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Simultaneous Quantification of Anions using Ion Chromatography

Issues concerning environmental and human health are often dynamic and multifaceted; requiring more rapid and comprehensive methods for data acquisition to help with formulating a strategic or diagnostic approach. Ion chromatography is a common technique to quantify anions in aqueous matrices. However, quantifying multiple anions for a diverse range of applications is difficult and expensive; requiring large sample volumes, multiple and tedious sample preparation techniques and complex instrument modifications.

Researchers at the Biodesign Institute of Arizona State University developed an analytical ion chromatography-based method to simultaneously detect up to 14 anion analytes. This method can be applied to a diverse range of human, industrial and environmental issues. This method is relatively simple, cost-effective and can be used for quantification of common inorganic anions as well as toxic anions of environmental and human concern as well as an organic anion. With detection limits as low as 0.8-27.6 µg/L, this method could be useful in measuring low-titer sample matrices. Good precision and accuracy in quantification of all the anion analytes in human origin and environmental aqueous matrices has been demonstrated.

This analytical method provides an all-encompassing suite of information important to health, industry and environment in a single run.

Potential Applications

- Diagnostics/epidemiology
 - Detection of biomarkers for incidence of diseases
- Environmental engineering
 - Monitor emerging chemicals of concern in the environment
- Health monitoring
 - Monitor interactions within the human gut microbiome

Benefits and Advantages

- Multiple anions of importance to human health, industries and environmental can be quantified simultaneously using one analytical method.
- Simple and cost-effective
- Can quantify common inorganic anions (chloride, fluoride, nitrite, bromide, nitrate, phosphate), anionic sulfur species (sulfite, sulfate & thiosulfate), toxic anions of concern (selenite, chromate, thiocyanate & perchlorate) and an organic anion (formate)
- Sensitive detection limits (low $\mu\text{g/L}$ range of 0.8-27.6 $\mu\text{g/L}$)
- Takes less than 35 minutes to complete
- Good precision and accuracy in quantification
 - Works in matrices of human origin (urine, feces, whole blood, plasma) as well as environmental aqueous matrices
 - Can detect multiple anions in a low-volume sample (<1 mL)

For more information about this opportunity, please see

[Mohana Rangan et al – Environ Eng Sci - 2021](#)

For more information about the inventor(s) and their research, please see

[Dr. Krajmalnik-Brown's departmental webpage](#)