

Abstract

The chemistry of low valent group 14 elements has received much attention in recent decades.[1-5] Among them, carbene chemistry has been explored most widely due to their good stability and donor properties. The valency of central atom in metallylenes (R_2M , $M = Si, Ge, Sn$ and Pb) is two. Due to the presence of a vacant p-orbital the metallylenes are highly reactive towards themselves as well as other molecules. They can be stabilized by electron donor atoms such as N, O and Cp^* ligands. The N_2P and N_3P_2 types of ligands are also useful scaffolds in stabilizing various four and six membered metal complexes. The substituents on N atoms can be varied to fine tune to offer good donor properties to stabilize both transition as well as main group elements. Various four membered ligands known till to date are amidinates, guanidinates and boramidinates. Among them, amidinates have played an important role in stabilizing low valent metallylenes. This thesis will describe: The monoanionic $[N,N']$ ligands based on acyclic N_2P and N_3P_2 backbone that were used to stabilize various four and six membered metal complexes and also to study their reactivity studies. These ligands offer good steric and electronic features. Due to the presence of bulky groups on N atom the ligands have the ability to stop the formation of aggregated molecules. The presence of phosphorous in the ligand is very useful tool to assess the progress of the reactions by ^{31}P NMR spectroscopy. The synthesis of low valent tin(II) complexes by using these $[N,N']$ chelating ligands has been undertaken over the known C/N based ligands. The newly synthesized compounds have been characterized by heteronuclear NMR (1H , ^{13}C , ^{31}P , ^{19}F), FT-IR, mass spectrometry and single crystal X-ray diffraction techniques.