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ABSTRACT

The present thesis deals with the synthesis and characterization of different types of multidentate ligands and their transition metal complexes with their antimicrobial properties. The chapters in this thesis involve the synthesis of different types of new macrocyclic ligands containing oxygen and nitrogen donor atoms. The macrocycles are of great interest due to presence of several potential donor atoms and their ability to coordinate either in neutral or deprotonated form. The macrocyclic ligands played important role in the formation of transition metal complexes. This importance is due to both kinetic and thermodynamic stabilities of their complexes. A series of transition metal complexes having macrocyclic ligands based on azomethine, amide or oxalate groups have been synthesized. The macrocyclic ligands have been synthesized by using the compounds with biological importance like semicarbazide, thiosemicarbazide, adipic acid and acrylamide. All the synthesized ligands and their metal complexes were characterized by elemental analysis, spectral studies (UV-Visible, FTIR, ^{1}HNMR and Mass spectra) and thermal studies. The ligand field splitting parameters 10Dq, the interelectronic repulsion parameter B and nephelauxetic parameter β have been calculated for metal complexes having octahedral geometry. All the synthesized metal complexes were found to be covalent in character. The thermogravimetric analysis of synthesized ligands and their metal complexes were studied by TGA in nitrogen

atmosphere upto 800°C. The antimicrobial activity of all the synthesized ligands and their metal complexes were investigated against some bacterial and fungal strains such as *Staphylococcus aureus, Escerishia coli, Bacillus subtilis, Salmonella typhimurium, Fusarium oryzae, Candida albicans, Aspergillus niger* etc. All the metal complexes found to be more thermally stable and showed high antimicrobial activity as compare to their parent macrocyclic ligands. It has been concluded that the synthesized transition metal complexes were acted as the membrane disruptures- antimicrobials. Research programmes on organic and metallo-drugs should not be seen as mutually exclusive. They overlap extensively and the combination is likely to be a powerful force for the future. In this field there are enormous opportunities for collaboration between academia and industry, and this can readily take place within the cost framework. . Macrocyclic and supramolecular chemistry have developed into one of the most active and promising research areas of chemical science- located at the interface between chemistry, physics and biology. Therefore an enormous potential exists for future applications in such fields as biotechnology, nanotechnology, environmental protection, catalysis and photonics as well as medicine.