

CHAPTER I

INTRODUCTION

Drug release is introducing a drug into the body at the proper part of the body, during a required period and amount of drug. It is necessary that the drug concentration in the blood be maintained at a level that provides the highest therapy and the lowest toxicity. There are three main routes of administration: Topical, Oral and Parenteral administration. The topical system is applied the drug directly to a surface area of the body, which is limited only small molecules are enough to penetrate through skin. The oral refer to anything of drug involving the digestive tract but they have some limitations which are poor absorption, drug might be degrade in acidic environment. Thus, the parenteral system or injection drug delivery is an especially attractive way to improved that drawbacks, it is easy to use and have a high efficient treatment.

In recent years, biodegradable materials especially natural polymers had been more popular to use in biomedical applications. A number of degradable polymers and natural materials are usually use for this aims. Natural polymers exhibit many excellent properties such as biocompatibility, biodegradability, non-toxicity, reinforcing properties, etc. Besides, they come from renewable sources which can be obtained in large amount. In this project was used chitin, poly (β -(1-4)-*N*-acetyl-D-glucosamine), which is known to be able to biodegrade by the nature and in the body (Hirano *et al.*, 1989; Sashiwa *et al.*, 1990). Moreover, Chitin has been found in various natural sources such as the shells of crustaceans, the cuticles of insects and the cell wall of fungi (Jayakumar *et al.*, 2010). In commercial production of chitin, it is easily available and inexpensive material. Chitin obtained from the shells of crustaceans such as crabs and shrimps which are readily available as wastes from seafood industries.

Whiskers, the organic nanofillers, are remarkable choices to improve the mechanical properties in composites because of their high aspect ratio and highly crystalline nature. Chitin whisker, one of substances from renewable sources obtained by acid hydrolysis of chitin, is extensively used as a reinforcement in several materials (Paillet *et al.*, 2001) which can improve the mechanical properties

(Sriupayo *et al.*, 2005) and dimensional stability in the composites (Wongpanit *et al.*, 2007).

Nowadays, The smart materials also are more interested especially for drug delivery systems, thermo-sensitive hydrogel plays an important role. It can change properties when temperature changes. To illustrate in Pluronic F127 is a commercial thermo-sensitive hydrogel, which exhibits reversible thermal gelation in aqueous solution at concentrations more than 20% (w/v). Aqueous Pluronic F127 solution is liquid as sol phase at low temperature, but it rapidly gels at 37 °C. After injection into the body, the cold sol phase containing drugs form into the gel and acts as a depot for sustained release of drugs that are all of reasons why Pluronic F127 is suitable to make for syringeable gel to use for the potential application in experimental medicine.

In this work, To preparation of chitin whisker-incorporate Pluronic for thermal responsive material and injection into the body to make a matrix of gel for drug delivery system. After that, studies the stability of gel will be investigated in terms of weight loss test and report in term of weigth remaining. Methylene blue, a cationic dye and methyl orange, an anionic dye, were selected as dye model compounds in order to examine the release characteristic of the gel. Moreover, Insulin, is representative of the protein drug , was used as a protein model compound to examine in term of drug release test. The effects of chitin whisker content, initial dye concentrations and various types of model drug were investigated as a function of time.