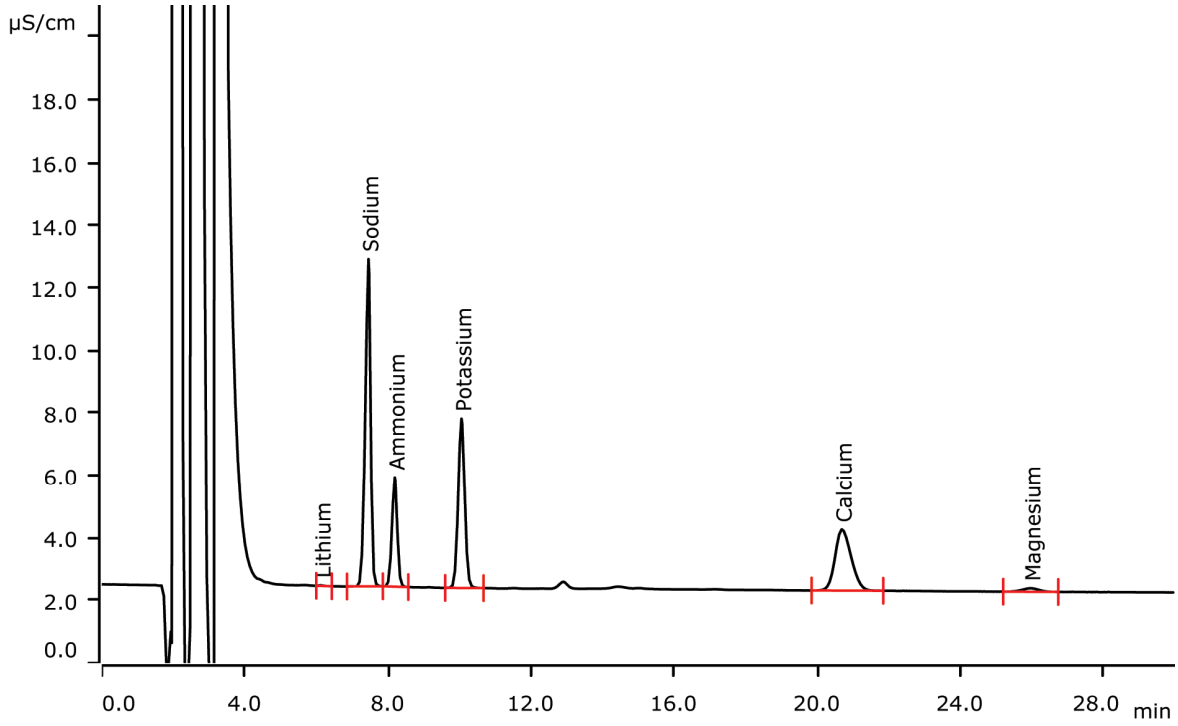
IC Application Note C–149

Determination of cations on the surface of printed circuit boards



Cleanliness is an indispensable condition in production of electronics. Especially ionic contamination can reduce the quality of products. Here, the determination of cations 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-S-317 for anion determination.

Results

Cation	Conc. [µg/cm^2]	Cation	Conc. [µg/cm^2]
Lithium	< 0.001	Potassium	0.872
Sodium	0.746	Calcium	0.475
Ammonium	0.192	Magnesium	0.016

Metrohm

Sample

Printed circuit board (PCB)

Sample preparation

The PCBs 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 C 4 - 250/4.0	6.1050.430
Metrosep C 4 Guard/4.0	6.1050.500

Solutions

Eluent (941 Eluent Production Module)	1.7 mmol/L nitric acid 1.0 mmol/L dipicolinic acid
Extraction solution	10% isopropanol in ultrapure water

Analysis

Direct conductivity detection

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)	2.800.0020
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

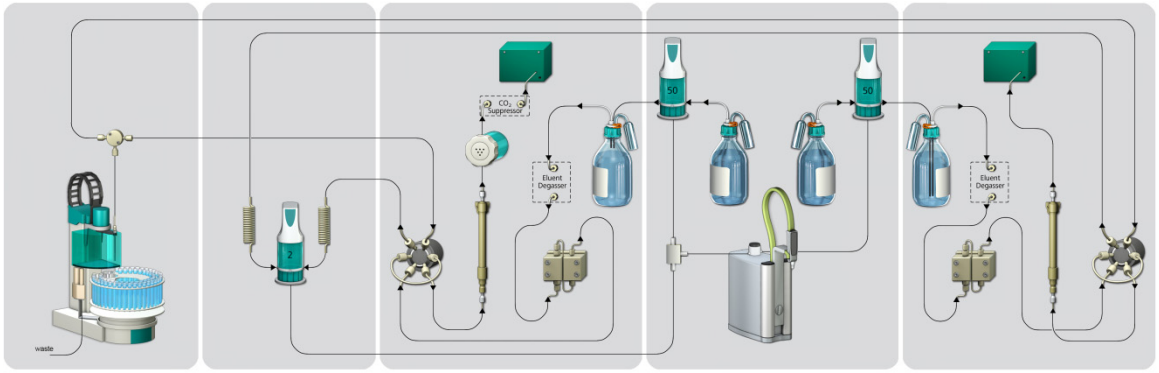
Flow rate	1.0 mL/min
Injection volume	100 µL (MiPT)
P_{max}	20 MPa
Recording time	30 min
Column temperature	45 °C

Calibration MiPT

Calibration range	Factor of 5
Standard solution:	
Lithium	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

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.



Sample Processor | Dosino for MiPT | Anion channel | Eluent preparation ELGA PURELAB flex 5 | Cation channel