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Toughening and Effect of Beta-irradiation on Mechanical Properties of Metallocene Elastomers/PA6 Blends

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Novel elastomeric and thermoplastic blends have been developed in order to improve mechanical properties using two types of nylon 6 as dispersed or matrix phase with two kinds of metallocene elastomers (mEPDM and mPOE). The Compatibilization was accomplished either by addition of a commercial compatibilizer (EPDM-g-MA, mPOE-g-MA and mEPR-g-MA,) or by reactive processing (mEPDM-g-MA and mPOE-g-MA, in situ generated). Selected blends were treated with different dosis of β-irradiation.
The interfacial reaction between blend components and the blend morphology were analysed by SEM measurements. Mechanical properties were examined by tensile strength, notch Izod and puncture impact behavior, compression set tests.
The results showed that thermosetting rubbers and TPE´s with excellent mechanical properties and thermal stability may be obtained by β -irradiation technology. The highest break elongation value was obtained for the PA/mPOE/-mEPR-g-MA ternary blend treated with an irradiation dose of 100 kGy. Similar break elongation values have been found for other thermoplastic rubbers prepared with EPDM or EPR materials. However, hardness, tensile strength, high-temperature behavior, compression set and reprocessing ability for the blends were dependent on the elastomer used as bulk phase and the irradiation dose employed. Although these preliminary experiments are encouraging, optimization with respect to the effect of other components in rubber formulations is necessary.
On the thermoplastic blends, the morphology study are in according with the viscosity values of the components and processing conditions employed. A reduction in tensile modulus and yield stress was observed in all reactive blends and an improvement in adhesion was clearly observed by SEM.The results also indicated that the effectiveness of the grafted copolymers as impact modifier depends on the morphology of the blends.