CHAPTER V

CONCLUSIONS AND SUGGESTION

5.1 Conclusions

The synthesis of superabsorbent polymer composites by solution polymerization is a highly flexible technique to produce superabsorbent polymer with a high capacity of absorption and enhanced gel strength. Acrylamide (AM) and itaconic acid (IA) are used as a comonomer pair. Silica is used as an inorganic particulate component in the polymerization process to strengthen the polymer. They are polymerized using APS and TEMED as an initiator and cointiator, respectively, and N-MBA as a crosslinking agent, at the temperature of 45°C for 30 min. The study of the research consists of the itaconic acid concentrations (mole percent), types of silica, and silica concentrations. The present research can be concluded as follows:

1. The functional groups of the synthesized copolymer were characterized by FTIR. The result shows that the infrared spectrum of copolymer give the characteristic absorption peaks of the $-CONH_2$ at 3445 cm^{-1} (N-H stretching) and 1660 cm^{-1} (C=O stretching).

2. The surface morphology of the copolymer studied by SEM technique reveals that copolymers having the higher absorbency are more porous.

3. The mole percent of IA was varied from 0-3 % and the concentration of crosslinking agent (N-MBA) was fixed at 0.5%wt of the total monomer with 1.0%wt APS at 45°C, 250 rpm. 30 min. The IA at 3 mole percent gave the highest water absorption of 233±8 times its dry weight.

4. The absorbency under load (0.28 and 0.70 psi) of the synthesized copolymer decreases with increasing the concentration of hydrophilic or ionic functional and chain flexibility.

5. The synthesized copolymer could absorb water up to 149±2 times its dry weight within 15 min. The dependence of the swelling time on equilibrium swelling capacity of the polymer can be observed.

6. The water absorbency of the synthesized copolymer containing silica aerosil 300 is less than those of silica aerosil 90 and silica aerosil 200.

7. The absorbency under load increases slightly with added silica but not much different among the silica aerosil 90, silica aerosil 200, and silica aerosil 300.

8. The water absorbency of the synthesized copolymer decreases with increasing silica concentrations.

9. The silica concentration has an effect on gel strength and water absorbency under load. The higher the silica percentage, the higher the gel strength for absorbency under load will be achieved.

10. The synthesized copolymers were measured for the absorbency by swelling in various temperatures of distilled water for water absorbency. The water absorption decreases in correlation with increasing water temperatures.

11. Differential scanning calorimetric (DSC) technique was employed to characterize the thermal properties of copolymers. The results revealed that the possible intercalation of silica in the copolymer.

12. The amount of silica retained in the superabsorbent polymers is about 10% lower than the silica concentration added to the polymerization recipe.

5.2 Suggestions for future work

The synthesis of the superabsorbent polymers of poly[acrylamide-*co*-(itaconia acid)]/silica composites by solution polymerization would be further investigated as follows:

1. Other types of inorganic component should be investigated to produce a new type of superabsorbent polymers that may absorb even a lager amount of water.

2. Other type of redox initiators should be used in place of APS: TMED.

3. Other type of crosslinking agent on the polymerization should be investigated.