CHAPTER VI
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

1. From the solubility experiments, it was shown that the solubilities of Cold Lake asphaltene obtained from the solubility method were higher than those obtained from the precipitation method and, the solubilities from both non-agitated and agitated systems were similar.
2. The solubilities of the higher polar fractions were less than those of the lower polar fractions. So, the order of solubility was decreased from F10/90, F20/80, F30/70 and F40/60.
3. Solubility parameters of unfractionated Cold Lake asphaltene were 21.12, 1.0639 and 7.1159 for representing dispersive, polar and hydrogen bonding force, respectively. The fractionated asphaltene solubility parameters were close to those of the unfractionated asphaltene. The highest polar fraction (F40/60) solubility parameters were 21.03, 2.52 and 6.8631 while those of the lowest polar fraction (F10/90) were 21.36, 1.26 and 7.2806.
4. From the single component solubility parameter model, unfractionated Cold Lake asphaltene molecular weights were to be the range of 850-1020. Asphaltenes having higher polarity resulted in increasing molecular weight. The lowest polar fraction molecular weight was in the range of 338-712 while the highest polar molecular weight was 932-1455. For the three-component solubility parameter model, the predicted molecular weights of unfractionated Cold Lake were in the range of 978-2009 while the lowest and highest polar fraction predicted molecular weight to be 659-743 and 1250-3004, respectively.
5. The predicted molecular weights calculated from the single component solubility parameter model are usually lower than those of the three-component solubility parameter model.
6. The solubility of asphaltene in toluene/heptane mixtures was shown to be useful to predict molecular weight of asphaltene

5.2 Recommendations

1. In order to accurately predict solubility parameters and molecular weights, more complex shapes of solubility space, for example, ellipsoid shape should be assumed with more surface points.
2. More complex and good numerical solving program are needed to improve the accuracy of solubility parameter prediction.
3. For developing the solubility parameter determination, the appropriate constraints should be added in the model to predict more reasonale asphaltene's solubility parameters.
4. The measurement of asphaltene molecular weight using Py-GC/MS or GPC is recommended in order to check the reliability of the asphaltene molecular weight prediction models.
5. This molecular weight prediction method using the solubility data should be validated by testing with the known molecular weight chemical compounds.