CHAPTER-4

This chapter concludes the formation, bonding and stereochemistry of newly synthesized complexes.
CONCLUSION

This thesis is a small addition to the coordination chemistry of transition metal complexes with multidentate ligands. The main aim behind this study was to design new macrocyclic ligands and their complexes in view of their variety of applications. However, an attempt has also been made to synthesize tin-transition metal heterobimetallic complexes with a view to provide different environments in the bimetallic complexes for the metal atoms; one transition (Mn\textsuperscript{II}, Co\textsuperscript{II}, Ni\textsuperscript{II}, Cu\textsuperscript{II} and Zn\textsuperscript{II}) and other non-transition metal have
been choosen for this purpose. The mode of coordination behaviour of central metal ion is proposed on the basis of available consistent spectroscopic and physico-chemical data. This project does not include the various applications, although the synthesis and characterization of a variety of macrocyclic and heterobimetallic complexes particularly tetraoxotetraamide, tetraiminetetraamide, bis-macrocyclic, dithiadiza and tin-transition metal heterobimetallic complexes was based on their applications.

The metal templation was the main criterion adopted to synthesize these complexes. Except in one case, the medium of reaction was methanol. The attempts to synthesize metal-free macrocyclic ligands was futile leading to the formation of unstable oily product, which could not be isolated and analysed. It is an established fact that templation is an efficient approach to synthesize macrocyclic complexes with considerable yields without any side reactions as compared to high dilution technique, which is used to synthesize complexes from pre-formed ligands. It is, therefore, concluded that metal ion directs the steric course of the reaction in the synthesis of macrocyclic complexes to provide better yields.

The complexes obtained were stable to atmosphere in the solid state and were freely soluble in polar solvents like
dimethylformamide, dimethylsulphoxide and acetonitrile. The molar conductance values in DMSO were generally supportive of their non-electrolytic nature, however, in certain cases complexes of nickel and copper exhibit their ionic behaviour. The results of spectroscopic studies, viz. IR, $^1$H NMR, EPR, electronic spectral and magnetic susceptibility measurements show that the complexes in general have octahedral stereochemistries except a few complexes of nickel and copper which exhibit square-planar geometries.