Hydrogen production from rotten dates by sequential three stages fermentation. International Journal of Hydrogen Energy

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Abstract:

This study was devoted for H2 production from rotten fruits of date palm (Phoenix dactylifera L.) by three fermentation stages. A facultative anaerobe, Escherichia coli EGY was used in first stage to consume O2 and maintain strict anaerobic conditions for a second stage dark fermentative H2 production by the strictly anaerobic Clostridium acetobutylicum ATCC 824. Subsequently, a third stage photofermentation using Rhodobacter capsulatus DSM 1710 has been conducted for the H2 production. The maximum total H2 yield of the three stages (7.8 mol H2 mol⁻¹ sucrose) was obtained when 5 g L⁻¹ of sucrose was supplemented to fermentor as rotten date fruits. A maximum estimated cumulative H2 yield of the three stages (162 LH2 kg⁻¹ fresh rotten dates) was estimated at the (5 g L⁻¹) sucrose concentration. These results suggest that rotten dates can be efficiently used for commercial H2 production. The described protocol did not require addition of a reducing agent or flashing with argon which both are expensive.

Keywords:

Clostridium acetobutylicum Escherichia coli Hydrogen production Rhodobacter capsulatus Rotten dates 16S rRNA gene sequences

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