

# RESEARCH ON THE BIOLOGICAL EFFECTIVENESS OF WOOD CONSTRUCTION MATERIALS TREATED WITH OLIGOMERIC ANTIPTYRENE-ANTISEPTICS WHICH CONTAIN SULFUR

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<https://doi.org/10.5281/zenodo.8032566>

**Abstract.** The purpose of researching the biological effectiveness of oligomer antipyrene-antiseptics, which contain sulfur, is to protect wood materials from termites. Termites cause serious damage to the wooden part of buildings and structures because of eating wood materials. In this research work, oligomer composites, which are biologically effective in combating termites, obtained physic-chemically. The biological effectiveness of the samples obtained researched in accordance with the requirements of GOST.

**Keywords:** oligomer antipyrene-antiseptics, wood materials, biological effectiveness, termites.

**Introduction.** Termite considered a biologically harmful insect and found in all regions of the world, except for cold regions. Because the main feed of termites is wood material, it causes serious damage to wood materials used in economic sectors. One of the main ways to treat termites is through chemical treatment of wood materials, in which, as a chemical agent, various types of substances and their solutions are used. In this research work, an oligomeric antipyrene-antiseptic composition containing sulfur was created and its biological efficacy against termites was researched in test experiments.

**Methods and materials.** In the process of practical experiments, an oligomer antipyrene-antiseptic Composite was obtained, which stored sulfur in its composition using chemical-mechanical methods from chemicals such as sodium theosulfide, zinc oxide, ammophos and urotropin (fig.1.).

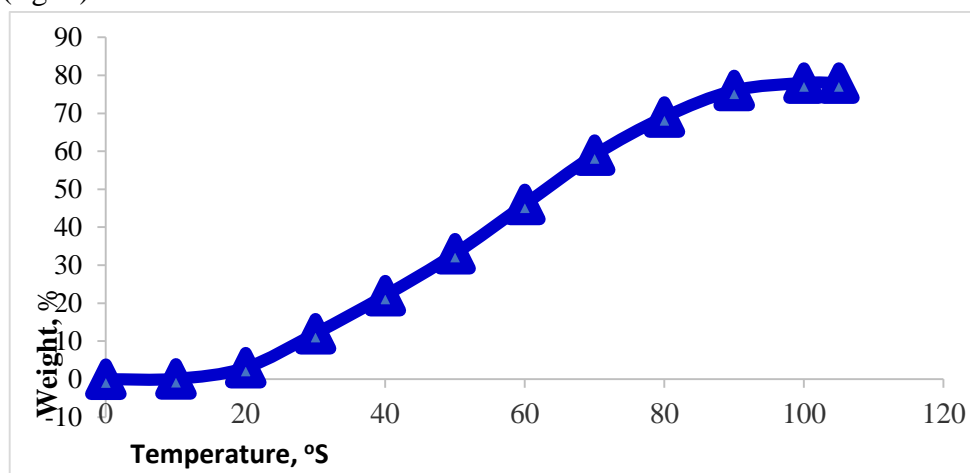


Figure 1. Temperature dependence of reaction productivity.

According to the mass ratio of the initial substances in the composition of these chemicals, oligomers of conditional brands SO, SO-1, SDG, SDG-1 and SDG-2 obtained. The appearance, physical properties, water solubility of the oligomer obtained in the laboratory investigated.

**Results and discussion.** In order to study the biological effectiveness of oligomers of different brands, which contained sulfur in the composition obtained in laboratory experiments, their saturated solutions in water formed. In accordance with the requirements of GOST-9.048-89, samples of wood were taken, and samples of wood were placed in the desired solution for a certain period of time and soaked (table 1).

**Table 1**

**Description of the technical characteristics of wood materials on biological efficiency**

<b>o/n</b>	<b>Sample</b>	<b>Biological efficiency (GOST-9.048-89)</b>	<b>Effective amount of application (g/kv.m)</b>	<b>Limited processing temperature</b>
1	wood + SO	ball 1	75-100	0°S - +40°S
2	wood + SO-1	ball 1	100-150	0°S - +40°S
3	wood + SDG	ball 1	100-125	0°S - +40°S
4	wood + SDG-1	ball 1	100-150	-15°S - +40°S
5	wood + SDG-2	ball 1	8 000	+5°S - +40°S

In the experiments carried out, the wood materials were treated with oligomeric antipyrenes that stored sulfur, and the oligomeric composition obtained during the test was found to be biologically efficient.

Anthropogenic regions to determine the biological efficacy of sulfur-containing oligomer antipyrene-antiseptics SO, SO-1, SDG, SDG-1 and SDG-2 have selected and tested. The experiment conducted found that the biological efficacy of oligomers against xylophagous-insect *hylotrupes bajulus*, *anacanthotermes ahngerianus*, *xylocopa valga* dominant species was a positive result of 84-90%.

Also, in the process of experiments, aqueous and alcohol solutions of oligomeric antipyrene-antiseptics of the brands SO, SO-1, SDG, SDG-1 and SDG-2 were prepared, and 10-20% solution of 1m<sup>2</sup>/2.0 liters was soaked in cellulose-rich sunflower stem, which was considered a termite nutrient, and dried and applied as a nutrient to termites. During the experiment, 25-30 working termites were used and termites were given 50 gr. from specially prepared feed was given (table 2).

**Table 2**

**Biological efficacy of PO-1 oligomer treated wooden samples against termites**

<b>o/n</b>	<b>Sample concentration (%)</b>	<b>Total termite population</b>	<b>Number of dead termites in the count of days (%)</b>						<b>Biological efficiency</b>
			<b>3 days</b>	<b>5 days</b>	<b>10 days</b>	<b>15 days</b>	<b>20 days</b>	<b>25 days</b>	
1	SO / 20	30.0±1.0	32±2	52±3	64±3	68±4	76±4	80±4	80±4
2	SO / 25	30.0±1.0	40±1	56±2	72±3	76±3	84±3	88±2	88±2
3	SO / 30	30.0±1.0	40±1	56±2	72±3	76±3	84±2	88±2	88±2

During this experiment, the stem constantly moistened in order to ensure the softness of the specially prepared sunflower stem. In the experimental process, termites fed in a special case with filter mold and sunflower stem, which not treated with antipyrene-antiseptic agents.

According to the results, the main part of the termites died up to 25 days. At this time, controlled termites that have been given feed that have not been treated with antipyreous-antiseptic agents were found to be active (table 3).

**Table 3**

**Biological effectiveness of oligomers in protecting wood samples from termites**

o/n	Sample concentration (%)	Total termite population	Number of dead termites in the count of days (%)					Biological efficiency	
			3 days	5 days	10 days	15 days	20 days		25 days
1	SO-1 / 15	30.0±1.0	32±2	48±3	56±3	64±3	65±4	75±4	75±5
2	SDG/10	30.0±1.0	40±2	53±3	60±3	73±3	82±3	88±2	87±2
3	SDG-1/15	30.0±1.0	37±1	43±2	58±3	69±3	82±2	87±2	82±2
4	SDG-2	30.0±1.0	10±1	10±2	58±3	17±3	19±2	22±2	23±2

From the oligomer antiprene - antiseptics of various brands used in their test-experiments, the biological efficacy of the SDG-2 brand oligomer found to be low. That is, the number of termites that died on 3-10 days of the experiment averaged 10-17% and 20-23% on 15-25 days. One of the main reasons for this was explain by the fact that this coating partially absorbs the wood base into the interior and forms a hard coating.

Thus, during the studies carried out, it scientifically proven that oligomer antiprene – antiseptic coatings that contain sulfur have a high level of biological effectiveness against termites. It is also advisable to research the physicochemical properties of these oligomers for use as a fire-resistant agent.

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