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Short Communication

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Effect of substrate concentration on hydrogen production by photo-fermentation in the pilot-scale baffled bioreactor

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Abstract: Effect of substrate concentration on photo-fermentative hydrogen production was studied with a self-designed 4 m³ pilot-scale baffled photo-fermentative hydrogen production reactor (BPHR). The relationships between parameters, such as hydrogen production rate (HPR, mol H₂/m³/d), hydrogen concentration, pH value, oxidation-reduction potential, biomass concentration (volatile suspended solids, VSS) and reducing sugar concentration, during the photo-fermentative hydrogen production process were investigated. The highest HPR of 202.64±8.83 mol/m³/d was achieved in chamber #3 at a substrate concentration of 20 g/L. Hydrogen contents were in the range of 42.19±0.94% - 49.71±0.27%. HPR increased when organic loading rate was increased from 3.3 to 20 g/L/d, then decreased when organic loading rate was further increased to 25 g/L/d. A maximum HPR of 148.65±4.19 mol/m³/d was obtained when organic loading rate was maintained at 20 g/L/d during continuous bio-hydrogen production.

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