

Simple Rheological Method to Estimate the Branch Structures of Polyethylene under Reactive Modification

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Abstract : The aim of this work is to estimate the change in molecular structure of linear low-density polyethylene (LLDPE) during peroxide modification can be detected by a simple rheological method. For this purpose a commercial grade LLDPE (Exxon Mobile™ LL4004EL) was reacted with different doses of dicumyl peroxide (DCP). The samples were analyzed by size-exclusion chromatography coupled with a light scattering detector. The dynamic shear oscillatory measurements showed a deviation of the δ' - δ'' curve from that of the linear LLDPE, which can be attributed to the presence of long-chain branching (LCB). By the use of a simple rheological method that utilizes melt rheology, transformations in molecular architecture induced on an originally linear low density polyethylene during the early stages of reactive modification were indicated. Reasonable and consistent estimates are obtained, concerning the degree of LCB, the volume fraction of the various molecular species produced in peroxide modification of LLDPE.

Keywords : linear low-density polyethylene, peroxide modification, long-chain branching, rheological method

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