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TECHNOLOGY FOR PRODUCING M10DM OIL BASED ON OIL DISTILLATES FERGHANA OIL PROCESSING PLANT (FOPP)

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ANNOTATION

A technology for producing M-10 DM engine oil using the K-471 n. additive package has been developed, which provides high performance characteristics.

KEY WORDS*: additives, oil, raw materials, additive, resin, phenols.*

INTRODUCTION

The ever-increasing demand for lubricating oils can only be met by expanding their range in accordance with the requirements of the equipment used and the technological capabilities of the oil refining industry. Severe operating conditions of high-powered diesel engines, which are widely distributed in the territory of the Republic of Uzbekistan, impose increased requirements for the quality of engine oil. Oils intended for these purposes must have, first of all, high thermal-oxidative stability, an increased stock of washing-dispersing and anti-carbon properties, as well as long-term anti-wear, anti-corrosion and anti-pressure qualities [1].

OBJECTIVES

One of the main conditions for the intensification of oil production is the constancy of the composition of oil raw materials with a high content of desirable components. A special feature of the Ferghana refinery is the use of a mixture of local high-sulfur raw materials from the Kokdumalak oil field, Kazakh oil (Kumkol) and gas condensate. The chemical composition of base oils depends on the nature of the raw material and the technological parameters of its processing processes, so a cycle of works was carried out at the FOOP to modernize the oil production without reducing the selection of the target product. In order to select the most rational technology for cleaning oil distillates, which ensures the production of oils with the specified parameters and the maximum yield of the target product, the chemical composition of the raw material and the properties of its individual groups of hydrocarbons, which determine such important performance characteristics of the base oils as viscosity, viscosity index and pour point, are studied in detail.

METHODOLOGY

It is shown that oil distillates and deasphaltisates obtained at the fnpz, along with high-index low-cyclic naphthenic and aromatic hydrocarbons with a high proportion of short side chains, also contain a significant amount of low-index polycyclic aromatic hydrocarbons, resins, as well as sulfur and nitrogen compounds. Analysis of the components of base oils obtained by selective purification with phenol at the fnpz revealed a significant difference in their properties, which often do not meet the criteria of international standards, according to which the carbon content in aromatic rings should not exceed 7%. In addition, base oils obtained from high-sulfur raw materials of unstable chemical composition often contain an understated number of high-index components and a lot of resins (up to 3.1 %) [1]. As a result, in order to obtain motor oil of the M-10 DM brand corresponding to GOST, it is necessary to select different fractions of oil distillate obtained during complex processing, including vacuum distillation, selective purification with phenol, dewaxing and Hydrotreating. The optimal ratio of the base components was found experimentally, providing the base oil viscosity at 100°C within 7.5-8.5 cSt: the III fraction is 45% and the remainder is 55 %. Table-1.

STATISTICAL DESIGN

Characteristics of the initial components and 10 DM oil based on them table-1

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Indicators	Components of the base oil -		OIL 10 DM			
	III fraction	Residual	Actual			GOST
Kinematic viscosity, мм²/с, at 100°C	6,8-7,8	19,45-20,82	11,96	11,77	11,82	≥11,4
Viscosity index	96-102	94-95	97	96	100	96
The density at 20°C, кг/дм³	0,885-0,887	0,902-0,904	0,902	0,895	0,900	0,905
Base number, мг КОН /г			8,32	8,25	8,34	≥8,2
Color on the colorimeter CNT, unit CNT with dilution 15: 85, at CNT	2,7-2,9	6,0-6,2	2,5	3,5	3,7	≤3,5
Flash point, °C - in an open crucible - closed crucible	210-230	200-260	224	232	244	≥220
Pour temrature, °C	-15	-15	-18	-18	-18	≥-18
Mass fraction of mechanical impurities, %	0,0047	0,0048	0,010	0,015	0,017	≤0,025
Sulphate ash content, %			0,68	0,71	0,83	≤1,5
Mass fraction of active elements: - calcium - - zinc			0,35 0,097	0,32 0,093	0,37 0,098	≥0,03 ≥0,09
Corrosion on the plates of lead, г/м²			Absent			At.
Stability over the induction period of sedimentation (NGO)			Withstands			≥60

However, the complex of additives usually used to produce motor oil of the M-10 DM type proved to be insufficiently effective when injected into the resulting base oil. Therefore, employees of the Federal customs service, together with the scientific and production enterprise "Quality", conducted a study to select the composition of additives for oil type M-10 DM, providing a high level of motor performance properties. The compounding series of prototypes distillates with different color characterizing the degree of purification, showed that the required level of quality end product is achieved only by using well-purified base oil, the optimum chemical composition and balanced composition of additives of polyfunctional action K-471 (table-1).

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RESULTS

The alkaline number is one of the most important indicators of the neutralizing ability of oils, in addition, it directly or indirectly characterizes the level of performance and performance of motor oils. Sulfonates of alkaline earth metals are widely used as detergent-dispersing additives to motor oils in order to increase the alkaline number. In [2-3], it is shown that medium-alkaline additives based on alkylphenol formaldehyde condensation products are equally effective in improving the cleaning and antioxidant properties of the oil, as well as significantly reducing the tendency to varnish formation at high temperature. The effectiveness of these additives is significantly affected by the nature of the cation in their structure. For example, in terms of dispersing and anticorrosive efficiency, calcium sulfonate is somewhat superior to the corresponding barium and strontium sulfonates, but the most toxic barium sulfonate shows the greatest effect in increasing thermal stability [2]. In addition, sulfonates of alkaline earth metals, with a General reduction in the content of additives in the composition, provide high physical, chemical and functional properties.

SUGGESTIONS

As a result of the conducted experiments, it was found that this base oil shows the greatest pick-up in relation to the package of K - 471n additives produced by JV Pharma. In addition to neutral, medium-alkaline and 'high-alkaline calcium sulfonates, the package also includes alkylphenol and succinimide additives, as well as high-temperature antioxidant additive K-34 and additive A-22. The optimal concentration (4-6 %) of the additive K-471h was found. Heavy operating conditions for the engines of quarry heavy-duty dump trucks, excavators, and similar equipment for which the M-10 DM oil is intended require increased depressor properties. This effect is achieved by the additional introduction of a special additive K-110 that modifies the crystal structure of solid hydrocarbons while maintaining the mobility of the oil at relatively low temperatures. Since many of the chemicals introduced into the base oil have foaming properties, the use of an anti – foam additive-polymethylsiloxane-is provided for accelerated foam destruction.[4] for the production of M-10DM oil, the Technological regulations and Technical conditions have been developed.

CONCLUSION

Thus, the use of the K-471 n additive package in combination with the K-110 depressor additive made it possible to obtain a motor oil with high functional properties that fully complies with GOST 8581. Due to good quality, m10dm engine oil is widely used by enterprises of the Republic of Uzbekistan and is imported to the CIS and foreign countries.

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