

CHAPTER IV

CONCLUSIONS

The first investigation of HPC-HTAB interaction has been studied here by dynamic light scattering and viscometry. The polyelectrolyte effect is imparted to the neutral HPC chain on formation of a charged complex with the cationic surfactant HTAB. The cac value is strongly independent of gram ratio of HTAB/HPC, but depends on the surfactant concentration (about 0.01% wt of HTAB). The saturation point of binding occurs at gram ratio of HTAB/HPC between 1-1.25. This critical level increases with the concentration of the polymer.

In the dilute regime and above the cac, the continuous expansion of chains is evident in by the increase in $R_{h,app}$ and the specific viscosity until the saturation point of binding is reached. These results are consistent with the data that the HPC molecules have a wormlike coil conformation and that the binding of HTAB micelles can expand the HPC backbones. The chains contract when the maximum point of binding at the gram ratio of HTAB/HPC between 1-1.25 is exceeded and when free counterions (Br^-) from the excess HTAB are therefore present to screen the electrostatic interactions.

Addition of salt depresses the cac value, and promotes the formation of complexes. The screening effect of Cl^- counterions from the added salt reduces the repulsive contributions to the interaction potential from the fixed charges along the HPC chains. The screening effect becomes increasingly important after the HPC chains are saturated because of the progressive increasing in concentration of free Cl^- counterions from the excess HTAB.

Since $R_{h,app}$ decreases below the value for nature HPC in the absence of HTAB, it is possible that the binding of HTAB micelles increases the flexibility of the HPC conformation.

In the semidilute regime, an increase in the effective molecular weight of the polymer through crosslinking of bound clusters as well as from increased chain entanglement may take place. A fast mode of motion with $R_{h,app}$ smaller than the value of pure HPC is detected from DLS, whereas the specific viscosity increases steeply. These results are consistent with the presence of a transient network. Addition of salt increases the flexibility of the transient network as evident by a decrease in $R_{h,app}$ and η_{sp} .