Preface

Coordination Chemistry is one of the rapidly growing research fields in Inorganic Chemistry. Even though the lion’s share of work is devoted to the transition metal complexes, the coordination chemistry of yttrium and lanthanides has attracted much attention in recent years. The majority of the coordination compounds of the lanthanides isolated are from neutral or anionic oxygen donor ligands. The application of lanthanide complexes in various fields like catalysis, ion exchange separation, antiflock additives, NMR shift reagents, etc. have enhanced the importance of this field.

The Schiff bases are versatile ligands and have played a vital role in the development of coordination chemistry. These ligands bearing functional groups like -OH, >C=O, -O-, =N- sufficiently near to the site of condensation forming a five or six-membered chelate ring upon interaction with the metal ion, are of much interest in lanthanide coordination chemistry.

Aminoantipyrine and its derivatives, being potential oxygen donor ligands, are well known to form stable complexes with tripositive lanthanide ions. The present
investigations include the synthesis and characterization of 50 novel complexes of yttrium and lanthanides with some Schiff bases derived from aminoantipyrine.

The rare earths selected for the present study include Y, La, Pr, Nd, Sm, Eu, Gd, Dy, Ho and Er. The Schiff bases used are

1. 4-N-(2’-furfurylidene)aminoantipyrine (abbreviated as FAA)
2. 4-N-(2’-thienylidene)aminoantipyrine (abbreviated as TAA), and
3. 4-N-(5’-nitro-2’-thienylidene)aminoantipyrine (NTA).

The Schiff base FAA is expected to coordinate with the lanthanide ion through the carbonyl oxygen, azomethine nitrogen and oxygen of the furan ring to give two five-membered rings. The ligand TAA has three donor atoms, viz., one carbonyl oxygen, one azomethine nitrogen and one sulphur of the thiophene ring, which are expected to form two five-membered rings on coordination with metal ion. The ligand NTA is tridentate with the donor sites carbonyl oxygen, azomethine nitrogen and sulphur of the thiophene ring which can form two five-membered rings on coordination with metal ion. The novel complexes synthesized from these Schiff bases were characterized by the physicochemical methods like elemental analyses,
molar conductance in nonaqueous solvents, magnetic susceptibility, IR, electronic and NMR spectra. The thermal decomposition kinetics were also studied using TG and DTG data of the complexes in nitrogen atmosphere.

The work incorporated in this thesis has been under publication as below:


3. Complexes of yttrium and lanthanide perchlorates with 4-N-(5'-nitro-2'-thienylidene)aminoantipyrine (Polyhedron - communicated).

4. Complexes of yttrium and lanthanide nitrates with 4-N-(2'-furfurylidene)aminoantipyrine (under publication).

5. Complexes of yttrium and lanthanide iodides with 4-N-(2'-furfurylidene)aminoantipyrine (under publication).

6. Thermal studies of the yttrium and lanthanide perchlorate complexes with 4-N-(2'-furfurylidene)aminoantipyrine (under publication).
7. Thermal studies of the yttrium and lanthanide nitrate complexes with 4-N-(2'-furfurylidene)aminoantipyrine (under publication).

8. Thermal studies of the yttrium and lanthanide iodide complexes with 4-N-(2'-furfurylidene)aminoantipyrine (under publication).


10. Kinetics and mechanism of the thermal decomposition of yttrium and lanthanide complexes with 4-N-(5'-nitro-2'-thienyldene)aminoantipyrine (under publication).