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Complex efficiency analysis of oil refining PFDs depending on refinery power in conditions of legislation changes in Russia. Part 2 (with deep processing PFDs, oil prices influence)

In the first part of work it was considered, what impact the change of Russian legislation (Technical regulations on oil products quality, change of excise taxes on fuels of different ecological classes) has on the efficiency of oil refinery reconstruction (without heavy residues processing). It was shown that the most effective options for reconstruction of oil refinery are schemes with maximum production of middle distillates, and also is noted that small refineries will be closed because of their economic inefficiency. Medium oil refineries with a capacity of less than 4 million tons per year with no deep processing will have also a low economic efficiency, but construction within their structure of a heavy residues processing can raise it and provide a reconstruction payback.

PETROLEUM PRODUCTS: TECHNOLOGY, INNOVATION, MARKET

Maganov N.U., Ibatullin R.R., Rempel R.D., Hayrudinov I.R., Kutysin Yu.A., Telyashev E.G.

Prospects of synthetic oil and road bitumens production from Ashalchinsky crudes

Keywords: heavy crude oils processing, base design.

Successful development of heavy oil mining technology at the Ashalchinsky field in Tatarstan was resulted in the need to estimate a possibility of creation of its processing complex at the production field. A base design of heavy oil processing technology at a mini-refinery containing rectification and deasphalting units was developed by the State Unitary Enterprise INHP RB. The production of synthetic oil and road bitumens is provided as commercial products.

Sultanov F.M., Hairudinov I.R., Shoipov H.S., Nasyrov R.R., Farhetdinova M.M., Safin E.R.

Modernization of DAO solvent recovery unit on deasphalting units of type 36/2, 36/2M aiming at reducing energy consumption

Keywords: deasphaltization, deasphalted oil solution (DAO solution) propane, propane-butane mixture, solvent, energy saving.

The analysis of the effectiveness of energy-saving dual-flow regeneration scheme of DAO solution solvent has been carried out; the separation of solvent from first flow DAO solution is carried out at elevated pressure, from second flow DAO solution – at low pressure. It is shown that introduction of the suggested method provides an opportunity to save up to 53% of water steam at the propane regeneration stage, and up to 63% of circulating water at the stage of recovered propane cooling and condensation.

Conclusion: The implementation of the suggested dual-flow energy-saving regeneration scheme of DAO solution solvent permits to save from 36% to 53% of water steam and from 26% to 63% of circulating water for running the process.

Particular values of energy resources saving are significantly defined by the pressure in high pressure separator. Bigger economy is achieved at supercritical mode of operation of a separator ($P = 4,3$ MPa) rather than at moderate pressure давлении (3,3 MPa).

In our opinion, for reconstruction of existing deasphalting units of type 36/2, 36/2M it is preferable to use second mode of solvent regeneration process running – at moderate pressure of 3,3 MPa, as long as this variant of reconstruction does not require the replacement of extracting columns. While constructing a new unit the first variant of execution of DAO solution solvent regeneration block that can be used at supercritical mode, has an undoubted advantage.

Aksyonov V.I.

Synthesis of copolymers of ethylene with vinyl-acetic ester – depressor additives to fuel oils at presence of protonless bipolar compounds

Keywords: protonless bipolar solvents, depressor additives, co-polymerisation intensification, fuel oil, radical co-polymerisation, ethylene copolymers with vinyl-acetic ester.

It is found that some protonless bipolar solvents as acetonitrile, tributyl phosphate, dimethyl formamide, dimethyl sulfoxide and hexamethyl formamide in particular, when being taken in equimolar rate with acyl peroxides or per-ethers, intensify radical co-polymerisation of ethylene with vinyl-acetic ester at medium pressure and moderate temperature in organic solvent, and increase by 25 to 85 percent the yields of copolymers used as effective depressor additives to fuel oil.

Barabanova G.V., Rudavets L.N., Evstratova M.A.

Improvement of operational characteristics of NGZh-5u aviation working liquid

Keywords: jellification, hydrolytic stability, phosphates, corrosion inhibitors, epoxy additives, resource tests, thermal stability, specific electric conductivity.

The present article is devoted to a problem of jellification of fire-resistant NGZh-5u working liquid by its long operation in hydraulic systems of civil aviation planes, and ways of its solution. The reasons for appearance and methods of assessment of this phenomenon are considered. Optimisation of phosphate liquid composition by introduction of new effective additives and components allowed to improve such operational characteristics as hydrolytic stability and specific electric conductivity. This could possibly help making an essential contribution to decrease in tendency of fire-resistant liquid towards jellification.

CHEMMOTOLOGY

Lashkhi V.L.

A view upon the applied chemistry of motor oils

50 years ago an article by K.K. Papok has been published, which presented to the scientific community in a systematised and formalized form a science so-called himmotologiya, and defined its research borders at the same time. Objects of study of this science are fuels and lubricants which in the form of a chemical-motor-logical triangle are being synchronised with the machinery and conditions of its operation. As the most difficult objects for the research, motor oils caused appearance of an important direction of himmotologiya – applied chemistry of motor oils.

ANALYTIC METHODS FOR OIL and PETROLEUM PRODUCTS

Al-Dahmi Abdulgani M.S., Varlamov A.P., Ilyasov L.V.

Automatic chemical analyzer of total mass concentration of hydrocarbons in the air

Keywords: thermochemical analyzer, mass concentration, hydrocarbons.

Describes the thermochemical analyzer based on the measurement of the temperature of the catalytic combustion products. It is shown that in this analyzer there is complete combustion of hydrocarbons, which provides the ability to measure the total mass concentration of hydrocarbons in the air.

Okhlopov A.S., Zorin A.D., Guschina E.A., Zarubin O.P.

Studying of influence of the liquid environment on intensity of fluorescence of chlorine-containing connections in crude oil X-ray fluorescence analysis method

Keywords: X-ray fluorescence analysis (X-ray FA), organochlorine compounds, crude oil.

Studied the effect of the fluid on the fluorescence intensity of chlorine in the application of X-ray fluorescence analysis (X-ray FA). It is shown that for determining the content of chlorinated compounds in the crude oil X-ray FA use standard solutions, prepared by blending an organochlorine compounds in toluene as the solutions in their optical characteristics similar to crude oil.

Zakharova M.S., Dorogochinskaya V.A.

Express method for S, Fe, Mn, Pb definition in light petroleum products

Keywords: hetero-organic compounds, light petroleum products, X-ray fluorescence spectrometry.

One of the most exact and sensitive methods for definition of sulphur, lead, manganese and iron in automotive gasoline, and also sulphur in aviation gasoline and diesel fuels is now the X-ray fluorescence spectrometry method with dispersion by wave length. Its main advantage is the possibility of simultaneous definition of a wide set of elements with minimal time and material costs. X-ray fluorescence spectrometers are used

for definition, as ThermoARL Optim'X and Perform'X by the ThermoScientific Company, whose representative in the Russian Federation is the Termo Tekhno LLC.

ECOLOGY and INDUSTRIAL SAFETY

Tomin V.P., Tsvetkov D.A., Mikishev V.A., Mogilevich V.M.

Offsite facilities the refinery in conditions of transition to issuance perspective engine fuels

Keywords: ammonia, analytical control, infrastructure, modernization, refinery offsite facilities, a greenhouse gas, steam reforming, sulfuric acid, waste water, elemental sulfur.

The article shows the current status of offsite facilities refineries and perspective in the conditions of carried production modernization. The main problems for offsite facilities, which arise during the transition of refineries to produce environmentally safe engine fuels, are presented. Problems related mainly to increase of consumption of fresh water, formation and utilization additional amount of emissions, waste from new processes. Therefore, the construction of new production facilities should be accompanied by modernization of infrastructure offsite facilities, which should include the newest developments, excluding problems of old technologies.

Mamulayshvili N.D., Baladze D.L., Hitarishvili T.D., Tarieladze M.A.

Natural sorbent on the basis of eastern plane tree fruits

Keywords: natural sorbent, reagent, oil products, eastern plane.

A natural petroleum sorbent is investigated, made of local vegetable feedstock: fruits of plane tree, namely eastern plane, a kind widespread in Georgia. Owing to sorption and hydrophobic properties it can be used as sorbing substance at collection and elimination of emergency spills of oil and oil products from water surface.

The tree fruits are located on a branch in a form of balls of a diameter from 3 to 3.5 cm. The chemical composition of fruits includes hydrocarbons, cytosterol, highest alcohols and their derivatives.

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