Preface

The work embodied in the present thesis comprises of five chapters. This thesis discuss about the chiral metal complex mediated oxidative kinetic resolution of secondary alcohols and enantioselective sulfoxidation.

**Chapter 1. Introduction.** This chapter briefly described the origin of chirality, importance of chirality in life, methods for the synthesis of optically pure organic molecules. Special emphasis given on the detail overview of chiral metal complex catalyzed oxidative kinetic resolution and asymmetric sulfoxidation reaction. This chapter also highlights the summary of the present work.

**Chapter 2. Macrocyclic Mn(III) salen complexes catalyzed oxidative kinetic resolution of secondary alcohols.** This chapter includes the synthesis and characterization of macrocyclic chiral Mn(III) salen complex and their use as catalyst for the oxidative kinetic resolution of secondary alcohols using both PhI(OAc)$_2$ and NBS as co-oxidant. Based on the experimental results and spectral studies a mechanism for OKR of racemic 1-phenylethanol has been proposed here.

**Chapter 3. Chiral Ti-complexes as efficient catalysts for asymmetric sulfoxidation.** This chapter consist of the synthesis and characterization of chiral amino alcohol derived Schiff base ligands and their use as ligand for the asymmetric sulfoxidation reaction with *in situ* generated Ti-complex using aqueous H$_2$O$_2$ as oxidant. A proposed catalytic cycle also presented in this chapters based on the kinetic study in combination with UV-vis. spectral analysis of the reaction a for the sulfoxidation reaction.

**Chapter 4. In-situ generated chiral iron complex as efficient catalyst for enantioselective sulfoxidation.** This chapter deals with the synthesis, characterization of a series of ONONO donor ligands and their use as ligand to generate chiral Fe-catalyst in situ for the enantioselective sulfoxidation reaction using aqueous H$_2$O$_2$ as oxidant. This chapter also include a proposed catalytic cycle based on UV-vis. and ESI-MS study.

**Chapter 5. Dimeric titanium complex catalyzed enantioselective oxidation of thioether using aqueous hydrogen peroxide as terminal oxidant.** This chapter includes the synthesis, characterization of dimeric amino alcohol derived Schiff base ligands and development of catalytic asymmetric sulfoxidation protocol with *in situ* generated Ti-complex. The
Synthetic value of this catalyst was demonstrated successfully for the synthesis of chiral omeprazole.

References have been placed at the end of each chapter for the sake of convenience. The *appendix* contains the list of publications, awards and presentations in various conferences.