

Microwave enhanced digestion of aerobic SBR sludge

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Abstract

Factorial experiments were carried out to determine the potential of microwaves (MWs) for improving characteristics of aerobic sequencing batch reactor (SBR) sludge to enhance mesophilic anaerobic digestion. Effects of pretreatment temperature, MW irradiation intensity and solids concentration on sludge characterisation parameters were monitored. Increasing pretreatment temperature in the 45 to 85°C range increased the soluble COD/total COD (chemical oxygen demand) ratio. MW intensity and sludge concentration in the 1 to 5% (w/v) had minimal effects on solubilisation of COD. Biochemical methane potential (BMP) tests at 35°C used to investigate effects of MW temperature, number of MW cycles and partial SBR sludge pretreatment showed that partial MW pretreatment of sludge and increased MW exposure cycles does not significantly improve overall methane production. In general, BMP tests demonstrated that 100% of SBR sludge irradiated once to 85°C produced the greatest improvement in VS destruction (12%) and overall methane production (16%). Generally improved biogas production via MW pretreatment was not accompanied by any potential improvement in sludge dewaterability.

Keywords: anaerobic sludge digestion, microwave (MW), pretreatment, solubilisation, BMP