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Features of calculation of the cost of production of oil refining in modern conditions

Keywords: instruction, calculation, cost, primary production, by-product, technological process, score, price of base oil.

Abstract. The main prerequisites for increasing transparency in the pricing of oil products on the domestic market of Russia are, firstly, a more complete accounting of their production costs by eliminating of "give-and-take" oil-processing and, secondly, reliable data about all of the costs of certain types of commodity petrochemicals, which, in turn, depends on the applied methods of calculation of the cost of oil products in complex production processes.

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Integration of oil refining processes

Keywords: capital expenses (CAPEX), operational expenses, crude oil distillation, hydrotreatment, catalytic reforming, catalytic cracking, residue hydroconversion.

Abstract. The configurations of integrated units of oil refining (LK-6U, GK-3, G-43-107, KT-1, KT-1u, KT-2) were reviewed. The advantages of creation of integrated units were emphasized: reduction of capital and operational expenses, decrease of losses of oil products, reduction of area occupied by units.

The LK-6 U unit is designed for simple oil refining, but it allows to produce quality gasolines and diesel fuels. Other types of units contain in their configuration the section of vacuum distillate cracking, which resolves the issue of deepening of oil refining. The KT-2 unit also allows the hydroprocessing of tar. The task of oil refining development in Russia is the creation of new generation of integrated units, containing the sections of vacuum gas oil hydrocracking and catalytic dewaxing of middle distillates.

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

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Esterification of natural naphthenic acids with aliphatic alcohols catalyzed by ionic liquids

Keywords: natural naphthenic acids, esters of naphthenic acids, ionic liquids.

Abstract. Protic ionic liquids N-methylpyrrolidone hydrogensulphate and 1,4-dimethylpiperazine digidrosulfat have been synthesized. Natural esters derived naphthenic acids with aliphatic alcohols (C₁ to C₈) in the presence of ionic liquids N-methylpyrrolidone and 1,4-dimethylpiperazine dihydrogensulphate. Defined physico-chemical characteristics of the resulting ester of natural naphthenic acids. Esters and ionic liquids were performed by IR, 1H, 13C-NMR spectroscopic methods.

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Mitin I.V.

The energy definition of the interface "water-oil". Theoretical questions of emulgruet

Keywords: phase interface energy; oil demulsifying ability; method of assessment of demulsifying properties of oil; water in oil; structuring of water globules in oil.

Abstract. The existing methods do not give exact assessment of demulsifying properties of oil, as they are based on oil operation imitation. Not a single method does consider the influence of two phases interface energy. On the basis of researches done, a method with a specially designed calorimeter application was developed, which allows to determine the size of phase interface energy by a temperature difference between water and oil layers. Size of this energy characterises the demulsifying ability of oil and activity of the deemulgator.

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Synthesis of allyl allyl and propargyl esters of natural naphthene acids in presence of ionic liquid as catalyst

Keywords: natural oil acids, ionic liquids, N-methyl pyrrolidone hydrogensulfate, allyl and propargyl alcohols.

Abstract. The esterification reaction of natural oil acids with allyl and propargyl alcohols in presence of ionic liquid N-methyl pyrrolidone hydrogensulfate have been studied. The received esters of oil acids have a high yield (85-90%) and the least duration of reaction (2 hours). The structure of synthesis compounds have been proved by the spectroscopic methods as IR and NMR.

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EQUIPMENT and DEVICES

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Ways of struggle with sediment in the feed heat exchanger units of hydrotreating diesel fuels

Keywords: the struggle against sediments, coke formation, heat transfer equipment, quality raw materials, diesel hydrotreating.

Abstract. Actuality of the problem is caused by that while using heat exchangers we always have a problems associated with a decrease in the effectiveness of their work. Diesel hydrotreater designed for destructive hydrogenation of sulphur-, nitrogen- and oxygen-containing organic compounds. The reaction produces hydrogen sulfide, ammonia, water and alkanes. By increasing the purity requirements of the European standards to the concentration of substances resulting from the hydrogenolysis is increased, which leads to side reactions of sulfidation, accumulation of salts on the walls of pipes and apparatus.

Three of the four represented in the diagram of the heat exchanger during overhaul subjected to complete disassembly. In the picture we can see that the upper part of the tube bundle heat exchanger T-5 at the exit of the tubes covered with a white powdery dirt. On the other heat exchanger tubes in tube area no sediments were found. The condition of the shell part of the heat exchanger T-5 is characterized by small thickness dirt, which did not increase the hydraulic resistance of the heat exchanger. Condition of the other two heat exchangers for shell side, by contrast, has a significant impact on the hydrodynamics and heat transfer.

The main identified components of sediments are chloride ions and ammonium ions. Corrosion products are presented in small quantities. Corrosion products are presented in small quantities. Thus, the sample is mainly ammonium chloride, which is also confirmed by its high solubility in water (98.1%) and substantially complete evaporation calcination at 600°C. According to the reference data of the salt solubility is 29.4 g per 100 ml of water, the sublimation temperature 337.6°C. In appearance the sample is also consistent with ammonium chloride (white crystals). The reason for formation of such sediments are the following factors:

1. The presence of chlorine compounds in the raw materials and hydrogen chloride in fresh VSG at the refinery factory. As a result, organic chlorine hydrogenation in the hydrotreating reactor, hydrogen chloride is released;
2. The presence of nitrogen compounds in the feed as a result of the hydrogenation of ammonia which is formed;
3. The temperature in the tube area of primary heat exchangers.

At the outlet of the reactor, hydrogen chloride and ammonia to form ammonium chloride, which is at a high temperature gas-product mixture is in the gaseous state. With a gradual decrease in temperature as a result of cooling in the raw heat exchangers it is possible desublimation, i.e. the change from the gas phase into the solid, which is what we are seeing at the outlet of the heat exchanger tube space of T-5. The temperature of happening this process is called the desublimation point. It depends on the ion concentration in the composition of gaseous salts (chlorides or increasing the concentration of ammonium ions causes a corresponding increase in temperature desublimation point whereby desublimation Move towards T-6), pressure, quality of surface heat exchange equipment, the presence of moisture.

In tube bundles 6, -7, -8-T devices such sediments was observed. Assuming that the gas-product mixture temperature at the inlet of the T-5 is 201°C, output 143°C - desublimation point is in a given temperature range. It depends on the ion concentration in the composition of gaseous salts (chlorides or increasing the concentration of ammonium ions causes a corresponding increase in temperature desublimation point whereby desublimation move in the direction T-6), pressure, quality of surface heat exchange equipment, the presence of moisture.

MATHEMATICAL SIMULATION

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Modeling of synthetic oils flooding in storage

Keywords: aircraft, synthetic aircraft oils, dissolved water.

Abstract. Synthetic aircraft oils have petroleum-based oils at a vantage, but they are notable for elevated hygroscopicity and connected with it corrosive aggressiveness which increases to critical value with densification of lysed water. For practical purposes limitation of synthetic oils' contact with the atmosphere air is required.

Out of the experiment it is known that the process of encroachment runs inhomogeneously. It slows down according to water accumulation and later reaches the saturation state. In connection with the existence of the saturation state it has been suggested that synthetic aircraft oils contain limited amount of «active» molecules which are able to retain water in solubility. There has been suggested a hypothesis that the process of watering is considered to be Markovian, and the speed of water accumulation in synthetic oils is proportional to the number of water free «active» molecules. The solution of Chapman–Kolmogorov simultaneous differential equations, describing the process of watering, determined an exponential form of dependance of air residence time on water rating $C_t = C_{\max} - (C_{\max} - C_0) \cdot \exp(\lambda \cdot t)$.

In the first approximant, C_{\max} is customary to be equal to upper-range test value. The amount was evaluated with experimental data using the method of mean-square approximation. After that, C_{\max} was refined using the method of progressive approximation by minimal dispersion criterion. Application of this method was exemplified using synthetic aircraft oil B-3V. The variability index for it was about 2 percent. The storage time prediction potential of presented method is also shown.

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Using the group method of data handling to formation restrictive standard of petroleum products quality

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

Abstract. This article considers features of using the group method of data handling to formation restrictive standard of petroleum products quality. Based on the results of measuring real laboratory found an optimal model that best describes initial data.

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