# CHAPTER V

# CONCLUSION AND SUGGESTION FOR FUTURE WORK

## 5.1 Conclusion

Zinc- and nickel-containing polyurethane-ureas were synthesized by the reaction between MSalOMe$_2$trien (M = Zn and Ni), diisocyanates and dialcohols. Metal-containing copolyureas were synthesized by the reaction between MSalOMe$_2$trien, diisocyanates and diamines. Different aliphatic and aromatic diisocyanates, diamines and dialcohols were employed to study the effect of the structure on the polymer properties.

The structures of metal-containing polymers were characterized by IR and NMR. Metal-containing polyurethane-ureas and copolyureas were soluble in DMF and DMSO but insoluble in other organic solvents. Metal-containing polyurethane-ureas showed higher solubility than metal-containing copolyureas. MDI-based polymers exhibited higher solubility than HMDI-based polymers. The inherent viscosity of metal-containing polyurethane-ureas and copolyureas were found to be in the range 0.0797-0.1095 and 0.0791-0.0947 dL/g, respectively. Thermal properties of polymers were investigated by TGA, which showed that metal-containing polyurethane-ureas had higher thermal stability than copolyureas and zinc-containing polymers have higher thermal stability than nickel-containing polymers. $T_5$ and char yields at 600°C of the polymers were found to be in the range 253-293°C and 36-64%, respectively. The most thermally stable polymers, which was obtained from ZnSalOMe$_2$trien:MDI:PEG at the mole ratio of 1:2:1, showed initial decomposition temperature of 293°C and char yields at 600°C of 64%, which is comparable to other types of thermally stable polyurethanes such as poly(urethane-imide)s and phosphorus-containing polyurethanes.

## 5.2 Suggestions for future work

Since it was found that ZnSalOMe$_2$trien-MDI-PEG has good thermal stability and solubility in DMF and DMSO, the suggestion for future work is to synthesize poly(urethane-urea-imide) by introducing imide linkage into the polymer. This should improve solubility of the polymer while the thermal stability is still good.