CHAPTER V

CONCLUSION

5.1 CONCLUSION

To synthesize the N,N'-MBA graft copolymer onto the silk fibres as to improve its physical properties, one should avoid grafting by using urea-formaldehyde because the released formaldehyde of the grafted silk fibre can irritate human skin and eyes. An alternative is in the direction of graft copolymerization of vinyl monomer onto the silk fibre. Due to the complexity of the influencing parameters involved in the reaction relevant to the relationship between the grafting yield and physical properties, statistical methods are necessary to evaluate the obtained results.

Theoretically, graft copolymerization is competitive with homopolymerization. The control of the system can be effected by varying the concentration of the initiator, monomer, acid or additives; temperature and time also plays an important roles; all these variables are important in such a reaction so as to obtain the highest percentage grafting. This research is based on the

work of Gupta et al.[4] and has several aspects of reaction conditions in common with Gupta. Therefore, it is worthwhile experimenting with the reaction of the graft copolymerization of N,N'-MBA onto the silk fibre by utilization of Gupta's basic guidelines and statistical approach. The current results can be concluded as the followings:

5.1.1 The yield of grafting increases with the increase in $Mn(acac)_3$ concentrations within the range of 0.5×10^{-3} to 2.5×10^{-3} mole-l^{-1}. Interestingly, the percentage grafting only minimally relates to the size of N,N'-MBA irrespective of its concentrations. This result is possibly due to the bulky structure of N,N'-MBA and thus the approach of N,N'-MBA to form charge transfer complex with $Mn(acac)_3$ is sterically hindered.

5.1.2 Due to the steric hindrance of the above-mentioned N,N'-MBA and the silk, homopolymer formation is thereby favoured. The yield of homopolymer formation obviously increases with an increase in N,N'-MBA concentrations within the range of 2.5×10^{-3} to 15.0×10^{-3} mole-l^{-1}.

5.1.3 Both the increases in percentage grafting and percentage of homopolymer cause the reduction of tensile

strength. Based on the statistical evaluation, the latter reduces tensile strength to a larger extent than does the former. Work done elsewhere indicated the improvement of wrinkle recovery with the increase in grafting yield.

5.1.4 The thermal decomposition of the N,N'-MBA-grafted silk fibres has the inclination to higher temperature.

5.1.5 Dyeability of Supranol Fast Orange GSN 140% and Kayacyl Sky Blue R on the N,N'-MBA-grafted silk fibres is lower than that on the ungrafted silk fibres. The reason is that those acid dyestuffs have lesser opportunity for ionic attraction. This is primarily due to the fact that its planar configurations is altered and that the grafted bulky N,N'-MBA hinders the accessibility of the acid dyestuffs to the silk surface.

5.1.6 Surface characteristic of N,N'-MBA-grafted silk fibres is uneven and rough, and there are some fibrils separated from the silk fibres.

5.2 FUTURE WORK

The percentage grafting obtained from the graft copolymerization of N,N'-MBA onto silk fibres in this

research is low, in the magnitude of not higher than 10%; and the thermal decomposition temperatures of those graft copolymers are shifted to higher temperature .

According to the current results, it may be stated that the higher the percentage of grafting, the lower the tensile strength obtained. It is undoubtedly that the contamination of homopolymer may be the attribute to cause the decrease in tensile strength. Therefore, complete removal of such a homopolymer probably contributes to an improvement in tensile properties. Thermal properties as such would be simultaneously increased according to the increase in grafting yield. Therefore, it is neccessary to investigate the proper solvent for poly(N,N'-MBA) so that the homopolymer can possibly be eliminated.

It should be stated again that the present reaction conditions used were based on the work of Gupta et al. [4]. Detailed reaction dependence on time, temperature, acid concentration and other variables should be further pursued to obtain the optimum conditions for such a system.