CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

1. Mathematical method to determine the precipitation onset point from absorbance curve was developed and model was verified using microscope to observe asphaltene and compare with the model.

2. The oil solubility parameter doesn't depend on solvents and asphaltene precipitants used. It only depends on temperature and pressure.

3. The onset solubility parameter doesn't depend on solvents used. It depends on type of asphaltene precipitant, temperature, and pressure.

4. From Gibbs free energy of mixing theory, the onset solubility parameter is not a linear function to the square root of molar volume of asphaltene precipitant as proposed earlier. Instead, it is a linear function to the square root of molar volume of the mixture.

5. A mathematical model to predict the live oil solubility parameter from experimental data and PVT data from simulator was developed and it successfully predicted the asphaltene instability at reservoir conditions.

6. A mathematical model was applied to three oil fields to determine the effect of miscible injection, carbon dioxide injection, and solvent injection on asphaltene instability at reservoir conditions. It was found that the model prediction corresponded to field observations and high temperature and high pressure tests.

7. Carbon dioxide injection has less of an effect on asphaltene instability than miscible injection because carbon dioxide has a higher solubility parameter than light alkanes in the live oil and carbon dioxide also chase light alkanes out of the live oil that will result in the higher solubility parameter of the live oil.

5.2 Recommendations

1. The model should be applied to different types (or sources) of crude oils to have more confidence of the prediction in any oil field.

2. The model should be verified using high temperature and high pressure cell with laser near IR detector to determine precipitation onset point under live conditions.

3. The effect of miscible injectant, carbon dioxide injection, and solvent injection should be verified using high pressure and high temperature cell with laser near IR detector.