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Biological disintegration of microalgae for biomethane recovery-prediction of biodegradability and computation of energy balance

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1 **Biological disintegration of microalgae for biomethane recovery-prediction**
2 **of biodegradability and computation of energy balance**

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11 **Abstract**

12 The present study investigates the synergistic effect of combined bacterial disintegration on
13 mixed microalgal biomass for energy efficient biomethane generation. The rate of microalgal
14 biomass lysis, enhanced biodegradability, and methane generation were used as indices to
15 assess efficiency of the disintegration. A maximal dissolvable organics release and algal
16 biomass lysis rate of about 1100, 950 and 800 mg/L and 26, 23 and 18% was achieved in
17 PA+C (protease, amylase + cellulase secreting bacteria), C (cellulase alone) and PA
18 (Protease, amylase) microalgal disintegration. During anaerobic fermentation, a greater
19 production of volatile fatty acids (1000 mg/L) was noted in PA+ C bacterial disintegration of
20 microalgal biomass. PA+C bacterial disintegration improve the amenability of microalgal
21 biomass to biomethanation process with higher biodegradability of about 0.27 gCOD/g COD,
22 respectively. The energy balance analysis of this combined bacterial disintegration of
23 microalgal biomass provides surplus positive net energy (1.14 GJ/d) by compensating the
24 input energy requirements.

25 **Keywords**

26 Microalgal biomass; bacterial disintegration; prediction of biodegradability; biomethanation;
27 energy balance analysis

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