

Title: Characterization of the chemical heterogeneity of complex PP compounds

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Reference 5:

Reference 6:

Reference 7:

Reference 8:

Reference 9:

Reference 10:

Reference 11:

Reference 12:

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Abstract:

Compounds containing polypropylene are able to cover a broad range of properties suitable for applications in automotive, electrical appliances, cables, construction and furniture components. These compounds contain besides PP other polymers like impact modifiers e.g. Ethylene-octene elastomers or EPDM, other polyolefins like HDPE but also inorganic fillers, pigments and additives.¹ Another recent trend is the use of PP based recycles, originated from post-consumer waste, in PP compounds. Due to the un-controlled PP structure, which can contain different kind of PP types, in combination with unknown impurities (other polymers and fillers etc.) the complexity in the chemical composition of a PP compound will increase and therefore lead to a modification in the analytical path how the polymer should be analyzed.

For virgin heterophasic ethylene-propylene copolymers it was shown that Crystex (CRYStallization EXtraction) analysis was capable to determine in an automated way accurately the amount of the xylene cold soluble (XCS), the ethylene content and the intrinsic viscosity (IV) of the whole material as well as of the crystalline and amorphous fraction.^{2,3} This enables a fast estimation of the key properties of such PP based compounds.

If a more deep structural information of the PP compound is needed like the determination of the chemical composition of the crystalline and soluble fraction as well as the corresponded molecular weight a combined approach using CFC analysis for the crystalline fraction and solvent gradient interaction chromatography for the soluble fraction was developed.⁴

During this presentation 2 different analytical approaches are discussed and presented to analyse complex PP compounds:

One approach is based on Crystex analysis enabling the fast determination of the key parameters of the PP based compound.

And a second approach is based on using a multistep approach for the determination of the chemical heterogeneity of PP compound containing various analytical including fractionation techniques like CFC in combination with spectroscopic and thermal analysis methods.