THE EPOXY OLIGOMER-BASED HEAT-RESISTANT POLYMERS AND COMPOSITES: SYNTHESIS AND PROPERTIES

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The polymers and composites based on organic binders have been widely usable in various industries, such as construction industry, machinery construction, aerospace industry, power industries, and shipbuilding. The binders based on epoxy oligomers (EOs) of the amine/anhydride hardening are in great demand as polymeric binders for synthesis of heat-resistant polymers and composites.

In the present work, the heat-resistant polymers and composites were synthesized via the poly-addition reaction between the different-functional EOs and the nadic methyl anhydride (NMA).

The DSC- and FTIR-spectroscopy methods were used to study kinetics and mechanism of interaction between the EOs and the NMA while under the action of differently-structured imidazoles as the reaction catalysts. The specimens of polymers and composites (organoplastic) with the glass transition temperature 175-195°C were obtained depending on functionality of the EOs. A concurrent effect of the imidazoles as structural modifiers was found out. Physic-chemical and thermo-mechanical properties of the polymers during their testing for rupture, compression, and bending on exposure to a wide diapason of temperatures and to ageing at 150°C for 30 days were determined. The polymers appeared to be of high thermal stability. The heat-resistance coefficient of the NMA-based polymers increased from 0.65 to 0.9 as compared with the standard composition.

The epoxy binders and the heat-resistant network polymers that were formed on hardening are featured by a good adhesion to aluminium and its alloys, and also to the RUSAR aramid fiber and glass fabric. This feature enables recommending these materials to be used in production of composites (organoplastics and glass-fiber materials).

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