Effect of aeration rates on the performance of an OSA-based sludge reduction process: limitations and implications

Yingying Wang a, Sihuang Xie b, Peter James Strong c, Guangxue Wu a, *

a Key Laboratory of Microorganism Application and Risk Control (MARc) of Shenzhen, Graduate School at Shenzhen, Tsinghua University, Shenzhen 518055, China, email: shdgtsgy@163.com (Y. Wang), Tel. +86-755-26036390, Fax +86-755-26036511, email: wu.guangxue@sz.tsinghua.edu.cn (G. Wu)
b Strategic Water Infrastructure Laboratory, School of Civil, Mining and Environmental Engineering, University of Wollongong, NSW 2522, Australia, email: sihuang@uow.edu.au
c Centre for Solid Waste Bioprocessing, Schools of Civil and Chemical Engineering, The University of Queensland, Brisbane, 4072, Australia, email: j.strong2@uq.edu.au

Received 14 July 2016; Accepted 9 November 2016

ABSTRACT

The oxic-settling-anaerobic (OSA) process can decrease the amount of sludge generated during wastewater treatment. In this study, the effect of aeration rates on the performance of an OSA-based sludge reduction process was investigated. Aeration rates did not significantly impact on sludge reduction in the main reactor (44.5% reduction at the lower aeration versus 45.4% reduction at the higher aeration rate). Integrating a side reactor for hydrolysis/acidification did not affect effluent quality, but resulted in slightly greater dominance of Proteobacteria and Dechloromonas in the main wastewater treatment reactor, especially under the low aeration. Recycling anaerobic hydrolysate improved denitrification, while nitrification was unaffected. However, recycling the anaerobic hydrolysate decreased sludge settle ability under the low aeration. These results have implications for operating and optimizing an OSA process for sludge reduction.

Keywords: Sludge reduction; Aeration rates; Oxic-settling-anaerobic; Sludge settle ability