

Study of the technological additive influence on the thermal properties of dynamic thermoplastic elastomer by differential scanning calorimetry and thermal gravimetric analysis

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Abstract

Dynamic thermoplastic elastomers (TPV) are materials that combine the characteristics of thermoplastic processing and the physical properties of vulcanized rubbers. That allowed to replace the products made of rubber products from the TPV. Dynamic thermoplastic elastomers processing may have some difficulties due to high viscosity of rubber. Technological additives related to different classes of chemical compounds are used to solve problems with processing. The technological additive in an amount of 1-3 % wt. were added to facilitate the processing of the dynamic thermoplastic elastomer based on chlorobutyl rubber and polypropylene. The method of mass spectroscopy was used to determine the chemical composition of the additive. It has been found that the additive relates to fatty acids polyesters.

The evaluation of the effect of this additive on thermal stability is of interest because TPV processing is carried out at sufficiently high temperatures. Differential scanning calorimetry and thermogravimetric analysis were carried out to assess the effect of the additive on the thermal stability of the TPV. Curves of DSK and TGA have shown that all curves have the general endo- and exothermic peaks. The endothermic peak with top about 170 °C which is characteristic of polypropylene and is connected with his melting is characteristic of all curves. The peak in the range of temperatures of 250-270 °C corresponds to destruction processes of additive. The exothermic peak at a temperature of 400 °C corresponds to full destruction of samples. On curve TGA it is shown that at this temperature there is a loss of 90% of the mass of a sample. The analysis by Freeman-Carroll's method has shown that introduction of additive in number of 1-1.5 % wt increases energy of activation of process of destruction of material, and reduces at the content of additive 2-3 % wt.

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