# CHAPTER I
# INTRODUCTION

Adsorption of surfactants at solid-liquid interface has been a major topic of experimental and theoretical interest for many years. Surfactant adsorption displays a complex range of phenomena involving a variety of aggregation processes on the surface. The topic is important in numerous processes ranging from mineral beneficiation to detergency, including applications such as waste water treatment and soil remediation, dispersion stabilization in ceramics, enhanced oil recovery and drilling mud formulation. In case of ionic surfactants and oxide solids, it is generally admitted that at very low concentration individual monomers tend to adsorb at localized ionic sites; at higher concentration, lateral interactions induce the formation of various structures (hemimicelles or admicelles) which increases with surfactant concentration approximately up to the critical micelle concentration (CMC). It may collapse into monolayer or bilayer structures or may retain a patchwork-type aggregate structure (Monticone and Treiner, 1995). The presence of aggregated adsorbed surfactant may induce the incorporation of hydrophobic solutes from the solution onto the aggregated adsorbed at concentrations below the critical micelle concentration (CMC). This phenomenon has been termed as surface solubilization or adsolubilization (Scamehorn and Harwell, 1988). There are several important parameters that affect both surfactant adsorption and adsolubilization such as type of surfactant and its concentration, pH and ionic strength.

Although the adsorption of single surfactant at the solid-liquid interface has been studied extensively, relatively fewer studies have been done on the adsorption of mixed surfactants. In addition, these studies are found to limit to the adsorption on mineral surfaces where surfactant mixtures of practical interest include like-charge surfactants, for instance, mixtures of anionic surfactants or mixtures of cationic surfactants. In contrast, the more common cases involve mixtures of ionic and nonionic surfactants. Recently, adsorption of mixed surfactants at the solid-liquid interface has received increasing interest because of the superior properties obtained by a mixture due to the synergistic effects between different surfactant species (Holland and Rubingh, 1992). In the systems comprising ionic-nonionic surfactants,

in particular, much lower amounts of surfactant is required to obtain both adsorption and adsolubilization that is similar or superior to the single surfactant systems.

Therefore, this research focuses on the investigation of the adsorption of both individual and mixed anionic/nonionic surfactants on aluminum oxide and the adsolubilization behavior of organic compounds in the surfactant admicelles formed by single- and mixed-surfactant on aluminum oxide.