

Nareerut Kamglomjai 2009: Isolation of Microorganism for Producing Hydrogen Gas from Food Wastewater. Master of Science (Environmental Technology and Management), Major Field: Environmental Technology and Management, Department of Environmental Science. Thesis Advisor: Assistant Professor Patthra Pengthamkeerati, Ph.D. 102 pages.

Hydrogen gas is a promising alternative energy, which has a potential for substituting fossil fuels. Hydrogen gas can be produced from both organic substances and organic wastes by biological process. The objectives of this study were to isolate effectively hydrogen-producing microorganism strains obtained from wastewater sludge and to determine the optimum conditions for hydrogen production by the isolated microorganism. Results from pretreating UASB sludge showed that heat-shock pretreatment could inhibit activity of methanogen greater than the acid pretreatment or no pretreatment. There were ten isolated strains from the pretreated sludge, but only three isolated strains could produce hydrogen gas, which were labeled as U1, U2 and H3. In addition, H3 was a heat-shock pretreated microorganism that could produce a greatest hydrogen gas of 53.73 ml l^{-1} when compared to the other two strains. The H3 strain was then analyzed by the automatic product identification (API) method at 37°C , which revealed that this H3 strain was classified as *Klebsiella pneumoniae*. The optimum conditions of this strain for hydrogen production by using food wastewater as a substrate, were inoculum size of 5 ml in food wastewater of 95 ml, the initial COD of $20,000 \text{ mg l}^{-1}$, the initial pH of 9 and incubation temperature at 37°C for 48 hours. These conditions resulted in the highest hydrogen production of 477.14 ml l^{-1} or $1.80 \text{ mmol g COD}^{-1}$. This finding suggests that food wastewater can be used as a substrate for biohydrogen production. It is not only being an alternative source of energy, but also reducing food wastewater and its environmental consequences.

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Thesis Advisor's signature

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