CHAPTER I
INTRODUCTION

In many applications, the behavior of surfactant at the interface of aqueous solution and mineral oxide surfaces is important. Surfactants adsorbed at the solid/liquid interface can form aggregates that are much like micelles. This phenomenon brings about a novel utilization of surfactants. These micelles can be used to solubilize organic molecule in the same manner that micelles are used and these micelles are called admicelles or hemimicelles. The solubilization of admicelles is called adsolubilization. Adsolubilization is the surface analogue of solubilization, with aggregates of adsorbed surfactant playing the role of micelles. Adsolubilization is able to apply for the separation and reaction processes. The admicellar chromatography, currently explored for separation process, uses the nature of the layer of surfactant adsorption and its adsolubilization properties for the environmental applications (Barton *et al.*, 1988). For the reaction processes, the applications have also been studied and have included admicellar catalysis (Yu *et al.*, 1992), admicellar polymerization of styrene which serves as a reaction solvent (Wu *et al.*, 1987) and surface modification processes by ultra-thin film formation (O'Haver *et al.*, 1994).

The counterion effects in surfactant adsorption have been studied and the critical role of counterions in admicellar formation which is critical in any surfactant-based enhanced oil recovery have been presented (Bitting and Harwell, 1987). Utilizing the media-sorbed surfactants for adsolubilization of contaminants is an important phenomenon for surfactant-based environmental technologies (Nayyer *et al.*, 1994).

The adsorption of ionic surfactant from aqueous solution on the oppositely charged substrates has been studied for quite sometime. For the

media-sorbed surfactants, this provides a convenient way of concentrating them on a metal oxide solid support such as aluminum oxide. The formation of surfactant aggregates (admicelles or hemimicelles) on the surface made the aluminum oxide hydrophobic and increased the capacity of the oxide surface for an organic compound. Aluminum oxide can then be reused for subsequent adsorption of admicelles and adsolubilization without loss of efficiency. The recovery and reuse of surfactants and aluminum oxide provide a strong incentive for research for using this process as a possible wastewater treatment process.

Emulsion is an enough dispersion of one liquid phase in another liquid phase with which it is immiscible. Emulsion can be applied in food processing area pharmaceutical and cosmetic industries etc. In the past decade, microemulsion have been intensively studied because of their uses in enhanced oil recovery. However, there is a lack of the information about the behavior of surfactant adsorption and oil adsolubilization on the solid substrate in microemulsion system.

In this study, this is the first work to investigate the properties of ionic surfactant adsorption on the special wide pore aluminum oxide and adsolubilization of hydrophobic compound, which is n-decane from microemulsions when the microemulsion type I approaches to the phase transition. Sodium bis (2-ethylhexyl) sulfosuccinate or aresol OT which is double-tailed anionic surfactant, water, n-decane and sodium chloride are used to prepare microemulsion and are able to form microemulsion without using co-surfactant (Kahlweit *et al.*, 1989 and Kahlweit *et al.*, 1995). The interactions between the ionic surfactant and solid substrate are dominated by strong electrostatic forces. This work also studies what functions effect to the adsorption and adsolubilization in microemulsion type I.

This is the way to control the uptake of solubilizates by admicelle. It is very important point in this study because the solubilization component in

micelle solution is hard to separate. The adsolubilization component and admicelle on substrate in solution which is the solid-liquid system can be easier separated than the liquid-liquid system. It can be applied in many processes such as in wastewater processing area and soil remediation etc. It can also be used in enhanced oil recovery.