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Production of volatile fatty acids from sewage organic matter by combined bioflocculation and alkaline fermentation

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Abstract

This study explored the potential of volatile fatty acids (VFA) production from sewage by a combined high-loaded membrane bioreactor and sequencing batch fermenter. VFA production was optimized with respect to SRT and alkaline pH (pH 8-10). Application of pH shock to a value of 9 at the start of a sequencing batch cycle, followed by a pH uncontrolled phase for 7 days, gave the highest VFA yield of 440 mg VFA-COD/g VSS. This yield was much higher than at fermentation without pH control or at a constant pH between 8 and 10. The high yield in the pH 9 shocked system could be explained by (1) a reduction of methanogenic activity, or (2) a high degree of solids degradation or (3) an enhanced protein hydrolysis and fermentation. VFA production can be further optimized by fine-tuning pH level and longer operation, possibly allowing enrichment of alkalophilic and alkali-tolerant fermenting microorganisms.

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