Perfluorinated Compounds in Environmental Matrices

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Environmental contamination by anthropogenic compounds is a subject of increasing public concern over the last 50 years. Compounds produced in low volumes do not pose a risk to human or environmental health. Even those produced in significant volumes may not be viewed as a global threat if their spatial mobility is limited due to poor volatility and/or solubility. However, many compounds have been produced in such quantities, and exhibit such physicochemical properties that they are ubiquitous globally and their potential deleterious effects are of a great concern. Perfluoroalkyl substances (PFASs) represent one group of such compounds.

PFASs are a group of important industrial substances with unique and useful physicochemical properties resulting in their wide production and a range of applications. Several hundred compounds, including oligomers and polymers are classified according to their structure into 23 groups. Important subgroups are perfluroalkylcarboxylic acids (PFCAs), perfluroalkyl sulfonates (PFSAs), perflurooctanesulfonamides (FOSAs) and sulfonamidoethanols (FOSEs).

PFASs are added to a wide range of commercial and industrial products in order to change their physicochemical properties. The addition of PFASs to various products makes them resistant to water, stains, oil, and fire. PFASs are used in the photographic industry, semiconductor manufacturing, to protect textiles, furniture, carpets, cookware as well as additives to fire-fighting foams and hydraulic fluids. Due to their toxicity, bioaccumulation and long-range transport capacity, PFASs are currently of significant concern to scientists and policy makers. Unlike the traditional lipophilic organic pollutants PFASs exhibit unique properties of solubility and atmospheric mobility depending on the compound form.

In 2009, PFOS and its salts and POSF were listed under Annex B of the Stockholm Convention on Persistent Organic Pollutants (POPs), which restricts their manufacturing and use to a few specific applications. The official risk profile of PFOA was prepared and approved in 2016. POPRC adopts the risk profile for PFOA, its salt and PFOA -related compounds, decides that PFOA is subject of long -range environmental transport which leads to significant adverse human health and environmental effects and also decides to establish a working group to prepare a risk management evaluation in accordance with Annex F to the Stockholm Convention.

Presented results are focused on analysis of PFAS in the environmental matrices and indoor environments using the HPLC-MS/MS techniques and have already been published in five impacted publications. Two of them are focusing on PFASs in water, another two on biota (pine needles) and last one on dust from indoor environment. All this studies were contributed to further enhance our understanding of their sources, regional and global distribution, human exposure and related risks.