



P-3-711

SYNTHESIS AND COMPARISON BETWEEN MECHANICAL AND THERMAL PROPERTIES OF TWO DIFFERENT TPU NANOCOMPOSITE SERIES

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Nanocomposites are a recently introduced class of materials which have become a major field of interest even with their relatively short age. Organoclays are the most commonly used additives in synthesizing nanocomposites. These materials are very general and have many classes in physical form organoclay are commercially available in the market which can be different in original modification in order to improve their dispersion in polymer matrix. They can improve the properties of polymers such as thermal and mechanical properties. The most important advantage of these nanoparticles is that, with much lower loading the same or better properties than common micro-sized fillers is attainable. Here in this research we focus on comparing properties of polyurethane nanocomposites prepared with different types of organoclays. Organoclays used here are from two different sources. The first source is a series of clay known as Dellite such as Dellite 43B, Dellite 67G, Dellite 72T, Dellite HPS, Dellite LVF. Another source is the Southern clay company products known as Cloisite series such as Cloisite 30B, Cloisite 20A, Cloisite 15A, Cloisite NA+. These nanocomposites were made by in situ method. TDI (Toluene Di-isocyanate) as isocyanate, CAPA 4000(Mw=4000) as polyol and 1, 4-Butanediol as chain extender were used. X-Ray diffraction (XRD), Differential Scanning Calorimetry (DSC), Thermal Gravimetric Analysis (TGA), and Dynamic Mechanical Thermal Analysis (DMTA) were applied to study the considered properties. The results showed improvement in some properties of polyurethane for both series of nanoparticles. XRD tests revealed intercalation/exfoliation structure in all samples which these results were proved by Transmission Electron Microscopy (TEM).