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Obtention and Characterization of Gamma Irradiated Recycled HDPE/EPDM Blends

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Elastomeric materials have specific properties that allow the development and use of a variety of products. The application of elastomeric compounds in the automotive industry has increased considerably; due this, high volume of parts are disposal and among these, thermosetting materials, that are not easily recyclable. High Density Polyethylene (HDPE) is a commodity material with a wide range of uses in the industry. What make this polymeric material so interesting to the market are its unique properties such as good conformability, high resistance to heat and chemicals, and a relative low cost. Another characteristic for this material is its good reprocessability, which is the ability of being recycled many times. Thus, the environmental impact of both materials is evident, thereby promoting essential damage. The present work the High Density Polyethylene (HDPE) matrix has been recycled four times from original substrate and mixed to EPDM rubber not vulcanized in proportions from 1 % to 10 %. The gamma irradiation process was applied at 50 kGy and 100 kGy in both original and recycled blend samples; in this way, mechanical properties and morphologic characteristics were evaluated. The results shown EPDM in quantities of 1 % bring high tensile strength and yield strength to recycled non-irradiated blends compared to higher concentration of 10 %, that present high impact resistance. Irradiation process applied to these samples carried an increase in these parameters and the recycled blends presented higher tensile strength values than pristine HDPE samples. Blends are homogeneous and presented no specific morphologic aspects that suggests HDPE and EPDM are miscible and compatible components; crystallinity is higher in low EPDM content blend and at a dose value of 50 kGy the crystallinity reached the maximum value of 79,5 % compared to 72,2 % for pristine HDPE. These results suggest irradiated blends formed by recycled HDPE with 1 % of EPDM present high viability for industrial use due its high mechanical performance compared its low production cost.

Country/Organization invited to participate

Brazil

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