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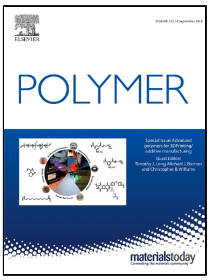

Characterization of the chemical composition distribution of polyolefin plastomers /elastomers (ethylene/1-octene copolymers) and comparison to theoretical predictions

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Characterization of the chemical composition distribution of polyolefin plastomers/elastomers (ethylene/1-octene copolymers) and comparison to theoretical predictions

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Abstract

Ethylene/1-olefin copolymers with a 1-olefin content >10 wt%, known as polyolefin plastomers (POP) and elastomers (POE), are materials of growing commercial importance. A relevant example are ethylene/1-octene (EO) copolymers. The thermal properties of nine 1-octene based POP/POE were studied by differential scanning calorimetry (DSC). The obtained thermograms were indicative of an asymmetric chemical composition distribution (CCD), triggering further investigations. At first, analytical temperature rising elution fractionation (a-TREF) was employed which gave further evidence of an asymmetric CCD for some samples. Given the low crystallinity of many of the samples, their CCD could, however, only be studied by high temperature high performance liquid chromatography (HT-HPLC). The hypothesis about an asymmetric CCD could be confirmed for all samples. The results were compared with theoretically calculated CCD (Stockmayer distributions) which are symmetrical. In a semiquantitative comparison, the main peak of the experimental CCD was found to be in good agreement with Stockmayer distributions.

1. Introduction

Polyolefins continue to be the synthetic polymers produced in largest quantity world-wide, finding countless applications, ranging from endoprostheses to automotive parts and packaging foils [1, 2]. The success of polyolefins is in large part due to their immensely