

PETROLEUM PRODUCTS:  
TECHNOLOGY, INNOVATION, MARKET

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**Unoxidized binders for pavement composites**

*Keywords:* PMB, unoxidized binders, SMA.

*Abstract.* Unoxidized bitumen and binders made on their basis - is one of the main components of high-quality European pavement. Residual or unoxidized binders prepared according to the technology of compounding is a soft fusible materials, which are finely dispersed colloid systems, related to the type of the Sol, the distinctive features of which are: a relatively high density; high hardness and resistance to tearing; sensitivity to temperature change; resistance to thermal-oxidative aging.

Analysis of publications has shown that the use of bitumen for compounding and compositions based on them, at least partially unoxidized components can achieve indicators that are often impossible with traditional oxidation of a mixture of oil residue air. And the use of technology in the preparation of pavement binders full of unoxidized oil feedstock, will provide high-quality binders with unique characteristics.

In the presented work a complex task was solved in developing and assessing the quality of organic binders (bitumen, PMB) on unoxidized raw material, as well as comparative tests on the durability of pavement asphalt, for example, SMA-20(Stone mastic asphalt-20).

Based on the experimental results, it can be noted that the developed PMB-60 on the unoxidized materials are different from the control series, prepared on the bitumen BND 90/130 high resistance to destructive processes: stratification and aging, as well as high uniformity, with less preparation time. This is particularly important as one of the causes of premature failure of asphalt concrete pavement is considered to be the aging of asphalt concrete, manifested in irreversible changes in the binder properties at high temperatures, mixing and during a long period of pavement exploitation.

Assessment of the effectiveness of the PMB-60 was carried out on the basis of raw unoxidized materials on the example of SMA. Indicators features of samples of SMA unoxidized for raw materials, as well as control series, fully comply with the requirements of Standarts. It was observed, it is quite natural that higher levels of water resistance and long-term water resistance, and it can be concluded that the most prone to cracking during the pavement exploitation is a highway formed from the standard oxidized feedstock.

Of course, these properties obtained in terms of binders, prepared with unoxidized materials and SMA based on them are ambiguous and do not fit into the usual standard requirements.

Completed preliminary tests showed that the use of of the PMB on unoxidized materials in the composition of stone-mastic asphalt leads to increased resistance to fatigue failure for more than 30%, as was recorded slowing rutting intensity on the test sample surface composition.

A comprehensive analysis of the obtained results characterizes SMA with organic binders that are not exposed to the oxidation process as a composite having an increased ability to stress relaxation from re-occurring loads and the aging process. It has a positive impact on the durability of asphalt pavement.

Thus, the Russian unoxidized binding - is not only a reality, but also the need for the road-building industry, requires a careful approach to the technical side of the production and selection of raw materials, refinement and systematization of collected data, as well as normative support that is different from the existing Standard.

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**Hydroisomerization of benzene fraction of gasoline on the catalyst NiCu/AL<sub>2</sub>O<sub>3</sub>**

*Keywords:* gasoline, aromatic hydrocarbons, catalyst, hydroisomerization

*Abstract.* It is known that during operation of vehicles emit a large amount of exhaust gases, containing in its composition of substances such as, oxides of carbon, oxides of nitrogen and benzopyrene. The main source of emission benzopyrene are aromatic hydrocarbons, primarily benzene. In this regard, the content of aromatic hydrocarbons in motor gasoline must meet strict environmental standards Euro-5.

To comply with European petrol specifications to Euro-5 emerged the need to develop processes enabling to reduce the composition of gasoline the content of aromatic hydrocarbons (not more than 35% vol.) and benzene (not more than 1% vol.).

The global trend for production of motor fuels from oil is formation more clear compositions of the hydrocarbons from aromatic and isoparaffin hydrocarbons with the use of ashless additives.

The development process of hydroisomerization benzenecontaining hydrocarbon fractions of gasoline on the new composition of the catalyst and obtaining high-octane component of motor fuel hydroisomerized-gasoline,

the development of technology for the individual components of gasoline from cheaper, high-quality and movable hydrocarbon mixtures is of great scientific and practical importance. By hydroisomerization benzene-containing hydrocarbon fraction of gasoline AI-80 at 300°C using a catalyst NiCu/Al<sub>2</sub>O<sub>3</sub>, the content of aromatic hydrocarbons decreased from 42,85 to 7,9%. In oil refining industries with a predominance of processes of catalytic reforming producing components of commercial gasolines with a high content of arenes by entering the processes of hydroisomerization benzene-containing hydrocarbon fractions (b.b.p.–120°C) in the presence of a catalyst NiCu/Al<sub>2</sub>O<sub>3</sub>, it is possible to significantly reduce the content of benzene and other aromatic hydrocarbons in the final product of hydroisomerization. The obtained results can be the basis for research in an enlarged scale in the laboratory, and also for production testing.

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### **The research of influence of temperature on processes of oxidation and thermal destruction of part synthetic motor oil Castrol Magnatec 10W-40 R SL/CF**

*Keywords:* coefficient of the luminous flux, volatility, coefficient of ratable viscosity, index of thermooxidation stability and thermal withstandability, increment velocity of processes of oxidation and thermal withstandability, index of anti-wear properties.

*Abstract.* The results of the study of the processes of oxidation and thermal destruction, and their influence on the kinematic viscosity, volatility and anti-wear properties are presented. It was found, that the processes of thermal destruction have increased the rate of change of optical density, have reduced volatility and they have decreased kinematic viscosity as well, but they have increased anti-wear properties of thermostatted oils with coefficient of the luminous flux greater than 0,4.

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### **The X-ray phase diffraction studies of petroleum residues after catalytic thermal destruction in the presence of zinc and nickel 2-ethylhexanoate**

*Keywords:* heavy oil, vacuum gas oil, tar, nanoparticles, X-ray picture, nanocatalyst, catalysis.

*Abstract.* Research of the samples of petroleum distillation residue after destructive distillation of Venezuelan crude oil tar, and the same vacuum gas oil in the presence of 2-ethylhexanoate zinc and 2-ethylhexanoate nickel X-ray diffraction method presented. X-ray picture of samples indicate the presence in the samples, such as metals and their oxides and sulfides.

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Bashkir State University*

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