CHAPTER I
INTRODUCTION

In recent years, supramolecular chemistry has received much attention owing to the possibility to develop the complicated and functionalized materials from a group of individual molecules, oligomers or polymer chains. Theoretically, supramolecules can be claimed as an asset of simple molecules of which the molecular recognition between molecules is induced. Ideal supramolecules can be seen in natural system, such as DNA, RNA, and enzymes, which are composed of simple chemical structure as a basic unit. For the past few decades, the development of instruments leads to the information of natural supramolecules and enables us to mimic the nature by designing the simple molecules with complicated two or three dimensional structure. The concept of supramolecules brings the idea to produce a molecule to give a channel, layer or cavity (Kroschwitz *et al.*, 1995) binding with guest compounds. The well known artificial supramolecules are crown ether (Pedersen, 1967), cyclodextrin (Chankvetadze *et al.*, 1996), and calixarenes (Shinkai, 1993) which are defined as host compound. In those cases, the secondary forces, i.e., hydrogen bonding, van der Waals, hydrophilic, and hydrophobic interaction established in the cavity lead to the molecular recognition properties. Thus, the key point of biomimic supramolecules is to prepare a cyclic or pseudocyclic of which the supra-structure is maintained by primary or secondary force.

For the past few years, our group focused on the open ring benzoxazine structure and aimed to clarify it as a novel host compound. Here, we proposed that the basic unit of the open ring benzoxazine is resemble to that of calixarenes with aza-methylene linkage group as a linkage. Chirachanchai *et al.* (1997), and Laobuthee *et al.* (2000, in preparation) reported hydrogen bonding formed in open ring benzoxazine and ion

extraction by benzoxazine monomer, dimer, esterified dimer, and oligomer as a result of assembly formation with alkali, and/or alkaline earth metal ion. Although the precise structure of complexation between benzoxazine and metal ion has not yet been well clarified from crystal structure, our group proposed that benzoxazine provides electrons from N, and O atom to interact with metal ions. In the previous work, it was reported that extraction ability depended on concentration, bulkiness of aza group, and phenol ring (Techakamolsuk *et al.*, 1999, and Takolpuckdee *et al.*, 2000). In order to establish the host properties of benzoxazine, a series of the open ring benzoxazine structures with variation of functional group should be systematically studied. The present work therefore focuses on the synthesis of benzoxazine dimer, esterified dimer, and cyclic oligobenzoxazine, which are a series of phenol-aza-methylene-aza-phenol (benzoxazine dimer compounds) and the inclusion phenomena. The work also extends to a design and preparation of a benzoxazine dimer cyclic compound which can be expected as a unique host molecule.