CHAPTER VI

CONCLUSIONS

These results suggest that both of benzoxazine resin and phenolic novolac resin have significant effects on increasing the fire resistant properties of the wood composites. An addition of phenolic novolac resin can effectively enhance sample's fire resistant properties whereas benzoxazine resin helps improve mechanical and thermal integrity of the alloys. From the results of char yield and solvent extraction showed excellent properties of alloys when the amount of phenolic novolac resin was not exceed 20% by weight. The attempt to incorporate phenolic novolac beyond 20% by weight resulted in a systematically decrease of the alloys' properties. Optimal polymer alloy mass ratio of benzoxazine/phenolic novolac resin was found to be BP82 to yield a high performance and good processability wood composites with acceptable fire-resistant properties.

The results can be summarized as follows. The limiting oxygen index increased when phenolic novolac mass fraction increased comparing at the same woodflour content. In addition, the limiting oxygen index value was found to decrease with increasing wood content.

The rate of burning was reduced when phenolic novolac mass fraction increased using the same woodflour content and this was increased with increasing wood content. While, the heat of combustion was preferably decreased with increasing the woodflour content.

The degradation temperature and the char yield were slightly increased when phenolic novolac mass fraction increased and those values decreased with increasing woodflour content.

The flexural properties were not noticeably affected by the phenolic novolac mass fraction in the tested range of 0.0-0.5. Moreover, the flexural properties were relatively high and useful for load-bearing applications.

The storage moduli of all composites with various phenolic novolac contents had similar values. The obtained glass-transition temperature (T_g) from loss modulus curve of

wood composites were found to be similar, i.e. 200-218°C, when the amount of phenolic novolac was increased from 0.0 to 0.2.

Scaning eletron micrograph revealed the good compatibility between the woodflour and the polymer alloys, which was one reason of rendering enhancing mechanical properties of our wood composite systems.

In summary, the obtained wood composites at the benzoxazine/phenolic novolac composition of BP82 at the woodflour content of 70% by weight rendered a wood-substituted composite systems of suitable fire-resistant characteristics and mechanical integrity for potential use as a construction material. Moreover, most properties of our wood systems, i.e. fire resistant, thermal, and mechanical, were higher than those of the commercial plastics wood composites.