

PLASTICIZING OF POLYLACTIC ACID (PLA) BIOPOLYMER WITH CITRATE ESTERS

M. Maiza, M. T. Benaniba, A. HAMAM, M. MESSAOUDI, B. Bouchoul

Abstract : Triethyl citrate (TEC) and acetyl tributyl citrate (ATBC) were used as plasticizer for Poly lactic acid (PLA). The treated and plasticized PLA at various concentrations were analyzed by differential scanning calorimetry (DSC), dynamic mechanical analysis (DMA), melt flow index (MFI) and thermogravimetric analysis (TGA). Differential scanning calorimetry was used to evaluate the crystallinity and thermal property of all the samples. It was found that the glass transition temperature (T_g) and the melting temperature (T_m) decreased as the amount of citrate esters increased. Additionally, the presence of TEC or ATBC tended to increase the crystallinity of PLA. This result was supported by x-ray diffraction. DMA of plasticized PLA indicates that a decrease in T_g is obtained with increasing plasticizer content, Plasticizing effect was also shown by decrease in the dynamic storage modulus and viscosity of plasticized mixtures compared to the treated PLA. The TGA results indicated that ATBC and TEC promoted a decrease in thermal stability of the PLA.

Keywords : Poly lactic acid (PLA), Plasticizer; Citrate esters; Crystallinity, Triethyl Citrate (TEC), Acetyl Tributyl Citrate (ATBC)