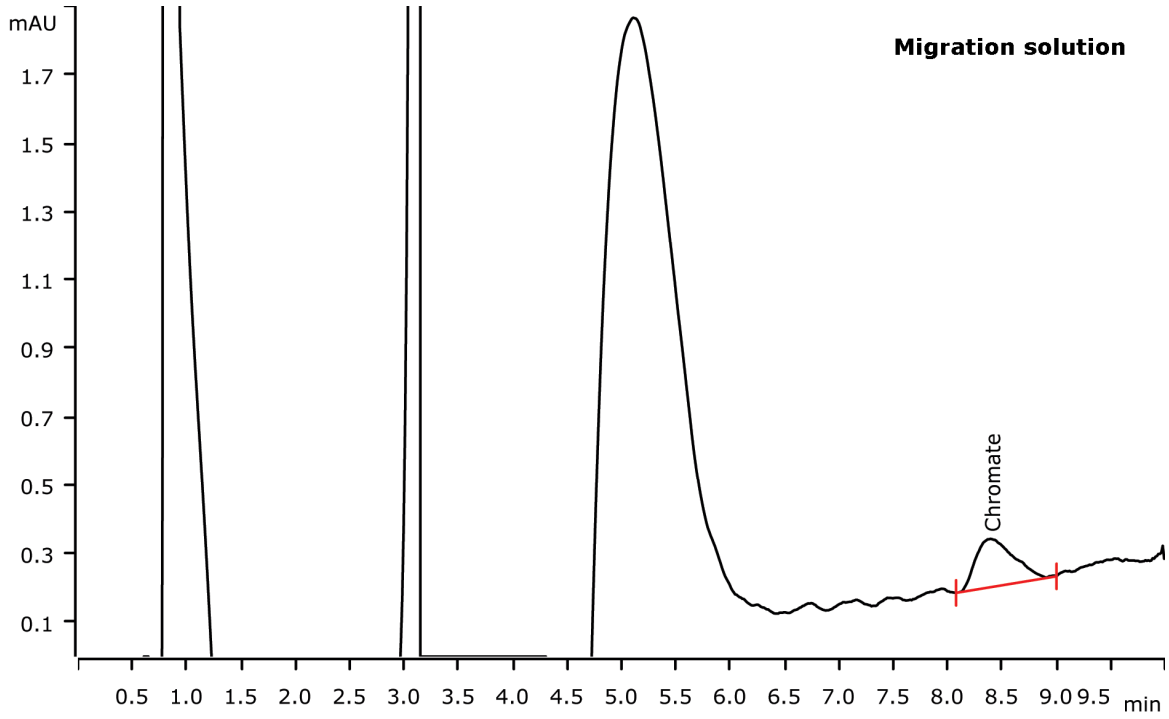
IC Application Note U–68

# Chromate in toy migration solution according to EU Directive 2018/725




Chromate (Cr(VI)) is considered toxic and potentially carcinogenic for which reason its concentrations should be as low as possible. EU Directive 2018/725 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 µg/L | 0.03 mg/kg | - |
| Spiked (2.66 µg/L) | 3.52 µg/L | - | 108% |

Metrohm

## 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<br>4.0 mmol/L sodium hydrogen carbonate<br>2.5 g/L ammonium sulfate |
| PCR reagent | 2.0 mmol/L 1,5-diphenyl-carbazide |
| Adjustment buffer | 8.0 g/L sodium carbonate<br>0.52 g/L sodium hydrogen carbonate<br>1.6 g/L ammonium sulfate |
| Cleaning solution | 50% acetone (v/v) |

## Parameters

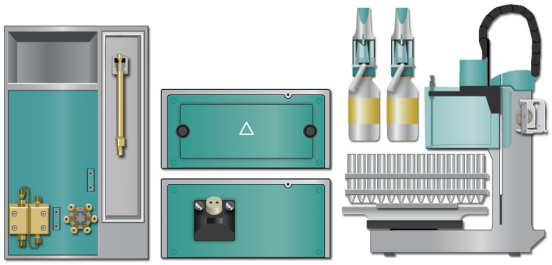
| | |
|---|---|
| Flow rate | 0.8 mL/min |
| Flow rate PCR | 0.2 mL/min |
| Injection volume | 2000 µL |
| $P_{max}$ | 15 MPa |
| Recording time | 10 min |
| Column temperature | 45 °C |
| PCR temperature | 45 °C |
| Light source (VIS) | Tungsten halogen lamp |
| Wavelength | 538 ± 21 nm |
| Reference | 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 |
| 947 Professional UV/VIS Detector Vario | 2.947.0010 |
| 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