CHAPTER V

CONCLUSION AND SUGGESTIONS

5.1 Conclusion

5.1.1 The preparation of IPNs products

The IPNs of prevulcanized natural rubber latex and polymethyl methacrylate were prepared by core-shell emulsion polymerization. A prevulcanized natural rubber latex was coated with a shell of polymethyl methacrylate. The bipolar redox initiating system *tert*-butyl hydroperoxide/ tetraethylene pentamine promoted a core-shell arrangement. The hydroperoxide-pentamine system used in this study was *tert*-butyl hydroperoxide- tetraethylene pentamine. The conditions of preparations are given for various monomers. For MMA, room temperature is sufficient to complete the polymerization, but for MMA a temperature of about 50^0C is necessary.

In this work, the IPNs of prevulcanized natural rubber latex and polymethyl methacrylate formed the completed core-shell. The appropriate conditions were an initiator concentration of 1.5 phr, crosslinking agent concentration at 0.25% wt of monomer, emulsifier concentration at 1.5 %wt of monomer, and reaction temperature at 60^0C for 2 hours. The maximum degree of monomer conversion was 87.8.%. The TEM, in combination with different staining methods, was used to observe the morphology of IPNs products, and it indicated that prevulcanized

natural rubber latex acts as a core and PMMA as a shell. The DSC and TGA confirmed two-phase particle morphology.

PMMA has been crosslinked with 1 phr of divinyl benzene based on MMA monomer. The latex products were of good long-term stability and conversions of MMA to PMMA were 100% in all cases. The SEM micrograph also shows that the individual domains appear to consist of both stained prevulcanized natural rubber latex and unstained PMMA. The fact that the particles and coalescence have distorted, it indicated that they are substantially prevulcanized natural rubber latex in composition.

Full IPNs were characterized by higher tensile strength, modulus and flexural strength than the corresponding semi-IPNs, while the latter exhibited higher elongation. Crosslinking of the plastomer component induced better miscibility and finer morphology.

It can be concluded that the effective IPNs have a wide range of mechanical properties. The application of these products depends on the content of prevulcanized NR latex and PMMA. Thus, these IPNs products could be applicable to be used for car bumper, rubber floor tiles, car floor rubbers, etc.

The NR/PMMA IPNs has superior mechanical properties than IPNs NR/PS due to the fact that PS is brittle and the oxygen permeablity of PS is higher than the permeability of PMMA.

Moreover, NR/PMMA IPNs gives higher mechanical properties than NR-g-PMMA.

5.1.2 The Product of PP/IPNs product Blends

The IPNs products could be used as an impact modifier for PP to form PP/IPNs of NR/PMMA by mechanical blending and compression molding. The good mechanical properties of blend were obtained at 15 and 20 phr of the IPNs products.

5.2 Suggestion

The presence of non-rubber, contaminants such as, protein, etc., could effect the polymerization of methyl methacrylate monomer to polymethyl methacrylate. These contaminants, which may act as catalyst inhibitors, can stop the roles of free radicals. Therefore, the elimination of non-rubber contaminants such as proteins from natural rubber before the polymerization process should be further studied. The effect of different processing methods and the blend of composite products with other thermoplastic should be investigated.