OBJECTIVES, RESULTS AND DISCUSSION

From the preceding chapter, it is clear that development of useful and practical chiral catalysts for the borane-mediated asymmetric reduction of prochiral ketones for obtaining enantiomerically pure (enriched) secondary alcohols has been and continues to be one of the interesting and fascinating areas in chiral chemistry because of the challenges involved in such endeavors and also due to the enormous applications of homochiral secondary alcohols in organic and medicinal chemistry. For example, \((R,R)\)-isomer of formoterol (131) (drug for asthma and chronic bronchitis),\(^{128}\) is more active than the corresponding \((S,S)\)-isomer. \((R)\)-Isomer of isoproterenol (4) (drug for asthma),\(^5\) salmeterol (132) (drug for asthma and chronic bronchitis)\(^{129}\) and denopamine (133) (drug for congestive heart failure)\(^{130}\) are more active than the corresponding \((S)\)-enantiomers/racemates as drugs and these can be readily synthesized from the respective enantiomerically pure/enriched secondary alcohols (Figure 18). Our research group has been working for the last few years on the development of recoverable and reusable chiral catalysts/catalytic species (Fig. 13, first chapter, page no. 34) for the borane-mediated asymmetric reduction of prochiral ketones with a view to provide operationally simple procedures for synthesis of secondary alcohols in high enantiomeric purities.\(^{109-113}\)
Chiral secondary alcohols as synthons for drugs

Figure 18

This thesis deals with studies towards the development of novel and effective chiral catalysts/catalytic sources for the borane-mediated asymmetric reduction of prochiral ketones with the following main objectives.