

Effect of activation of wollastonite surface by quaternary ammonium salts on the relaxation properties of PVC compositions modified by it

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Abstract

It is promising to use wollastonite as a modifier of plasticized polyvinyl chloride compositions. The main advantages of wollastonite are white colour and needle-shaped particles. To improve the compatibility of this filler with a polymer matrix, it is effective to activate the surface of this mineral by quaternary ammonium salts (QAS).

Valuable information on molecular motion in modified compositions can be obtained by studying the relaxation processes using dynamic mechanical analysis.

In the temperature dependences of the mechanical loss tangent of the PVC compositions in the region of transition from the glassy to highly elastic state, two maxima were observed. It has been established that for compositions modified with both natural and surface treated wollastonite, regardless of the chemical structure of QAS used to activate the polymer.

This is probably due to the formation of a boundary layer in which molecular mobility is inhibited because of the interaction of the polymer with the filler. Thawing of segmental mobility in this boundary layer occurs at the higher temperatures than in the PVC matrix.

The surface treatment of wollastonite by QAS somewhat shifts the described relaxation transitions to higher temperatures due to an increase in the efficiency of interaction of the components at the interface.

The magnitude of the change in the temperature of the segmental mobility, both in the polymer matrix and in the boundary layer, increases with an increase in the degree of activity of the filler surface.

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