Geophysical Research Abstracts, Vol. 9, 10452, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10452

Using Nitrogen Isotope Fractionation to Assess Abiotic Reduction of Nitroaromatic Compounds

A. Hartenbach, **T. B. Hofstetter**, M. Berg, J. Bolotin, and R. P. Schwarzenbach

Institute of Biogeochemistry and Pollutant Dynamics, ETH Zurich, Switzerland
(thomas.hofstetter@env.ethz.ch / Fax: +41 44 633 1122 / Phone: +41 44 632 8328)

Compound-specific isotope analysis (CSIA) is an increasingly important tool for the qualitative and quantitative assessment of transformations of organic compounds in contaminated environments. To date, the use of CSIA has been mainly restricted to the elements C and H, although N constitutes a very important reactive center for many priority contaminants. To evaluate the potential use of N isotope effects in the fate assessment of organic contaminants, we investigated the N isotope enrichment during the abiotic reduction of 4 substituted nitroaromatic compounds (NACs), using two abiotic model reductants, namely Fe(II) sorbed to goethite (α-FeOOH) and juglone (8-hydroxy-1,4-naphthoquinone) in the presence of H_2S. Substantial and virtually identical isotope enrichment factors, ε_N, of about -30$^o/_{oo}$, indicative of the breaking of one N-O bond, were found for all NACs, regardless of the reductant involved and the substitution of the NAC. These results indicate that the ε_N-values determined in our study could be representative for the reduction of aromatic NO_2-groups and thus be used to assess the abiotic transformation of NACs qualitatively and quantitatively in complex anoxic environments.