Heavy metal ions removal from waste-activated sludge by Fered-Fenton electrochemical advanced oxidation process (EAOP) with the aim of agricultural land application

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Received 16 April 2017; Accepted 15 July 2017

A B S T R A C T

According to the characterisations of the waste-activated sludge, its reuse as fertilizer in farms and agricultural lands is an interesting environmental and economic issue. One of the main hazards associated with waste-activated sludge reuse on agricultural land is the potential long-term accumulation of toxic materials in the crops and soil. Due to the various limitations, the conventional sludge stabilization processes are not able to remove the heavy metals ions from waste activated sludge to make it reliable enough to be utilized as fertilizer in agricultural lands and farms. In this regard, various promising novel technologies and processes have been studied with the aim of its efficient stabilization and reuse in agricultural applications. Fered-Fenton is one of the most promising electrochemical advanced oxidation processes (EAOPs) which has demonstrated significantly reliable performance in waste-activated sludge stabilization. In this regard, this study has been conducted to evaluate the Fered-Fenton process efficiency to remove the frequent heavy metals (chromium, molybdenum, copper, lead, zinc, and mercury) from waste activated sludge at three different operating pH values equal to 3, 5 and 7, and supplying current densities equal to 450, 650 and 850 mA with the aim of agricultural land applications. The results of the experiments demonstrated that this process is highly effective in removing chromium, molybdenum, zinc, copper and lead ions from waste activated sludge to the limits, lower than the specified concentrations by the USEPA regulations. Also, this process has significant ability to reduce the concentration of mercury ions in the waste activated sludge.

Keywords: Waste activated sludge; Heavy metals removal; Electrochemical advanced oxidation process (EAOP); Fered-Fenton; Reuse; Agricultural land application

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Presented at the 3rd International Conference on Recycling and Reuse, 28-30 September 2016, Istanbul, Turkey