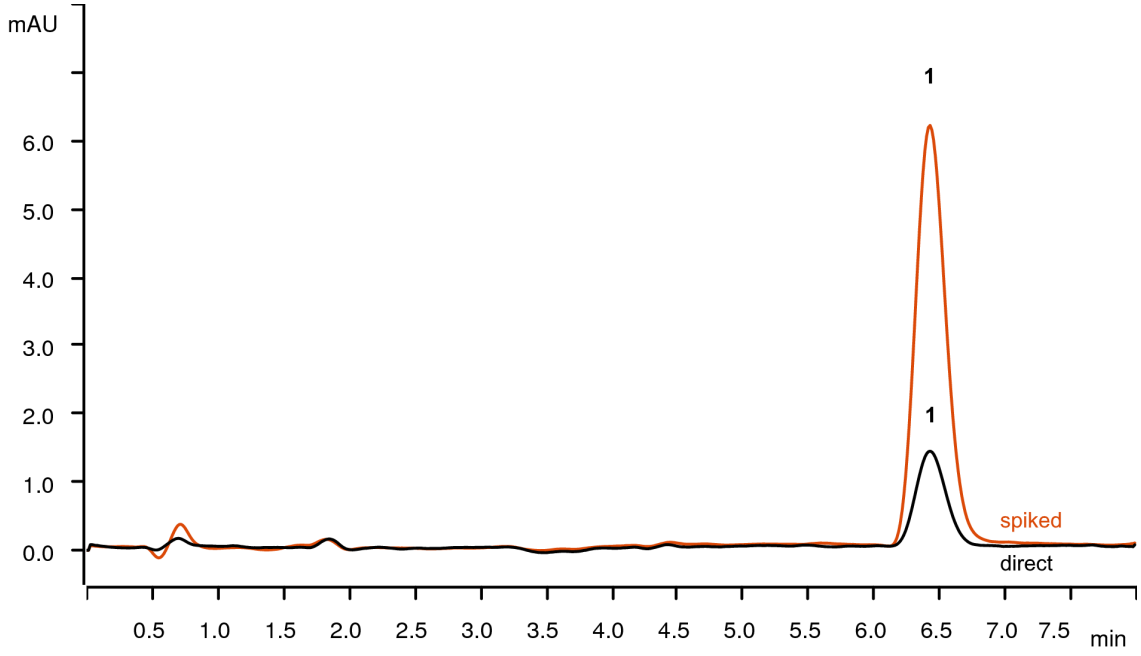
IC Application Note U–079

Chromate (Cr(VI)) in water

Determination of chromate in water applying UV/VIS detection after post-column reaction (PCR) with 1,5-diphenylcarbazide according to DIN 38405-52 (draft)



Chromatograms of drinking water: (black) direct injection, (red) spiked with 1.0 µg/L chromate.

Chromate and dichromate are the two oxoanions of chromium. In both, chromium is present in its hexavalent form (Cr(VI)). In aqueous solutions, chromate exists under alkaline and dichromate under acidic conditions. Hexavalent chromium is highly toxic and carcinogenic. It is therefore restricted in manufactured goods as well as in the environment and requires thorough monitoring. DIN 38405-52 describes the determination of Cr(VI) in water, wastewater, and sludge by photometric methods. In Appendix C, chapter C.6 the use of ion chromatography is described. This AN shows the application of the method to drinking water samples.

Results

	Anion	Conc. direct [µg/L]	Conc. spiked [µg/L]	Recovery [%]
1	Chromate	0.344	1.184	114

Metrohm

Sample

Drinking water.

Sample preparation

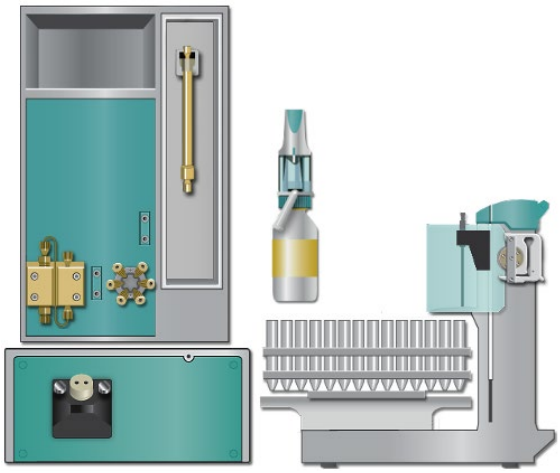
Direct injection.

Columns

Metrosep A Supp 17 - 100/4.0	6.01032.410
Metrosep A Supp 17 Guard/4.0	6.01032.500

Instrumentation

930 Compact IC Flex Oven/Deg	2.930.2160
947 Professional UV/VIS Detector Vario - SW	2.947.0010
Halogen lamp (Vis) for Professional UV/VIS Detector	6.2804.100
919 IC Autosampler Plus	2.919.0020
800 Dosino	2.800.0010
IC equipment: PCR with dosing unit	6.5330.400
Reactor complete	6.2845.200



Solutions

Eluent	70 mmol/L ammonium nitrate 7.0 mmol/L sodium hydroxide
Post-column reagent	2.0 mmol/L 1,5-diphenylcarbazide 10% ethanol 0.5 mol/L sulfuric acid

Analysis

VIS detection after post-column reaction

Parameters

Flow rate	0.7 mL/min
Injection volume	1325 µL
P_{max}	18 MPa
Column temperature	45 °C
Reactor temperature*	45 °C
VIS lamp	On
PCR flow	0.22 mL/min
Wavelength	538 ± 21 nm
Reference channel	650 ± 21 nm
Filter: Savitzky-Golay	Length 10
Measuring duration	800 ms
Recording time	8 min

* Reactor mounted in the column oven.

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Metrohm