Abstract

It is more than a half of century has gone since the Ziegler-Natta catalyst was discovered in the 1950s .In 2009, the total production of polypropylene made by this catalyst has reached 113 million tones, in which copolymer account for 19%. Such an explosive growth of polyolefin industry is attributed to the advantage of this kind of material: low cost, light weight and excellent physical properties. However, a complete understanding of the copolymer mechanism has not achieved. Comonomer activation mechanism is not exception. Comomer activation effect is an interesting phenomenon, where catalyst activity is markedly increased after the presence of comonomer units in polymer chains. Several explanations, both chemical and physical, have been proposed. They were including modification of the catalytic sites with an increase in the number of active sites (C^*) (formation of new active sites or reactivation of "dormant sites"), the changes in k_p owing to modification of the active sites by monomer insertion, diffusion limitation of monomers and cocatalyst through polymer films, or the easier fragmentation of catalyst particles in copolymerization. By applying the advantages of the stopped-flow technique, this thesis is looking for the kinetic origins of the comonomer activation effect. New application of stopped-flow technique for kinetic copolymerization is established in Chapter 2. Thus, the kinetic parameters (k_p and C*) of homo and copolymerization are determined. The findings in this study are believed to be a comprehensive about copolymerization mechanism with heterogeneous Ziegler-Natta catalyst.