P-3-758

INVESTIGATION OF MECHANICAL PROPERTIES OF LDPELLDPENANOCLAY HYBRIDS PREPARED WITH WATER INJECTION METHOD IN A TWIN-SCREW EXTRUDER USING PRISTINE CLAY

Seied Ismail Seied Shahabadi, Hamid Garmabi,

Polymer engineering and color technology, Amirkabir University

sis.shahabadi@aut.ac.ir

A new production method including the in-situ treatment of the nanoclay particle for LDPE\\LLDPE\\Nanoclay nanocomposites has been successfully developed using a twin-screw extruder. This method did not require the pretreatment of the clay mineral with an organo-cation. In this study the effect of Alkyl ammonium salt type, extruder feeding rate and the amount of clay that was dispersed in water were investigated. Response surface method of experimental design was applied to optimize the level of three parameters. Water\\clay suspension was injected into a complex of compatibilized LDPE\\LLDPE blend in a twin-screw extruder. By controlling the pressure of the water vapor, the dispersion of the clay mineral was achieved in the twin-screw extruder. Compatibilizers were added to the LDPE\\LLDPE blend to prevent aggregation. X-ray Diffraction patterns revealed that the silicate layers of the clay mineral in these LDPE\\LLDPE nanocomposites were fully dispersed. Tensile strength results showed comprehensive enhancement in tensile modulus in some cases. Other tensile properties including elongation and stress at break and work to break have been proved to have good improvement in most of the cases. This new type of polyethylene nanocomposite prepared with pristine nanoclay had better mechanical properties in comparison to conventionally prepared polyethylene-clay nanocomposites. Keywords: Pristine Clay, Water Injection Method, Nanocomposite, LDPE\\LLDPE Blend, Alkyl Ammonium Salt, Response Surface Method.