



## CHAPTER I INTRODUCTION

Fundamental and application studies of host-guest compounds or inclusion compounds have received much interest owing to its unique molecular assembly and the induced property of molecular recognition. Various types of compounds, such as steroid, crown ether, cyclodextrin, calixarenes, etc., are known to show inclusion property for many decades. To develop inclusion compounds for practical applications, especially for high selectivity separation in the molecular level, many attempts have been made to study and create the preferable supramolecular structure. It is known that macrocyclic compounds provide the specific cavity for guest of which can either be neutral molecule, cation or anion. Recently, Yamagishi *et al.* reported a pseudocyclic calixarene-crown ether-like structure and showed that molecular recognition can be achieved for various alkaline and alkaline earth ions.

Polybenzoxazine is an interesting compound, of which the main chain structure is somewhat similar to calixarene with aza group combining each repeating unit. Ishida *et al.* contributed many research works to establish benzoxazine as a class of phenolic resins that can overcome disadvantages of traditional phenolic resins in terms of physical and chemical properties. Chirachanchai *et al.* have focused on the structure of the repeating unit to originally propose polybenzoxazine as a host compound. The studies on metal ion extraction clarified that benzoxazine oligomer and monomer perform as a host assembly to be a receptor for alkaline and alkaline earth ions.

However, in order to define the host-guest structure of the inclusion compound, it requires extensive study on the inclusion phenomenon related to

the variation of benzoxazine derivatives. Thus, the present work is based on the synthesis of controlled structure of benzoxazines, especially the benzoxazine dimers and effects of the structure to derived molecular assembly with metal ion guests. The inclusion property of the benzoxazine dimers is concentrated on the ion extraction ability. The aims of the present work also extend to the structural analysis of the molecular assembly of benzoxazine dimers including the synthesis of the related derivatives.