



Passive samplers as accumulation media for compound specific stable isotope analysis of persistent organic pollutants

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Persistent organic pollutants (POPs) are bioaccumulative toxic chemicals that are ubiquitously distributed in several environmental compartments such as the atmosphere, soils, and groundwater. Release scenarios include combustion (e.g., polycyclic aromatic hydrocarbons, dioxins), production processes and applications in the environment (e.g., pesticides) and spills. Emission of POPs into the atmosphere, subsequent long-range atmospheric transport, and deposition is an important pathway by which POPs disperse in the environment causing non-point soil contamination in rural areas. For monitoring of POPs, time-integrating passive sampling techniques became increasingly important during the last decade because they often fulfil the requirements of environmental monitoring programs to cover long-term evaluations of months to years. Furthermore, method detection limits of pollutants were substantially lowered by accumulation on appropriate adsorbents (e.g., polyurethan foam discs for atmospheric concentrations, polystyrenes in adsorption cartridges for flux measurements such as atmospheric deposition, or in ceramic membranes for groundwater concentrations).

As a new method in environmental sciences, compound-specific stable isotope analysis (CSIA) of organic contaminants has been increasingly applied during the last years for source and fate assessment. In the meantime, many case studies have been conducted at contaminated sites to assess degradation of organic contaminants. However, with respect to field studies CSIA is often limited by high detection limits. This is

particularly the case for diffuse pollution with organic contaminants. Such limitations can be overcome by means of passive samplers that accumulate pollutants over time. In our study, we started to combine and calibrate time-integrating passive sampling techniques with applications of CSIA of POPs for potential source attributions and quantification of turnover as key questions regarding diffuse pollution.