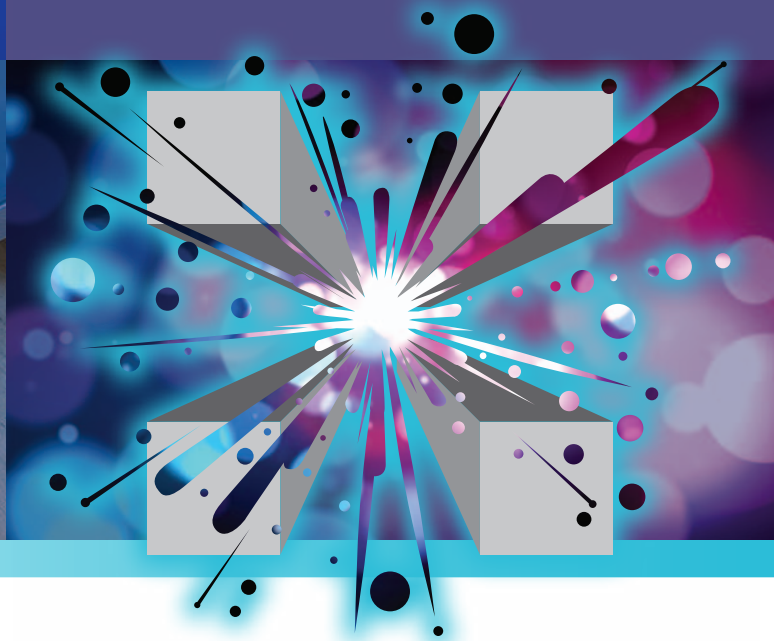




Thermo Scientific iCAP Q ICP-MS



Dramatically Different

**ICP-MS**

**Thermo**  
SCIENTIFIC

# Thermo Scientific iCAP Q ICP-MS

## Dramatically Different



With an all-new, user-inspired design, advanced engineering and ground-breaking technology, the iCAP™ Q is an evolutionary jump in ICP-MS. The iCAP Q is easier to use, simpler to maintain, and delivers more performance than any other system — giving you total confidence in your results, whether you perform routine analyses or state-of-the-art research.

Three models are available to support all types of laboratories. The **iCAP Qa** is a reliable 24/7 multi-elemental workhorse, incorporating all of the class-leading reliability and ease of use features unique to the iCAP Q range. The **iCAP Qc** offers uniquely reliable cell mode performance and is configured for high quality analyses in routine, high throughput laboratories such as those specializing in environmental analysis, food quality control and geochemical exploration. For demanding applications such as ultra-trace analysis in the semiconductor industry, the **iCAP Qs** combines ultimate performance with ultimate flexibility.

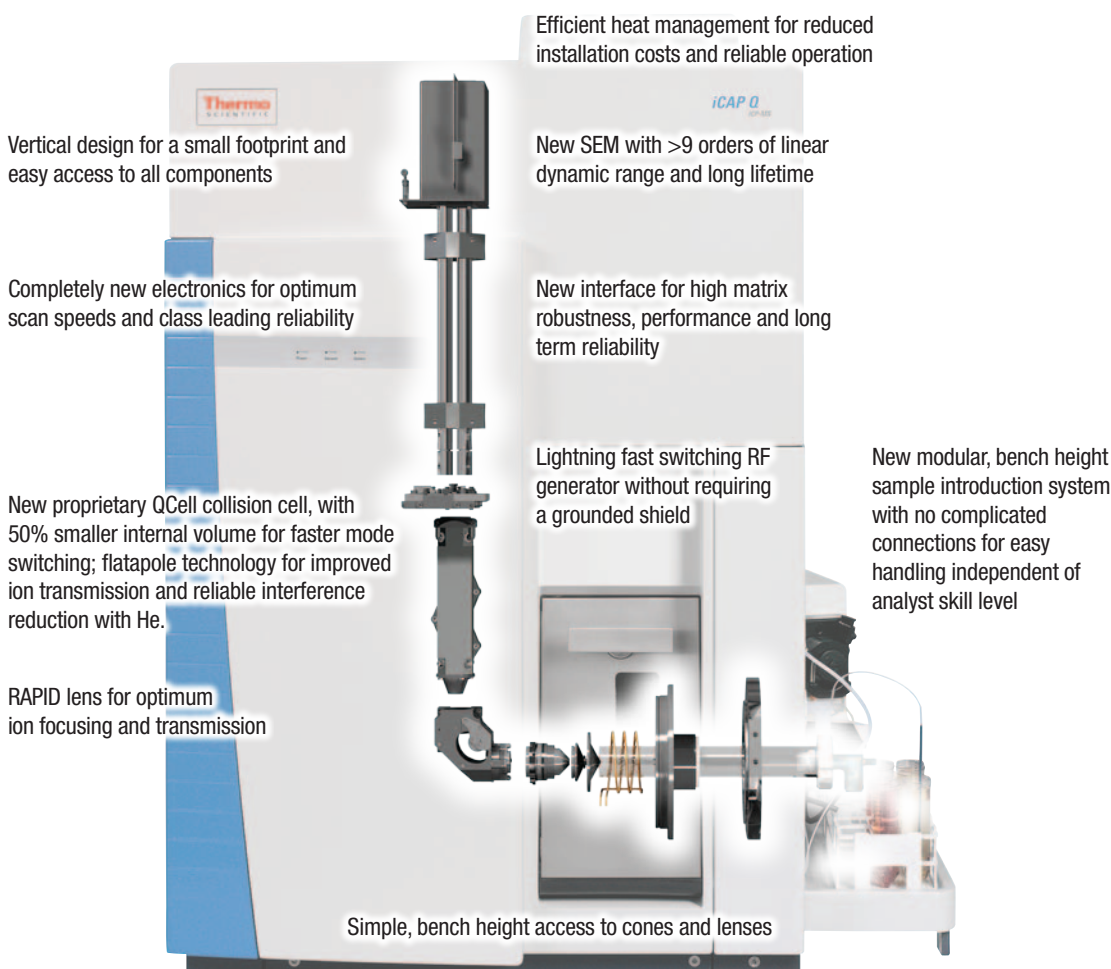


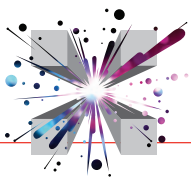
## Be prepared for all your ICP-MS analytical challenges with:

**Exceptional reliability** – With self-aligning injector, cone and lens assemblies, unparalleled plasma and collision cell stability and improved resistance to heavy sample matrices, the iCAP Q requires less maintenance and delivers accurate results — even in challenging and complicated sample conditions. One click instrument setup and intuitive analytical workflows eliminate user error and ensure consistent operation and repeatable results.

**Advanced performance** – Our proprietary Thermo Scientific QCell with advanced flatapole technology combines proven He KED (kinetic energy discrimination) interference reduction capabilities with unique low mass cut off capabilities for reliable cell based analyses. Single figure ppt detection limits for low mass elements such as Li, Be and B in He KED mode allow for full mass range analyses in a single He KED mode.

**Incredible flexibility** – The bench height, open access sample introduction area makes connection of peripheral devices easier than ever before. Minimized sample pathways increase throughput from all accessories and reduce peak broadening.





# Dramatically Different Reliability

In the completely new design of the iCAP Q ICP-MS all aspects of the instrument have been developed to produce the most reliable ICP-MS solution.

Positioned at bench height, **access to the open, modular sample introduction system makes routine operation simple** even from a seated position. With error-free assembly and no complicated gas connections required when fitting the torch, results are reliable and repeatable.

**The sampler cone, skimmer cone and the extraction lens** are mounted onto a robust interface door that rotates out from the main casing to give direct, simultaneous access to the cones, extraction lens and load coil.

**Plasma TV** allows for remote viewing for plasma diagnostics and optimization, for example over remote desktops.

A new **digital, solid-state RF generator employing ultra-fast frequency impedance matching provides unparalleled plasma stability** even for highly volatile organic solvents. The iCAP Q ICP-MS ion source generates a low and tightly defined ion energy spread that together with a new ion optics system ensures universal ion focusing for high transmission and sensitivity.

The **Thermo Scientific RAPID deflection lens** ensures that only ions are transmitted, while any other component is safely removed from the system.



**1981**

Invention of ICP-MS

**1984**

First commercial ICP-MS

**1994**

Sector field ICP-MS (ELEMENT)

**1998**

PQ ExCell with collision cell technology (CCT)

**1999**

First routine sector field ICP-MS (ELEMENT 2)

**2001**

X Series platform

The **iCAP Q ICP-MS** has significantly reduced installation requirements and is the smallest bench-top ICP-MS available — making it the ideal choice for laboratories where space is at a premium, for example, clean-room installations.

In addition to its reduced size, the iCAP Q offers streamlined cabling and ducting to provide open, easy access to all components. This design facilitates not only any service requirements but also improves heat management, leading to better signal and mass stability as well as reducing installation and operational costs.

The **single stage rotary pump** provides backing to an advanced, three-stage, split-flow turbomolecular pump as well as evacuating the expansion region between the sampler and skimmer cones. A wear resistant, synthetic rotary pump oil improves resistance to aggressive sample matrices — lengthening the periods between routine maintenance.



**2005**

ELEMENT XR  
with extended  
dynamic range

**2006**

XSERIES 2  
with significant  
performance  
enhancements

**2010**

Breakthrough sensitivity  
enhancement  
(JET Interface on  
ELEMENT 2/XR)

**2012**

**The future  
is here.**



# Dramatically Different Performance

## Sample Introduction

Positioned at bench height to provide the user with immediate, easy access, the iCAP Q sample introduction system consists of an efficient, low-flow concentric nebulizer, paired with a compact, peltier-cooled cyclonic spraychamber providing optimum short and long term signal stability. Additional gases, for example oxygen for the analysis of organic solvents, may be easily added to the plasma via a dedicated inlet.

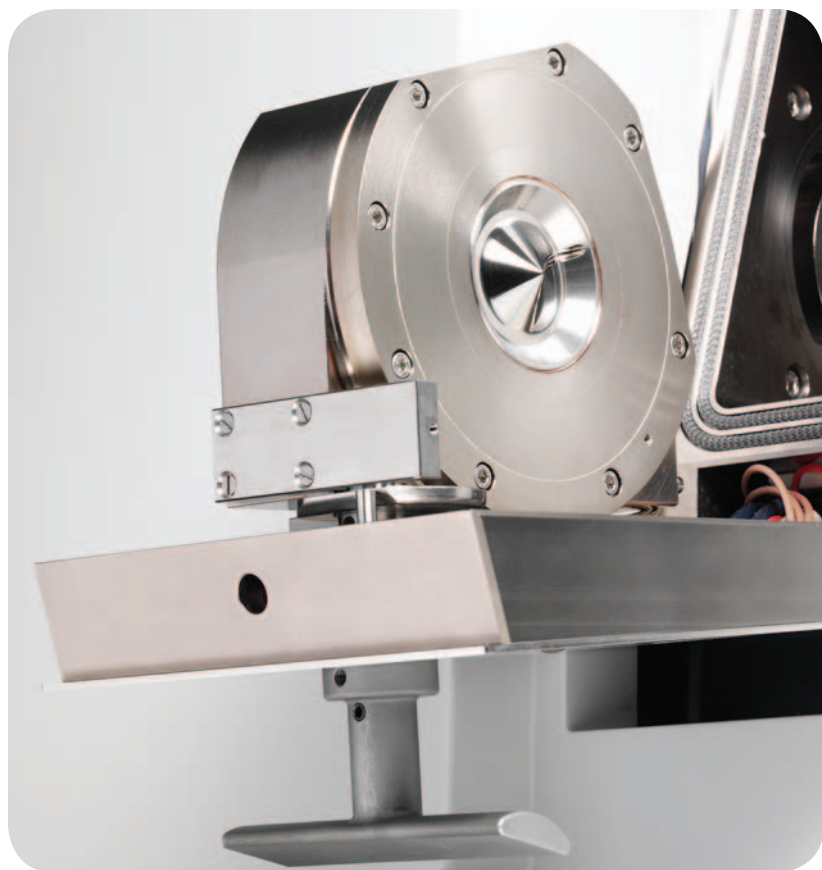
## RF Generator

The exceptional robustness of the RF generator means that volatile organic solvents such as 100% acetonitrile, can be analyzed at flow rates over 1 mL/min. The novel RF generator does not require the use of a shielded torch to produce ions with a low and well defined energy spread. Routine cold plasma operation is achieved with optimal ion transmission for class-leading ICP-Q-MS performance.

## Interface

The proprietary iCAP Q interface consists of a pair of solid Ni cones. The water cooled design leads to optimized temperatures across the entire cone, improving resistance to sample deposition and lengthening periods between routine cleaning. When cleaning is required, access to and removal of cones is straightforward.

The iCAP Q skimmer cone features unique, user-replaceable inserts mounted behind the cone tip to control memory effects.



## RAPID Lens Technology — 90° Ion Optics Done Right

Ions extracted from the iCAP Q interface are accelerated via an initial ion lens stack into the RAPID (Right Angle Positive Ion Deflection) lens that efficiently deflects analyte ions by 90° before entry into the QCell. The RAPID lens ensures neutrals from the plasma are unaffected and do not impact on the QCell, leading to stable cell performance and eliminating routine maintenance.

In comparison to other more complicated 90° ion optic systems, the RAPID lens is a simple, open ion lens operating at a single fixed voltage for optimum, stable ion transmission. RAPID lens technology ensures optimal ion focusing in all dimensions while the beam is turned 90°, resulting in unrivalled signal/noise ratios.

## QCell — Unsurpassed Cell Performance

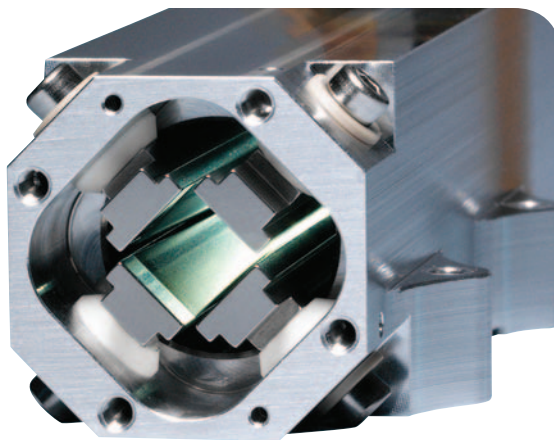
The iCAP Q is the only ICP-MS system to include proprietary QCell technology combining proven He KED (kinetic energy discrimination) interference reduction capabilities with a flatapole low mass cut-off.

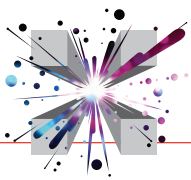
In comparison with higher order multipole systems used in collision cells, the flatapoles in the QCell provide a low mass cut off that stops unwanted species from passing to the quadrupole mass filter. This provides complete collision cell reliability even with new, complicated sample matrices.

The use of flatapoles in the QCell allows for a reduced cell volume, leading to shorter gas fill and flush times and corresponding increases in sample throughput.

When pressurized with an inert gas such as He, the flatapoles provide powerful interference reduction for a simpler ICP-MS spectrum in all sample types. In He QCell KED mode, the iCAP Q ICP-MS has sufficient sensitivity to provide single figure ppt detection limits for low mass elements such as Li, Be and B. The iCAP Q therefore allows full mass range analysis of routine samples in environmental, clinical and food applications.

In non-gas pressurized mode, the QCell acts as a highly efficient ion guide.





# Dramatically Different Flexibility

## for Accessories and Hyphenated Techniques

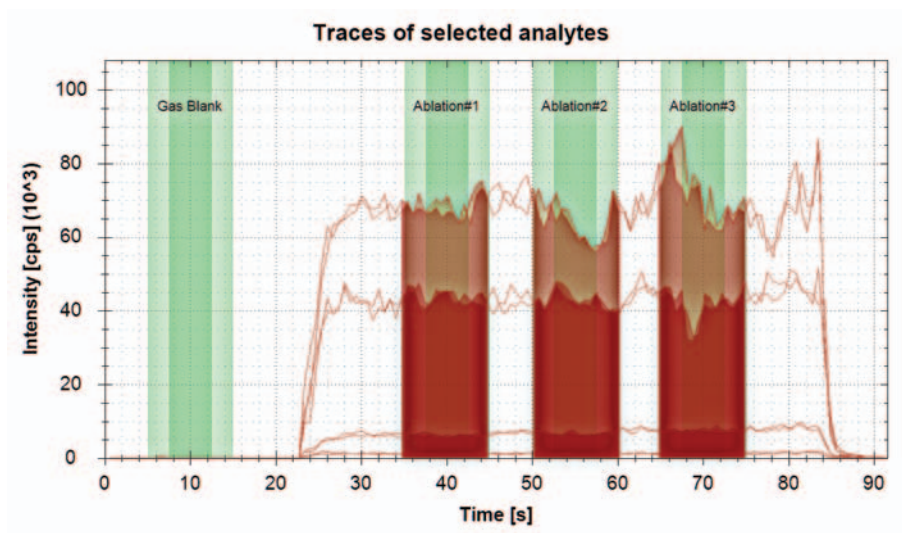
The easily accessible sample introduction area allows simple connectivity to peripheral devices, such as laser ablation (LA), ion/liquid chromatography (IC/LC) and gas chromatography (GC) systems. Bench top IC/LC and GC devices can be placed directly next to the iCAP Q ICP source, minimizing sample pathways to reduce peak broadening. Additional gas supplies for use with peripherals are positioned directly next to the sample introduction system for efficient coupling.

A dedicated I/O (input/output) panel on the side of the iCAP Q system provides full bidirectional control of accessories. The I/O ports are software controlled for user-defined high/low TTL or contact closure for comprehensive support of any coupled accessory.

### Laser Ablation

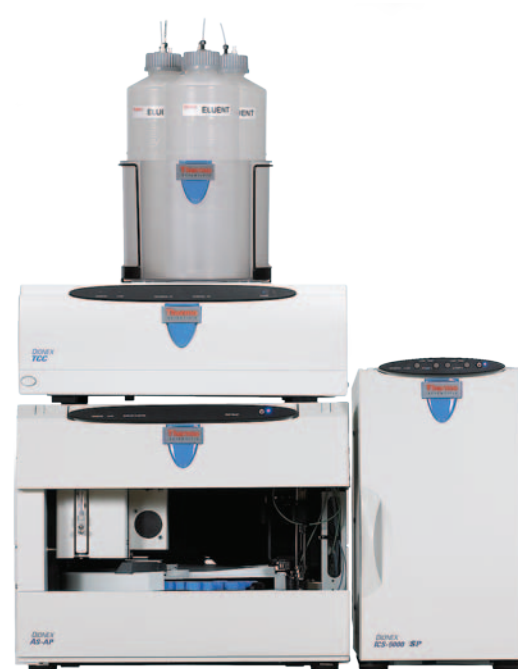
Coupling the iCAP Q analyzer with a laser ablation system creates a powerful solution for the multi-element analysis of conducting and non-conducting solids. For applications that require discrete solid sampling, coupling laser ablation with the iCAP Q is a cost effective alternative to other techniques.

Laser systems from major manufacturers are supported by the iCAP Q hardware and Thermo Scientific Qtegra software platform. Full software support of quantification routines in laser ablation analysis is provided in the Qtegra™ software.



### Speciation

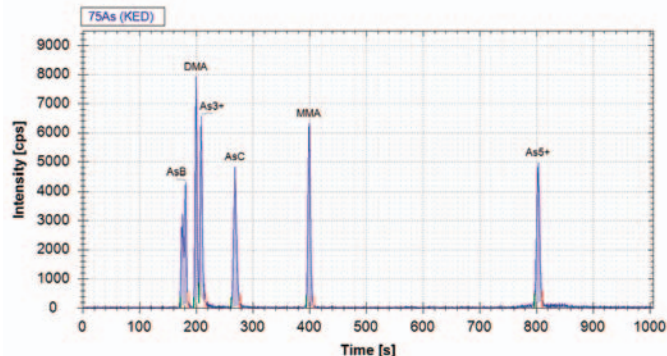
Traditional ICP-MS provides rapid, robust and accurate total element concentration determinations in many sample types. By using ICP-MS as a sensitive elemental detector in combination with a selective separation techniques, information on the chemical form of the element is obtained. Critical in food, environmental and pharmaceutical analyses, total elemental concentration information can be used to screen samples, selecting high total element concentration samples for speciation based ICP-MS investigation. Technique specific coupling kits are available.





## IC and HPLC

The iCAP Q ICP-MS provides unique capabilities in its use as an elemental detector in both IC (ion chromatography) and LC (liquid chromatography) applications, for example combination with the Thermo Scientific Dionex ICS-5000 IC system.



## GC

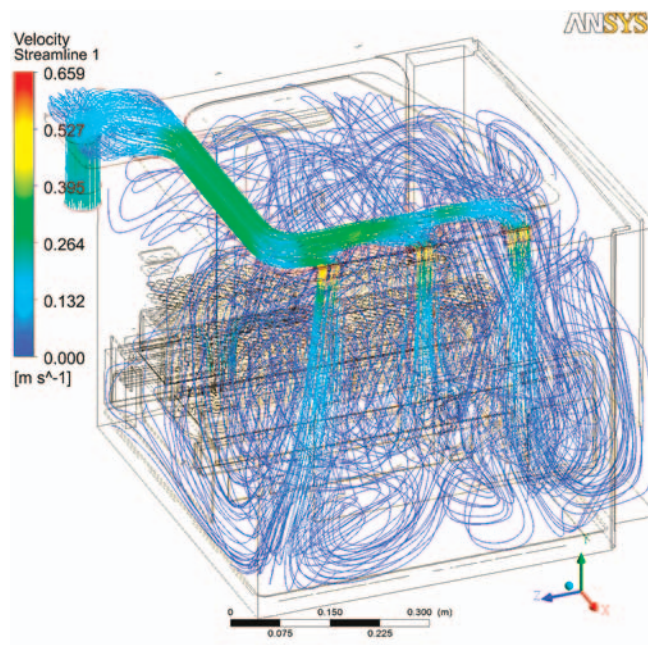
Coupling capillary GC with the iCAP Q analyzer generates outstanding separation power with rapid, sensitive detection for the determination of ultra-trace elemental species. The iCAP Q GC-ICP-MS coupling kit incorporates a unique dual mode sample introduction system for the simultaneous introduction of a liquid in parallel to the GC outlet. This dual mode technology enables advanced flexibility for optimization, quantification and internal standardization.

## Autosampler

Autosampler systems from CETAC and ESI are fully supported. The easy-to-access sample introduction area facilitates safe, straightforward sample transfer from any autosampler. Autosamplers can be positioned directly next to the ICP ion source, minimizing tubing, increasing sample throughput and minimizing cross-sample contamination.

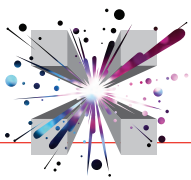
## Autosampler Housing

A dedicated housing, designed using CFD (computational fluid dynamics) modelling is available for autosamplers from CETAC and ESI. The optional housing is directly mounted to the iCAP Q system to provide a contained, controlled HEPA filtered atmosphere, reducing potential atmospheric deposition and subsequent, costly reruns. Additional accessories can be placed inside the housing.



## Productivity Packs

Complete packs for prescribed EPA methods are available to support rapid laboratory compliance. Tailored software templates and performance reports are included as well as full documentation to assist in the generation of standard operating procedures.



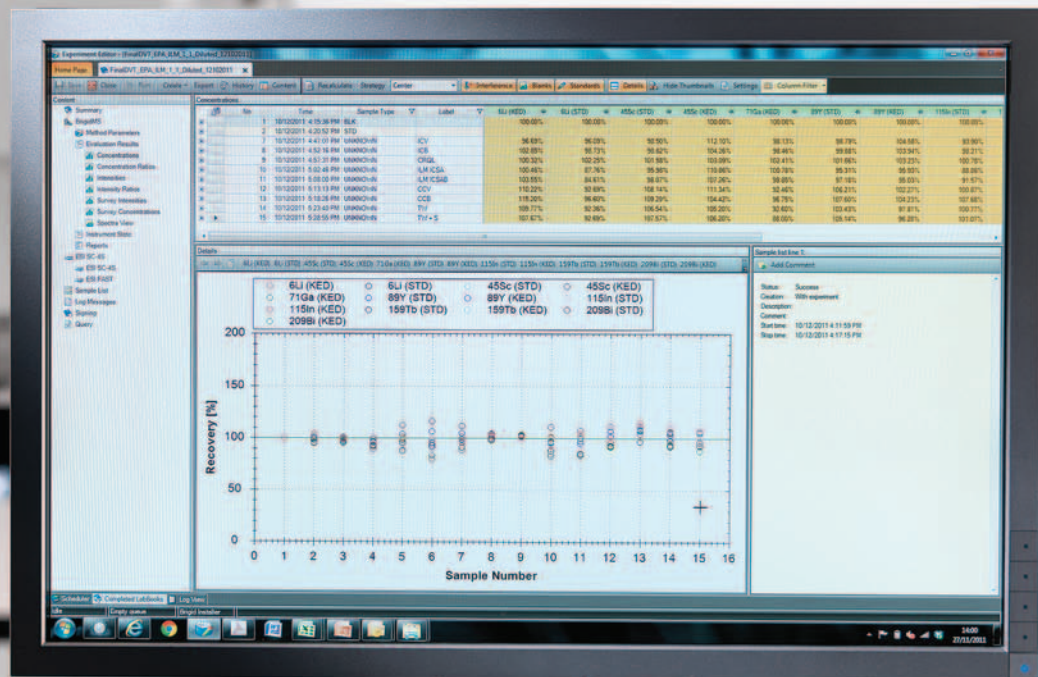
# Dramatically Different Software

## Thermo Scientific Qtegra

### Qtegra Instrument Control Software

The Thermo Scientific Qtegra software is a new, comprehensive platform that provides an intuitive tailored workflow for all ICP-MS applications. The introduction of Qtegra software on the iCAP Q ICP-MS is the first step in its implementation on a range of Thermo Scientific instruments. Through the introduction of a platform-based approach to control software across different analytical devices, cross-device training and faster adoption of new instrumentation is simpler, allowing for increased flexibility in modern multi-technique laboratories. Developed using the very latest Microsoft® .NET technology, the Qtegra platform contains the most modern software features of any ICP-MS.

Qtegra is a modular software that provides a flexible framework in which instrumental and accessory 'plug-ins' are combined into a single workflow. In addition to the iCAP Q control plug-in, Qtegra provides integrated plug-ins for autosamplers, auto-dilutors as well as major chromatography and laser ablation systems.





## One click Instrument Set Up

With a single mouse click, the iCAP Q is taken into operate mode, tested and, where necessary, intelligently autotuned and/or calibrated to meet the protocol or user defined performance criteria.

## Intuitive Analytical Workflow

A simple, logical workflow allows for rapid definition of analytical protocols.

## Full Integration with LIMS

Sample lists can be imported from LIMS into pre-defined protocol templates, incorporating the full range of quality control checks. Comprehensive, user-definable reports allow for flexible export to external software packages as well as LIMS.

## Support for 21 CFR Part 11 Compliant Environments

Qtegra software provides a full range of features allowing individual laboratories to operate under 21 CFR Part 11 requirements, including audit trails, support for electronic signatures as well as tools for integrated data management.

## Intuitive Data Query Tool

Fast searches across multiple analyses and dates can be performed directly within Qtegra, for example to assess long term reproducibility of quality control results.

## Time Resolved Quantification

Comprehensive control of laser ablation and chromatographic systems is combined with the full range of display and data reduction techniques, all within a single workflow.

Experiment Editor - [US EPA METHOD 200.8 (FAST)\_1]

Home Page | US EPA METHOD 200.8 (FAST)\_1

Save | Close | Run | Create | Export | History | Contents | Add | Delete | Print sample layout | Comments | Options | Copy | Paste | Insert | Append

Sample list estimated runtime: 3 hours 45 minutes 48 seconds

Label	Rack Number	Vial Numbers	Survey Runs	Main Runs	Sample Type	Internal Standard	Standard	Dilution Factor	QC Action	QC Restart	QC Reference
1 CALIBRATION BLA	Standard	1	1	3	BLK	200.8 IS		1	None		
2 CALIBRATION STD	Standard	1	1	3	STD	200.8 IS	WCS 3	10	None		
3 CALIBRATION STD	Standard	1	1	3	STD	200.8 IS	WCS 3	5	None		
4 CALIBRATION STD	Standard	1	1	3	STD	200.8 IS	WCS 3	1	None		
5 RINSE	Standard	1	1	3	QC	200.8 IS		1	ICB	Next sample	
6 ICV	Standard	1	1	3	QC	200.8 IS	ICV	1	ICV	Next sample	
7 ICB	Standard	1	1	3	QC	200.8 IS		1	ICB	Next sample	
8 LFB	Standard	1	1	3	UNKNOWN	200.8 IS		1	None		
9 RINSE	Standard	1	1	3	QC	200.8 IS		1	ICB	Next sample	
10 QCS NIST 1643e	Standard	1	1	3	QC	200.8 IS	QCS	1	QCS	Next sample	
11 CCV	Standard	1	1	3	QC	200.8 IS	ICV	1	CCV	Next sample	
12 CCB	Standard	1	1	3	QC	200.8 IS		1	CCB	Next sample	
13 SAMPLE UNS	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		13
14 SPIKED SAMPLE	Standard	1	0	1	QC	200.8 IS	SPIKE	1	MXS	After previous QC	13
15 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
16 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
17 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
18 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
19 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
20 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
21 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
22 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
23 CCV	Standard	1	0	1	QC	200.8 IS	ICV	1	ICV	Next sample	
24 CCB	Standard	1	0	1	QC	200.8 IS		1	ICB	Next sample	
25 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		25
26 SPIKED SAMPLE	Standard	1	0	1	QC	200.8 IS	SPIKE	1	MXS	Next sample	25
27 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
28 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		
29 SAMPLE	Standard	1	0	1	UNKNOWN	200.8 IS		1	None		

Scheduler | Completed LabBooks | Log View

Brigitd Installer





Be prepared for every analytical challenge with dramatically different AA, ICP-OES and ICP-MS. Comprehensive trace elemental analysis solutions for environmental, clinical, pharmaceutical or food & beverage laboratories.

[www.thermoscientific.com/trace](http://www.thermoscientific.com/trace)

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