Abstract

The Thesis describes investigations that elucidate the role of Magnesium Chloride support in Ziegler - Natta catalysts for the polymerization of unsaturated monomers. Two, otherwise, inefficient Ti - based polymerization catalysts, namely titanium - nbutoxide (TNB) and dicyclopentadienyl titanium(IV) chloride were chosen for this study. A novel route to the preparation of MgCI2.2THF was discovered and used as support for the synthesis of two unique catalysts systems, namely (a) a homogeneous xylene soluble Mg - Ti catalyst based on TNB (b) a heterogeneous MgCI2 supported titanocene catalyst. The two catalysts were used for ethylene polymerization in conjunction with alkylaluminums as cocatalysts. The results show that MgCI2 plays a significant role in converting the otherwise inefficient titanium based catalysts to efficient polymerization catalysts. The role of support in transforming the nature of active centers has been explained based on the known chemistry of Mg - Ti catalysts. The xylene soluble Mg - Ti catalyst is also active towards the polymerization of hexene-1 and octene-1 as well as phenylacetylene. The catalyst yields the first ever narrow molecular weight distribution of poly(?-olef?n)s and poly(phenylacetylene)s with significantly higher proportion of soluble fraction compared to hitherto known Ziegler - Natta catalysts for phenylacetylene. Different techniques of characterization such as elemental analysis, UV, 1H NMR, 13CP-MAS NMR, FT-IR, ESR, Powder XRD, GPC and TGA have been employed for characterizing both the catalyst and polymers obtained in the present investigation.