CHAPTER I
INTRODUCTION

The formation of aggregates by surfactant adsorbed at the solid/liquid interfaces has been well studied for decades (O'Haver *et al.*, 1995). The nature of these aggregates is much like that of micelles and they have thus been termed admicelles (adsorbed micelles) (Wu *et al.*, 1987). As with micelles, admicelles can solubilize various kinds of sparingly soluble solutes in a phenomenon called adsolubilization. Various areas involving adsolubilization have been examined to date, including chemical separation (Nayyar *et al.*, 1994; and Pradubmook *et al.*, 2003), semiconductor (Funkhouser *et al.*, 1995 and Yuan *et al.*, 2002), surface modification (Esumi *et al.*, 1991; O'Haver *et al.*, 1994; Waddell *et al.*, 1995; Thammathadanukul *et al.*, 1996 and O'Haver *et al.*, 1996), drug delivery (Hayakawa *et al.*, 2000) and soil remediation (Jafvert, 1991).

A general key factor to determine the degree of adsolubilization is a value of partition coefficient (O'Haver and Harwell, 1995; Dickson and O'Haver, 2002; Kittiyanan *et al.*, 1996 and Dunaway *et al.*, 1995). The correlation of partition coefficient vs solute mole fraction in the admicelle is useful for inferring the location of solubilized solutes in admicelles, typically described as three main loci of adsolubilization (O'Haver *et al.*, 1995); i.e. surfactant headgroup, palisade and core regions, and where a solute partitions is dependent upon the physicochemical compatibility between each region and the adsolubilized solute. Most studies of adsolubilization concerning partition coefficient play attention on related phenomena occurring at "ambient" temperature (O'Haver *et al.*, 1995 and Treiner, 2003). However, to-date it was found that some applications of adsolubilization at higher temperature have been performed as well such as admicellar polymerization of styrene and other monomers (Wu *et al.*, 1987; Esumi *et al.*, 1991; O'Haver et al., 1994; Ochiai *et al.*, 1991; Kittiyanan *et al.*, 1996 and Dunaway *et al.*, 1995). In principle, change in operating temperature will shift the equilibrium of adsolubilization system and alter intra- and inter-molecular interactions among surfactant, solute, solid substrate and other additives. These phenomena can be significant for some degree of temperature change. Our research work thus primarily

aims to elucidate the effect of operating temperature on degree of adsolubilization represented by the partition coefficient. This study is performed and discussed along with the study of solute/surfactant molecular interactions in admicelles, loci of adsolubilization for each solute and degree of surfactant adsorption to obtain distinct insight in a nature of neutral solute solubilzed into cationic admicelles. In addition, applying principal knowledge, a simple molecular thermodynamic model of adsolubilization is also successfully developed.