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EVALUATION OF PERMEABILITY OF LDPE/PA6/CLAY NANOCOMPOSITE FILMS

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In this study a Polymeric nanocomposite containing low density polyethylene (LDPE), Polyamide 6 (PA6), maleic anhydride grafted polyethylene (PEMA) and Closite 30 B that is a type of organomodified montmorolonite (O-MMT) were prepared by a co-rotating twin screw extruder at speed of mixing 200rpm and different zone temperature. LDPE-g-MA was used as compatibilizer to improve interaction between polymer blend and organoclay. Thermal (DSC and TGA), mechanical and rheological properties were characterized in order to optimize the composition of blend. Small Angle Xray (SAX) analysis showed an intercalated clay structure for the LDPE/PA6/clay nanocomposite with 3% clay and a potentially exfoliated structure with 5% clay, but for LDPE/PA6/PEMA/clay nanocomposite both composition showed a potentially exfoliated structure. In order to evaluate permeability of LDPE/PA6/PEMA/clay nanocomposite the blend were filmed by film blowing process at specific conditions. It was found that incorporation of PA into PE in presence of organoclay reduces the water vapor permeability by a factor of 0.1 in comparison with neat PA and PA/clay nanocomposite. On the other hand the results shown that the incorporation of PA into PE in presence of organoclay reduces the oxygen permeability too. Crystallinity of the nanocomposites was studied by DSC. Given the fact that crystals are effectively non-permeable , the concomitant reduction in crystallinity of the blend with decrease in permeability suggests that barrier properties arise from tortuousity of nanoparticles in the blend.