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FERMENTATIVE BIO-HYDROGEN PRODUCTION FROM ORGANIC WASTES AND SUGARS

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ABSTRACT

Utilization of renewable energy has been identified as a priority within the "European Energy Policy" which stresses the need to develop new sources of green energy. A follow-up of the programme "Intelligent Energy – Europe" (Decision No. 1230/2003/EC of the European Parliament and of the Council of 26 June 2003) is projected for the 7th Framework Programme (2007-2013). The main focus of the programme is the production of electricity from renewable sources of energy, as described in Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001. According to this document, Portugal has committed to raise the national electricity production exclusively from renewable sources to 39% by 2010. In addition, it constitutes an essential part of the package of measures necessary to comply with the commitments made by the EU under the 1997 Kyoto Protocol on the reduction of greenhouse gas emissions.

Hydrogen is a CO_2-neutral energy source with a very promising future as an alternative to fossil fuels for energy production. The treatment and disposal of wastes by conventional methods poses many problems throughout the world and may result in the consumption of energy. In addition, costs to dispose and treat wastes are escalating. Hydrogen can be produced, from undesirable waste products by bacterial fermentation, to generate electricity.

The Centre for Biological Engineering at the University of Minho is studying bio-hydrogen production from organic wastes and sugars. The specific tasks of the project (FCT/POCI/ENR/57786/2004) include the utilization of different waste compositions from a real kitchen waste and sugars to produce and optimize H_2 yields, methanogenesis inhibition strategies, design, construction and operation of batch and continuous lab scale reactors for mesophilic (37 °C), thermophilic (55 °C), and hyperthermophilic (70 °C) conditions. In addition, molecular ecology techniques are being used to study bacterial community dynamics in the different bioreactors, comparing the microbial communities developed at different temperatures and different OLR. One objective is to determine the optimal conditions to select the most important microorganisms involved in H_2 production.

Keywords: Bio-hydrogen; organic wastes; sugars; microbiological fermentation.

Theme: Biogas and Biohydrogen