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PII: S0376-7388(15)00365-8
DOI: http://dx.doi.org/10.1016/j.memsci.2015.04.034
Reference: MEMSCI13644

To appear in: *Journal of Membrane Science*

Received date: 4 December 2014
Revised date: 13 April 2015
Accepted date: 18 April 2015

Cite this article as: Xiaolin Wang, Xu Zhang, Yaoming Wang, Yuxiang Du, Hongyan Feng, Tongwen Xu, Simultaneous recovery of ammonium and phosphorus via the integration of electrodialysis with struvite reactor, *Journal of Membrane Science,* http://dx.doi.org/10.1016/j.memsci.2015.04.034

Simultaneous recovery of ammonium and phosphorus via the integration of electrodialysis with struvite reactor

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Abstract: To eliminate the waste to discharge or backflow to the headstream of the wastewater treatment plant, recovering ammonia and phosphate (N&P) salts from Sidestreams of anaerobic digesting excess sludge was investigated. Electrodialysis (ED) technology was used mainly for desalting and concentrating wastewater. An integration of struvite reactor and ammonia stripping was established to recover N&P from the concentrated wastewater. During single ED experiments, removal ratio of ammonia and phosphate salts were in the ranges of 95.8-100% and 86.1-94.4%, respectively. During the integration of ED and struvite reactor, the concentrated N&P salts were effectively used to form the struvite while the desalination ratio was kept at a high level. After the generation of struvite, a small amount of ammonia salt was still remained in the concentrated N&P solution. The introduction of gas stripping could result in an effective extraction and recovery of ammonia. X-ray diffraction (XRD) analysis and scanning electron microscopy (SEM) were conducted to characterize the obtained precipitates. The diffractograms peaks of the precipitates were well correlated with the struvite pattern, confirming the formation of struvite from the wastes.

Keywords: Phosphate recovery; Ammonia recovery; Excess sludge; Electrodialysis; Struvite reactor

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