PREFACE

The work embodied in the present thesis comprises of six chapters. Chapter 1 gives an account of the brief introduction of chiral catalysis in general with special emphasis on asymmetric cyanation reaction and HKR of racemic epoxides. This chapter also highlights the scope and objectives of the present work.

Chapter 2 includes the synthesis and characterization of chiral dimeric and monomeric V(V) macrocyclic salen complexes as active catalysts for the synthesis of chiral cyanohydrins via enantioselective cyanation of aldehydes with KCN/NaCN and ethyl cyanoformate as cyanide sources.

Chapter 3 consists of asymmetric cyano ethoxycarbonylation reaction of aldehydes with in situ generated chiral macrocyclic Ti(IV) catalysts. The products were further successfully converted to (R)-Phenylephrine (β-adrenergic blocker) and α₁-adrenergic receptor agonist (R)-Proethalol.

Chapter 4 deals with the synthesis and characterization of oxazoline derived organocatalysts and used as efficient catalyst for asymmetric Strecker reaction of aldemines for the synthesis of chiral amino nitrile with trimethyl silyl cyanide as cyanide source. The efficacy of the reaction was further supported by the computational calculation and the chiral amino nitrile was further converted to drug molecule (R)-tetramisole.

Chapter 5 describes the first successful method for the synthesis of one-pot chiral amino nitrile of aldehydes with secondary amine in presence of hydroquinine and NaF as catalysts. The application was further applied for the synthesis of valuable drug molecule (S)-clopidogrel (an antiplatelet agent).

Chapter 6 illustrates the synthesis and characterization of chiral macrocyclic Co(III) salen complexes as active recyclable catalysts for HKR of racemic epoxides for the synthesis of enantio-pure epoxide and diol. The chiral epoxides were further used for the synthesis of (R)-mexiletine and (S)-Propanolol. References have been placed at the end of each chapter for the sake of convenience.