NANOCOMPOSITES BASED ON DYNAMICALLY VULCANIZED THERMOELASTOPLASTICS, MODIFIED BY MONTMORILLONITE

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The production and application of dynamically vulcanized thermoelastoplastics are intensively developed in the last years. Of a special interest to developers and consumers are thermo-resistant and oil and petrol resistant dynamically vulcanized thermoelastoplastics with a hardness of 65-80 units to Shore A. These butadiene-nitrile rubber and polypropylene based dynamically vulcanized thermoelastoplastics are well suited for the production of auto parts. However, they show low component compatibility during mixing of the polar elastomer and non-polar thermoplastic phases into butadiene-nitrile rubber- polypropylene pairs. This is owing to the decreased elastic-strength and thermal properties of composition materials of this type. We propose that using inorganic fillers partially decreases the weaknesses identified above.

One of the possible ways to improve the complex properties of polymer composites is the introduction of nanoscale fillers into them, including layered silicates from the montmorillonite group, which are capable of organizing organic-mineral complexes. This ability is a consequence of the lability of the layered structure of montmorillonite which swells during the intercalation of organic substances. A subject of the study was the properties of Cloisite 15A, a natural montmorillonite modified with quaternary ammonium salts. Dynamically vulcanized thermoelastoplastics based on polypropylene and butadiene-acrylonitrile rubber, modified by montmorillonite Cloisite 15A were obtained. Dynamically vulcanized thermoelastoplastics were produced in a plasticorder Brabender mixing chamber by introducing Cloisite 15A organoclay at a dosage of up to 7 wt.% per 100 parts by weight polymer in both the polyolefin, and rubber phases.

It was established that the best physical-mechanical, thermal, viscous-elastic and operational properties by preliminary mixing of small quantities montmorillonite with elastomer are achieved. The results obtained by XRD composition show that the improvement of the physical and mechanical characteristics of dynamically vulcanized thermoelastoplastics are explained by the exfoliation of montmorillonite's nanosized particles in a polymer matrix.

From the standpoint of processing the filled composites are important features of their flow. The results of rheological studies (MPT Monsanto) also demonstrated the positive effects of montmorillonite nanofillers on the properties of dynamically vulcanized thermoelastoplastics. It was found that the introduction of montmorillonite of 7 wt.%. into dynamically vulcanized thermoelastoplastics is not accompanied by increased viscosity and does not complicate the processing of such composites. The elastic-hysteresis characteristics of filled dynamically vulcanized thermoelastoplastics were estimate. These data correlate with the physical and mechanical characteristics and can be used to predict the properties of the composites. It was found that the best combination of properties have dynamically vulcanized thermoelastoplastics containing into rubber Cloisite 15A with 1 - 3 wt.%.