

## **Summary**

The “Aromatics and polyaromatics: Synthesis and study of properties” include the synthesis and study of some new aromatic compounds having an element of symmetry with supramolecular chemistry point of view. The title of thesis indicates a general area of research only. The actual focus of the work is on synthesis of some novel host molecules starting with an aromatic or multi-aromatic system. In addition to the  $\pi$ -stacking ability of the host molecules, additional binding sites have been also introduced. The host molecules prepared during this work include the synthesis of new podand molecules. On the way of synthesis of cryptands, functionalised  $C_3$ -symmetric aromatic systems, chiral  $C_3$ -symmetric host molecules and a new polyaza macrobicyclic cryptand with 14 donor groups and 6 aromatic rings capable of  $\pi$ -stacking interactions have been synthesised. The compound synthesised are well characterized and the data are presented at appropriate place. The thesis is presented in the form of following chapters:

### **Chapter1: Introduction**

This chapter covers the emergence and development of supramolecular chemistry and its importance. The emphasis is laid on various secondary forces, which are responsible for supramolecular interactions between the molecules. A variety of host molecules ranging from podands to polycyclic cryptands, rotaxanes to catananes, crown ethers to carceplanes and callixarenes, which are formed due to and

for supramolecular interactions, have been covered and discussed. This chapter covers related literature from the sixties to the very recent one.

## **Chapter2: From colour to cavity: Application of tri-phenyl methane dye**

Aurin, a triphenylmethane dye also known as rosolic acid has been employed in the preparation of some host molecules having enclosed cavity. During the work, new tripodal compounds containing aliphatic or aromatic podand groups attached to three aromatic rings of the molecules via ether linkage have been prepared and characterised. The length of the aliphatic chain varies from four carbons to eighteen carbon atoms. A compound with four eight-carbon chains attached at the quaternary carbon atom via an oxygen atom has also been prepared. For coupling of the cavity compounds, functionalised podands were introduced into the rosolic acid molecule. Tris(bromomethoxyphenyl)carbinol and tris(bromomethylbenzyloxy)phenyl carbinol derivatives have been synthesised for carrying out coupling with another molecule of rosolic acid. The results from these compounds have been presented in this chapter.

## **Chapter 3: Designing Functionalised Polyaromatic systems for well-controlled Macromolecular synthesis**

Growing of larger molecules starting from a simple molecule through an iterative synthesis has resulted in dendritic molecules. Dendritic molecules have a definite structure, molecular weight and can be prepared using step-wise synthetic reactions.

In this chapter, some newly functionalised polyaromatic molecules, which can be employed for building up larger molecules or for building chiral supramolecular hosts, have been reported.  $C_3$ -Symmetric compounds with central aromatic ring have shown molecular recognition ability. The compounds reported here have three functionalised aromatic rings attached to the central ring and have additional binding capability.

#### **Chapter 4: $C_3$ - symmetric molecules with Asymmetric recognizing centers**

Chiral supramolecular compounds have not only been employed in chiral recognition but are also useful in chiral polymer printing and as chiral stationary phase for purification of enantiomers. In this chapter, we have demonstrated application of some of the compounds synthesised in the earlier chapter for preparation of chiral  $C_3$ -symmetric hosts as potential hosts. Optically pure enantiomers of 2-amino butanol have been employed for introducing complimentary chiral centers in the  $C_3$ -symmetric molecule. The resulting chiral iminoalcohols have been fully characterised and can be studied for their chiral molecular recognizing ability.

#### **Chapter 5: Synthesis of an Oval-shaped spherical azacryptand**

Cryptands are bicyclic macromolecules with a greater binding ability. D-bis(2-aminoethyl)amine has been employed for the preparation of various cryptands as well as dendritic molecules. In this chapter, synthesis of new octa-aza cryptand using

tris(aminoethyl)amine (TREN) has been described. The cryptand has greater number of binding sites in the oval-shaped molecule. It can be employed for the preparation of dinuclear metal ion complexes and has vast binding probabilities. The supportive effect of the presence of six phenolic hydroxyl groups has to be studied.

Thus, the thesis reports the synthesis of molecules having a variety of structural features ranging from tripodal compounds medium sized functionalised  $C_3$ -symmetric compounds and chiral supramolecules. It also includes the synthesis of a new bicyclic host compound. All these compounds need to be studied for their binding and molecular recognition capabilities. Study and application of metal complexes of these compounds would find some useful applications and is part of future study.