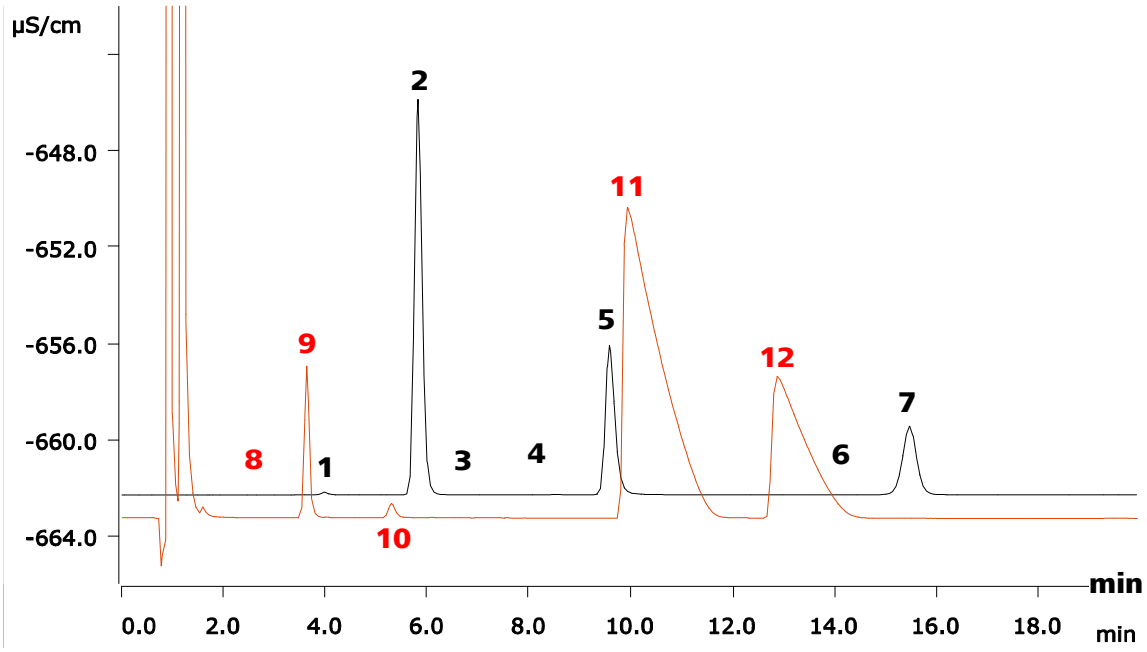
IC Application Note S–301

Comprehensive water analysis with VoltIC pro I



VoltIC pro I 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): comprehensive water analysis out of one hand.

Results

IC		IC / voltammetry	
1 Fluoride	0.055 mg/L	9 Sodium	5.779 mg/L
2 Chloride	6.074 mg/L	10 Potassium	1.653 mg/L
3 Nitrite	0.009 mg/L	11 Calcium	106.18 mg/L
4 Bromide	0.014 mg/L	12 Magnesium	21.09 mg/L
5 Nitrate	7.676 mg/L	Zinc	94.0 µg/L
6 Phosphate	0.014 mg/L	Cadmium	n.d.
7 Sulfate	4.680 mg/L	Lead	0.6 µg/L
8 Lithium	0.005 mg/L	Copper	6.3 µg/L

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Method description

Sample

Tap water

Sample preparation

None

Columns

Metrosep A Supp 5 - 150/4.0	6.1006.520
Metrosep A Supp 4/5 Guard/4.0	6.1006.500
Metrosep C 4 - 100/4.0	6.1050.410
Metrosep C 4 Guard/4.0	6.1050.500

Solutions

Eluent anions	3.6 mmol/L sodium carbonate 1.0 mmol/L sodium hydrogen carbonate
Suppressor regenerant	100 mmol/L sulfuric acid
Rinsing solutions (IC)	Ultrapure water
Eluent cation	1.7 mmol/L nitric acid 0.7 mmol/L dipicolinic acid
Working electrolyte	Acetate buffer pH = 4.6
Rinsing solution (VA)	1.0 mL/L nitric acid in ultrapure water

Analyses

Suppressed conductivity (IC, anions)
Non-suppressed conductivity (IC, cations)
Differential pulse voltammetry (DPV)

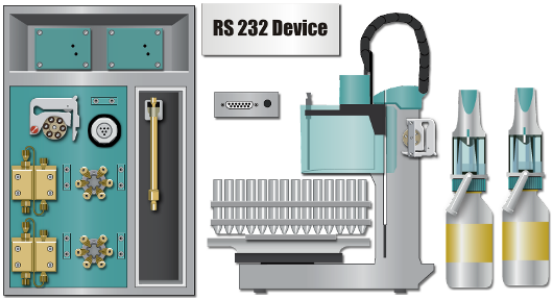
Parameters

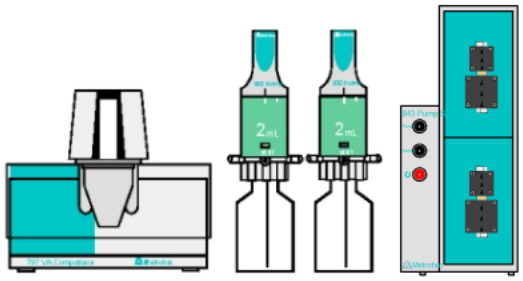
IC, anion:	
Flow rate	0.7 mL/min
Injection volume	20 µL
P_{max}	15.0 MPa
Recording time	20 min
Column temperature	30 °C

IC, cation:	
Flow rate	0.9 mL/min
Injection volume	10 µL
P_{max}	20.0 MPa
Recording time	20 min
Column temperature	30 °C

Voltammetry:	
Mode	DP (differential pulse)
Calibration	Standard addition
Addition	Automatic
Electrode	HMDE
Drop size	4
Stirrer	2000 rpm
Sweep	
Start potential	-1.15 V
End potential	0.15 V
Pulse amplitude	0.05 V
Pulse time	0.04 s
Voltage step	0.006 V

Method description





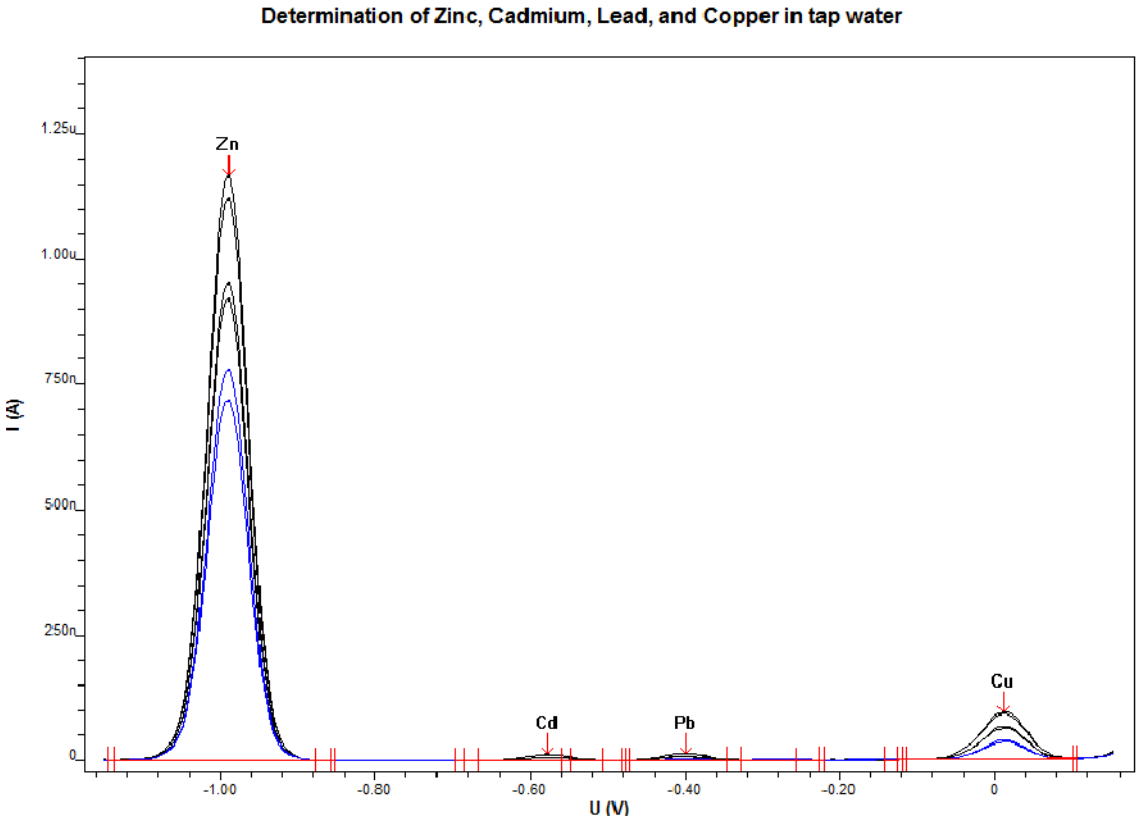
Instrumentation IC

850 Professional IC AnCat – MSM – MCS	2.850.3040
2 × IC Conductivity Detector	2.850.9010
815 Robotic USB Sample Processor XL (2T/2P)	2.815.0110
2 × 800 Dosino	2.800.0010

Instrumentation Voltammetry

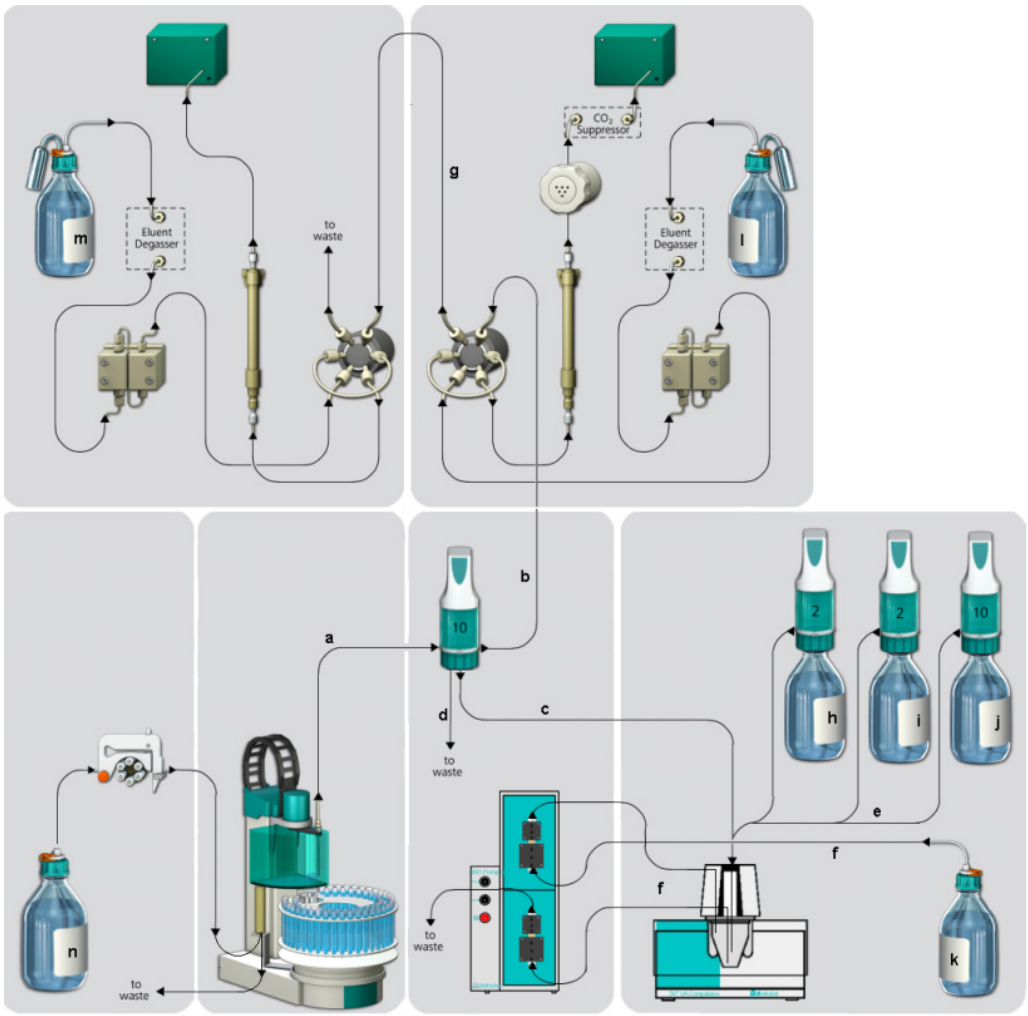
797 VA Computrace	2.797.0010
843 Pump Station	2.843.0140
2 × 800 Dosino	2.800.0010

Voltammogram



Method description

Flow chart



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

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