

# THERMAL DESTRUCTION PROCESS STUDY ON THE COPOLYMERS OF POLY(PROPYLENE) GLYCOL MALEATE PHTHALATE WITH ACRYLIC ACID

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One of the perspective materials for practical application is hydrogels which use as highly efficient moisture sorbents. From these positions copolymers of unsaturated polyester resins with ionogenic hydrophilic monomers represents significant interest.

We have first synthesized copolymers on the basis of poly(propylene) glycol maleate phthalate (p-PGMP) with acrylic acid (AA) with satisfactory specific sorption capacity [1]. In this connection, it was of interest to estimate the effect of the thermal factor on the stability of the copolymers.

In the work we evaluated thermal destruction of copolymers of p-PGMP-AA with the various molar composition by dynamic thermogravimetric analysis under nitrogen at different heating rates (5, 10, 15 and 20°C/min) in the range of temperatures of 30–520°C. It was established that the destruction of the copolymers began at 108–130°C and represented a complex process. According to the data obtained by the isoconversional Ozawa-Flinn-Wall, Friedman and Kissinger-Akahira-Sunose methods [2], we calculated the activation energies  $E_a$  and the pre-exponential factor  $A$ . It was found that the activation energy values increases correspondingly with content of the unsaturated polyester p-PGMP in the copolymer composition. On the basis of the  $E_a$  values, changes in the entropy ( $\Delta S$ ), enthalpy ( $\Delta H$ ), and Gibbs energy ( $\Delta G$ ) of the copolymers decomposition have been determined, so they have a good convergence. An analysis of the data indicates that during the thermal degradation of the copolymers, the entropy of the system  $\Delta S$  decreases with increasing content of p-PGMP in the composition.

It was revealed that the copolymers of p-PGMP-AA with different compositions are more readily degraded in an inert nitrogen medium with a decrease in the proportion of unsaturated polyester.

## References:

1. BURKEEV, M.Zh., TAZHBAEV, E.M., KOVALEVA, A.K. 2014. Investigation of the radical copolymerization reaction of polypropylene glycol maleate terephthalate with acrylic acid. *Chemical Journal of Kazakhstan*, 4 (45), pp.68–73.
2. POPOV, A., BOGDANOV, B., PETROVA, I., GYUROVA, K., NEDELICHEV, N., VELEV, V. 2013. Thermal studies on polycaprolactam. *J Therm Anal Calorim*, **111**, pp.1539-44.