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Assessment of in situ biodegradation of monochlorobenzene in contaminated groundwater treated in a constructed wetland

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Abstract:

The degradation of monochlorobenzene (MCB) was assessed in a constructed wetland treating MCB contaminated groundwater using a detailed geochemical characterisation, stable isotope composition analysis and in situ microcosm experiments. A correlation between ferrous iron mobilisation, decreasing MCB concentration and enrichment in carbon isotope composition was visible at increasing distance from the inflow point, indicating biodegradation of MCB in the wetland. Additionally, in situ microcosm systems loaded with ¹³C-labelled MCB were deployed for the first time in sediments to investigate the biotransformation of MCB. Incorporation of ¹³C-labelled carbon derived from the MCB into bacterial fatty acids substantiated in situ degradation of MCB. The detection of ¹³C-labelled benzene indicated reductive dehalogenation of MCB. This integrated approach indicated the natural attenuation of the MCB in a wetland system. Further investigations are required to document and optimise the in situ biodegradation of MCB in constructed and natural wetland systems treating contaminated groundwater.

Key-words: Constructed wetland, monochlorobenzene, biodegradation, in situ microcosms, isotopic fractionation