

Title: **Revealing non-reproducibility in the synthesis of LLDPE using high-temperature size exclusion chromatography coupled with an infrared detector (HT-SEC-IR5)**

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Reference 1: A. Ortín, J. Montesinos, E. López, P. del Hierro, B. Monrabal, J.R. Torres-Lapasió, M.C. García-Álvarez-Coque "Characterization of chemical composition along the molar mass distribution in polyolefin copolymers by GPC Using a modern filter-based IR detector" Macromol. Symp. 2013, 330, 63–80.

Reference 2: A. Ortín, E. Lopez, B. Monrabal, J.R. Torres-Lapasio, M.C. Garcia-Alvarez-Coque, Filter-based infrared detectors for high-temperature size exclusion chromatography analysis of polyolefins: Calibration with a small number of standards and error analysis, J. Chromatogr. A, 1257, 2012, 66-73.

Reference 3: _____
Reference 4: _____
Reference 5: _____
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Reference 8: _____
Reference 9: _____
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Abstract:

Note: maximum length of 400 words.

In this work, the chemical composition of polyolefin copolymers (Linear Low-Density Polyethylene, LLDPE) that were synthesized by different catalytic systems and contain varying comonomer types was studied using high-temperature size exclusion chromatography (HT-SEC) and state-of-the-art infrared detection (IR5, PolymerChar, Valencia, Spain) [1,2].

The IR5 detector enables monitoring of the IR response of methyl (CH_3 -) and methylene groups (- CH_2 -) in macromolecules with high sensitivity. The CH_3/CH_2 ratio obtained with the SEC-IR5 reflects the distribution of methyl branching along the molar mass axis.

Multiple series of ethylene/1-alkene and propylene/1-alkene copolymers were characterized by employing SEC-IR5. It was found that the slope of the ratio CH_3/CH_2 along the molar mass axis in some series of the copolymers was very different (for example, increasing of the ratio CH_3/CH_2 along the molar mass axis in one sample, constant in the other and decreasing in the next sample), although the samples were synthesized under almost the same conditions. On the other hand, all LLDPE samples from other series exhibited similar slopes (for example, either only constant or only increasing). It is hypothesized that this effect is related to the synthesis of the LLDPE samples. Thus SEC-IR5 enables to reveal non-reproducible effects in their synthesis.