

Recycled HDPE/Vulcanized EPDM Mixtures Obtained by Irradiation Processes

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Recycling polymers process includes techniques that present solutions to the problem of plastic waste in the environment. This process is important to improve the economic sector in many countries, like cooperative societies. Primary recycling is related to the reuse of plastic waste directly from the production site in the industry, that carry on some advantages besides the low cost involved in the reuse of this waste: the raw material is free from dust of many kinds (metals, different powders and plastics). Among this polymeric waste, packaging dominates this scenario, covering 62.2% of the total, where polyolefins account more than 50% of the packaging production. In the same way, the recovering of sulfur-cured rubber contribute to release the environment from this almost non-degradable rubber. The goal of this work is to produce an alternative recycled product composed by mixing twenty-times reused HDPE (by primary recycling process) with vulcanized EPDM rubber. The twenty-times recycled thermoplastic was reached by extrusion, which intention was to simulate a polyolefin like a scrap. The EPDM rubber was fragmented and incorporated to the thermoplastic matrix in proportions of 1% and 5% w/w, from both kinds of rubber, like received and after a thermal treatment. One of the thermal treatment of rubber consisted in an oven ageing in the temperature of 100°C; the other was a simultaneous heating under irradiation process by electron beam at 130°C and at 100 kGy absorbed dose (at 22.4 kGy/s dose rate). The final mixture was obtained by injection molding and specimens from injection process were γ -irradiated at 50 kGy and at 100 kGy. Mechanical analysis of stress-strain, infrared FTIR spectra and thermogravimetric degradation were performed to evaluate the final product. The obtained product showed heterogeneous; the rubber without thermal treatment was better incorporated to thermoplastic matrix and the irradiated samples present mechanical resistance that suggests this new material intended to be viable to industrial use.