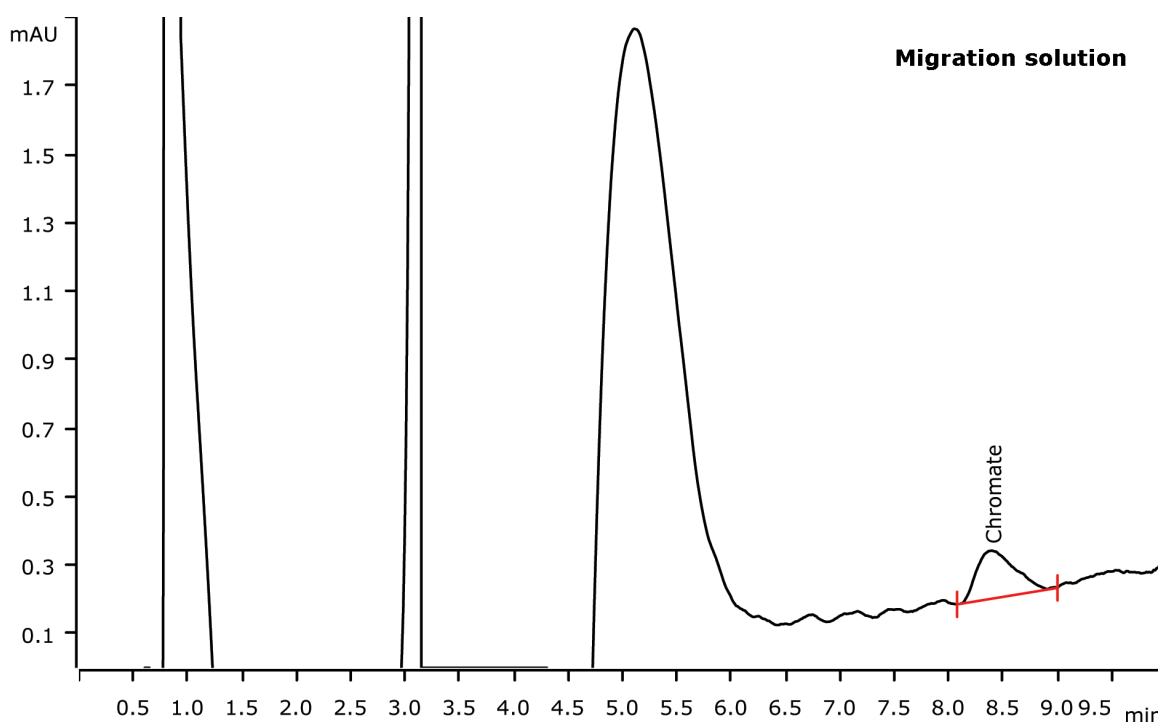


Chromate in toy migration solution according to EU directive 2009/48/EC



Chromate (Cr(VI)) is considered toxic and potentially carcinogenic for which reason its concentrations should be as low as possible. EU directive 2009/48/EC defines limits for chromate migrating from toys. Here, the hydrochloric acid migration solutions are diluted with a buffer. 2000 μL of this solution is injected by Metrohm intelligent Preconcentration Technique and Inline Matrix Elimination (MiPCT-ME). Detection is performed by VIS-Detection after post-column reaction with diphenylcarbazide.

Results

	Concentration in migration solution	Migrated amount	Recovery
Chromate	0.64 $\mu\text{g/L}$	0.03 mg/kg	-
Spiked (2.66 $\mu\text{g/L}$)	3.52 $\mu\text{g/L}$	-	108%

Sample

Plastic toy

Sample preparation

1 g of sample is extracted in 50 mL of 0.25% hydrochloric acid. This solution is neutralized and injected applying MiPCT-ME.

Columns

Metrosep A Supp 5 - 250/4.0	6.1006.530
Metrosep A Supp 4/5 Guard/4.0	6.1006.500

Solutions

Eluent (inline eluent preparation)	12.8 mmol/L sodium carbonate 4.0 mmol/L sodium hydrogen carbonate 2.5 g/L ammonium sulfate
PCR reagent	2.0 mmol/L 1,5-diphenyl-carbazide
Adjustment buffer	8.0 g/L sodium carbonate 0.52 g/L sodium hydrogen carbonate 1.6 g/L ammonium sulfate
Cleaning solution	50% acetone (v/v)

Parameters

Flow rate	0.8 mL/min
Flow rate PCR	0.2 mL/min
Injection volume	2000 µL
P _{max}	15 MPa
Recording time	10 min
Column temperature	45 °C
PCR temperature	45 °C
Light source (VIS)	Tungsten halogen lamp
Wavelength	538 ± 21 nm
Reference	650 ± 21 nm

Analysis

Visible detection after PCR

Instrumentation

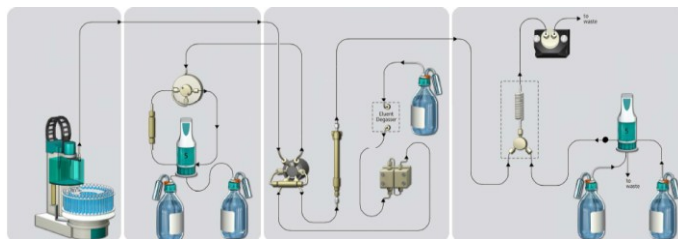
930 Compact IC Flex Oven/Deg	2.930.2160
858 Professional Sample Processor – Pump	2.858.0020
943 Professional Reactor Vario	2.943.0110
994 Professional UV/VIS Detector Vario	2.944.0010
2 x 800 Dosino	2.800.0010
IC equipment: Liquid Handling Station, left	6.5330.130
IC equipment: MiPCT-ME	6.5330.160



Calibration MiPCT-ME

Calibration range	Factor of 100
Standard solution:	
Chromate	2 µg/L
1. Level	20 µL = 0.02 µg/L
2. Level	40 µL = 0.04 µg/L
3. Level	100 µL = 0.10 µg/L
4. Level	200 µL = 0.20 µg/L
5. Level	400 µL = 0.40 µg/L
6. Level	1000 µL = 1.00 µg/L
7. Level	2000 µL = 2.00 µg/L

Flow chart



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