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THE ROLE OF ORGANOCLAY ON MICROSTRUCTURE DEVELOPMENT AND RHEOLOGICAL PROPERTIES OF POLY(BUTYLENE TEREPHTALATE)/EPOXY/ORGANOCLAY HYBRID SYSTEMS

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The main objective of the present work was to study the interfacial role of organoclay on the microstructure development and rheological properties of Poly(butylene terephtalate)/epoxy/organoclay (Cloisite® 30B) hybrid nanocomposites. The effects curing of epoxy and feeding order were also investigated. The hybrid Nanocomposite samples were prepared by melt compounding in a laboratory internal mixer at temperature 240°C. The samples were prepared by three feeding roots; 1) simultaneous feeding, 2) PBT/organoclay based master batch feeding, and 3) epoxy/organoclay based master batch feeding. The XRD results showed a highly intercalated microstructure for all the samples. The linear viscoelastic results obtained for uncured samples, prepared by the first and second feeding root, exhibited a pronounced low frequency non-terminal behavior whose extent was found to be increased in the cured samples. These results suggested that the major part of nanoclay tactoids and/or platelets are dispersed in the PBT matrix with higher nanoclay concentration in the sample prepared by second feeding root. However, the samples prepared through epoxy/organoclay based master batch did not exhibit an appreciable low frequency solid body response. This suggests that the process of migration of the nanoclay tactoids and/or platelets from epoxy droplet to PBT matrix is the time consuming process due to highly aspect ratio nanoclay and great viscosity of the PBT matrix. From linear and nonlinear viscoelastic measurements it could be deduced that curing process dose not play an important role in determining the extent of intercalation and dispersion of the nanoclay, But it can enhance the interfacial interaction between two phases in the nanocomposite.