HIGH PERFORMANCE, ROBUST, EASY-TO-USE MULTI-ELEMENTAL ANALYSIS

SOLATION
ICP-MS

Advion Interchim
scientific

INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY

Advion Interchim Scientific™ has produced the SOLATION® ICP-MS - the ultimate instrument for multi-element analysis, providing high sensitivity measurement of trace elements from a wide range of matrices. Designed for ease-of-use, with intuitive software, the SOLATION® ICP-MS is the ideal instrument for environmental, pharmaceutical, food safety, agricultural, and clinical laboratories everywhere.

SOLATION ICP-MS

INCREASE YOUR THROUGHPUT, DECREASE YOUR WORKLOAD

The thoughtfully designed SOLATION® ICP-MS puts the power of trace, multi-elemental analysis in your hands by simplifying and optimizing the typical ICP-MS workflow, inside and out.

The SOLATION® ICP-MS offers a state of the art quadrupole deflector that ensures the analyzer and detector stay clean, and improves S/N by preventing neutrals and particles from entering the analyzer.

ADVANCED, INTUITIVE SOFTWARE FOR SPEED AND EASE OF USE

The SOLATION® ICP-MS is delivered with a full suite of robust, intuitive software designed to provide answers with the fewest clicks, including:

ICP-MS Express: Provides seamless workflow to configure and control the instrument with integrated control of peripherals, including: peristaltic pump, liquid autosampler and Rapid Sample Interface. The program offers an easy to use interface for system control, method development, sample entry and data acquisition.

Quant Express: Simple user interface for batch processing of ICP-MS data for versatile quantitative analysis and easy creation of reports.

MAXIMIZE EFFICIENCIES WITH ICP-MS

For quantitative, elemental analyses, the SOLATION® ICP-MS is the ideal system for R & D laboratories seeking the perfect mix of performance and ease-of-use.

ADVANCE YOUR APPLICATIONS WITH MULTI-ELEMENTAL ANALYSIS AT YOUR FINGERTIPS

Adding the SOLATION® ICP-MS to your lab opens up a world of possibilities for environmental, biomedical, food, agriculture and geological testing and research.

Food and Agriculture: Ensure the quality and safety of food and raw ingredients by relying on the power of ICP-MS for full elemental analysis. Ideal for meeting regulatory requirements for baby food and crop safety.

Environmental Analysis: Ensure Earth's most precious resources remain viable with the help of ICP-MS technology. Determine purity of drinking water, well water, waste water and soils, and use the system as a tool to monitor industrial site remediation.

Biomedical: Monitor biological matrices, including urine, serum, plasma, whole blood and tissue samples for toxicity and nutritional indicators. Satisfy the allowable limits in pharmaceutical and clinical applications with a single instrument.

INTRODUCING TLC/ICP-MS FOR PREP-FREE SAMPLE ANALYSIS OF SWIPE SURFACES

Advion Interchim Scientific offers a new, novel sample introduction technique, coupling the best-selling Plate Express™ automated microextraction tool with the SOLATION® ICP-MS for a new technique known as TLC/ICP-MS.

Using a swipe surface or TLC plate, users can now introduce a sample to the ICP-MS in minutes, offering a significant advancement from the traditional workflow. Obtain isotopic ratio measurements faster and easier than ever before.

THE SOLATION® ICP-MS

Ion extraction cones

Triple-cone ion extraction. The third extraction cone, followed by an Einzel lens, are electrically controlled to maximize transmission of ions into the vacuum system.

RF coil

Plasma generation with water cooled RF coil using industry standard 27 MHz variable frequency generator for rapid impedance matching and ultimate performance with challenging matrices.

Torch

One-piece torch with fast, one-step connection of argon and igniter. Silver guard shield to prevent secondary discharge.

Nebulizer

High efficiency concentric nebulizer available in quartz and PFA for compatibility with the widest range of flow rates and sample composition.

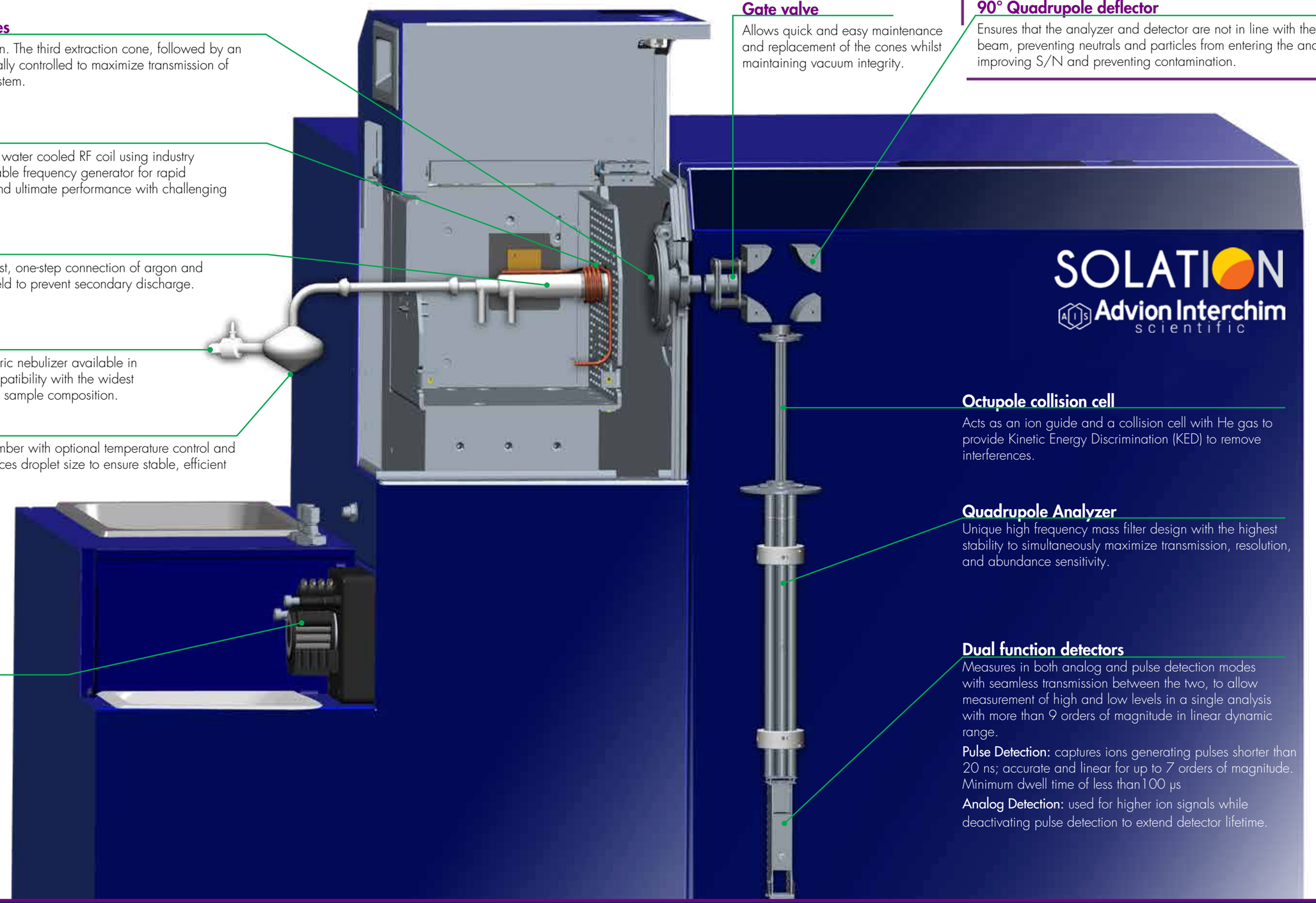
Spray chamber

The cyclonic spray chamber with optional temperature control and dilution gas further reduces droplet size to ensure stable, efficient plasma.

Peristaltic pump

Integrated 4-channel, 12-roller pump for maximum flexibility and ultra-low pulsation.

Software controlled flow rate from low µL/min to mL/min.



Gate valve

Allows quick and easy maintenance and replacement of the cones whilst maintaining vacuum integrity.

90° Quadrupole deflector

Ensures that the analyzer and detector are not in line with the plasma beam, preventing neutrals and particles from entering the analyzer, improving S/N and preventing contamination.

Octupole collision cell

Acts as an ion guide and a collision cell with He gas to provide Kinetic Energy Discrimination (KED) to remove interferences.

Quadrupole Analyzer

Unique high frequency mass filter design with the highest stability to simultaneously maximize transmission, resolution, and abundance sensitivity.

Dual function detectors

Measures in both analog and pulse detection modes with seamless transmission between the two, to allow measurement of high and low levels in a single analysis with more than 9 orders of magnitude in linear dynamic range.

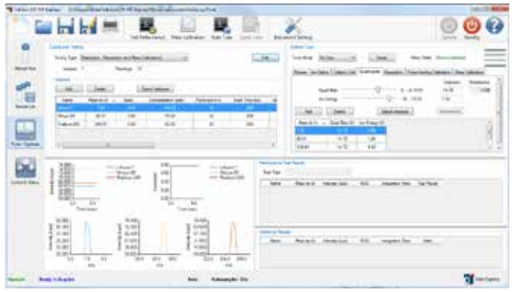
Pulse Detection: captures ions generating pulses shorter than 20 ns; accurate and linear for up to 7 orders of magnitude. Minimum dwell time of less than100 µs

Analog Detection: used for higher ion signals while deactivating pulse detection to extend detector lifetime.

SOLATION® ICP-MS SOFTWARE PACKAGE

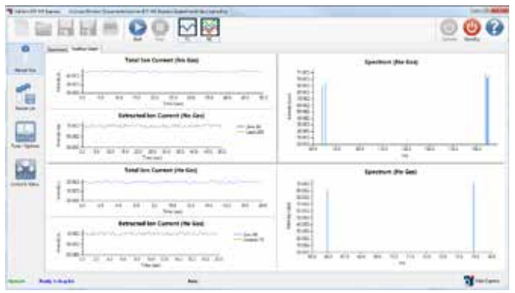
A modern user interface to help simplify method development, experiment creation and data acquisition – starting and completing your run with just a single click.

Experience a simplified user interface and streamlined workflow for optimized, automatic calibration and tuning.



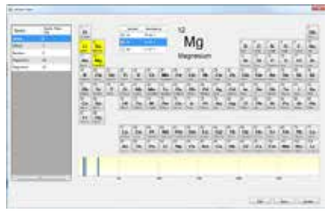
- Autotune, including x,y position of torch, for resolution and maximum sensitivity with minimum creation of oxides and doubly charged species.
- Optimize mass calibration, detector gain and pulse to analog factor
- Reporting on 9 performance tests for instrument specifications:
  - › Background
  - › Abundance Sensitivity
  - › Resolution and Mass Calibration
  - › Detection Limit
  - › Sensitivity
  - › Oxide
  - › Doubly Charged
  - › Isotope Ratio Precision
  - › Pulse/Analog Calibration
- Real time display of spectrum and time-resolved signals

Achieve optimized data acquisition with real time graphing of spectrum and time resolved signals during manual runs or batch acquisition.



With ICP-MS Express, data collection is automatically optimized by selecting the pulse or analog data stream for each element depending on signal intensity. Thanks to built-in onboard databases, users can access easy, automatic element selection and interference correction, with the ability to utilize:

- A graphical periodic table to select elements to analyze



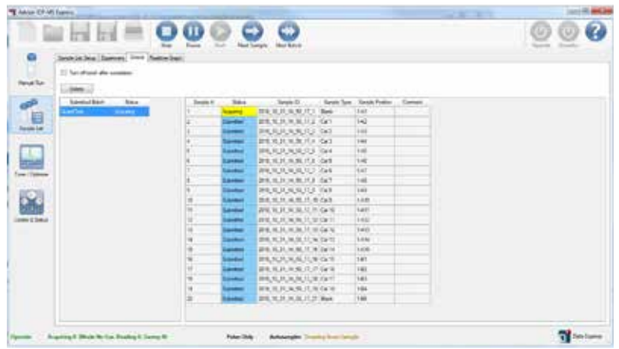
- NIST isotope table
- Standard interference correction equations (user editable)
- Standard list of excluded masses (user editable)

Access qualitative, semi-quantitative and full quantitative data acquisition modes

- View raw data from pulse, analog or auto signals in qualitative mode
- Semi quantitative feature allows scanning for unknowns during quantitative analyses

UPGRADE YOUR WORKFLOW WITH ICP-MS EXPRESS

Optimized sample list for easy workflow



ICP-MS Express simplifies your setup to quickly and easily create experiment batches.

- Multiple sample lists can be submitted.
- Sample lists can be copied and pasted from spreadsheets like Excel
- Simple editing and reprocessing.
- Supports autosampler position and vial size selection

Quantitative calibration curve for meticulous accuracy

With ICP-MS Express, the quantitation method supports:

- External standard (with or without internal standard)
- Elemental and Isotope Ratio reporting
- Quality Control standards
- Standard addition

Automatically applies interference corrections, if selected, and records semi quantitative results in the same report

NATURAL PRODUCTS, FOOD AND AGRICULTURE

Fast and reliable testing methods for safety and nutrition in plant material and foodstuffs, including screening and speciation analysis of raw ingredients, final products, and beverages.

APPLICATION STUDY:

ANALYZING HEAVY METAL IN PLANTS WITH THE SOLATION® ICP-MS

The SOLATION® ICP-MS is the preferred method for heavy metal analysis of plant materials. The system is suitable for the accurate, robust and reproducible analysis of heavy metals in plant material – greatly exceeding the requirements of USP <233> protocol.

PDE limits for states that use the USP guidelines for heavy metal exposure by inhalation.

USP<233> also defines the accuracy, repeatability, and ruggedness required for the analysis of these toxic elements:

Accuracy	Repeatability	Ruggedness
The matrix and materials under investigation must be spikes with target elements at concentrations that are 50%, 100%, and 150% of the maximum permitted daily exposure (PDE). Mean spike recoveries for each target element must be within 70%-150% of the actual.	Six independent samples of the material under investigation must be spiked at 100% of the target limits defined and analyzed. The measured percent relative standard deviation (%RSD) must not exceed 20% for each target element.	Carrying out the repeatability measurement testing procedure by analyzing the six repeatability test solutions either on different days, either with a different instrument or by a different analyst. The %RSD of the 12 replicates must be less than 25% for each target element.

Accuracy: Table 1
The samples were spiked at 50%, 100%, and 150% of the action level (Table 2 above) and the percent recoveries calculated. Spike recoveries were all between 92.5% - 114.1%, well within the 70-150% range defined by the USP method.

Table 1: Accuracy- Spike recoveries

Spike Recoveries Averages	^{75}As ng/g	^{111}Cd ng/g	^{202}Hg ng/g	^{208}Pb ng/g
unspiked avg.	42.2	305.6	5.7	52.5
50% Spike avg.	142.0	402.9	52.6	314.4
% recovery	**99.8%**	**97.4%**	**93.6%**	**104.8%**
100% Spike avg.	242.7	501.4	99.6	622.9
% recovery	**100.3%**	**97.9%**	**93.8%**	**114.1%**
150% Spike avg.	342.2	637.6	144.5	818.8
% recovery	**100.0%**	**110.7%**	**92.5%**	**102.2%**

Repeatability: Table 2
Six samples were spiked at 100% of the action level and digested. The results that are summarized in Table 7 show that the %RSD of the measured concentrations are between 1.3% - 3.7%, demonstrating repeatability well below the 20% limit.

Table 2: USP<233> Repeatability results

Repeatability	^{75}As ng/g	^{111}Cd ng/g	^{202}Hg ng/g	^{208}Pb ng/g
100% spk 1	247.60	512.12	94.94	628.41
100% spk 2	242.88	529.00	99.86	558.30
100% spk 3	247.44	505.00	92.70	569.59
100% spk 4	243.11	535.74	94.65	569.80
100% spk 5	241.05	530.53	99.59	565.71
100% spk 6	242.42	520.98	104.68	578.92
Average	244.08	522.23	97.74	578.46
SD	2.8	11.8	4.4	25.4
%RSD (< 20%)	**1.1%**	**2.3%**	**4.6%**	**4.4%**

Ruggedness: Table 3
The repeatability sample set was prepared and run on a different day by a different analyst. The results from that run are combined with the previous run to determine the ruggedness. The ruggedness values are similar to the repeatability values and the measured %RSD (2.4 – 4.0%) are comfortably under the 25% limit defined by the USP method. The results are summarized in Table 8.

Table 3: USP<233> Ruggedness results

Ruggedness	^{75}As ng/g	^{111}Cd ng/g	^{202}Hg ng/g	^{208}Pb ng/g
Day 1 spike 1	247.60	512.12	94.94	628.41
Day 1 spike 2	242.88	529.00	99.86	558.30
Day 1 spike 3	247.44	505.00	92.70	569.59
Day 1 spike 4	243.11	535.74	94.65	569.80
Day 1 spike 5	241.05	530.53	99.59	565.71
Day 1 spike 6	242.42	520.98	104.68	578.92
Day 2 spike 1	239.12	488.82	102.34	625.59
Day 2 spike 2	249.26	504.43	103.79	574.59
Day 2 spike 3	233.68	478.98	98.79	564.66
Day 2 spike 4	246.33	512.50	95.95	568.29
Day 2 spike 5	244.67	508.67	97.66	570.90
Day 2 spike 6	229.10	496.94	97.83	583.11
Average	242.22	510.31	98.57	579.82
SD	5.9	17.1	3.7	23.0
%RSD (< 25%)	**2.4%**	**3.3%**	**3.8%**	**4.0%**

NIST 1575a Results: Table 4
The results for the NIST SRM are summarized in Table 9. The values for As and Hg were less than the low standard in solution but there is good agreement between the experimental values and the certified values.

Table 4: NIST 1575a Pine Needles SRM

NIST 1575 Pine ng/g Certified Values	^{75}As **39.0**	^{111}Cd **233.0**	^{202}Hg **39.9**	^{208}Pb **167.0**
Day 1 avg.	38.4	222.8	36.0	169.3
%error	**-1.61%**	**-4.37%**	**-9.83%**	**1.39%**
Day 2 avg.	39.7	231.6	35.3	168.2
%error	**1.86%**	**-0.59%**	**-11.54%**	**0.69%**

THE SOLATION® ICP-MS GREATLY EXCEEDS THE REQUIREMENTS OF USP <233>.

SOIL ANALYSIS

The combination of the quadrupole deflector and the collision cell minimizes drift and ensures accuracy and precision over time. The reported method benefits from the fast collision cell gas switching capabilities of the SOLATION® to analyze a wide range of elements in soil for rapid, accurate and reproducible results.

APPLICATION STUDY:

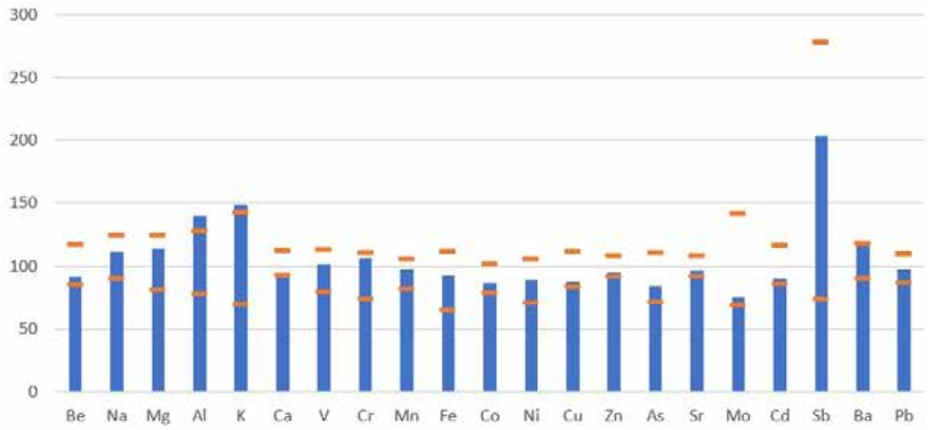
ANALYZING HEAVY METALS IN SOIL WITH THE SOLATION® ICP-MS

The SOLATION® ICP-MS offers an ideal method for routine elemental analysis. The system is suitable for elemental analysis of soil that meets and exceeds EPA requirements. Demonstrated through the analysis of a group of unknown soil samples and a CRM, they were digested using EPA 3051a and analyzed according to method 6020a requirements.

EPA 6020a defines standards for the multi-elemental determination of analytes by ICP-MS in environmental samples.

Results & Discussion: The results summarized in Figure 1 show excellent agreement between the measured data for CRM2706 and the reported extracted levels for these elements. A slightly higher recovery was observed for K and Al, possibly due to variability in the extraction efficiency of this digestion method.

Figure 1: Certified reference material recovery data.



SAMPLE DIGESTED USING EPA 3051A, ANALYZED ACCORDING TO EPA METHOD 6020A, EXCEED EPA REQUIREMENTS.

SOLATION® ICP-MS IN BIOMEDICAL & PHARMACEUTICAL APPLICATIONS, BLOOD & PLASMA ANALYSIS

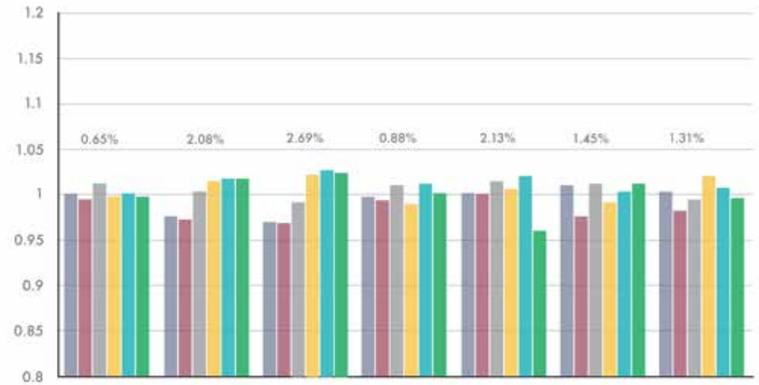
The reliability and high-throughput capabilities of the SOLATION® ICP-MS put it as the centerpiece of any modern bioanalytical lab.

APPLICATION STUDY:

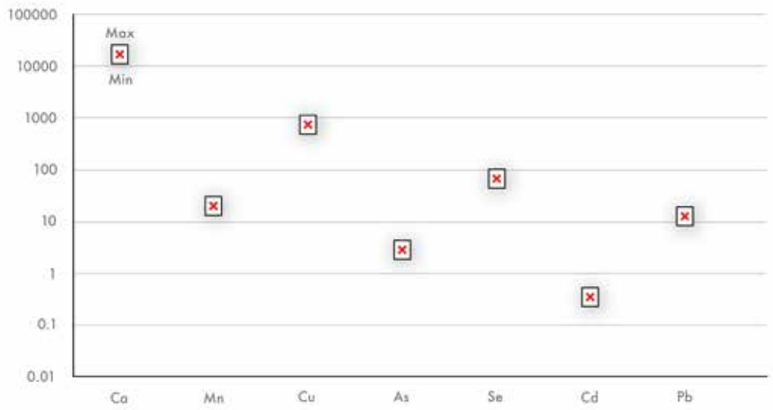
PLASMA ANALYSIS USING THE SOLATION® ICP-MS

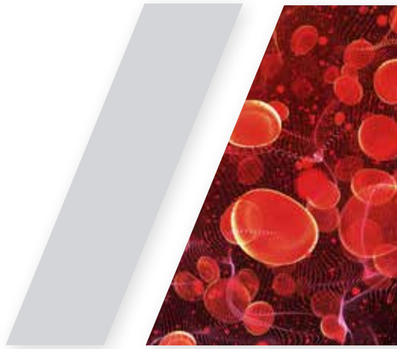
The SOLATION® ICP-MS is ideally suited for the elemental analysis of biological fluids including whole blood. The high sensitivity and wide dynamic range of the SOLATION® ICP-MS are particularly important for the simultaneous determination of trace levels of heavy metals, while measuring nutritionally relevant elements at higher levels.

Precision of six replicate analyses of blood samples



Accuracy vs 95% confidence limit of Seronorm Blood Level 1





SEE OUR FULL RANGE OF MASS SPECTROMETRY & FLASH CHROMATOGRAPHY SOLUTIONS

Advion Interchim Scientific provides an extensive range of innovative instrumentation with integrated novel sample introduction techniques and unique coupling to streamline your workflow and simplify your time in the lab.

Plate Express™ Automated Microextraction Reader

Plate Express™ provides a simple, automated means of obtaining mass spectra directly from TLC plates or swipe samples. The system can be combined with the Advion Interchim Scientific's expression® compact mass spectrometer or SOLATION® ICP-MS, creating a proprietary technique known as TLC/CMS, or TLC/ICP-MS. Using this technique, users can quickly and confidently identify products even in complex mixtures without additional sample preparation.

- Mass analysis of spots in <1 minute, avoiding system bottlenecks
- Avoid the risk of overloading the mass spectrometer – microextraction spots contain the ideal amount of sample for mass spectrometry
- Software controlled – spectra obtained within a few mouse clicks
- Simplify the process of obtaining spectra – ideal for multi-user labs

puriFlash® Flash & Preparative Chromatography Systems

The puriFlash® range offers ow to high pressure LC purification of small & large molecules with 3X detection UV, ELSD & MS. Combining easy-to-use features and best-in-class design, purifications by liquid chromatography is easier, intuitive, and even more productive than ever before.

- Routine to sophisticated RP purification of small organics, natural products, peptides and proteins.
- Avoid risk of product loss thanks to sensors, overpressure management, and pauses.
- Runs 24/7 and requires minimal service and training
- Easy, multi-profile software that requires minimal training with the InterSoft®X software for flash systems and Mass Express® software suite for mass spectrometry
- Fast and easy sample preparation with multi-mode mass spec and streamlined purification workflows
- Minimal bench space thanks to compact design

expression® CMS (Compact Mass Spectrometer)

The expression® family of compact mass spectrometers was developed with maximum versatility in mind. They allow users to switch rapidly between the many different sample introduction techniques required throughout the chemist's workflow; from simple direct probe analysis to ultra-high performance liquid chromatography and prep-scale purification.

The Advion Interchim Scientific expression® CMS offers a wide range of prep-free sampling techniques, including:

- Plate Express Microextraction/TLC Plate Reader for push-button analysis of TLC Plates
- ASAP® direct probe for one-touch analysis of liquid and solid samples
- puriFlash® integration for mass-directed purification
- HPLC and UHPLC coupling, including the Advion Interchim Scientific AVANT™ (U)HPLC

ASAP® Atmospheric Solids Analysis Probe

The ASAP direct analysis probe provides fast, simple, reliable mass analysis of solid and liquid samples without the need for sample preparation. The chemist simply dips the probe in a liquid, or rubs it on a solid sample, and inserts it through a port directly into the ion source yielding results in seconds. Ideal for:

- Reaction monitoring
- Compound identification
- Food safety
- Forensics
- Natural products
- Tablets

AVANT™ HPLC & UHPLC Chromatography Systems

Advion Interchim Scientific's range of AVANT™, high performance, liquid chromatography provides seamlessly integrated LC/CMS and LC/ICP-MS under the full control of Advion Interchim Scientific's simple, intuitive Mass Express software suite.

From the simplest manual injection HPLC to a fully automated, streamlined UHPLC system and everything in-between, the AVANT™ series can be configured to fit your analytical requirements and your budget.

The Advion Interchim Scientific AVANT™ series offers:

- HPLC and UHPLC
- UV and UV-Vis DAD
- Column oven
- Autosamplers with optional cooling
- Modular and stackable design
- High-pressure mixing with optional degassing

SOLATION® ICP-MS PRODUCT SPECIFICATIONS

Model Options

System Model Options

Available models	HM and E

Sample Interface

Sample Introduction

Peristaltic pump	4 channels 12 rollers
Spray chamber	T-controlled, Cyclonic, Quartz
Spray chamber T (°C) (optional)	-10 to 10
Nebulizer	PFA and Quartz

Plasma

Torch	
Rf generator frequency (MHz)	27
Rf generator power (W)	500-1600

Optics

Cones	Cu or Ni
Sampler cone i.d.	1mm
Skimmer cone i.d.	0.4mm
Extraction cone i.d.	3mm
Lens	Einzel
Optics	90° quad deflector

Mass Spectrometer

Collision Cell

Collision cell type	Octupole
Kinetic energy discrimination	Yes
No. Gases	1 (He)

Detector

Dwell time (µs)	100
Linear dynamic range	> 9 orders

Mass Spectrometer

Mass range (u)	2-260 (212 for E)
Resolution	0.9
Scan speed (u/s)	5000
Abundance sensitivity m-1	1.00E-07
Abundance sensitivity m+1	1.00E-07

Performance Specifications

Sensitivity (Kcs/ppb)

7Li	>40
89Y	>300
205Ti	>100

Detection Limits (ppt)

9Be	<1
115In	<0.5
209Bi	<0.5

Other Specifications

CeO/Ce (%)	<1.5
Ba^{++}/Ba^{+} (%)	<3
Background cps (@ *m/z* 220)	<1
Stability, 20 min (%)	<3
Stability, 2 hours (%)	<4
107Ag/109Ag (%)	<0.5

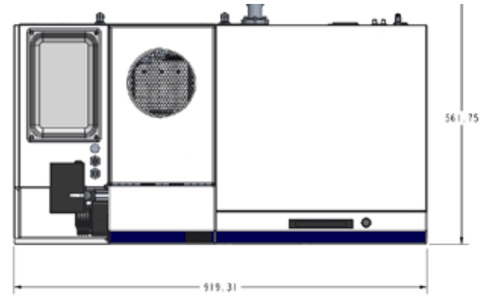
Installation Requirements

Installation, Facility Requirements

Size: W X D X H (cm)	90 x 66 x 70 cm
Volume (m3)	0.42
Weight (Kg)	115
Argon (99.95% mL/min)	24
Cell gas (mL/min)	10 (99.999% He)

Environmental Requirements

Operating Temperature	15 to 30 °C (59 – 86 °F). Performance specifications require +/- 2 °C from calibration temperature
Operating Humidity	10% and 80% RH, non-condensing



Peripheral Equipment & Sample Inlets

Autosampler

Simplifying sample introduction, increasing throughput

The ASX-560 Autosampler offers:

- Optional dual rinse station
- Optimal chemical compatibility
- Redefined and configurable XYZ movement
- Integrated enclosure (optional)

Sample Racks

Vials	Opening	Vial Compatibility
90	13.3 mm round	8 mL round bottom or 7 mL flat bottom
60	17.0 mm square	14 mL or 15 mL
21	30.5 mm square	50 mL

Rapid Sample Introduction

More sample throughput, less time

The ASX$_{\text{PRESS PLUS}}$ rapid sample introduction accessory reduces time required for autosampler movement, sample uptake, stabilization and rinse operations, thereby reducing sample run times significantly.

Sample Introduction Step	Time Required
1. Autosampler Movement	5 sec.
2. Sample Uptake	15 sec.
3. Stabilization	20 sec.
4. Measurement	10 sec.
5. Rinse	30 sec.
Total Time	**80 sec.**

Sample Introduction Step	Time Required
1. Autosampler Movement, Sample Uptake, Stabilization and Rinse	20 sec.
2. Measurement	10 sec.
Total Time	**30 sec.**

HOW TO REQUEST MORE INFORMATION, A QUOTATION OR TO PLACE AN ORDER

Looking for technical assistance?
Our scientific experts are here to help.

By Area

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Live Demo

Our team will be pleased to give you a live demonstration of our products.
Let's arrange a personal appointment!

Advion Interchim scientific

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