Desalination and Water Treatment
www.deswater.com
1944-3994/1944-3986 © 2012 Desalination Publications. All rights reserved
doi: 10/5004/dwt.2012.2555

Taylor & Francis
Taylor & Francis Group

44 (2012) 75–82
June

Study on leachate treatment for old phosphorous slag

Jingdong Zhang*, Yanxiao Cao

School of Information and Safety Engineering, Zhongnan University of Economics and Law, Wuhan 430074, P.R. China
Tel./Fax: +86 (27) 88385099; email: jingdongz@163.com

Received 28 December 2010; Accepted 20 December 2011

ABSTRACT

In Yichang, city of Hubei, China, where the famous Three Gorges Project is located, the upstream areas of the reservoir are rich in phosphate rock. During long-term phosphate chemical production, lots of phosphorus slag was buried or dumped in the mountains. Over the past decades, a combination of physical, chemical and microbial processes in the waste transferred pollutants from the waste material to the leachate, the untreated leachate was discharged into Xiangxi River, upstream of the reservoir, worsen the water quality of Three Gorges Reservoir, and resulted in diminishing fish and shrimp in some tributaries. A combined process was employed in this study to treat old phosphorus slag leachate. The results showed that, dispersed aeration reduced yellow phosphorus to 1 ppm, and the addition of sodium hypochlorite accelerated the reaction in 10 min. Besides, coagulation process reduced the leachate turbidity, as well as concentration of F^- and Fe^{2+}, the effluent concentration of turbidity, F^- and Fe^{2+} were below 2 NTU, 0.5 and 1 ppm, respectively. Final process of the combined membranes technology (UF + NF + RO) decreased total phosphorus, COD and Fe^{2+} to below 4, 50 and 0.1 ppm, respectively, and effluent yellow phosphorus was not detected.

Keywords: Phosphate rock; Leachate; Yellow phosphorus; Aeration; Coagulation; Combined membranes treatment

*Corresponding author.