PREFACE

Molecular complexation is a precondition for various receptor functions such as substrate selection, isomeric differentiation, substrate transportation and stereoselective catalysis. The widely accepted and recent term for this chemical phenomenon is molecular recognition, although other terms like inclusion complexes, host-guest chemistry etc were used over the years. It has been known for a long time that many of the biological processes involve molecular complexation. But the investigation of such functions with synthetically derived compounds is a new development in chemistry. This has opened up challenging and exciting areas in the field of molecular recognition and has given us new insights into the nature of noncovalent bonds.

Since Pedersen's discovery of crown ethers, vast number of macrocyclic compounds with the desired size, shape, flexibility and arrangement of binding sites were synthesized. Soon after the discovery of these simple crown ethers, chirality was recognized as an essential element of molecular receptor design. Various naturally occurring chiral compounds were used to synthesize chiral receptors. This led to a better understanding of the principles determining specific molecular interactions. Chemists were able to resolve racemic modifications into optically active compounds and

this found applications in different areas of physical, chemical and biological sciences.

In Nature's chiral pool, carbohydrates constitute the most versatile and inexpensive source of chirality. They are endowed with an array of stereogenic centeres and functionalities that are valuable in the construction of chiral crown ethers of varying cavity sizes and shapes. The present thesis entitled "Synthetic Investigations in Carbohydrate Chemistry: Synthesis of Some Macrocyclic Molecules as Potential Hosts in the Study of Molecular Complexation Phenomena" contains the results of an investigation in this exciting area. The subject matter of the thesis has been divided into four chapters. Relevant references are given at the end of the thesis.

The first chapter is a general introduction to the thesis. It details the concept of molecular recognition through non-bonded interactions, its potential applications and the landmark developments in this area.

The second chapter deals with the synthesis of chiral crown ether derivatives based on carbohydrates and it consists of three major sections. In the first section, a brief review of the synthesis and applications of chiral crown ether derivatives incorporating carbohydrates is presented. The second section comprises the synthesis of a novel class of crown ether derivatives based on 1,4-glucose linkage. This section also covers the

preliminary complexation as well as the molecular modelling studies. Synthesis of *bis*-gluco-crown ether derivatives which are also based on 1,4-glucose linkage are included in the third section.

During the course of the work, we have come across a convenient and efficient method for the synthesis of glycosyl bromides using triphenyl phosphite dibromide. This has been presented in the third chapter.

Chapter four contains the experimental details with complete characterization of all new compounds.

Towards the end, a summary of the work is given.

All the compounds, figures, schemes, tables and references have been numbered continuously from chapters 1-3. Some compounds which differ only in the nature of substituents have been represented alphabetically (**59a, 59b,** .... etc).