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Inventors

Srivatsan Mohana Rangan

Anca Delgado

Rosa Krajmalnik-Brown

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Methods to Detect Toxic Chromium (VI) and other Anions

Hexavalent Chromium is used in industrial processes and is a known toxic, mutagenic and carcinogenic pollutant. Widespread contamination and high solubility necessitate a simple method for Cr (VI) determination at parts per billion concentrations. The maximum allowable limit for Cr (VI) in groundwater and drinking water, as set by the World Health Organization, is 50 µg/L. Commonly used ion chromatography (IC) method for quantification of Cr (VI) requires special amendments to the IC system, such as post column derivatization reactor, post column delivery system, complexing reagents and UV-Vis detector, which adds complexity, increased sample volume and costs. Further, the IC system does not enable the simultaneous detection of co-occurring environmentally relevant anions.

Researchers at the Biodesign Institute of Arizona State University have developed a novel isocratic ion chromatography analytical method for simultaneous quantification of 9 anions (Fluoride, Chloride, Nitrite, Nitrate, Sulfate, Selenate, Arsenate, Perchlorate, and Chromate) in aqueous samples. This method is relatively simple and shows good linearity, precision and accuracy measurements, without requiring special amendments or pre-processing of the samples. The method detection limit and minimum reporting limit are 0.3 µg/L Cr (VI) and 1 µg/L Cr (VI), respectively.

This relatively simple but effective method would reduce the cost for anion analyses in environmental aqueous samples and could be adopted by companies, laboratories, federal agencies and industries.

Potential Applications

- Analyzing Cr (VI) and other anions in aqueous samples such as groundwater, wastewater, drinking water, surface water, mine drainage, etc.
- o Can be used by remediation companies, research laboratories, environmental consultants, federal agencies and industry leaders

Benefits and Advantages

- Quantifies Cr (VI) at low µg/L concentrations without preprocessing of

sample or post column derivatization

- Simple method without sample pre-processing steps
- Faster than conventional methods
- Lower cost and reduced sample requirement
- Simultaneous quantification of 9 important anions in environmental aqueous samples
 - o Chromate, arsenate, selenate, perchlorate, fluoride, chloride, nitrite, nitrate, sulfate, etc.
- Good linearity, precision and accuracy of Cr (VI) measurement
- Detection limit of 0.3 µg/L and reporting limit of 1 µg/L
- Percentage recovery of 101.4% and a relative standard deviation of 0.6%

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 Biodesign webpage](#)

[Dr. Delgado's Biodesign webpage](#)