CHAPTER V
CONCLUSION

5.1 Conclusion

From the results presented in this thesis, it can be concluded that both tin compounds (ZHS and ZS) produce little or no further improvements to the fire retardancy of the resin.

The tin/BTBPE combinations examined in this study were more effective as fire retardants than the individual components when used alone. When in combination with CPE (tin/BTBPE/CPE) for drip-reduction, higher LOI values were obtained. LOI values more than 24 units were obtained for these systems, 4% ZHS/5% CPE, 6% ZHS/3% CPE or 5%CPE and 6%ZS / 5%CPE in combination with 20% BTBPE for all systems, which gave V-0 rating from UL-94 test. Hence these studies demonstrated that the tin additives, ZHS and ZS, not only imparted fire retardancy, but also showed a significant reduction in smoke emission from the burning polymer. However, the fire retardancy was less than that of Sb_2O_3.

Thermoanalytical and related mechanistic studies indicated that the flame retardant action of ZHS and ZS in ABS with the bromine compound involved both condensed and vapor phase reactions.

5.2 Suggestions

In this work, it was concluded that ZHS and ZS can be used as synergist flame retardants in ABS. However, the tin compound is more expensive than antimony trioxide, the synergist flame retardant for commercial ABS. In some cases where low smoke and low toxic gases formation is necessary, it may be valuable to use ZHS or ZS instead of Sb_2O_3.

However, it should be further studied to obtain a lower cost than the Sb_2O_3 system, for example, by addition of other fire retardants combination with tin, to obtain the same properties as the commercial ABS.