CHAPTER III

A GENERAL INTRODUCTION AND OBJECTIVES OF THE PRESENT WORK
Schiff base complexes of transition metals have been fairly well known for many years and contribute a diverse and rich field of research. A schiff base is a condensation product of a carbonyl compound with a primary amine. It contains essentially the azomethine linkage. These schiff bases are known effective chelating agents if either the carbonyl compound or the amine or both contain functional groups, such as hydroxyl or sulfhydryl near the site of condensation. Complexes containing only azomethine nitrogen atoms in equitorial plane are known that ranges from aromatic porphyrin to the completely saturated [14]-ane \( N_4 \) systems with more than 3000 complexes in the literature\(^1\)\(^-\)\(^6\). This progress led to the synthesis of a large number of \( \sigma \)-bonded organocobalt complexes having quadridentate ligands\(^7\)\(^-\)\(^10\). The year 1964 may be designated as a landmark in this field with the name of G.N. Schrauzer, who reported\(^11\) a number of organo bis(dimethylglyoximato)cobalt complexes trivally known as cobaloximes. Because of their biochemical relevance to vitamin \( B_{12} \) coenzymes, cobaloximes are the most studied ones\(^12\),\(^13\).

The area of schiff base metal complexes has attracted ever since Pfeiffer's pioneering research in 1930's. Metal complexes of quadridentate schiff bases played a significant role as model compounds with biochemical relevance.
organometallic compounds of cobalt have been considered as model compounds to vitamin B\textsubscript{12} coenzyme. For example, organocobalt complexes\textsuperscript{14} prepared with bis(salicylaldehyde)ethylenediamine and bis(acetylacetone)ethylenediamine. Another important class of model compounds derived from quadridentate schiff base complexes is oxygen adducts. Recently some oxygen adducts of formula Co(Salen)\textsubscript{2}(O\textsubscript{2})L\textsubscript{2} have been isolated and studied\textsuperscript{15}. Finally, the evidence for the existence of oxygen adducts of formula Co(Salen)(O\textsubscript{2})L has been reported\textsuperscript{16,17}. The potential usefulness of such dioxygen carriers has been recognised, in view of the fact that the separation factor for the removal of oxygen from a mixture of inert gases is nearly cent per cent. Recently these schiff base complexes have been used in catalytic or reversible oxygenation reactions. A strong driving force in a study of model compounds has been due to the fact that at least one-third of the enzymes are metalloenzymes or require metal ion for activity.

Inspite of several examples of schiff base complexes in the literature, synthesis of quadridentate schiff base complexes with new or modified structural features continues to be fascinating area in bioinorganic chemistry. The detailed survey of literature on transition metal complexes of quadridentate schiff base ligands is presented in Chapter II.
Though the cobalt complexes of quadridentate Schiff bases have been studied significantly, there is not much literature on the Schiff base complexes of remaining transition metals and main group elements. Another important lacuna that has been identified is being the studies on metal complexes with variety of quadridentate Schiff bases.

In view of growing importance of quadridentate and mixed donor ligands to derive model compounds, the present work would involve quadridentate ligand synthesis, the characterization of solid complexes of quadridentate ligands derived with transition metal ions and group II-B elements, studies of the solution chemistry of these complexes using UV-visible and NMR techniques and reaction studies to verify the ability of Schiff base complex to function as model compounds.

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REFERENCES


