Role of surfactants on the hydrolysis and acidogenesis of waste-activated sludge

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\textbf{ABSTRACT}

The role of a biosurfactant (i.e. alkyl polyglycosides, APG in short) and a chemical surfactant (i.e. sodium dodecyl sulfate, SDS in short) on the hydrolysis and acidogenesis of waste-activated sludge was investigated in this study. The results showed that both sludge hydrolysis and short-chain fatty acids (SCFAs) accumulation were increased by APG or SDS addition. The maximum SCFAs concentrations were as high as 2,330 mg L\textsuperscript{-1} at SDS dosage of 0.2 g g\textsuperscript{-1} TSS, and 2,222 mg L\textsuperscript{-1} at APG dosage of 0.2 g g\textsuperscript{-1} TSS, while the maximum SCFAs concentration was only 1,212 mg L\textsuperscript{-1} in the blank test. In addition, the distribution of individual SCFA was also influenced significantly at the presence of these two surfactants. With the addition of APG or SDS, \textalpha{}-glucosidase and protease activities were enhanced, while the activity of the hydrolase decreased with the increase in the incubation time. Comparison of sludge surface morphology showed that the sludge matrix could be broken up at the presence of the two surfactants. The enhanced production of SCFAs at the presence of the APG or SDS was mainly caused by biological effect rather than chemical effect. Moreover, the contribution to SCFAs production by the degradation of the two surfactants was negligible.

\textbf{Keywords:} Waste-activated sludge; Hydrolysis; Acidogenesis; Surfactant; Short-chain fatty acid

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