

Nanoindentation and Tensile Testing of Nylons Blends Nanocomposites

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Abstract

Nylon 6, Nylon 6.6 and their blends: ((30% nylon6:70% nylon 6.6), (50% nylon6:50% nylon 6.6) and (70% nylon6:30% nylon 6.6)) at different clay loadings were prepared by mixing the polymers with 1.34TC nanoclay which is an organic modified clay to be compatible with the polymer matrix (nylons) and by heat and melt injection the nanocomposites were prepared. Tensile test and nanoindentation test were performed to investigate the effect of blending process as well as the effect of the incorporated clay on the mechanical properties. An enhancement in the Young's modulus after the addition of the nanoclay was obtained for all the nanocomposites but the amount of increase differs from one composite to other having its greatest value for nylon 6 after the addition of 6% nanoclay by weight with an increase of nearly 55% above its original value. While the effect of the addition of nanoclay on the tensile strength depends on the blend ratio of the composite having its greatest effect on the (50% nylon6:50% nylon6.6) blend with an increase of an amount of 44%, 59% for 2% , 4% clay loading respectively and the blend exhibited ductile behavior at 2% clay loading The reduced modulus and the young's modulus obtained from the nanoindentation test have the same trend as the one obtained from the tensile test but with greater values and hardness increases for nearly all the composites by the addition of the nanoclay.