Title: An Exploration of Sample Prep Techniques for Non-targeted Analysis of PFAS using Combustion Ion Chromatography

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Abstract:

Due to their environmental persistence and potential implications on human health, the analysis of per- and polyfluoroalkyl substances, or PFAS, in the environment remains critical. Targeted analysis using LC-MS/MS has long been the analytical method of choice, due to its high sensitivity and specificity. With more than 3000 potential PFAS-type compounds, targeted analysis does not always allow for the assessment of the total impact of these compounds. Because of this, there has been increasing interest by regulatory committees in non-targeted analysis techniques, such as quantifying total organic fluorine (TOF), as a PFAS impact assessment.

Combustion Ion Chromatography, or CIC, allows for the sensitive quantitation of TOF, ranging from single digit ppb to percent levels. In this technique, samples are combusted in a high temperature oven, where organofluorine bonds are broken to produce HF, which is subsequently absorbed into solution and analyzed by IC for fluorine. Prior to analysis by IC, inorganic, or free fluoride must be separated from the sample to prevent interference.

A variety of techniques exist to accomplish removal of inorganic fluoride, such as the AOF (adsorbable organic fluorine) method (USEPA Method 1621), which captures organofluorine compounds on an activated charcoal bed and allows for removal of free fluoride through a rinsing step. The charcoal can then be analyzed by CIC. Other methods have also been investigated to further improve recovery of TOF, allowing for the non-targeted identification of PFAS compounds ranging from C1-C16+. A comparison of these methods will be presented.