

2016

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

Nadjat CHELGHOUM, Melia GUESSOUM, Nacerddine HADDAOUI

Abstract : Biopolymers are expected to be an alternative for conventional plastics due to the limited resources and soaring petroleum price which will restrict the use of petroleum based plastics in the near future. In this context, poly(lactic acid) (PLA) has attracted the attention of polymer scientists as a potential biopolymer to substitute the fossil fuel based polymers. Even the huge advancements in PLA research, there is still many drawbacks that continue to limit its employment in some sectors which require particular mechanical and thermal properties. For this reason, blending with other polymers appears as an attractive strategy to overcome the PLA shortcomings and enlarge its application domains. Among possible PLA blends, its combination with polycarbonate (PC) presenting a high inherent thermal stability and an important tensile strength appears the more suitable path to overcome PLA brittleness and poor thermal resistance. Consequently, PLA/PC blends have received considerable attention in research because of their potential applications as friendly to the environment advanced packaging materials and for industrial applications. The objective of this study was to prepare biodegradable materials based on a bio-based polymer, which is the PLA and an engineering thermoplastic, PC. The properties of the blends were characterized by differential scanning calorimetry (DSC), thermogravimetric analysis (TGA) and scanning electron microscopy (SEM). The study showed that the blends kneading torque are between those of the homopolymers and are proportional to the rate of PLA. Thermogravimetric analysis showed that PC improved notably the thermal stability of the blends. DSC results pointed out significant changes on the thermal behavior of the PLA phase into the blends.

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