

Plenary 1

“Forever Chemicals” – PFAS as an analytical challenge caught between benefit and harm

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Per- and polyfluoroalkyl substances (PFAS) are a group of chemical compounds used in numerous products due to their unique properties. There are hundreds of applications and that are particularly common in product categories where materials need to be water-, oil-, or dirt-repellent, such as textiles, upholstery or carpets, packaging to medical devices, or must withstand extreme conditions, such as in the automotive industry, gaskets or firefighting foams.

However, PFAS are controversial due to their persistence in the environment and their potential health risks. They are often referred to as “forever chemicals” because they are virtually non-degradable and can accumulate in both humans and the environment.

Presently, they also play a significant role in the energy and transport transition towards carbon neutral economy, resulting in a classic conflict of objectives.

This presentation will focus on two major aspects, (i) the environmental occurrence of PFAS in the marine environment and what we can derive from field data on emission sources, distribution pathways and long-term contamination patterns in the coastal margin and in the Arctic. Secondly (ii.) analytical challenges will be presented and discussed in relation to specific substance properties but also with respect to the extremely high number of individual PFAS, with more than 12,000 chemicals listed by the United States Environmental Protection Agency (US EPA).

As the new drinking water guideline of the EU covers 20 individual compounds that can be analysed by specialised commercial laboratories for monitoring purposes, we can expect that there is large fraction of unknown and undetected PFAS in environmental samples. An analytical PFAS toolbox will be presented that has been developed to examine more closely the unknown “dark fraction” of PFAS in the environment. Based on selected case studies, it will be shown that the exclusive use of conventional target analysis results in a systematic underestimation of environmental and human exposure to PFAS.

References

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