

PREFACE

Coordination chemistry enjoys a prominent place in inorganic chemistry. Werner's coordination theory was the first attempt to explain the bonding in coordination complexes, and he concluded that in complexes the metal shows two different sorts of valencies *viz* primary and secondary valency. Primary valencies are non-directional and are the number of charges on the complex ion. In compounds, this charge is matched by the same number of charges from negative ions. Secondary valencies are directional. In modern terms the number of secondary valencies equals the number of ligand atoms coordinated to the metal. This is now called the coordination number.

In the quest of exploring the chelating behaviour of some ONS and NNS donor thiosemicarbazones in several metal complexes, we could get hold of more information about their nature of coordination and related structural, spectral and biological properties. The term "dinucleating ligands" was first introduced in 1970 by Robinson to portray the class of polydentate chelating ligands, and to bind simultaneously two metal ions. The possible applications of the complexes with this type of ligands vary from modeling the active sites of many metalloenzymes, to hosting and carrying small molecules or catalysis.

The work embodied in the thesis was carried out by the author in the Department of Applied Chemistry during 2004–2007. The thesis is only an introduction to our attempts to evaluate the coordination behaviour of a few compounds of our interest. The crucial aim of these investigations was to synthesize and characterize some transition metal complexes using the ligands benzaldehyde, 2-hydroxybenzaldehyde and 4-methoxybenzaldehyde N(4)-ring incorporated thiosemicarbazones.

The work is divided into seven chapters and the last section deals with summary and conclusion. Chapter 1 involves a brief foreword of the metal complexes of thiosemicarbazones including their bonding, stereochemistry and biological activities. The different analytical and spectroscopic techniques used for the analysis of the ligands and their complexes are discussed in this chapter. Chapter 2 deals with the synthesis and spectral characterization of the thiosemicarbazones and single crystal X-ray diffraction study of one of them. Chapter 3 describes the synthesis, spectral characterization, single crystal X-ray diffraction studies of copper(II) complexes with ONS/NS donor thiosemicarbazones. Chapter 4 deals with the synthesis, spectral characterization and single crystal X-ray diffraction studies of nickel(II) complexes. Chapter 5 contains the synthesis, structural and spectral characterization of the cobalt(III) complexes. Chapters 6 and 7 include the synthesis, structural and spectral characterization of zinc(II) and cadmium(II) complexes with ONS/NS donor thiosemicarbazones.