

## CHAPTER IV

### CONCLUSION AND SUGGESTIONS FOR FUTURE WORK

#### 4.1 Conclusion

Two important goals have been achieved in this research. Firstly, prepolymers with terminal NCO group were synthesized, namely HDI / PCL diol prepolymer, HDI / PCL triol prepolymer and HDI / PP glycol prepolymer. The reactivity of zinc complex with prepolymers in the polymerization step was polycaprolactone triol > polycaprolactone diol > polypropylene glycol. The suitable NCO contents in HDI / PCL diol prepolymer, HDI / PCL triol prepolymer and HDI / PP glycol prepolymer for the preparation of polyurethane were 17%, 13% and 55% NCO and the weight contents of zinc complex in the resulting polyurethanes were 9%, 10% and 16% respectively.

Secondly, liquid crystalline polyurethanes were synthesized. Three types of polyurethanes that contained zinc complex in the main chain were obtained, namely PCL diol polyurethane, PCL triol polyurethane and PP glycol polyurethane.

All synthesized polyurethanes were characterized by FTIR. Their mesogenic properties and morphology were indicated by POM and SEM. All of polyurethanes are nonhomogeneous, zinc complex did not mix very well with the prepolymer and the mixture had high viscosity. PCL diol polyurethanes-1 and -2 exhibited weak birefringence from room temperature to 75°C. PCL triol polyurethanes-1 and -2 exhibited birefringence at room temperature. PP glycol polyurethane -1 did not exhibit mesomorphism at room temperature. PP glycol polyurethane -2 exhibited weak birefringence at room temperature. Polyurethanes were prepared from HDI with a high molecular weight soft segment showed less mesophase stability than a low molecular weight soft segment.

#### 4.2 Suggestions for future work

It should be emphasized that more detailed study is needed to prove that the birefringence observed in PCL diol and PCL triol polyurethanes were due to the mesophase. The suggestion for future work is to synthesize metal-containing thermotropic liquid crystalline polyurethane elastomers and in the form of powder for further characterization by  $^1\text{H}$  and  $^{13}\text{C}$  NMR.



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