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A Novel Method for Preparation of Polyamide 66/Silica Nanocomposites via Interfacial Polycondensation

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Polyamide 66/silica nanocomposites were prepared by direct interfacial polycondensation of Hexamethylenediamine and Adipoyl Chloride dispersed in two phases in which, different amounts of organically modified montmorillonite (OMMT) nanoparticles were dispersed in the organic phase (Dichloromethane). In this process the irreversible polycondensation of the two fast reacting intermediates, in presence of OMMT, occurs near the interface of two phases of a heterogeneous liquid system. For many interfacial polycondensation reactions it has been found that there is an optimum ratio of concentration of reactants in the organic phase to the concentration of reactants in the inorganic phase for production of high molecular weight polymers. This may result from favorable changes in the diffusion rates and the interfacial area. During the polycondensation process some OMMT nanopaticles may set in the polymeric matrix while a small portion may settle in the organic phase. The films of PA66/OMMT nanocomposites produced at the interface of the two phases were coiled round a spool. The nanocomposite samples were dried in an air oven at 80°C for 24 h and were characterized by means of XRD, TGA and TEM techniques. The XRD pattern has been used to assess the dispersion of OMMT layers in the PA66 matrix and evaluate the type of nanostructures that has been formed, showed a good dispersion of the silicate layers in this system. It was found that the silicate layers were dispersed homogeneously and nearly exfoliated in the PA66 matrix. The amount of the incorporated OMMT in the polyamide 66 matrix was determined by means of the TGA technique. The TGA graphs indicated an increase in heat stability as well as degradation temperature of the prepared PA66/silica nanocomposites. The TEM analyses also confirmed the good dispersion of silica layers in the Polyamide 66 matrix.