OP 1.7

Simultaneous speciation of As, Se, and Cr: Feasibility for real samples

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An analytical method has been developed that allows the simultaneous determination of As(III), As(V), Se(IV), Se(VI), Cr(III), and Cr(VI) species using high performance liquid chromatography (HPLC) separation with ICP-MS detection. In order to reduce interferences for the determination of As, Cr, and Se by ICP-MS, a Dynamic Reaction Cell (DRC) ICP-MS system was used to detect the species eluted from the chromatographic column. A variety of reaction cell gases and conditions may be utilized and the advantages and limitations of the gases tested will be presented and discussed.

By complexing the Cr(III) with EDTA prior to injection into the chromatographic column, the method allows the separation and detection of the As, Cr, and Se species of interest using the same chromatographic conditions in less than 2 minutes (Figure 1). The robustness of the method to concomitant element and anion effects will be discussed as well as the method's applicability for the analysis of environmental and geological samples including waters, soil leachates and simulated bio-fluid leachates. The method uses relatively inexpensive 3 cm C8 columns and a tetrabutylammonium hydroxide/EDTA/methanol mobile phase.

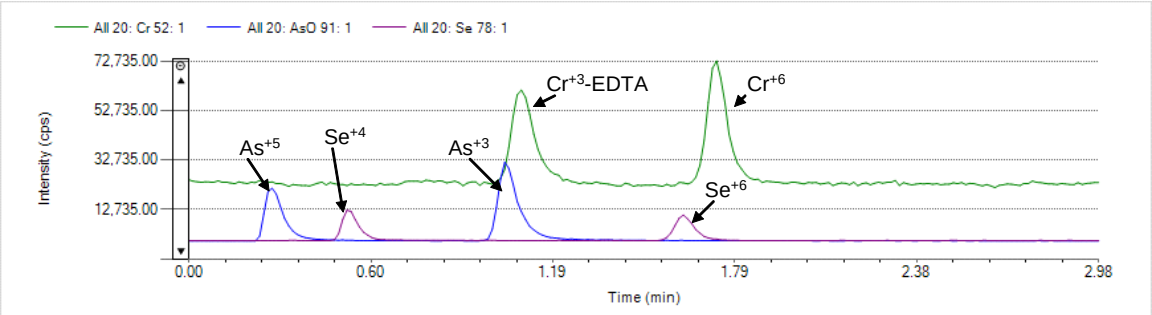

Figure 1: Example chromatogram of 20 ppb As^{+3}, As^{+5}, Se^{+4}, Se^{+6}, Cr^{+3} (as EDTA complex), and Cr^{+6} using a single set of chromatographic conditions and oxygen as the reaction gas in a DRC-ICP-MS. Using oxygen as the reaction gas, arsenic is measured as AsO at mass 91.