

WASTE TO ENERGY

DEMONSTRATING THE CONVERSION OF ORGANICALLY LOADED WASTE WATER
TO BIO-GAS AND REDUCED OXYGEN DEMAND USING
HIGH RATE ANAEROBIC DIGESTION AT PILOT SCALE

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Abstract

The development of microbial biofilm community in biochar packed anaerobic digesters was explored during start up at demonstration scale on high strength grease trap waste wastewater. Total and soluble chemical oxygen demand reduction reached 68% and 69%, respectively, after just fifty nine days at an HRT of 1.8 days. Methane head space gas compositions averaged across all reactors exceeded 60% and total methane production rates approached the theoretical maximum per kilogram of chemical oxygen demand reduced. Aggressive consumption of volatile organic acids correlated linearly with an increase in pH from 5.86 in the mixing reactor to a value of 7.61 in the final effluent. Both soluble and total phosphorous and total nitrogen were relatively unaffected by the treatment. Active methanogenic microbial biofilm communities possessing high proportions of methanogens were established despite the presence of feed wastewater streams possessing significantly different populations of planktonic bacteria. In sum, these results indicate that biochar alone can support the rapid development of robust well balanced methanogenic microbial biofilms that effectively minimize the impact of influent microbial communities on the reactor microbial biofilm communities.