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# Ultra-trace level speciated isotope dilution measurement of Cr(VI) using ion chromatography tandem mass spectrometry in environmental waters

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The reliable analysis of highly toxic hexavalent chromium, Cr(VI), at ultra-trace levels remains challenging, given its easy conversion to non-toxic trivalent chromium. The new approach demonstrates a novel analytical method to quantify Cr(VI) at low ng/L concentration levels in environmental water samples by using speciated isotope dilution (SID) analysis and double-spiking with Cr(III) and Cr(VI) enriched for different isotopes. Ion chromatography tandem mass spectrometry (IC-MS/MS) was used for the analysis of Cr(VI) as $HCrO_4^-$ → $CrO_3^-$. While following a classical linear multipoint calibration curve a method detection limit (MDL) of 7 ng/L Cr(VI) was achieved, the modified SID-MS method adapted from U.S. EPA 6800 allowed for the quantification of Cr(VI) with an MDL of 2 ng/L and provided results corrected for Cr(VI) loss occurred after sample collection. The adapted SID-MS approach proved to yield more accurate and precise results than the multipoint calibration method, allowed for compensation of Cr(VI) reduction during sample transportation and storage while eliminating the need for frequent external calibration. The SID approach permitted continuous sample analysis for several days without the need for recalibration. This new developed IC-MS/MS method represents an alternative to the routinely used inductively-coupled plasma (ICP) instrumentation, IC-ICP-MS, and offers several advantages over detection with ICP-MS for Cr(VI), such as the absence of polyatomic interferences of 52Cr formed in the ICP ($^{36}Ar^{16}O$, $^{40}Ar^{12}C$, $^{35}Cl^{16}OH$, and $^{37}Cl^{14}NH$) that require the use of dynamic reaction/collision cells or high-resolution double-focusing sector field instruments.

## Biography

Stefanie Maedlerreceived her Ph.D. in analytical chemistry in 2011 from the Swiss Federal Institute of Technology in Zurich, Switzerland (ETHZ). After 2 postdoctoral fellowships at York University and University of Toronto, Canada, Dr. Maedler joined the Ontario Ministry of Environment and Climate Change as a Development Scientist. She has 10 years of expertise in the use of mass spectrometry (MS) for biological and environmental applications and is currently focusing on the speciation of inorganic analytes and understanding their toxicological effects on fish through MS-based metabolomics approaches

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