

CHAPTER I

INTRODUCTION

The behavior of surfactant at the interface of aqueous solution and mineral oxide surfaces is important in many applications, such as detergency, enhance oil recovery, froth flotation, and surfactant-based chromatographic techniques. Numerous studies have been made on the adsorption of ionic surfactant from aqueous solution onto oppositely charged substrate. In aqueous solution, the protonation or deprotonation of chemically adsorbed water will cause the solid surface to be charged, depending on the pH value of the solution. In mildly basic environments, cationic surfactants readily adsorb on silica; in mildly acidic environment, anionic surfactants adsorb on alumina. The morphology of the adsorbed surfactant is unclear, but many studies have shown that adsorbed surfactant forms a micelle-like bilayer or so call “admicelle” at sufficiently high coverage (Thakulsukanant *et al.*, 1997; and Yeskie and Harwell, 1987).

Adsolubilization is the surface analogy of solubilization, with adsorbed surfactant aggregate taking the place of micelle. In most cases the solubilization and adsolubilization of neutral molecule has been considered (Thakulsukanant *et al.*, 1997). The research on adsolubilization indicated that at high adsorption densities admicelles have adsolubilization capacities similar to that of micelles but with greater selectivity than micelles, probably because of the greater packing density which can be achieved with admicelles. At lower adsorption densities the adsolubilization capacity of the admicelle may be many times the capacity of the micelle for amphiphilic molecules (O’ Haver *et al.*, 1995). The enhanced sorption/adsolubilization of organic contaminants on adsorbed surfactant on solid surface is an important phenomenon for surfactant-based environmental technologies. There are many

factors that affect the adsolubilization such as the molecular structure of the surfactant, the pH of the aqueous phase.

In this work, we investigated the impact of pH on adsolubilization of organic solutes. It is well known that the surface charge density of dispersed hydrophilic solids in water, especially mineral oxides such as silica, is governed primarily by the pH of the system. The amount of adsorption by ionic and even nonionic surfactant also depends on changes in the pH of the systems (Favoriti *et al.*, 1996). It has been suggested that there are different sites within the surfactant aggregate in which the organic solute can be sorbed, with polar solutes tending to be located near the head groups or in the palisades, while nonpolar solutes tend to be located in the admicellar core (Behrends *et al.*, 1999). In this perspective, it is important to examine the adsolubilization capacity for the various organic solutes with different polarities in order to evaluate the influence of pH on adsolubilization of the organic solutes, which is the main focus of this research. Thus, the specific objectives of this research are to investigate adsolubilization of toluene and acetophenone into cetyltrimethylammoniumbromide (CTAB) adsorbed on the precipitated silica and to examine the impact of pH on the adsolubilization of toluene and acetophenone. For all studies, the adsolubilization equilibrium constant (partition coefficient) will be determined.