Synthesis of metallocene catalysts for olefin copolymerization

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Recent progress in α-olefin polymerization catalysts has been focused on the development of metallocene-type catalysts with high activity as well as control of polymer microstructure. In this way, regio- and stereoselectivity of polymerization reaction and also comonomer incorporation in the polymeric chain can be controlled by modifying the ligand architecture. The purpose of this work was to synthesize and characterize organometallic compounds and evaluate their performance in the copolymerization of ethylene-hexene with the addition of a chain shuttling agent to produce new ethylene copolymers containing hard and soft blocks in the same polymer chain. The synthesized catalysts were based on bis-fluorenyl and bis-indenyl ligands using zirconium and hafnium as transition metal. Mixtures of catalysts with different ligands were employed in copolymerizations of ethylene-hexene and also in homopolymerization of propylene with the addition of increasing amounts of diethylzinc. The catalytic complexes were characterized by ^{13}C-and ^{1}H-NMR. Polymerizations were carried out at high temperature in toluene using methylaluminoxane as cocatalyst. Polymers were characterized by techniques like differential scanning calorimetry, X-ray diffractometry, infrared spectroscopy, and heptanes extractables.

Keywords: Copolymerizaion, α-olefin, catalyst metallocene, organometallic compounds

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