CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Amorphous silica with high purity (97.46 ±0.01% SiO_2) and high specific surface area (349 ±0.05m^2/g) could be prepared from rice husk. Specific surface area of rice husk silica was higher than commercial silica (Hi-Sil®255) (184 m^2/g) by around 47%. Porosity diameter of rice husk silica (52.80 Å) was smaller than Hi-Sil®255 (328.0 Å) by around 521%. The rice husk silica was flat with irregular shape and had particle size finer than Hi-Sil®255 which had a sphere shape. Acid leaching pretreatment, acid concentration, and calcination temperature did not give much difference in purity of rice husk silica. The appropriate silica preparation condition of silica from rice husk employed in this present study was calcination of rice husk at 600°C for 6 h and acid leaching pretreatment with 0.4 M HCl.

From the adsorption isotherm of CTAB on rice husk silica, the maximum CTAB adsorption value was approximately 64 μmol of CTAB per g of silica. It should be noted that the amount of CTAB adsorption on silica depended not only on specific surface area but also on pore size of silica. However, the surface modification of both rice husk silica and Hi-Sil®255 could be performed via admicellar polymerization process using styrene monomer. The FTIR spectra of the extracted materials from both the modified silicas proved the existence of polystyrene with low molecular weight. The weight average molecular weight of polystyrene polymerized on surface of the rice husk silica (832 $gmol^{-1}$) was close to that obtained on Hi-Sil®255 (885 $gmol^{-1}$). TGA indicated that the polymer and surfactant adsorbed on the surface of both silicas. SEM also showed the difference in surface appearance between the unmodified and modified silicas of both types of silicas. The decrease of BET specific surface area is additional evidence supporting the presence of polystyrene on the surface and within pore structure of the silica.

5.2 Recommendations

The rice husk silica, which has high purity and high specific surface area, can be used for many technological applications, for example, reinforcing materials, an absorbent as stationary phase for chromatography, supported-metal catalyst, thermal insulators, silica film, etc.

In this research, the amount of silica obtained and admicellar polymerization process were limited by small batch process. So, further study should be done in a bigger system or using a continuous system.