CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

The graft copolymerization of styrene and glycidyl methacrylate onto natural rubber were prepared by emulsion polymerization. The effects of initiator concentration, reaction temperature, monomer concentration, and reaction time on monomer conversion and grafting efficiency were investigated. From TEM micrographs, the grafted natural rubber show the core-shell confriguration with complete closed shell of polymer of styrene and glycidyl methacrylate around the core of natural rubber particle. The appropriate conditions of graft copolymerization was found to be at 2.5 parts by weight of initiator, 100 parts by weight of monomer and at reaction temperature of 60°C for 10 hours. The conversion was 69.3 % and the grafting properties are as follows :

- Grafting efficiency : 69.3 %
- Grafted natural rubber : 71.8 %
- Free natural rubber : 13.5 %
- Free St/GMA : 14.6 %

The functional groups in the grafted natural rubber was characterized by FT-IR spectroscopy. The appearance of new peaks in the FT-IR spectrum of grafted natural rubber was at 3371 cm^{-1}, 3040 cm^{-1}, 1738 cm^{-1}, 1494 cm^{-1}, 929 cm^{-1} and 695 cm^{-1} corresponding to O-H stretching vibration, C-H stretching vibration of aromatic ring, carbonyl stretching vibration , C=C stretching vibration of aromatic ring of styrene, epoxy group of glycidyl methacrylate, and C=C-H bending of aromatic ring,

respectively. The copolymer composition of grafted natural rubber (NR-g-St/GMA) was confirmed by NMR analysis. The glass transition temperature of grafted natural rubber determined by DMTA technique was –54.2°C. The grafted natural rubber product (NR-g-St/GMA) could be used as a compatibilizer for STR5L/PMMA blends. The tensile strength, tear strength, hardness and impact energy of blends exhibited considerable improvement by the addition of the grafted natural rubber. The good mechanical properties of unvulcanized and vulcanized STR5L/PMMA blends at ratio of 50/50 and 70/30 was obtained at 5 and 10 phr, respectively. From SEM photographs, the fracture surface of STR5L/PMMA blends show good interfacial adhesion by the addition of grafted natural rubber content.

In this work, the grafted natural rubber product (NR-g-St/GMA) was also blended with PMMA. The mechanical properties of these blends were compared with the NR-g-MMA60/PMMA blend [19]. The mechanical properties are summarized as follows:

- The hardness, tear strength and tensile strength increased with increasing PMMA content.
- The elongation at break decreased with increasing PMMA content.

From SEM photographs, the fracture surface of grafted natural rubber/PMMA blends had good interfacial adhesion due to the increase in the PMMA content.

5.2 Suggestion for Future Work

In the area of modification of natural rubber latex and polymer blends, further study should be given to the following aspects:

1. Graft copolymerization of styrene and glycidyl methacrylate onto natural rubber by using different redox initiators.
2. Emulsion graft copolymerization by irradiation technique using cobalt-60 as the source of gamma rays.

3. Application of NR-g-St/GMA as a compatibilizer for other polymer blends, e.g. acrylonitrile-co-butadiene-co-acrylic acid rubber (NBR).