



CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The research focused on the production of both hydrogen and methane from cassava wastewater using two upflow anaerobic sludge blanket reactors (UASB). Each UASB had a liquid holding volume of 24 L and was separately operated with mixed culture. For the biohydrogen production reactor, the mixed culture was boiled prior to use. The results showed that the maximum hydrogen production was achieved at a COD loading rate of 25 kg/m³d under a controlled pH of 5.5 and a mesophilic temperature of 37°C. The produced gas contained mainly hydrogen and carbon dioxide. Under these conditions, the highest hydrogen content (36.4%), hydrogen yield (39.8 L/kg COD removed), hydrogen production rate (0.4 L/Ld), specific hydrogen production rate (10.4 L/kg VSS d), COD removal (43.8%), and mixed liquid suspended solid (35,740 mg/L) were obtained. Additionally, the volatile fatty acid concentrations in the liquid effluent were 47% butyric acid, 25% valeric acid, 18% acetic acid, and 10% propionic acid. The lowest butyric acid-to-acetic acid ratio of 2.63 was obtained at the optimum condition. For the biomethane production, the studied UASB was fed by the effluent from the hydrogen production step, which was operated at a COD loading rate of 25 kg/m³d. The system was operated at a constant temperature of 37°C without pH control to obtain the maximum methane production.

5.2 Recommendations

In the future work, the other real organic wastewaters, such as protein-rich wastewater, should be applied. The bioreactors with smaller size should be used for the easier control.