

Molecular weight and branching structure distributions of polyethylene.

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The properties of polyethylene are highly dependent on the molecular weight and analysis of this parameter is vital for research and quality control. The molecular structure in the form of the presence of long chain branching also influences physical properties such as melt viscosity and mechanical strength. The polymerization mechanism directly effects the distribution of the chain branches in the polymer and the determination of this distribution is of significant interest in the production of polyolefins with well-defined molecular weight and branching distributions for specific applications.

In research into non-polyolefin polymers, multi-detector GPC has become the accepted industry standard for simultaneous molecular weight and structure determination, providing absolute molecular weight from light scattering and structural resolution from viscosity detection. However, the added practical and theoretical obstacles of the high-temperature GPC required for polyolefins, means that not all the advantages of structural characterization have been taken up by polyolefin analysts.

In this paper we will review and present some of the old and new issues and practical solutions to implementing reliable, robust absolute molecular weight and structural determinations in HT-GPC of polyethylene. Data from both linear and branched polyethylene samples will be presented, along with detailed procedures on how branching parameters can be quantitatively determined to differentiate even small changes in structure with confidence.

References:

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