CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

1. The precipitation of asphaltenes is a function of both the concentration and type of precipitant, and time. The concept of the critical precipitant concentration on crude oil stability has been demonstrated to be invalid.
2. Asphaltene precipitation kinetics is a universal phenomenon seen for various types of crude oils.
3. The solubility of asphaltenes in crude oil–heptane mixtures can only be determined after equilibrium has been reached.
4. The kinetics of asphaltene precipitation can be described by the aggregation of destabilized asphaltenes using a geometric population balance model with the Brownian flocculation kernel.
5. The type of n-alkane precipitant has a profound effect on the kinetics of precipitation. The observed kinetic trends from using different n-alkanes were explained by possible competing effects between the collision efficiency and frequency caused by the aggregation tendency of precipitated asphaltenes and the viscosity of the n-alkane and oil medium, respectively.
6. The stronger n-alkane precipitant governs the behavior of the blend of precipitants towards the kinetics of asphaltene precipitation.

5.2 RECOMMENDATIONS

1. In order to predict the stability of crude oils, a characterization of asphaltenes from different crude oils would give better understanding of the observed kinetics effects on asphaltene precipitation. Parameters like heteroatom content, polarity or aromaticity may give indications of the asphaltenes' tendency to aggregate. A compositional analysis of the crude oil could give indications which abundant fraction can affect asphaltene stability.
2. The hypothesis regarding the effect of the type of n-alkane on the kinetics of asphaltene precipitation should be tested. Parameters like heteroatom content, polarity or aromaticity may give indications on the physical and chemical differences of the asphaltenes and their tendency to aggregate.
3. Solubility curves of asphaltenes in different n-alkanes should be generated. This study will evaluate the equilibrium yield of asphaltenes that can be precipitated by different n-alkanes at different precipitant concentrations. This information will be used to validate preliminary results as shown in Appendix F.
4. The effect of the type of precipitant on the kinetics of asphaltene precipitation should be included in the population balance model. A factor describing the ability of the n-alkane precipitant to destabilize asphaltenes can be incorporated in the collision efficiency.