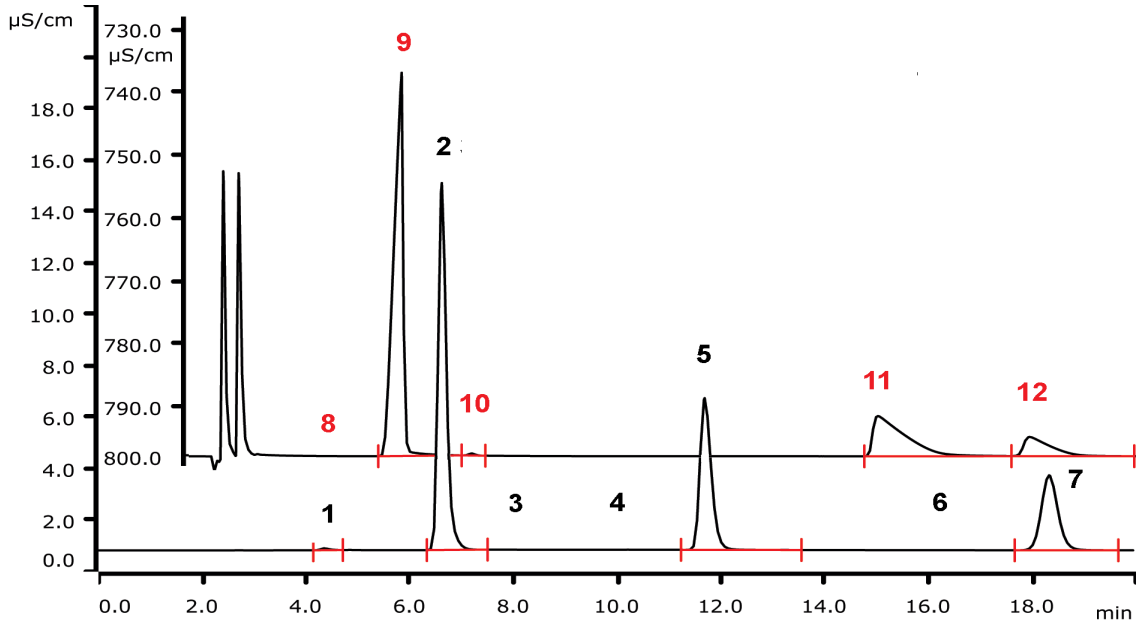
IC Application Note S–347

Comprehensive water analysis with VoltIC Professional 1



VoltIC Professional 1 is the perfect combination of voltammetry and ion chromatography for the fully automated analysis of anions, cations, and heavy metals (e.g., Zn, Cd, Pb, Cu): multiparameter water analysis out of one hand.

Results

IC		IC / voltammetry	
1 Fluoride	0.05 mg/L	9 Sodium	105.8 mg/L
2 Chloride	8.2 mg/L	10 Potassium	0.7 mg/L
3 Nitrite	n.d.	11 Calcium	17.8 mg/L
4 Bromide	n.d.	12 Magnesium	21.8 mg/L
5 Nitrate	8.1 mg/L	Zinc	17.4 µg/L
6 Phosphate	n.d. mg/L	Cadmium	n.d.
7 Sulfate	4.9 mg/L	Lead	1.0 µg/L
8 Lithium	n.d. mg/L	Copper	51.7 µg/L

Metrohm

Method description

Sample

Tap water

Sample preparation

None

Columns

Metrosep A Supp 7 - 150/4.0	6.1006.620
Metrosep A Supp 4/5 Guard/4.0	6.1006.500
Metrosep C 4 - 150/4.0	6.1050.420
Metrosep C 4 Guard/4.0	6.1050.500

Electrodes

Multi-Mode electrode pro Silanized capillaries	6.1246.120 6.1226.050
Ag/AgCl/KCl (3 mol/L) reference electrode. Bridge electrolyte c(KCl) = 3 mol/L	6.0728.120 6.1245.010
Separate Pt rod electrode	6.0343.100

Solutions

Eluent anions	3.6 mmol/L sodium carbonate
Suppressor regenerant	100 mmol/L sulfuric acid
Rinsing solutions (IC)	STREAM
Eluent cation	1.7 mmol/L nitric acid 0.7 mmol/L dipicolinic acid
Supporting electrolyte voltammetry	Ammonium acetate buffer pH = 4.6 2 moL/L acetic acid 1 moL/L ammonium hydroxid

Analyses

Suppressed conductivity (IC, anions)	
Non-suppressed conductivity (IC, cations)	
Differential pulse anodic stripping voltammetry (DP-ASV)	
Voltammetry measuring solution	10 mL sample + 1 mL supporting electrolyte

Parameters

IC, anions:	
Flow rate	0.7 mL/min
Injection volume	20 µL
P_{max}	15 MPa
Recording time	20 min
Column temperature	45 °C

IC, cations:	
Flow rate	0.9 mL/min
Injection volume	10 µL
P_{max}	25 Mpa
Recording time	22 min
Column temperature	45 °C

Voltammetry:	
Calibration	Standard addition
Mode	DP (differential pulse)
Working electrode	HMDE
Drop size	4
Stirrer	2000 rpm
Potential 1	-1.15 V
Waiting time 1	90 s
Start potential	-1.15 V
End potential	0.15 V
Potential step	0.006 V
Potential step time	0.1 s
Sweep rate	0.06 V/s
Pulse amplitude	0.05 V
Pulse time	0.04 s
Peak potential Zn	-1.0 V
Peak potential Cd	-0.6 V
Peak potential Pb	-0.4 V
Peak potential Cu	0 V

Method description

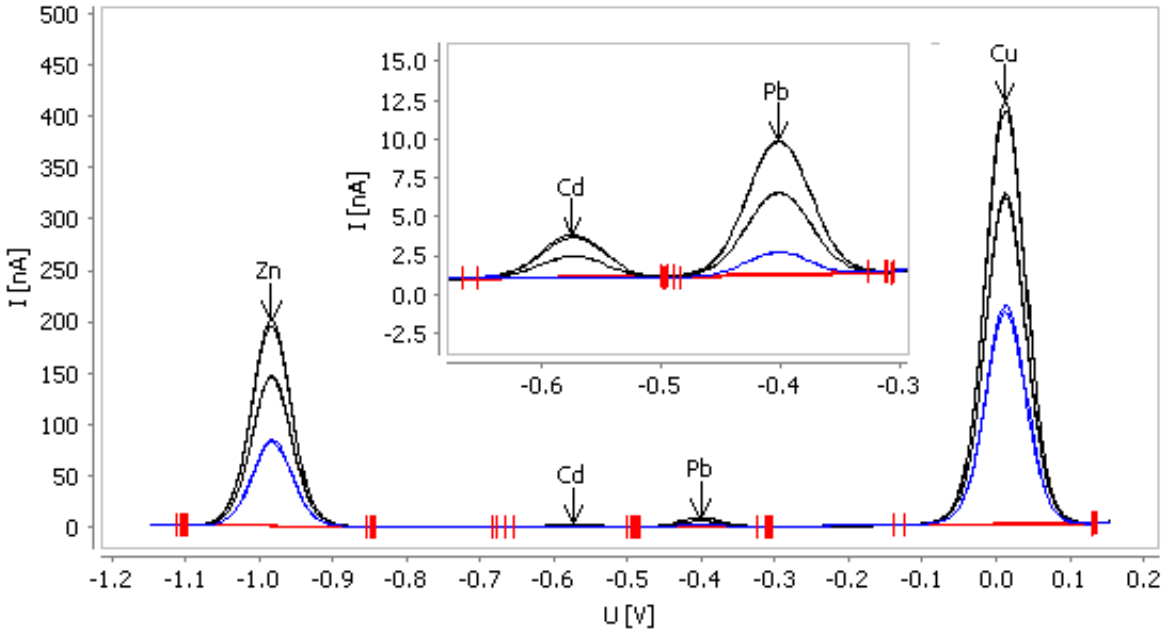
Instrumentation IC

940 Professional IC TWO/SeS/PP	2.940.2500
2 × IC Conductivity Detector	2.850.9010
858 Professional Sample Processor	2.858.0010
800 Dosino	2.800.0010

Instrumentation Voltammetry

884 Professional VA semiautomated for MME	2.884.1110
843 Membrane Pump Station	2.843.0240
Electrode equipment with MME pro	6.5339.030

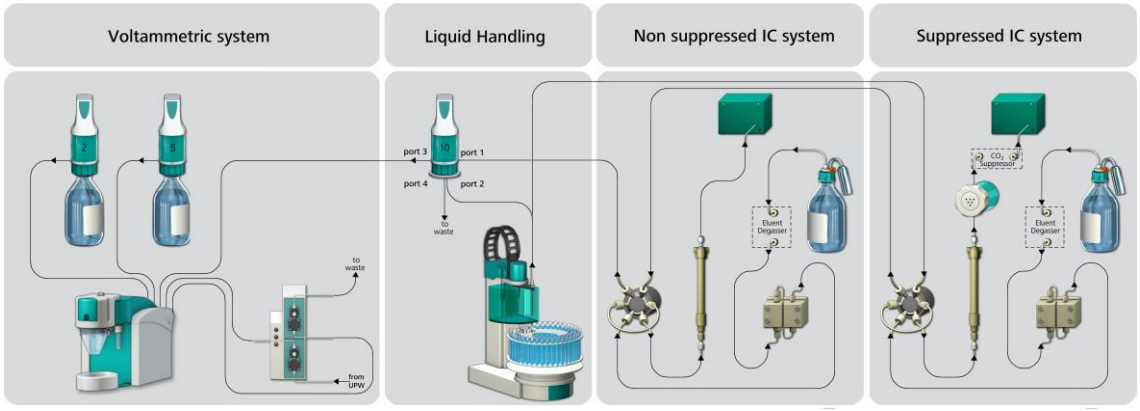
Voltammogram



Metrohm

Method description

Flow chart



The liquid-handling Dosino fills the loops of both ion chromatographs and transfers the sample to the VA measuring vessel.

Metrohm