Desalination and Water Treatment
www.deswater.com
8 (2009) 146–153
August
1944-3994 / 1944-3986 © 2009 Desalination Publications. All rights reserved.
doi: 10.5004/dwt.2009.679

Treatment of washrack wastewater with water recycling by advanced flocculation–column flotation

Jorge Rubio*, Rafael Newton Zaneti

Laboratório de Tecnologia Mineral a Ambiental (LTM), Departamento de Engenharia de Minas, PPGEM – Universidade Federal do Rio Grande do Sul (UFRGS), Avenida Bento Gonçalves 9500, 91501-970 Porto Alegre, RS, Brazil
Tel. +55 (51) 3308 9479; Fax +55 (51) 3308 9477; email: jrubio@ufrgs.br

Received 9 January 2009; Accepted 25 June 2009

ABSTRACT

A new technique for flocculation and flotation (aerated flocs), called flocculation–column flotation (FCF) was evaluated for the treatment of vehicle (bus) washrack wastewater and water reuse. The system is composed of a compact flocculation–flotation unit, utilizing an in-line flocculator device, a centrifugal multiphase pump which generates microbubbles (Sauter mean diameter, 75 μm), and a column flotation for solid/liquid separation. Design and operating parameters were studied and the efficiency of the FCF was evaluated based on the chemical and physio-chemical quality of the treated water. A tannin derivative was employed as a flocculant and aerated flocs (0.8–1.6 mm diameter; 45–150 m h^{-1} rise rates) were rapidly formed (10 s, residence time). Due to the rapid formation of these very light flocs, the FCF system was able to handle a high hydraulic-load capacity (>18 m h^{-1}), using a reduced foot print (compact unit), and reduced energy consumption. The data shows that this rapid FCF system appears to have a high potential to treat oily (or non-oily) voluminous wastewater at high flow-rates.

Keywords: Flotation; Flocculation; Water reuse; Aerated flocs

* Corresponding author.