**Selective extraction of the artificial-sweetener acesulfame from wastewater samples using molecularly imprinted polymer**

Mashaalah Zarejousheghani1, Steffi Schrader2, Monika Möder2, Helko Borsdorf1

1 UFZ-Helmholtz Centre for Environmental Research, Department Monitoring and Exploration Technologies, Permoserstraße 15, D-04318 Leipzig, Germany, mashaalah.zare@ufz.de, helko.borsdorf@ufz.de

2UFZ-Helmholtz Centre for Environmental Research, Department of Analytical Chemistry, Permoserstraße 15, D-04318 Leipzig, Germany, monika.moeder@ufz.de, steffi.schrader@ufz.de

Acesulfame is an artificial low-calorie sweetener that is consumed in substantial quantities and can be found in various foods and beverages. After undergoing human metabolism and even multi-barrier treatment processes, it passes through the systems largely unaffected and as a result, it is almost ubiquitously present in aquatic environments. Due to its large consumption and persistency towards molecular transformation in treatment processes, acesulfame has been accepted as an ideal indicator to identify the impact of wastewater on e.g. groundwater (Buerge 2009). This is particularly the case in urban settings with complex hydrology, where indicator substances can be used to locate pollution sources and to discover aquifer pathways. In these kinds of studies, a targeted analysis of the marker substance can help facilitate the investigation of complex systems and simplify the associated data processing. In order to determine a specific target compound like acesulfame, a selective separation from accompanying substances is required. A new class of selective sorbent materials is molecularly imprinted polymers (MIPs) which are based on molecular recognition (Zarejousheghani 2013). MIPs operate as artificial specific receptors that can be used as a powerful tool in the development of highly selective analytical methods (Zarejousheghani 2014).

Acesulfame is negatively charged and highly water-soluble at environmental pH values. Based on the imprinted polymer principles, synthesis of an actual valid and proper MIP for highly water-soluble acesulfame is the main challenge. An ammonium salt was used for novel phase transfer, as a solubility enhancer and as a functional monomer. After the phase transfer process, methacrylic acid was used as an extra functional monomer to enhance the selectivity of the synthesized polymer. After polymerization evaluations, a solid phase extraction (SPE) protocol was devised, optimized and applied for the selective extraction of acesulfame from different wastewater samples.

I.J. Buerge, H.R. Buser, M. Kahle, M.D. Muller, T. Poiger, Ubiquitous Occurrence of the Artificial Sweetener Acesulfame in the Aquatic Environment: An Ideal Chemical Marker of Domestic Wastewater in Groundwater, Environ. Sci. Technol. 43 (2009) 4381-4385.

M. Zarejousheghani, M. Moder, H. Borsdorf, A new strategy for synthesis of an in-tube molecularly imprinted polymer-solid phase microextraction device: Selective off-line extraction of 4-nitrophenol as an example of priority pollutants from environmental water samples, Anal. Chim. Acta 798 (2013) 48-55.

M. Zarejousheghani, P. Fiedler, M. Möder, H. Borsdorf, Selective mixed-bed solid phase extraction of atrazine herbicide from environmental water samples using molecularly imprinted polymer, Talanta 129 (2014) 132-138.