



CHAPTER I

INTRODUCTION

Microencapsulation is a process of applying relatively thin coatings with polymeric material to small particles of solids or droplets of liquids and the products from this process are called microcapsules. Microencapsulation, which is one of those techniques, has been widely investigated in the pharmaceutical industry for several years and it is still of great interest and use today. There are many advantages of this useful technique; one of these is the stabilization of drugs sensitive to environmental conditions [1-6]. A large number of herbs in Thailand have been used as traditional medicine for a long time. One herbal medicine that is widely used in Thailand, because of its effectiveness for certain illnesses, readily availability and inexpensiveness is *Andrographis paniculata* Nees.

A. paniculata Nees. is a plant in the family of “Acanthaceae”. In Thailand, it is commonly known as “Fa thalaai jone” (Bangkok), “Nam lai pangpon” (Bangkok), “Yaa kannguu” (Songkhla), “Fa sang” (Chonburi), “Sam sib dee” (Roi-et) and “Mekh thalai” (Yala) [7].

The botanical characteristics are described as follows: a perennial herb, rigidly erect, very bitter, 40-90 cm. high as shown in Figure 1-1. It has been applied in traditional Thai medicine for the treatment of fever, sore throat, dysentery [8-9] and possible used as an antidiarrhoeal drug in baby pigs. Due to the high bitter taste of *A. paniculata* Nees., baby pigs could not consume it. Microencapsulation is one of the methods that has potential to solve this problem by coating the drug with polymers that can control the drug release. Thus, this study proposes to solve the problem of the bitter taste of *A. paniculata* Nees. by microencapsulation.



Figure 1-1 *Andrographis paniculata* Nees. [8]

Microcapsules may be prepared by a number of methods. The technique of complex coacervation is the most widely used method of microencapsulation and suitable for water-insoluble compounds, both solids and liquids [3,10-11], e.g. benzaldehyde [12], liposomes of aspirin [13], indomethacin [14], etc. The principle of this technique is the reduction in the solvation of colloid solutes in an aqueous medium to form coacervate by charge neutralization between the negative charge of the negative charge polymer, e.g. acacia, carragenan, etc. and the positive charge of gelatin at pH below the electric point of gelatin and in the appropriate concentration [3,10-11]. Then the coacervate droplets deposit on the surface of the core particles that disperse in that medium and merge to form the coating in order to reduce total free interfacial energy. The coating is shrunk and crosslinked to form rigid wall. Finally, dried by the appropriate method, the desired microcapsules are collected. The reason for choosing gelatin as a positive polymer is because it is nontoxic, inexpensive and commercially available; it also has a good film-forming property. Moreover, it can be used together with other polyanionic colloids [10].

The aims of this study were:

1. To prepare *A. paniculata* Nees. microcapsules by complex coacervation.
2. To investigate the effects of 1) negative charge polymers, 2) ratio of gelatin and negative charge polymers, 3) ratio of core and wall, 4) hardening time and 5) amount of hardening agent on properties of the *A. paniculata* Nees. microcapsules prepared by complex coacervation technique.
3. To evaluate the properties of prepared microcapsules in term of morphology, yield, particle size, drug content, drug entrapment, drug release rate of *A. paniculata* Nees. from the microcapsules and stability of *A. paniculata* Nees. microcapsules prepared from complex coacervation technique.

Scope of this study:

In this study, *A. paniculata* Nees. will be microencapsulated by complex coacervation technique by coating with water-soluble biopolymers to mask the bitter taste. Scope of this study is as follows.

1. Literature survey of relevant research works.
2. Providing of chemicals and equipment.
3. Preparation of complex coacervation of *A. paniculata* Nees. with variation of the following parameters:
 - a) negative charge polymers
 - b) ratio of gelatin and negative charge polymers
 - c) ratio of core and wall
 - d) hardening time
 - e) amount of hardening agent
4. Investigating the properties of *A. paniculata* Nees. microcapsules.
5. Summarizing of the results.