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STUDY ON FERMENTATIVE CONVERSION OF RAW AND PRETREATED STARCH TO HYDROGEN USING ANAEROBIC MIXED MICRO FLORA

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Abstract

The present paper reports the use of starch effluent for biohydrogen production with anaerobic mixed microbial cultures and demonstrates that an acclimated mixed bacterial consortium was able to produce H_2 from sugar substrates. To reduce cost of the medium for more commercially viable H_2 production, starch waste water was used as the feedstock via dark fermentation. Yields of hydrogen under varying conditions of pH (ranges 5.5-7.5), temperatures (45°C-65°C) and initial substrate concentrations (5g/l-20g/l) were monitored. Different pretreatment strategies for the effluent were also tried for optimization of pretreatment process. Optimization studies were initially carried out in a 80ml reactor and were subsequently scaled up to an 6 liter bioreactor. Anaerobic sewage sludge was used as inoculum after heat and alkaline treatment. After 24 hrs of incubation at 65°C and at an initial pH of 5.5, a yield of 5.1 mmol/g starch was observed in the initial optimization studies. Study with the 6 liter batch reactor has yielded 5.9 mmol/g starch H_2 and COD reduction of 71%.

Keywords: Biohydrogen, Anaerobic sewage sludge, Starch effluent, Batch reactor.