

Chamaiporn Somjit 2012: Feasibility Study for Biohydrogen Production from Brewery Wastewater by Dark Fermentation. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Mr. Suchat Leungprasert, Ph.D. 108 pages.

The objective of this research was a feasibility study for biohydrogen production from normal brewery wastewater through dark fermentation by using the mixed bacterial culture originated from the brewery digested sludge. Five pretreatment methods including heat, acid, base, chloroform, and freezing and thawing methods were applied to suppress methane producing bacteria. Glucose-based substrate was used to acclimate the pretreated bacterial culture for 15 days. The acclimated bacterial culture was used as a parent culture. The initial biomass was approximately 4000 mgMLVSS/l. Brewery wastewater used was prepared to be 6000 mgCOD/l. The wastewater pH was 6.3. The study was divided into two parts. The first part was a digestion of brewery wastewater by the separate pretreated bacteria in a batch mode at 35⁰C. Each batch test lasted about 120 hours. The initial pHs of brewery wastewater were varied in the range of 4-7. The biogas and digested wastewater in the system were collected to determine the biogas yield obtained from the system. The second part was a digestion of brewery wastewater by the separate pretreated bacteria in a semi-continuous mode at the hydraulic retention time of 2.6 days at 30⁰C. Experiments were conducted up to 30 days. The biogas was collected to determine the content of gas.

The results found that normal brewery wastewater digested with the pretreated bacteria under the tested conditions was not appropriate to produce H₂. Heat, acid and base pretreated culture produced H₂ insignificantly level. The maximum H₂ yield obtained was approximately 30 ml at STP/g COD degraded. Moreover H₂ was not detected from the reactors that contained chloroform and freezing and thawing pretreated bacteria. On the other hand, CH₄ in the produced biogas was detected at high levels. Another finding was that methane producing bacteria could tolerate heat, acid, base, chloroform, and freezing and thawing and could be recovered when sufficient time was allowed.

Student's signature

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