



## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

In this study, the results indicate that the adsorption of CTAB on silica and adsolubilization of toluene and acetophenone are dependent upon pH and ionic strength of the system. From the adsorption studies, it can be seen that CTAB adsorption on Hi-Sil 255 silica at pH 8 is higher than the adsorption at pH 5 at every CTAB equilibrium concentration. This can be attributed to the increase in the surface charge as pH increases, thus leading to a better and more tightly packing of the surfactant on the silica surface. CTAB adsorption is found to be higher as ionic strength of the system increases. These results may be explained by the screening of the headgroup charge of the surfactant by the electrolyte, causing reduced headgroup area. Consequently, this leads to a higher packing density (Atkin *et al.*, 2001).

For the adsolubilization studies, the adsolubilization of toluene and acetophenone are found to increase with increasing pH and ionic strength of the system. This is primarily due to the increase in the adsorbed amount of CTAB on silica at higher pH and ionic strength. However, it is observed that, for toluene, the partition coefficient decreases with increasing ionic strength. In contrast, the partition coefficient of acetophenone increases with increasing pH and ionic strength. This may be due to the difference in the polarity of the two solutes and also the difference in the structural characteristics of the adsorbed CTAB on silica surface at different pH and ionic strength. At the partition coefficient (K) predict that location adsolubilization for acetophenone is in the palisade regions, while toluene is both the core and palisade regions. Our previous study indicates that the location of adsolubilization of toluene is in both core and palisade regions whereas the adsolubilization of acetophenone is primarily in the palisade region.

In the mixed-solute systems, the adsolubilization of toluene is slightly higher in the presence of added acetophenone for both pH values and various ionic strengths studied. Acetophenone present in the admicelle may forces out the water molecules in the palisade region, making the interior of the admicelle more nonpolar.

The synergetic effect is clearly observed in the case of acetophenone adsolubilization in co-solute system. The amount of adsolubilized acetophenone is significantly higher in the presence of toluene both pH values and various ionic strengths studied. This may be attributed to the swelling of the admicelle due to the presence of toluene and the hydrophobic interactions between the two adsolubilizates.

## **5.2 Recommendations**

Upon the completion of this study, the effects of both pH and ionic strength on surfactant adsorption and adsolubilization of organic solutes have been examined. However, this study and our previous study have studied both phenomena using the bilayer of the cationic surfactant adsorbed on the silica surface. It is interesting to study both adsorption and adsolubilization with different surfactant surface coverages. In addition, it is not easy to describe what really happens without knowing the characteristics of the surfactant adsorbed on the solid surface. Further study using optical reflectometry and atomic force microscopy (AFM) may be used to explore this issue.