

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

In the extraction of aromatic with the single solvent, benzene was better extracted than toluene and *p*-xylene, respectively. Among the single solvent, sulfolane performed better in terms of both selectivity and solvent capacity than other single solvents studied. Ethylene glycol (EG) had good selectivity properties but not good in solvent capacity while ethylene carbonate (EC) had better capacity with quite similar selectivity as EG. Dimethylsulfoxide (DMSO) was highly capacitive solvent but not good in selectivity. Three-methoxypropionitrile (3MOPN) performed better capacity than DMSO but were very poor in selectivity. The selectivity, from high to low, are: EG>EC>sulfolane>DMSO>3MOPN. The solvent capacity, from high to low, are: 3MOPN>DMSO>sulfolane>EC>EG. Both selectivity and capacity of the solvents show similar trend with previous work (Hamid and Ali, 1996). Moreover, in the operating temperature range studied, temperature did not have significant effect on the extraction.

Among the mixed solvent, the mixed solvent of EG/3MOPN was carried out in 3 different ratios; 30/70, 50/50, and 70/30 by volume. It was found that the mixed solvent of EG/3MOPN at all three ratios performed combined properties of selectivity and capacity of the single solvents that they were made of. The mixed solvent at 70/30 ratio had properties close to EG as there were more EG, while that of the mixed solvent at 30/70 ratio was close to 3MOPN. The mixed ratio of 50/50 by volume had selectivity and capacity in between the other ratios as mentioned. However, the selectivity and capacity of all that three ratios of the mixed solvent of EG/3MOPN did not perform as high selectivity and capacity as the single solvents of EG and 3MOPN did. The mixed solvent of EC/DMSO was studied at two different ratios; 50/50 and 10/90 by volume. It was found that the mixed solvent of EC/DMSO could combine the properties in capacity and selectivity of the original single solvents. At the ratio of 50/50 by volume, the mixed solvent of EC/DMSO had the properties closer to EC than DMSO that made it become highly selective

solvent. The mixed solvent of EC/DMSO at 10/90 by volume was higher in solvent capacity as compare to the ratio of 50/50 while the selectivity was also quite high. Among the mixed solvents, the EC/DMSO, especially at 10/90 by volume, performed better capacity and selectivity than the mixed solvent of EG/3MOPN.

## 5.2 Recommendations

As far as the scope of this work is concerned, some other interesting points could be studied in future work. The following recommendations are suggested:

- 1) In further studies, other paraffinic hydrocarbons could be used in instead of n-hexane to avoid the vaporization and the limitation of the operating temperature.
- 2) As the preliminary screening of the ratios of the mixed solvent had been done, other ratios of the mixed solvent can also be carried out to study further.
- 3) As the efficient mixed-solvent was set up, the continuous process of the extraction could be performed to utilize and investigate pressure and specific gravity to make the extraction closed to the commercial process.
- 4) Other parameters that may affect the selectivity and solvent capacity, e.g. water content presented in the solvents, could be further investigated.