CHAPTER I

INTRODUCTION

Curcuminoids are polyphenolic pigments found in the spice turmeric (*Curcuma longa* Linn.). The major curcuminoids are curcumin, desmethoxycurcumin, and bisdesmethoxycurcumin. A great number of literatures (Chan et al., 1995, Gupta and Balasubrahmanyam, 1998, Pfeiffer et al., 2003, Priyadarsini, 1997, Ruby et al., 1995, Tønnesen et al., 2002, Tønnesen and Greenhill, 1997, Wang et al., 1997) reported the number of biological and pharmaceutical effects of curcuminoids, which include anti-inflammatory, antioxidative, antimutagenic, anticarcinogenic, chemopreventive, hepatoprotective, antipsoriatic, antibacterial and antiviral properties. Moreover, they are readily obtained in large quantities and at low cost. Toxicology studies indicate that the main constituent, curcumin, is non-toxic even at high dosage (Tønnesen, 1986). However, the use of curcuminoids in turmeric are limited due to many reasons, including its low water solubility under acidic or neutral condition, high decomposition rate in alkaline media and photo-degradation in organic solvent (Tønnesen et al., 1986, Tønnesen and Greenhill, 1992). Therefore, the free curcuminoids must be protected or modified in some forms before its industrial application. In this study, the possibility of solving the problems of instability of curcuminoids in aqueous solution is of interest.

In pharmaceutical field, microencapsulation technique has been widely used to protect the core material against atmospheric effects (Bakan and Anderson, 1976, Shu et al., 2004), enhance the flow properties of drugs before compression into tablets (National Cash Register, 1966), reduce the volatility of several substances such as methyl salicylate and peppermint oil (Bakan and Anderson, 1976), provide compatibility between drugs such as aspirin and chlorpheniramine maleate (Bakan and Anderson, 1976), disguise the unpleasant taste of a number of drugs, provide sustain-release of drugs (Frankle et al., 1968) etc. The protective mechanism therein is to form a membrane (wall system) to enclose droplets or particles of the encapsulated material (core). So far, various kinds of microencapsulation techniques such as solvent dispersion/evaporation, phase separation (coacervation), co-crystallization, interfacial-polymerization etc., have been developed, among which spray-drying is the most commonly used one in the pharmaceutical industry due to its continuous production and ease of industrialization.

For microencapsulation by spray-drying, the coating of solid dosage forms with aqueous dispersion of ethylcellulose (Aquacoat® ECD) and polymethacrylate (*Eastacryl* 30D) is the choice because these polymers are among the most widely used polymers in the production of coated dosage forms. A new aqueous polymer dispersion of polyvinyl acetate (Kollicoat® SR 30) is also of interest. In addition, hydrophilic plasticizers are also used to promote the formation of spherical and smooth-surfaced microcapsules, enhancing adhesion force between wall and core materials.

The purposes of the study are as follows:

1. To prepare curcuminoid microcapsules using spray drying techniques
2. To characterize the curcuminoid microcapsules in terms of yield, curcuminoids content, entrapment efficiency, physical properties
3. To determine the chemical stability of spray dried curcuminoid microcapsules during storage and curcuminoid microcapsules in skin-care preparations
4. To investigate the effects of different polymers and plasticizers on physicochemical properties of curcuminoid microcapsules.