

Catalyst Development for CO₂/Epoxide and Ethylene/ α -Olefin Copolymerizations: From Flask to Industrial Process

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A highly active catalyst was discovered for the CO₂/propylene oxide (PO) copolymerization. It is a cobalt(III) complex prepared from a Salen-type ligand tethered by four quaternary ammonium salts (1). Complex 1 showed a high TON up to 16000 and a high turnover frequency (TOF) of 16000h⁻¹ that produced a strictly alternating copolymer with a high molecular weight (M_n) of up to 300000. These performances of 1 allow for constructing a pilot plant for continuous commercial process.

We developed a synthetic route for *o*-phenylene-bridged (tetramethylcyclopentadienyl, indenyl, or fluorenyl)/amido titanium complexes. The complexes can be prepared in two steps in Kg-scale (eq. 1). Higher activity, higher α -olefin incorporation, and higher molecular weight than the Dow-CGC ([Me₂Si(η^5 -Me₄C₅)(N^tBu)]TiCl₂) are achieved. These features enable the complex to be applicable in a commercial process.