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**Features of calculation of investment amounts for modernization of the operating oil refineries on the current stage of Russian economy development**

*Keywords:* investments, modernization, petroleum refineries, processing equipment, consolidated cost indexes, mathematical modelling techniques, statistical modelling, feasibility study, estimated cost.

*Abstract.* The author review the current models of investment activities in petroleum refining industry. Existing problems in costs calculation of imported and domestic oil refining equipment are considered, in the context of feasibility studies and capital budgeting of the modernization projects of refineries in Russia. The difficulty is that many technical characteristics of equipment are not identified at the beginning of the investment process. To make a decision to start investing in an upgrade of a petroleum refinery, an investor would need a feasibility analysis and a calculation of economic efficiency. Today, different project management organizations use their own practices in determining the costs of the equipment required. The article shows the advantages and disadvantages of the existing methods for determining the value of petrochemical equipment. In some cases the results of determining this value performed by different teams or organizations vary widely even for the same equipment. And the author claim that the main problem for this is the overall failure of the economic system in Russia. There is no a systemic approach in determining the costs of equipment. A method of multiple-factor statistical modeling is offered as the most effective solution for determination of petrochemical equipment's market value. Due to using the statistical modeling, and due to having a great amount of factors that influence the final value and that may be rather easily altered at the modeling stage, it is possible to achieve conformance of the future technical characteristics with the required input parameters. This way the result of value calculations tend to be more accurate. In practice, though, application of statistical modeling requires a big array of statistical data available. And it is generally possible to have this large array of data only by means of trade associations.

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**Nanotechnologies and nanomaterials of Russian Academy of Sciences for ecological safety in oil and gas industry**

*Keywords:* Russian Academy of Sciences (RAS), oil, gas, nanomaterials, nanotechnologies, ecology, safety.

*Abstract.* On Common meeting of members of Russian Academy of Sciences (RAS) Spring, 2015 were discussed the results of 2014. Were presented the results of work in different spheres (including oil, gas, nanotechnological and ecological industries) with cooperation of academician institutions and its regional divisions with leading industrial holdings. Also were presented thermoelectric generators, pure-ecological corrosion-protection nano-covers and nanotribological mineral covers with the level up to 10-12 class, nanotechnology of parallel carbon-titan composition for producing of ecological composite films, autonomous energy stations for power supply for cathode protection stations for oil and product pipelines, devices and methods for square hydrocarbon geochemical researching with passive concentrators and analyzing in field conditions on gas chromatograph system.

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

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**Glossary of technical regulations and motor gasoline toxicity**

*Keywords:* motor gasoline, toxicity, carcinogens, cancer, toluidines, monomethylaniline, antidetonators.

*Abstract.* Technical Regulations of the Customs Union established a prohibition on using monomethylaniline in the manufacture of ecological class 5 gasoline.

The terminology allows the compounded gasoline producers to treat the term "monomethylaniline" only to the N-methylaniline, it can be used as the basis for the application of toluidine in anti-knock additives.

Certified methods for the determination of monomethylaniline content could not provide presence control of the toluidine group isomers.

This article presents the systematization of organic compounds used in the amine-containing additives.

*Tsvetkov O.N.*

### **Marine diesel engine oils**

*Keywords:* studies of oils, marine engine oils, circulating and dry sump lubrication systems, trunk and cross-head diesel engines.

*Abstract.* Studies of oils at all the stages of their progress have paid a lot of attention to motor oils for marine diesel engines, since they differ significantly from diesel engines used for ground machinery in their size, cylinder output, usage of mid- and high-viscosity fuels with sulfur content up to 3.5% wt., volume and complexity of lubrication systems, operational conditions of diesel engines in humid environment, trim differences and tilts of vessels. Practically all marine engine oils are based on oil distillates and residual basic components, doped by packages of additives, including antioxidants, detergents, dispersants, anti-wear, anti-corrosion, anti-foaming and other additives. The essential bulk of marine engine oils is produced according to GOST 12337 from domestic base components and additives. The production of marine engine oils is performed by the leading Russian vertically-integrated companies, as well as Zavod Imeni Shaumyana (Shaumyan plant) and some smaller companies. Besides, foreign companies, such as BP, Castrol, Chevron, ExxonMobil, Shell, SK, are also on the market. The core directions for development of marine engine oils are: increase of oil change period, decrease of oil consumption, improvement of fuel saving with existing or reduced wear of main friction couples and increase of the engine reliability rate.

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### **Motor oil of group D<sub>2</sub> with improved performance characteristics**

*Keywords:* engine oil, laboratory tests, bench tests, engine tests, anti-wear properties, diesel engine.

*Abstract.* This article deals with the oil M-14-Д<sub>2</sub> (M-14-D<sub>2</sub>), developed under government contract. Primarily, the results of laboratory tests have confirmed that the oil complies with requirements of the technical specification. Then the results of bench and engine tests are given in tables in comparison with the oil M-14-Д<sub>2</sub>CE (M-14-D<sub>2</sub>SE, then – the reference sample).

Anticorrosion properties of the oil M-14-D<sub>2</sub>, determined on Petter W-1 and ИМ-1 (IM-1), exceed the reference sample. Cleaning properties, defined on ИМ-1 and ПЗВ-Р (PZV-R), are superior to the reference sample. The antioxidant properties of the developed oil are almost at the level of a reference sample. Antiwear properties defined on ИМ-1 and method «roller (steel) - shoes (bronze)» of PJSC «Kolomensky Zavod», are superior to the reference sample. Aggressiveness of the oil M-14-D<sub>2</sub> to rubber and paronite sealing and cushioning materials has been evaluated by the method of PJSC «Kolomensky Zavod». So it has been concluded that the oil M-14-D<sub>2</sub> is not aggressive to these materials. The oil M-14-D<sub>2</sub> is also compatible with commercial motor oil M-14-Г<sub>2</sub>ЦС (M-14-G<sub>2</sub>TsS) and the reference sample, which are regular used in diesel engines Д 49 (D49). Ageing test on ДК-2 НАМИ (DK-2 NAMI) has shown up almost the same properties of the oil M-14-D<sub>2</sub> and the reference sample. Evaluation of thermal stability and volatility of the oil M-14-D<sub>2</sub> was carried out on Q-derivatograph. The obtained results have shown up that the oil M-14-D<sub>2</sub> thermal stability is almost the same as the reference sample.

The engine test has been carried out on full-size diesel-generator 21–26ДГ (21-26DG) with diesel 12ЧН26/26 (12ChN26/26) of type D49. It has been brought out that the oil M-14-D<sub>2</sub> antiwear properties are better than the reference sample's. The test also has shown that using the oil M-14-D<sub>2</sub> reduces the emissions of weighted dispersed particles to the atmosphere from the exhaust gases. Thus, the motor oil M-14-D<sub>2</sub> has been approved for use in diesel engines produced by PJSC «Kolomensky Zavod».

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PJSC «Kolomensky Zavod», Kolomna)*

## **ECOLOGY and INDUSTRIAL SAFETY**

*Mogilevich V.M., Pavlova O.I.*

### **Organization of environmental control and eco-analytical monitoring in JSC "Angarsk petrochemical company"**

*Keywords:* environmental control, ecological monitoring and environmental management.

*Abstract.* The result of the effective environmental management system operation, environmental monitoring and implementation of environmental monitoring in JSC "Angarsk petrochemical company" is risk minimization of environmental damage.

SC «Angarsk petrochemical company»

## EQUIPMENT and DEVICES

*Vezirov I.R., Vezirov R.R., Arslanov F.A., Telyashev G.G.*

### **Technology for the fuel-oil high-vacuum distillation and two-stage hydro-ejector vacuum-creating system**

*Keywords:* vacuum distillation, fuel oil, one- and two-stage vacuum hydro-circulation system, saturated vapor pressure, decomposition gases, steam booster ejector, line jet device, nozzles, ejection coefficient, energy efficiency.

*Abstract.* The article describes the technology of increasing the efficiency of vacuum hydro-circulation systems. On an example of one of the Russian refineries we solve the problem of increasing the depth of the vacuum (residual pressure reduction) without replacing the existing equipment of the unit. The task is solved with the help of jet device (booster ejector) and column operation optimization. The proposed design of the steam booster ejector provides its assembly without additional foundations and supporting platforms. Optimization of the operating mode of the column and the use of the booster ejector enhance takes-off of the targeted distillates. Also, raw materials temperature lowering is provided at the outlet of the furnace, which reduces the load on the vacuum system and increases the run life of the unit. The proposed activities enhance the takes-off of the desired fractions and the run life of the unit, as well as reduce energy consumption for the process.

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### **Experience jet hydraulic mixer for oil at OJSC "BASHNEFT"**

*Keywords:* vertical steel tanks, sludge deposition, jet mixers, hydraulic.

*Abstract.* There was a generalized experience of using hydraulic jet mixers on-site oil preparation JSC «BASHNEFT». When using oil tanks equipped with Jet hydraulic MIXER deviations from the technological regime is not observed - background noise and vibration of the oil tanks were absent. Submission prepared in vertical steel oil reservoir (oil tanks) through hydraulic jet mixers to avoid sludge deposits in them and homogenize the entire volume of oil.

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## CHEMMOTOLOGOS

*Lashkhi V.L., Chudinovskikh A.L., Boikov D.V.*

### **Systematisation of conceptions in motor oil detergents field**

*Keywords:* detergents, disperse phase, micellar structure, motor oil.

*Abstract.* With use of physical and chemical as also colloidal and chemical model it is carried out some systematisation of knowledge of the mechanism of detergents effect in motor oils, emphasizing their washing, stabilising and neutralizing abilities. Difference in behaviour of detergents in different directions is noted, depending on their chemical composition and structure.

## MATERIALS of the PETROCHEMICAL and REFINERS ASSOCIATION

**Extracts of the protocol #123 of ANN board meeting of 25.06.2015**