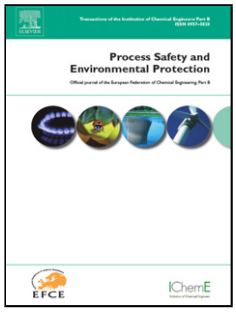
Accepted Manuscript



Title: Arsenic and Selenium removal from water using Biosynthesized Nanoscale zero-valent iron: A factorial design analysis

Authors: Salawu Omobayo Adio, Mohammed Hussain Omar, Mohammad Asif, Tawfik A. Saleh

PII: S0957-5820(17)30070-8
DOI: http://dx.doi.org/doi:10.1016/j.psep.2017.03.004
Reference: PSEP 995

To appear in: *Process Safety and Environment Protection*

Received date: 5-1-2017
Revised date: 19-2-2017
Accepted date: 1-3-2017

Please cite this article as: Adio, Salawu Omobayo, Omar, Mohammed Hussain, Asif, Mohammad, Saleh, Tawfik A., Arsenic and Selenium removal from water using Biosynthesized Nanoscale zero-valent iron: A factorial design analysis.Process Safety and Environment Protection http://dx.doi.org/10.1016/j.psep.2017.03.004

Arsenic and Selenium removal from water using Biosynthesized Nanoscale zero-valent iron: A factorial design analysis

Salawu Omobayo Adio[a], Mohammed Hussain Omar[b], Mohammad Asif[b], Tawfik A. Saleh [c]

[a]Department of Earth Sciences, King Fahd University of Petroleum and Minerals

[b]Center for Environment and Water, Research Institute, King Fahd University of Petroleum & Minerals

[c]Department of Chemistry, King Fahd University of Petroleum and Minerals

**Corresponding author*

E-mail address: tawfikas@hotmail.com; tawfik@kfupm.edu.sa

ABSTRACT

Environmentally friendly method is reported for the synthesis of nanoscale zero-valent iron using plant extract as a reducing agent. The biosynthesized nanoparticles were characterized using FESEM, EDS, XRD, FT-IR and TGA. A factorial design analysis was conducted to determine the influence of different factors affecting the removal of arsenic (As) and selenium (Se) from water using biosynthesized nanoscale zero-valent iron. The factors investigated include; pH, adsorbent dosage, initial concentration, contact time and shaker speed. It was observed that the effect of adsorbent dosage was most significant for the removal of arsenic from water. At 95 % confidence level, dosage variation showed more than 30% increase in removal efficiency when it was varied between 10 mg and 100 mg. About 95 % of arsenic removal was recorded using 100 mg adsorbent at solution pH 3. For selenium removal, the effect of adsorbent dosage showed a relatively positive influence. About 90 % removal efficiency was recorded at Se solution of pH 3 which signifies the applicability of the material for real samples.