

Recent advances and critical future research directions for poly- and perfluorinated alkyl substances (PFASs)

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Poly- and perfluorinated alkyl substances (PFASs) comprise a diverse group of chemicals that have been widely used for over 50 years in various industrial applications and consumer products. It has now been more than a decade since the first landmark publications identified the global contamination of the environment and organisms with long-chain perfluorinated alkyl acids, an alarming ubiquity given the possible adverse effects. Yet, critical knowledge gaps remain regarding their sources, environmental distribution, fate, bioaccumulation, toxicokinetics and effects. Attempts to fill these gaps are complicated by analytical challenges associated with some PFASs and by their structural diversity. This session aims to reassess the state-of-the-art knowledge of PFASs, so as to point out real progress in developing effective analytical methods and understanding the properties and fate of these chemicals in the environment, humans and biota. It further aims to provide a roadmap for future research to fill remaining knowledge gaps. Session topics include: (i) identity and evidence of occurrence for PFASs, including legacy categories that have been largely ignored (e.g., branched isomers, phosphonic and phosphinic acids), alternatives (e.g., perfluoropolyethers), commercial mixtures, impurities and key transformation products; (ii) physicochemical properties, including key differences between anions and acids, their partitioning and/or binding behavior in biotic and abiotic phases, and degradation pathways in the environment and organisms; (iii) sources and emissions trends, including comparisons between developed and developing countries and understanding of urban sources (indoor vs. outdoor, wastewater); (iv) environmental fate, including key processes and mechanisms that control the transport and removal of different PFAS classes; (v) exposure and toxicokinetics, determining whether trends are discernible in human biomonitoring data and assessing differences in bioaccumulation and elimination kinetics across different species; (vi) recent developments on evaluating possible adverse effects; (vii) promising remediation and engineered degradation technologies. These topics will be of interest to scientists, industry representative and regulators.

SESSION TYPE: Platform, Poster Spotlight and Poster