DEVELOPMENT OF BIODEGRADABLE PLA/PBT NANOBLENDS

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The inappropriate use and disposal of polymeric materials, combined with their resistance to degradation, produces considerable environmental problems, which encourages the pursuit for a balance between the durability and degradation after final disposal. A great alternative can be found in the use of biodegradable polymers which, for some applications, present a great potential in non-biodegradable polymers replacements. Poly (lactic acid) (PLA) has been widely applied as an environmentally friendly thermoplastic; however, its brittle behaviour is a challenge for application in the packaging industry, for example. In order to obtain improved toughness, without a great loss of tensile modulus, immiscible blends with poly (butylene terephthalate) (PBT) were produced in a co-rotating twin-screw extruder. Distinctive properties can be achieved in immiscible polymer blends if the dimensions of the particles of the disperse phase are in the nanometric range (Nanoblends). Compatibilized blends with 3, 5 and 10 wt% of disperse phase (PBT) in the matrix (PLA) were produced, as well as an uncompatibilized blend with 5wt% PBT. The compatibilizer used in this study was LOTADER AX 8840, with glycidyl methacrylate reactive groups. The tensile tests showed an increase in strain at break from 3.08% for pure PLA to 49.10% for PLA with 3 wt% PBT compatibilized, while tensile modulus dropped from 3.59GPa to 3.35GPa, for the same samples. Izod unnotched results showed a transition from a brittle behaviour of pure PLA, with 59.2J/m impact resistance, to a ductile one for compatibilized blends, with values for the 3, 5 and 10 wt% being respectively: 160.2, 188.6 and 216,7J/m. Those results indicates that the nanometric disperse phase was efficient in changing the deformation behaviour of the matrix without a significant loss of tensile modulus.