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Electrohydrolysis pretreatment for enhanced methane production from lignocellulose waste pulp and paper mill sludge and its kinetics

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Abstract:

A novel electrohydrolysis pretreatment enhances methane production from lignocellulose material during anaerobic digestion. A biochemical methane potential assay was carried out to determine the effect of direct current and the efficacy of electrohydrolysis pretreatment on biogas production. Methane yield was increased by 13.8%, to 301 ± 3 mL CH₄/ g VS, when lignocellulosic waste was pretreated with electrohydrolysis. A net energy gain of 13,224 kJ was realized after electrohydrolysis pretreatment, which was 1.51 times higher than reported for thermal pretreatment. In addition, two kinetic models were used, including the modified Gompertz model to reproduce the experimental data. These findings support the potential for increased methane recovery from lignocellulosic waste using electrohydrolysis as a pretreatment.

Keywords: Electrohydrolysis; pretreatment; pulp and paper mill sludge; bioenergy; biogas production; modelling.

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