intensity of handling which is largely related to the level of economic development, industrial production and state environmental oversight.

In reforming the legislation governing the treatment used oils in the Russian Federation, it is useful to take into account the existing experience of handling (collection and recycling (recycling, recovery)) used oils in economically developed countries, having a historical aspect, as in the world as well as in the domestic scale. Special attention worthy achievements in the organization and management of handling, as well as the development of infrastructure for the collection and processing (recycling) of used oils in the European Union. It should be noted that in the economically developed countries waste oils are regenerated, that is, extended life cycle, which is reflected in the adopted laws and regulations.

In the Russian Federation, in the interests of manufacturers of lubricants, legally regulated disposal (recycling) used oils, that is, in general, the completion of the life cycle.

Therefore, in the Russian Federation to the development of regulations and adoption of the federal bodies of executive decisions on the organization of waste handling it is advisable to take into account the experiences and elements of the treatment used oils in Russia taking into account the risks and opportunities for producers and importers of lubricants.

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PETROLEUM PRODUCTS: TECHNOLOGY, INNOVATION, MARKET

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FCC naphtha hydrotreating

Keywords: cracked naphtha (CN), hydrotreating, dienes, iodine number, octane, olefins, mercaptans, sulfur.

Abstracts. The features of the chemical composition of samples of FCC naphtha (CN), obtained at different catalytic cracking units were examined, the results of hydrotreating of these samples on catalysts in the

series of RK were carried out, analysis of the kinetics of sulfur hydrogenolysis and hydrogenation of unsaturated compounds was made, it was established the influence of the method of synthesis of catalysts and their operating conditions on the kinetic hydroforming process parameters and product quality. It was shown:

- in hydrotreating process of FCC naphtha significant role belongs to porous structure alumonikel(cobalt)molybdenum catalysts, therefore, a process for their preparation. It is preferable a uniform distribution of the active ingredients in a porous carrier structure. It is possible the combination of catalysts with different distribution of the components in the porous structure;
- process hydrotreating of FCC naphtha is divided into two areas of the reactions:
 - preferable in homogeneous phase with the predominance hydrogenolysis reactions of sulfur compounds thiophenless nature and minimum hydrogenation of olefins;
 - on the active centers of the pore surface of the catalyst, that is the internal kinetic and internal diffusion areas with reactions hydrogenolysis of thiophene sulfur series and hydrogenation of unsaturated.

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Influence of process of catalytic cracking of heavy vacuum distillate

Keywords: catalytic cracking, vacuum gas oil, parameters of process catalytic cracking, cracking.

Abstracts. Ever-increasing demand for motor fuels requires further deepening of oil refining. Growth of oil refining depth is achieved by an increase of the proportion of destructive processes of conversion of weighted distillate fractions boiling above 350°C. One of the most largest processes that let to achieve a successful solution is the process of catalytic cracking. Currently the advanced catalytic cracking feed becomes the heavy distillates and residuums of various depth slate.

It's found that using of vacuum gas oil of Kazakhstan sweat crude as feed, boiling point vacuum gas oil might be raised from 480 to 550°C. Whereby resources of catalytic cracking feed grow by 8,3–11,0% mass. So evolution of catalytic cracking principally associated with widening of feedstock base, requirement toughening to feed quality and products that obtained from it, the improvement of catalysts and technologies.

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New carbonaceous reducing for manufacturing silicon carbide

Keywords: silicon carbide, a reducing agent, petroleum coke, petroleum coke fines, specific surface area, reactivity, silica, drying, pores.

Abstracts. Considered skilled use of all particle size distribution of petroleum coke. Shows the different technology upgrading petroleum coke breeze and identified their strengths and weaknesses. An optimal variant preparation petroleum coke for the production of silicon carbide.

Excessive moisture degrades reducing thermal balance costs since electrofusion heat for evaporation and partially dissociate water, as well as causing increased consumption of the reducing agent due to its oxidation activity of the steam and products of water dissociation. When using wet reductant difficulties with its vibrating screen for sifting, especially in the process of separating fines fr. 0–8 mm. The greatest negative impact on the whole is not so much the absolute moisture content, as the instability of this indicator is caused by loss of precision blending furnace carbon. It was found that an increase in reactivity and specific surface petroleum coke entails improving the technology of silicon carbide, the reduction of material and capital costs of producing it.

Due to evaporation of moisture and the impact of water vapor on the carbonaceous material can create a positive effect consisting in the steam activation of a reducing agent, accompanied by an increase in its reactivity, and electrical resistivity. The intensity of the recovery depends on the surface accessible oxidant activity of carbon, the reaction mechanism and the conditions of their occurrence.

Humidity petroleum cokes at UT due to the specifics of their discharge from the coking reactor water jets. At the same time discharged coke humidified both by contact with water and water transport at the pore channels and due to «pull» water into the pores of the coke from the condensation of vapor and volume reduction of gas in the pores during cooling of coke

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Para-, Superpara/Ferromagnetic Intermediates in Catalytic Systems of Butadiene Polymerization Based on Dithiophosphate Complexes of Co(II) and Ni(II)

Keywords: para-, superpara/ferromagnetic Intermediates, Butadiene Polymerization, Dithiophosphate Complexes of Co(II) and Ni(II).

Abstracts. The results of spectroscopic and catalytic properties of Co(II) and Ni(II) dithiophosphate complexes based on mordenit are given. The intermediate paramagnetic complexes and superpara /ferromagnetic clusters of nickel and cobalt in catalytic systems of butadiene polymerization are identified by EMR spectroscopy. By comparing the experimental spectra with theoretically calculated the size of the magnetic particles produced in the reaction medium is estimated and the changes of the size during the reaction (3–12 nm) is investigated. It is assumed that in these systems under the influence of alkylaluminum Ni (II) and Co (II) ions in starting dithiophosphate complexes are reduced to zerovalent state and further due to disproportionation reaction complexes of diamagnetic monovalent cobalt and paramagnetic monovalent nickel in the system are formed. The structure and nature of the magnetic centers and their participation as the catalytically active centers of polymerization reactions of butadiene are discussed.

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ANALYTIC METHODS FOR OIL and PETROLEUM PRODUCTS

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New tool opportunities in a maslovedeniye

Keywords: oils, viscosity, Stabinger viscometer, base oils, finished oils, density, precision.

Abstracts. In maslovedeniye viscosity, measured in accordance with GOST 33-2000, is the routine and the most often determined parameter for the certification of lubricating oils, therefore simplification and automation of viscosity measurement is of great importance. The article describes application of Stabinger viscometer SVM 3000 for this purpose. The Stabinger viscometer combines the accuracy of standard capillary viscometers with high speed and convenience in operation of the advanced digital Anton Paar density meters and has the standard mode of viscosity index calculation in accordance with ASTM D2270 and ISO 2909. The measuring cells consist of a pair of rotating concentric cylinders and an oscillating U-tube. The dynamic viscosity is determined from the equilibrium rotational speed of the inner cylinder under the influence of the

shear stress of the test specimen and an eddy current brake in conjunction with adjustment data. The density is determined by the oscillation frequency of the U-tube in conjunction with adjustment data. The kinematic viscosity is calculated by dividing the dynamic viscosity by the density. The new principle of measurement allows to eliminate traditional barriers between capillary and rotational viscometry. Compatibility with the earlier used methods of measurement provides the possibility of automatic recalculation of the results from dynamic viscosity to the kinematic. The methodology of the tests carried out in JSC All-Russian Research Institute of Oil Refining (VNII NP) covers measurement of dynamic and kinematic viscosities, densities of base oils and finished oils (motor oils, hydraulic oils, transmission oils, compressor oils, turbine oils, aviation oils) on Stabinger viscometer SVM 3000. The obtained data were compared with results of the tests carried out in accordance with GOST 33-2000 and GOST 3900-85 with further calculation of deviations in values obtained by both methods. Tests on Stabinger viscometer were carried out according to ASTM D 7042-04. Deviations of the values of kinematic viscosity measured by both methods were within the limits admissible by GOST 33-2000 – no more than 1,2%, and for density – 0,0015 g/cm³ in accordance with GOST 3900-85. The performed on Stabinger viscometer tests clearly show that the results of measurements of kinematic viscosity and density for the studied oils at different temperatures are identical to the results obtained in accordance with GOST 33 and GOST 3900. The kinematic viscosity values at 20°C, 40°C, 50°C, 100°C, minus 20°C and minus 40°C obtained in accordance with GOST 33-2000 and on the Stabinger viscometer meet the admissible deviations in accordance with GOST 33-2000. According to GOST 33-2000 kinematic viscosity is measured up to the 30000 mm²/s (inclusively). The obtained results form the basis for carrying out interlaboratory tests under the authority of JSC “VNII NP” with the subsequent inclusion of this device in the GOST 33-2000 interstate standard.

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MATHEMATICAL SIMULATION

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The algorithm of formation restrictive standard of petroleum products quality using group method of data handling

Keywords: restrictive standard, quality of petroleum products, group method of handling.

Abstracts. This article is devoted to the problem of determining the restrictive standards of petroleum product quality. Quality indices of any product are continuously changing during the process of storage, transportation and use. Therefore, quality control is one of the most important component of product life cycle. The procedure of quality control is impossible without information about regulated value of quality index (restrictive standard), which represents the value established in normative documents. This means that today the problem of determining the restrictive standards of product quality is relevant. The central part of the article is devoted to procedure of analysis possible application of group method of data handling in order to use in calculating the regulated values of product quality. Reviewed and analyzed the three main stages of the simulation in compliance with group method of data handling. Among them: determining a number of models increasing complexity, S ; the calculation of the external selection criterion; the choice of the optimal model for minimum criterion. Using group method of data handling assume the choice two criteria: internal, which used to construct the model and external, which used to select the optimal model. This article discusses general classification criteria used in group method of data handling, as well as features of their application in the calculation of restrictive standard. In conclusion, gives an example that illustrates possible outcome of the

modeling process. The article considers the case when the optimal model is a linear function. If the model is nonlinear, then the calculation of the restrictive standards will be different from this.

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