

CHAPTER 4

CONCLUSION

From viscosity and adhesion studies, 16 ratios were found to be appropriate in the case of current solvents (toluene, 2-propanol and ethyl acetate) and 25 suitable solvent blends in the case of current ratios (6:3:1 by volume). The criteria are level 4 and 5 of adhesion and 6-7 minutes of viscosity.

The evaporation rate studies by GC includes the effect of time, stirring rates and temperature.

The time dependence studies reveal that with no more than 65 min time the evaporation rate of solvent are virtually the same with the relative standard deviation (%RSD) less than 15%. The solvents with evaporating amount from highest to lowest are xylene, toluene, n-butyl acetate, ethyl acetate, 1-propanol and 2-propanol respectively.

The amount of evaporating solvent has no significant effect from the stirring rate of the rang 600-1200 rpm with the relative standard deviation (%RSD) less than 6%. The evaporation from highest to lower are xylene, toluene, n-butyl acetate, 1-propanol, ethyl acetate and 2-propanol respectively. In the case of unstirred mixtures, the extent of evaporation is greater than the stirred ones. The order of evaporation from higher to lower is toluene, xylene, n-butyl acetate, 1-propanol, ethyl acetate and 2-propanol respectively.

Temperatures were found to increase the evaporation amount of the solvents with the relative standard deviation (%RSD) less than 10%. The order of evaporation amount

from higher to lower is xylene, toluene, n-butyl acetate, ethyl acetate, 1-propanol and 2-propanol respectively.

From the evaporation rate studies, two most suitable ratios for toluene, 2-propanol and ethyl acetate includes 3:2:5 by volume which have the solvent evaporation rates of 0.014, 0.006 and 0.024 mg/ml respectively and 7:2:1 by volume with solvent evaporation rates of 0.091, 0.023 and 0.014 mg/min respectively. With the ratio of 6:3:1 by volume, five most suitable solvents were found, i.e.; ethanol and propyl acetate with the solvent evaporation rate of 0.072, 0.005 and 0.021 mg/min respectively; o-xylene, 1-propanol and n-butyl acetate with the solvent evaporation rate of 0.010, 0.017 and 0.035 mg/min respectively; o-xylene, ethanol and n-butyl acetate with the solvent evaporation rate of 0.087, 0.021 and 0.006 mg/ml respectively; m-xylene, ethanol and n-butyl acetate with the solvent evaporation rate of 0.044, 0.007 and 0.057 mg/min respectively; and m-xylene, ethanol and ethyl acetate with the solvent evaporation rate of 0.060, 0.098 and 0.002 mg/min respectively.

In addition to lower evaporation rate, the cost and toxicity of solvent are other factors that need to be taken into consideration. With these criteria, the best solvent mixture from this study is toluene, 2-propanol and ethyl acetate with the ratio of 7:2:1 by volume.

Suggestions

Further studies should include the water-base solvents because water is easy to obtain. Also, the cost can be reduced well. The toxicity is also less which is good for worker's health. The low evaporation solvent-base mixture can still have effects on operators.

The formulas of the study of the solubility in solvent mixtures of polymer can be calculated with Burrell method or Hansen's method by using the solubility parameters concept. The reformulation of solvent systems could help reduce the number of formulas that have to be evaluated experimentally.