

# Study on bioconcentration of aquatic pollutants originated from aromatic sensitizers

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We have recently identified aromatic hydrocarbon-type sensitizers and related compounds (SRCs) in water and sediment samples collected from paper mill effluent discharge areas by LLE, GPC clean-up, and GC/MS analysis. SRCs are hydrophobic and are considered to be potentially persistent compounds since they are structurally analogous to PAHs and biphenyls. The objective of this study was to develop a simple and fast method for the identification of SRCs and determination of SRC concentrations in water and aquatic organisms by using a clean-up procedure based on SPE.

Eleven currently used SRCs are selected as target compounds in this study. The typical experimental procedure is as follows: The compounds present in the water samples were concentrated using an SPE cartridge with a C18 or a PH sorbent, and their concentrations were then determined by GC/MS in the SIM mode. As for the aquatic organisms, samples were extracted with acetonitrile, and the lipids in the extract were removed by low-temperature cleanup prior to GC/MS analysis.

*Experimental optimization, QA, and QC:* The  $R^2$  ranged from 0.9942 to 0.9999. Under optimized experimental conditions, SPE cartridges with a PH sorbent were conditioned with 10 mL hexane and subsequently with 10 mL methanol, loaded with water at 2 mL/min, and eluted with 10 mL hexane at 1.5 mL/min. The limits of detection ( $S/N = 3$ ) were in the range of 0.04–0.20  $\mu\text{g/L}$  for river water and 0.1–2.0  $\mu\text{g/kg}$  wet wt. for fish. The limits of quantification ( $S/N = 10$ ) were in the range of 0.08–0.40  $\mu\text{g/L}$  for river water and 0.2–3.0  $\mu\text{g/kg}$  wet wt. for fish. The recovery yields were in the range of 86%–116% for river water and 63%–106% for fish. The repeatability, expressed a relative standard deviation (RSD), was in the range of 1%–10% for river water and 1%–5% for fish.

*SRCs in real samples:* Ten compounds were identified in surface water, and their total concentration was found to be up to 17  $\mu\text{g/L}$ . The individual concentrations ranged from 0.15 to 5.1  $\mu\text{g/L}$  in the samples; 1,1-di(4-methylphenyl)ethane (DME) was detected in all the water samples and was observed to be the most abundant chemical in the samples. Eleven compounds were detected in all the organism samples. The individual concentrations ranged from 1.5 to 650  $\mu\text{g/kg}$  wet wt. in the samples. As in the case of the water samples, DME was observed to be the most abundant chemical in the investigated organism samples. The total concentrations of SRCs in each organism ranged from 290 to 1200  $\mu\text{g/kg}$  wet wt.