CHAPTER I

INTRODUCTION

Urethane-based materials are of commercial interest in many applications owing to their abrasion resistance, low temperature flexibility, high strength and chemical resistance. Polyurethane-ureas (PUU) are of considerable technical importance since they have wide application to a number of industrial products such as elastomers, foams, adhesives and paints *etc*., and have been extensively used in medical field including artificial heart blood vessels. Therefore, there are many research works that involve in the improvement on the thermal stability of the polymers.

The introduction of metal to a urethane-urea backbone results in a considerable increase in thermal stability of the polymers. Therefore, the focus of this work is the synthesis and characterization of metal-containing polyurethane-ureas (ML-PUU) and copolyurethane-ureas (ML-coPUU) containing 4,4′-dihydroxysaltrien metal complexes (ML) in the polymer backbone. Metal-containing polyurethane-ureas were synthesized by the polyaddition of ML with different diisocyanates at the molar ratio of 1:2 with dibutytin dilaurate (DBTDL) as a catalyst. Metal-containing copolyurethane-ureas were synthesized by the reaction between ML, diisocyanate and *m*-xylylenediamine with dibutytin dilaurate (DBTDL) as a catalyst. Metal-containing copolyurethane-ureas were synthesized from different compositions by taking the molar ratio of ML:diisocyanate:*m*-xylylenediamine as 0.5:3.0:1.5, 1.0:3.0:1.0 and 1.5:3.0:0.5 to study the influence of *m*-xylylenediamine on the thermal property of ML-coPUU. The blank polymer without metal complexes was also prepared by the reaction of MDI with *m*-xylylenediamine. Metal-containing polymers and metal-containing copolyurethane-ureas were characterized by FTIR, NMR, elemental analysis, solubility and viscometry. Flammability of polymers was investigated by measuring limiting oxygen index (LOI) values and thermal stability was studied by thermogravimetric analysis (TGA).