



**Organofluorine Mass Balance and Per- and Polyfluoroalkyl
Substance Analysis of Environmental Samples and Human
Blood**

av

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Abstract

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Per- and polyfluoroalkyl substances (PFAS) have been linked to a range of negative health and environmental effects. Regulations limiting and/or banning the use of some of the legacy compounds have been introduced. Consequently, the production and use of PFAS has diversified. The risks posed by these newly introduced PFAS to both the environment and humans may be underestimated if they are not evaluated in current monitoring programs. Organofluorine mass balance analysis has been used in previous studies to estimate the overall exposure to PFAS since naturally occurring organofluorine compounds are rare in nature.

In this thesis, the organofluorine mass balance analysis was performed on a variety of samples, from surface water to sewage and human blood. The results indicated the ubiquitous presence of unidentified organofluorines in all environmental compartments and human samples, for example, more than 50 % of extractable organofluorine (EOF) in human samples could not be accounted for by an extended list of target analytes. Until these compounds are identified, it is not possible to assess the risks they pose and it could lead to misguided policy decisions.

To tackle the increasingly complex analytical picture and ensure more comprehensive screening, a workflow using EOF as an initial metric to identify pollution hot-spots was proposed. The wider adoption of organofluorine mass balance analysis would also require a better understanding of the analytical instrumentation used for this type of work. Experiments carried out here demonstrated the robustness of combustion ion chromatography in EOF analysis and highlighted areas in need of improvement.

While organofluorine mass balance analysis has its drawbacks, the potential health and environmental risks posed by the unidentified organofluorine compounds cannot be underestimated.

Keywords: organofluorine mass balance, PFAS, extractable organofluorine, unidentified organofluorine, whole blood, surface water, effluent, sludge

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