Continuous Removal of Copper, Magnesium, and Nickel from Industrial Wastewater Utilizing the Natural Product Yersiniabactin Immobilized within a Packed-bed Column

Nicholas Moscatello, Girish Swayambhu, Charles H. Jones, Jiale Xu, Ning Dai, Blaine A. Pfeifer

PII: S1385-8947(18)30306-1
DOI: https://doi.org/10.1016/j.cej.2018.02.093
Reference: CEJ 18572

To appear in: *Chemical Engineering Journal*

Received Date: 16 December 2017
Revised Date: 20 February 2018
Accepted Date: 21 February 2018

Please cite this article as: N. Moscatello, G. Swayambhu, C.H. Jones, J. Xu, N. Dai, B.A. Pfeifer, Continuous Removal of Copper, Magnesium, and Nickel from Industrial Wastewater Utilizing the Natural Product Yersiniabactin Immobilized within a Packed-bed Column, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.02.093

Continuous Removal of Copper, Magnesium, and Nickel from Industrial Wastewater Utilizing the Natural Product Yersiniabactin Immobilized within a Packed-bed Column

Nicholas Moscatello[a], Girish Swayambhu[a], Charles H. Jones[b], Jiale Xu[c], Ning Dai[c], Blaine A. Pfeifer[a*]

[a]Department of Chemical and Biological Engineering, University at Buffalo, The State University of New York, Buffalo, New York 14260, USA

[b]Abcombi Biosciences, Buffalo, New York 14260, USA

[c]Department of Civil, Structural, and Environmental Engineering, University at Buffalo, The State University of New York, Buffalo, NY 14260, USA

*Corresponding author. E-mail address: blainepf@buffalo.edu (B.A. Pfeifer)

Abstract:

Yersiniabactin, a nonribosomal peptide-polyketide complex natural product with a strong affinity for metals, was immobilized to a polymeric XAD16 resin (forming Ybt-XAD) and used as packing for a successive series of columns designed for scaled removal of Cu^{2+}, Mg^{2+}, and Ni^{2+} from industrial wastewater. Ybt-XAD showed regenerative capacity for two cycles in metal removal and a relatively higher degree of selective for copper within the largest column (5×50 cm). System pH variation influenced metal removal and the potential for metal recovery (or stripping) from the column setup. The system was also characterized using Thomas and dose response models for the 2.5×10 cm column, providing valuable information on the resin capacity of Cu^{2+}, Mg^{2+}, and Ni^{2+} to inform future column designs for enhanced metal removal.