

**Title:** An Evaluation of Weak-Anion Exchange Solid Phase Extraction Cartridges for the Quantification of Per- and Polyfluoroalkyl substances (PFAS) Compounds

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**Abstract:**

Per- and Polyfluoroalkyl substances, also known as PFAS compounds, are a group of man-made chemicals that includes PFOA, PFOS, GenX, and many more. These compounds have been produced since the 1940s and research has shown that they do not break down and can accumulate over time. There is also evidence that proves PFAS can lead to disadvantageous health effects.

It is important to be able to detect and quantitate the compounds in human biological samples. By developing and validating analytical methods, we can detect and quantify selected PFAS compounds. The purpose of this study was to measure the PFAS content through the human biological matrix of human serum using the QSight 220. The QSight 220 is a laminar flow ultra-high-pressure liquid chromatography-tandem mass spectrometer (LC-MS/MS, PerkinElmer, Waltham, MA, USA) equipped with a Selectra C18 (UCT, Bristol, PA, USA) column.<sup>1</sup> Analytes are separated and identified by comparing the acquired mass spectra and retention times to reference spectra and retention times for calibration standards acquired under identical LC/MS/MS conditions. The concentration of each analyte is determined by using the internal standard technique.<sup>2</sup>

The results from this study were from eleven different PFAS compounds: PFBA, PFBS, PFHxA, PFHpA, PFHxS, PFOA, PFOS, PFNA, PFDA, PFUnA, PFDoA.<sup>3</sup> All analytes showed a between-run precision (%CV) in an acceptable range of  $\pm 20\%$ . The average analyte recovery for SPE ranges from 77.64-104.73% with recovery of  $\sim 77\%$  for PFBS,  $\sim 83\%$  for PFBA, and  $\sim 95\text{-}105\%$  for PFHxA, PFHpA, PFHxS, PFOA, PFOS, PFNA, PFDA, PFUnA, PFDoA.

The extraction technique was efficient for high analysis compared to other traditional SPE methods. This allowed for adequate re-equilibration and system washes to prevent carryover and contamination of these persistent pollutants with excellent chromatography. Accurate quantitation of PFAS compounds in biological matrices will allow for a better understanding of the prevalence, bioaccumulation in biological matrices, and how these concentrations relate to various health outcomes.<sup>4</sup>

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<sup>1</sup> SOFT Annual Meeting 2021 Abstract. Nashville, TN.

<sup>2</sup> Gamble, H, Wu, J, Qin, F, Yang, Liz. 2019. A Simple and Sensitive Method for Rapid Determination of PFOA and PFOS in Water Samples by Direct Injection UHPLCMSMS (Application Note). PerkinElmer.

<sup>3</sup> Victor Grant Methods Test. 2021.

<sup>4</sup> SOFT Annual 2021 Meeting