CHAPTER I
INTRODUCTION

Chitin and chitosan are polysaccharides which are the second most abundant naturally and are found in invertebrate's exoskeleton such as shrimps, crabs and squids as well as some microorganisms. The advantages of these biopolymers include availability, cost performance, high biocompatibility, biodegradability and ability for chemical modification.

Much research on chitin has examined for various applications to take advantages from its specific properties. However, most of the applications using chitin were achieved with physical modifications; for example, bead preparation, gel formation and membrane casting. As a result, the application of chitin for advanced applications is limited.

To overcome this problem, a chemical modification of chitin becomes as an alternative way to improve its properties and achieve the performances which are not found in natural chitin.

Hence, one of the most interesting applications for chitin/chitosan is its potential utilization in the pharmaceutical field, especially as a material for controlled release system which is called a polymeric drug delivery system.

Polymeric drug delivery systems can be categorized into two main systems – 1. the physical insertion in polymer matrix and 2. the chemical conjugation between polymer main chain and drug molecules. In the controlled release process for both systems, it is an ideal that the system responds to the changes in environmental conditions, e.g., temperature, pH or light. In physical insertion system, the changing conditions can change the structure of the

polymer network and cause the release of drug molecules from the matrix, while for chemical conjugation, the bonds between the drug molecules and polymer main chain will be broken due to the external stimulant. After the release process, the polymer should be easily eliminated or biodegraded and cause no side effects or reactions.

Chitin in controlled release system is interesting and probably capable to develop in real situation since it can play an important role for not only providing biocompatible and biodegradable matrix as an acceptor for drug molecules, but also the active site via chemical modification to form a prodrug in the release system.

The present work is focused on the chitin-chitosan for controlled release system in both physical insertion and chemical conjugation of a model drug. Chloramphenicol, the model drug used, has a benzene ring as a chromophore which can easily be detected by a UV-VIS spectrophotometer. Moreover, a hydroxyl group in chloramphenicol is also a requirement for the preparation of chitosan conjugate. The obtained systems, physical modification and chemical conjugation, will be studied to determine the condition as well as the release mechanism.