Desalination and Water Treatment
www.deswater.com

doi:10.5004/dwt.2017.21079

83 (2017) 222–233
July

Study of cadmium adsorption onto calcite using full factorial experiment design

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Received 1 February 2016; Accepted 15 November 2016

ABSTRACT

Full factorial experimental design technical was used to study the main effects and interactions between operational parameters in batch adsorption of cadmium using calcite as adsorbent. The significant parameters which affect cadmium removal efficiency and adsorption amount, such as initial concentration, adsorbent dose, temperature and contact time, were investigated. Parameters that influence the cadmium removal efficiency from water were evaluated statistically by using factorial plots: the Pareto chart, main effect, interaction effect, contour plot, surface plot and the cube plot. Analysis of variance and p-value significant levels were used to check the significance of the effect on percentage removal. The statistical analysis was allowed to verify that the four studied parameters have an influence on the cadmium elimination (p-values ≤ 0.05 and $R^2 = 0.9652$). It was found that the most effective parameters of adsorbed cadmium amount were initial concentration and adsorbent dose. The interaction between initial concentration and adsorbent dose was the most important factor.

Keywords: Cadmium removal; Adsorption; Water treatment; Calcite; ANOVA; Full factorial design

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Presented at the 5th Maghreb Conference on Desalination and Water Treatment — CMTDE 2015, December 21–24, 2015, Hammamet, Tunisia