Thermal, rheological and morphological propertiesof biodegradable blends based on poly (lactic acid)and polycarbonate blends

Nadjat CHELGHOUM, Melia GUESSOUM, Nacerddine HADDAOUI

Abstract : Biopolymers are expected to be an alternative forconventional plastics due to the limited resources and soaringpetroleum price which will restrict the use of petroleum basedplastics in the near future. In this context, poly(lactic acid) (PLA)has attracted the attention of polymer scientists as a potentialbiopolymer to substitute the fossil fuel based polymers.Even the huge advancements in PLA research, there is stillmany drawbacks that continue to limit its employment in somesectors which require particular mechanical and thermalproperties. For this reason, blending with other polymersappears as an attractive strategy to overcome the PLAsshortcomings and enlarge its application domains. Amongpossible PLA blends, its combination with polycarbonate (PC)presenting a high inherent thermal stability and an importanttensile strength appears the more suitable path to overcome PLAbrittleness and poor thermal resistance. Consequently, PLA/PCblends have received considerable attention in research becauseof their potential applications as friendly to the environmentadvanced packaging materials and for industrial applications.The objective of this study was to prepare biodegradablematerials based on a bio-based polymer, which is the PLA and anengineering thermoplastic, PC. The properties of the blends werecharacterized by differential scanning calorimetry (DSC),thermogravimetric analysis (TGA)and scanning electronmicroscopy (SEM).The study showed that the blends kneadingtorque are between those of the homopolymers and areproportional to the rate of PLA. Thermogravimetric analysisshowed that PC improved notably the thermal stability of theblends. DSC results pointed out significant changes on thethermal behavior of the PLA phase into the blends.

Keywords : Blends, Biopolymer, Poly (lactic acid), Polycarbonate, Thermal stability.