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Enhanced methane production and its kinetics model of thermally pretreated lignocellulose waste material

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Abstract:

The objective of the study was to assess the effect of substrate concentration by specific methanogenic activity (SMA) of thermally pretreated pulp and paper mill sludge. Different substrate concentration through food to microorganism ratio varied from 1.0 to 3.0 was carried out in a mesophilic condition as biochemical methane potential assay. Experimental results offered that cellulose removal rate spikes up to 60.2%. The specific methane gas production and biodegradability were increased up to 303 mL of CH_4/g VS and 73% respectively. By increasing the substrate concentration, SMA was significantly improved in a linear manner. The net energy of 8735 kJ was gained after thermal pretreatment. In addition to that three kinetics model were used, among that the modified Gompertz and logistic function models represent and reproduce the experimental data, while the earlier has the better fit.

Keywords: Thermal pretreatment; pulp and paper mill sludge; kinetic models; specific methanogenic activity; energy assessment; biodegradability.

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