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**Profitable ultrasonic assisted microwave disintegration of sludge biomass:  
modelling of biomethanation and energy parameter analysis**

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**Abstract**

In this study, microwave irradiation has been employed to disintegrate the sludge biomass profitably by deagglomerating the sludge using a mechanical device, ultrasonicator. The outcomes of the study revealed that a specific energy input of 3.5 kJ/kg TS was found to be optimum for deagglomeration with limited cell lysis. A higher suspended solids (SS) reduction and biomass lysis efficiency of about 22.5 % and 33.2 % was achieved through ultrasonic assisted microwave disintegration (UMWD) when compared to microwave disintegration –MWD (15 % and 20.9 %). The results of biochemical methane potential (BMP) test were used to estimate biodegradability of samples. Among the samples subjected to BMP, UMWD showed better amenability towards anaerobic digestion with higher methane production potential of 0.3 L/g COD representing enhanced liquefaction potential of disaggregated sludge biomass. Economic analysis of the proposed method of sludge biomass pretreatment showed a net profit of 2.67 USD /Ton respectively.

**Keywords:** sludge biomass, microwave pretreatment, biomass lysis efficiency; methane production; economic analysis

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