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Issue Article

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STUDY OF XANTHOGENATES AS ADDITIVES IN SYNTHETIC OILS

Abstract: *The article is devoted to the study of the biocidal properties of synthesized substances containing oxygen-containing groups in addition to sulfur and nitrogen in the composition of synthetic oil. All of the tested substances, except for one, demonstrate high effectiveness against fungi, and some of them also have a destructive effect against bacteria.*

Key words: *N-alkoxy- and N-allyloxymethylcarbamoylmethylxanthate, bacteria, synthetic oil.*

Language: *English*

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Introduction

In modern times, there is a lot of information in the literature about the biocidal effect of many representatives of sulfur and nitrogen-containing organic compounds [1]. At the same time, it can be predicted that newly synthesized substances containing an oxygen molecule in their molecule, along with sulfur and nitrogen, will act as biocidal additives in the composition of oils [3-4]. Because the biocidal properties of xanthogenate derivatives have been determined in our previous studies [2]. The substances studied were studied in the composition of mineral and synthetic oils suitable for bacteria and fungi.

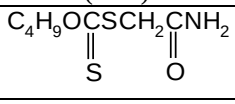
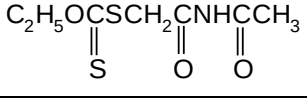
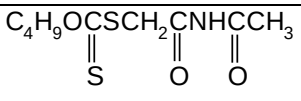
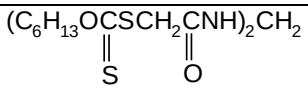
The antimicrobial properties of N-alkoxy- and N-allyloxymethylcarbamoylmethylxanthate, which are better soluble in mineral oils, were studied in the composition of M-10 base oil obtained from the "Azerneftyag" Refinery in the presence of bacteria and fungi that damage petroleum products. The test results of the substances were studied in comparison with the test results of mineral oil and ω-nitrostyrene taken as a standard. This indicates the complete growth of microorganisms, in other words, the absence of a biocidal effect of the studied substance. As can be seen, N-alkoxy- and N-allyloxymethylcarbamoylmethylxanthate, as well as ω-nitrostyrene, do not have a bactericidal effect in the composition of M-10 oil. However, N-allyloxymethyl- and especially N-butoxymethylcarbamoylmethyl esters of butylxanthate acid are prone to a strong fungicidal (fungal) effect and are superior to the standard in this respect. Increasing the concentration of these substances in oil from 0.25% to 1.0% increases their effect.

A group of substances insoluble in mineral oil was studied in the composition of synthetic oil, in which microorganisms easily multiply. The results obtained are compared with the test results of 8-oxyquinoline, taken as a standard in the table. It can be seen from the table that although the tested substances have a sufficiently strong killing effect on the fungal mixture, not all of them can prevent the growth of bacteria: S-carbamoylmethylbutylxanthogenate (no. 2), N,N'-methylenebihexylxanthogenatoacetamide (no. 5) and 8-oxyquinoline, taken at a concentration of 0.5-1.0%, do not protect synthetic oil from the undesirable effects of bacteria. However, when one of the amide hydrogens of S-carbamoyl-methylbutylxanthogenate is replaced by an acetyl group, it turns into a substance with a high bactericidal effect (no. 4). It should be noted that the ethylxanthogenate derivative, which is

an analogue of this substance, also has a sufficiently high bactericidal effect (no. 3).

When comparing the tested substances as fungicides, it is seen that N-acetylcarbamoylmethylbutylxanthate has the highest effect against fungi. It is noticeable that the fungicidal effect of the substance decreases with the increase in the number of carbon atoms in the alkyl radical of the xanthate fragment from 4 to 6. However, it can also be assumed that the decrease in the antifungal effect of the hexylxanthate derivative compared to the butylxanthate derivatives is due to another reason, namely the different effect of the substituents on the nitrogen atoms.

Table 1. Antimicrobial properties of synthesized substances in synthetic oil (PEE)

№-	Chemical formula of the substance (number)	The density of the substance in oil, %	Diameter of the zone of destruction of microorganisms, cm	
			bacterial mixture	mushroom mixture
1.	Synthetic oil (PEE)	-	+	+
2.	 (19)	0.5	+	1.6
		1.0	+	3.5
3.	 (34)	0.5	1.5	2.0
		1.0	2.9	3.3
4.	 (35)	0.5	1.6	2.0
		1.0	3.4	4.2
5.	 (72)	0.5	+	0.9
		1.0	+	2.0
6.	8 -Oxyquinoline	0.5	+	2.8
		1.0	+	2.9

\+ - *overall development of microorganisms*

Thus, the study of representatives of the synthesized substances with different composition and structure in the corresponding oils and liquids in which they are dissolved shows that many of them have a strong biocidal effect. All of the tested substances, except for one, demonstrate high effectiveness against fungi, and some of them also have a destructive effect against bacteria. The compounds have been investigated as extreme pressure additives in libricating oils. It was revealed that they have high extreme pressure properties, with the exception of oxydimethylcarbamoylmethylxanthate, which as it, turned out, have limited solubility oils, and therefore were investigated as biological additives in the composition of cutting fluids.

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