COMPATIBILIZATION OF RECYCLED HIGH DENSITY POLYETHYLENE (HDPE)/POLYETHYLENE TEREPHTHALATE (PET) BLENDS

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Abstract

Immiscible blends of recycled high density polyethylene (HDPE) and polyethylene terephthalate (PET) were compatibilized with maleic anhydride grafted polyethylene (PE-*g*-MA). The effect of the compatibilizer content on the mechanical, morphological, rheological, and thermal properties of recycled HDPE/PET blends was investigated. The blends were prepared in a twin screw extruder. Tensile strength, tensile strain at break, and impact strength improved with the addition of the compatibilizer. The compatibilized blends had a smaller size of dispersed phase compared with the uncompatibilized blends. The addition of the compatibilizer increased the melt viscosity of the compatibilized blends. The compatibilizer affected on the crystallinity behavior of the blends.

Keywords: HDPE/PET blend, PE-*g*-MA, compatibilization, recycling

Introduction

High density polyethylene (HDPE) and polyethylene terephthalate (PET) have been widely used in packaging applications and constitute a large portion of post-consumer wastes. Recycling offers an alternative solution for handling plastic wastes. A mechanical recycling method which involves blending of the plastics is one of the solutions for recycling plastics. However, the immiscibility of HDPE and PET leads to poor interfacial adhesion and mechanical properties. The compatibility of immiscible blends can be improved by reactive and non-reactive compatibilization. The reduction of interfacial tension and improvement of interfacial adhesion and dispersion are obtained. (Baker *et al*., 2001)

Several researchers have studied the compatibilization of HDPE/PET blends using compatibilizers. Dagli and Kamdar (1994) discussed the effects of component addition on the reactive compatibilization of HDPE/PET blends. Ethylene glycidyl methacrylate copolymer (EGMA) was very effective in compatibilization of the blends. The different sequences and modes of component addition affected the mechanical and morphological properties of the blends. The best properties were obtained when EGMA was blended first with HDPE and then with PET. Guerrero *et al*. (2001) studied the effect of a copolymer of ethylene and methacrylic

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