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Silicon based compounds containing a basic heteroatom attached to Si (e.g., siloxanes, alkoxy silanes) form hydrocarbon soluble complexes of aluminum chloride. They are highly active for the polymerization of olefins in absence of chlorinated solvents up to the ceiling T. Reaction can be conducted in neat monomer or in alkanes and the molecular weight temperature performance of these systems are superior to their ethereal analogs or aluminum bromide under otherwise identical conditions. In the case of hexamethyldisiloxane as the coordinating agent the identity of the resultant adduct was found to be determined by the polarity of the solvent it is formed in. In low polarity alkanes it consists of dimeric aluminum chloride bound to one mole siloxane {i.e., $(\text{Me}_3\text{Si})_2\text{O} \cdot \text{Al}_2\text{Cl}_6$ } whereas it is monomeric in both acid and hexamethyldisiloxane {i.e., $(\text{Me}_3\text{Si})_2\text{O} \cdot \text{AlCl}_3$ } when formed in aromatic solvents. The activity of these complexes is tunable by adjusting the mole ratio of the coordinating agent to the acid and if aromatic solvent is included. The ability to adjust the activity of the resultant complexes allows for polymerization to be conducted safely under demanding reaction conditions (e.g., solventless, high T).