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Study of the performance of a thermophilic biological methanation system

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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 CH_4 /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 CO_2 and H_2. The experiment was repeated at 65°C with fresh inoculum (a mixed culture); methane composition and volumetric productivity of 92% and 0.46 L CH_4 /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.

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