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Study of the performance of a thermophilic biological methanation system

Amita Jacob Guneratnam^a, Eoin Ahern^a, Jamie A. Fitzgerald^d, Stephen A. Jackson^d, Ao Xia^c, Alan D.W. Dobson^d, Jerry D. Murphy^{a,b*}

^a *The MaREI Centre, Environmental Research Institute, University College Cork, Ireland*

^b *School of Engineering, University College Cork, Ireland*

^c *Key Laboratory of Low-grade Energy Utilisation Technologies and Systems, Chongqing University, Chongqing 400044, China*

^d *School of Microbiology, University College Cork*

Abstract

This study investigated the operation of ex-situ biological methanation at two thermophilic temperatures (55°C and 65°C). Methane composition of 85 to 88% was obtained and volumetric productivities of 0.45 and 0.4 L CH₄/L reactor were observed at 55°C and 65°C after 24h respectively. It is postulated that at 55°C the process operated as a mixed culture as the residual organic substrates in the starting inoculum were still available. These were consumed prior to the assessment at 65°C; thus the methanogens were now dependent on gaseous substrates CO₂ and H₂. The experiment was repeated at 65°C with fresh inoculum (a mixed culture); methane composition and volumetric productivity of 92% and 0.46 L CH₄/L reactor were achieved in 24 hours. *Methanothermobacter* species represent likely and resilient candidates for thermophilic biogas upgrading.

Keywords: Biogas; Power to Gas; Biological Methanation; Methanogenic Archaea; Volatile Fatty Acids.

* Corresponding author at: School of Engineering, University College Cork, Cork, Ireland. Tel.: +353 21 490 2286.

E-mail address: jerry.murphy@ucc.ie (Jerry D. Murphy).

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