CHAPTER I
INTRODUCTION

Detergency is unquestionable a surface and colloidal phenomenon reflecting the physicochemical behavior of matter at interface. The scientific and technological development of the area has, over the centuries, come as a result of much trial and error, and only more recently as a result of systematic scientific investigation (Drew Mayer, 1946).

Removal of soil from fabric, i.e. detergency, is a complex process involving interactions between surfactants, soil and textile surface (K. Holmberg; B. Jonsson; B. Krongerg; B. Lindman, 2003). There are many factors such as physical properties of wash systems, time, and temperature of wash that is especially critical when removing cooking grease and other materials with a high melting point., hydrodynamic force exerted during the wash process such as agitation aids in lifting matte fibers, the substrates, additives (builder, enzymes, and anti-depositions agents), water hardness, and electrolyte level (Verma *et al.*, 1998).

The soils present on the fabric may vary widely and different mechanisms are responsible for removal of different types of soil component. The term 'oily soil' refers to petroleum products, such as motor oil and vegetable oil, e.g. butter, but also skin sebum. Surfactants play the key role in removing oily soil but hydrolytic enzymes, which are in most detergent formulations today (K. Holmberg; B. Jonsson; B. Krongerg; B. Lindman, 2003).

However, the current level of understanding of oily soil removal mechanism is only qualitatively adequate. It is well accepted that there are three primary mechanisms of oily soil removal. Roll- up of oily soil is the primary mechanism, which is facilitated by increase in contact angle exhibited by the oil droplet on the fabric surface in the presence of a wash system. Necking and emulsification is the second accepted mechanism, in which a part of the oil droplet is drawn off into the wash liquor by hydrodynamic forces. The third mechanism is solubilization, in which oil molecules diffuse into the hydrophobic cores of micelles of surfactant (Verma *et al.*, 1998).

There have been a large number of studies on evolution of guidelines for superior oily soil removal, and the most popular in recent literature is the approach based on a microemulsion formation. As microemulsions are known to possess high limits for oil solubilization, They have been investigated for developing mixed active systems to give superior oily soil removal (Verma *et al.*, 1998).

Since microemulsions exhibit an ultra-low interfacial tension at their own oil-water interface and process high limits for oil solubilization that is favorable for soil removal, most recent literatures have emphasized on the correlation of microemulsion and detergency (Raney *et al.*, 1987).

Detergents and cleaning products depend upon surfactants for their cleaning. Surfactants are often referred to as the engine of the detergent system. Today, abroad choice of surfactants is commercially available. Surfactant formulation system is the one important factor in forming a middle phase microemulsion. In a nonionic surfactant system, the point at the optimum is known as phase inversion temperature (PIT). For a system with ionic surfactant, salt concentration at the optimum point in the middle phase is known as the optimum condition, which has the lowest interfacial tension (Bronze, 1994).

A mixed surfactant of sodium dioctyl sulfosuccinate (AOT), alkyldiphenyloxide disulfonate (ADPODS), and sorbitan monooleate (Span 80) with motor oil was studied by Tongcumpou, 2002; Korphol, 2003: and, Pantipa, 2004. Their results, showed that their formulation exhibited a Winsor Type III microemulsion (middle phase) which help to remove the oily soil.

Nowadays, environmental concern are serious in the laundry industry and the type of surfactant which is used in detergents is one of those concerns. The objective of our study was therefore to develop a formulation with low salinity for the formation of a microemulsion with motor oil in detergency applications by a mixed surfactant system of branched alcohol propoxylate sulfate sodium salt with 14 – 15 carbons and 3 propylene oxides (Alflotera 145-3PO), an ionic surfactant, and secondary alcohol exthoxylate nonionic surfactant (Tergital 15S5), a commercial surfactant used in laundry applications which is friendly to environment.

From the results of phase behavior, a formulation will be selected for detergency experiments. Detergency experiment of oily soil removal from polyester/cotton blend (65/35) was carried out. In addition, the measurements of supersolubilization parameter and adsorption isotherm of surfactants on to fabric surfaces were determined in order to correlate the detergency performance and interfacial tension.