

Accepted Manuscript

Enhancing recovery of ammonia from rare earth wastewater by air stripping combination of microwave heating and high gravity technology

Shaohua Yin, Kaihua Chen, C. Srinivasakannan, Shenghui Guo, Shiwei Li, Jinhui Peng, Libo Zhang

PII: S1385-8947(17)32269-6
DOI: <https://doi.org/10.1016/j.cej.2017.12.147>
Reference: CEJ 18308

To appear in: *Chemical Engineering Journal*

Received Date: 20 November 2017
Revised Date: 27 December 2017
Accepted Date: 28 December 2017

Please cite this article as: S. Yin, K. Chen, C. Srinivasakannan, S. Guo, S. Li, J. Peng, L. Zhang, Enhancing recovery of ammonia from rare earth wastewater by air stripping combination of microwave heating and high gravity technology, *Chemical Engineering Journal* (2017), doi: <https://doi.org/10.1016/j.cej.2017.12.147>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Enhancing recovery of ammonia from rare earth wastewater by air stripping combination of microwave heating and high gravity technology

Shaohua Yin ^{a, b, *}, Kaihua Chen ^{a, b}, C. Srinivasakannan ^c, Shenghui Guo ^{a, b, **}, Shiwei Li ^{a, b}, Jinhui Peng ^{a, b}, Libo Zhang ^{a, b}

^a State Key Laboratory of Complex Nonferrous Metal Resources Clean Utilization, Kunming University of Science and Technology, Kunming, Yunnan 650093, China.

^b Faculty of Metallurgical and Energy Engineering, Kunming University of Science and Technology, Kunming, Yunnan 650093, China

^c Chemical Engineering Department, The Petroleum Institute, Khalifa University of Science and Technology, Abu Dhabi, P.O. Box 253, United Arab Emirates

***Corresponding author**

Email: yinsh@kmust.edu.cn (S.-H. Yin) and shguo78@hotmail.com (S.-H. Guo)

Abstract: Currently, a larger amount of $\text{NH}_3\text{-N}$ wastewater is generated in the rare earth manufacture process. Air stripping is one of the effective technologies for ammonia removal, but low separation efficiency and huge stripping tower rendering the process techno-economically inefficient. Hence, microwave heating and high gravity separation are employed to intensify air stripping process. Microwave dielectric characteristics for this solution indicate strong absorption, which can reduce the heating time rapidly. The effect of main operating parameters such as the rotational speed (ω), liquid flow rate (Q_L), gas flow rate (Q_g), and stripping temperature (T) on the volumetric liquid mass transfer coefficient (K_La) and stripping efficiency (η) are assessed. Results show that K_La increase significantly with increasing gas flow rate, followed by rotating speed and liquid flow rate. However, the η decrease with increase in Q_L due to reduction in the liquid hydraulic retention time. Under the optimal conditions, K_La and η could reach 0.0061 s^{-1} and 99.3%, respectively. Dimensionless empirical correlations are developed relating process parameters with the K_La and η , which shows a good agreement of the model equation with the experimental data. In addition, high gravity air stripping and conventional technologies are compared.

Keywords: Ammonia removal; Microwave heating; High gravity technology; Air stripping; Mass transfer

1. Introduction

Environmental pollution is still one of the main problems in rare earth extraction industries, especially one due to ammonium nitrogen [1]. Ammonium nitrogen wastewater is commonly divided into two kinds of ammonium sulphate wastewater and ammonia chloride wastewater, wherein the former mainly comes from ammonium sulfate leaching agent for the weathered crust

Download English Version:

<https://daneshyari.com/en/article/6580455>

Download Persian Version:

<https://daneshyari.com/article/6580455>

[Daneshyari.com](https://daneshyari.com)