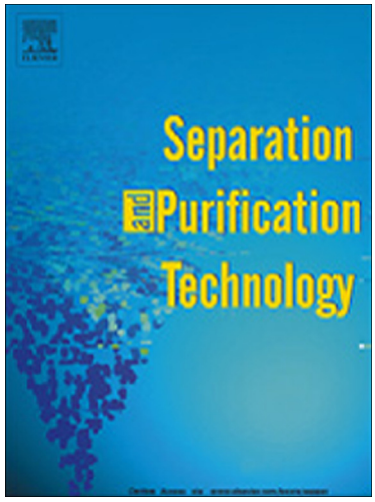

The electrocoagulation pretreatment of biogas digestion slurry from swine farm prior to nanofiltration concentration

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PII: S1383-5866(15)30304-X
DOI: http://dx.doi.org/10.1016/j.seppur.2015.10.054
Reference: SEPPUR 12658

To appear in: *Separation and Purification Technology*

Received Date: 26 July 2015
Revised Date: 20 October 2015
Accepted Date: 24 October 2015

Please cite this article as: Z. Han, L. Wang, L. Duan, S. Zhu, Z. Ye, H. Yu, The electrocoagulation pretreatment of biogas digestion slurry from swine farm prior to nanofiltration concentration, *Separation and Purification Technology* (2015), doi: http://dx.doi.org/10.1016/j.seppur.2015.10.054

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Abstract

Nanofiltration (NF) is a promising technique since it can reclaim the concentrated nutrients from the biogas digestion slurry from swine farms, and produce reusable permeates. However, a lack of efficient and reasonable pretreatment processes to alleviate membrane fouling has become one of the main obstacles for practical NF applications. In this study, an electrocoagulation (EC) process was developed to pretreat biogas digestion slurry prior to NF. It was found that current density had the most significant effect on turbidity removal and electric energy consumption of the EC process, and the optimal combination for a high turbidity removal (65.6%) with low electric energy (0.73 W h L^{-1}) consumption was determined by the response surface method as current density of 35.7 A m^{-2}, reaction time of 24 min, and A/V of 20.7 m^2 m^{-3}. Finally, the EC was proved to be able to alleviate NF membrane fouling by 22.2% for treating biogas digestion slurry.

Keywords: Biogas digestion slurry; Electrocoagulation; Response surface method; Nanofiltration; Turbidity