

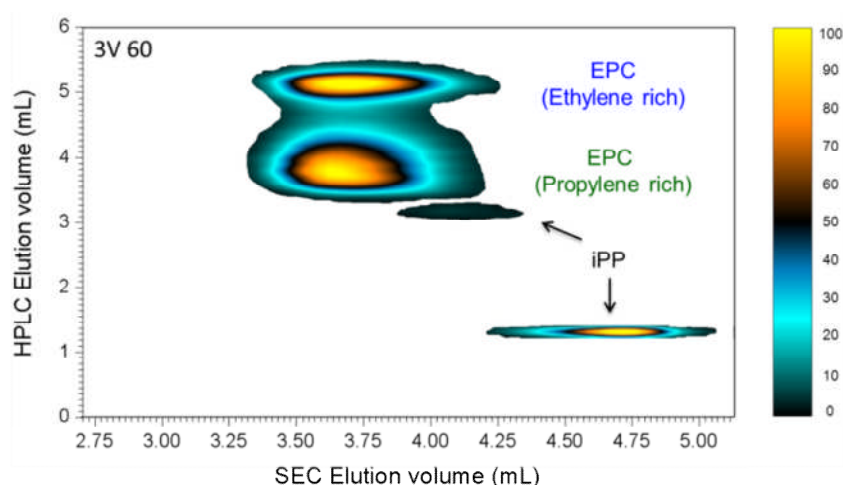
MOLECULAR CHARACTERIZATION OF IMPACT POLYPROPYLENE COPOLYMERS BY HIGH TEMPERATURE TWO-DIMENSIONAL LIQUID CHROMATOGRAPHY

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ABSTRACT

Information regarding the molar mass distribution (MMD) and chemical composition distribution (CCD) of complex polyolefins such as Impact Polypropylene Copolymer's (IPC's) is important in order to fully understand their properties during processing and application. Precise analysis of such materials with multivariate distributions is a difficult task and a single separation method is often not able to provide complete information. Preparative fractionation and subsequent analysis of the individual fractions is found to be an effective method for the complete characterisation of such complex polymeric materials. Recently, a hyphenated technique, offline coupling of SEC with FTIR, has been used to study the compositional heterogeneity of an IPC.¹ Polyolefin analytical techniques are continuously improving with the development and improvement of hyphenated-techniques and cross-fractionation methods, in order to provide a more detailed picture of the various microstructures contained in such complex polyolefins. In this work, we introduced a new analytical technique, a combination of Preparative TREF with HT HPLC and HT 2D-LC for the separation of the individual components in the all the TREF fractions of an IPC. This is the first time that the individual components in all the TREF fractions of an IPC were separated according to their chemical composition using high temperature solvent gradient HPLC, which is based on the selective adsorption and desorption of the polymer molecules on a Hypercarb stationary phase at 160 °C. Finally, separation by both chemical composition and molar mass were obtained by HT 2D-LC.²



HT 2D-LC contour plot for the 60 °C TREF fraction of a commercial IPC sample.

References:

- 1 de Goede, E.; Mallon, P.; Pasch, H. *Macromol. Mater. Eng.* 2010, 295, 366–373.
- 2 Sadiqali Cheruthazhekatt, Thijs F. J. Pijpers, Gareth W. Harding, Vincent B. F. Mathot, and Harald Pasch. *Macromolecules*, 2012, 45 (4), pp 2025–2034.