SL 8.15

Influence of Branch Content and Strain Rate on the Mechanical Properties of Metallocene LLDPE

A. Islam, I.A. Hussein
Department of Chemical engineering, King Fahd University of Petroleum & Minerals, Dhahran 31261, Saudi Arabia

The influences of branch content (BC) and branch type of metallocene linear low density polyethylene (m-LLDPEs) on the mechanical behavior were studied by means of stress/strain experiments. Linear polyethylene was analyzed for comparison purposes. The experiments were conducted in Instron machine at room temperature. The degree of crystallinity of these copolymers was determined by differential scanning calorimetry (DSC). It was observed that the copolymers show low modulus as BC increases and the crystallinity decreases. A correlation between crystallinity, Young's modulus and BC was obtained. Ziegler-Natta LLDPE (ZN-LLDPEs) were also studied for comparisons. ZN-LLDPEs showed higher Young's modulus but lower elongation at break and ultimate tensile strength than m-LLDPEs. Also, m-LLDPEs with high BC exhibit an increase in the crystallinity during stress/strain experiments. Double yielding and strain hardening was observed in most of the m-LLDPEs. The influence of the strain rate on the mechanical properties was also investigated. There exists a very narrow strain rate window within which maximum modulus and ultimate properties occurs.