



Polyfluorinated telomers in precipitation and surface water in a urban area of Japan

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Abstract:

Although fluorotelomer alcohols (FTOHs) have been detected in various environmental matrices worldwide, no studies have been conducted to evaluate their concentrations in surface water or precipitation. Therefore, we developed a sensitive and reliable method to analyze various environmental aqueous samples for the presence of trace levels of 6:2 FTOH, 8:2 FTOH, 10:2 FTOH, 8:2 FTOAcr and 8:2 FTOMethacr FTOfelin using gas-chromatography/mass-spectrometry. The recoveries obtained using this method ranged from 57.8% to 78.2% and the detection limits were 0.5, 0.2, 0.2, 0.05 and 0.1 ng L⁻¹ for 6:2 FTOH, 8:2 FTOH, 10:2 FTOH, 8:2 FTOAcr and 8:2 FTOMethacr, respectively. Liquid and suspended phases of the examined samples were analyzed. The analysis revealed presence of telomer alcohols from the liquid phase only. Of the FTOHs evaluated, 6:2 FTOH and 8:2 FTOMethacr FTOfelin were not found in any of the environmental samples. The average concentrations of 8:2 FTOH, 10:2 FTOH and 8:2 FTOAcr of the precipitation samples were 1.97, 0.82 and 0.21 ng L⁻¹, respectively. In surface water samples, the highest concentrations of 8:2 FTOH, 10:2 FTOH and 8:2 FTOAcr were 3.38, 4.06 and 0.16 ng L⁻¹, which were observed in samples from the Daini-Neyagawa, Yamato and Kanzaki rivers, respectively. The total concentration of FTOHs in wastewater treatment plant effluents (23.2 ng L⁻¹) was much higher than that of surface water (10.8 ng L⁻¹). Taken together, the results of this study indicate that FTOHs released into the air contaminate rain and that those released from water disposal sites contaminate surface water.

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