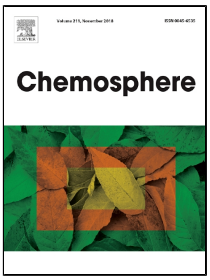
Accepted Manuscript



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PII:	S0045-6535(18)31832-0
DOI:	10.1016/j.chemosphere.2018.09.166
Reference:	CHEM 22246
To appear in:	*Chemosphere*
Received Date:	01 August 2018
Accepted Date:	28 September 2018

Please cite this article as: Karin Hellauer, Sara Martínez Mayerlen, Jörg E. Drewes, Uwe Hübner, Biotransformation of trace organic chemicals in the presence of highly refractory dissolved organic carbon, *Chemosphere* (2018), doi: 10.1016/j.chemosphere.2018.09.166

Biotransformation of trace organic chemicals in the presence of highly refractory dissolved organic carbon

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Abstract

Previous studies demonstrated that the transformation of trace organic chemicals (TOrCs) in managed aquifer recharge (MAR) systems is favored under carbon-limited and oxic redox conditions especially, if the dissolved organic carbon (DOC) serving as primary substrate has a refractory character. Since co-metabolism is suggested to be the dominant removal mechanism, it is hypothesized that TOrCs transformation is controlled by the concentration of the refractory carbon under oxic redox conditions. A laboratory-scale soil column experiment mimicking MAR was established to investigate the influence of two different concentrations of highly refractory carbon sources on TOrCs transformation, namely drinking water (DW) and drinking water augmented with humic acid (DW+HA). Oxic redox conditions and carbon-limitation were present in both systems ($\Delta DOC_{DW+HA} \approx 0.6$ - 0.7 mg/L; $\Delta DOC_{DW} \approx 0.1$ mg/L). Of the 12 TOrCs investigated seven exhibited moderate to efficient transformation in both systems with only one compound (diclofenac) showing significantly enhanced (co-metabolic) biotransformation by adding humic acids as primary growth substrate. It is postulated that transformation of some TOrCs is characterized by metabolic degradation under starving