

CHAPTER 6

CONCLUSIONS

From the results presented in this thesis it was concluded that studies have been carried out to investigate the effects of (1) organotin compounds: monobutyltin oxide (MBTO), mono-octyltin oxide (MOTO), dibutyltin diacetate (DBTA), dibutyltin maleate (DBTM), dibutyltin oxide (DBTO) and dioctyltin oxide (DOTO); (2) inorganic tin compounds: zinc hydroxystannate (ZHS) and zinc stannate (ZS) on the flammability and smoke production of rigid polyurethane. The results indicated that all tin compounds produced little or no further improvements to the fire retardancy of the foam.

The tin/C70 combinations examined in this study were more effective as fire retardants than were the individual components when used alone, synergistic effect to halogen. The highest LOI values obtained for these binary systems, 3g DBTA/C70, 7g DBTO/C70 and 7g ZHS/C70, were greater than that given by DMMP, commercial phosphorus fire retardant for polyurethane alone, but were lower than when DMMP used in combination with C70 or DBDPO. However, the greatest benefit imparted by these dual additive systems was to reduce the smoke evolved by the burning polymer about 40 to 60 percent when compared with the DMMP/halogen combinations and about 30 to 50 percent when compared to DMMP alone. Hence these studies identified the tin additive which not only imparted a fire retardancy, similar to that imparted by DMMP but also showed a significant reduction in smoke emission from the burning polymer.

Thermal analysis techniques have been applied to investigate chemical changes which occur during thermal degradation and combustion of these compositions. The results suggested that in tin/DBDPO except DBTA/DBDPO and tin/C70 binary systems, tin acts predominantly in the solid phase by char promotion mechanism.