CHAPTER I
INTRODUCTION

Wettability of solid surfaces by surfactants is an important property that is manipulated in numerous practical applications such as oil recovery, printing, coating, adhesion, floatation, and detergency and also used as an analytical technique to characterize surfaces in basic material research (Oner and McCarthy, 2000). Wetting is the ability of a surfactant solution to spread over a given surface. Surfactants accomplish this by lowering the energy barrier between the solution and substrate. The ability to "wet" is a function of several parameters including the molecular structure of surfactant, its concentration, its environment, and the composition of the substrate. Consequently, the ability to wet is somewhat difficult to predict.

The measurement of contact angle is the most rapid and convenient way of characterizing surfaces likes wetting, hydrophobicity, and surface energies (solid/vapor and solid/liquid surface tensions) for example the contact angle of water has been commonly used as a criterion for evaluation of hydrophobicity of the surface (Kwok *et al.*, 1977; Miwa *et al.*, 2000). There have been many experimental techniques available for contact angle measurement (Subrahmanyam *et al.*, 1996; Gyorvary *et al.*, 1996; Adamson, 1990; Serre *et al.*, 1998; Rosen, 1989). However, the direct measurement of contact angle from the sessile drop is the most popular method. In the goniometer method, contact angles are measured simply by depositing a drop of liquid on a given solid surface and placing a tangent to a drop at its base. However, the more simple way is to take photograph of the droplet and measure the angles by a computer program as was done in previous work (Dechabumphen *et al.*, 2000) and the resulting "static advancing contact angle" represents the "equilibrium contact angle". However, there are many

factors affecting the precision including contamination of the droplet from surrounding, surface cleanliness, surface heterogeneity, and surface roughness (Serre *et al.*, 1998) and the precision of the contact angle measurement was within 5 degrees error.

The previous work (Dechabumphen *et al.*, 2000) studied the contact angles of saturated surfactant solutions on its precipitated surfaces and demonstrated that when a second subsaturated was added, it can act as a wetting agent by substantially decreasing contact angle at low concentration and remaining constant at high concentration. It was postulated that adsorption of a second surfactant from solution onto the precipitated surface may probably be a primary cause of solid/liquid surface tension reduction and decrease in contact angle.

In this study, contact angles of saturated calcium soap precipitated (calcium dodecanoate) solution containing the second surfactant (sodium dodecylsulfate) are investigated in an attempt to elucidate the fundamental wetting mechanism by correlating the contact angles to surface energy (solid/liquid surface tension) and to surfactant adsorption. This work may likewise develop a better understanding of the antifoam properties of fatty acid in hard water through a dewetting mechanism (Garrett, 1993).