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Hydrogen production by cyanobacteria *Anabaena* sp. (1448) in nitrogen-deprived cultures under different light intensities

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An efficient way to produce hydrogen is biologically through microorganisms cultures, which can have a production as efficient as physical and chemical processes. This research aimed to investigate biological hydrogen production with the cyanobacteria *Anabaena* sp. (1448 - UTEX) by indirect biophotolysis (via nitrogenase) in batch cultures. The experiments were carried out in triplicate using Duran glass bottles as photobioreactors (500 mL). *Anabaena* sp. was cultivated axenic in BG-11 medium and pH 9.2 in two phases: in the first stage, cultures were maintained in aerobic conditions with nitrogen limitation (10 $mg.L^{-1}$) to stimulate heterocyst formation, until the middle of the exponential phase; in the second stage, the biomass produced was centrifuged (2000 rpm for 10 minutes), washed (2x) and transferred to closed photobioreactors which had their atmosphere exchanged for argon and were maintained for 204 hours under nitrogen deprivation and two lights intensities (60 and 200 $\mu E.m^{-2}.s^{-1}$) for hydrogen production studies. Gas chromatography and Gompertz model were used to measure hydrogen production and hydrogen production rate, respectively. The hydrogen productivity was 44.9±1.14 $\mu mol.L^{-1}.h^{-1}$ at the 200 $\mu E.m^{-2}.s^{-1}$ light and reached the yield of 8.7±0.73 $mmol.L^{-1}$. At the light of 60 $\mu E.m^{-2}.s^{-1}$ productivity was 43.5±1.39 $\mu mol.L^{-1}.h^{-1}$ and reached the yield of 8.7±0.72 $mmol.L^{-1}$. Although the productivity and yields did not change between lights tested, the experiment showed that the *Anabaena* strain is able to produce hydrogen biologically at rates close to or even better than other microbial cultures.

Biography

Sarah Regina Vargas is a Biologist and an MSc graduate in Science from University of São Paulo, São Carlos, Brazil. She has experience with microbiology and ecotoxicology. She is currently a PhD candidate in Science at Hydraulics and Sanitation Department, University of São Paulo and her research is focused on the hydrogen production with microalgae and cyanobacteria.

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