

INVESTIGATION OF THE SYNTHESIS OF ACRYLIC-URETHANE COPOLYMER COATING AND ITS ADHESION CHARACTERISTICS

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Abstract. *In this research work, research was carried out on obtaining various copolymers based on acrylic monomer and urethane oligomer. In the studies carried out, the process of obtaining a copolymer of acrylic monomers and a urethane oligomer in an aqueous emulsion medium was considered in practical experiments. In addition, the adhesion indicators of the acrylic-urethane copolymer coating obtained in practical experiments were determined.*

Keywords: *flame retardant coating, acrylic copolymer, emulsion acrylic-urethane copolymers.*

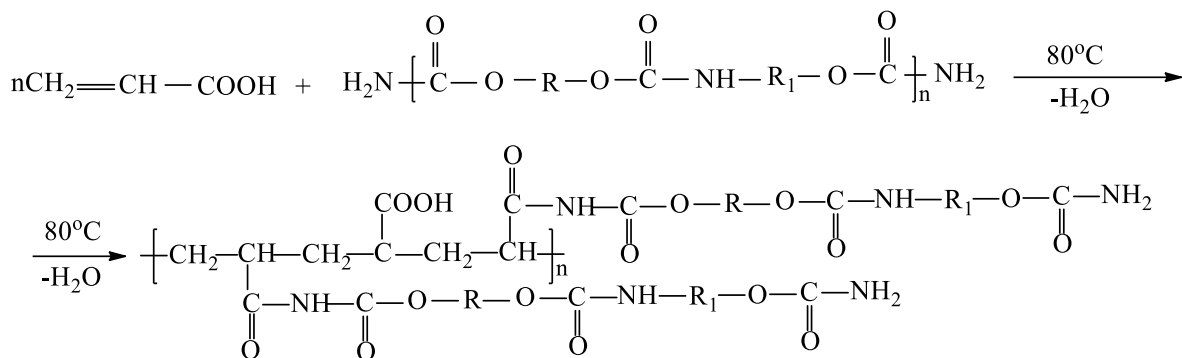
Introduction. The negative impact of the economy of fossil energy sources on the environment, the production of products from renewable energy sources is developing rapidly. Experts in this field are also trying to protect the environment by looking for new solutions and new ways to produce compounds that the industry considers products made from fossil fuels [1]. The above situation is also observed in the process of obtaining acrylic monomers. Acrylic monomers can be obtained from petrochemical and renewable sources. In obtaining oligomers and polymers on an industrial scale, acrylic acid and its esters are considered the main monomer [2].

There has been considerable research on obtaining various copolymers based on acrylic and Craton monomers and urethane oligomer. As a continuation of these studies, the process of obtaining a copolymer of acrylic monomers and a urethane oligomer in an aqueous emulsion medium considered in practical experiments [3]. Practical experiments have also been carried out on the basis of the urethane oligomer and acrylic monomers obtained by the above sopolicondensation reaction in aqueous media, obtaining acrylic-urethane and acrylic-Craton-urethane copolymers by free radical copolymerization reaction [4].

Methods and materials. At the first stage of practical experiments, work was carried out to obtain the acrylic-urethane copolymer. At the same time, a triangular tube, a cooler and a dropper equipped with a thermometer, a heating device and a mechanical stirrer were obtained. Urethane oligomer and acrylic monomers also obtained as initial organic monomers [5].

The studied high-temperature resistant emulsion acrylic-urethane copolymer has been scientifically proven to depend on the initial urethane oligomer mass ratio when obtaining a coating, as well as on the active substances potassium persulfate initiator and alkylbenzolsulfoacid surface in aqueous media.

It is noteworthy that the process of this polycondensation reaction, carried out in the presence of an acrylic monomer and a urethane oligomer, was carried out in an aquatic environment. The conduct of a copolymerization reaction in an aquatic environment considered one of the main methods of industrial production in the following years.



In order to obtain a positive result in the reaction in this process, the urethane oligomer and the acrylic Monomer will have to completely dissolve in the aquatic environment. The acrylic acid obtained for practical experiments is well soluble in the solvent water of our choice, but the urethane oligomer is poorly soluble. In this case, the addition of special emulsifiers prescribed to obtain a positive result from the reacting components.

Results and discussion. The BGD-500 measuring device in accordance with ISO-4624 (international standard) was use in the method of determining the adhesion of an acrylic-urethane copolymer coating “adhesion testing of paints and varnishes by weighing”. When preparing the sample for the test experiment, a metal plate was taken and the surface of the plate was coated with an acrylic-urethane coating (Fig.1).



Figure 1. The process of determining the adgesia of an acrylic-urethane sample.

When studying the dependence of the sample preparation time for the test on the adhesion index of the coating, it was found that the adhesion index of the acrylourethane copolymer coating obtained for the test, that is, is associated with solidification. In particular, it has been scientifically proven that if, 4 hours after the preparation of the sample, the adhesion index was 0.22 MPa, then after 16-20 hours the maximum value will reach 0.80 MPa (Fig.2).

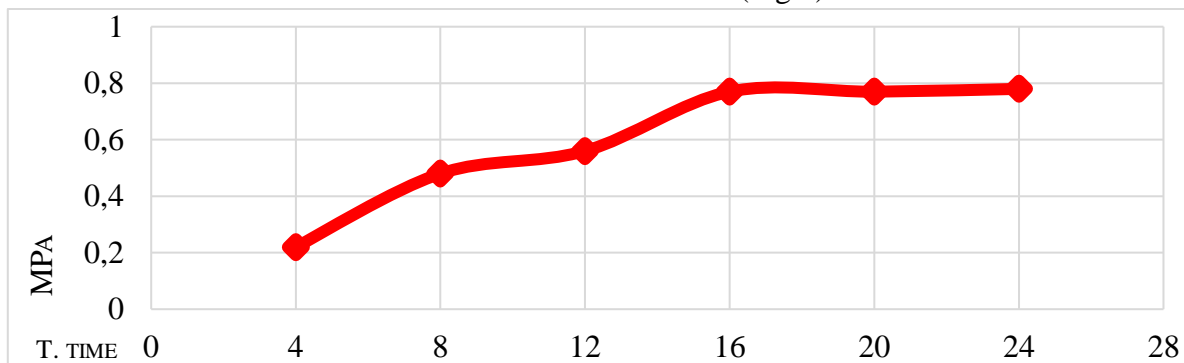


Figure 2. The dependence of the adhesion of the acrylic-urethane coating sample on time.

In the same order, the adhesion parameters to an acrylic-urethane polymer coating, which includes ammophos to increase its heat resistance and corrosion resistance, were studied (Table. 1).

Table 1.

Adhesion indicators of the coating in the case when ammophos is included in the composition of the acrylic-urethane copolymer coating

o/n	Acrylic-urethane copolymer coatings	Added ammophos (%)	Adhesion indicators (MPa)
1	Acrylic-urethane	0	0,77
2		8	0.78
3		12	0.80
4		16	0.88
5		20	0.92
		24	0.92

In the course of practical tests, scientific confirmation was found that when 20% of ammophos is introduced into the composition of an acrylic polyurethane coating on a metal plate, its adhesion index changes in a positive direction.

Thus, in the course of practical experiments, the synthesis of an acryl-urethane copolymer coating was carry out in the presence of an acrylic monomer and a urethane oligomer. When studying the adhesion parameters of the resulting coating, it was found that it has a positive indicator compared to its analogues.

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