

How to tune the activity, induction period and polyol properties of double metal cyanide catalyzed ring-opening polymerizations of propylene oxide

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The polyols produced by the ring-opening polymerization (ROP) of propylene oxide (PO) are one of the core raw materials for various polyurethane (PU) applications. Advances in zinc hexacyanocobaltate-based double metal cyanide (DMC) catalyst used to produce PPG diols, resulted in a substantial improvement in the levels of polyfunctionality and molecular weight (MW), a narrowing of the molecular weight distribution (MWD), and a lowering of viscosity. The resulting PPG polyols of narrow MWD and ultra-low monol content allow them to yield PU with superior mechanical properties. In this presentation, polymerizations of PO have been carried out by using DMC catalysts prepared by reacting $ZnCl_2$ and $K_3[Co(CN)_6]$ in the presence of tert-butyl alcohol (tBuOH) as a complexing agent. The activity and induction period for PO polymerizations catalyzed by DMC are tunable by using various quaternary ammonium salts, ionic liquids, and modified montmorillonite as external additives. The binary catalysts improves polymer properties as well such as MW, MWD, viscosity, and unsaturation level.