

# Molecular Structure of Linear Low Density Polyethylene.

J.C.J.F.Tacx<sup>1</sup>, B.A.H. van den Esschert<sup>1</sup>, S.Kok<sup>2</sup>

<sup>1</sup>SABIC Technology and Innovation Center, PO Box 319, Geleen (Netherlands)

<sup>2</sup>DSM Resolve, PO box 18, 6160 MD Geleen (Netherlands)

Linear Low Density Polyethylene (LLDPE) is an important commercial material for various applications. It is generally known that LLDPEs made using Ziegler Natta (Z/N) catalysts show a relatively broad molar mass distribution (MMD) and decreasing average comonomer content with increasing molar mass. On the other hand, LLDPEs made using a metallocene catalyst show a narrow MMD and a more or less constant average comonomer content as function of molar mass. This was shown often in literature and also in this investigation using the LC-transform in combination with infra red spectroscopy (IR). In this investigation, two crossfractionation methods were applied. First, a preparative method separating according to molar mass[1] with subsequent characterization of the fractions according to composition using analytical temperature rising elution fractionation (aTREF). The fractionation was checked for average composition using NMR and molar mass using SEC-IR. Secondly, preparative TREF (pTREF) with subsequent characterization of the fractions using Size Exclusion Chromatography coupled with infrared (IR) was used.

From the results it was concluded that the LLDPE materials made using a Z/N catalyst system are even more heterogeneous than generally assumed.

## References:

1. W. Holtrup, Makromol. Chem. 178, 2335 (1977), "Zur Fraktionierung von Polymeren durch Direktextraktion".