CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

CTAB adsorption onto an amorphous precipitated silica at a feed pH of 8 was measured. The experimental plateau adsorption value was 600 μmol of CTAB per gram of silica and the CMC of CTAB estimated as 900 μM. The initial CTAB concentration giving an equilibrium bulk concentration below the CMC, for a ratio of one kilogram of silica per 12.5 liters, is 48,900 μM.

The continuous stirred tank reactor system was designed, assembled, and tested. The system was found to indeed be well-stirred and reached steady state in approximately 70 minutes.

The admicellar polymerization process reduced the BET surface area and increased the mean agglomerate particle size of the treated silicas. Scanning electron microscopy (SEM) showed that small particles present in the unmodified silica disappear in the modified silica samples. Fourier Transform Infrared Spectroscopy of extracted material from the modified silica showed the characteristic benzene ring functional group peak at a wave number of 700 cm^{-1}, proving the existence of styrene, and the characteristic aliphatic carbon double bond (C=C) peak at 1600 cm^{-1}, proving the presence of isoprene.

Thermogravimetric analysis data was used to investigate the amount of polymer formed on silica surface. Although the data is inconsistent and inconclusive, the sample with the highest calculated amount of polymer is the 5-g co-monomer loading per kilogram silica with 60 minutes resident time.

According to the experimental results obtained from the present study, it can be concluded that the optimum condition for silica modification should be 5 g of monomers per kilogram of silica at 60 minutes resident time.

5.2 Recommendations

To indicate the optimum silica surface modification conditions, the rubber compounding process and rubber compound testing should be performed. Additional runs should be made at a few operating conditions to test the reproducibility of the process.