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ХИМИЯ ЖӘНЕ ХИМИЯЛЫҚ ТЕХНОЛОГИЯ БОЙЫНША X ХАЛЫҚАРАЛЫҚ БІРІМЖАНОВ СЪЕЗДІНІҢ ЕҢБЕКТЕРІ
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SYNTHESIS AND CHARACTERIZATION OF BIODEGRADABLE MATERIALS BASED ON GRAFT COPOLYMERS OF CHITOSAN

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At the present time, recycling waste plastics is an actual problem with the environmental position of the medium. Most synthetic polymers, plastics and rubber are not suitable for reuse and for a long time not decomposed. All major at the end of last century, the firm field of polymer production are developing environmentally friendly disposal of plastic waste strategy. The reason for choosing Chitosan (Ch), N-isopropylacrylamide (NIPAAm), acrylic acid (AAc) to form a three-dimensional connection was based on the fact that NIPAAm is a temperature sensitivity as a response to the most important homeostatic parameters of biological systems are interesting. More attractive is the use of the copolymers having in their composition different functional groups allow to modify combined responses to different types of external parameters in one system. One of them is to provide a biodegradable material blend compositions based on natural and synthetic polymers, other - copolymers comprising polymer blocks of different nature. The development of biodegradable polymers for use in medicine has received much attention. One such polymer is Ch. It is expensive, but has been noted for its flexibility and biodegradability. Fortunately, it is possible to blend chitosan with another copolymers, so reducing the cost of the final product and leading to commercially successful applications. Ch is a good film materials with many advantages: non-toxic, antibacterial and biodegradable. It has been blended with copolymers for use as a packaging material.

Purpose of the work: is to obtain temperature sensitive NIPAAm- AAc - Ch copolymers of grafted structure, to investigate their physico-chemical characteristics. Experimental part of synthesis copolymer based on NIPAAm- AAc -Ch. A weighed amount of chitosan was dissolved in 100 g of 1% acetic acid and charged into 250 ml three-necked flask. The free radical initiation system of ammonium persulfate (APS) (0.03 g) was added to the flask during mechanical stirring. N-isopropylacrylamide and actylic acid was added to the solution and the reaction mixture was stirred for 1 h at 60°C, 2 h at 70°C. The product dried at the room temperature 2-3 days.

In this study used one of the most preferred chemical modification methods – graft copolymerization. Grafting of NIPAAm\AAc on to Ch was successfully achieved. Grafting process improved the thermal stabilities of the copolymers. The use of synthetic biodegradable copolymers for two most important areas of human life – medicine and environmental protection. The method of graft copolymerization of the three-dimensional grafted copolymers NIPAAm-AAc-Ch obtained for first time with different ratio. The physico-chemical characteristics of these copolymers were investigated using FTIR, TGA, and SEM, X-ray diffraction methods. Characterization of thus NIPAAm-AAc-Ch copolymers via FTIR spectroscopy analysis and scanning electron microscopy was investigated and after modification difference in surfaces of copolymers was verified. The TGA technique was employed to successfully characterize the weight loss of the obtained copolymers. X-ray patterns showed after copolymerization changing of crystal morphology to amorphous structure. Biodegradation obtained were investigated based copolymers NIPAAm-AAc-Ch in soil burial. These observations therefore symbolize of degradation process during soil burial studies of grafted chitosan .

The samples were cut into 30 × 50 mm pieces and buried in the soil at a depth of 10 cm. The soil was placed in the laboratory, and the moisture of the soil was maintained by sprinkling water at regular time intervals. The excess water was drained through a hole at the bottom of the pot. The degradation of the samples was determined at regular time intervals (7 days) by carefully removing the sample from the soil and washing it gently with distilled water to remove soil from the film. The sample was dried under vacuum until a constant weight was obtained. Weight loss of the sample over time was used to indicate the degradation rate of the soil burial test. Chitosan grains can be seen on the sample before burial. In the same sample, after only two months of burial these grains start to disappear because they are consumed by microorganisms. This leaves a film with a surface full of cavities, which become more abundant as the

burial time increases. These film imperfections lead to a deterioration in mechanical properties and make the film fragile.

Copolymers based on NIPAAm-AAc-Ch were examined effects of organic solvent chloroform, ethanol, dimethyl sulfoxide. Polarity of solvents increases, the increase in the degree of swelling is determined. Swelling studies copolymers with various solvents has been selected in the following order: ethanol> dymethylformadide> chloroform.