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Osama Eljamal, Ahmed M.E. Khalil, Yuji Sugihara, Nobuhiro Matsunaga

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Phosphorus Removal from Aqueous Solution by Nanoscale Zero Valent Iron in the Presence of Copper Chloride

Osama Eljamal ^{*a}, Ahmed M. E. Khalil ^{a,b}, Yuji Sugihara ^a and Nobuhiro Matsunaga ^a

^a Department of Earth System Science and Technology, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, 6-1 Kasugakoen, Kasuga-shi, Fukuoka, 816-8580, Japan. ^b Department of Chemical Engineering, Faculty of Engineering, Cairo University, Giza 12613, Egypt

* Corresponding author. Tel/Fax: +81 92 583 8387,

E-mail address: osama-eljamal@kyudai.jp

Abstract. This study investigates the adsorption of phosphorus by nanoscale zero valent iron (NZVI) in the presence of copper chloride. The NZVI used for the experiments was synthesized under optimum conditions using the chemical reduction method. The NZVI was characterized by transmission electron microscopy, X-ray diffraction, Brunauer–Emmett–Teller surface characterization and particle size analysis. Batch experiments were performed under different conditions to study the effect of parameters such as initial phosphorus concentration, copper chloride load, aerobic, anaerobic, pH and recovery. The results indicated that the presence of copper chloride effectively enhanced the adsorption capacity of phosphorus as it produced copper ferrite spinel on NZVI particles' surface which can adsorb phosphorus and increase its rate of adsorption, and also it stimulated NZVI corrosion. The adsorption capacity of phosphorus reached 50 mg $\text{PO}_4^{3-}\text{-P/ g}$ NZVI in the presence of copper chloride while NZVI without copper chloride reached the maximum adsorption capacity of 28 mg $\text{PO}_4^{3-}\text{-P/ g}$ NZVI. Phosphorus recovery batch

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