CHAPTER V
CONCLUSIONS AND RECOMENDATIONS

5.1 Conclusions

1) From the properties analyses of both crude oils, it is found that Lankrabue crude oil has higher initial boiling point, pour point, density, WAT, and WDT than U-Thong crude oil.

2) From GC chromatograms, they indicate that the major range of carbon atom number of Lankrabue crude oil is $C_{10} - C_{24}$ and that of U-Thong crude oil is C_{11}- C_{24}. These carbon ranges cause the problem of wax deposition.

3) The total waxes, micro- and macro-crystalline wax, obtained from Nguyen's method are higher than that of obtained from modified method in this work because both methods used different solvents in the saturates dissolution part. Para-xylene that was used in Nguyen's method has higher polarity than *n*-heptane used in modified method, therefore the ability to dissolve saturates of *p*-xylene is better than *n*-heptane.

4) The total wax content as obtained from standard UOP46-64 was higher than the combined wax content as obtained from both Nguyen's method and modified method. It is possible that the mixture of petroleum ether and acetone used in the standard method which has higher polarity than both *p*-xylene and *n*-heptane has the ability to dissolve more saturates fraction than the other two solvents employed in Nguyen's and modified methods.

5) When the relationship between percent wax deposition and temperature of both crude oils are compared with each other, it is found that at the same temperature Lankrabue crude oil has higher percent wax deposition than U-Thong crude oil.

6) The difference between micro- and macro-crystalline wax was indicated and confirmed by FTIR. Also, the result from this technique indicates that these separated fractions were free from asphaltene.

7) When both Lankrabue and U-Thong crude oils were treated by EVA and PMMA, it was found that maximum reduction of pour point of Lankrabue crude

oil was obtained when it was treated by PMMA, VH grade, at 1,000 ppm and that of U-Thong crude oil was obtained when it was treated by EVA, 25% content of VA, at 200 ppm.

5.2 Recommendations for Future Work

The modified method in this work to separate the hydrocarbon fractions in crude oil has close efficiency to Nguyen's method. Therefore, in future work, the modified method to separate the wax fractions from crude oil can be used to study more about effect of wax inhibitors on them. Further studies will give better understanding about the mechanism of wax inhibitors and finding the suitable chemicals to solve wax deposition problem. It will also give useful information for the oil industry about wax inhibitors, EVA, PMMA, etc., for possible application to solve the wax deposition problem.