

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

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**New russian standard – Unleaded aviation gasoline B-92/115**

*Keywords:* unleaded aviation gasoline, tetraethyl lead.

*Abstract.* The article presents results of research of tetraethyl lead replacement in aviation gasoline. International developments in the field of unleaded aviation gasoline were analyzed, also were developed technical requirements for unleaded aviation gasoline B-92/115 and standard of organization. Prototype was tested for compliance with the designed technical requirements.

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**Theoretical aspects of destruction PMB**

*Keywords:* polymer modified bitumen, destruction, aging, stratification.

*Abstract.* Every year the number of vehicles on the roads of the country is increasing, leading to an increase in the load on the road surface. Therefore, the use of normal road bitumen in the asphalt concrete, no longer able to provide the necessary durability of the road surface. The introduction of polymer modifiers bitumen makes it possible to obtain fundamentally new high quality polymer modified bitumen (PMB). Russian scientists have carried out numerous scientific papers devoted to aging and degradation of PMB. Unfortunately, there is currently no works that represent this problem in more detail. Theoretical studying of questions of aging and destruction of components in PMB was a research objective. In general, the aging of bitumen is a process which occurs in several stages: the first stage is a technological one or «short-term aging», which includes the preparation and production of bitumen asphalt intermixture, the second one is operational period laid asphalt concrete covering or «long-term aging». Most intensively processes of aging of bitumen occur at a technological stage. At a free access of air, in bitumen the destructive processes connected with accumulation in it of free radicals and, as a result, decrease in the content of oils, accumulation of asfalten prevail. Thus, in the course of thermooxidizing aging of bitumen changes not only their group structure, but also group composition of oils and pitches: the molecular mass of pitches increases, and the molecular weight and the dissolving ability of oils decreases. The described processes are followed by the deep chemical transformations leading to change of group composition of bitumen and their technical characteristics. The mechanism of aging of PMB is more complex than that of the bitumen of the fact that the aging process is exposed as an astringent - bitumen and polymer. Moreover, the same factors such as temperature, air oxidation, UV irradiation, etc., have different effects on each of the components of the PMB. Ageing of polymers bearing chain character, consist of:

- the thermal destruction representing the fastest of aging processes. Therefore, the temperature is the most aggressive factor of aging. At this stage there is a rupture of chains of polymer to formation of steady macromolecules of smaller molecular weight. In some cases destruction proceeds up to formation of monomer;
- destruction under the influence of ultra-violet light. The result is separation of hydrogen from the formation of free radicals. Under the influence of radiations of a molecule of polymer are ionized and excited. The excited molecule can break up to two radicals;
- mechanodegradation in which, as in the thermal, there is a rupture of macromolecules. The difference is that the mechanical destruction can proceed only as long as the energy of the intermolecular bonds will not be equal to the energy of a chemical bond in the chain. Thus it will be energetically favorable to macromolecule to change the conformation or to move, than to become torn;
- oxidation, in which the degradation process is carried out through the reaction according to the radical chain mechanism.

We can conclude of the results of the research. It is impossible to exclude processes of destruction of PMB, however having sufficient knowledge them it is possible to predict and minimize. Summarizing the results, we can conclude that the issues of aging PMB is currently very poorly explored and require greater attention to the system, due to the popularity of this type of modified binder. Especially this issue is relevant and popular in light of the fact that the main purpose of development and production PMB – to get a durable and preserves the stability of the colloidal binder material.

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#### **New Тп-46С turbine oil**

*Keywords:* turbine oil, oxidation stability, lubricating properties, power generation industry.

*Abstract.* The new Тп-46С turbine oil is developed for the lubrication gas, steam, hydraulic turbines, turbo-compressors, and as hydraulic fluid in equipment control systems. Consequent technical specification TY 38.401-58-425-2015 for this oil repeats requirements for categories L-TSA-46 and L-TGA-46 of ISO 8068:2006. The oil shows good test result of corrosion-preventive, demulsibility, air-release and foaming tendency properties. ASTM D 983 test reveals very good oxidation stability and sludge forming tendency of the new oil.

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#### **Use middle distillate products Recycling oil to increase production of diesel EURO**

*Keywords:* Diesel fuel class EURO, medium distillate petroleum products recycling, light gas oil delayed coking, light gas oil catalytic cracking, himmotologicheskie properties, modeling of technological processes in the program ASPEN HYSYS

*Abstract.* A new approach to increase the production of diesel fuels, due to involving in basic diesel mixture of a medium distillate petroleum products recycling was proposed. Light gas oil delayed coking, light gas oil catalytic cracking were involved as additives to diesel base mixtures. Quantitie the involved light gas oil has been optimized by mathematical modeling (ASPEN HYSYS). It is found that release of diesel fuels to EURO marks can be carried by adding 1% of light gas oil delayed coking and 10% of light gas oil catalytic cracking to basic raw materials, respectively Himmotologicheskie and physico-chemical characteristics of diesel fuels produced with the addition of a middle recycling petroleum products fully meet the requirements of regulatory documents for diesel fuel EURO brand. Offered by us approach will allow us to increase the production of straight summer diesel fuel on 0.46%, while the production of straight-run diesel fuel winter grades – 6.39%.

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#### **Influence photoradiation on termoluminescence hydrocarbons of heavy oil residues**

*Keywords:* radicals, aromatic hydrocarbons endoperoxides, photosentizers, activators, initiators oxidation, batteries of light energy

*Abstract.* Termoluminescence hydrocarbons extracted from the heavy petroleum residue (>500°C) is investigated a row oil Azerbaijan at their oxidation (20-200°C) and of influence photoirradiation The mechanisms connected termoluminescence with existence in the remains the nafteno-paraffin and aromatic hydrocarbons are considered. Prospects of the last for accumulation of light energy are discussed. Investigation of influence photoirradiation at hydrocarbons extracted of heavy petroleum residues shown that inlike many hydrocarbons distillate fraction studied they have maximas termoluminescence in a relatively low – temperature region. At action of the exciting in the field of electronic absorption spectrum and as result by recombination generatied of peroxide radicals, as well as the decay at the peroxides of aromatic hydrocarbons, stands out the quantum of light, corresponding to the visible light region. In this way, this gives reason to believe that on the basis hydrocarbons heavy petroleum residues of a lot of oil can create wireless and fuel- light sources on the basis on the accumulated light, including solar energy.

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## **EQUIPMENT and DEVICES**

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#### **Cermet tribological characteristics of titanium carbide for parts stop valves**

*Keywords:* metal-ceramic based material of titanium carbide; limit normal stress; shear strength of adhesive bonds; molecular (adhesive) component of the coefficient of friction, the coefficient of hardening of adhesive bonds.

*Abstract.* One of the main ways of increasing technical and operational characteristics of ball valves (heat resistance, corrosion resistance, wear resistance, etc.) is based on the use of ceramic-metallic materials

(cermet) who are members of a class of composites consisting of different materials (ceramics and metal bond) and combine their positive qualities. They hardness and durability comparable to ceramics, but in contrast, have a much better resistance against thermal and mechanical shocks, characterized by greater ease of handling and Technology.

An important technical characteristic of the ball valve and other valves is the force on the rotary shaft at its opening and closing. It has a decisive influence on the performance properties of reinforcement: energy drive, the response time, the wear and durability, reliability, etc.

The efforts of "open - closed" depend not only on the dimensions, but to an even greater extent on the tribological characteristics (coefficient of friction, adhesion, etc.) of the friction pair "ball valve - the saddle." Until now, these characteristics for the friction pair "cermet-cermet" and cermets in combination with other materials insufficiently studied. This paper aims to fill this gap.

Study of tribological characteristics was performed mainly on cermets TiC-ЖС6У and TiC-БЖЛ14Н with different contents of titanium carbide. In comparison with the investigated tribocontact ЖС6У superalloy and stainless steel 12Х18Н10Т.

The results showed that the use of cermets based on titanium carbide TiC-ЖС6У and TiC –БЖЛ14Н can provide a high quality of the valves as compared to other materials. It is found that the best tribological characteristics ( $p_m$ ,  $\tau_{nn}$  and  $f_m$ ) provides frictional couple TiC-БЖЛ14Н (TiC 64%) - TiC-БЖЛ14Н (64% TiC).

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## **ANALYTIC METHODS FOR OIL and PETROLEUM PRODUCTS**

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### **Control method of thermooxidizing stability of mineral engine oil after a preliminary termostatirovaniye**

*Keywords:* thermooxidizing stability; termostatirovaniye; potential resource; coefficient of absorption of a light stream; fotometrirovaniye; coefficient of resistance to oxidation.

*Abstract.* The results of control of processes of oxidation of mineral engine oil, previously temperature-controlled in the range of temperatures from 140 to 240°C are presented. It is established that processes of oxidation are slowed down in the oil termostatirovaniye range from 160 to 220°C, and the potential resource of oil increases from 54 to 76 hours, and it is offered to estimate control of thermooxidizing stability on coefficient of resistance to the oxidation considering optical properties and an evaporability of the studied oil at oxidation.

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## **MATERIALS of the PETROCHEMICAL and REFINERS ASSOCIATION**

**Extracts of the protocol #126 of ANN board meeting of 12.11.2015 / Subject – The basic results of work of a petroleum-refining industry of Russia for 2015; About work of "averages" NPZ on introduction of tax maneuver**