Elemental Scientific Inc Technical Note-6

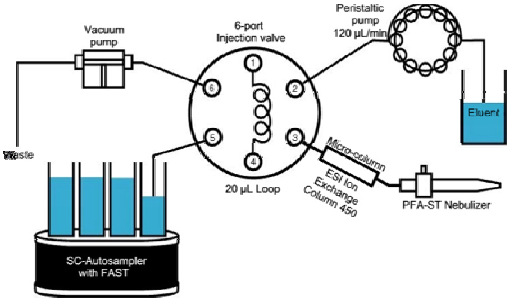
Chromium speciation using SC-FAST

Chromium exists in the environment in several forms which differ in their effects upon organisms. Chromium enters the air, water and soil in the Cr(III) and Cr(VI) form through natural processes and human activities. Cr(III) is an essential nutrient to humans, whereas Cr(VI) is known to cause various health effects including cancer and death. The SC-FAST can be used to perform a simple, but robust and fully automated separation of Cr species.

Instrumentation & sample intro

- Element2
- SC-FAST
- PFA-LC MicroFlow nebulizer
- Cyclonic spray chamber

SC-FAST for Chromatography



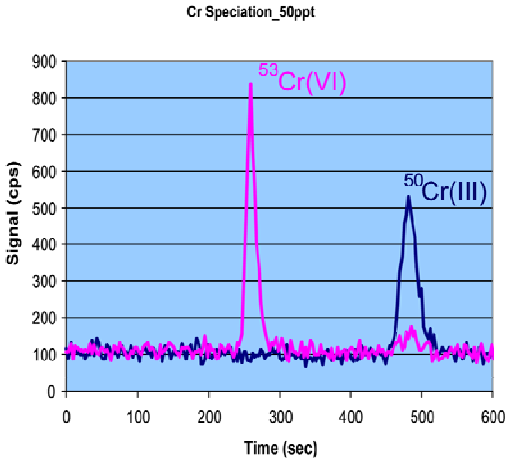
- Column: ESI Ion Exchange 450
- Carrier Flow Rate: 120µL/min
- Loop volume 20µL

Operating parameters

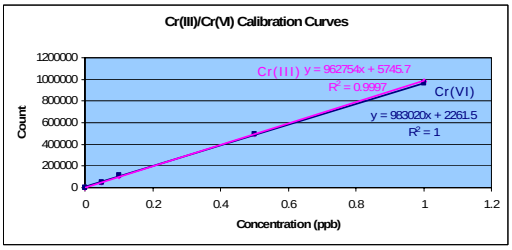
Samples and standards were loaded into the loop via the Teflon diaphragm pump, once loaded the valve was switched and the sample pushed through the column with the peristaltic pump. The Cr species were separated on the column and nebulized using a low dead volume PFA-LC nebulizer. The peaks for Cr(VI) and Cr(III) were measured using the Element2's time resolved software.

Separation and Calibration Studies

Isotope enriched standards of ^{50}Cr(III) and ^{53}Cr(VI) were used to perform separation and calibration studies.



Calibration graphs were found to be linear over the range 0.05 -1ppb



Detection Limits: Cr(III) 3ppt; Cr(VI) 4ppt

Water Analysis - Recoveries

Various water samples were analyzed and spiked at 500ppt and recoveries assessed.

	Cr(III)	Recovery	Cr(VI)	Recovery
Distilled Water	< 3ppt		5ppt	
DW + spike	490ppt	98%	508ppt	100%
Bottled Water	6ppt		313ppt	
BW + spike	514ppt	101%	817ppt	101%
Tap Water	4ppt		1068ppt	
TW + spike	498ppt	99%	1548ppt	96%

The SC-FAST provides a simple but effective means of performing speciation /chromatography applications.