The presence of high concentrations of mono and divalent anions such as chloride and sulfate has no significant influence on the determination of the perfluorinated alkyl substances (PFAs). In contrast, the presence of divalent cations, such as calcium and magnesium, which are normally present in water matrices, impairs PFOS recovery. This drawback was overcome by applying Metrohm’s Inline Cation Removal. While the interfering divalent cations are exchanged for non-interfering sodium cations, PFOA and PFOS are directly transferred to the sample loop. After inline cation removal, PFAS recovery in water samples containing 350 mg/L of Ca²⁺ and Mg²⁺ improved from 90…115% to 93…107%.

While PFAS determination of low salt-containing water samples is best performed by straightforward direct-injection IC, water rich in alkaline-earth metals are best analyzed using Metrohm’s Inline Cation Removal.

Introduction

The rapidly expanding research on commercially important perfluorinated alkyl substances such as perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) has resulted in a wide range of analytical methods to determine their human and environmental exposure potential. LC-MS/MS is currently used for the determination of anionic perfluorinated surfactants. The analytical methods for PFAS determination in water samples generally employ a C18-SPE column, either with or without ion pairing or acidification, followed by LC-MS/MS. However, this method suffers from relatively high running and investment costs.

This poster presents an easy-to-use and economic direct-injection method for PFOA and PFOS determination in drinking water samples. The method is validated in terms of linearity, recovery and matrix effects. For water samples having a high cationic content, such as tap, lake, sludge or river water, an alternative method using upstream inline sample preparation is presented.

Instrumentation

- B50 Professional IC Anion – MCS – Prep 3
- BSB Professional Sample Processor

The interfering alkaline earth metals in the sample matrix were removed by applying Metrohm’s Inline Cation Removal technique. Using Metrohm’s Sample Preparation Module «SPM», calcium and magnesium ions in the sample are automatically replaced by sodium ions.

After removal of the alkaline earth metals, recoveries for PFOA and PFOS ranged between 98.7…102.1% and 93.6…107.1%, respectively.

While PFOA and PFOS determination in low salt-containing water samples can be performed using straightforward direct-injection chromatography, samples with higher alkaline-earth-metal concentration, such as tap, lake, sludge or river water samples, should pass over the MSM cation exchanger prior to separation.

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