



CHAPTER I INTRODUCTION

The stereochemically controlled structure of polymer is known to be achieved in various systems, especially by using catalysts, such as Ziegler-Natta, and metallocene catalyst. Alternatively, topochemical polymerization is a unique technique to prepare controlled structure polymer by polymerization in microspace at a molecular level of inclusion compound, as seen in traditional system conducted by urea, thiourea, cyclodextrin, dialkyl muconates, etc., via radiation polymerization. It is known that inclusion compound host backbone molecule provides a certain structure of cavity for guest molecules. These specific cavities are used for topochemical polymerization or inclusion polymerization when monomer is entrapped as a guest.

However, traditional host systems show the limit of cavity size for monomer and/or instability of monomer-host adducts. Miyata *et al.* reported that steroid compounds, such as, deoxycholic acid (3a, 12a-dihydroxy-5b-cholan-24-oic acid, DCA), apocholic acid (3a, 12a-dihydroxy-5b-chol-(8)14-en-24-oic acid, ACA), and cholic acid (3a, 7a,12a-dihydroxy-5b-cholan-24-oic acid, CA), can provide suitable cavity size, shape, polarity, and chirality for acrylic or cyclic conjugated diene, vinyl monomers and diacetylene monomers. With these systems, polymerization in the canal and post polymerization even at high temperature can be achieved owing to high thermal stability of the monomer-host adduct.

Topochemical polymerization of those monomers in cholic acid and its derivatives have proven to be successful. Interestingly, there was no report about topochemical polymerization of vinylchloride monomer until 1975 when Yoshii *et al.* studied the polymerization of vinylchloride monomer in urea to obtain syndiotactic poly(vinyl chloride). However, there are a few

reports concerned with the inclusion phenomenon of vinylchloride monomer in urea host including the structural analysis of the obtained poly(vinyl chloride).

The present work is focused on the inclusion compound system between vinylchloride monomer and DCA, which is obtained from guest free structure of DCA host, combining with the intercalation technique. The present work is also extended to the study of radiation polymerization conditions by γ -ray and the characterization to clarify the stereoregularity of the obtained PVC.