



Build a Better ICP-MS Workflow

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Sample Preparation

- **CEM Corporation**
 - Microwave digestion products for significant reduction in sample preparation time, resources and labor
 - New products
 - Applications examples

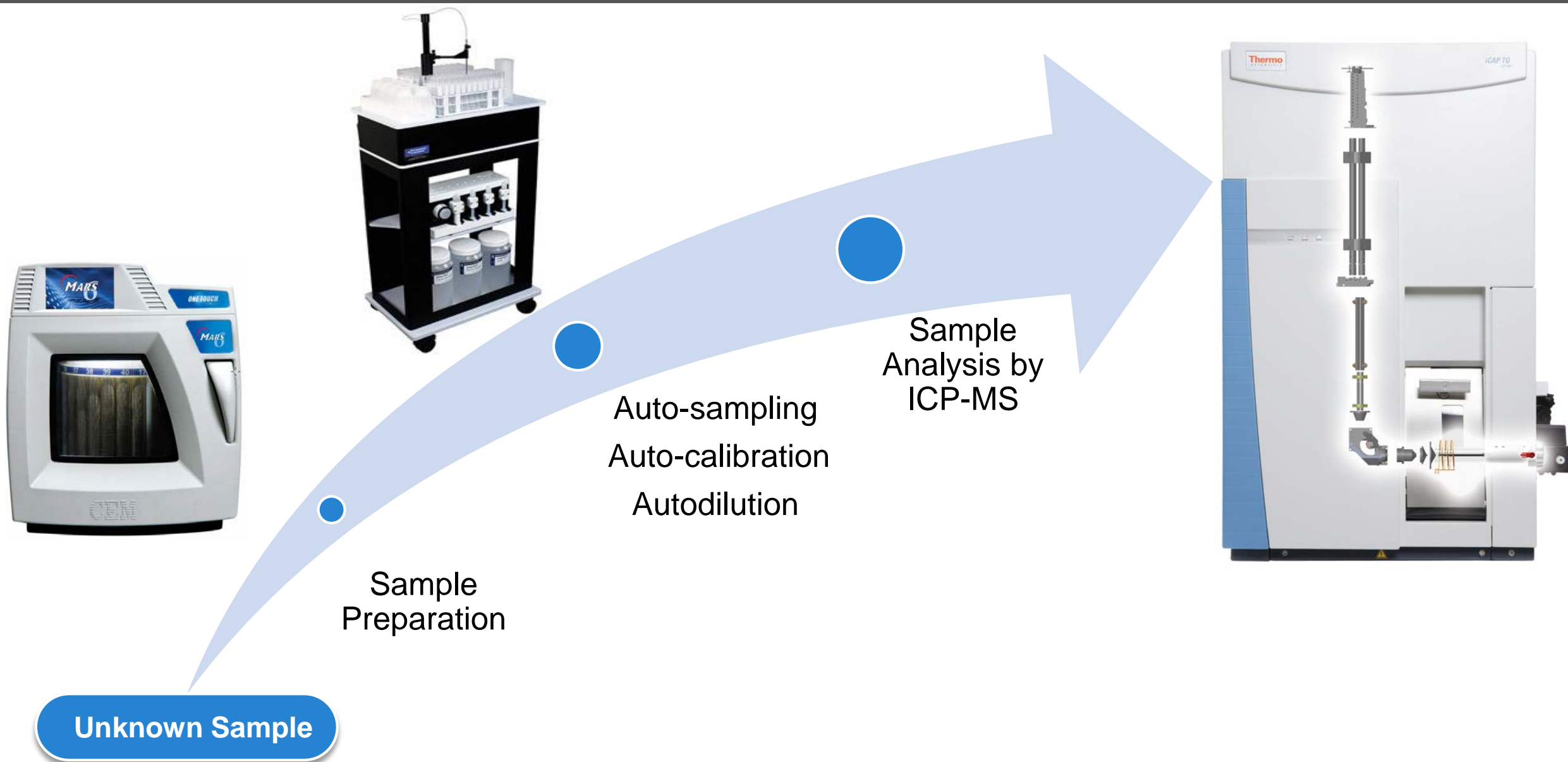
Sample Introduction Automation

- **Elemental Scientific (ESI)**
 - Sample introduction automation – products for optimized uptake/rinse out and for automatic inline dilution of standards and samples
 - New products
 - Application examples

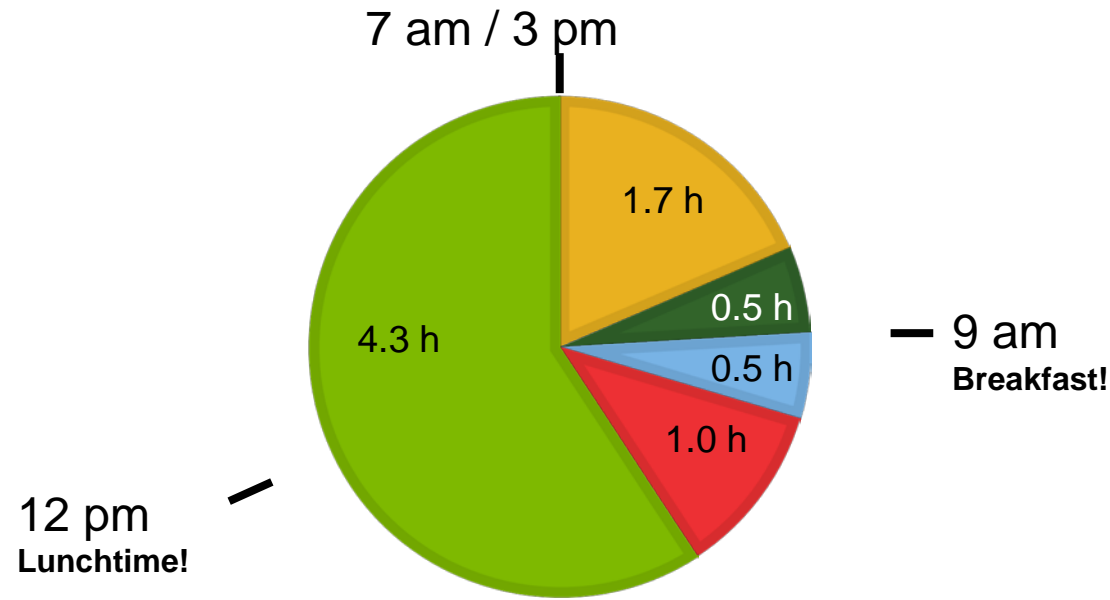
ICP-MS Analysis

- **Thermo Fisher Scientific**
 - ICP-MS instruments - single and triple quadrupole – easy to use and maintain with advanced interference removal capabilities
 - Streamlined workflow software platform for easy method development

Sample Preparation and ICP-MS Analysis Workflow



A Typical Day in the Busy Lab without Autodilution

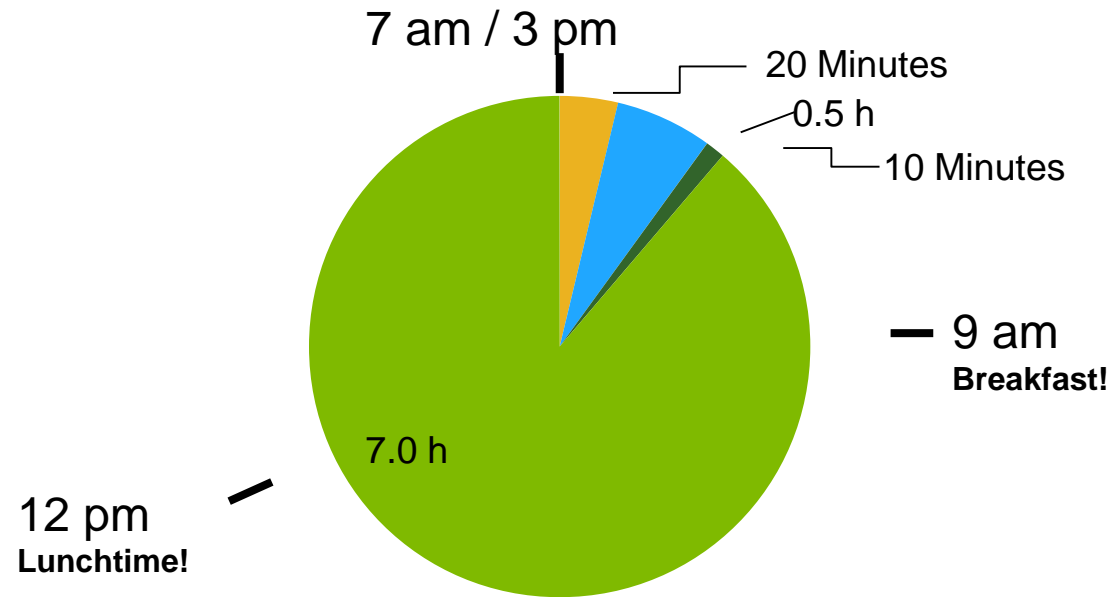


Improvement Opportunities:

- Operator time wasted for simple tasks
- Risk of contamination
- Manual interaction may be error prone

Action	Time	#	Total
Dilution	20s / sample	300	1.7 h
Preparation of Calibration/QC solutions	30 Minutes		0.5 h
Performance Verification	30 Minutes		0.5 h
Re-run failed samples	2 minutes	10%	1.0 h
Remaining Time			4.3 h

A Typical Day in the Busy Lab with Autodilution



Action	Time	#	Total
Dilution	20s / sample	300	20 Minutes
Preparation of Calibration/QC solutions	30 Minutes		10 Minutes
Performance Verification	30 Minutes		0.5 h
Re-run failed samples	2 minutes	10%	0
Remaining Time			7.5 h

Advantages:

- Completely integrated
- Optimized flow paths
- Prescriptive Autodilution
- Intelligent Autodilution
 - Calibrated Range
 - Internal Standard Recovery

Gain:

- 3 h Operator time per day!

Thermo Scientific iCAP Qnova Series ICP-MS

- Single Quad ICP-MS



Compact footprint

Quick connect and push-fit sample intro components

Innovative QCell Collision Cell

Thermo Scientific™ iCAP™ RQ ICP-MS

- Triple Quad ICP-MS



Additional quadrupole for superior interference removal

Built-in safety for handling reactive gases

4 mass flow controllers with optimized flow rates

Thermo Scientific™ iCAP™ TQ ICP-MS

Designed in parallel

Maximum ease of use

Superior performance

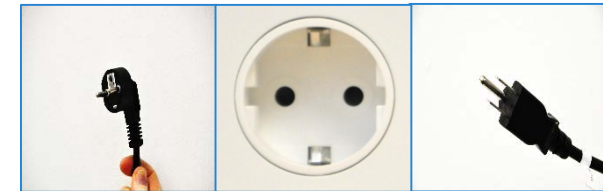
Streamlined Workflow Software

Ease of Use – Installation and Maintenance

- The iCAP RQ and iCAP TQ ICP-MS instruments exemplify ease of use, starting with installation and maintenance:

- Vertical analyzer – small footprint
- All service access from front and side
- Rear of instrument can be flush against the wall

- Simplified mains power connection (Country Kits)



Front
Easy Access



Right
Open Geometry

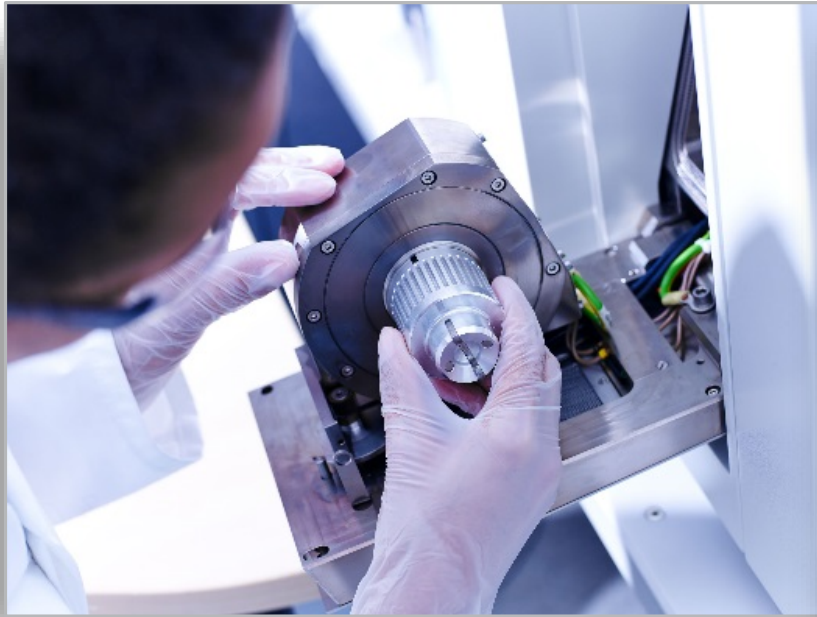


Left
Service Connections



Back
No Connections

Ease of Use Through Innovative Design



Unique drop down door

- Bench-level, pop-out interface
- Door unlocks with 180° turn of outer handle
- Provides direct access to load coil extraction lens and cones **without breaking vacuum**



Quick connect sample introduction

- Push-fit connections
- O-ring free spray chamber
- Easy to access mass flow-controlled gases

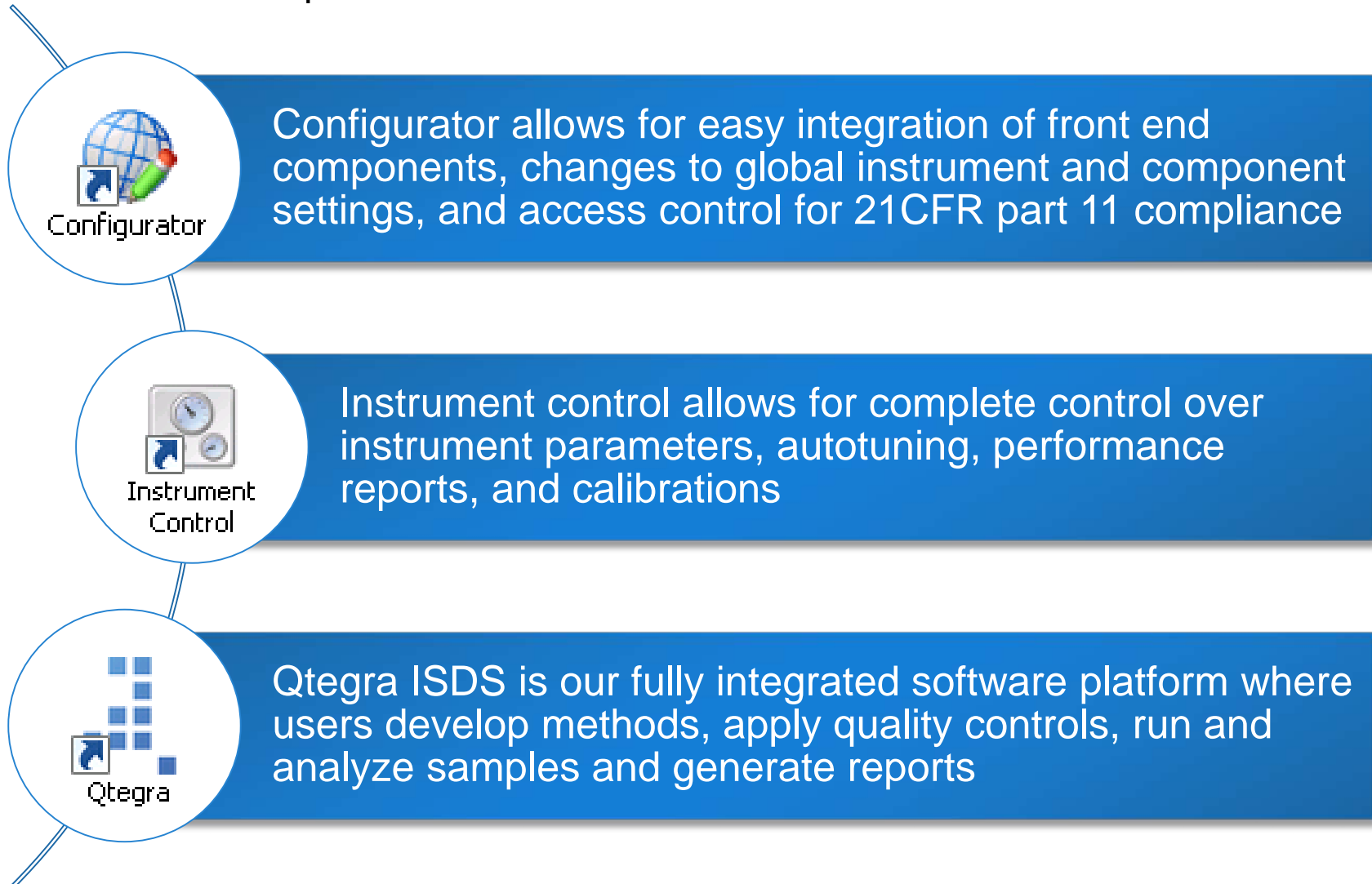


Simple torch assembly

- Innovative holder automatically aligns injector
- Built-in gas fittings (no manual connections)
- O-ring free

Thermo Scientific Qtegra Intelligent Scientific Data Solution Software

- Thermo Scientific™ Qtegra™ Intelligent Scientific Data Solution™ (ISDS) software is an easy-to-use, streamlined workflow platform with three main parts:





Configurator

Thermo Scientific Qtegra ISDS Software - Configurator

Configurator Qtegra Version: 2.7.2425.11 About

Experiment configurator

Configurations

- New Save Delete Load
- ▶ iCAP Q
- ▶ iCAP Q w/ ASX-520
- ▶ with sampler
- ▶ MyNewConfiguration
 - iCAP Q

Configuration Details

Name: MyNewConfiguration

Description: iCAP Q with Laser

Available Items

Name	Description
Accela LC Autosampler	Thermo Accela LC Auto...
Accela LC Pump	Thermo Accela LC Pump
iCAP Q	iCAP Q Mass Spectrom...
iCAP RQ	iCAP RQ Mass Spectro...
Cetac ASX-100	Cetac ASX-100 Autosa...
Cetac ASX-112FR	Cetac ASX-112FR Auto...
Cetac ASX-1400	Cetac ASX-1400 Autosa...
Cetac ASX-260	Cetac ASX-260 Autosa...
Cetac ASX-520	Cetac ASX-520 Autosa...
DigiLaz Software	CETAC Laser Ablation...
ESI SC-14DX	ESI SC-14DX Autosamp...
ESI SC-2DX	ESI SC-2DX Autosampler
ESI SC-4DX	ESI SC-4DX Autosampler
ESI SC-4Q	ESI SC-4Q Autosampler
ESI SC-8DX	ESI SC-8DX Autosampler
ID100	Thermo ID100 Autodilutor
Manual Sample Control	Provides prompts for the...
NWR Laser	New Wave Research La...
PMI Analyte Laser Syste...	Photon Machines Analy...

Viewer Search

0 Info Messages 0 Warnings 0 Errors 0 Fatal Errors

Level	Message	Time	Category	Sub Category
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Instrument Control and Optimization

Thermo Scientific Qtegra ISDS Software - Instrument Control

Experiment Configuration

Control: On, Off, Run, Stop, Restart

Measurement Mode: Interface: High Sensitivity, Current Measurement Mode: S-SQ-KED, SQ / TQ: SQ, CR Gas Flow: Normal, CR Gas: KED

Control Panel

Advanced

Extraction Lens 1 Positive [V]: 0.000

Sampling Depth [mm]: 15.00

RAPID Lens [V]: -250.00

Q1 Entry Lens [V]: -67.50

Focus Lens [V]: -7.50

Detector Voltage (Counting) [V]: 0.00

Detector Voltage (Analog) [V]: 0.00

Analytes

Elements

Enabled	Identifier	Dwell time (s)	Channels	Spacing (u)	Q3 Analyte	Q3 resolution	Color
<input checked="" type="checkbox"/>	7Li	0.1	1	0.1		Normal	204, 127, Indigo
<input checked="" type="checkbox"/>	35Cl.16O	0.1	1	0.1		Normal	Red
<input checked="" type="checkbox"/>	59Co	0.1	1	0.1		Normal	112, 122, Blue
<input checked="" type="checkbox"/>	140Ce++	0.1	1	0.1		Normal	Indigo
<input checked="" type="checkbox"/>	115In	0.1	1	0.1		Normal	165, 117, Brown

Average Intensities

Identifier	Value	RSD [%]
59Co	218506.67	0.7
7Li	323475.7	1
115In	532435.32	8.8
Bkg4.5	0	0
140Ce++	16898.08	1.7
140Ce	563088.08	1.1
140Ce.16O	9627.05	4.4
Bkg220.7	0	0
238U	541690.99	12.8
Oxides	1.7096	4.1
Doubly Cha	3.0016	2.5

Log View

Viewer: Search

1810 Info Messages, 1 Warning, 12 Errors, 0 Fatal Errors

Level	Message	Time	Category	Sub Category
Info	Moving torch	2/6/2019 16:42:25.01	ControlManagerService	iCAPQNova.Control.vi
Info	Cooling glassware	2/6/2019 16:42:27.19	ControlManagerService	iCAPQNova.Control.vi
Info	Standby	2/6/2019 16:44:29.45	ControlManagerService	iCAPQNova.Control.vi

Full Front End Component Integration Through Plug-ins

The screenshot displays the 'Instrument Control' software interface. The main window shows a schematic of the ion trap with numbered components (1-21) and a central detector. The left sidebar contains the 'Control Panel' with various parameters like 'Torch Horizontal Position [mm]' and 'Nebulizer Flow [l/min]'. The bottom section shows a 'Log View' with a table of system messages.

Level	Message	Time	Category	Sub Category
Info	Processing Stage Nebulizer again, CeO/Ce < 2 % Nebulizer Flow Iteration 1	1/31/2019 11:42:29.79	InstrumentControl	Autotuning
Info	Processing Stage Extraction Lens 2 again Extraction Lens 2 Iteration 1	1/31/2019 11:45:36.35	InstrumentControl	Autotuning
Info	Processing Stage Q1 Bias again Pole Bias Q1 Set Iteration 1	1/31/2019 11:45:58.00	InstrumentControl	Autotuning

Front End Component Methods

Instrument Control
Experiment Configuration Window

iCAP-TQ SC2
Select

Control Panel

iCAP TQ

Main

Torch Horizontal Position [mm] 0.10

Torch Vertical Position [mm] 0.48

Nebulizer Flow [l/min] 1.1114

Extraction Lens [V] -150.0

Q1 Focus Lens [V] 1.75

Main

Inlet

Plasma

QCell

Vacuum

Advanced

Cooling

Control Panel | Status Panel

iCAP TQ ESI SC-2DX

1.0 mL - Precision

Events	Actions
On Probe Down	FAST Vacuum 1 - Off
	FAST Valve 1 Load
	S500V -V1 Dispense
	S500V -V2 Dispense
	FAST Valve 2 Load
	Fill S500V -S1 Continuously at 3000µL/min
Probe in Sample at 05s	Fill S500V -S5 1500µL at 15000µL/min
S500V - Completed: S5 Fill	Start Timer D
	Probe Up
Timer D at 2 s	Fill S500V -S5 600µL at 15000µL/min
S500V - Completed: S5 Fill	Start Timer C
Timer C at 4 s	Dilute S500V : Sample=10000µL/min, IS=4000µL/min, Flush #2 at 500µL/min for 1 [s]
	Start Timer A
Timer A at 1 s	FAST Vacuum 1 - On
	FAST Valve 2 Inject
	S500V -V2 Fill
Timer A at 2 s	Fill S500V -S5 Continuously at 40000µL/min
	Move Rinse: R1=2s & R2=2s
+ On S500V Dilution Completed	Start Method: prepFAST M5 Refill
+ On SubMethods: prepFAST M5 Refill Completed	Start Method: Valve 2 LRT
+ On Rinse	Start Method: prepFAST M5 Reset
On SubMethods: prepFAST M5 Reset Completed	Method Complete
*	

Autosampler | **FAST Method** | Valves & Pumps

Log View

Viewer Search

40 Info Messages | 0 Warnings | 1 Error | 0 Fatal Errors

Level	Message	Time	Category	Sub Category
Info	Processing Stage Extraction Lens 2 again Extraction Lens 2 Iteration 1	1/31/2019 11:45:36.35	InstrumentControl	Autotuning
Info	Processing Stage Q1 Bias again Pole Bias Q1 Set Iteration 1	1/31/2019 11:45:58.00	InstrumentControl	Autotuning
Info	Processing Stage CR Entry Lens again CR Entry Lens Iteration 1	1/31/2019 11:46:34.99	InstrumentControl	Autotuning

Events / Actions

Events

- General
 - Monitor Results
- Host
 - On Probe Up
 - On Probe Down
 - On Rinse
- Autosampler
 - Probe In
 - Move Completed
 - Rinse Completed
- Syringe
 - Completed
 - On Dilution Comp
- FAST
 - On Method
 - Timer at
 - Loop at

Actions

- General
 - Vacuum Valve
- Autosampler
 - Probe Up
 - Probe Down
 - Move
 - Move Next
 - Move Rinse
- Syringe
 - Dispense
 - Fill
 - Dilute
 - Stop
- FAST
 - Method
 - Timer
 - Loop

Description

A description of the Event or Action that the user has selected.

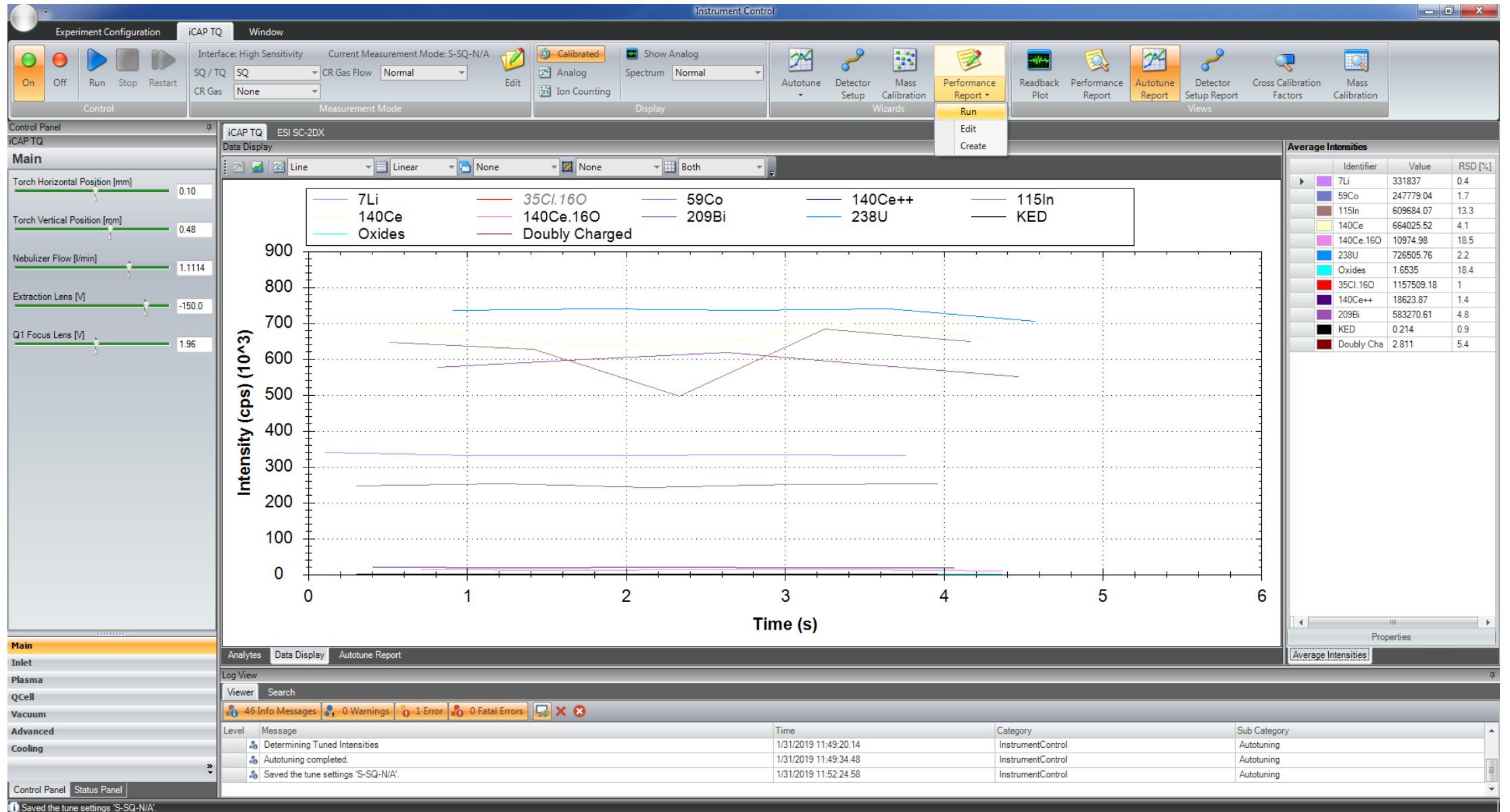
Processing Stage CR Entry Lens again | CR Entry Lens | Iteration 1

Autotune Seq: InterfaceTune HighSensitivity Cancel Autotuning



Optimization

Performance Report



Performance Report Procedure

Instrument Control

Experiment Configuration | iCAP TQ | Window

Control: On, Off, Run, Stop, Restart

Interface: High Sensitivity | Current Measurement Mode: S-SQ-N/A

SQ / TQ: SQ | CR Gas Flow: Normal | Edit

CR Gas: None | Measurement Mode

Calibrated | Show Analog | Analog | Spectrum: Normal | Ion Counting | Display

Autotune | Detector Setup | Mass Calibration | Performance Report | Views: Readback Plot, Performance Report, Autotune Report, Detector Setup Report, Cross Calibration Factors, Mass Calibration

Control Panel

iCAP TQ

Main

Torch Horizontal Position [mm]: 0.10

Torch Vertical Position [mm]: 0.48

Nebulizer Flow [l/min]: 1.1114

Extraction Lens [V]: -150.0

Q1 Focus Lens [V]: 1.96

Performance Report Wizard

Acquisition status

This page shows the progress of the data acquisition.

Acquisition status

- Switching measurement mode to S-SQ-N/A
- Setting up for mass calibration verification
 - Q3 mass calibration verification scan started.
 - Sweep 1/5 completed.
 - Sweep 2/5 completed.
 - Sweep 3/5 completed.
 - Sweep 4/5 completed.
 - Sweep 5/5 completed.
 - Found a peak for mass 7Li; Mass Difference: 0.01564 amu; Width: 0.76 amu
 - Found a peak for mass 59Co; Mass Difference: 0.01821 amu; Width: 0.75 amu
 - Found a peak for mass 115In; Mass Difference: 0.01193 amu; Width: 0.75 amu
 - Found a peak for mass 209Bi; Mass Difference: 0.02595 amu; Width: 0.71 amu
 - The mass calibration verification has passed
- Switching measurement mode to S-SQ-N/A
- Setting up for performance verification
 - Performance verification scan started. Run 1 of 60.
 - Sweep 1/10 completed.
 - Sweep 2/10 completed.
 - Sweep 3/10 completed.
 - Sweep 4/10 completed.
 - Sweep 5/10 completed.
 - Sweep 6/10 completed.

Average Intensities

Identifier	Value	RSD [%]
7Li	329024.18	0.6
59Co	250304.87	1.1
115In	647563.66	3
Bkg4.5	0	0
140Ce++	18660.6	3.6
140Ce	651767.13	4.6
140Ce.160	10938.17	10.6
Bkg220.7	0	0
238U	693356.32	7.8
Oxides	1.6778	9.4
Doubly Cha	2.8659	3.5

Log View

Viewer Search

66 Info Messages | 0 Warnings | 1 Error | 0 Fatal Errors

Level	Message	Time	Category	Sub Category
Info	Sweep 4/10 completed.	1/31/2019 11:56:00.67	ControlManagerService	iCAPQNova.Control.vi
Info	Sweep 5/10 completed.	1/31/2019 11:56:01.61	ControlManagerService	iCAPQNova.Control.vi
Info	Sweep 6/10 completed.	1/31/2019 11:56:02.55	ControlManagerService	iCAPQNova.Control.vi

Control Panel | Status Panel

Sweep 6/10 completed.

Report: [Progress Bar] Cancel Performance Report

Performance Report Print-out and Files

Instrument Control

Experiment Configuration iCAP TQ Window

Control Panel

Interface: High Sensitivity Current Measurement Mode: S-SQ-N/A

SQ / TQ: SQ CR Gas Flow: Normal

CR Gas: None

Calibrated Show Analog

Analog Spectrum: Normal

Autotune Detector Setup Mass Calibration Performance Report

Readback Plot Performance Report Autotune Report Detector Setup Report Cross Calibration Factors Mass Calibration

iCAP TQ ESI SC-2DX Performance Report

Zoom: 75% Output Format: PDF Renderer

Performance check

Interface check

Q3 Mass Calibration Test

Result	Channels	Dwell	MeasureWidth	PointSpacing	Sweeps
Passed	75	0.04	1.5	0.02	5

Analyte	Result	Centroid Mass [u]	Offset	Peak width [u]	Peak width min [u]	Peak width max [u]
7Li	Passed	6.9741	0.0419	0.759	0.650	0.850
59Co	Passed	58.9307	0.0245	0.754	0.650	0.850
115In	Passed	114.8966	0.0073	0.761	0.650	0.850
208Bi	Passed	208.9777	0.0174	0.748	0.650	0.850

Sensitivity & Stability Test

Result	Runs	Sweeps
Passed	60	10

Analyte	Result	Value	Condition	Limit
Bkg4.5	Passed	0.18 CPS	Less than	1.0 CPS
Bkg220.7	Passed	0.03 CPS	Less than	2.0 CPS
7Li	Passed	76,110.0 CPS	Greater than	65,000.0 CPS
59Co	Passed	174,547.0 CPS	Greater than	150,000.0 CPS
238U	Passed	608,872.0 CPS	Greater than	330,000.0 CPS
140Ce 160/140Ce	Passed	0.0174	Less than	0.02
140Ce++/140Ce	Passed	0.0191	Less than	0.04
115In	Passed	512,480.0 CPS	Greater than	300,000.0 CPS

Analyte	Value	Limit
7Li	0.8%	2
59Co	0.7%	2
238U	0.9%	2
115In	0.8%	2

Vacuum Check

Parameter	Result	Value
Analyzer Pressure	Vacuum ok	3.855e-7
Interface Pressure	Vacuum ok	1.617e+0

Name Date created

PerformanceReport-S-SQ-N/A-2018...	4/25/2018 12:47...
PerformanceReport-S-SQ-N/A-2018...	3/27/2018 10:47...
PerformanceReport-S-SQ-N/A-2018...	3/21/2018 9:47...
PerformanceReport-S-SQ-N/A-2018...	3/21/2018 9:17...
PerformanceReport-S-SQ-N/A-2018...	3/20/2018 1:30...
PerformanceReport-S-SQ-N/A-2018...	3/20/2018 9:58...
PerformanceReport-S-SQ-N/A-2018...	3/16/2018 10:48...
PerformanceReport-S-SQ-KED-201...	12/5/2018 2:43...
PerformanceReport-S-SQ-KED-201...	12/5/2018 2:16...
PerformanceReport-S-SQ-KED-201...	11/28/2018 10:5...
PerformanceReport-S-SQ-KED-201...	9/13/2018 12:53...
PerformanceReport-S-SQ-KED-201...	8/22/2018 11:11...
PerformanceReport-S-SQ-KED-201...	8/22/2018 11:00...
PerformanceReport-S-SQ-KED-201...	8/20/2018 11:51...
PerformanceReport-S-SQ-KED-201...	8/20/2018 11:49...
PerformanceReport-S-SQ-KED-201...	8/17/2018 11:25...
PerformanceReport-S-SQ-KED-201...	8/15/2018 3:04...
PerformanceReport-S-SQ-KED-201...	8/14/2018 12:52...
PerformanceReport-S-SQ-KED-201...	8/8/2018 12:01...
PerformanceReport-S-SQ-KED-201...	8/1/2018 12:41...
PerformanceReport-S-SQ-KED-201...	8/1/2018 12:23...
PerformanceReport-S-SQ-KED-201...	7/30/2018 2:11...
PerformanceReport-S-SQ-KED-201...	7/6/2018 10:46...
PerformanceReport-S-SQ-KED-201...	7/6/2018 10:27...
PerformanceReport-S-SQ-KED-201...	7/2/2018 2:31 PM
PerformanceReport-S-SQ-KED-201...	7/2/2018 1:55 PM
PerformanceReport-S-SQ-KED-201...	5/23/2018 11:07...
PerformanceReport-S-SQ-KED-201...	5/23/2018 10:41...
PerformanceReport-S-SQ-KED-201...	5/18/2018 12:02...
PerformanceReport-S-SQ-KED-201...	5/18/2018 11:52...
PerformanceReport-S-SQ-KED-201...	5/18/2018 11:12...
PerformanceReport-S-SQ-KED-201...	5/18/2018 10:52...

Average Intensities

Identifier	Value	RSD [%]
7Li	323585.16	1
59Co	240002.97	1.9
115In	632744.04	3.2
Bkg4.5	0	0
140Ce++	17896.15	3.6
140Ce	580742.69	12.4
140Ce.160	11495.3	6.1
Bkg220.7	0	0
238U	717702.43	1.4
Oxides	2.0091	13.1
Doubly Cha	3.1389	15.1

Control Panel iCAP TQ Status Panel Vacuum ok

Log View

Viewer Search

734 Info Messages 0 Warnings 3 Errors 0 Fatal Errors

Level	Message	Time	Category	Sub Category
Info	Analyzer Pressure 4.12426933003479E-07 mbar	1/31/2019 12:05:30.68	ControlManagerService	iCAPQNova.Control.vi
Info	Interface Pressure 1.58097401240281 mbar	1/31/2019 12:05:30.68	ControlManagerService	iCAPQNova.Control.vi
Info	Vacuum ok	1/31/2019 12:05:30.68	ControlManagerService	iCAPQNova.Control.vi

Autotuning

The screenshot displays the iCAP TQ Instrument Control software interface. The top toolbar features several icons, including 'Autotune', 'Detector Setup', 'Mass Calibration', and 'Performance Report'. A dropdown menu for 'Autotune' is open, showing options: 'Interface', 'Advanced', 'Fast Q1 Calibration', and 'Edit'. The main area contains a periodic table of elements, with a 'Show legend' button below it. On the left, a 'Main' control panel shows parameters like 'Torch Horizontal Position [mm]' (0.09) and 'Extraction Lens [V]' (-145.0). At the bottom, a 'Log View' shows a list of messages, including an error message: 'SQ-mode RF Dac Factor, is not a valid tune setting and can therefore not be set to the value 600.' The log view also shows system messages and operate events.

Enabled	Identifier	Dwell time (s)	Channels	Spacing (u)	Q3 Analyte	Q3 resolution	Color
<input checked="" type="checkbox"/>	7Li	0.1	1	0.1		Normal	204, 127.
<input checked="" type="checkbox"/>	59Co	0.1	1	0.1		Normal	112, 122.
<input checked="" type="checkbox"/>	115In	0.1	1	0.1		Normal	165, 117.
<input checked="" type="checkbox"/>	140Ce	0.1	1	0.1		Normal	255, 255.
<input checked="" type="checkbox"/>	238U	0.1	1	0.1		Normal	0, 142, 25
<input checked="" type="checkbox"/>	209Bi	0.1	1	0.1		Normal	158, 79, 1
<input checked="" type="checkbox"/>	140Ce++	0.1	1	0.1		Normal	Indigo
<input checked="" type="checkbox"/>	140Ce.16O	0.1	1	0.1		Normal	Violet
<input checked="" type="checkbox"/>	35Cl.16O	0.1	1	0.1		Normal	Red

Level	Message	Time	Category	Sub Category
	Lens supply on	1/31/2019 11:18:34.25	ControlManagerService	iCAPQNova.Control.vi
	SQ-mode RF Dac Factor, is not a valid tune setting and can therefore not be set to the value 600.	1/31/2019 11:18:34.39	ControlManagerService	SpectrometerBase.Core
	Operate	1/31/2019 11:18:34.39	ControlManagerService	iCAPQNova.Control.vi

Autotuning Wizard

The screenshot displays the 'Instrument Control' software interface for an iCAP TQ system. The main window is titled 'Autotune Wizard [AdvancedTune N/A]'. The interface is divided into several sections:

- Control Panel (Left):** Contains five sliders for adjusting instrument parameters:
 - Torch Horizontal Position [mm]: 0.09
 - Torch Vertical Position [mm]: 0.37
 - Nebulizer Flow [l/min]: 1.1029
 - Extraction Lens [V]: -145.0
 - Q1 Focus Lens [V]: 1.96
- Main Area (Center):** Displays the instruction: "Please place the sample probe into the solution and select 'Next' to start the data acquisition." Below this, it states: "The required solution is: iCAP TQ TUNE solution".
- Log View (Bottom):** Shows a table of system messages:

Level	Message	Time	Category	Sub Category
Info	Starting Autotune "InterfaceTune HighSensitivity"	1/31/2019 11:32:08.53	InstrumentControl	Autotuning
Info	Determining Original Intensities	1/31/2019 11:32:08.56	InstrumentControl	Autotuning
Info	Autotuning canceled.	1/31/2019 11:32:11.08	InstrumentControl	Autotuning

Autotuning Procedure

Instrument Control

Experiment Configuration iCAP TQ Window

Control: On Off Run Stop Restart

Interface: High Sensitivity Current Measurement Mode: S-SQ-N/A

SQ/TQ: SQ CR Gas Flow: Normal

CR Gas: None

Calibrated Show Analog

Analog Spectrum: Normal

Ion Counting

Autotune Detector Setup Mass Calibration Performance Report

Readback Plot Performance Report Autotune Report Detector Setup Report Cross Calibration Factors Mass Calibration

Control Panel

iCAP TQ ESI SC-2DX

Autotune Wizard [InterfaceTune HighSensitivity]

Tune Data View

This page shows the actual tune process.

Torch position

Intensity [cps] (10³)

Torch Horizontal Position [mm] (Coarse Scan)

Average Intensities

Identifier	Value	RSD [%]
115In	26538.14	0

Control Panel

Main

Torch Horizontal Position [mm]: -0.60

Torch Vertical Position [mm]: 0.37

Nebulizer Flow [l/min]: 1.1029

Extraction Lens [V]: -200.0

Q1 Focus Lens [V]: 0.00

Main

Inlet

Plasma

QCell

Vacuum

Advanced

Cooling

Control Panel Status Panel

Analyses Data Display Autotune Wizard [InterfaceTune HighSensitivity]

Log View

Viewer Search

29 Info Messages 0 Warnings 1 Error 0 Fatal Errors

Level	Message	Time	Category	Sub Category
Info	Starting Autotune "InterfaceTune HighSensitivity"	1/31/2019 11:34:19.26	InstrumentControl	Autotuning
Info	Determining Original Intensities	1/31/2019 11:34:19.29	InstrumentControl	Autotuning
Info	Processing Stage Torch position Torch Horizontal Position Iteration 1	1/31/2019 11:35:12.11	InstrumentControl	Autotuning

Processing Stage Torch position | Torch Horizontal Position | Iteration 1

Autotune Seq.: InterfaceTune HighSensitivity

Cancel Autotuning

Autotuning Report

Instrument Control

Experiment Configuration iCAP TQ Window

Control: On Off Run Stop Restart

Interface: High Sensitivity Current Measurement Mode: S-SQ-N/A

SQ / TQ: SQ CR Gas Flow: Normal

CR Gas: None Measurement Mode

Calibrated Show Analog

Analog Spectrum: Normal

Autotune Detector Setup Mass Calibration Performance Report

Readback Plot Performance Report Autotune Report Detector Setup Report Cross Calibration Factors Mass Calibration

Control Panel iCAP TQ ESI SC-2DX Autotune Report

Main

Torch Horizontal Position [mm]: 0.10

Torch Vertical Position [mm]: 0.48

Nebulizer Flow [l/min]: 1.1114

Extraction Lens [V]: -150.0

Q1 Focus Lens [V]: 1.96

Autotune Report

Zoom: Whole page Output Format: PDF Renderer

Autotune Report

System

Starttime: 5/15/2019 3:11:38 PM
 Instrument: iCAP TQ
 User: WINDOW\SQ\DA\JP\Administrator
 Template: AdvancedTune.H2
 Instrument Serial Number: T200011
 Solution: iCAP TQ Tune solution
 Endtime: 5/15/2019 3:21:08 PM
 Result: The autotuning was successful.

Intensity Changes

Abundance	Original value	Tuned result
7Li	21202	3355
59Co	20350	3352
115In	83871	81583
238U	55071	1443102
209B	87082	1247181

Control Changes

Control	Unit	Original value	Tuned value
CR Gas	[V]	-1.2	-1.54
Focus Lens	[V]	-1.25	-1.33
Q1 Lens	[V]	-151.35	-155
Quad Entry Lens	[V]	-25.87	-31.33
CR Gas Flow	[ml/min]	6.225	9.25
CR RF Low Mass Amplitude Offset		0	42

1/28/2019 12:58:12 PM 17/8

Name Date created

Autotune-InterfaceTune HighSensitivit...	3/13/2018 12...
Autotune-AdvancedTune N/A-201803...	3/13/2018 12...
Autotune-InterfaceTune HighSensitivit...	3/13/2018 12...
Autotune-InterfaceTune HighSensitivit...	3/13/2018 3.1...
Autotune-AdvancedTune N/A-201803...	3/13/2018 3.2...
Autotune-InterfaceTune HighSensitivit...	3/16/2018 4.3...
Autotune-InterfaceTune HighSensitivit...	3/16/2018 5.3...
Autotune-InterfaceTune HighSensitivit...	3/16/2018 10...
Autotune-AdvancedTune N/A-201803...	3/16/2018 10...
Autotune-AdvancedTune N/A-201803...	3/16/2018 1.4...
Autotune-InterfaceTune HighSensitivit...	3/16/2018 1.4...
Autotune-InterfaceTune HighSensitivit...	3/20/2018 1.0...
Autotune-AdvancedTune N/A-201803...	3/20/2018 1.2...
Autotune-InterfaceTune HighSensitivit...	3/21/2018 8.5...
Autotune-AdvancedTune N/A-201803...	3/21/2018 9.0...
Autotune-InterfaceTune HighSensitivit...	3/21/2018 9.3...
Autotune-AdvancedTune KED-20180...	3/21/2018 10...
Autotune-InterfaceTune HighSensitivit...	3/27/2018 10...
Autotune-AdvancedTune O2-2018032...	3/27/2018 12...
Autotune-InterfaceTune HighSensitivit...	3/29/2018 11...
Autotune-InterfaceTune HighSensitivit...	3/30/2018 10...
Autotune-AdvancedTune KED-20180...	3/30/2018 12...
Autotune-InterfaceTune HighSensitivit...	4/17/2018 11...
Autotune-InterfaceTune HighSensitivit...	4/25/2018 12...
Autotune-InterfaceTune HighSensitivit...	5/14/2018 11...
Autotune-AdvancedTune N/A-201805...	5/14/2018 12...
Autotune-InterfaceTune HighSensitivit...	5/14/2018 12...
Autotune-AdvancedTune O2-2018051...	5/14/2018 1.4...
Autotune-InterfaceTune HighSensitivit...	5/15/2018 11...
Autotune-AdvancedTune O2-2018051...	5/15/2018 11...
Autotune-AdvancedTune KED-20180...	5/15/2018 2.5...
Autotune-AdvancedTune H2-2018051...	5/15/2018 3.1...

Average Intensities

Identifier	Value	RSD [%]
7Li	329876.42	0.9
59Co	244406.48	1
115In	634089.29	3.4
140Ce	644816.7	0.1
140Ce.160	13154.71	5
238U	767212.65	2.4
Oxides	2.04	4.9

Properties

Log View

Viewer Search

46 Info Messages 0 Warnings 1 Error 0 Fatal Errors

Level	Message	Time	Category	Sub Category
Info	Determining Tuned Intensities	1/31/2019 11:49:20.14	InstrumentControl	Autotuning
Info	Autotuning completed.	1/31/2019 11:49:34.48	InstrumentControl	Autotuning
Info	Saved the tune settings 'S-SQ-N/A'.	1/31/2019 11:52:24.58	InstrumentControl	Autotuning

Control Panel Status Panel

Saved the tune settings 'S-SQ-N/A'.



Method Development

Thermo Scientific iCAP Qnova Series ICP-MS

- Single Quad ICP-MS: iCAP RQ ICP-MS



Compact footprint

Quick connect and push-fit sample intro components

Innovative QCell Collision Cell

Interference Removal

KED

Polyatomic



Isobaric

X

Doubly charged

X

- Triple Quad ICP-MS: iCAP TQ ICP-MS



Additional quadrupole for superior interference removal

Built-in safety for handling reactive gases

4 mass flow controllers with optimized flow rates

Interference Removal

KED, Reactive Gas

Polyatomic



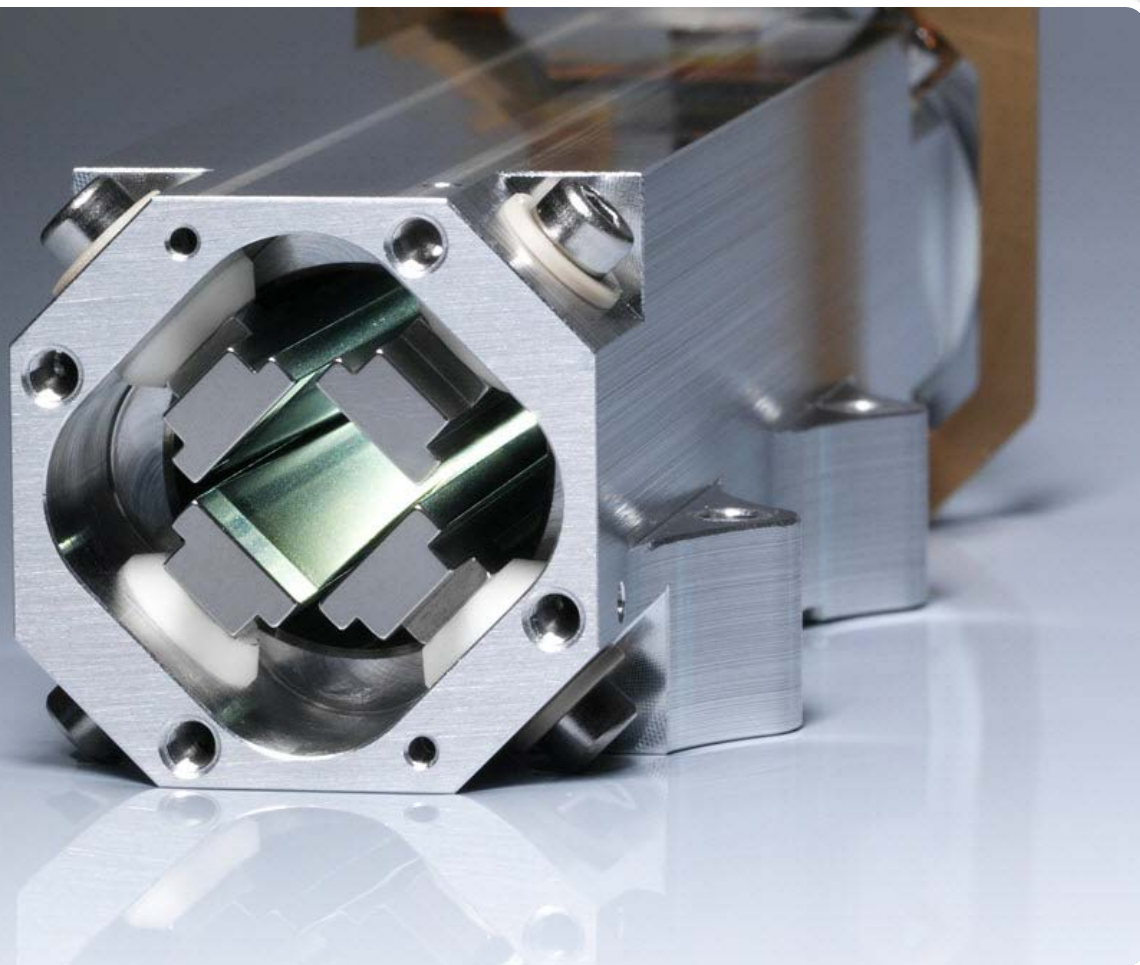
Isobaric



Doubly charged



Handling Interferences with Collision Reaction Cell Technology



- Proprietary design utilizing 4 **flatapoles** and automatic low-mass cut-off
- Requires **zero-maintenance** and is a non-consumable item
- 50% smaller volume for faster mode switching (<10s)
- **Single mode interference removal** with He for routine applications (KED)
- High ion transmission for improved sensitivity when using **kinetic energy discrimination**
- Can also be used in reactive mode with O₂, H₂ or NH₃ mixtures

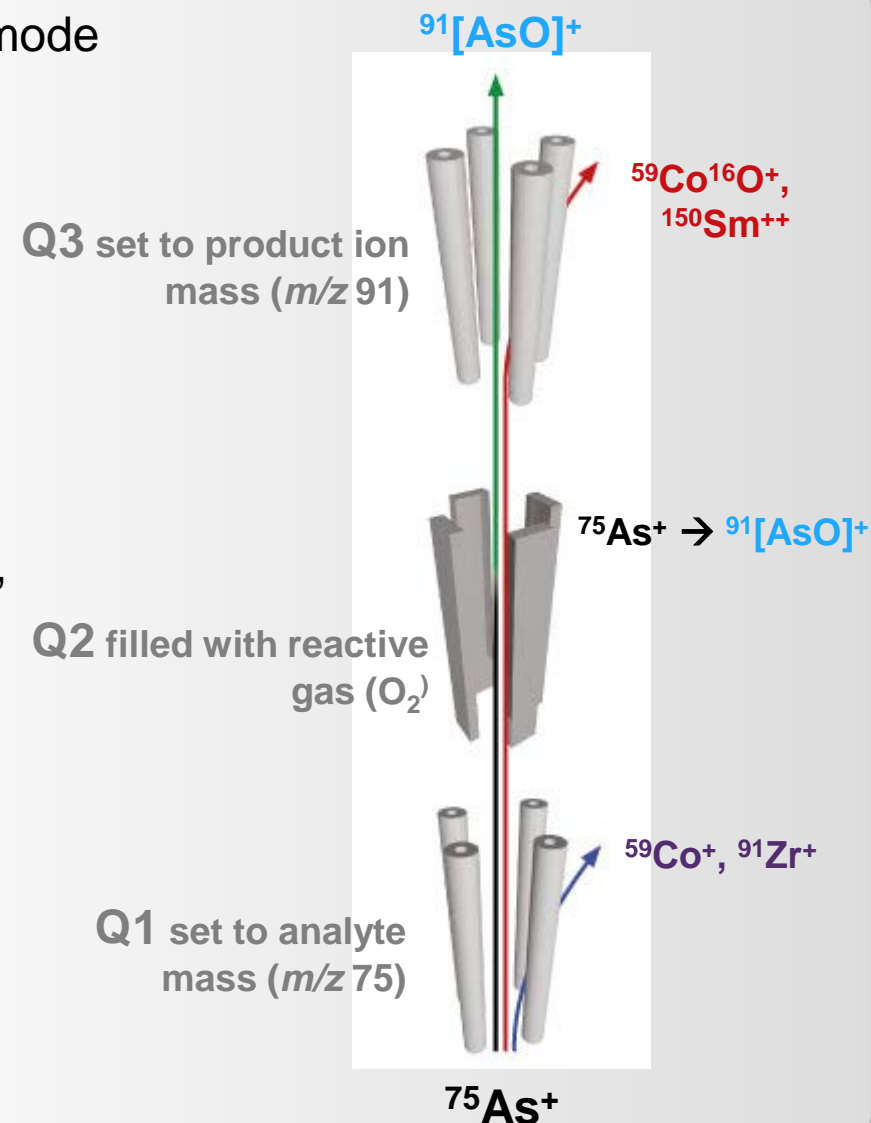
ICP-MS Interferences

- Polyatomic Interferences – removed by single quadrupole ICP-MS, KED mode

Element	Interference	How to Remove
^{75}As	$^{40}\text{Ar}^{35}\text{Cl}^+$	KED
$^{78,80}\text{Se}$	$^{40}\text{Ar}^{38}\text{Ar}^+$; $^{40}\text{Ar}^{40}\text{Ar}^+$	KED, H_2
^{51}V	$^{35}\text{Cl}^{16}\text{O}^+$	KED

- Other Interferences – isobaric, doubly charged, high levels of polyatomics,
Removed by triple quadrupole ICP-MS ➔

Element	Interference	How to Remove
^{75}As	$^{150}\text{Sm}^{2+}$, $^{59}\text{Co}^{16}\text{O}^+$	O_2 , mass shift of As
$^{78,80}\text{Se}$	$^{156, 160}\text{Gd}^{2+}$	O_2 , mass shift of Se
^{111}Cd	$^{95}\text{Mo}^{16}\text{O}^+$	O_2 , H_2 , on mass
^{31}P , ^{32}S	$^{14}\text{N}^{16}\text{O}^{1}\text{H}^+$; $^{16}\text{O}^{16}\text{O}^+$	O_2 , mass shift of P, S



The Power of Triple Quadrupole Technology

- **Problem:** the possibilities are endless!
- Collision cell operation:
 - Standard mode, collision (KED) mode, reaction mode, or a combination?
 - If reaction mode, which reaction gas/es?
 - Collision mode: what gas flow rate?
 - Reaction mode: what gas flow rate/s?
 - Collision cell voltage setting?
 - Do you measure the analyte on mass or on mass-shift?
- Quadrupole 1:
 - Voltage setting?
- Quadrupole 3:
 - Voltage setting?
- Sample intro settings (RF power, plasma gases, spray chamber temperature)



Eliminate the Complexity of Triple Quadrupole ICP-MS

- **Reaction Finder for Qtegra ISDS Software**

Step 1: Select your element/s or isotope/s

Step 2: You're done!

- **Reaction Finder proposes the most appropriate gas/scan settings**
- **Settings for both single quad mode and triple quad mode are suggested, for reference**

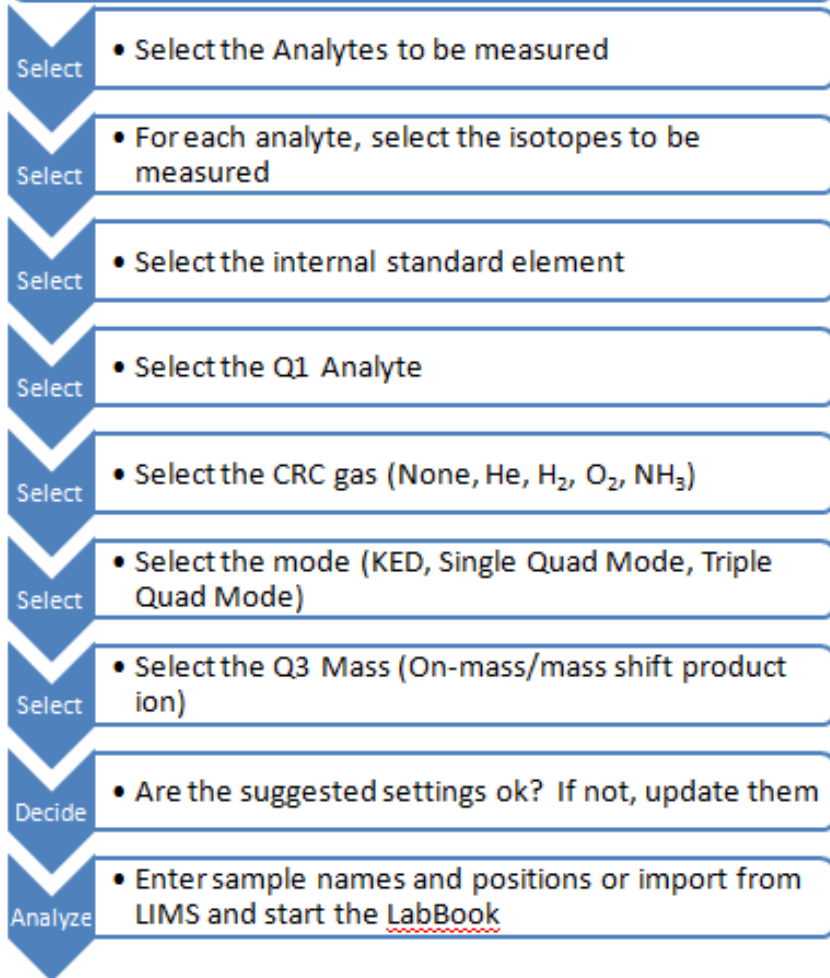
Identifier	Q3 Analyte	SQ / TQ	CR Gas	Dwell time (s)	Channels	Spacing (u)	
▶ 78Se 78Se.160	78Se.160 (93.912 ▾)	TQ	O ₂	0.1	1	0.1	Normal
80Se 80Se.160	80Se.160	TQ	O ₂	0.1	1	0.1	Normal



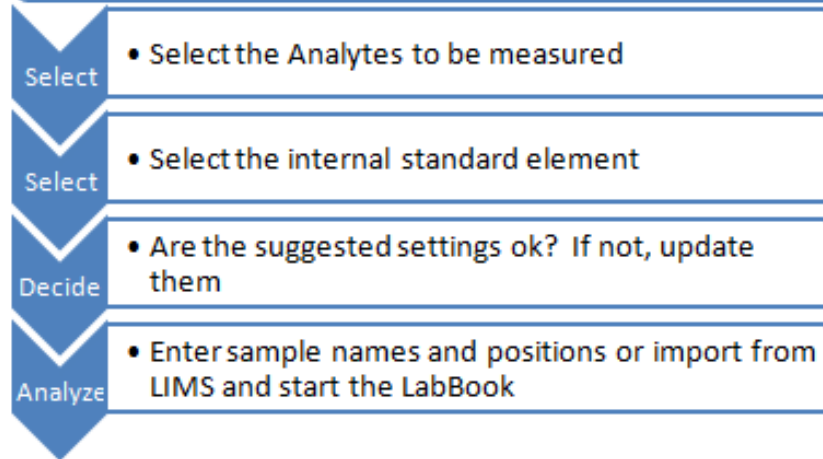
Redefining triple quadrupole technology with unique ease of use

Reaction Finder Method Development Assistant Workflow

Without Reaction Finder



With Reaction Finder



Less than 20 Minutes until a method is set up and the samples are ready to run!



Select Element/Isotope of interest



Reaction Finder proposes most appropriate gas and mode setting combination

Identifier	Q3 Analyte	SQ / TQ	CR Gas	Dwell time (s)	Channels	Spacing (u)	
78Se 78Se.160	78Se.160 (93.912)	TQ	O ₂	0.1	1	0.1	Normal
80Se 80Se.160	80Se.160	TQ	O ₂	0.1	1	0.1	Normal

Select Analytes

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- Summary
- iCAP TQ
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 - CSV Export
 - Report Export
 - Settings

Analytes

Elements Molecules

H																			He
Li	Be											B	C	N	O	F		Ne	
Na	Mg											Al	Si	P	S	Cl		Ar	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br		Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I		Xe	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At		Rn	
Fr	Ra	Ac																	
			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			

Show legend

Reaction Finder Determines Optimum Settings

Interferences

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Acquisition Parameters, runtime estimation 1 minutes 2 seconds

Identifier	Q3 Analyte	SQ / TQ	CR Gas Flow	CR Gas	Dwell time (s)	Channels	Spacing (u)	Q1 resolution	Q3 resolution
111Cd 111Cd (S-TQ-iO2)	111Cd	TQ	High	O ₂	0.1	1	0.1	Normal	Normal
89Y 89Y.160 (S-TQ-O2)	89Y.160	TQ	Normal	O ₂	0.1	1	0.1	Normal	Normal
89Y 89Y.160 (S-TQ-iO2)	89Y.160	TQ	High	O ₂	0.1	1	0.1	Normal	Normal
89Y (S-SQ-KED)		SQ	Normal	KED	0.1	1	0.1	Normal	Normal
80Se 80Se.160 (S-TQ-O2)	80Se.160	TQ	Normal	O ₂	0.1	1	0.1	Normal	Normal
78Se (S-SQ-KED)		SQ	Normal	KED	0.1	1	0.1	Normal	Normal
75As 75As.160 (S-TQ-O2)	75As.160	TQ	Normal	O ₂	0.1	1	0.1	Normal	Normal
51V 51V.160 (S-TQ-O2)	51V.160	TQ	Normal	O ₂	0.1	1	0.1	Normal	Normal
48Ti 48Ti.14N4.1H10 (S-T)	48Ti.14N4.1H10	TQ	Normal	NH ₃	0.1	1	0.1	Normal	Normal
45Sc 45Sc.160 (S-TQ-O2)	45Sc.160	TQ	Normal	O ₂	0.1	1	0.1	Normal	Normal
45Sc 45Sc.160 (S-TQ-O2)	45Sc.160	TQ	Normal	O ₂	0.1	1	0.1	Normal	Normal
45Sc (S-SQ-KED)		SQ	Normal	KED	0.1	1	0.1	Normal	Normal
45Sc 45Sc (S-TQ-NH3)	45Sc (44.956u) (d)	TQ	Normal	NH ₃	0.1	1	0.1	Normal	Normal
32S 32S.160 (S-TQ-O2)	32S.160	TQ	Normal	O ₂	0.1	1	0.1	Normal	Normal
31P 31P.160 (S-TQ-O2)	31P.160	TQ	Normal	O ₂	0.1	1	0.1	Normal	Normal
83Kr (S-SQ-KED)		SQ	Normal	KED	0.1	1	0.1	Normal	Normal

Advanced Parameters

Number of sweeps:

Measurement order:

- Intelligent mode switching

External Input Trigger	Level Trigger	Edge Trigger
Digital IN 1	None	None
Digital IN 2	None	None

External Output Trigger	Trigger step
Digital OUT 1	Never
Digital OUT 2	Never

Scheduler

Creating Standards

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Standard(s)

+ New

Name	Description
10 ppb	

Selected Elements for "10 ppb"

No.	Element	Concentration	Unit	Use in standard	Representation
1	Si	10	ppb	<input type="checkbox"/>	Ar.Ar
2	P	10	ppb	<input type="checkbox"/>	Ar.Cl
3	S	10	ppb	<input type="checkbox"/>	Ar.O
4	V	10	ppb	<input type="checkbox"/>	Ar++
5	As	10	ppb	<input type="checkbox"/>	As.O
6	Se	10	ppb	<input type="checkbox"/>	Ba.F
7	Cd	10	ppb	<input type="checkbox"/>	Ba.O

Molecules

<input type="checkbox"/>	Ba++
<input type="checkbox"/>	Bkg
<input type="checkbox"/>	Ce.O
<input type="checkbox"/>	Ce++
<input type="checkbox"/>	Cl.O
<input type="checkbox"/>	Cm.O

Select Elements

Show legend

Quantification and Quality Control

Content | Create | | **Quantification**

Use Quality Control

Analyte	Measurement Mode	Quantify	Internal Standard	Fit Type	Weighting	Forcing	Use for SemiQuant
31P 31P.160 (S-TQ-O2)	S-TQ-O2	Yes	45Sc 45Sc.160 (S-TQ-O2)	Linear	None	Blank	Yes
32S 32S.160 (S-TQ-O2)	S-TQ-O2	Yes	45Sc 45Sc.160 (S-TQ-O2)	Linear	None	Blank	Yes
45Sc (S-SQ-KED)	S-SQ-KED	No	Use as Internal Standard	Linear	None	Blank	Yes
45Sc 45Sc.160 (S-TQ-O2)	S-TQ-O2	No	Use as Internal Standard	Linear	None	Blank	Yes
45Sc 45Sc (S-TQ-NH3)	S-TQ-NH3	No	Use as Internal Standard	Linear	None	Blank	Yes
45Sc 45Sc.160 (S-TQ-O2,1)	S-TQ-O2	No	Use as Internal Standard	Linear	None	Blank	Yes
48Ti 48Ti.14N4.1H10 (S-TQ-NH3)	S-TQ-NH3	Yes	45Sc 45Sc (S-TQ-NH3)	Linear	None	Blank	Yes
51V 51V.160 (S-TQ-O2)	S-TQ-O2	Yes	45Sc 45Sc.160 (S-TQ-O2)	Linear	None	Blank	Yes
75As 75As.160 (S-TQ-O2)	S-TQ-O2	Yes	89Y 89Y.160 (S-TQ-O2)	Linear	None	Blank	Yes
78Se (S-SQ-KED)	S-SQ-KED	Yes	89Y (S-SQ-KED)	Linear	None	Blank	Yes
80Se 80Se.160 (S-TQ-O2)	S-TQ-O2	Yes	89Y 89Y.160 (S-TQ-O2)	Linear	None	Blank	Yes
83Kr (S-SQ-KED)	S-SQ-KED	No	89Y (S-SQ-KED)	Linear	None	Blank	Yes
89Y (S-SQ-KED)	S-SQ-KED	No	Use as Internal Standard	Linear	None	Blank	Yes
89Y 89Y.160 (S-TQ-O2)	S-TQ-O2	No	Use as Internal Standard	Linear	None	Blank	Yes
89Y 89Y.160 (S-TQ-iO2)	S-TQ-iO2	No	Use as Internal Standard	Linear	None	Blank	Yes
111Cd 111Cd (S-TQ-iO2)	S-TQ-iO2	Yes	89Y 89Y.160 (S-TQ-iO2)	Linear	None	Blank	Yes

IS Recovery settings

Low warning limit [%]: Low failure limit [%]:

High warning limit [%]: High failure limit [%]:

Built-in Quality Control Protocol

Create ▾ |

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Quality Control Tests

Name	Description
Blank Tests	
CCB	Continuing Calibration Blank
ICB	Initial Calibration Blank
MTB	Memory Test Blank
PRB	Preparation Blank
Calibration Tests	
CCV	Continuing Calibration Verification
ICV	Initial Calibration Verification
LCS	Laboratory Control Standard
QCS	Quality Control Standard
Paired Sample Tests	
DUP	Duplicate
SER	Serial Dilution
Paired Sample Tests (EPA)	
DUP EPA	Duplicate (EPA)
SER EPA	Serial Dilution (EPA)
Spike Tests	
LFB	Laboratory Fortified Blank
MXS	Matrix Spike
PDS	Post Digestion Spike
Spike Tests (ARC)	
MXS ARC	Matrix Spike (ARC)
Continuous Tests	
RCV	Regression Coefficient Verification
RSV	Relative Stability Verification
Internal Standard Test	
IST	Internal Standard Test

Test details for CCB

Number of analyte failures to generate a QC failure:

Number of analyte warnings to generate a QC failure:

If this QC fails: times

If this QC fails again: times

If this QC fails a final time: times


Test Parameters

Enabled	Analyte	Warning Limit	Failure Limit
<input type="checkbox"/>	45Sc (S-SQ-KED)	1	2
<input type="checkbox"/>	89Y (S-SQ-KED)	1	2
<input checked="" type="checkbox"/>	31P 31P.160 (S)	1	2
<input checked="" type="checkbox"/>	32S 32S.160 (S)	1	2
<input type="checkbox"/>	89Y 89Y.160 (S)	1	2
<input type="checkbox"/>	45Sc 45Sc.160	1	2
<input checked="" type="checkbox"/>	75As 75As.160	1	2
<input checked="" type="checkbox"/>	80Se 80Se.160	1	2
<input checked="" type="checkbox"/>	78Se (S-SQ-KED)	1	2
<input checked="" type="checkbox"/>	111Cd 111Cd (S)	1	2
<input checked="" type="checkbox"/>	51V 51V.160 (S)	1	2
<input type="checkbox"/>	89Y 89Y.160 (S)	1	2
<input type="checkbox"/>	45Sc 45Sc (S-T)	1	2
<input checked="" type="checkbox"/>	48Ti 48Ti.14N4.	1	2
<input type="checkbox"/>	45Sc 45Sc.160	1	2
<input type="checkbox"/>	83Kr (S-SQ-KED)	1	2

Intelligent Dilution – Internal Standards and Over-range Samples

Create ▾ ↻ ↺ ↻ ↻ ↻ ↻

Content

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Internal Standard

Enable

Upper Limit [%] of Internal Standard Recovery

Lower Limit [%] of Internal Standard Recovery

Autodilution Factor

Max. # of Autodilutions

Action on Failure

Calibration Range

Enable

Limit [%]

Target [%]

Action on Failure

Sample List

Print sample layout | Comments | Options | Copy | Paste | Insert | Append

Content

- Summary
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Sample List estimated runtime: 11 minutes 46 seconds

	Label	Status	Survey Runs	Main Runs	Evaluate	Sample Type	Standard	Dilution Facto	QC Action	QC Restart	QC Reference	Total Dilution Fact	Rack Number	Vial Numbers	prepFAST DF
1	Rinse	●	1	3	✓	UNKNOWN		1	None			1	0	1	1
2	Rinse	●	1	3	✓	UNKNOWN		1	None			1	0	1	1
3	Blank	●	1	3	✓	BLK		1	None			1	0	1	1
4	0.01ppb	●	1	3	✓	STD	Low Standard	1	None			100	0	2	100
5	0.02ppb	●	1	3	✓	STD	Low Standard	1	None			50	0	2	50
6	0.05ppb	●	1	3	✓	STD	Low Standard	1	None			20	0	2	20
7	0.1ppb	●	1	3	✓	STD	Low Standard	1	None			10	0	2	10
8	0.2ppb	●	1	3	✓	STD	Low Standard	1	None			5	0	2	5
9	0.5ppb	●	1	3	✓	STD	Low Standard	1	None			2	0	2	2
10	1ppb	●	1	3	✓	STD	High Standard	1	None			20	0	3	20
11	2ppb	●	1	3	✓	STD	High Standard	1	None			10	0	3	10
12	5ppb	●	1	3	✓	STD	High Standard	1	None			5	0	3	5
13	10ppb	●	1	3	✓	STD	High Standard	1	None			2	0	3	2
14	20ppb	●	1	3	✓	STD	High Standard	1	None			1	0	3	1
15	Washout	●	1	3	✓	UNKNOWN		1	None			1	0	1	1
16	ICV	●	1	3	✓	QC	Low Standard	1	ICV	QC.Next		1	0	2	1
17	ICB	●	1	3	✓	QC		1	ICB	QC.Next		1	0	1	1
18	Blank_1	●	1	3	✓	UNKNOWN		1	None			1	1	1	1
19	Blank_2	●	1	3	✓	UNKNOWN		1	None			1	1	2	1
20	Blank_3	●	1	3	✓	UNKNOWN		1	None			1	1	3	1
21	Blank_6	●	1	3	✓	UNKNOWN		1	None			1	1	6	1
22	Blank_7	●	1	3	✓	UNKNOWN		1	None			1	1	7	1
23	CCV	●	1	3	✓	QC	Low Standard	1	CCV	QC.Next		1	0	2	1
24	CCB	●	1	3	✓	QC		1	CCB	QC.Next		1	0	1	1
25	Sample_1	●	1	3	✓	UNKNOWN		1	None			1	1	8	1
26	Sample_2	●	1	3	✓	UNKNOWN		1	None			1	1	9	1
27	Sample_3	●	1	3	✓	UNKNOWN		1	None			1	1	10	1
28	CCV	●	1	3	✓	QC	Low Standard	1	CCV	QC.Next		1	0	2	1
29	CCB	●	1	3	✓	QC		1	CCB	QC.Next		1	0	1	1
30	Washout	●	1	3	✓	UNKNOWN		1	None			1	0	1	1
31	Washout	●	1	3	✓	UNKNOWN		1	None			1	0	1	1

Scheduler

Results

Create | Column Filter

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 - Concentration Ratios
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 - Intensity Ratios
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 - Survey Concentrations
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- Instrument State
- ESI SC-4DX
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- Query
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- Settings

Concentrations				89Y (KED)	115In (KED)	206Pb (KED) [207Pb (KED) [208Pb (KED) [209Bi (KED)
No	Time	Sample Type	Label						
1	1/10/2019 9:52:49 A	UNKNOWN	Rinse	100.7%	99.3%	0.000313	0.000975	0.000442	98.9%
1				100.0%	99.5%	0.000523	0.000322	0.000436 (1.872)	99.2%
1				100.7%	98.2%	0.000669	0.001241	0.000582 (1.980)	98.7%
1				101.4%	100.2%	-0.000252	0.001362	0.000307 (1.884)	98.8%
			Mean:	100.7%	99.3%	0.000313	0.000975	0.000442	98.9%
			RSD [%]:	0.7	1.0	157.9	58.3	31.2	0.3
			SD:	0.7%	1.0%	0.0	0.0	0.0	0.3%
No	Time	Sample Type	Label	89Y (KED)	115In (KED)	206Pb (KED) [207Pb (KED) [208Pb (KED) [209Bi (KED)
2	1/10/2019 9:54:51 A	UNKNOWN	Rinse	100.9%	100.4%	0.000321	0.000271	0.000168	99.8%
3	1/10/2019 9:57:01 A	BLK		100.0%	100.0%	0.000000	0.000000	0.000000	100.0%
4	1/10/2019 9:59:12 A	STD							
15	1/10/2019 10:22:35	UNKNOWN	Washout	99.4%	97.6%	0.000121	0.000383	0.000213	96.0%
16	1/10/2019 10:24:40	QC - ICV	ICV	96.3%	95.5%	1.089957 (109.0)	1.101678 (110.2)	1.095126 (109.5)	95.8%
17	1/10/2019 10:26:52	QC - ICB	ICB	97.0%	96.4%	-0.000199	0.000111	-0.000069	95.7%
18	1/10/2019 10:29:02	UNKNOWN	Blank_1	99.2%	98.7%	-0.000272	-0.000049	-0.000141	97.0%
19	1/10/2019 10:31:07	UNKNOWN	Blank_2	98.4%	98.5%	-0.000585	-0.000354	-0.000361	96.9%
20	1/10/2019 10:33:15	UNKNOWN	Blank_3	98.8%	97.9%	-0.000154	-0.000355	-0.000161	96.9%
21	1/10/2019 10:35:22	UNKNOWN	Blank_4	99.1%	98.3%	-0.000282	-0.000422	-0.000144	97.6%
22	1/10/2019 10:37:28	UNKNOWN	Blank_5	97.2%	96.8%	0.000049	0.000185	0.000194	96.3%
23	1/10/2019 10:39:37	UNKNOWN	Blank_6	94.7%	96.2%	0.000382	0.000618	0.000287	96.7%
24	1/10/2019 10:41:40	UNKNOWN	Blank_7	98.3%	97.6%	-0.000195	-0.000436	-0.000179	97.9%
25	1/10/2019 10:43:46	QC - CCV	CCV	96.0%	95.9%	1.103177 (110.3)	1.105600 (110.6)	1.098169 (109.8)	96.4%
26	1/10/2019 10:45:55	QC - CCB	CCB	98.1%	98.5%	-0.000415	-0.000562	-0.000442	97.0%
27	1/10/2019 10:48:04	UNKNOWN	Sample_1	121.2%	106.7%	0.313602	0.301820	0.305861	83.2%
28	1/10/2019 10:50:09	UNKNOWN	Sample_2	129.5%	108.7%	0.273223	0.264698	0.265987	76.1%
29	1/10/2019 10:52:13	UNKNOWN	Sample_3	129.8%	105.8%	0.285679	0.271559	0.275917	67.1%
32	1/10/2019 10:58:35	QC - CCV	CCV	133.4%	119.0%	1.099399 (109.9)	1.094513 (109.5)	1.091138 (109.1)	84.5%
33	1/10/2019 11:00:42	QC - CCB	CCB	133.0%	116.8%	0.000517	0.000363	0.000332	81.6%
40	1/10/2019 12:12:42	UNKNOWN	Washout	116.1%	114.6%	0.000138	-0.000045	-0.000033	104.5%
41	1/10/2019 12:14:45	UNKNOWN	Washout	111.8%	111.9%	-0.000207	-0.000177	-0.000208	104.7%

Results – Calibration Data

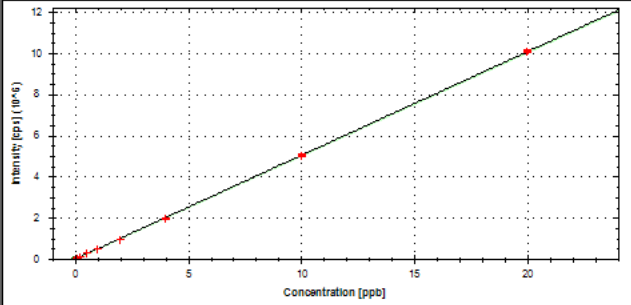
Content

- Summary
- iCAP RQ
- Method Parameters
- Evaluation Results
 - Concentrations**
 - Concentration Ratios
 - Intensities
 - Intensity Ratios
 - Survey Intensities
 - Survey Concentrations
 - Spectra View
- Instrument State
- ESI SC-4DX
 - Method Settings
 - FAST Methods
 - Intelligent Dilution
- Sample List
- Log Messages
- Signing
- Query
- Reports
- Settings

		Concentrations							
No	Time	Sample Type	Label	89Y (KED)	115In (KED)	206Pb (KED) [207Pb (KED) [208Pb (KED) [209Bi (KED)
1	1/10/2019 9:52:49 A	UNKNOWN	Rinse	100.7%	99.3%	0.000313	0.000975	0.000442	98.9%
1				100.0%	99.5%	0.000523	0.000322	0.000436 (1.872)	99.2%
1			2	100.7%	98.2%	0.000669	0.001241	0.000582 (1.980)	98.7%
1			3	101.4%	100.2%	-0.000252	0.001362	0.000307 (1.884)	98.8%
Mean:				100.7%	99.3%	0.000313	0.000975	0.000442	98.9%
RSD [%]:				0.7	1.0	157.9	58.3	31.2	0.3
SD:				0.7%	1.0%	0.0	0.0	0.0	0.3%

No	Time	Sample Type	Label	89Y (KED)	115In (KED)	206Pb (KED) [207Pb (KED) [208Pb (KED) [209Bi (KED)
2	1/10/2019 9:54:51 A	UNKNOWN	Rinse	100.9%	100.4%	0.000321	0.000271	0.000168	99.8%
3	1/10/2019 9:57:01 A	BLK		100.0%	100.0%	0.000000	0.000000	0.000000	100.0%

Details



208Pb (KED) - IS:209Bi (KED)

Calibration Properties

FitType:

Weighting:

Forcing:

Use for SemiQ:

Sample list line 1:

+ Add Comment

Status: Success

Creation: With experiment

Description:

Comment:

Start time: 1/10/2019 9:52:49 AM

Stop time: 1/10/2019 9:54:51 AM

User name: ADMINTH-17PO19M/sarvesh.2786

Quality control

RSV test passed.

Reason: Relative Stability Verification: Could not determine the concentration for analyte '209Bi (KED)'. The quality control test is not performed.

Relative Stability Verification: Could not determine the concentration for analyte '89Y (KED)'. The quality control test is not performed.

Relative Stability Verification: Could not determine the concentration for analyte '115In (KED)'. The quality control test is not performed.

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ThermoFisher
SCIENTIFIC

Spectra View

Content

- Summary
- iCAP RQ
 - Method Parameters
 - Evaluation Results
 - Concentrations
 - Concentration Ratios
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 - Intensity Ratios
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Spectra View Data

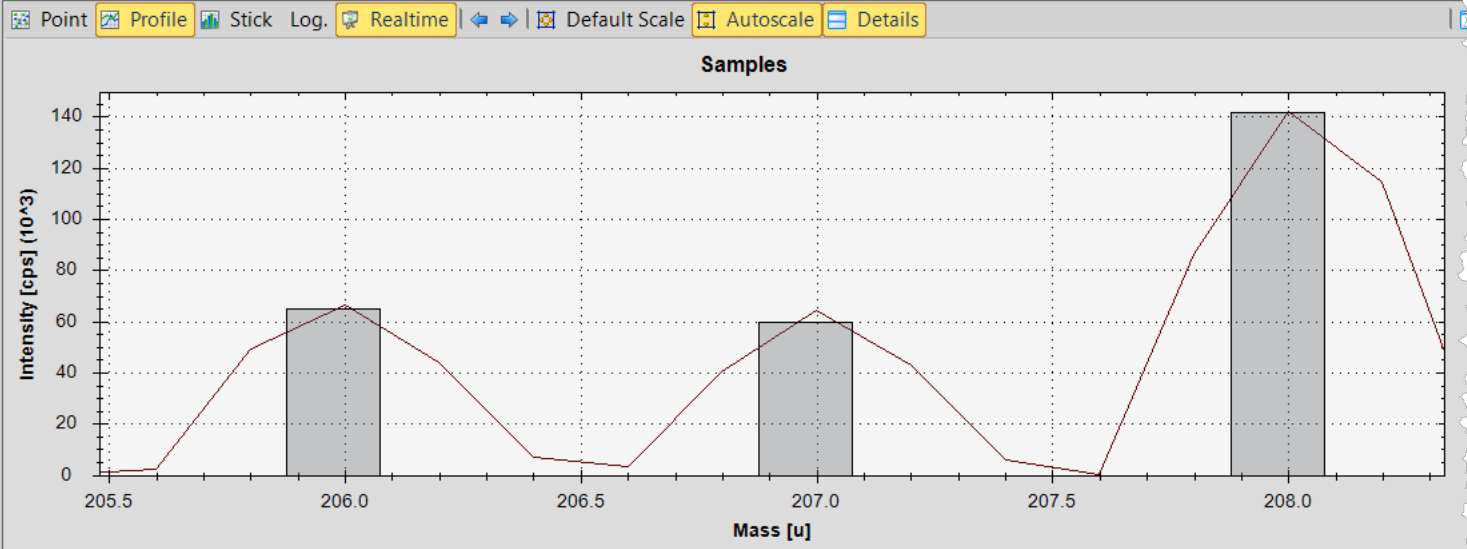
No	Label
1	Rinse
2	Rinse
3	Blank
4	0.01ppb
5	0.02ppb
6	0.05ppb
7	0.1ppb
8	0.2ppb
9	0.5ppb

Category	Color
MainRuns	Aqua
SurveyRuns	Maroon

Run	Show	Color
1	<input checked="" type="checkbox"/>	102.0, 0

No	Label
10	1ppb
11	2ppb
12	5ppb
13	10ppb
14	20ppb
15	Washout
16	ICV
17	ICB
18	Blank_1
19	Blank_2
20	Blank_3
21	Blank_4
22	Blank_5
23	Blank_6
24	Blank_7
25	CCV
26	CCB
27	Sample_1
28	Sample_2
29	Sample_3

Spectra View Graph



Details

Symbol	Col	Mass	Abundance
<input checked="" type="checkbox"/> 206Pb		205.974455	24.1
<input type="checkbox"/> 1H + 205Tl		205.982235037	70.4654286
<input type="checkbox"/> 14N + 192Os		205.964561008	40.84994
<input type="checkbox"/> 40Ar + 166Er		205.8926881	33.4656
<input type="checkbox"/> 12C + 194Pt		205.962679	32.5381
<input type="checkbox"/> 16O + 190Os		205.95336964	26.337168
<input type="checkbox"/> 16O + 1H + 189Os		205.960895677	16.0592727477
<input type="checkbox"/> 14N + 192Pt		205.964123008	0.7871086
<input type="checkbox"/> 13C + 193Ir		205.966296839	0.6897
<input type="checkbox"/> 15N + 191Ir		205.960711978	0.136518
<input type="checkbox"/> 16O + 3H + 187Re		205.96667964	0
<input type="checkbox"/> 17O + 2H + 187Re		205.968997387	3.5682E-06
<input type="checkbox"/> 18O + 1H + 187Re		205.962749427	0.12518122



Reporting

PDF Reports – Several Report Templates Available and Customizable

Content | Report Preview | Zoom: 75% | Edit Report | Output Format: PDF Render

Comprehensive Sample Report
2/24/2019 12:19:24 PM

QTEGRA

Calibration details

	0.01ppb	0.02ppb	0.05ppb	0.1ppb	0.2ppb
206Pb (KED)	0.010000 ppb	0.020000 ppb	0.050000 ppb	0.100000 ppb	0.200000 ppb
207Pb (KED)	0.010000 ppb	0.020000 ppb	0.050000 ppb	0.100000 ppb	0.200000 ppb
208Pb (KED)	0.010000 ppb	0.020000 ppb	0.050000 ppb	0.100000 ppb	0.200000 ppb

	0.5ppb	1ppb	2ppb	5ppb	10ppb
206Pb (KED)	0.500000 ppb	1.000000 ppb	2.000000 ppb	4.000000 ppb	10.000000 ppb
207Pb (KED)	0.500000 ppb	1.000000 ppb	2.000000 ppb	4.000000 ppb	10.000000 ppb
208Pb (KED)	0.500000 ppb	1.000000 ppb	2.000000 ppb	4.000000 ppb	10.000000 ppb

	20ppb
206Pb (KED)	20.000000 ppb
207Pb (KED)	20.000000 ppb
208Pb (KED)	20.000000 ppb

Fit Type	Weighting	Forcing
Linear	None	Blank
Linear	None	Blank
Linear	None	Blank
Linear	None	Blank
Linear	None	Blank
Linear	None	Blank
Linear	None	Blank

206Pb (KED)

$f(x) = 121827.6635x + 952.0320$
 $R^2 = 1.0000$

207Pb (KED)

$f(x) = 111180.4722x + 834.7843$
 $R^2 = 1.0000$

Scheduler

Export Data as a CSV File

Content

Summary

iCAP RQ

- Method Parameters
 - Analytes
 - Acquisition parameters
 - Monitor Analytes
 - Survey scan settings
 - Interference correction
 - Standards
 - Quantification
 - Ratios
 - Quality Control
- Evaluation Results
 - Concentrations**
 - Concentration Ratios
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 - Intensity Ratios
 - Survey Intensities
 - Survey Concentrations
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Concentrations

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			RSD [%]:	0.7	1.0	157.9	58.3	31.2	0.3
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Exporting Data

Export data

Exporter: CSV Export

Available data

Schemes

- Concentration average
- Concentration SD
- Concentration RSD
- Relative wt%
- Relative at%
- MQL
- Concentration per Run
- Relative wt% per Run
- Relative at% per Run
- Survey
- Survey Concentrations
- Quality Control
- Instrument Raw Data
- Calibration Information
 - RSE
 - LOD
 - BEC
 - Coefficient of Determination
 - Correlation Coefficient
 - Standard Concentration
 - Intercept (a)
 - Linear factor (b)
 - Quadratic factor (c)
- Sample list
 - User name
 - Start Time
 - Stop Time
 - iCAP RQ
 - ESI SC-4DX
- Instrument Status
 - iCAP RQ

CSV Export Options

Path: C:\Users\keith.macrenaris\Desktop

Filename: Pittcon_2019

Open containing folder after export

Column separator: Custom .

Decimal Symbol: Point

Export sample lines as rows.

Group exported blocks.

Export complete LabBook.

Export per sample .

Export Cancel



Advanced Applications

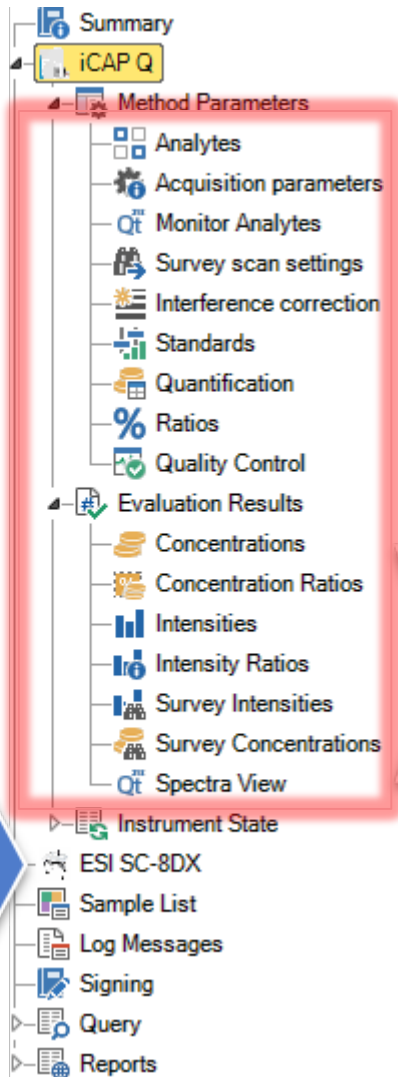
Qtegra Workflow – Application Independent

- Total element quantification

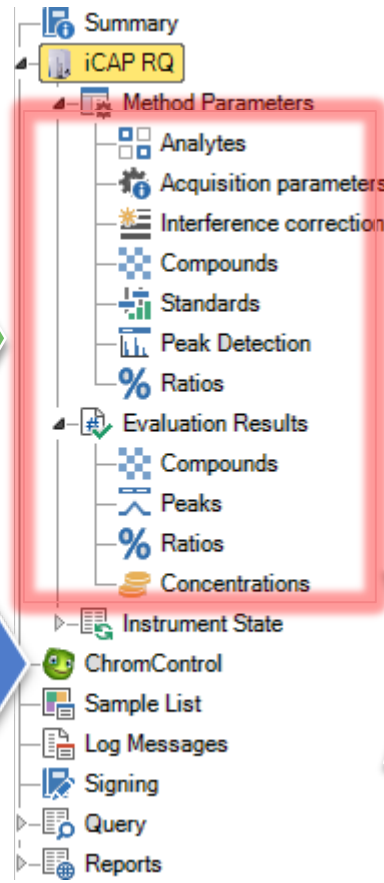
- Elemental speciation

- LA-ICP-MS

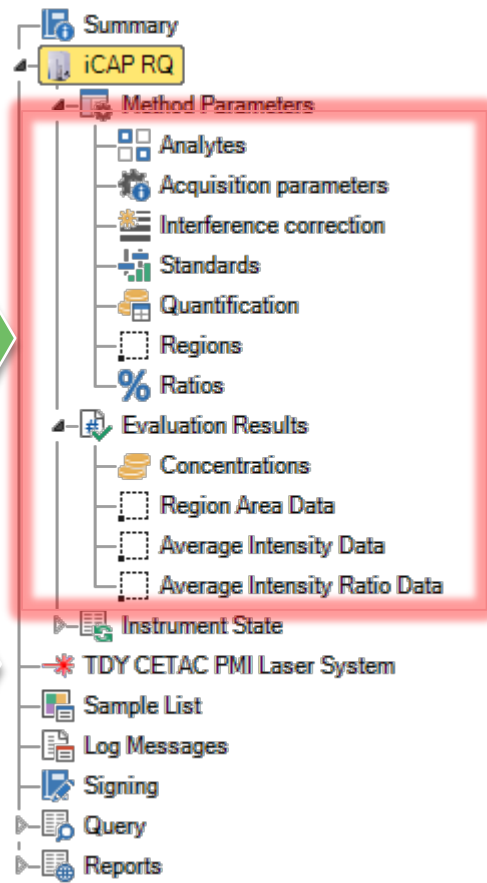
eQuant



tQuant



trQuant



Elemental Speciation via ChromControl

Dedicated Laser Plug-ins

Traditional Autosampler based analysis

Summary – Build a Better ICP-MS Workflow



CEM Microwave

Easy set-up, Fast sample digestion

ESI Automatic Sample Introduction

Fast Uptake/Rinse, Autodilution, Autocalibration

iCAP RQ and iCAP TQ ICP-MS

Easy to Use, Streamlined Workflow Software

Thank You for Attending

Please return our survey to receive a drink ticket for our daily networking event where you can continue your discussions with our experts!



Visit Booth #2632

Join us Tuesday through
Thursday from 3:30 – 5:00 p.m.
to collaborate with our technical experts

Redeem this ticket
for a complimentary beverage!

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