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Sodium thiosulphate induced immobilized bacterial disintegration of sludge: An energy efficient and cost effective platform for sludge management and biomethanation

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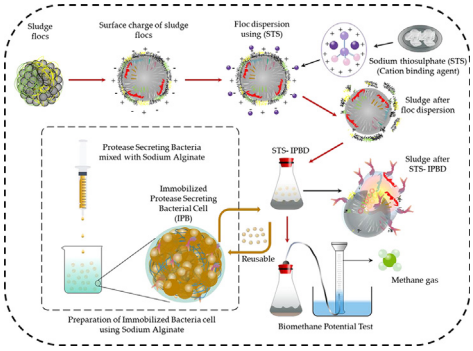
GRAPHICAL ABSTRACT



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ABSTRACT

The present study aimed to gain better insights into profitable biomethanation through sodium thiosulphate induced immobilized protease secreting bacterial disintegration (STS-IPBD) of sludge. STS disperse the flocs at 0.08 g/g SS of dosage and assists the subsequent bacterial disintegration. Immobilization of bacteria increases the hydrolytic activity of cells towards effective liquefaction of sludge. A higher liquefaction of 22% was accomplished for STS-IPBD when compared to immobilized protease secreting bacterial disintegration (IPBD alone). The kinetic parameters of Line Weaver Burk plot analysis revealed a maximal specific growth rate (μmax) of 0.320 h^{-1} for immobilized cells when compared to suspended free cells showing the benefit of immobilization. Floc dispersion and immobilization of bacteria imparts a major role in biomethanation as the methane generation (0.32 gCOD/g COD) was higher in STS-IPBD sample. The cost analysis showed that STS – IPBD was a feasible process with net profit of 2.6 USD/Ton of sludge.

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