CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The present work involved studying the effects of small molecular solvents on the phase diagrams, tensile strength and glass transition temperatures of polymer blend of styrene-acrylonitrile copolymer (SAN) and poly(methyl methacrylate) (PMMA). Five solvents which are methylene chloride, acetone, tetrahydrofuran, methyl ethyl ketone and 1,2-dichloroethane were used. The phase diagrams of the blends of SAN and PMMA prepared from two methods; solvent casting from different solvents and melt mixing, were compared. The phase diagrams of the blends were constructed from plotting the cloud point temperatures occurred on heating against blend compositions. Whereas the effects of different solvents vapor on tensile strength and glass transition temperatures of SAN/PMMA blends were studied on the melt mixing blends. The number of conclusions from the results of this work can be summarized as follows:

1. The phase diagrams of the blends of SAN and PMMA are affected by different type of solvents used in preparation. The phase separation of the blends cast from moderated hydrogen bonding solvents which are acetone, tetrahydrofuran and methyl ethyl ketone occurs at the higher cloud point temperatures than blends cast from weak hydrogen bonding solvents that are methylene chloride and 1,2-dichloroethane. In other words, appropriate solvents used in solution casting method can improve miscibility of the blends of SAN and PMMA.

2. The amount of the solvents remained in the blends of SAN and PMMA cast from moderated hydrogen bonding solvents can enhance the miscibility of the blends. The higher the amount of solvent remains in blend, the higher the cloud point temperature of the blend occurs.

3. The phase diagrams of blends cast from acetone and tetrahydrofuran take place at the lower cloud point temperatures than one cast from methyl ethyl ketone owing to the lower boiling points of acetone (56.24 $^{\circ}C$) and tetrahydrofuran (64-65 $^{\circ}C$) compared with methyl ethyl ketone (79.60 $^{\circ}C$)

4. There is a difference in the phase separation of SAN and PMMA blends prepared from solvent casting and melt mixing. The phase separation of solvent cast blends, which are expected to have the finer morphology, occurs at much higher temperatures than that of melt mixing blends.

5. Traces of different solvents vapor absorbed in melt mixing blends of SAN and PMMA are unable to cause the significant effects on the glass transition temperatures of the blends and, hence, the tensile strength. This is because of the plasticized effects of solvents on the glass transition temperatures of the blends, which could result in the significant reduction of tensile strength of the blends, does not occur.

6.2 Recommendations for Further Studies

1. The cloud point temperatures of SAN and PMMA blends prepared from solvent cast from different solvents and melt mixing should be reexamined at the lower heating rate than the one used in this work in order to obtain the exact cloud point temperatures of the blends, i.e. the cloud point temperatures at zero heating rate.

2. The cloud point temperatures of SAN and PMMA blends prepared from solvent cast from different solvents and melt mixing should be redetermined by Small Angle Light Scattering (SALS) technique in order to obtain the information on the mechanism of phase separation that happens on heating in these samples.

3. The effects of small molecular solvents on the phase diagrams of polymer blends should be studied in other polymer blend systems in order to confirm the micibility enhancement in the other systems.