

Incorporating Ultrashort-Chain Compounds into the Comprehensive Analysis of PFAS in Potable and Non-Potable Waters

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Introduction

Ultrashort-chain (USC) per- and polyfluoroalkyl substances (PFAS) are small and very polar compounds with carbon chain lengths shorter than C4. Their ubiquitous and high levels of occurrence in environmental aquatic systems are emerging as a significant concern, rivaling the well-established issues associated with long-chain PFAS contamination. Therefore, it is important to analyze both USC and long-chain PFAS together in water samples to comprehensively assess and address the full spectrum of PFAS contamination. The high polarity of USC PFAS poses a challenge for standard chromatographic practices in PFAS analysis, primarily due to insufficient chromatographic retention. In this study, a simple and reliable workflow was developed for the simultaneous analysis of C1 to C14 perfluoroalkyl carboxylic and sulfonic acids, along with other groups of PFAS, in both potable and non-potable waters. The chromatographic separation was conducted using a polar-embedded reversed-phase LC column with an inert coating on the hardware. A dilute-and-shoot workflow was evaluated by accuracy and precision analysis of fortified drinking waters and wastewaters. Additional potable and non-potable waters collected from various source waters were tested to further demonstrate that the established workflow is suitable for the accurate quantification of targeted PFAS in a wide range of water matrices.

Figure 1: Structures of C1 to C3 PFAS

