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Preetha G. Prasad
Zeolites are competing class of micro porous materials with tunable architecture and selectivity towards several catalytic reactions. The catalytic activity of these materials can be enhanced by encapsulation of certain chemically active materials with redox centers in the cavities. Metal Schiff base complexes are a fascinating class of molecular complexes, which can fine-tune the redox center. With this objective, we have investigated the interesting structural features of a series of transition metal Schiff base complexes encapsulated in Y zeolite. The catalytic properties of these complexes were studied with a view to know if there is any fine-tuning of the redox properties of the metal ion by the ligand environment within the supercage.

The use of chiral catalyst is a powerful strategy in modern synthetic organic chemistry. The homogeneous catalysts can be logically improved by heterogenisation. We have attempted the heterogenisation of chiral catalysts in the pores of Y zeolite. The interesting outcome of this study was that the encapsulated Ni(II) chiral complex was found to be the most efficient catalyst in bringing about good enantiomeric excess in the asymmetric epoxidation of styrene.

The thesis is divided into eight chapters with Chapter I giving an overview about the zeolite encapsulated complexes. The material and methods employed are presented in Chapter II. Chapters III to VI describe the synthesis and characterization of zeolite encapsulated Schiff base complexes. The screening studies of the catalytic activity of the complexes are presented in Chapter VII. Chapter VIII gives the details of the heterogenisation of the asymmetric catalyst and its catalysis in the asymmetric epoxidation of styrene. Summary and conclusion of our investigation are provided at the end of this thesis.