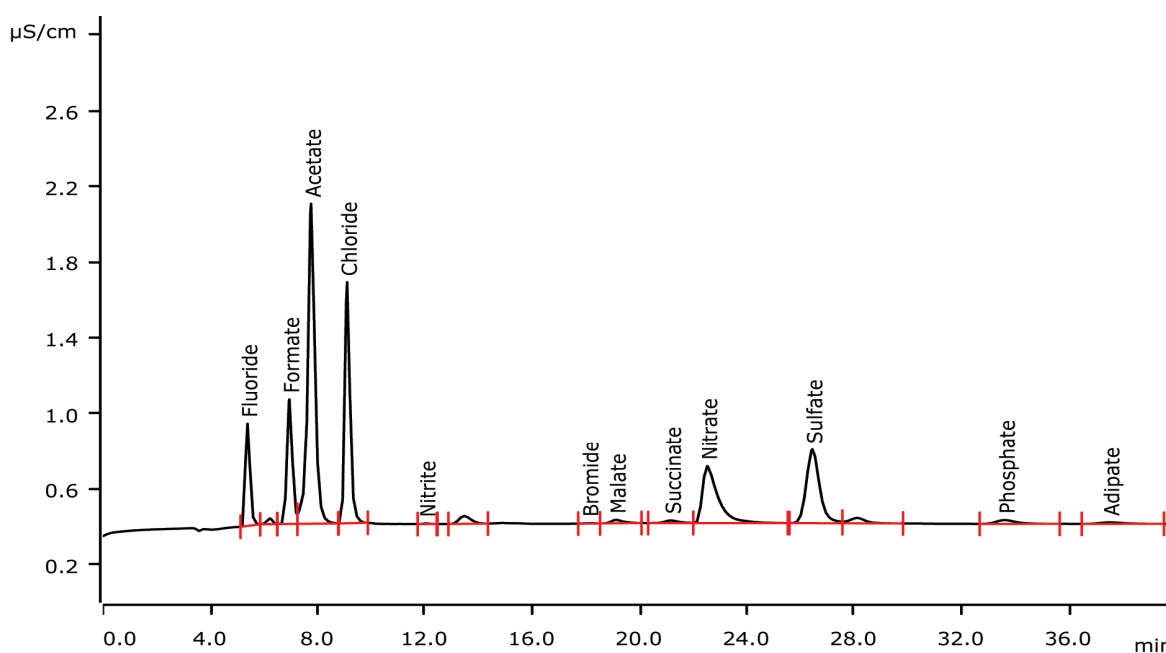


Determination of anions on the surface of printed circuit board materials



Cleanliness is an indispensable condition in production of electronics. Especially ionic contamination can reduce the quality of products. Here, the determination of anions on the surface of circuit board materials is shown. The method applies intelligent Partial Loop Technique (MiPT) from one sample to both anion and cation channel. See AN-C-149 for cation determination.

Results

Anion	Conc. [$\mu\text{g}/\text{cm}^2$]	Anion	Conc. [$\mu\text{g}/\text{cm}^2$]
Fluoride	0.093	Malate	0.074
Formate	0.478	Succinate	0.073
Acetate	2.384	Nitrate	0.691
Chloride	0.554	Sulfate	0.662
Nitrite	< 0.001	Phosphate	0.123
Bromide	0.021	Adipate	0.071

Sample

Printed circuit board

Sample preparation

The circuit boards are leached with isopropanol/water 10/90% in a plastic bag according to ICP-TM-650 Test methods manual, No 2.3.28.2. Injection with intelligent Partial Loop Injection Technique (MiPT).

Columns

Metrosep A Supp 16 - 250/4.0	6.1031.430
Metrosep A Supp 16 Guard/4.0	6.1031.500

Solutions

Eluent (941 Eluent Production Module)	7.5 mmol/L sodium carbonate 0.75 mmol/L sodium hydroxide
Suppressor regenerant	100 mmol/L sulfuric acid
Extraction solution	10% isopropanol in ultrapure water

Analysis

Conductivity detection after sequential suppression

Instrumentation

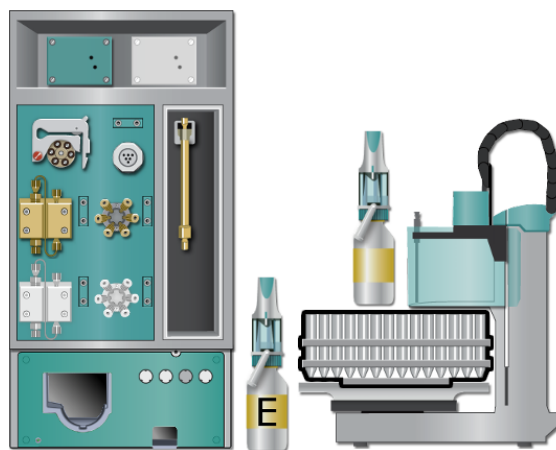
940 Professional IC Vario TWO/SeS/PP	2.940.2500
2 × IC Conductivity Detector	2.850.9010
941 Eluent Production Module	2.941.0010
2 × 800 Dosino (MiPT, Eluent Cations)	2.800.0010
858 Professional Sample Processor	2.858.0010
MSM-HC Rotor A	6.2842.000
IC equipment: Additional eluent for 941	6.5330.090
IC equipment: MiPT	6.5330.180
Sensor Empty 2 L (Eluent Cat)	6.2769.110

Parameters

Flow rate	0.8 mL/min
Injection volume	20 µL (MiPT)
P _{max}	20 MPa
Recording time	30 min
Column temperature	45 °C

Calibration MiPT

Calibration range	Factor of 5
Standard solution:	
Fluoride	0.05 mg/L
All others	0.5 mg/L
1. Level	20 µL = 0.05 / 0.5 mg/L
2. Level	40 µL = 0.10 / 1.0 mg/L
3. Level	60 µL = 0.15 / 1.5 mg/L
4. Level	80 µL = 0.20 / 2.0 mg/L
5. Level	100 µL = 0.25 / 2.5 mg/L



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Flow chart

The graphic below shows the system setup for the simultaneous determination of anions and cations in leaching solutions applying Metrohm intelligent Partial Loop Technique (MiPT). The sample is loaded to the two IC channels by a single 800 Dosino (2nd segment from the left). The eluents are automatically produced by the 941 Eluent Production Module (2nd segment from the right). Ultrapure water for eluent preparation and rinsing is provided by a ELGA PURELAB flex 5 ultrapure water supplying instrument.

