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PII: S0960-8524(17)31274-9
DOI: http://dx.doi.org/10.1016/j.biortech.2017.07.158
Reference: BITE 18578

To appear in: *Bioresource Technology*

Received Date: 22 June 2017
Revised Date: 24 July 2017
Accepted Date: 26 July 2017

Please cite this article as: Akhlagi, M., Boni, M.R., De Gioannis, G., Muntoni, A., Polettini, A., Pomi, R., Rossi, A., Spiga, D., A parametric response surface study of fermentative hydrogen production from cheese whey, *Bioresource Technology* (2017), doi: http://dx.doi.org/10.1016/j.biortech.2017.07.158

A PARAMETRIC RESPONSE SURFACE STUDY OF FERMENTATIVE HYDROGEN PRODUCTION FROM CHEESE WHEY

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ABSTRACT

Batch factorial experiments were performed on cheese whey + wastewater sludge mixtures to evaluate the influence of pH and the inoculum-to-substrate ratio (ISR) on fermentative H_2 production and build a related predictive model. ISR and pH affected H_2 potential and rate, and the fermentation pathways. The specific H_2 yield varied from 61 (ISR = 0, pH = 7.0) to 371 L H_2/kg TOC_{whey} (ISR = 1.44 g VS/g TOC, pH = 5.5). The process duration range was 5.3 (ISR = 1.44 g VS/g TOC, pH = 7.5) – 183 h (ISR = 0, pH = 5.5). The metabolic products included mainly acetate and butyrate followed by ethanol, while propionate was only observed once H_2 production had significantly decreased. The multiple metabolic products suggested that the process was governed by several fermentation pathways, presumably overlapping and mutually