

Study of Poly(Ethylene Terephthalate)-Clay Nanocomposites Prepared by Extrusion Reactive Method

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Abstract : A method for the exfoliation of polyethylene terephthalate (PET) - clay nanocomposites has been reported in this study. Montmorillonite clay based polyethylene terephthalate nanocomposites were prepared by reactive melt-mixing. To achieve this, untreated clay was first functionalized with the crosslinking agent compound based mainly on peroxide/sulphur and TMTD as accelerator or activator for sulphur. Furthermore, the different blends composition of PET/clay were directly mixed in melt state in closed chamber of plastograph at given working conditions for short time and in one step process. To investigate the microstructure modification and thermal, mechanical and rheological properties the DSC, WAXS, microhardness, FTIR and tensile properties were performed. The resulting structure of the modified samples shows that total exfoliation appears at 4% w/w of clay to PET matrices. The crystallinity and tensile modulus were correlated by the H microhardness and the DSC shows no significant effect on the crystallinity degree. The mechanical properties were improved significantly. The viscosity decreases for 4% clay and the activation energy is the minimum. The WAXS measurement shows a partial exfoliation without any intercalation which is the most relevant point. The grafting of organic to inorganic nanolayers was observed by Si—O—C and Si—C bonds by FTIR.

Keywords : PET, montmorillonite, nanocomposites, exfoliation, reactive melt-mixing

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