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STUDY OF OLIGOMER-ANTIPYRINE SYNTHESIS AND PROPERTIES OF NITROGEN, PHOSPHORUS AND ZINC STORAGE

Abstract: *The article studied the composition and structure of oligomer synthesis based on urea and phosphoric acid and zinc oxide, as well as the composition and structure of nitrogen and phosphorus oligomers synthesized using IR spectroscopic analysis to determine chemical bonds and functional groups.*

Key words: *zinc oxide, urea, orthophosphate acid, oligomer, viscosity.*
Language: *English*
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Introduction

One of the most important and fundamental problems in the chemistry of high molecular weight compounds is the synthesis of polymers and the production of materials based on them that retain their operational properties for a long time under high and very low temperatures, various chemicals, high radiation levels and other factors. The main directions in the development of technology are aimed at obtaining multifunctional polymers containing nitrogen and phosphorus to increase the efficiency of construction and industrial composites. This work is devoted to the production of nitrogen- and phosphorus oligomers with effective corrosion inhibitors and flammable properties. Therefore, one of the urgent tasks today is the production of new oligomeric materials with high-temperature resistance and fire resistance, anti-corrosion, polymer stabilization, environmentally safe and economical. In [1-4], oligomeric antioxidants and corrosion inhibitors were obtained and proposed as multifunctional N -, S -, P inhibitors, on the basis of which more than a dozen new products were synthesized: polymethylene (thio) amidophosphates, oligomeric derivatives of gossypol, synthesized on the basis of epichlorohydrin di (thio) amidophosphate oligomers, and oligomers of dimethyl terephthalate formed with polyethene polyamine were synthesized. Oligomer refractory NB-6 [5-7] based on urea, phosphorus compounds and metal oxides also has advantages in increasing the fire resistance of wooden structures and polymeric materials. Phosphorus, nitrogen, boron, and metal-containing oligomers of grade 17a were synthesized [8] and applied to wood materials as flame retardants, and the refractory efficiency of the synthesized oligomer was determined. Nitrogen- and phosphorus thiocol oligomers based on sulfur, sodium tetrasulfide, and ammonium polyphosphate have been synthesized for use as fillers for polyethene [9 - 10].

Research methods.

Infrared spectroscopy (IR). The IR spectra of the first and synthesized compounds were obtained on UR-20 and UR-75 spectrophotometers. Samples in powder form were obtained by adding potassium bromide.

Experimental part.

As a result of the interaction of nitrogen-, phosphorus-, zinc-containing compounds, new multifunctional oligomeric antipyretic antiseptics were synthesized. In the synthesis of these substances, solutions of zinc oxide in phosphate acid were first prepared. 1,3,5% solutions were prepared. Then we put a 5% solution in a 200 ml flask equipped with a stirrer, a reverse cooler and a thermometer. when the mole ratio was 5.5: 1 mol, the reaction lasted 3 hours and a white viscous mass was formed as a result of the reaction.

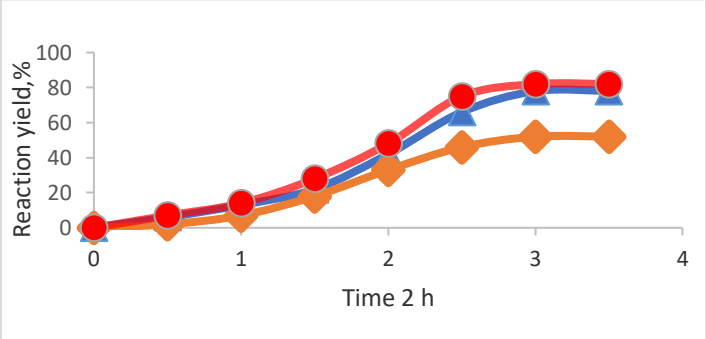
2- experiment

A 34% solution of zinc oxide in phosphate acid was prepared. The solution was prepared at a temperature of 100 ^{0} C. In the first experiment, urea was added to the solution formed using the equipment shown. The mole ratio of zinc oxide and urea was 1: 2. The reaction lasted 45 min. As a result, a yellowish viscous mass was formed and a brown liquid remained at the bottom of the vessel. When we took the liquid in a separate container, it solidified to a yellowish colour.

Experiment 3 As in the above experiment, a solution of zinc oxide in phosphoric acid was prepared in a vessel and urea was added to it. In this process, the molar ratio of zinc oxide and urea was 1: 1. mass was formed.

A number of synthesis processes were carried out in different conditions and environments, and the ratio of time, temperature and starting materials to the yield of mainly synthesized oligomeric flame retardant antiseptics as well as the effect of catalyst species were studied. Based on the above, the optimal conditions for obtaining synthetic antipyretic antiseptics were found.

Figure 1 below analyzes the reactions of oligomers containing nitrogen, phosphorus, and zinc in different proportions. Accordingly, the ratio of orthophosphoric acid: urea: zinc oxides was 5.5: 1: 2.6 the temperature was 100 ^{0}C and the duration of the process was 3 hours.



(Fig. 1) Time dependence of reaction yield

Figure 1 shows that these reaction processes are temperature-dependent, and the reaction products at different temperatures in the ratio of 5.5: 1: 2.6, which achieved the highest yield among all ratios, were studied. These reaction processes obtained the best results at 90-100oS.

When studying IR spectroscopic analysis of organic oligomer compounds obtained in three different ratios (5.5: 1: 2.6 and 2.06: 1: 1.9) consisting of the same synthesized components, it can be seen that the main absorption lines are close to each other.

Result and its discussion

In IR spectroscopy analyses, the -SN2- groups have wavelengths in the 2889–2850 cm-1 domains and absorption lines in the 1633–1600 cm-1 domains, confirming close absorption in Figures 2 and 3. However, although the presence of -SN2- groups in the IR spectra shown in both images has been identified, the absorption areas can be clearly seen in Figure 2, where the phosphate acid content is high.

In the IR spectrum (Figures 2 and 3-4), the absorption lines were typically found to have almost identical absorption lines in both images at the 3186 cm-1 range (–NH-SO-group). At the same time, in the range of 476 cm-1, there are absorption lines characterizing the Me-O-groups, and in the range of 889-1070 cm-1, the presence of phosphorus groups (P = O) and (-P - O - C) is widespread. can be seen in an intensive state.

Physicochemical properties of the obtained organic oligomer flame retardants.

The physical properties of the obtained substance were determined and shown in Table 2.

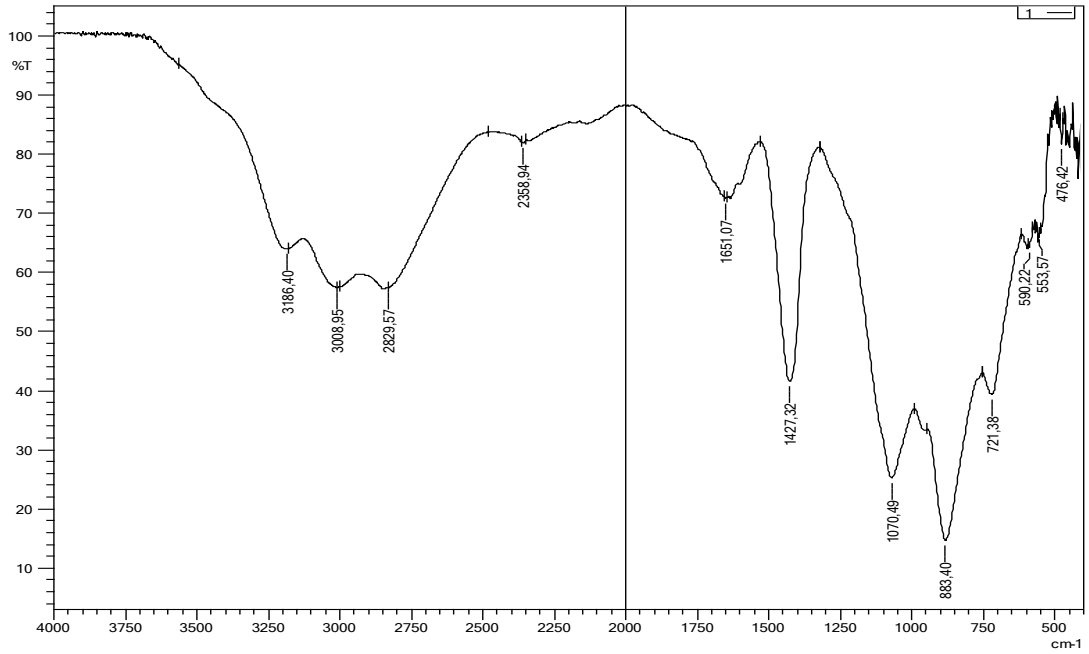


Figure 2.

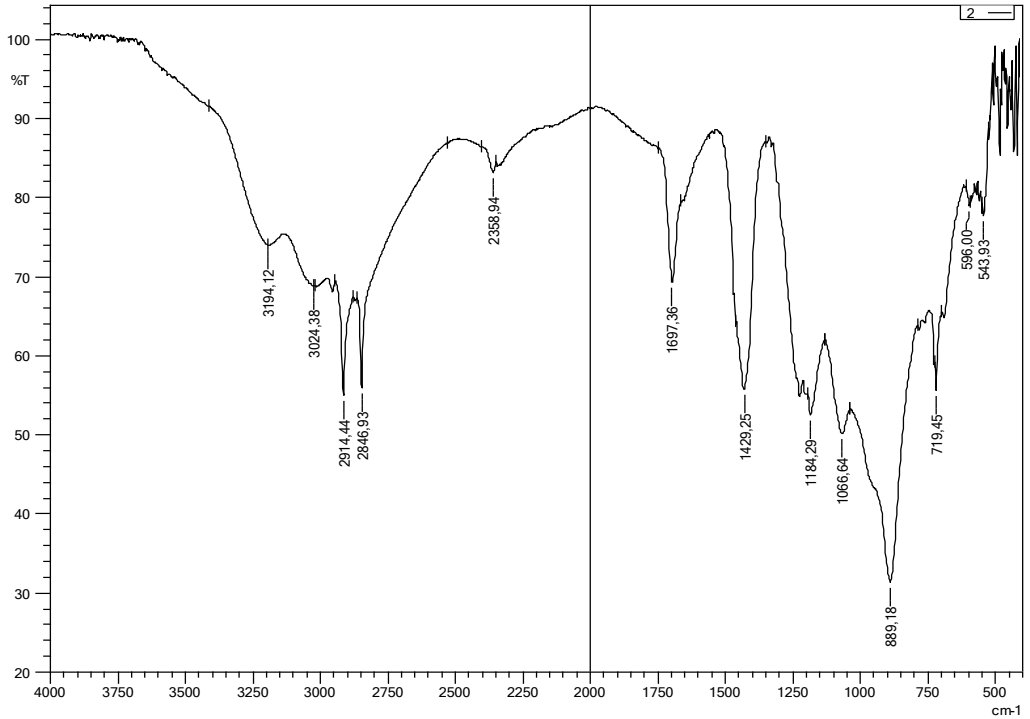


Figure 3.

Figure 2-3 IR spectroscopic analysis of organic oligomeric compounds containing nitrogen, phosphorus and zinc synthesized on the basis of phosphoric acid.

Table-1. Physical properties of the obtained substance

The name of oligomer	Raw materials	Relative (mol)	quantity,%	Aggregate condition	pH	Density, g / cm^3
Contains nitrogen, phosphorus. zinc-containing substances	orthophosphoric acid: zinc oxide: urea	5.5:1:2.6	75	White viscous substance	7,5	1,2
		2,06 : 1: 1,9	65		7,2	1,1
		1,63: 1:1	80		7,5	1,3

Depending on the results obtained, it was found that there was a slight change in the physical properties of the substances as the mole ratios of the substances changed.

Orthophosphoric acid: zinc oxide: measuring the viscosity of aqueous solutions of oligomeric compounds obtained in different proportions of urea

The viscosity of the resulting oligomer antipyrine was determined on a VPJ-1 viscometer. Viscometer diameter 0.55 mm.

Table2. Measuring the readability of the obtained substance

№	Ratio of substances.	Solution concentration%	Transition time of the solution (min)	$\eta_{отн}$	$\eta_{уд}$	$\eta_{пр}$	$\eta_{лог}$	$\eta_{хв}$
1		0 (Solvent)	4.89					
2	5.48:1:2.6	1	5.11	1.045	0.045	0.3	0.94	0,8
		0,5	5.6	1.145	0.145	0.58	0.52	
		0,25	7.6	1.55	0.55	1.1	1.13	
3	2,06 : 1: 1,9	1	5.4	1.1	0.1	0.4	1.23	1,3
		0,5	5.9	1.2	0.2	0.8	1.57	
		0,25	5,2	1,1	0,15	0,75	1,53	

Based on the readability of the obtained substance, it can be concluded that it has oligomeric properties.

Conclusion.

The study of nitrogen, phosphorus and zinc-containing organic compounds in world practice opens up possibilities. As a result of the interaction of nitrogen, phosphorus, zinc-containing compounds, new multifunctional oligomeric antipyretic antiseptics were synthesized and their physicochemical properties were studied.

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