CHAPTER I
INTRODUCTION

Normally in the ancient time, housewives cleaned their family's clothes by beating wet clothes on rocks or wooden board near a river. Even today, in some remote areas, they still clean clothes by beating. This methods can clean clothes because beating (mechanical agitation) expedites the detachment of solid soil. Water can dissolve polar stains for instance, dyes, sugar, and fish sauce. In general, cloth-wash process or detergency or laundry can be considered as the removal of unwanted substances from clothes by mechanical agitation (washing machine, or hand) in the presence of surfactant solution.

Detergency can be defined as the detachment or removal of unwanted substances (soils) from a solid surface immersed in media—normally through the application of mechanical force--in the presence of chemical substance (Kissa, 1987). It is a complicated process which depends on several factors such as the nature and concentration of washing medium, additives (builders, enzymes, antiredeposition agents), nature of solid surfaces, hydrodynamic conditions, mechanical during washing, water hardness, temperature, and electrolyte concentration (Azemar, 1997). The soils present on fabric can be classified as particulate soils (solids–usually inorganic), oily soils (usually organic and liquid; sometimes also waxy solids), and stains (unwanted dyestuff) (Carroll, 1995).

Particulate soils are composed of, for example, siliceous minerals (such as clay), carbonaceous material (such as ashes, soot and carbon black), and inorganic oxides (such as ferric oxide) (Paria, 2003). Detergency of particulate soils, which present on fabric, is affected by several particulate-soil properties: chemical composition; fabric surface and solid surface characteristics; size, shape, and hardness of the particles; and particle size distribution, among others. Besides the particulate–soil properties, the particulate soil detergency are also affected by the adhesion of particulate soils on fabric, the strength of adhesive bonds between the particles and fabric, the adsorption of ions and surfactant, and the wettability of particles and fabric. The mechanism for the removal of particulate soils may differ, depending on both types of surfactant and particulates. Generally, anionic surfactants enhance particulate

soil removal. In general, particulate soils removal in aqueous solution progresses by the formation of electrical double layers of the same sign on substrate and soiled particles resulting in mutual repulsion (which reduces the net adhesion of soil) (Rosen,1978). The repulsion force must overcome the attraction force in order to remove particulate soil from substrate. This repulsion is based on the DLVO theory for the forces between double layers. The adsorption of surfactant at interphase—substrate and liquid; and, particle and liquid—also enhance the removal of particulate soil because of the reduction of the work required for particulate soil removal.

The purpose of this work was to investigate the behavior of surfactants (anionic and nonionic) on fabrics and ferric oxide surfaces and to correlate the relation of adsorption isotherm, zeta potential and contact angle. The detergency performance of anionic and nonionic surfactants in ferric oxide removal were also evaluated by varying the pH and surfactant concentrations. The adsorption isotherm, contact angle and zeta potential were used to explain both the mechanism and detergency performance for the removal of hydrophilic particulate soil of ferric oxide.