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Estimation of biodegradability and biogas recovery from a two-phase anaerobic process treating piggery wastewater

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ABSTRACT

The purpose of this study was to investigate the biodegradability, as well as the organic removal and methane production rates, when treating piggery wastewater, using a pilot-scale two-phase anaerobic system, with a volumetric rate of up to 10 m^3/d. The acidogenic CSTR was operated at organic loading rates between 1.8 and 14.4 kg COD/m^3·d, and the methanogenic UASB reactor between 0.5 and 5.6 kg COD/m^3·d. A stable maximum biogas production rate of 81 m^3/d was observed, but the conversion rate of the organic matter to methane varied between 0.30 and 0.42 L CH_4/g COD removed (average 0.40) at hydraulic retention time above 3.5 days. The methane content ranged from 73 to 82% during the experimental period, implying that most of the removed organic matter was converted to methane gas, which might be of high quality for subsequent use. The gas produced could be directly used as a fuel source to increase the reactor temperature, with a potential electronic power production of 167 kWh.

Keywords: Two-phase anaerobic process; Piggery wastewater; BMP test; Biogas recovery; Methanogenesis

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