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PRODUCTION OF FLAMMABLE PAINTS BASED ON SILICONE AND LIQUID GLASS

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ABSTRACT

In this work, a substance obtained on the basis of silicone and liquid glass, which is added to the composition of various lacquer materials and increases their fire resistance, was analyzed. The same environment was created in laboratory conditions and the level of protection of the refractory material was studied.

KEYWORDS

Derivatography, thermostable, level of protection, flammability, burning speed, efficiency

Introduction

Thermostable paints are designed for painting wooden constructions with a risk of fire. Their difference from other paints and varnishes is that the resulting coating increases the fire resistance of wooden structures to a certain extent and reduces the risk to material and human life to a certain extent. Differential thermal analysis (DTT) is one of the main methods of phase analysis and serves to determine the thermal properties of a substance.

With the help of thermography, we can determine the temperature limits of many existing compounds, the temperature of phase changes, heat capacity, thermal conductivity of solid and liquid phases, thermal decomposition, dehydration, dissociation (separation into components), melting of many synthetic and natural substances. and chemical interactions can be studied.

This method is especially important in studying glass crystallization processes. Derivatography is a method of studying chemical and physico-chemical processes that occur in a certain substance under conditions of temperature change. Derivatography is based on a combination of thermogravimetry and differential heat analysis.

RESEARCH METHODOLOGY

Thermal analysis of wood materials coated with the mixture of silicone and liquid glass modification. In scientific tests, the thermal analysis method was used to compare the relative thermal stability of fire-protected and unprotected wood materials. Figure 1 shows the derivatogram of the original, untreated pine wood.

The mass loss of the sample was 62.8% in the temperature range of 135-355°C. At 310°C, the maximum heat dissipation efficiency (exoeffect) was observed and the mass loss was 45.4%. In this

case, it was observed that the decomposition of wood reached the maximum speed and the separation of the combustible products decomposed under the influence of heat.

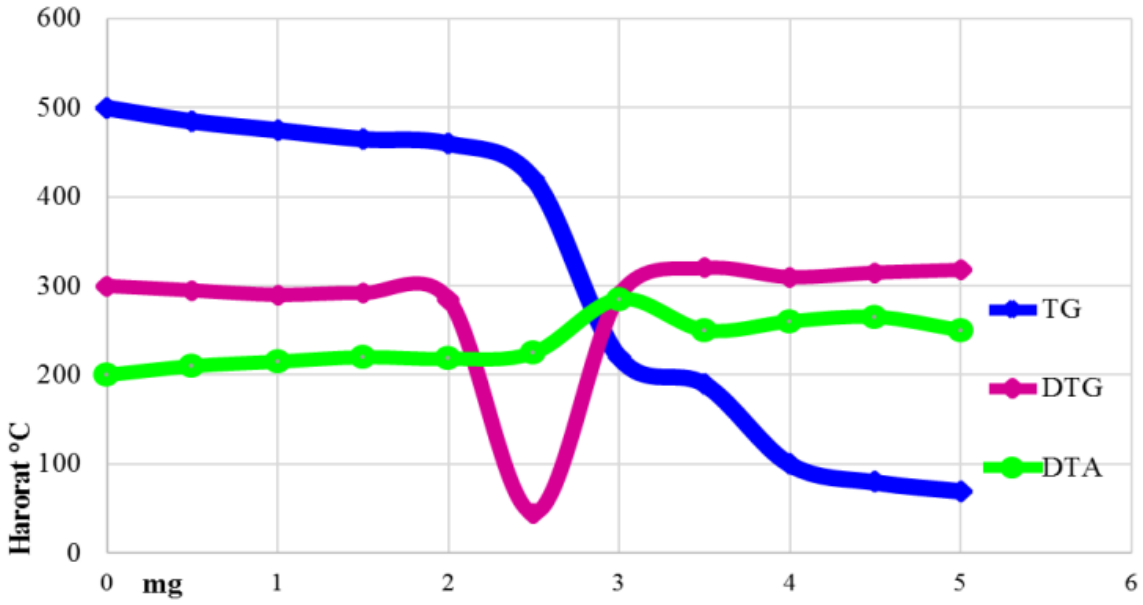

Figure 1. Derivatogram of untreated wood

It is known that at this temperature the maximum rate of decomposition of cellulose in wood is observed.

A 20% water solution of the substance formed from the modification of silicone and liquid glass was prepared and soaked in wooden (pine) products at a temperature of 40-50°C for 1-1.5 hours in a special bath. It was studied according to GOST 16363-98 that the fire resistance of wooden materials treated with the resulting solution increased dramatically.

The wooden samples treated with the resulting solution (Fig. 2) were taken in 3 pieces each (size 150x60, thickness 30 mm) and submitted for research.

The test procedure was carried out as follows: tested samples of pine wood were placed vertically in a black steel pipe with a length of 166 mm and a diameter
of 50 mm.

Figure 2. The wooden samples treated with the resulting solution

The flame of a gas or alcohol burner was given under the sample 5 mm protruding from the tube (alcohol was used in the tests). The distance from the upper edge of the flame to the sample is 10 mm, the time of holding the sample in the flame of a gas burner is 2 minutes and in the flame of alcohol 1 minute 30 seconds, after the sample is removed from the flame, the independent burning of the sample and the duration of burning were studied and recorded.

This experiment was conducted according to GOST 16363-98. The essence of the research methods was to determine the mass loss of wood treated with tested coatings or feeding compounds during fire tests under favorable conditions for heat accumulation. The classification method is used to determine the fire performance group and during certification tests. The accelerated test method is used to control the fire performance of fire protection products that have passed classification tests.

Table 1 Investigation of the fire resistance properties of untreated wooden materials with fire-resistant material obtained on the basis of silicone and liquid glass

№	Time, s			Mass, g		Mass loss	
	Effect of flame source	By itself ignition	Ignition time	Until experience	After experience	gm	%
1	120	305	122	128,45	41,9	86,54	67,38
2	120	305	122	126,62	40,8	85,82	67,78
3	120	30	122	130,12	43,14	86,98	66,85
mass loss of samples (arithmetic mean) %:							67,3

According to this normative document, the air temperature is 22 °C, atmospheric pressure - 720-725 mm.sim.asl., relative humidity - 55-57%. The experimental test results of treated and untreated wood materials with silicone and liquid glass modification are presented in the tables below.

Table 1 shows the fire resistance of samples of wooden materials not treated with fire-resistant .As a result, it was determined that the mass loss of the samples exceeded 67.3% and belonged to the combustible group.

Table 2 Investigation of the fire resistance properties of treated wooden materials with fire-resistant material obtained on the basis of silicone and liquid glass

№	Time, s			Mass, g		Mass loss	
	Effect of flame source	By itself ignition	Ignition time	Until experience	After experience	gm	%
1	120	10	5	145,78	143,89	86,54	1,30
2	120	11	7	148,32	146,36	85,82	1,34
3	120	11	7	146,68	144,75	86,98	1,31
mass loss of samples (arithmetic mean) %:							1,31

According to the experiment, in Table 2, the results of the study of the fire-resistant properties of wood materials treated with the substance created by the modification of silicone and liquid glass showed that the mass loss of the average sample of fire-resistant wood materials was 1 was 31%. This indicates that the fire-resistant materials are of the 1st group.

SUMMARY

In conclusion, as a result of research, the mass loss of a wood sample that was not treated with a thermostable substance after burning was 67.3%. The mass loss of wood samples treated with a 20% aqueous solution of our substance based on silica gel and liquid glass was 1.31%. Experiment conducted according to GOST 16363-98. All this represents the effectiveness of our substance. This thermostable substance can easily replace imported goods.

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