

Methods of long chain branching detection in PE by triple-detector GPC.

Thippaya Pathaweeisariyakul¹, Wallace Yau², **Kanyanut Narkchamnan**¹, Boonyakeat Thitisuk¹

¹*SCG Chemicals (Thailand)*

²*Polyolefin Characterization Consultant (USA)*

Long chain branching (LCB) in polyethylene is one of the key microstructures that controls melt rheology and final product properties, especially in low density polyethylene (LDPE) and in some application of high density polyethylene (HDPE). Gel permeation chromatography (GPC) with online viscometer (IV) and/or light scattering (LS) detector has been intensely used to quantify long chain branching of polymers. The widespread method to quantify LCB from GPC with these molecular weight sensitive detectors is to report the value of LCB frequency (LCBf) calculated on the base of the Zimm-Stockmayer (ZS) random long chain branching model (Ref. 1). In our work we compare this conventional approach with the method of the gpcBR index, recently developed to improve the precision of the LCB detection (Ref. 2). The comparison of the sensitivity of these different methods on samples with slight increment of long chain branching will be reported in this work. And, the linkage of LCB quantities determined by these methods to the application test on polymer properties will be compared and illustrated.

References:

1. Bruno Zimm, and Walter H. Stockmayer, J. Chem. Phys. 17., 1301-14, 1949.
2. C. Enos, K. Rufener, J. Merrick-Mack, and W. Yau, Waters International GPC Symposium Proceedings, Jun. 6-12, 2003; C. Enos, and W. Yau, PittCon, Chicago, ILL 2004.