CHAPTER V

CONCLUSION AND SUGGESTIONS FOR FUTURE WORK

5.1 Conclusion

Two metal-containing polyurethanes, namely PB900Zn and PP1000Zn, and OMH-BNH organoclay were used to prepare metal-containing polyurethanes/clay nanocomposites by solution intercalation method to obtain PB900Zn/BNH and PP1000Zn/BNH nanocomposites. DMSO was employed as a solvent to disperse organoclay and to dissolve polymer. The suitable condition for drying nanocomposites films in a vacuum oven is 50 °C for 48 hours.

XRD indicated that the BNH organoclay in PB900Zn/BNH and PP1000Zn/BNH showed an increase in the interlayer distance when compared with BNH organoclay. Correspondingly, the peak intensity increased with increasing clay content. The XRD data were correlated with TEM pictures and both of them confirmed that there was incorporation between organoclay and polymer matrix and these results suggested the classification of the obtained nanocomposite as an intercalated type. The IR spectra indicate that the chemical structures of the polymers were not changed by the presence of organoclay. Thermal properties of nanocomposites were investigated by TGA and LOI. The thermal stability of nanocomposites was not superior to that of the pure polymer at lower temperature. However, the % weight loss of the nanocomposites at high temperature was lower than that of the pure polymers in the range 430-1000 °C and 300-1000 °C for PB900Zn/BNH and PP1000Zn/BNH nanocomposites, respectively. The % weight loss in this high temperature range decreased with increase in the amount of organoclay. This phenomenon reveals that the nanocomposites possessed better thermal stability at high temperature. The flammability was evaluated by LOI value measurement. The LOI values increased with an increase in organoclay content of the

nanocomposite, implying that the flame retardant of the metal-containing PU polymer was improved by the presence of organoclay in the metal-containing PU matrix. All experimental results indicated that there is interaction between metal-containing PU chain and surface of organoclay because both of them contain polar species.

5.2 Suggestions for Future Work

In this work, metal-containing polyurethane/BNH nanocomposites were prepared by solution intercalation method to obtain intercalated nanocomposites. The suggestion for future work is to prepare metal-containing polyurethane/BNH nanocomposites by *in situ* polymerization method. For this method, the organoclay is swollen in the solution of metal complex and prepolymer and the mixture is then heated to cause the polymerization. Therefore, the polymer formation may occur in between the clay layers. The exfoliated nanocomposites may be obtained and their thermal properties should be better than those of the intercalated nanocomposites.