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PII: S0960-8524(18)30944-1
DOI: https://doi.org/10.1016/j.biortech.2018.07.047
Reference: BITE 20177

To appear in: *Bioresource Technology*

Received Date: 12 June 2018
Revised Date: 8 July 2018
Accepted Date: 9 July 2018

Please cite this article as: Jiang, L-M., Zhou, Z., Niu, T., Jiang, L., Chen, G., Pang, H., Zhao, X., Qiu, Z., Effects of hydraulic retention time on process performance of anaerobic side-stream reactor coupled membrane bioreactors: kinetic model, sludge reduction mechanism and microbial community structures, *Bioresource Technology* (2018), doi: https://doi.org/10.1016/j.biortech.2018.07.047

Effects of hydraulic retention time on process performance of anaerobic side-stream reactor coupled membrane bioreactors: kinetic model, sludge reduction mechanism and microbial community structures

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Abstract: An anoxic/oxic membrane bioreactor (AO-MBR) and three anaerobic side-stream reactor (ASSR) coupled MBRs (ASSR-MBR) were operated to investigate the effects of hydraulic retention time of ASSR (HRT_A) and to elucidate sludge reduction mechanisms in ASSR-MBRs. Increasing HRT_A from 3.3 to 6.6 h improved nitrogen removal, and enhanced sludge reduction from 8.0% to 40.9% in ASSR-MBR. The sludge decay coefficient was 0.0221 d^{-1} in MBRs, and 0.0231-0.0345 d^{-1} in ASSRs. The measured lysis rate coefficient of heterotrophic biomass was 0.083-0.112 d^{-1} in MBRs and 0.079-0.111 d^{-1} in ASSRs. The hydrolysis rate coefficient of inactive particulate organic matters (POMs) in ASSRs significantly exceeded that in the MBR.

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