

OPTIMAL PROPORTIONS IN THE PREPARATION OF AN OLIGOMER PRESERVING NITROGEN AND SULFUR AS WELL AS THE STUDY OF THE PROPERTIES OF THE RESULTING OLIGOMER

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Abstract. *The article studied the optimal ratio of obtaining organic additives containing nitrogen and sulfur. In addition, analysis of the structure IQ spectroscopy of the organic additives obtained was studied. According to the preliminary results obtained, the proposed NS2 additives were found to be resistant to mechanical wear formed on a metal surface under the influence of fuel.*

Keywords: *organic modifier, composite, IQ-spectroscopy, analog, octane number, petroleum fuels.*

Introduction. Anti-wear additives on surfaces operating in normal friction mode prevent strong abrasion. Because of light pressure and temperature, normally, surfactants act as an anti-absorption agent. However, as anti-abrasion pliers, additives are mainly used that, when reacting with a metal surface at high temperatures, form films that prevent friction with the surface

Such substances contain sulfur atoms. The cheapest and most widely combed anti-abrasion supplement are oils that are saturate with sulfur [1]. Black oil-elemental sulfur (S) occurs using sulfur atoms to bind to the cyclooctansulfanate ring. With the help of catalysts, the cyclooctansulfanate ring is disconnected and the disulfide bonds are convert into an easily disconnected polysulfide chain. Olefin hydrocarbons [2], or their polymers [3], ground to sulfur, are widely used as highly effective anti-absorption additives.

The saturation of Olefin hydrocarbons with sulfur is carried out in the presence of a catalyst and high efficiency is achieved under mild conditions. As a catalyst, sulfides of alkaline metals, alum chloride, oxide and hydroxides of metals, amines [4] or mercaptans are used.

Researchers have studied the mechanism of action of additives that improve the properties of oils over the years. Because, knowing the mechanisms of action and changes of different types of compounds, which are add to oils as additives, allows you to select and synthesize additives with a theoretical bias-based approach, taking into account various friction conditions.

In the course of the study, it was found to reduce friction due to the formation of a mercaptide film on the surface of the metal in the presence of sulfur compounds. It decomposes in the process of the formation of iron sulfide and organic sulfides in heavy friction modes. Iron mercaptides function like an adsorption film. Protects the metal surface and iron sulfides soften the compression process.

During practical experiments, on the basis of melamine-cyanuric acid, sodium tetra sulfide and ortho phosphoric acid, the extraction of oligomers containing nitrogen and sulfur (brand NS-2) and their physicochemical properties were studied.

Results and discussion. During the experiments, the resulting product was dried in the oven, and the resulting brown product is packaged by grinding through a grinder to a powdery

consistency. The resulting oligomer was formed with 85% unum in theoretical calculation, and the sulfur content of the oligomer was 41.6%.

NS-2 Brand of synthesized oligomerine has a temperature of 90 °C, resulting in a depleted ounce of materials science goods and gardening time. A highly effective oligomer was obtained when the reaction time was 1.5 hours and the starting products were in a ratio of 1 : 1 : 0.4. (fig 1).

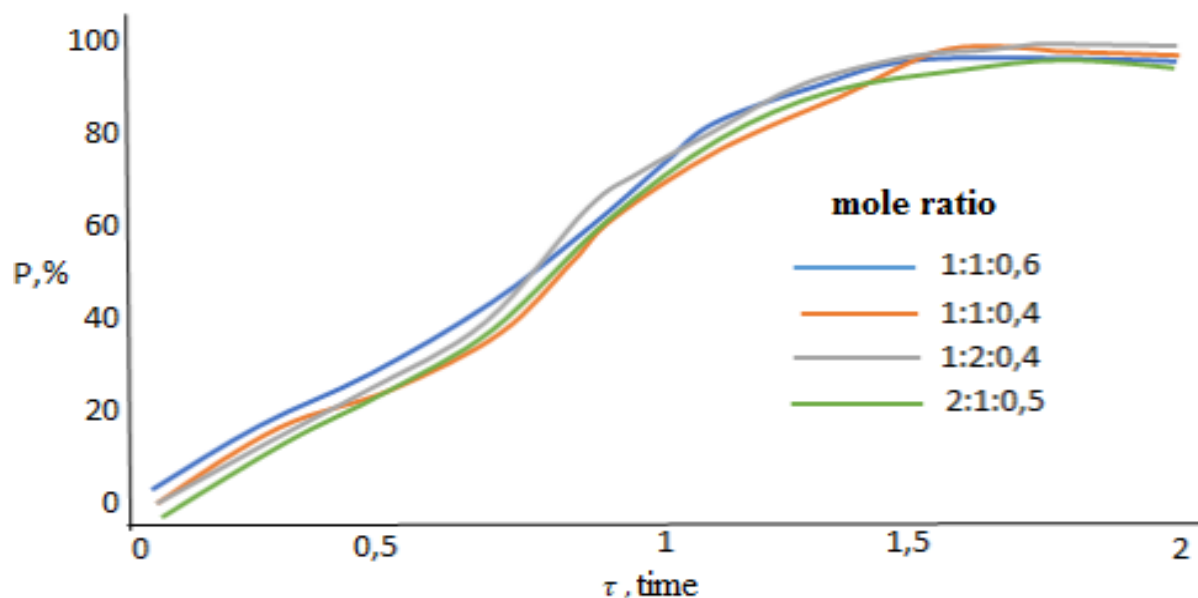


Figure 1. The dependence of the yield of the NS-2 brand oligomer on the molar ratio of the initial substances.

Also during the experiments, it was found that obtaining an NS-2 brand oligomer in high efficiency required obtaining an equimolar ratio of reactants according to the table (table 1).

Table 1
The dependence of the yield of the NS-2 brand oligomer, which contains nitrogen and sulfur, on the ratio of moles (80° C, τ=1.5 hours)

Molar ratios of primers	Efficiency, %	Molecular mass (cryoscopic)	Appearance	Sulfur content, %	
				Calculated	Found
melamine cyanurally adduce: orthophosphate acid: sodium tetrasulfide					
1:1:0,1	73	850	Light brown, whitish	36,3	36,8
1:1:0,2	74	920		38,7	38,8
1:1:0,3	77	950		39,5	39,4
1:1:0,4	78	910		41,6	41,8
1:1:0,5	84	890		23,2	23,7
1:1:0,6	86	900		24,6	23,8
1:2:1	75	920		21,4	20,8
2:1:1	76	950		37,7	37,2
1:3:1	67	920		23,1	23,4
2:1:0,8	65	915		34,3	34,8
1:2:0,5	77	920		27,7	26,9

2:3:0,5	82	910	34,5	35,4
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The obtained NS-2 brand oligomer physico-chemical descriptions (sodium polysulfide, orthophosphatic acid and melamine cyanurate adduct) data are shown in table 2 (table 2).

Table 2

Physico-chemical indicators of the NS-2 brand oligomer

Property	NS-2 brand oligomer indicators
Density g/sm ³ GOST 15139-69	1,06
Dilution temperature T °C	123
η_{XB}	0,067
Solubility (22°C)	Oil products, 20%
Appearance	Light brown, whitish

In order to study the composition and functional groups of the NS-2 branded oligomer obtained in the practical experiments of the study, the indicators of IR spectroscopy (IRAffinity-1S (SHIMADZU)) were analyzed [5] (fig 2).

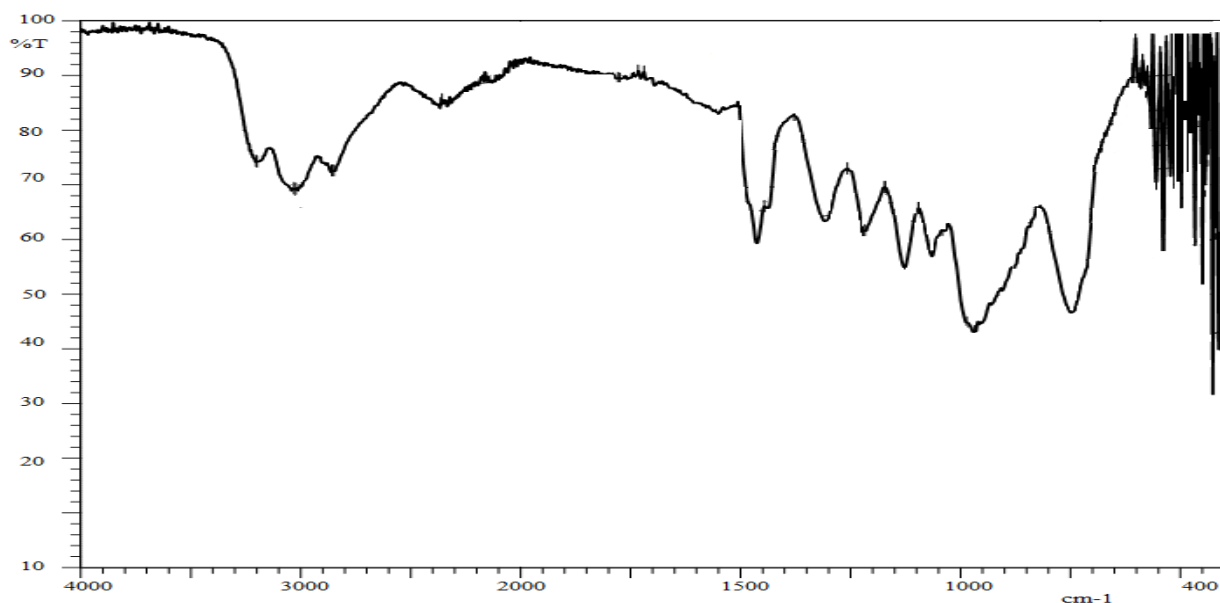


Figure 2. Indicators of IR spectra of NS-2 branded oligomer.

Based on the results of the analysis of NS-2 branded oligomer obtained, it characterized by IR spectroscopy.

Valence oscillations in the 2852-1460 cm⁻¹ area have absorption lines confirming the presence of -CH₂- groups and valence oscillations in the 1640 cm⁻¹ area. Spectrum indicators-valence oscillations in the area of 3200 cm⁻¹ corresponding to -CONH₂ groups and valence oscillations in the area of 3000-3400 cm⁻¹ corresponding to the secondary -CONH₂ groups-have absorption lines. Among the functional groups - CH₂ - CO - contained in the oligomer, valence fluctuations in the area of 1400 - 1465 cm⁻¹ are manifested. Assimilation ranges up to 800-1600 cm⁻¹ confirm the presence of -NH₂ groups.

The presence of groups with phosphorus P=O and P–O–C in the range of valence fluctuations in the area 1000-1180 cm⁻¹ in the spectrum indicators confirms the presence of sulfur-containing compounds in areas 1040-1060 cm⁻¹ as well as 1100-900 cm⁻¹. Also, valence fluctuations in the 600-800 cm⁻¹ and 1460 cm⁻¹ areas of the obtained NS-2 brand oligomer indicate the presence of narrow low-intensity lines containing bonds of sulfur compounds.

Thus, on the basis of melamine-cyanuric acid, sodium tetrasulfide and orthophosphoric acid in the practical experiments of the study, an oligomer of the NS-2 brand with nitrogen and sulfur in its composition was obtained in an effective way. Also, its properties have been researched in physicochemical ways to apply this obtained oligomeric metal surface to protection against abrasion.

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