CHARACTERIZATION OF VINYL POLYMERS BY THERMAL FIELD-FLOW FRACTIONATION

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ABSTRACT

Thermal field-flow fractionation (ThFFF) is a powerful alternative to SEC as the relatively gentle fractionation conditions and absence of a stationary phase allows for the fractionation of a variety of high molecular weight and fragile compounds without shear degradation taking place. ThFFF is a channel-based fractionation technique that utilises a temperature gradient to induce thermal diffusion of analytes in order to achieve fractionation according to size and chemical composition or microstrucutre.[1-4] However, the application of ThFFF for the characterisation of amorphous polyolefins and other vinyl polymers according to molecular microstructure is still interesting area to explore.

ThFFF is applied to the characterization of vinyl polymers such as poly(vinylcyclohexane) (PVCH) in terms of size, molar mass and chemical composition. It is shown by ^{1}H NMR that, although limited, ThFFF using single component solvents can separate polystyrene (PS) and its hydrogenated product, PVCH, according to differences in molecular microstructure. Different from single component solvents, binary solvent systems of cyclohexane and methyl ethyl ketone can provide an additional driving force (in the form of solvent partitioning) to dramatically improve the separation of PS and PVCH by ThFFF. It is found that the separation of PS and PVCH improves with increasing methyl ethyl ketone content in the mobile phase up to 30 vol%. Additionally, it is shown that the compositional distribution of PVCH in the binary solvent systems can be obtained by the online coupling of infrared spectroscopy to ThFFF.[5]

References :

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