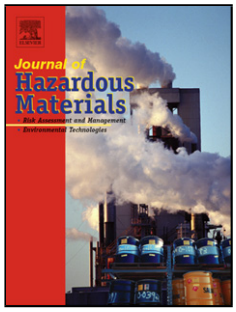

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Author: L. Di Palma M.T. Gueye E. Petrucci

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HEXAVALENT CHROMIUM REDUCTION IN CONTAMINATED SOIL: A COMPARISON BETWEEN FERROUS SULPHATE AND NANOSCALE ZERO-VALENT IRON

DI PALMA L.*, GUEYE M. T., PETRUCCI E.

Dipartimento di Ingegneria Chimica Materiali Ambiente - Sapienza Università di Roma, via Eudossiana 18 – 00184, Roma, Italy.

*luca.dipalma@uniroma1.it; tel: +390644585571

ABSTRACT

Iron sulphate ($FeSO_4$) and colloidal nano zero-valent iron (nZVI) as reducing agents were compared, with the aim of assessing their effectiveness in hexavalent chromium [Cr(VI)] removal from a contaminated industrial soil. Experiments were performed on soil samples collected from an industrial site where a nickel contamination, caused by a long-term productive activity, was also verified. The influence of reducing agents amount with respect to chromium content and the effectiveness of deoxygenation of the slurry were discussed.

The soil was fully characterized before and after each test, and sequential extractions were performed to assess chemico-physical modifications and evaluate metals mobility induced by washing.

Results show that both the reducing agents successfully lowered the amount of Cr(VI) in the soil below the threshold allowed by Italian Environmental Regulation for industrial reuse. Cr(VI) reduction by colloidal nZVI proved to be faster and more effective: the civil reuse of soil [Cr(VI)<2 mg/kg] was only achieved using colloidal nZVI within 60 minutes adopting a nZVI/Cr(VI) molar ratio of 30. The reducing treatment resulted in an increase in the amount of chromium in the oxide-hydroxide fraction, thus confirming a mechanism of chromium-iron hydroxides precipitation.