INFLUENCE OF THE REFRACTIVE INDEX INCREMENT ON GPC-MALLS ANALYSIS OF TECHNICAL EVA-COPOLYMERS

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ABSTRACT

Ethylene vinylacetate (EVA) copolymers have a broad range of applications such as hot-melt adhesives, coatings and blends. The copolymer properties are mainly determined by its molecular weight distribution and the vinylacetate content. For the last few decades high temperature GPC-MALLS analysis of hardly soluble polymers like EVA have been well established and widely-used. The multi-angled laser light scattering analysis (MALLS) is used to determine the absolute molecular weight distribution and other characteristics like short-chain branching (SCB), long-chain branching (LCB) or the radius of gyration (R_g) of polymers.[1] For the characterization of polymer samples with MALLS the refractive index increment (d*n*/d*c*) and the concentration are needed. The concentration is often measured online with detectors, the refractive index increment (d*n*/d*c*) of most polymers under certain conditions can be found in literature. It is necessary to note that the absolute molecular weight determined with the MALLS technique among with other factors is a function of the squared d*n*/d*c*, hence acquiring an accurate value is critical. For copolymers the characterization with MALLS is only possible, if the composition of the copolymer and thus the d*n*/d*c* are constant along the chain. Therefore, only statistical copolymers qualify for this type of measurement. Bugada et al.[2] and Coto et al.[3] measured the d*n*/d*c* values of ethylene copolymers at a given temperature, solvent and wavelength to determine the influence of the composition of the copolymer on the d*n*/d*c* values. This work aims to quantify the influence of a deviating d*n*/d*c* on the results obtained by the measurements of EVA-copolymers with MALLS. The copolymer distribution along the chain is measured with a GPC-MALLS system at 150°C in trichlorobenzene and a coupled infrared (IR) detector. This combination allows the measurement of the copolymer size distribution and the content of comonomer at the same time. Based on the first results the d*n*/d*c* of technical copolymer systems, their deviation from literature data and the resultant impact on high temperature GPC-MALLS analysis is investigated. Technical EVA-copolymers are used in this work to show the influence of the weight average molecular weight and the polydispersity index on the refractive index increment.

References:

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[3]Coto, B.; Escola, J. M.; Suarez, I.; Caballero, M. *Journal Polymer Testing* **2007**, 26, 568-575.