

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

The enhancement of methane production with microaeration and cassava residue in the cassava wastewater was investigated under the anaerobic digestion in the CSTR system at the total COD loading rate of  $1.884 \text{ kg/m}^3 \text{ d}$  without temperature and pH control. The results indicated that the oxygen supply rate of  $3.0 \text{ mL O}_2/\text{L}_R \text{ d}$  was considered to be the optimum oxygen supply rate for the growth of the facultative anaerobic bacteria via aerobic respiration under anaerobic hydrolysis. Under this microaerobic condition, the CSTR system provided the optimum pH (6.81), total alkalinity (580.59 mg/l), and total acidity (938.43 mg/l) that were suitable for the survival of the anaerobic bacteria. As a result, the anaerobic bacteria (facultative anaerobic, acidogenic, acetogenic, and methanogenic bacteria) could perform well and enhance the methane production. That also resulted in the highest COD removal (79.24 %), methane production rate ( $977.52 \text{ mL/d}$ ), specific methane production rate of  $244.38 \text{ mL CH}_4/\text{L d}$  (or  $13.79 \text{ mL CH}_4/\text{g MLVSS d}$ ), methane yield of  $624.79 \text{ mL CH}_4/\text{g COD removed}$  (or  $129.69 \text{ mL CH}_4/\text{g COD applied}$ ), and total VFA concentration ( $1,254.31 \text{ mg/L}$  as acetic acid), acetic acid concentration ( $903.10 \text{ mg/L}$ ). The produced biogas ( $1,188.50 \text{ mL/d}$ ) was mainly composed of methane (82.25 %) and carbon dioxide (10.76 %) with negligible amounts of nitrogen and oxygen. Moreover, the microaeration affected the efficiency of desulphurization of the produced biogas. The hydrogen sulfide gas was reduced from 0.28 % to 0.00 %. In addition, the microaeration resulted in the highest hydrolysis efficiency (78.45 %). After hydrolysis, 62.57 % of cellulose, 37.24 % of hemicellulose, and 44.85 % of starch were degraded.

## 5.2 Recommendations

It is interesting to study the enhancement of the methane production with microaeration and cassava residue in the cassava wastewater under the anaerobic digestion by using the CSTR system. In addition, ASBR (Anaerobic Sludge Blanket Reactor) and UASB (Upflow Anaerobic Sludge Blanket Reactor) system under the optimum condition including the various types of wastewater that may be investigated.