

CHAPTER I

INTRODUCTION

Development of polymer materials are known to be accomplished by functionalizing the polymer chain by adding other functional groups via chemical reaction. However, with a rapid increment of understanding in the polymer structure at the molecular level, an alternative development of polymer is expected to be based on a well defined structure of polymer by controlling the regularity of polymer unit, the crystallinity and the amorphous phases and the morphology of the polymer chains. The ways to obtain a well defined structure of polymer can be mentioned as the use of specific catalysis system and the application of inclusion polymerization. In either case, the monomer or reactive chemical species will be controlled to align themselves in a manner that polymerization will proceed at a certain condition to give higher regularity polymer.

Inclusion polymerization is the space-dependent reaction, which contributes the stereoregularity of polymer corresponding to the low-dimensional spaces. Many reports have been discussed with the utilization of hosts, such as urea, thiourea, cyclodextrin, and steroid compounds, to perform the inclusion polymerization for various vinyl monomers.

Miyata *et al.* studied a series of crystal structures of cholic acid inclusion compound and clarified the inclusion phenomena as a guest responsive molecular assembly system (Miyata *et al.*, 1990). The inclusion compound of cholic acid can be prepared either by the recrystallization directly with guest, or guest adsorption into the guest free cholic acid host crystal. With the increment of basic understanding about cholic acid inclusion phenomena, the studies on inclusion polymerization of vinyl monomers via cholic acid host channel to obtain the controlled structure of

polymer is another attractive theme.

Many reports have been dealt with the inclusion polymerization of some specific vinyl monomers, such as diacetylene (Jorgensen *et al.*, 1986), butadiene (White, 1960), methacrylate (Allcock and Levin, 1985), isoprene (Farina *et al.*, 1972), etc. Although polyvinylchloride (PVC) is one of the commodity plastics, few studies are performed on its controlled structure. The studies on the inclusion polymerization of VCM have to deal with the preparation of host compound with the low boiling point of -13°C VCM. The adduct preparation, thus, can not be achieved by ordinary recrystallization. The most ways that have been reported to prepare the adduct are to soak VCM with the host directly, as seen in the case of transoid-trans-transoid-trans-transoid-trans isomer of perhydrotriphenylene, PHTP (Silvestro *et al.*), tris(o-phenylenedioxy cyclotriphosphazene) TPP (Finter and Wegner, 1979), urea (White, 1960, Chatani *et al.*, 1978), and thiourea (Brown and White, 1960) hosts. As a result, the host guest formation can not be well characterized.

Hence, it is our interest to apply the guest responsive property of cholic acid by using the guest insertion technique and clarify the VCM-cholic acid adduct formation. The present work also stands on the viewpoint of inclusion polymerization of VCM via cholic acid host system by using γ -irradiation and identifies the host channel effect on the stereoregularity of the polymer.