

Occurrence and distribution of organic UV-stabilizers in sediments of rivers distributed over Europe

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UV-filters are important ingredients in personal care products like sunscreen products, cosmetics, skin lotions and hairspray. They protect skin and hair against harmful effects of UV radiation. The pathways into the aquatic environment are either indirectly by waste water treatment plants or directly by bathing and swimming in rivers, lakes and seas. Furthermore UV-absorbing agents are used as additives in formulations of textiles, varnishes and plastics. Some UV-absorbing agents have potential for bioaccumulation and are known to cause endocrine disrupting effects (BRAUSCH & RAND 2011). In the last few years, these substances have increasingly been discussed as emerging contaminants.

For this study sediment samples from ten estuaries distributed over Europe were analyzed for twelve commonly used UV-absorbing agents. The sample pretreatment and analysis was done accordingly to SÜHRING ET AL. 2014. The samples were homogenized with anhydrous sodium sulfate (Na_2SO_4) using an agate mortar and afterwards spiked with isotopically labelled surrogate standards 3-(4-methylbenzylidene- d_4) camphor, oxybenzone (phenyl- $^{13}\text{C}_6$) and triphenyl- d_{15} phosphate. Extraction and clean-up was performed using an online accelerated solvent extraction (DIONEX ASE-350) method. Therefore, 33 mL stainless steel ASE cells were filled with 5 g of 10% deactivated silica, 2 g copper and 10 g sodium sulfate/sediment mixture. The cells were extracted using hexane for the first fraction and DCM/acetone 80/20 for a second fraction. The fractions were reduced separately in volume to 150 μL and spiked with 500 pg (absolute) of ^{13}C -PCB-141 and ^{13}C -PCB-208 each as an injection standard.

The instrumental analysis were performed on a GC-(EI)MS/MS system (Agilent 7010) equipped with an PTV-Injector and an HP-5MS column (30m x 0.25mm i.d. x 0.25 μm film thickness, J&W Scientific). Separate aliquots of sediments were dried to constant weight (at 105 °C) for the gravimetrical determination of water content as well as the subsequent analysis of total organic carbon (TOC). TOC was measured using a LECO RC612 multiphase.

This study shows levels of contamination and distribution of UV-stabilizers in surface sediments of rivers distributed over Europe. River specific contamination pattern were in the low ng/g range detected.

References:

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