CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Experiments studied here were designed to provide an insight of the API separator sludge pyrolysis mechanism including kinetic and product characterization by using thermogravimetric analysis and mass spectroscopy. The following is a summary derived from this work.

1. The kinetic and thermal conversion behaviors, pyrolysis, of the API separator sludge were studied at 5, 10 and 20°C·min^{-1} heating rates. The results showed that the sludge underwent the volatilization at ca. 230-270°C and the main pyrolysis at around 415-440°C depending on the heating rates. Only the high heating rate of 20°C·min^{-1} caused significant differences in the thermal conversion behavior compared to results from the low heating rates. That may be due to the high amount of ash in the sludge.

2. The mass spectra further confirmed the thermal conversion behavior of API separator sludge pyrolysis. All detected light gases such as hydrogen, acetylene, carbon dioxide, acetic acid and process vapors were released in the temperature range of the main pyrolysis. Hydrogen and acetylene were found to be the major species from the main pyrolysis.

3. The pseudo bi-component model applied with the Coat and Redfern model represented the TGA curves relatively well.

5.2 Recommendations

The several ways to gain more efficiencies of kinetic method and more product information can be determined by

1. Developing and applying the new alternative algorithm to make the kinetic model more flexibles for solving kinetic parameters.

2. Applying different kinds of sludge to study the pyrolysis behavior.

3. Measuring the pyrolysis product by advanced analysis ways such as using pyrolyzer connected with mass spectroscopy and FTIR to give more details.

4. Studying pyrolysis oil and solid products from the API sludge pyrolysis to gain more information.