

Budsakorn Kanchanakhan 2012: Biohydrogen Production by Dark Fermentation of Starch Wastewater. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Mr. Suchat Leungprasert, Ph.D. 139 pages.

This research aimed to study on the biohydrogen production from starch wastewater by dark fermentation. Wastewater has approximately 29,300 mg COD/l and its initial pH was 3.79. Mixed culture sludge were obtained from the bottom of the upflow anaerobic sludge blanket tank of its plant. The mixed sludge had been subjected to treatment processes including the use of heat, acid, base, chloroform and freezing and thawing. The treated sludge were acclimated with nutrient medium followed by starch wastewater. Experiments were performed at 35 Celsius in a batch process. Preliminary result found that the appropriate ratio of the mass of sludge-to-substrate is 0.26 g cell/g COD. The experiments were conducted at this ratio by varying the initial pH of wastewater in the range of 4-7. The starch wastewater of 20,000 mg COD/l and sludge mass of 5,000 mg MLVSS/l were used as the fermentation medium. The results found that heat, acid and base treated sludge could produce hydrogen effectively. The hydrogen yield and the specific hydrogen production rate were acceptably high. On the other hand, the chloroform and freezing and thawing treated sludge could not produce hydrogen. The initial pH of starch wastewater affected hydrogen production. When using heat treated sludge, difference of sludge activity affected the optimum initial pH of starch wastewater in hydrogen production. The low activity sludge produced maximum hydrogen when the initial pH of starch wastewater was at 7, while the high activity sludge produced maximum hydrogen when the initial pH was at 4. In order to produce maximum hydrogen, the high activity sludge and the initial pH of starch wastewater at 4 were recommended. The pH of the fermentation medium must be controlled at the pH range of 4.4-4.7.

---

Student's signature

---

Thesis Advisor's signature