Environmental Engineering and Management Journal *November 2015, Vol.14, No. 11, 2713-2718*
http://omicron.ch.tuiasi.ro/EEMJ/

"Gheorghe Asachi" Technical University of Iasi, Romania

KINETIC TESTS OF ANAEROBIC DECHLORINATION OF A POLLUTED GROUNDWATER IN ITALY

Luca Di Palma[1]*, Paolo De Filippis[1], Daniele Lausdei[2], Elisabetta Petrucci[1]

[1]Dip. Ingegneria Chimica Materiali Ambiente Sapienza Università di Roma, Via Eudossiana 18 – 00184, Roma, Italy
[2]Environ Italy S.r.l. – via Mentore Maggini, 50, 00143, Roma, Italy

Abstract

The results of batch tests of anaerobic dechlorination on groundwater samples collected downgradient from an industrial site in Northern Italy are presented and discussed. The experiments were carried out using sucrose as electron donor at equimolar concentration and at selected excess with respect to the total reducible species. The purpose of the study was to investigate the effectiveness of sucrose to achieve a complete chlorinated solvents degradations at the specific site, and comparing its effectiveness with milk whey. The results of batch tests experiments indicate that the overall process pathway involves the initial denitrification, followed by simultaneous sulfate reduction and methane production. The process was faster when using milk whey rather than sucrose as electron donor. However, in the presence of the larger excess of milk whey, a fast decrease of pH causes a partial inhibition of methanogens activity, thus retarding the beginning of methane production. In the reactors fed with milk whey, methanogenesis started after 17-20 days of incubation. The results of kinetic tests performed on digesters fed with a large excess of sucrose showed that PCE and TCE degradation to ethylene was completed within 40 days, with a TCE degradation rate of about 11 $\mu mol \cdot l^{-1} \cdot d^{-1}$.

Key words: anaerobic dechlorination, chlorinated solvents, groundwater remediation, kinetic, sucrose

Received: November, 2012; Revised final: November, 2013; Accepted: December, 2013

* Author to whom all correspondence should be addressed: e-mail: luca.dipalma@uniroma1.it; Phone: +390644585571; Fax: +39064827453