

## CHAPTER I

### INTRODUCTION

A large number of surfactants are synthesized for particular applications, especially in laundry detergency. Detergency is a term used to specify abilities of surfactants in lifting and removing soils from substrates and suspending the soils which are washed off during cleaning process. In laundry detergents, the soils can be classified as particulates (solids and inorganic), oils (organic and liquid, or waxy solids), and stains (unwanted dyestuffs). Among the soil types, monoglyceride oily soil is a special type of oily soils which has the intermediate properties, such as rigidity and viscosity between solid and liquid, depending on temperature. This type of oil includes stiff dough, margarine, butter, and methyl palmitate. It is considered as a difficult problem to remove oil from clothes in textile cleansing. Hence, it becomes a big challenge how to develop an effect detergent formulation to handle this type of oil (monoglyceride oily soil).

Microemulsion is a single-phase mixture of water, oil, and surfactant. Due to its unique properties of the ultralow interfacial tension (IFT) and high solubilization capacity, it has been widely applied in several areas, including detergency. A linker molecule is an amphiphilic molecule that enhances the interaction between the surfactant and oil (lipophilic linker), the surfactant and water (hydrophilic linker). With combining linkers, this can extend the interaction of the surfactant with water and oil then provide an efficient way to bridge the hydrophilic-lipophilic gap between the surfactant and oil (Graciaa *et al.*, 1993, Acosta *et al.*, 2002). According to the Winsor R-concept, an effective way to produce microemulsions with greater solubilization is the increasing interactions of surfactant for both oil and water. This can be achieved by increasing the hydrophilicity of the surfactant head and the hydrophobicity of hydrocarbon tail but this approach is limited by the decrease in solubility associated with increasing hydrocarbon tail length. Extended surfactants have been proposed as an alternative surfactant structure to achieve the Winsor potential without reducing the water solubility (Witthayapanyanon *et al.*, 2009). In addition, extended surfactants and linkers can form

the middle phase microemulsion with ultralow interfacial tension and higher solubilization than commercial surfactants. The detergency process is governed by roll-back or snap-off mechanism which is believed to play a major role in oily soil removal (Rosen, 2004).

The objective of this research was to apply the microemulsion formation of methyl palmitate with the extended surfactant ( $C_{12,13}$ -4PO-SO<sub>4</sub>Na), lipophilic linker (1-dodecanol), and hydrophilic linker (SMDNS) under different surfactant concentrations and salinities at 40 °C. For laundry process, the selected formulation was employed to remove the monoglyceride oily soil from fabric under different total surfactant concentrations, salinities, and washing temperatures. Furthermore, a commercial liquid detergent was also tested in order to compare the detergency performance with the selected formulation.