

Numtip Dechprae 2012: Photoproduction of Biohydrogen using Cassava Wastewater from Cassava Starch Manufacturing and Factors Affecting. Master of Science (Microbiology), Major Field: Microbiology, Department of Microbiology. Thesis Advisor: Associate Professor Lerluck Citradon, Dr.Agr. 203 pages.

This research is successful in production of biohydrogen from cassava wastewater. It is a photoproduction of hydrogen by *Rubrivivax gelatinosus* SB24. The experiments in 18, 23, 60 mL culture and 5.7 L-reactor showed that the H₂ production from the cassava wastewater required supplementation of nutrient, vitamins and initial pH adjustment to neutral pH of 6.8. Maximum rate of H₂ production was 5-6 fold improved. Cumulative hydrogen increased by 2-fold. Concentration of the wastewater optimal for being an electron donor for H₂ production by this bacteria was 27%.

Chemical agents that effected to H₂ production metabolism of *R. gelatinosus* SB24 are biotin, thiamine, *p*-aminobenzoic acid and nicotinic acid. Biotin was necessary for H₂ production, the others enhanced the metabolism. Ferrous and molybdenum ions were essential ions for an enzyme catalyzed H₂ production pathway. EDTA isn't necessary on the pathway but high concentration of EDTA affected to the metabolism of H₂ production.

Using mathematical theory evaluated statistical relationships between Fe, Mo and EDTA could predicted and verified that optimal concentrations of the 3 factors were 10.48, 0.38 and 7.98 mg/L, respectively. Experimental results from original medium without cassava wastewater showed that the highest rate of H₂ production could achieved to 13-15 mL/L culture/h with cumulative hydrogen gas of 8 L from 5.7 L cell suspension culture in the 6 L-reactor. However, the optimized conditions could not be implemented to cassava wastewater because of the addition of high amount of heavy metal ions resulting the wastewater color to be darkened.

An important factor on the photobiohydrogen production of H₂ was light intensity. Increasing light intensity from 2 klux to 3 klux increased the H₂ production by 2.4 fold. Elimination of the suspended fibre in the wastewater increased the production. The highest H₂ production obtained in 27% of non-sediment cassava wastewater was 4 liter from 5.7 L-culture with the highest rate H₂ production of 13.7 mL/L culture/h.

Student's signature

Thesis Advisor's signature