

CHAPTER IV

CONCLUSION

The investigation had been carried out to search for novel optically active Lewis acid catalysts for the asymmetric Strecker reaction. The work had focused on the utilization of various optically active catalysts including those derived from chiral Schiff bases, amino alcohols, and peptide-Schiff base with appropriate metals as well as reaction conditions. It was found that the enantiomeric composition of the resulting α -aminonitriles could be monitored by ^1H NMR spectroscopy. The results described herein indicated that neither of the polymeric salen **65-74** was suitable for asymmetric induction in the systems investigated. Very poor enantioselectivity of 0-3% *ee* was afforded. On the contrary, enantiomeric purity of the product increased noticeably when Schiff base derived from optically active amino alcohols **52** and **53** were employed in the reactions. The metal complexes derived from such amino alcohols could induce up to 12% enantiomeric excess in the α -aminonitriles. More importantly, the optimum condition which is the most well suited for such catalytic system involves TMSCN as a cyanide source in toluene at $-5-0^\circ\text{C}$. This is in contrast with an earlier evidence by Shibasaki and others that when a proton source was added, TMSCN underwent the reaction more efficiently. From the standpoint of the metals used, namely, Mn, Cu, Zn, Ti, Al, Yb, and Sc, it was observed that only Ti and Mn afforded the enantioselectivity.

The last and most important conclusion drawn from this piece of work deals with the structure of the optically active ligand employed in the reaction. When ligands **78** and **82** were used in the reactions, only small % *ee* was observed. In contrast, when **79** and **80** were utilized, the degree of enantioselectivity increased dramatically (up to 40% *ee*). The similarity in the structures of **52** and **53** strongly suggested that at least one, if not the only, crucial element responsible for the observed enantioselectivity was the ability of the ligands to coordinate in a tridentate fashion. All the factors mentioned above leave room for future investigation on the effects of ligand structures with Ti and Mn, and other conditions on the degree of

enantioselectivity in the Strecker reaction. In addition, a scope of the utilization of such a system on a vast variety of imines could be explored.



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