Trifluoroacetic Acid and Other Ultrashort PFAS: Understanding Their Measurement and Relevance for Remediation Monitoring

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Per-and polyfluoroalkyl substances (PFAS) with chain lengths of three (3) or fewer carbons are referred to as ultra-short PFAS. Currently, there is a significant information gap regarding the sources, occurrence and fate of this group of compounds. Known sources of environmental impact by ultrashort PFAS include trifluoroacetic acid (TFA) arising from atmospheric degradation of hydrofluorocarbons (HFCs and HCFCs), and the oxidation and chain shortening of fluorotelomer compounds

Current laboratory methods used to determine short and long-chain PFAS do not typically analyze for ultrashort PFAS, necessitating new and/or modified measurement approaches. In this presentation, new measurement tools for ultrashort PFAS will be discussed, highlighting their ability to identify and quantify ultrashorts as an important source of PFAS in the environment, as well as their potential application in forensic evaluations of PFAS sources using the total oxidizable precursors (TOPs) assay.

The development and validation of an isotope dilution ultra-high pressure liquid chromatography tandem mass spectrometry (UPLC-MS/MS) method for the measurement of five (5) ultrashort PFAS: TFA, perfl uoropropionic acid (PFPrA), perfluoromethanesulfonic acid (PFMS), perfluoroethanesulfonic acid (PFEtS) and perfluoropropanesulfonic acid (PFPrS) in aqueous samples will be described. Reporting limits for the method range from1-20 ng/L (ppt). Application of this method affords the data user an expanded list of TOPs assay target compounds and continues to close the mass balance on fluorotelomeroxidation.

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Dr. Terry Obal is the Specialty Testing Practice Leader for SGS North America. Terry's mission is to position SGS as a thought leader in the specialty testing and PFAS marketplace and ensure that customers have access to the latest scientific advancements and best practices. This mandate includes the design, development, and implementation of specialty testing programs in collaboration with key clients. Terry also provides technical representation, consultative support, and expert opinions for SGS clients and key environmental stakeholders.

Prior to joining SGS, Terry has led the development and commercialization of robust, reliable, and defensible methods for the determination of per-and polyfluoroalkylsubstances (PFAS) in a diverse range of environmental matrices. He continues to be active and recognized in the science and measurement of PFAS.

Terry has almost 40 years of experience in analytical chemistry, laboratory management and environmental chemical consulting. He holds B.Sc., M.Sc., and Ph.D. degrees in chemistry, and is a Chartered Chemist (C.Chem.) through the Association of the Chemical Profession of Ontario (ACPO).