γ-Radiation (0-150 kGy) Effects on HDPE/LDPE Blends

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In the present work, irradiation with ^{60}Co source was employed to study the effect of γ-rays on some physical properties of HDPE/LDPE blends (0/100, 10/90, 25/75, 50/50, 75/25, 100/0), using various doses: 0, 50, 150 kGy. The blends were prepared by extrusion and plates were compression molded employing fast and slow cooling methods from the melt.

Density, degree of crystallinity and mechanical properties were dependant on the cooling rate used and blend composition. Better properties were found for HDPE-rich blends. Mechanical properties showed no significant variations in tensile modulus and yield stress. Instead, a decrease in elongation at break, due to molecular crosslinking or branching reaction effects, with the raise of radiation dose was obtained. Density measurements and differential scanning calorimetry results failed to exhibit significant changes with radiation dose. Some qualitative aspects included changes in endotherms shape. These were attributed to the variation of in crystallite sizes, probably due to structural changes originated by crosslinking and chain scission reactions occurring as a result of γ-rays exposure.

On the other hand, there was an abrupt reduction of the melt flow index (MFI) from the range of 16-9 dg/min for 0 kGy to non-fluidity for an exposure of 150 kGy; this behavior is another sign of high crosslinking, impairing the viscous fluidity of the blends.