**Evaluation of brominated hydrocarbon tansformation using dual C and Br compound specific isotope analysis**

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Since many years, extensive research has been performed on microbial transformation processes of common groundwater contaminants such as halogenated hydrocarbons. Concepts involving compound specific stable isotope analysis (CSIA) have been developed allowing the qualification and quantification of the *in situ* (bio)transformation and evaluation of the related reaction mechanism. The approach of CSIA is based on the fact that bonds formed by heavy isotopes (e.g. 2H, 13C, 37Cl, 81Br) are slightly more stable and therefore cleaved slower than bonds between lighter isotopes. As a result, the residual (not yet degraded) fraction of the substrate becomes enriched in the heavier isotopes as a reaction proceeds. When the changes in isotope composition of the elements are represented as a dual element isotope plot a specific correlation is expected for identification of reaction pathways cleaving specific bonds formed by various elements.

Brominated organic compounds (BOCs) are widely used and play an important role in the production of e.g. agrochemicals, pharmaceuticals or dyes. Many of these compounds are considered to be toxic, carcinogenic or even mutagenic. Compared to their chlorinated analogues, however, concepts to assess their fate *in situ* are absent.

Therefore, we performed isotope analysis for both carbon and bromine during transformation using ethylene dibromide (EDB) and brominated ethenes (tri- and cis/trans-dibromoethene) as model compounds. EDB transformation was tested under alkaline conditions; by reduction with Zn0, reduced corrinoids or by *Sulfurospirillum multivorans* as well as during aerobic degradation by *Ancylobacter aquaticus*. The transformation of brominated ethenes was performed with crude extract of *S. multivorans* and *Desulfitobacterium hafniense* PCE-S, two anaerobic halogenated compound degraders. The resulting isotope effects correlated with the presumed reaction types based on observed reactivity for the chlorinated analogues: dihaloelimination and nucleophilic substitution. Calculated apparent kinetic isotope effects (AKIE) carbon fit with expected values for the reaction types, however, bromine AKIE exceeded theoretical values. In summary, our study confirmed that CSIA may be used for the evaluation of *in situ* transformation of BOCs, as well as to distinguish different degradation pathways.