

## CHAPTER I

### INTRODUCTION

Separations of chemical species and extractions of metal ions are concerned to be important for industries and global environment. In the past decades, ion separation by using ion exchange resin has been one of the most practical purification methods. Conventionally, ion exchange resin can be achieved by the synthetic polymer containing active functional groups, such as sulfonic, carboxylic, and phenolic or amino group. etc., which provide the resin for the ionic specific interaction property with metal ion. The ion exchange resin also shows the merit of the recycle use owing to reversible chemical reaction between a solid (ion exchanger) and a fluid containing various types of ions. However, traditional ion exchange resin has reached its own limit for the sensitivity and selectivity when dealing with the separation of ion mixtures. Recently, the understanding of host-guest compound at the molecular level contributes the theory of molecular recognition and is concerned to be an extended area for separation process, including ion separation, as seen in the cases of calixarenes and crown ether.

Chirachanchai *et al.* (1997) proposed the open ring structure of benzoxazine to be one of the inclusion compounds according to its repeating unit, which is resemble to that of calixarenes. The property of benzoxazine as a host compound was studied on the alkali and alkaline earth metal extraction to find the significant ion interaction ability.

Yoswathananont *et al.* (1999) originally proposed benzoxazine as an ion extraction resin by coupling benzoxazine monomer on silica surface. The

ion extraction properties were evaluated by Pedersen's technique declaring high sensitivity of ion interaction even after being used for multiple times.

The present work is extended to study on the benzoxazine-silica resin by coupling the dimer derivatives on silica surface. The aim of the work is also to clarify the ion interaction ability in order to establish a new type of ion extraction resin.