**The impact of different proportions of a treated effluent on the biotransformation of selected micro-contaminants in river water microcosms**

Karsten Nödler1,2, Maria Tsakiri2, Tobias Licha2

1 TZW: DVGW – Technologiezentrum Wasser, Karlsruher Straße 84, 76139 Karlsruhe, Germany; karsten.noedler@tzw.de

2 Department Applied Geology, Geoscience Centre of the University of Göttingen, Goldschmidtstraße 3, 37077 Göttingen, Germany; tobias.licha@geo.uni-goettingen.de

Biotransformation of micro-contaminants is a very complex field in environmental science and it is difficult to understand the subject and all essential factors in its entirety. However, for a proper risk-assessment a sound understanding of the fate of micro-contaminants in the aqueous environment is necessary. Wastewater treatment plants (WWTPs) are typical point sources of a high variety of contaminants and the implementation of new WWTPs or technical upgrades of already existing WWTPs (e.g. the “quaternary treatment” step, which is currently in the deployment phase) may significantly alter the quality of the adjacent surface water. Based on a preliminary study (Hillebrand et al., 2013) this also holds true for the bio-transformation rate of selected compounds.

Preliminary studies (e. g. Gawlik et al., 2012; Hillebrand et al., 2013) suggest that biodegradation rates of micro-contaminants in the aqueous environment depend on the water matrix. The focus of the study presented here is the systematic comparison of biotransformation rates of caffeine (stimulant), carbamazepine (anticonvulsant), metoprolol (antihypertensive), paracetamol (analgesic) and valsartan (antihypertensive) in aerobic river water microcosms spiked with different proportions of treated effluent (0%, 0.1%, 1%, and 10%). Biotransformation was identified as the dominating attenuation process by comparison with abiotic control batches (5 g/L NaN3) and, furthermore, by the evolution of biotransformation products (BTP) such as atenolol acid and valsartan acid.

The presented study demonstrates that even slight changes of the water phase by treated effluent can result in substantial changes of biotransformation rates. As indicated by the preliminary study (Hillebrand et al., 2013), rather unsystematic results were encountered: *Decreasing* biotransformation rates of metoprolol were observed at treated effluent proportions ≥0.1% whereas *increasing* biotransformation rates of caffeine and valsartan were observed in the presence of 10% treated effluent. Furthermore, these trends were confirmed by altered BTP-evolution. Potential reasons for the observations are discussed and the impact of additional phosphorus on the biodegradation rates was tested. The experiments revealed that phosphorus-limitation was not responsible.

*References*

Gawlik BM, Loos R, Bidoglio G, Fauler G, Guo X, Lankmayr E, Linsinger T (**2012**): Testing sample stability in short-term isochronous stability studies for EU-wide monitoring surveys of polar organic contaminants in water. *TrAC Trends in Analytical Chemistry* 36, 36–46.

Hillebrand O, Musallam S, Scherer L, Nödler K, Licha T (**2013**): The challenge of sample-stabilisation in the era of multi-residue analytical methods: A practical guideline for the stabilisation of 46 organic micropollutants in aqueous samples. *Science of the Total Environment* 454–455, 289–298.