

CHAPTER I

INTRODUCTION

The improvement of thermal stability of the polymers is interesting in order to fulfill the application nowadays, which requires that the polymers should have high thermal stability and be in highly flammable. The field involving thermally stable polyureas and polyurethane-ureas has attracted great interest both in industry and academia since this development can lead to the broader application of the polymers. Polyurethanes-ureas and polyureas have many applications including elastomers, fibers, foams, adhesives and coatings because of their good physical and mechanical properties. The incorporation of metals into the polymer backbone gives them the numerous interesting properties such as high strength and good thermal stability and leads to wide applications

This research involves the synthesis of metal-containing polyurethane-ureas and copolyureas from zinc and nickel dimethoxysaltrien metal complexes (MSalOMe₂trien), diisocyanates (4, 4'-methylenebis (phenyl isocyanate) (MDI) and 1,6-hexamethylene diisocyanate (HMDI)) and various dialcohols or diamines, respectively. Different aliphatic and aromatic dialcohols and diamines were employed to study the effect of the structure on the polymer properties. Dialcohols were 1,6-hexanediol (HMDO), bis(4-Hydroxyphenyl)propane (BPA), triethylene glycol (TEG), and polyethylene glycol (PEG, MW = 300). Diamines were 1,6-diaminohexane (HMDA), 4,7,10-trioxa-1,13-tridecanediamine (TDA), 4,4'-diaminodiphenylmethane (DAP), and *m*-xylylenediamine (XDA). Dibutyltin dilaurate (DBTDL) was used as a catalyst. Series of polyurethane-ureas and copolyureas were prepared by taking the mole ratio of MSalOMe₂trien: diisocyanate: dialcohol or diamine as 1:2:1. Blank polyurethane and polyureas without metal complexes were also prepared by the reaction of diisocyanates with dialcohols or diamines to study the influence of metal on the thermal property. It was expected that these polyurethane-ureas and copolyureas would show good thermal stability, excellent solubility and can be utilized in high temperature application.