

Accepted Manuscript

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PII: S1385-8947(18)30439-X
DOI: <https://doi.org/10.1016/j.cej.2018.03.081>
Reference: CEJ 18688

To appear in: *Chemical Engineering Journal*

Received Date: 27 January 2018
Revised Date: 14 March 2018
Accepted Date: 15 March 2018

Please cite this article as: H. Wu, R. Dong, S. Wu, Exploring low-cost practical antifoaming strategies in the ammonia stripping process of anaerobic digested slurry, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.03.081>



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Exploring low-cost practical antifoaming strategies in the ammonia stripping process of anaerobic digested slurry

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Abstract

As excessive foam formation is undesirable from an operational perspective in the ammonia stripping process of anaerobic digested slurry, the effect of alkaline agents on foam production was first evaluated by comparing two pH adjusters (NaOH and CaO). Results show that increased pH via CaO addition can significantly aggravate foam production and restrain defoaming ability during the stripping of anaerobic digestion effluent. The addition of 0.75% normal silicone oil (NSO) or 0.01% polyether-modified silicone oil (PMSO) as antifoam reduced foam capacity by $56.2 \pm 2.5\%$ and $75.2 \pm 2.7\%$, respectively, but only works in a slurry with pH adjusted by NaOH, not by CaO. Moreover, the addition of these antifoams led to 4.31% (0.75% NSO) and 5.38% (0.01% PMSO) NH_4^+ -N removal efficiency abatement during the stripping process. Finally, a new high-temperature, neutral (without pH adjustment) stripping strategy is proposed in this study, because it can effectively mitigate the formation of foam and maintain equalized ammonia removal. The effluent discharged via this stripping concept can be handled easily and does not cause heavy negative impacts from the residual alkaline content. Furthermore, the ammonia loss in the preparation phase before stripping was only 1/3 that in the traditionally high-pH stripping, indicating the potential of this new mitigation strategy in the frame of an environmentally friendly development.

Keywords: Ammonium stripping; Antifoaming strategies; Digested slurry; Foam

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