

Polymer 1996 vol.37 N14, pages 3049-3053

Poly(methyl methacrylate)/1,2-dichloroethane system: Freezing of conformational mobility in the low-molecular component

Stolov A., Kamalova D., Remizov A., Zgadzai O.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The conformational dynamics in 1,2-dichloroethane (DCE)/poly(methyl methacrylate) (PMMA) mixtures has been studied at different concentrations of DCE. The intensities of the infrared absorption bands belonging to the trans and gauche conformers have been measured in the 77-300 K temperature range. Besides, the glass transition temperatures of the mixtures T_g were determined by the differential scanning calorimetry. For all the systems under investigation the freezing of the conformational transitions has been found: below a certain temperature T_f the trans/gauche ratio becomes temperature independent. The T_f value for the lowest volume fraction of DCE ($C = 0.01$) was found to be close to the temperature of one of the secondary relaxation transitions of pure PMMA (195 K). At this temperature the free volume entities in PMMA should have the volume close to that of the conformationally mobile groups of DCE ($\sim 25 \text{ \AA}^3$). The concentration dependence of T_f consists of two branches. At low concentrations of the diluent ($C < 0.6$) T_f slowly decreases with the concentration of DCE, reflecting the concentration behaviour of the relaxation transition temperature. At the higher concentrations the freezing of the conformational equilibrium in DCE occurs at the glass transition of the mixtures, and the T_f values are close to the T_g ones. Copyright © 1996 Elsevier Science Ltd.

[http://dx.doi.org/10.1016/0032-3861\(96\)89404-3](http://dx.doi.org/10.1016/0032-3861(96)89404-3)

Keywords

Conformationally mobile probes, Glassy polymers, Molecular mobility