

Name of PhD Scholar : GURUARIBAM SHASHIKUMAR SHARMA

Name of Supervisor : Dr. Athar Adil Hashmi

Department : CHEMISTRY

**Title of Thesis : Syntheses and Characterization of Asymmetric ligands and its
Coordination behaviour with Metals**

ABSTRACT :The Chemistry of Organoborates, more specifically the poly (pyrazolyl) borates was first initiated by S.Trofimenko in the mid 1960's while a researcher at Dupont. He started the basic chemistry of Tris(pyrazolyl) borates more commonly named as the Scorpionates. Like the pincers of a scorpion this tripodal ligands bind a metal atom from the front side and sting the metal from behind. This mode of binding looks like the pinch and sting concept of a scorpion.

The background of this research work mainly comes from the Scorpionates. But we are more interested in modifying this type of ligand by introducing different groups to the boron atom in order to impart different properties, different geometries with different steric and electronic environment. These modifications however have led to new scorpionates capable of bridging different metal centers, yielding dimers or coordination polymers characterized by peculiar spectroscopic and structural features.

Some of these new ligands are very promising for the synthesis of inorganic materials with inner cavities useful for the catalysis of organic reactions or with collective magnetic phenomena or the design of molecular-based ferromagnets.

In Chapter 2 of the Thesis we have reported the Synthesis and Characterisation of a potassium salt of a ligand, Hydro(3-amino-1,2,4- triazolyl) (3,5-dimethylpyrazolyl) (imidazolyl) borate and its cobalt(II), nickel(II), and copper(II) Complexes. The Ligand was characterized by Elemental Analysis, IR spectroscopy, Nuclear Magnetic Resonance, ESI mass spectroscopy, Electronic Spectroscopy, and Magnetic data measurements. The cobalt (II) and nickel (II) complex shows a tetrahedral geometry while the copper (II) complex shows a square planar geometry.

Chapter 3 discusses the Synthesis and characterization of a ligand, hydro (3-amino-1,2,4-triazolyl)(benzoyl)(Imidazolyl)borate and its cobalt(II), nickel(II), and copper(II) complexes. The cobalt (II) and nickel (II) complex shows a tetrahedral geometry while the copper (II) complex shows a square planar geometry.

In Chapter 4, Synthesis and characterization of a potassium salt of a ligand, Hydro (benzoyl)(phthalyl) borate and its cobalt(II), nickel(II), and copper(II) complexes has been discussed. The cobalt (II) and nickel (II) complex shows an octahedral geometry while the copper (II) complex shows a square planar geometry.

Finally Chapter 5 discusses the Synthesis and characterization of a potassium salt of heteroscorpionate ligand, Hydro (phthalyl) (salicylyl) borate and its cobalt(II), nickel(II), and copper(II) complexes. Here the cobalt (II) and nickel (II) complex shows an octahedral geometry while the copper (II) complex shows a square planar geometry.