

NANOCOMPOSITES OF CALCIUM CARBONATE AND POLYPROPYLENE: A RHEOLOGICAL, MECHANICAL AND STRUCTURAL STUDY.

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ABSTRACT

Research on polymer nanocomposites has gained rightful importance during the past ten years. Polymer properties can be dramatically improved, even with very low amount of nano fillers (less than 5 wt. %), compared to those improved by conventional fillers with high percentage (20 to 40 wt. %). The present investigation is a study of the effect of nano filler (CaCO_3), on torque of their compounds using Brabender torque rheometer. Crystallization behaviour and mechanical properties of nanocomposites were also determined. Calcium carbonate (nanoparticle size) was synthesized by *in situ* deposition technique and its size (35 to 55) was confirmed by Transmission Electron Microscopy. A number of composites of the filler CaCO_3 (conventional and nano) and the matrix polypropylene (PP) were prepared with different filler loading (1-5 wt. %). The variation of torque was studied for these formulations using Brabender torque rheometer. The rheological behaviour of the nanocomposites was compared with the corresponding composites containing conventional CaCO_3 . There was marginal effect of nano CaCO_3 on the magnitude of torque. However tensile properties and crystallization peak temperature for the nanocomposites showed a significant change on higher side. This change is accounted for more and stronger filler cluster formed due to larger surface area of the nanofillers. In nanocomposites, more and stronger filler cluster were formed than in microcomposites due to large surface area of the nano fillers. While WXAD shows the structure of PP nanocomposites is intercalated. The morphology fractured surfaces was study using the SEM.

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