

Summary

The combination of 850 Professional IC, 858 Professional Sample Processor, Dosino and MagIC Net™ software offers a variety of automated ion chromatographic sample preparation and calibration techniques available as an anion, cation or dual channel system. Calibration is straightforward and requires only one multi-ion standard.

Inline calibration allows to calibrate in the ppt range by using just one stable standard solution at the ppb level. By switching the valves one, two or more times different calibration concentrations at the ultra-trace level can be created with unprecedented reproducibility. The inline preconcentration technique uses a preconcentration column and is ideally suited for trace analysis in complex matrices, especially when combined with matrix elimination. Besides facilitating the preparation of g/L to ng/L calibration graphs Metrohm's intelligent techniques are capable of logical decision making. While Metrohm's intelligent Partial Loop technique (MIPT) allows samples with a wide concentration range to be injected without previous manual dilution, the intelligent inline dilution technique, after the first sample injection, compares peak areas, calculates, if necessary, the dilution factor, dilutes and automatically re-injects the sample.

The presented inline techniques allow to rationalize the time-consuming, error-prone and cost-intensive manual preparation of standard solutions. They guarantee that the determined sample concentrations always lie within the calibration range. Higher sample throughputs as well as lower analysis costs and improved data reliability are achieved.

Introduction

Quantification in ion chromatography (IC) requires a calibration that covers the defined measuring range. The necessary calibration standards are usually prepared from a concentrated standard by appropriate manual dilution. This procedure is both time-consuming and error-prone. Metrohm's fully automated intelligent inline systems avoid these problems.

The Metrohm Dosino is a precise and extremely flexible dosing device. Liquid handling and dosing tasks can be completely automated by using control procedures included in the IC software, the sample table serving as the user interface. Methods including sample preparation procedures save money, reduce the workload, shorten the preparation time, extend the measuring range and improve the accuracy and reproducibility of the results.

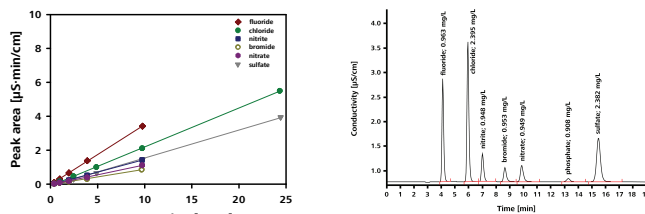
On the basis of four fully automated inline techniques, a g/L to ng/L measuring range is available for the determination of both anions and cations.

Intelligence

MagIC Net™ controls all data and components of the intelligent ion chromatography system. The combination of the intelligent software and hardware (iPumps, iColumns, iDetectors and intelligent Dosing Units) allows the systems to compare results, take decisions and carry them out. Custom-tailored systems provide convenient handling, increased user comfort and data reliability, minimize the risk of operating errors and relieve the users of many routine tasks.

Inline dilution

Application areas: strongly loaded waste water, food and beverage samples
Principle: calibration standards are produced by applying the respective dilution factors to one single concentrated multi-ion standard
Benefits: intelligent calculation of the dilution factor can be combined with ultrafiltration and dialysis



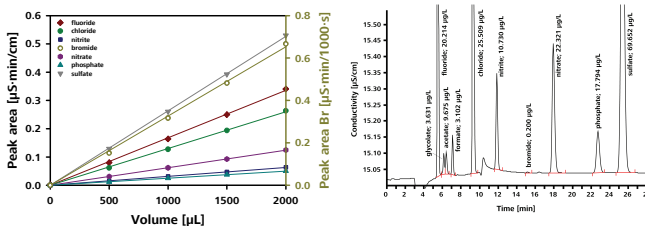
	Fluoride	Chloride	Nitrite	Bromide	Nitrate	Sulfate
Correlation coefficient	0.999984	0.999993	0.999972	0.999981	0.999981	0.999976
RSD [%]	0.920	0.601	1.288	1.076	1.078	1.182



Technique	Concentration range	Calibration range	Sample concentration range	Combination possibilities
Inline dilution	mg/L...g/L	1:100	1:10000	ultrafiltration dialysis internal loop injection
Partial loop injection	µg/L...mg/L	1:100	1:10000	-
Inline preconcentration	µg/L	1:40	1:1600	matrix elimination
Inline calibration	ng/L...µg/L	1:20	1:800	matrix elimination neutralization

Inline preconcentration

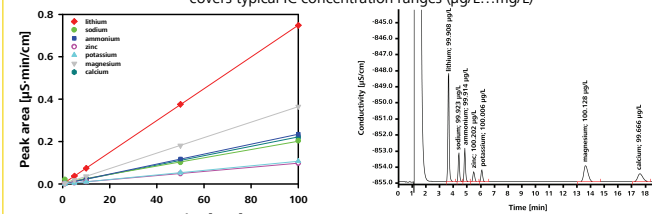
Application areas: trace analysis in samples from nuclear power plants
Principle: sequential preconcentration steps with varying sample volume
Benefits: trace analysis in challenging matrices can be coupled to matrix elimination



	Fluoride	Chloride	Nitrite	Bromide	Nitrate	Phosphate	Sulfate
Correlation coefficient	0.999612	0.999980	0.999984	0.999827	0.999598	0.999948	0.999974
RSD [%]	0.290	0.330	0.800	0.980	0.180	0.240	0.150

Partial loop injection

Application areas: water samples, process water, «Produced water» and conventional power plant samples
Principle: calibration is performed by injecting different volumes of one single concentrated multi-ion standard
Benefits: intelligent calculation of the injection volume covers typical IC concentration ranges (µg/L...mg/L)

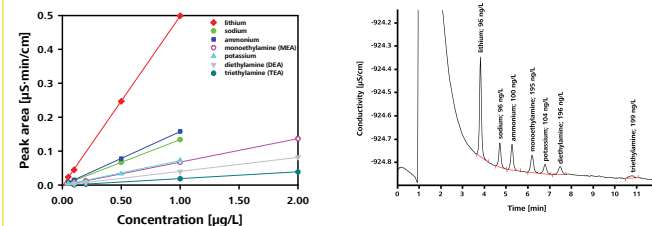


	Lithium	Sodium	Ammonium	Zinc	Potassium	Magnesium	Calcium
Correlation coefficient	0.999996	0.999996	0.999995	0.999938	0.999998	0.999992	0.999900
RSD [%]	0.409	0.421	0.448	1.576	0.296	0.577	2.039



Inline calibration

Application areas: ultra-trace analysis in samples from nuclear power plants and the semiconductor industry
Principle: sequential loop filling and preconcentration steps
Benefits: ppt analysis based on a single stable ppb standard can be combined with matrix elimination and neutralization



	Lithium	Sodium	Ammonium	MEA ¹	Potassium	DEA ²	TEA ³
Correlation coefficient	0.999971	0.999963	0.999986	0.999898	0.999333	0.999809	0.999998
RSD [%]	1.015	1.122	0.699	1.916	4.869	2.627	0.252

¹monoethylamine, ²diethylamine, ³triethylamine