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Analysis of Poly- and Perfluoroalkyl Substances (PFASs) in the Danube River Water Samples from Serbia

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Poly- and perfluoroalkyl substances (PFASs) form an important group of synthetic chemicals that have found multiple industrial and domestic applications and are widely distributed on the world market. For these reasons, PFASs have a global distribution in the environment and affect ecosystems and human health. Moreover, PFASs have been detected in waste, surface, and ground waters, as well as in other environmental compartments such as soils, sediments, and biota. Literature data indicate that the dominant sources of PFASs into the environment are manufacturing facilities, followed by wastewater treatment plants (WWTPs), which have been found to be ineffective in removing these compounds from wastewater influents. Previous investigations on PFASs were based on analytical methods for the determination of PFASs such as perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) in various environmental matrices. Recent research is focused on the identification of other PFASs produced as alternatives for PFOS and PFOA and the development of methods that can cover a wide range of PFAS species. Accordingly, current knowledge suggests that progress in the identification of PFASs in environmental samples has been achieved through the successful application of high-resolution mass spectrometry (HRMS) techniques. Although the presence of PFASs has been reported in surface waters throughout Europe, the need for their constant monitoring and fresh data is the motive for numerous ongoing studies.

Within this context, the main aim of this study was to assess the occurrence and environmental fate of a wide range of PFASs in water samples taken at selected locations along the Danube River through Serbia. Water samples were successfully prepared with Oasis WAX cartridges, while ultra-high performance liquid chromatography coupled with high-resolution mass spectrometry was employed for instrumental analysis. The results of this study will provide insight into trends and patterns in PFAS occurrence in the surface water of the Danube from the region with frequent discharges of untreated municipal wastewaters, which will be compared with those available in the literature, indicating potential risks that may be caused by these contaminants.

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