

The modification process investigation of the of cellulose modification products on SKI-3 elastomer and it is based on rubbers

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Abstract

The article is devoted to the study of influence of powdered cellulose modifiers on thermo-mechanical and thermo-oxidative resistance of synthetic isoprene rubber SKI-3, as well as on rheometric and physical-mechanical properties of the gums based on SKI-3 (not containing carbon black). Microcrystalline cellulose (MCC) and nanocrystalline cellulose (NCC) were used as test samples of the modifiers.

The microcrystalline cellulose sample was obtained by hydrolytic degradation of unbleached hardwood cellulose with nitric acid up to polymerization degree 100. Sample nanocrystalline cellulose has received by regulated cellulose degradation in acetic acid under the action of phosphotungstic acid.

It was established using thermogravimetry and differential scanning calorimetry that the MCC and NCC modifiers don not affect the thermal degradation rate of isoprene rubber and it is thermal resistance. It was found that the introduction of MCC and NCC modifiers (1 wt. per 100 wt. SKI-3) lead to decrease of rate of thermal-mechanical degradation of rubber by factor of 2.

Introduction of MCC and NCC modifiers to the sample of gums based on SKI-3 rubber increases both minimum and maximum torques in a rubber mixture compared to the sample without modifier. The last indicates the formation of a more dense mesh and increasing the rigidity of the rubber. Reversion is not observed. It is observed an increase of optimum vulcanization time of gums. Introduction of MCC and NCC modifiers to the polymer composition leads to decrease of relative elongation on breaking and residual elongations of gum samples. The strength characteristics of rubbers remain at the level of control sample.

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