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**Pricing of used (waste) oils - a key factor in the development of business in the collection and processing (recycling) of used (waste) oils in Russia**

*Keywords:* used (waste) oil, price, pricing, cost, methods, costs, handling, collection, processing, utilization, quality, factors analysis, market

*Abstract.* Reviewed the information, economic and methodological aspects of pricing of used (waste) oils in the interaction of the participants of their treatment.

The analysis of the factors affecting the pricing of used (waste) oils.

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

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**On the prospects to produce petroleum binders in «Angarsk petrochemical company» OJSC**

*Keywords:* polymer-bitumen binders (PBB), petroleum pitch, sintering aid, brittle point, tars, de-asphalting asphalt, adhesion, briquetting, bituminous concrete, oil carbon.

*Abstract.* The paper reports on the results of long-term researches in the field of the organization of industrial manufacturing and introduction in commercial production of the following petroleum binders: polymer modified bitumen, petroleum pitch, and sintering aids. Having described the production techniques of polymer-bitumen compositions and petroleum binders produced on the basis of any raw material components manufactured by the Angarsk Refinery, the article demonstrates their potential to be used at the major industrial enterprises of the Eastern Siberia including large tonnage aluminum production (anode paste), road services, modified road bitumen, power engineering and metallurgical industry, and organization of sintering aid production.

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**Octane corrector – simple mixed ether**

*Keywords:* petrol, octane-corrector, mixed ether, emission standard, N-methyl-para-aminoanisole

*Abstract.* In the following article stated studies of high efficiency octane corrector, simple mixed ether – N-methyl-para-aminoanisole, N-methyl-para-anisidine (NMPA), which combines effectiveness of ether functional group and aromatic amines. While injecting in ether “mixture 70”, 1.0% and 1.3% NMPA octane number by motor method tests increases on 5.8 and 7.1 points, RON increases on 6.0 and 7.5. While injected in petrol ON-92 TAME, made from raw material with NMPA in amount of 3.0% of complete mass, octane number by motor method test increases on 2.5 octane points. NMPA exhibits anti-oxidant and washing capabilities and provides inquiry on high-octane petrol components for 5th emission standard.

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**Thermal cracking of residual fuel Nigerian oil**

*Keywords:* gasoline fraction; diesel fraction; residual fuel; thermal cracking; distillate fractions, iodine number, cetane index.

*Abstract.* Many years ago one of the major oil refining processes was thermal cracking, which was crucial for the production of gasoline. Subsequently, after the realization of the need for a catalytic cracking process in the thermal cracking was reduced. Now thermal cracking is used only in the version of visbreaking unit. However, in modern refining schemes that requires the achievement of a significant oil refining depth again increased interest in the thermal cracking process, in particular, to the cracking of residual fuel as a source of additional resources distillate fractions. In this regard, we have carried out experiments on the thermal cracking of residual fuel Nigerian oil.

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### **The results of the development of technology for production of base oils from the mixture of Azerbaijan oil**

*Keywords:* hydrogenation processes, API classification, the mixture of Azerbaijani oils, selective catalysts, hydrocarbon composition of oils.

*Abstract.* Currently in Azerbaijan state program for processing a perspective mix of Azerbaijan oil to the new petrochemical complex with the involvement of foreign companies to produce base oils that meet the requirements of API classification using hydrogenation processes.

A review of advanced foreign companies apply technology to produce base oil of the II and III groups showed a preference for a combination of selective treatment with subsequent hydrogenation processes, which allows the use of lower temperature and pressure, a more selective catalysts to reduce the consumption of hydrogen.

The article shows how the processing of oil fractions mixture of Azerbaijan oil to produce base oils of group II in two ways. I – distillate selective treatment (fr. 330–500°C) – mild hydrocracking at a temperature of 400°C, a hydrogen pressure of 10 MPa, a hydrogen amount of 500 l/l of catalyst per hour at an industrial HKIO-430 further dewaxing hydrocatalytic fraction (385 to 500°C) isolated from the industrial hydrogenation catalyst Russian CTK-1 at 380°C, p = 4.5 MPa, an amount of 500 liters of hydrogen / liter of hydrogenation of selected oil fraction (330 to 500°C) is then subjected to hydrotreating in the hard mode at Al Ni Mo catalyst, at 400°C, pressure of hydrogen 4.5 MPa.

It is shown that with the I obtain embodiment the base oil type SN-80 is received saturates content of ~ 90%, and 0.03% sulfur.

According to the II obtain base oil SN-180 type with saturated hydrocarbons 89% sulfur and 0.028%.

It is shown that the yield of base oils and a combination of selective treatment of hydrogenation is 27.52% for oil and oil distillates using hydroconversion - 20.6% oil.

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## **EQUIPMENT and DEVICES**

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### **Research of gas fuel blend composition impact on combustion process in burner nozzles of technological furnaces**

*Keywords:* hydrogen, gas, coke deposit, composite, methane, furnace, burning-up, incineration, composition, heat, burner nozzle.

*Abstract.* As a result of growth of development pace both in domestic and foreign industries there is an increasing demand for natural gas used as feedstock for organic synthesis or as fuel for technological needs. That's why in order to reduce the consumption of natural gas a new composition of fuel gas for technological furnaces in refinery industry was defined, based on hydrogen-containing gas and hydrocarbon gas of own production. The experimental data obtained in the course of tests have shown that 44% rate of hydrogen content in hydrocarbon gas allows to obtain fuel gas with calorific value of ca. 38,5 MJ/m<sup>3</sup>, which is comparable to the natural gas calorific value (equal to 37 MJ/m<sup>3</sup>). The impact of hydrogen content rate on formation, structure and appearance of flame during combustion process in burner nozzles of technological furnaces was determined. It was shown that composite fuel has the required flame length and width, and combustion products are equally distributed in the heat flow in the radiant cell of the furnace. For the first time the research was conducted on commercial scale regarding the combustion process of composite gas fuel with optimal composition and positive results were achieved, which permits to substitute natural gas as the fuel for technological furnaces.

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### **Parametric diagnosis of heat exchange equipment**

*Keywords:* diagnostics, modeling of heat exchangers, the wrestle against sediments, coke formation, heat transfer equipment, quality raw materials, hydrotreating.

*Abstract.* This article contains information about a diagnostic method heat exchange equipment in the refinery, from whose work is directly related energy consumption at the plant. Heat exchanger - a critical element in the process of any enterprise, which affects the operation of the main equipment. Heat exchangers of all types require regular cleaning of the heat transfer surface of the sediment and dirt. Currently, the refinery

don't have methodology for determining the needs of the cleaning heat exchange equipment. This leads to an unjustified increase in costs due to late cleaning. These costs may be caused by excessive consumption of fuel to furnaces, arranged after the heat exchangers due to the strong heat transfer surface contamination as a result of prolonged operation, and the additional cost of the repair of heat exchangers with their associated disassembly and cleaning, in cases when these works were not substantiated. Real losses can be estimated by comparing the two types of costs and determine the optimum operating period of the heat exchanger from disassembly to disassemble when excessive operating costs will be equal to the cost of repair of the heat exchanger. As a result, long-term monitoring of process parameters of heat-exchange equipment and the calculations was found proportionately between the driving force for heat transfer and temperature difference between the hot side of the heat exchanger. Hence, by measuring the temperature at the end of the exchanger flows and comparing their difference at the current time and the initial time with some confidence we can judge the purity of the heat transfer surface. The main objective here is to choose the borders on which to judge the need for cleaning of the heat exchanger.

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## MATHEMATICAL SIMULATION

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### **The influence of the type of optimal models on restrictive standard of petroleum products quality**

*Keywords:* restrictive standard, quality, petroleum products, optimal model.

*Abstract.* Article «The influence of the type of optimal models on restrictive standard of petroleum products quality» is continuation of publications [1] and [2]. It considers in detail the methods of formation restrictive standard of petroleum products quality depending on the type of optimal models. Based on the results of [1] and [2] three situations were reviewed and analyzed. As a result, for each situation provides guidance on the definition of restrictive standard of petroleum product quality.

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