CHAPTER I

INTRODUCTION

Microencapsulation

In the pharmaceutical industry today, microencapsulation is a novel technique in drug delivery system, which requires knowledge of the field of pure polymer science, emulsion technology, pharmaceutical technology and in-depth understanding of drug and protein stabilization (Becher 1983, Cohen and Bernstein, 1996).

Microencapsulation is a process of entrapping solid, liquid or gases inside one or more polymeric coating and the products from this process are called microcapsules. Microcapsules may be prepared by a number of methods that involved in chemical, physical and mechanical mechanism. Major functions of microcapsules are to protect material environment, mask taste, odor and color, reduce toxicity of a material, change the properties or nature of material (e.g., liquid to free-flowing powders), prolong the storage time of such materials as volatile liquids, increase the stability of drugs or enzymes in preparation. These functions enable one to use microcapsules as a powerful tool in many fields of science and technology especially in pharmaceutical and cosmetic field.

In cosmetic industry microcapsules are used in commercial products for many reasons as the following:

- Protect materials from environment by preventing oxidation radiation and degradation.
- Contain any color, odor or volatile substance.
- Solidify tacky material and increase its fluidity.
- Control release of the core materials.
- Change specific gravity or liquid to solid form.
- Make product more valuable.

D-panthenol, one of the water-soluble vitamins is often used in cosmetic preparations. Because of its physical property, it is easy to incorporate into all common

cosmetic formulations. It penetrates the skin, hair and nails and generally fulfills all the expectation of both the manufacturers and customers. D-panthenol is the biologically active alcohol analogue of pantothenic acid, a vitamin B complex group-that is a normal constituent of skin and hair when applied topically, D-panthenol is converted to pantothenic acid (Idson, 1993). It is essential for the normal functioning of epithelial tissues and is a natural constituent of healthy skin. D-panthenol can act as a skin moisturizer therefore, it is used into products such as skin cream, lotion or toner, hair conditioner and shampoo at usual concentration from 0.1-2.5% w/w. Weiser and Erlemam (1987) have shown that even low concentration of D-panthenol have a positive influence on epithelisation. The studies were carried out using commercial water in oil cream with varying concentration of D-panthenol.

The interesting in encapsulation technique, which was easy to process and possible to manufacture for water-soluble vitamins as D-panthenol was investigated. The present study was designed to develop microcapsules of D-panthenol by interfacial polymerization where two reactive monomers were dissolved in immiscible solvent, one in aqueous phase with D-panthenol reacted to the other monomer in solvent to form a polymeric membrane at interface of the water in oil (w/o) emulsion.

Biodegradable polymers such as bovine serum albumin, ovulbumin and gelatin were investigated as wall materials. The microcapsules should be applicable using in topical products such as creams, lotions, facial cleansing foams and scrub products. The factors affected microcapsules by this technique were studied and D-panthenol loading was examined to obtain the suitable and microcapsules for cosmetic products.

The purposes of the study were as follows.

1. To encapsulated D-panthenol microcapsules by interfacial cross-linking terephthaloyl chloride with proteins.
2. To study factors affecting on microcapsule formation such as concentration of polymers, concentration of terephthaloyl chloride (TC) and stirring rate.
3. To determine surface characteristic, size distribution and percent entrapment of D-panthenol microcapsules.