Desalination and Water Treatment
www.deswater.com
29 (2011) 218–226
May
1944-3994 / 1944-3986 © 2011 Desalination Publications. All rights reserved.
doi: 10.5004/dwt.2011.2099

Removal of cadmium from simulated wastewaters by electrodeposition on stainless steeel tubes bundle electrode

Abbas Hamid Sulaymon[a], Adel Obaid Sharif[b], Thana Kamil Al-Shalchi[c]*

[a]*Environmental Engineering Department, University of Baghdad, Iraq*
[b]*Faculty of Engineering and Physical Sciences, University of Surrey, UK*
[c]*Environmental Engineering Department, University of Baghdad, Iraq*
Tel. +964 7901 320849; email: talshalchi@yahoo.com

Received 22 June 2010; Accepted in revised form 9 December 2010

ABSTRACT

Electrochemical processes can provide valuable contributions to the protection of the environment through implementation of effluent treatment and production-integrated processes for the minimization of waste and toxic compounds. The performance of a novel pilot scale, fixed bed flow-through cell, consisting of stainless steel tubes bundle cathode, in the removal of cadmium was investigated in the batch re-circulation mode; utilizing the potential results obtained from rotating disc electrode experiments in batch mode. The studied electrochemical reaction was the cathodic reduction of Cd^{2+} using 0.5 M sodium sulphate as supporting electrolyte. The analyzed parameters were different electrolyte pH, different initial Cd^{2+} concentrations, and different Reynolds numbers. The tubes bundle consisted of 920 tubes of 0.6 cm outer diameters. The overall empirical mass transfer correlation was found to be: $Sh = 0.51\ Re^{0.859}\ Sc^{1/3}$ for $5 < Re < 20$ and $Sc = 649$. Experimental results, analysis and correlations showed good performance of the cell and proved its adequacy in the removal of Cd^{2+} from simulated effluents.

Keywords: Electrochemical; Fixed bed flow through cell; Cadmium; Tubes bundle electrode

* Corresponding author.