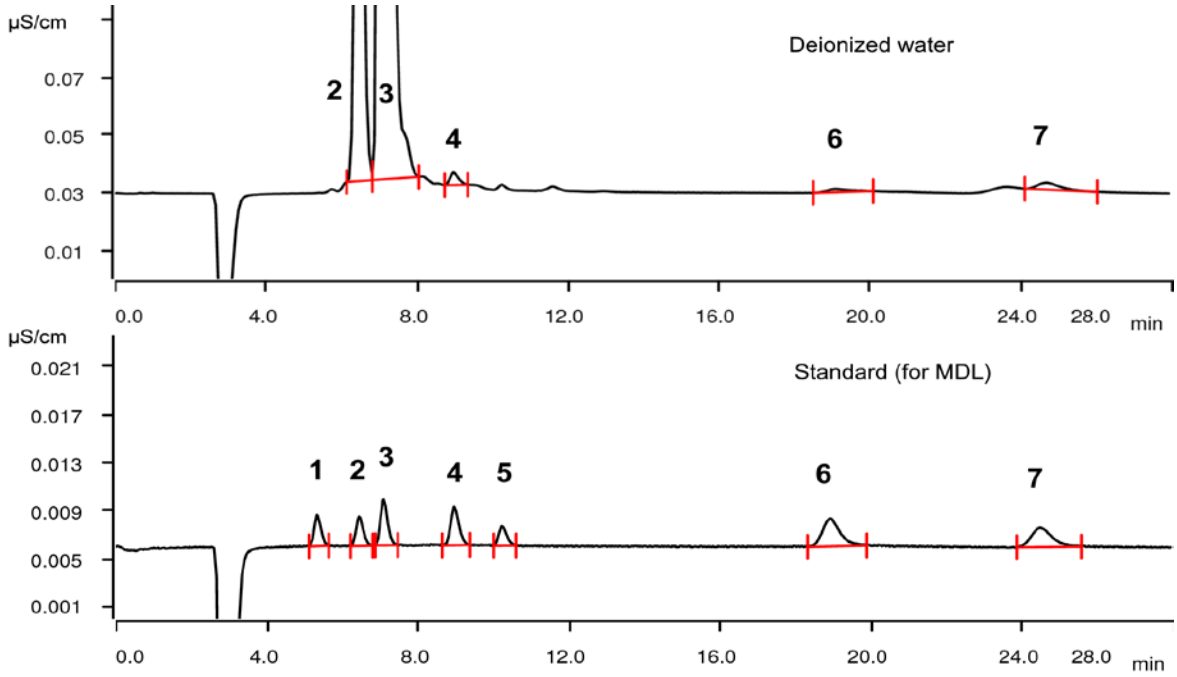
IC Application Note CS–013

Cations in deionized water and calculation of LOD and MDL of MiPCT



Trace cation analysis in high purity water (sub-µg/L range) requires cation chromatography after sequential suppression and intelligent Preconcentration Technique (MiPCT). Trace cations in deionized water (DI) are determined and the method detection limit (MDL according to US EPA) as well as the limit of detection (LOD = 3 x S/N) is calculated. MDL and LOD are very similar in the lowest ng/L range for this setup with 6 mL preconcentration volume.

Results

Cation	Conc. DI [µg/L]	Conc. std. [ng/L]	MDL [ng/L]	LOD [ng/L]	Cation	Conc. DI [µg/L]	Conc. std. [ng/L]	MDL [ng/L]	LOD [ng/L]
1 Li^+	n.d.	10.9	1.1	0.8	4 K^+	0.08	66.3	7.3	3.8
2 Na^+	1.82*	31.7	1.9	2.3	6 Mg^{2+}	0.05	64.0	6.3	5.4
3 NH_4^+	13.67*	34.4	2.6	1.6	7 Ca^{2+}	0.14	100.7	10.5	12.0

* quantified with preconcentration of 300 µL // Peak 5 corresponds to rubidium in the eluent

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Sample

Deionized water

Sample preparation

Metrohm intelligent Preconcentration Technique (MiPCT).

Columns

Metrosep C Supp 1 - 250/4.0	6.1052.430
Metrosep C Supp 1 Guard/4.0	6.1052.500
Metrosep C PCC 1 HC/4.0	6.1010.310
Metrosep I Trap 1 - 100/4.0	6.1014.200

Solutions

Eluent (prepared by 941)	4.0 mmol/L nitric acid 100 µg/L rubidium
Suppressor regenerant	70 mmol/L sodium carbonate 70 mmol/L sodium hydrogen carbonate
Rinsing solution	STREAM

Parameters

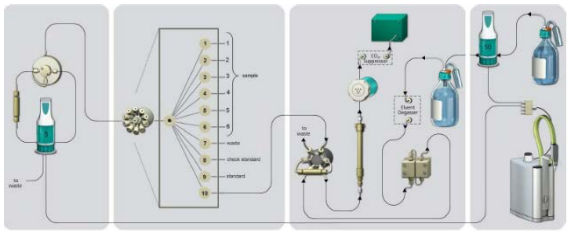
Flow rate	1.0 mL/min
Injection volume	6000 µL
P_{max}	15 MPa
Recording time	28 min
Column temperature	40 °C

Analysis

Conductivity detection after sequential suppression

Instrumentation

940 Professional IC Vario ONE/SeS	2.940.1400
IC Conductivity Detector	2.850.9010
942 Extension Module Vario LQH	2.942.0070
2 x 800 Dosino	2.800.0010
MSM-HC Rotor C	6.2842.200
IC equipment: Dosino regeneration	6.5330.190
941 Eluent Production Module	2.641.0010
Purelab® flex 6	-



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