

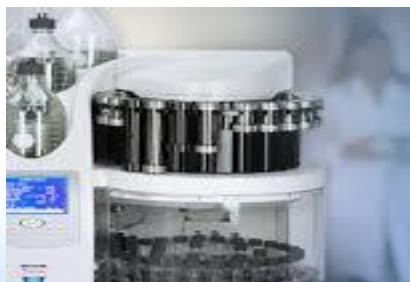


Innovations in GC & GCMS for the Environmental Laboratory

The world leader in serving science

Environmental GC-MS Workflow

Sample prep / consumables



- Automation for sample preparation
- Consumables that simplify and improve results

Gas Chromatograph (GC)



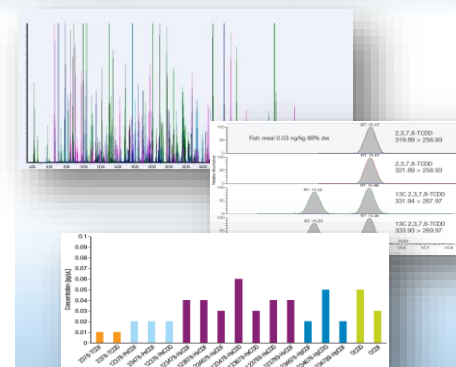
- Accuracy Speed and Productivity.
- Innovating GC for demanding routine / applications

GC Mass spectrometry



- Lower limits of detection for regulatory compliance
- Robust performance for simple and complex matrices

Data analysis Software



- Software that matches specific environmental analysis requirements
- Tools that simplify data analysis

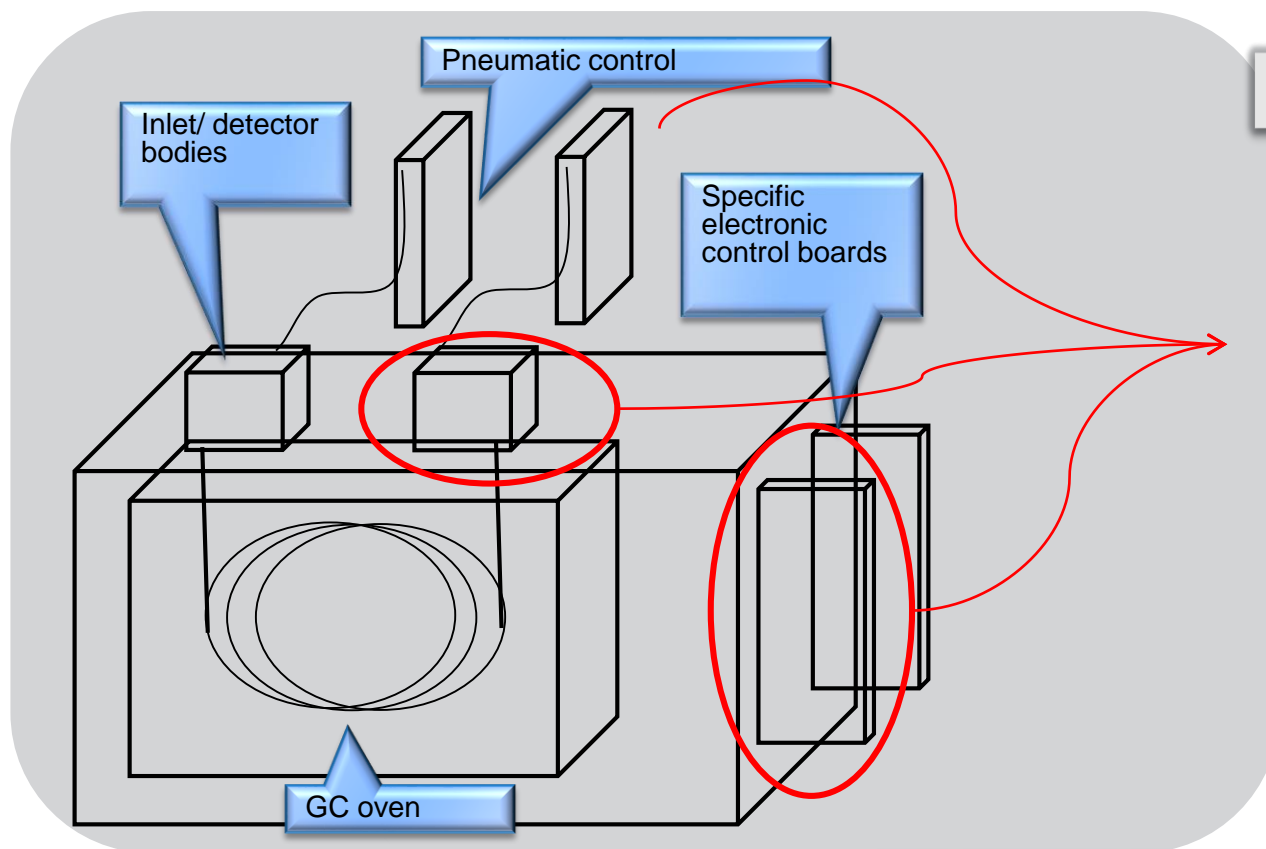
Workflow Solutions from Sample Prep to Reporting



Product Innovations to Simplify Your Workflow

TRACE 1300 Series GC-Injector and Detector Modularity

Tailor Instrument Configurations within Minutes



Electronic boards

Proportional solenoid valves for gas control

Pneumatic manifold

Inlet body heater and Insulation

Column connection (inside the oven)



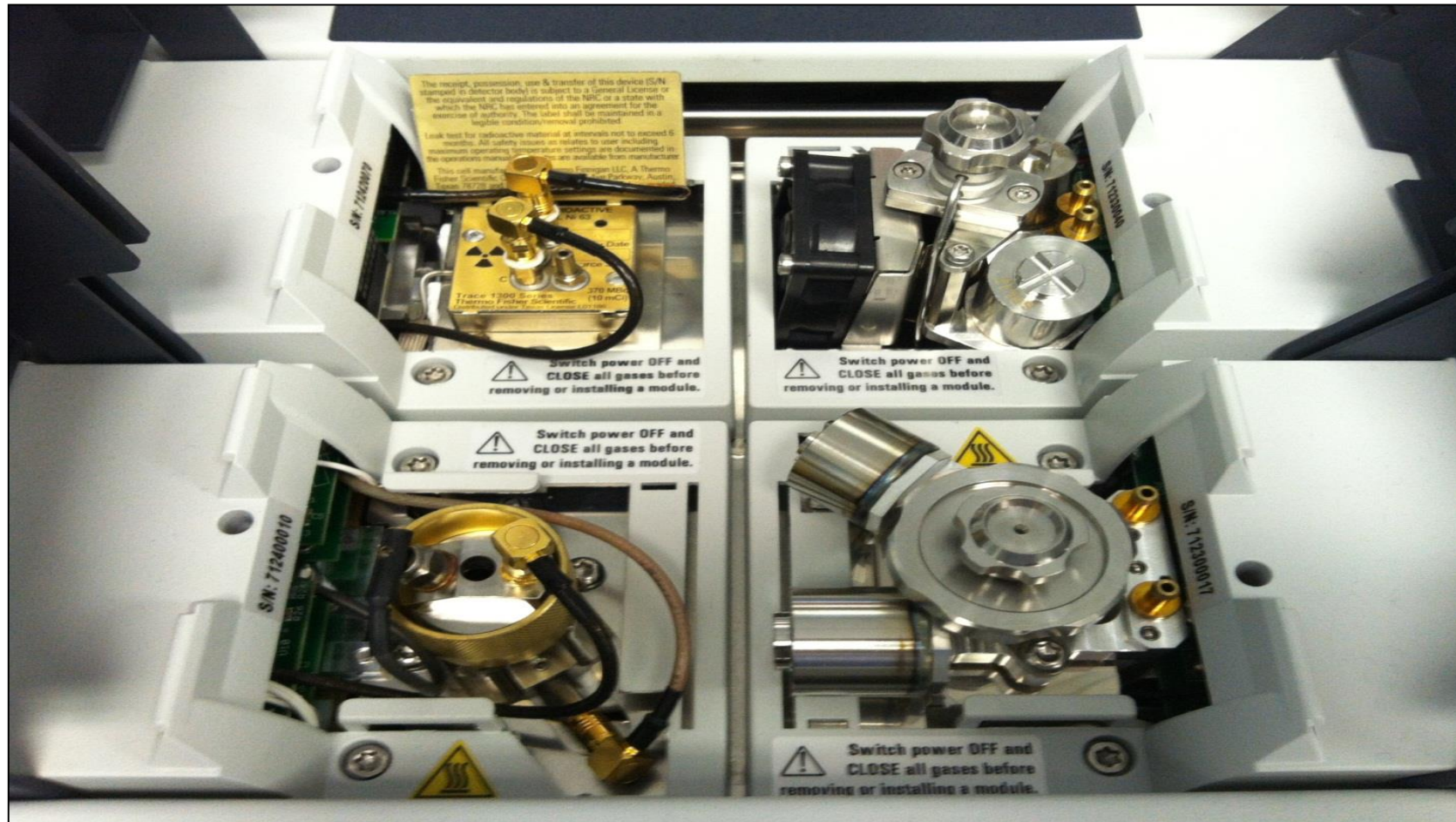
Trace 1310 Instant Connect Modules

ECD
Detector

PTV Inlet

FID Detector

S/SL Inlet



TRACE 1300 Series

TRACE 1310: Touch screen interface provides instant access for ease of use and local control



TRACE 1300: Local built-in ultra-simplified user interface – two buttons and four LEDs.



Modules available:

INLETS: SSL - SSL backflush - PTV - PTV backflush – GSV (Gas Sampling Valve)

DETECTORS: FID - TCD - ECD - NPD - FPD - PDD - MS*

OTHER OPTIONS: Oven Cryo - Aux carrier

SOFTWARE: Chromeleon, TraceFinder, XCalibur

* Supported ISQ, TSQ-EVO, TSQ Duo, Q-Exactive



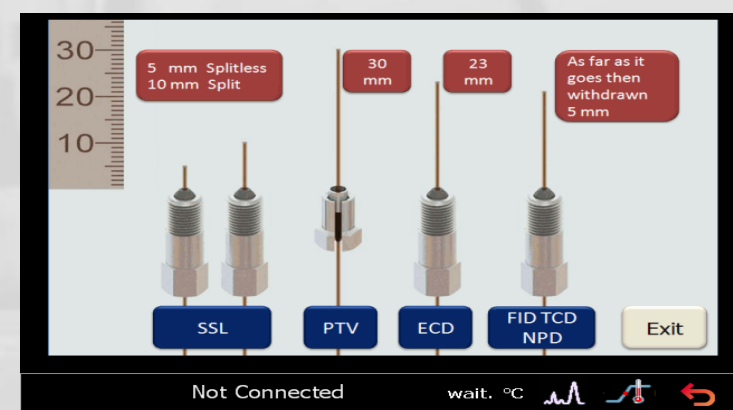
Complete Touch Screen for Direct Control

Complete touch screen for direct control

Method development & status control

Multi language capabilities

Maintenance, run log and video tutorials



SSL Inlet Designed for Performance, Robustness, PM Simplicity

Going Beyond the Standard:



Less Frequent PM Scheduling

Injector maintenance is quick, simple and easy

Cool head and septum

Lower septum bleeding

Longer septa lifetime for high productivity

No septum sticking for quick maintenance

Entire injector body can be removed for efficient cleaning-have a spare for even faster PM recovery

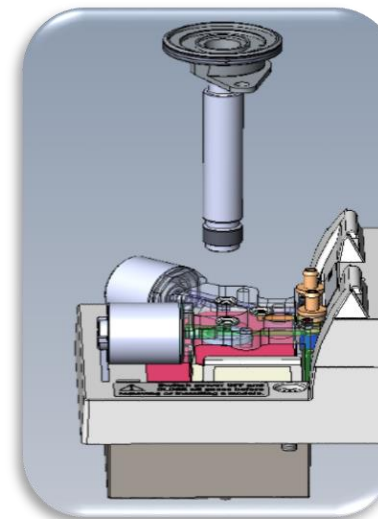
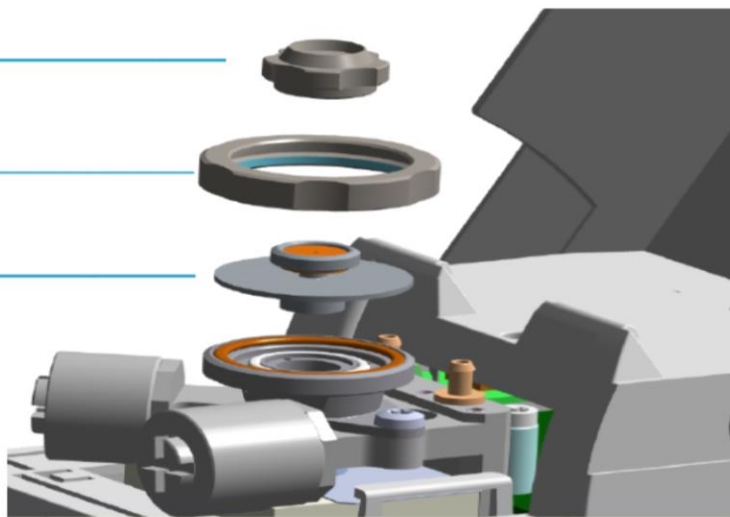
Increased column lifetime and MS sensitivity



Septum Cap

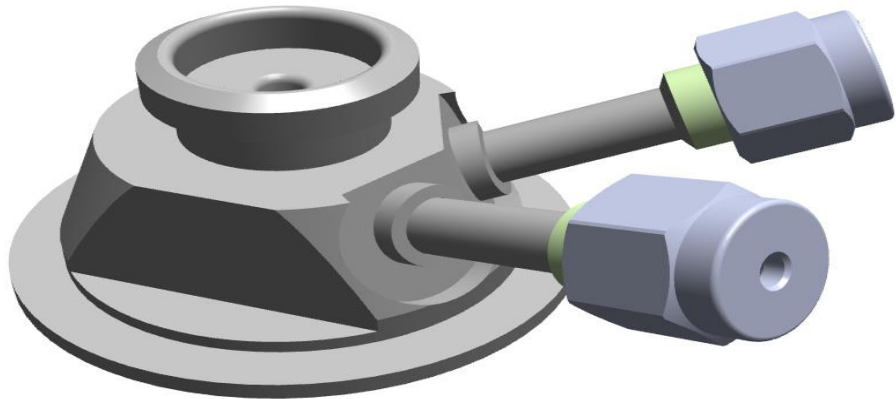
Ring Nut

Septum Holder/Liner Cap with Septum



Purge and Trap Adapter for TRACE 1300 (Volatile Methods)

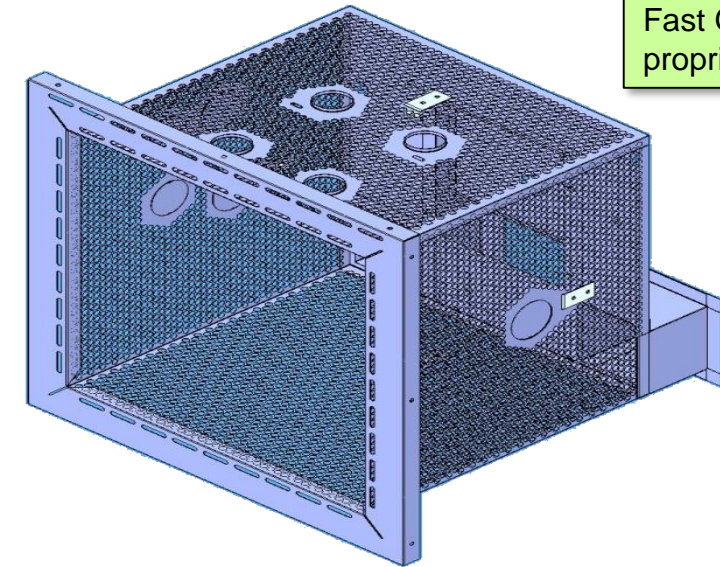
- Purge and Trap Adapter is a modification to the 1300 SSL Module
- Purge and Trap Adapter allows direct coupling of the Purge and Trap transfer line to the heated inlet
 - Reduces potential cold spot at PTC / GC interface
- No cut or unions are required in the carrier gas pathway
- Quickly and easily adapted back to liquid injections



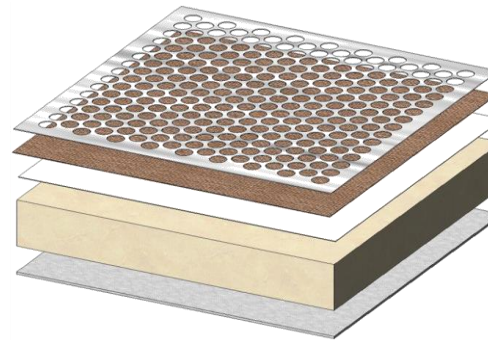
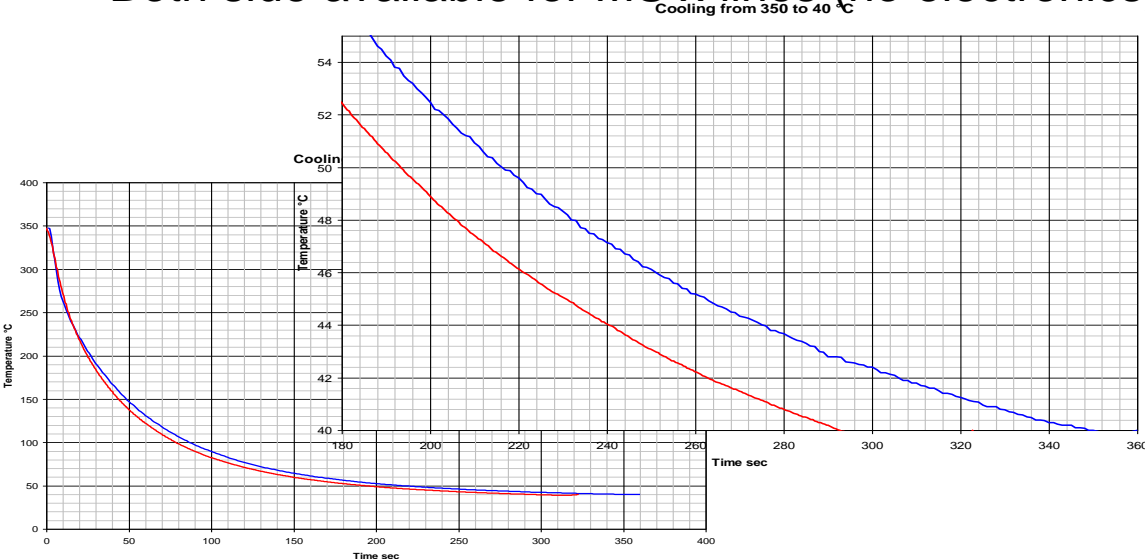
Trace 1300 GC Oven - Thermal Mass Reduction – Increased Productivity

- A robust and simple idea for superior oven performance

- Use of perforated sheet metal walls
- Layered insulation materials
- Larger exhaust air doors
- Fast cooling and heating
- Same size of TRACE GC oven
- Both side available for MS x-lines (no electronics)



Fast GC oven
proprietary technology





Product Innovations to Simplify Your Workflow

Integrated Sampling System

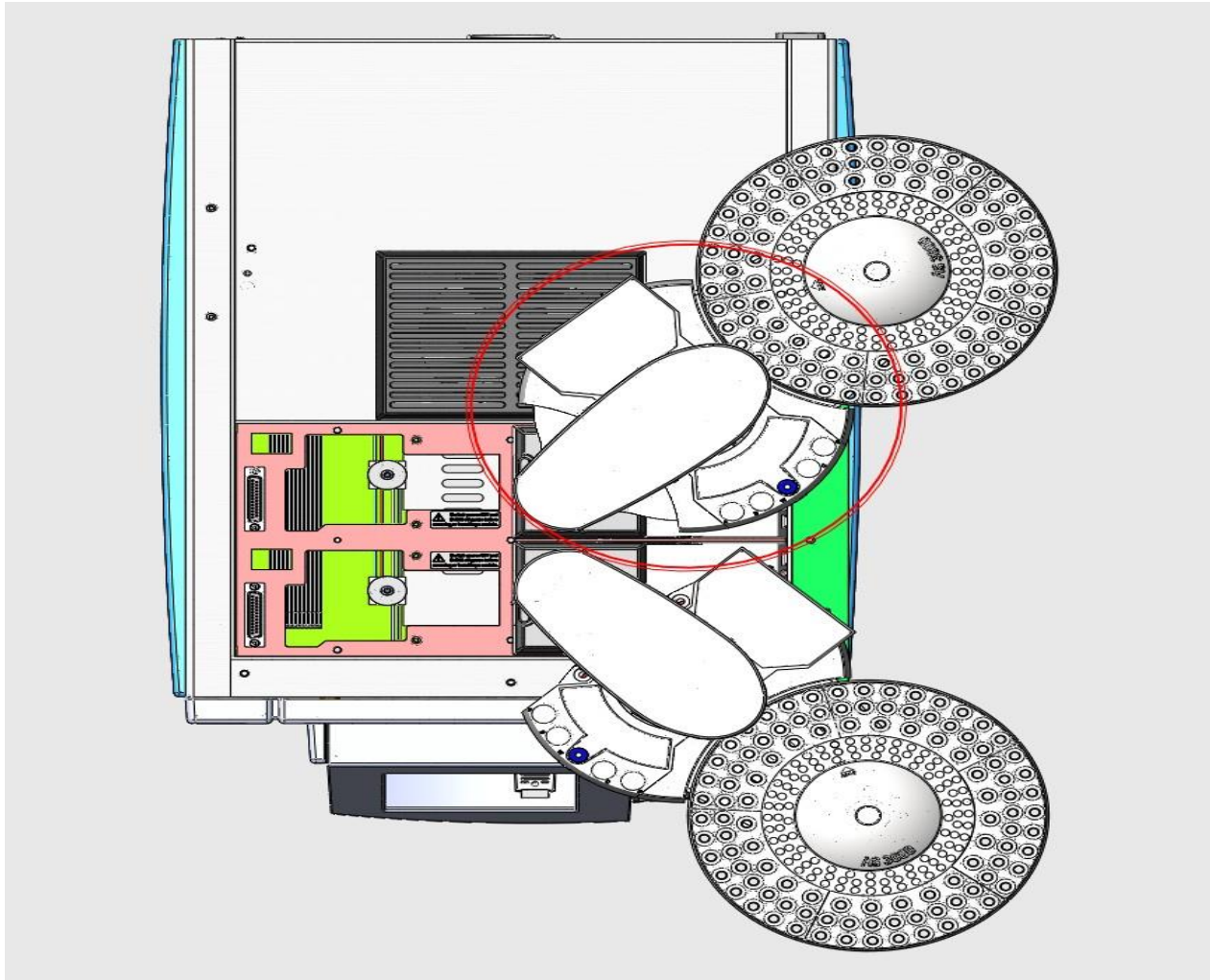
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Liquid Auto-sampler – AI/AS 1310

- Alignment-free
 - No alignment procedures at installation or for syringe replacement
- Symmetrical (for front or back side mounting)
 - One unique option with automatic recognition



Trace 1300 series with Dual AS 1310 Configuration



- **310** total sample capacity
- Gemini mode
- Minimal space coverage
- Trace 1300 to inject on two separate injection ports for simultaneous two+ channel analysis (GEMINI configuration)
- Ensures full injector maintenance capability as well as injector/detector module exchangeability
- Confirmation Analysis – Pesticides/PCBs

TriPlus RSH – Automated Robotic Sample Handling

Basic Liquid configuration fully compatible with...



Agitator and Heated oven for HS, SPME or sample prep



Peltier heating or cooling of samples



SPME fiber conditioning for SPME applications



Vortexer for Intensive sample mix



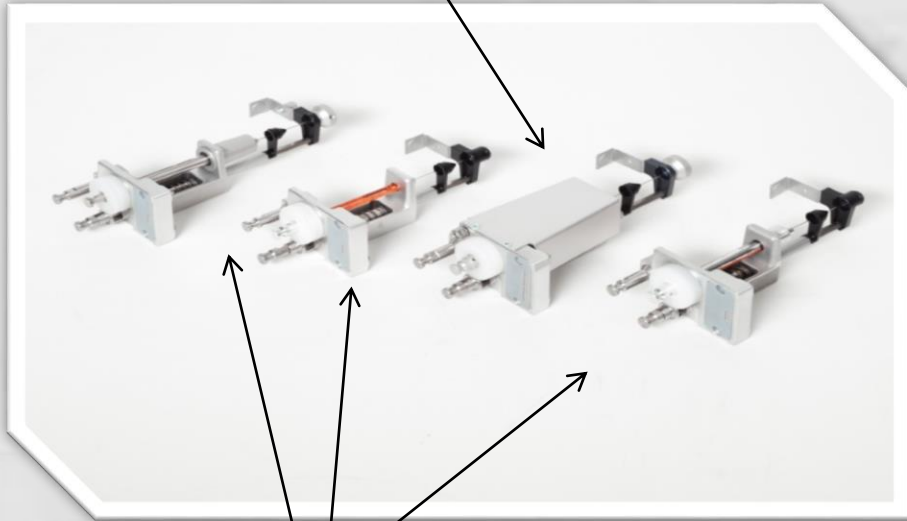
Barcode reader for sample tracking



More sample trays for higher capacity

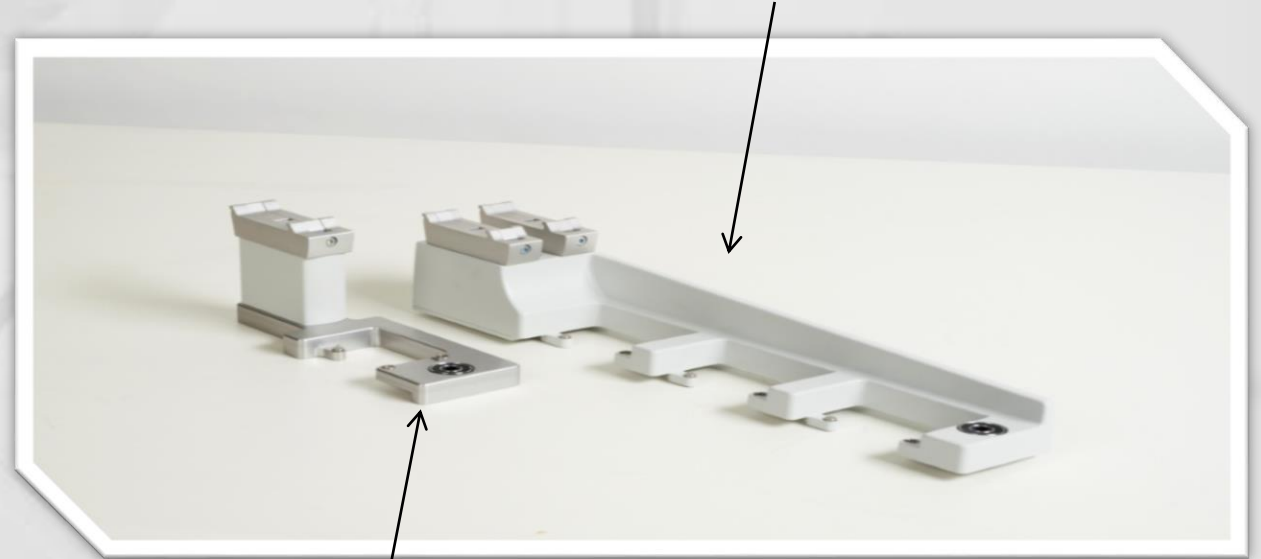
Triplus RSH: Syringe tools and ATC/TR stations

Headspace syringe tool



Different syringe sizes or
SPME tool

ATC (Automatic Tool change) Station for automatic
recognition and syringe exchanges during operation



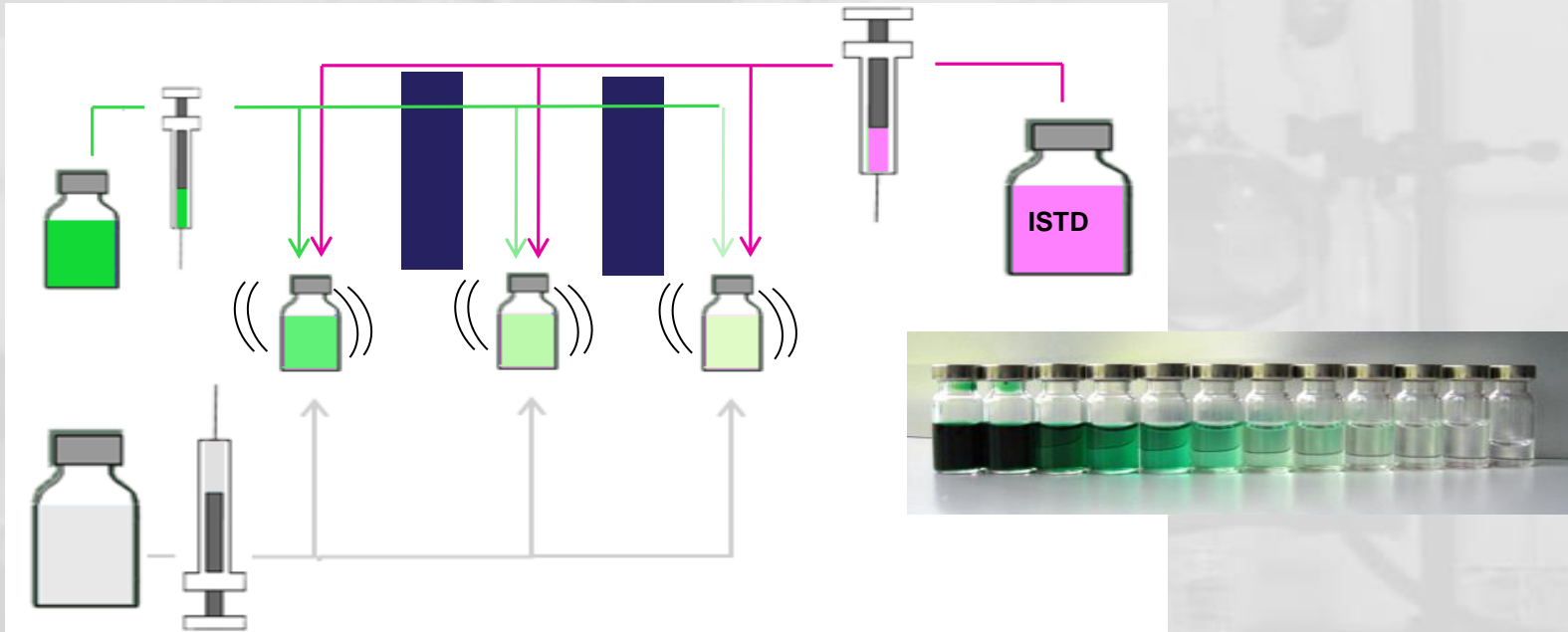
TR (Tool Releasing) Station for manual
syringe exchange

- TriPlus RSH is compatible with a wide range of syringe volumes
- ATC station enables unattended syringe exchange during a sequence

TriPlus RSH: Substantially Reducing \$/sample Lab Cost

Automated basic sample handling and sample prep

- **Calibration dilution:** automatically prepare calibration points adding internal standards



Labor costs strongly reduced with improved accuracy



Product Innovations to Simplify Your Workflow

ISQ Single Quadrupole Mass Spectrometer

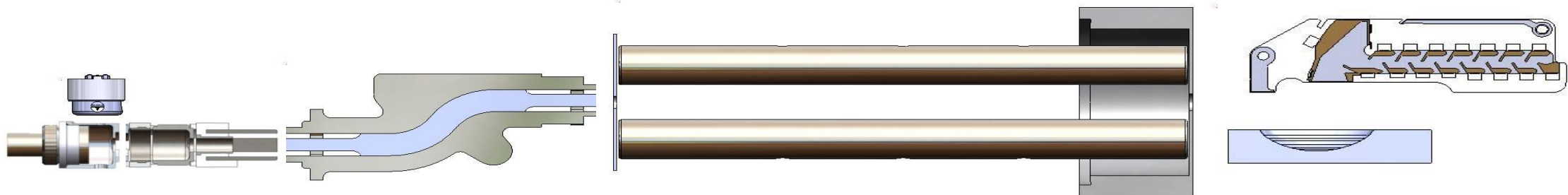
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ISQ Series GC-MS: ISQ QD, ISQ QD 300, and ISQ LT



Designed for Sensitivity and Robustness

- *Thermo Scientific™ ExtractaBrite™* Ion Source
 - Repeller, ion volume, lenses and “RF lens”
 - Contained in a keyed, easy-to-work-with cartridge sleeve
 - No tools required for assembly or disassembly
 - High efficiency ion focusing optics
 - Repeller works with the RF Lens for a ‘push / pull’ approach to ion extraction



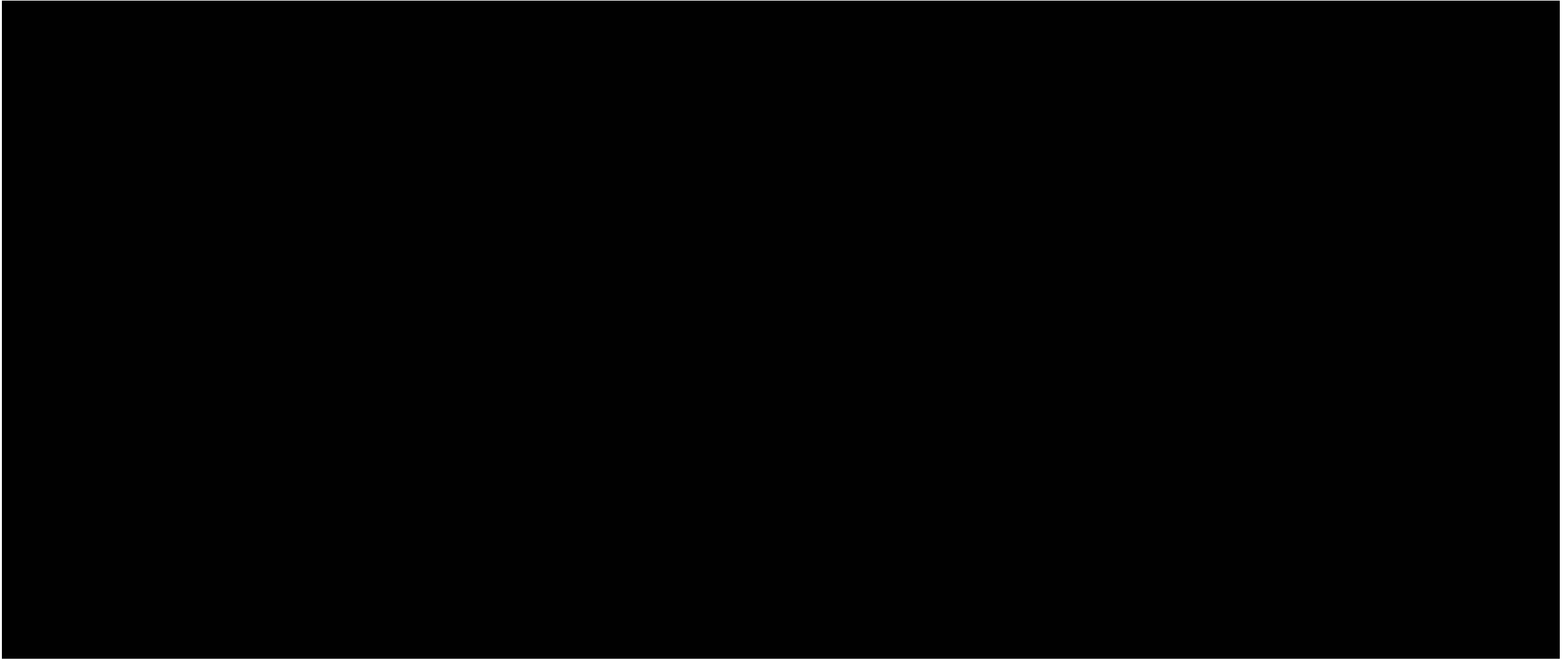
A Tour of the ISQ Series Design

ExtractaBrite Ion Source

Lenses 1, 2 and 3 plus the RF lens, along with the repeller and ion volume are contained in a sleeve, all of which can be removed from **ISQ LT** while the system is under vacuum.

The ability to remove the entire ion source from **ISQ LT** without venting means you are never down and always productive.

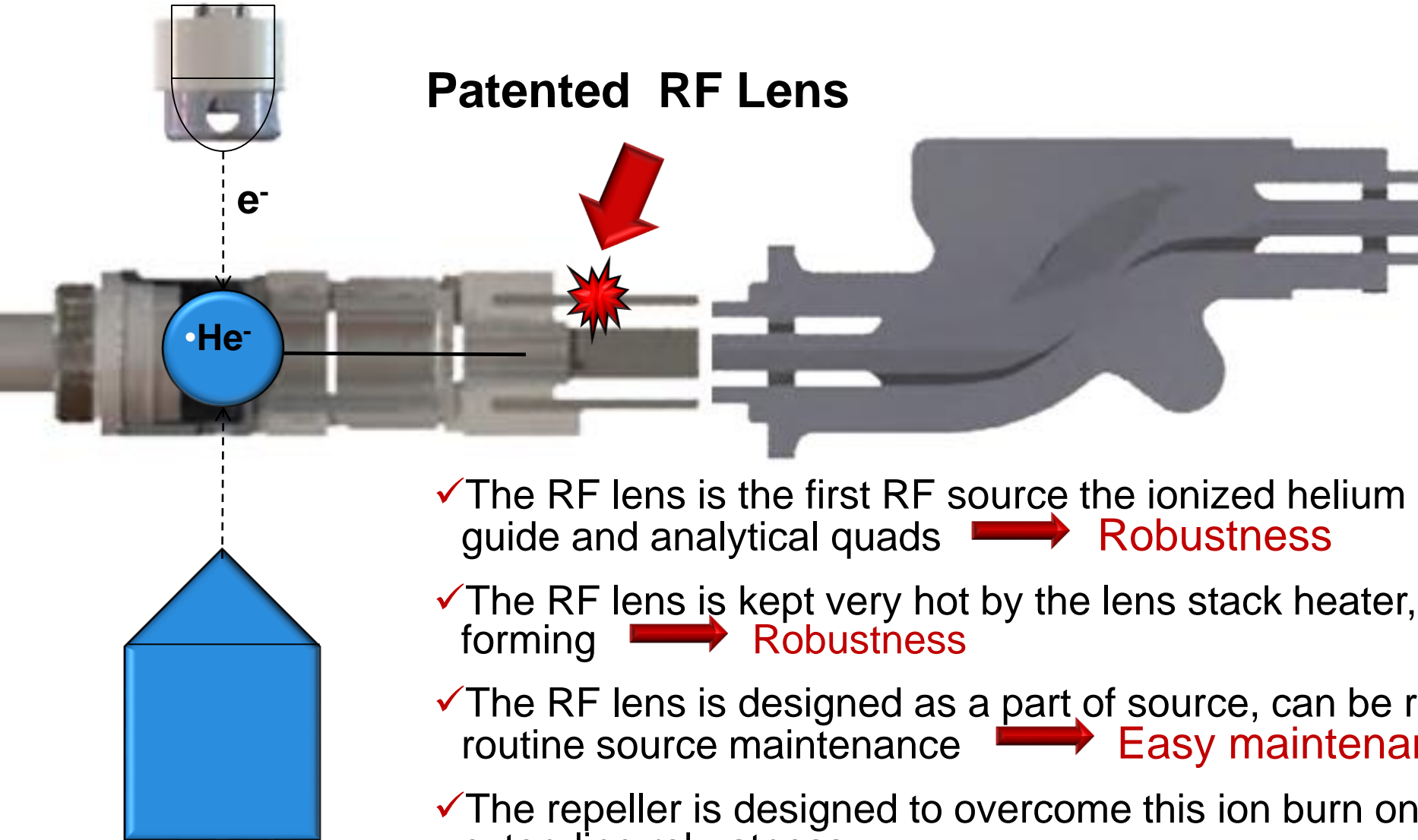




Exploded view diagram of a probe assembly. The diagram shows the main probe body and various internal and external components. Red circles indicate parts that are not in the sample path and do not require frequent cleaning. Blue circles indicate parts that are in the sample path and require scrubbing with Aluminum oxide, rinsing, and sonicating.

- Not in sample path. Does not require frequent cleaning (Red circles)
- In the sample path. Scrub with Aluminum oxide, rinse and sonicate (Blue circles)

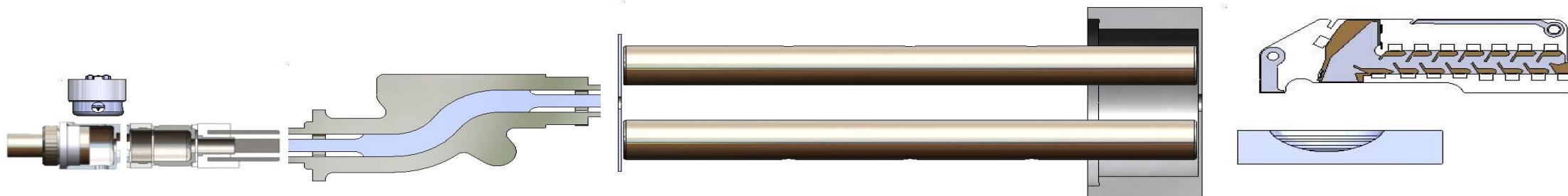
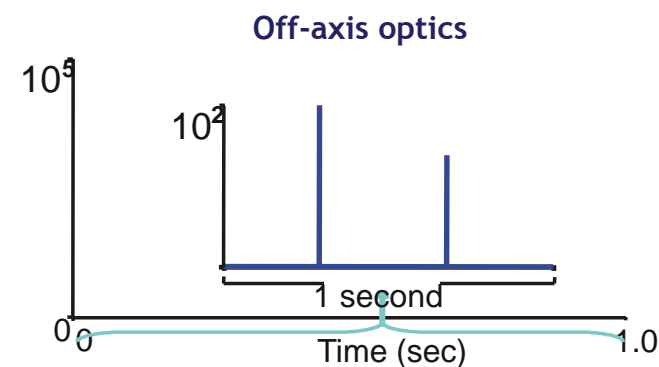
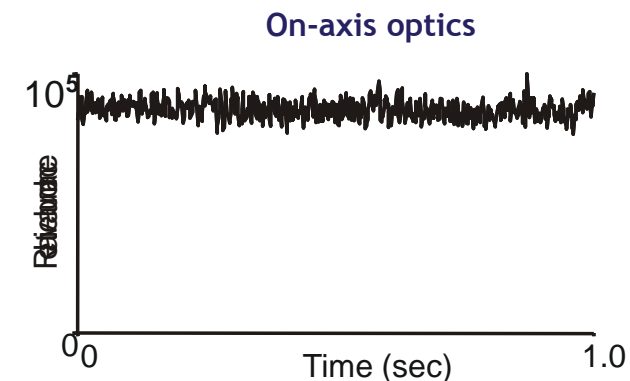
- 



- ✓ The RF lens is the first RF source the ionized helium sees, protecting the ion guide and analytical quads → **Robustness**
- ✓ The RF lens is kept very hot by the lens stack heater, preventing ion burn from forming → **Robustness**
- ✓ The RF lens is designed as a part of source, can be removed to clean during routine source maintenance → **Easy maintenance**
- ✓ The repeller is designed to overcome this ion burn once it does form, further extending robustness

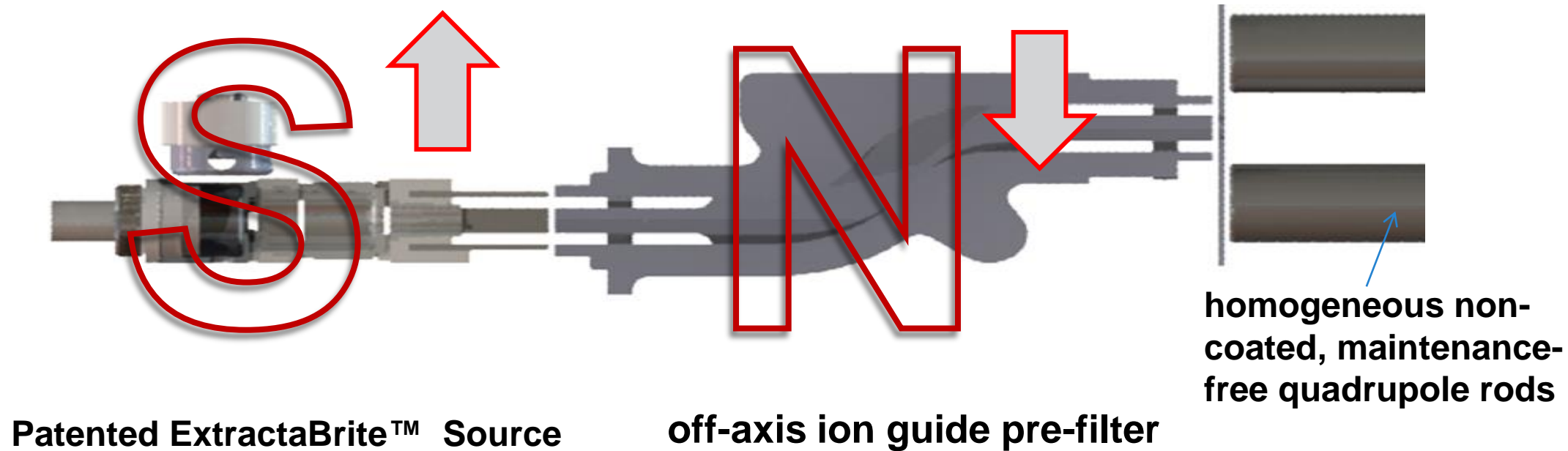
Designed for Selectivity

- S-Shaped *Flatapole* Ion Guide
 - Dramatic reduction in neutral noise
 - Excited but neutral helium follows a linear path from the ion source, and therefore does not reach the mass analyzer and detector
 - No electronic 'zero' noise suppression required
 - Maintain ion ratio performance, even at very low concentrations
 - Peaks not riding on neutral noise background, making it easier for automated peak detection and review



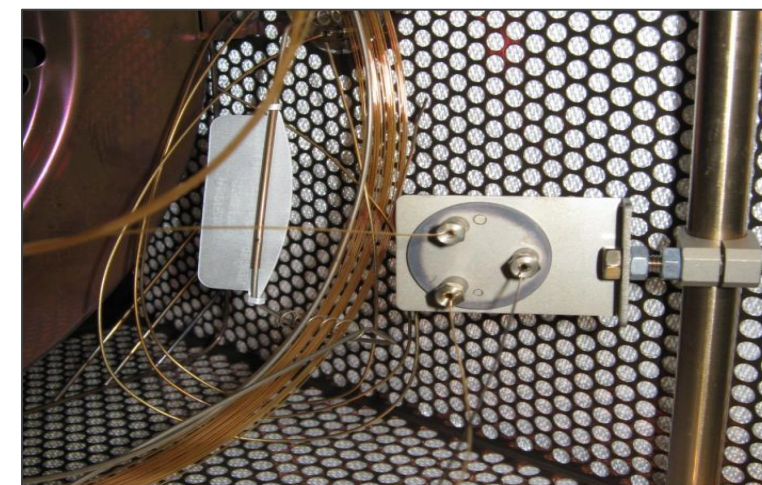
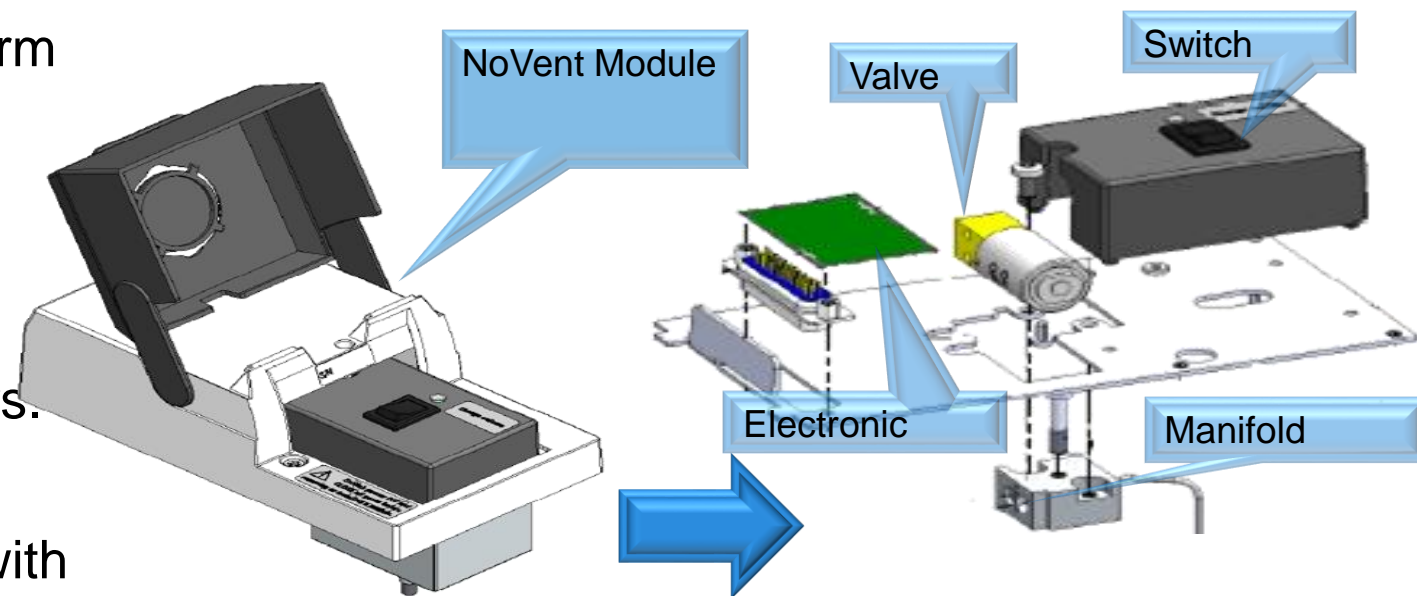
How Does Thermo address Neutral Noise?

Signal to Noise: high intensity and low noise = high sensitivity in real analysis



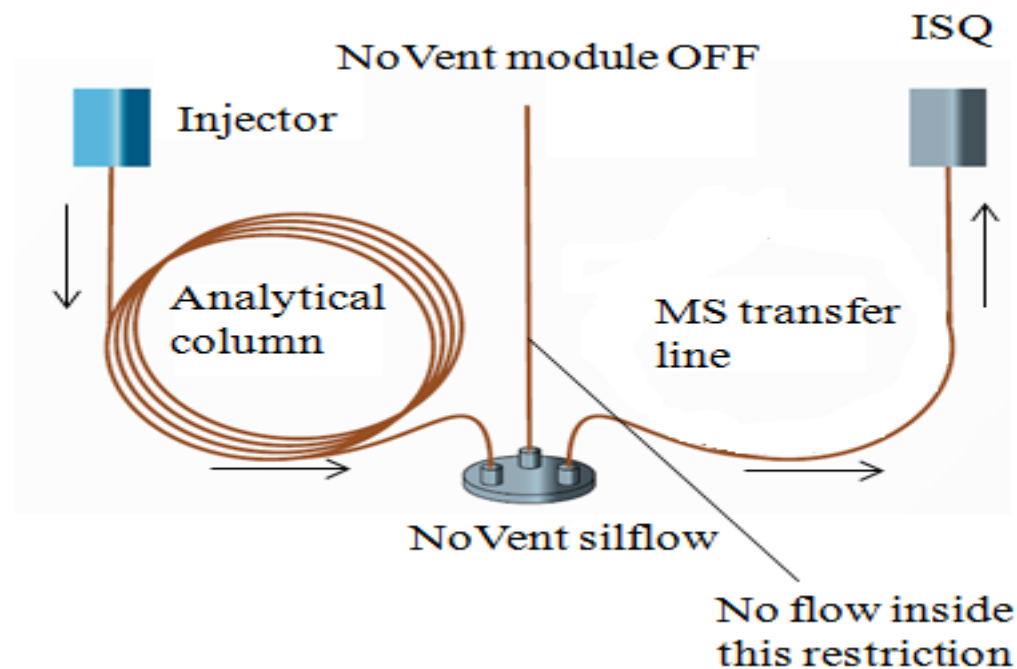
NoVent MS: For any Routine GC-MS Applications

- NoVent module allows GC-MS user to perform quick, reliable column maintenance without venting the system.
- User not puzzled with gas flow settings because there are no additional flow controllers.
- System core is the SGE Silflow, completed with a manual on/off switching, calibrated restrictions and connectors

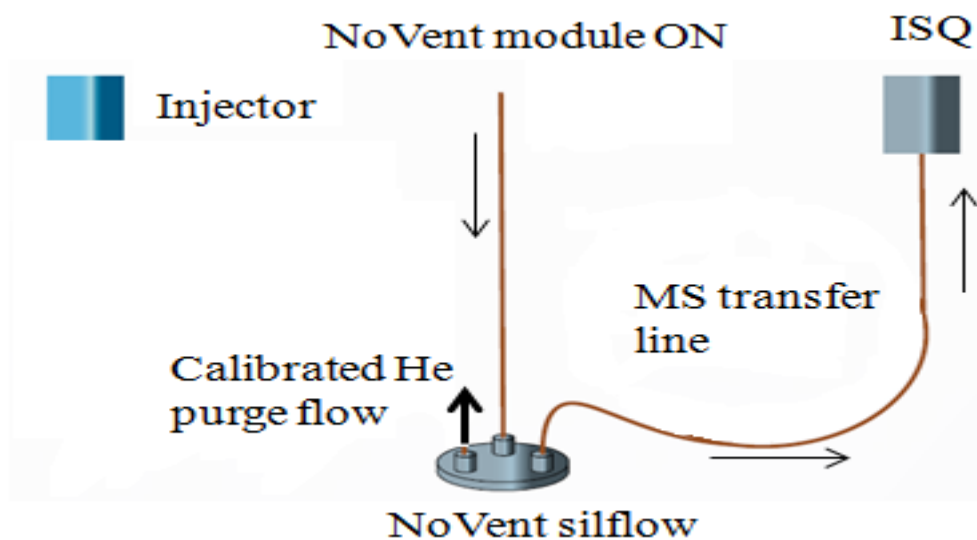


NoVent Module: Principle of Operation

- During standard operation, the NoVent module is switched OFF



- During column replacement the NoVent module is switched ON





“A solution focused on Environmental customers that need high sensitivity and throughput instrumentation”

8270D Analysis Kit Contents

Column, TG-5MS w/ 5m guard, 30m X 0.25mm X 0.25 μ m

Injection liner, 4mm ID x 105 mm, pack of 5

Graphite/Vespel Ferrule, 0.1 - 0.25 mm, pack of 10

Septa BTO Coated, 11 mm, pack of 50

EPA 8270D CD (Contents: user guide, instrument and processing methods, compound retention times, method specific reports, trouble shooting info, etc)

- Ready to use package with method, troubleshooting and pre-loaded report package
- Set of consumables included (column, liner, septa, etc.)
- Compatible with Chromeleon 7.2 SR4 Mub or newer and Trace Finder EFS 4.1 or newer
- Compatible with ISQ QD and ISQ LT



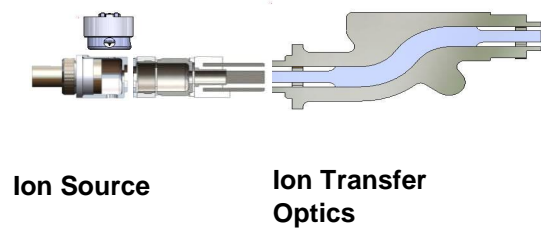
Product Innovations to Simplify Your Workflow

TSQ Duo Triple Quadrupole Mass Spectrometer

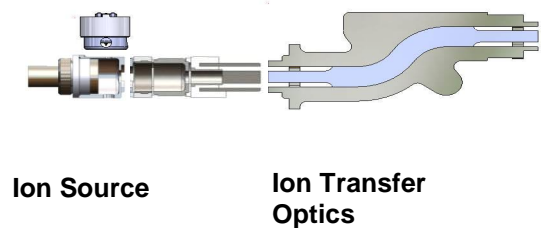
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What is Triple Quadrupole GC-MS/MS?

Single Quadrupole GC-MS

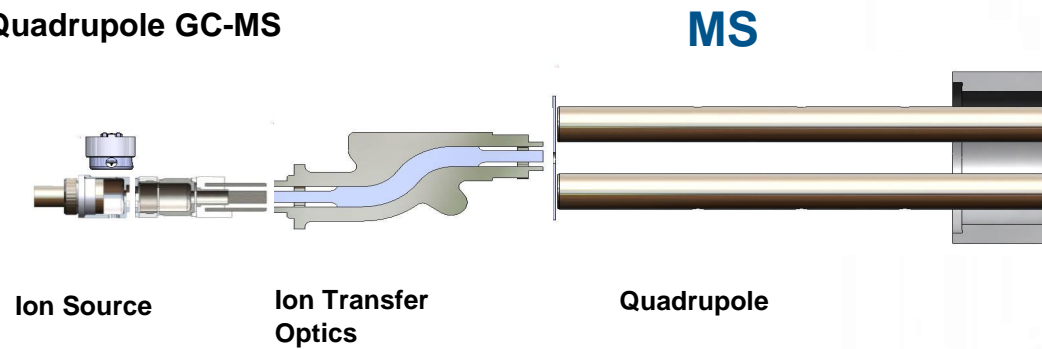


Triple Quadrupole GC-MS/MS

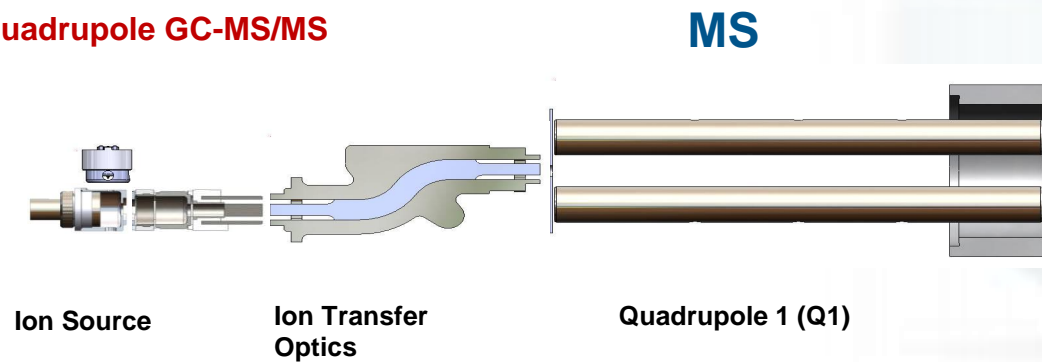


What is Triple Quadrupole GC-MS/MS?

Single Quadrupole GC-MS

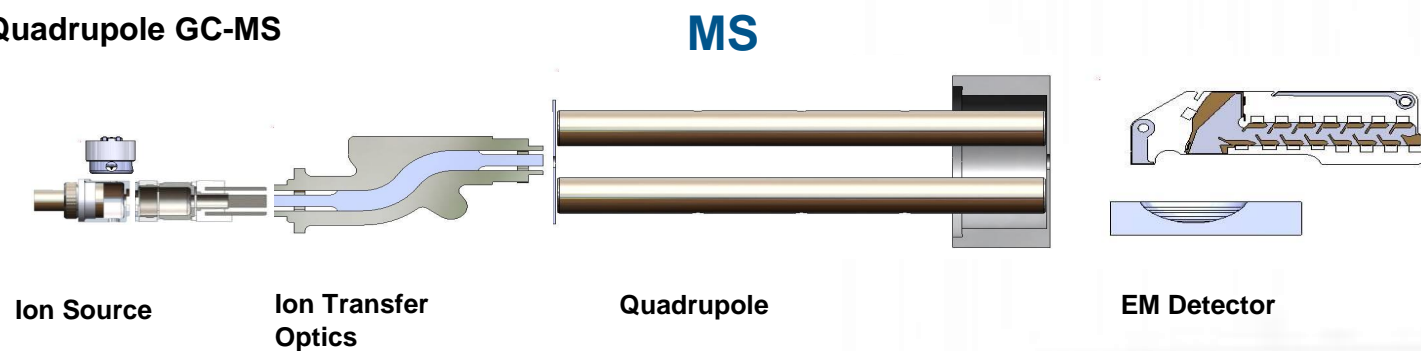


Triple Quadrupole GC-MS/MS

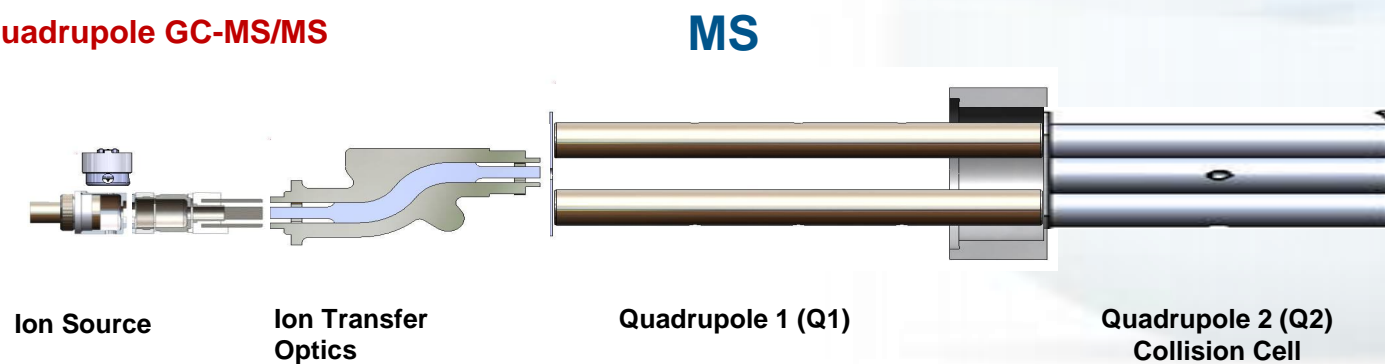


What is Triple Quadrupole GC-MS/MS?

Single Quadrupole GC-MS

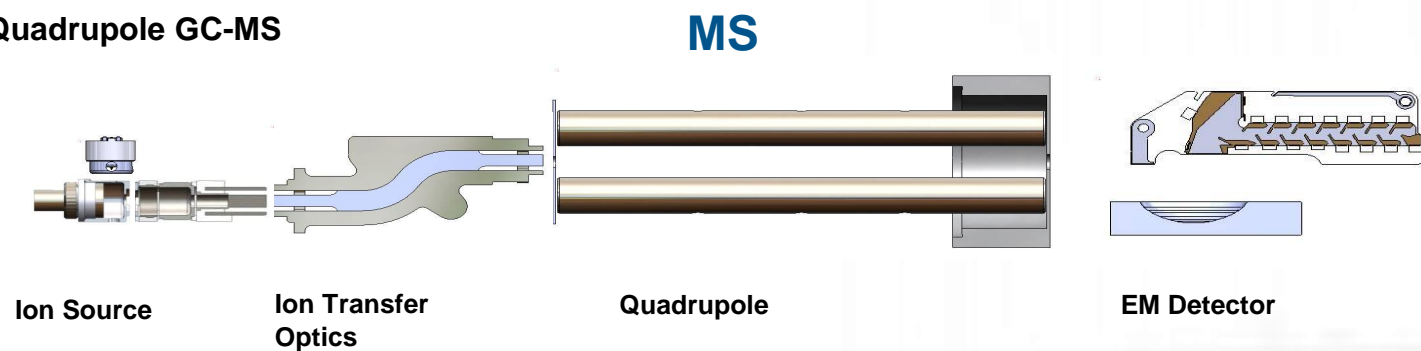


Triple Quadrupole GC-MS/MS

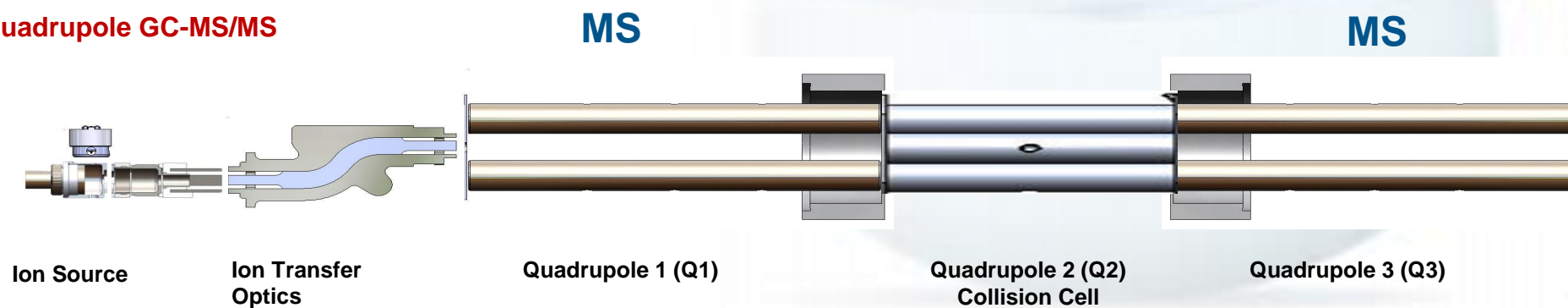


What is Triple Quadrupole GC-MS/MS?

Single Quadrupole GC-MS

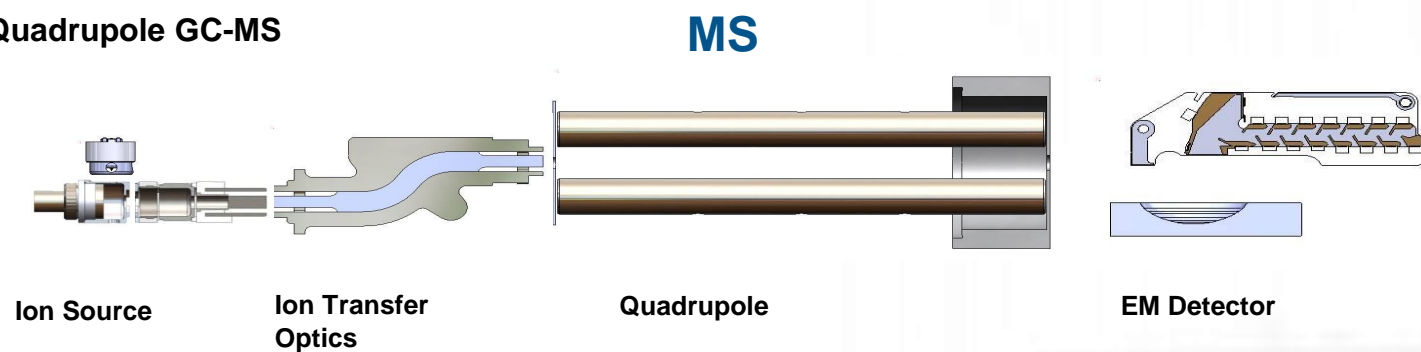


Triple Quadrupole GC-MS/MS

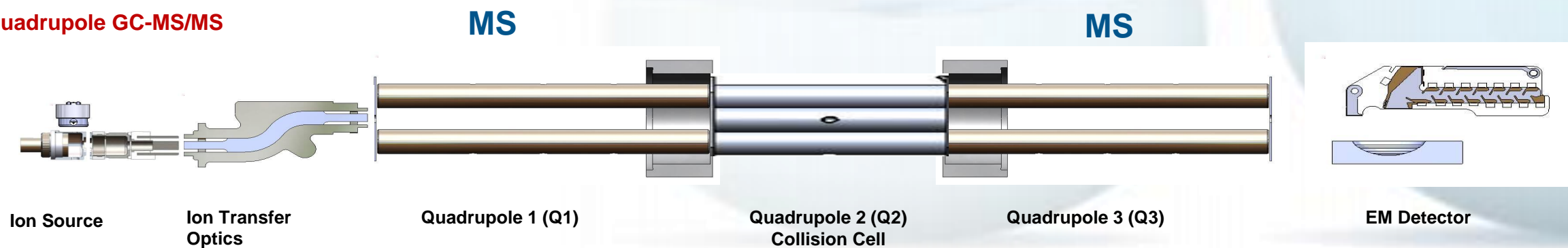


What is Triple Quadrupole GC-MS/MS?

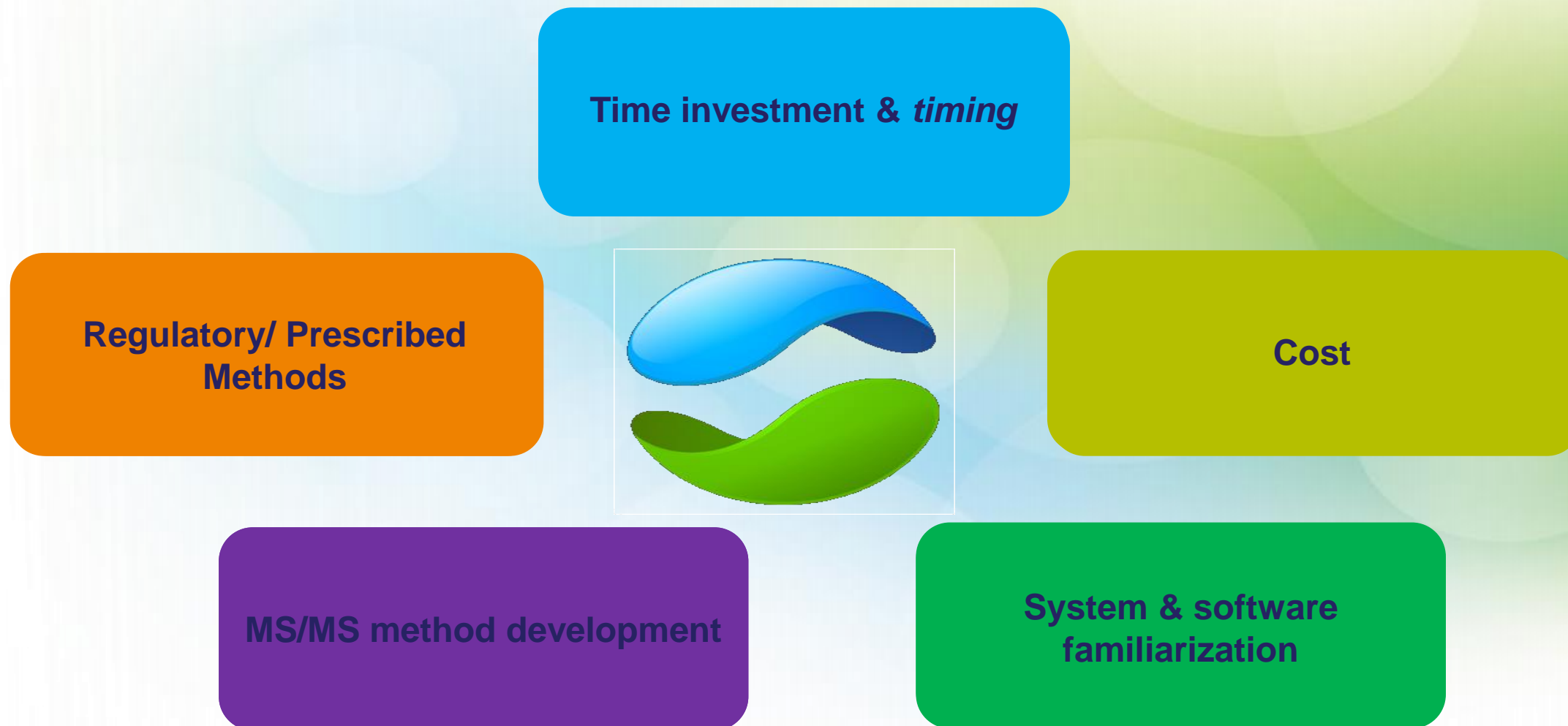
Single Quadrupole GC-MS



Triple Quadrupole GC-MS/MS



Why not a GC Triple Quadrupole?

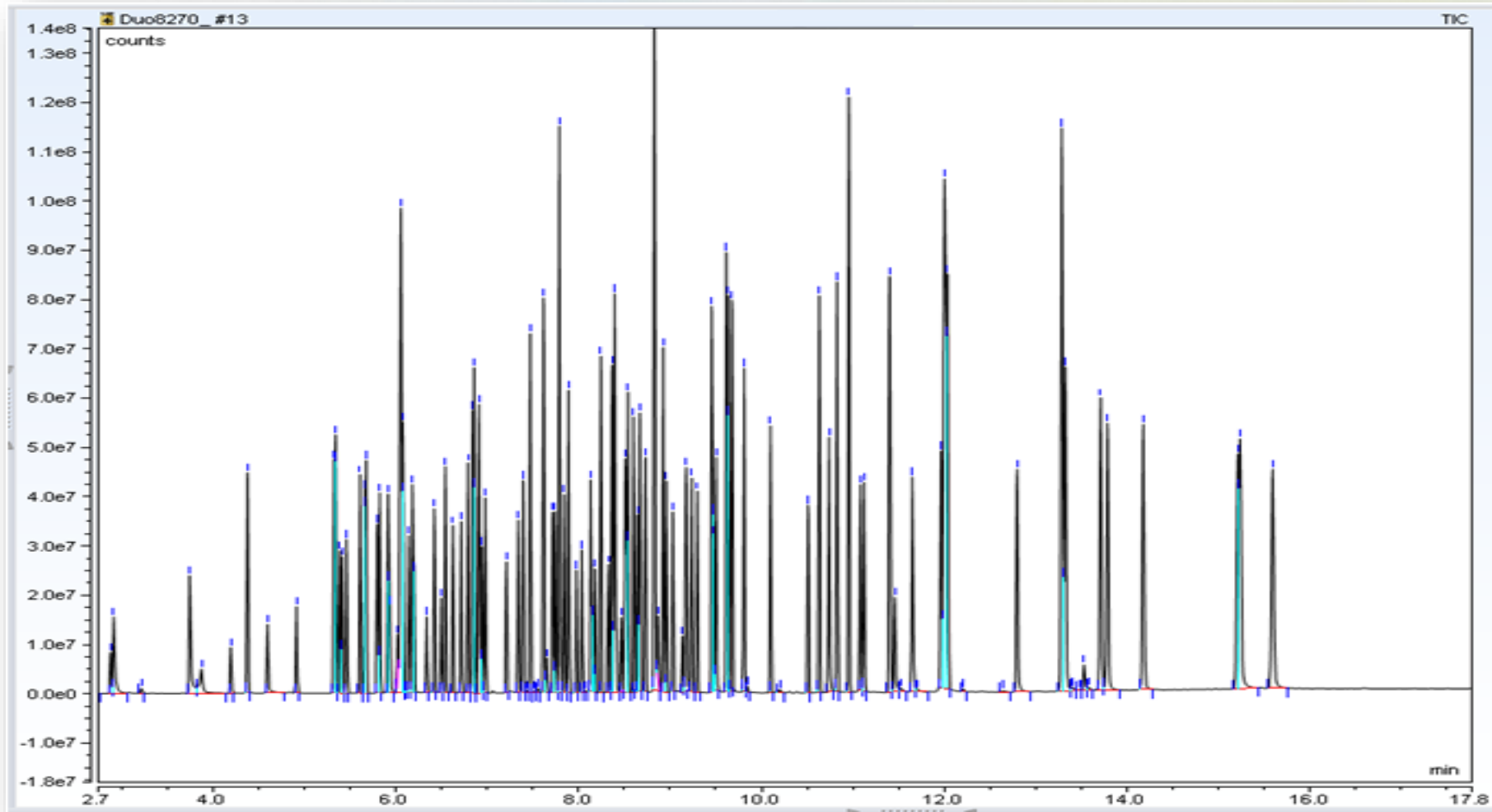




- Simply Unique GC-MS/MS
- Excellent Performance
 - Selected Ion Monitoring (SIM)
 - Full Scan
 - Selected Reaction Monitoring (SRM)
 - other MS/MS modes
- Chromeleon 7 - Operational Simplicity™

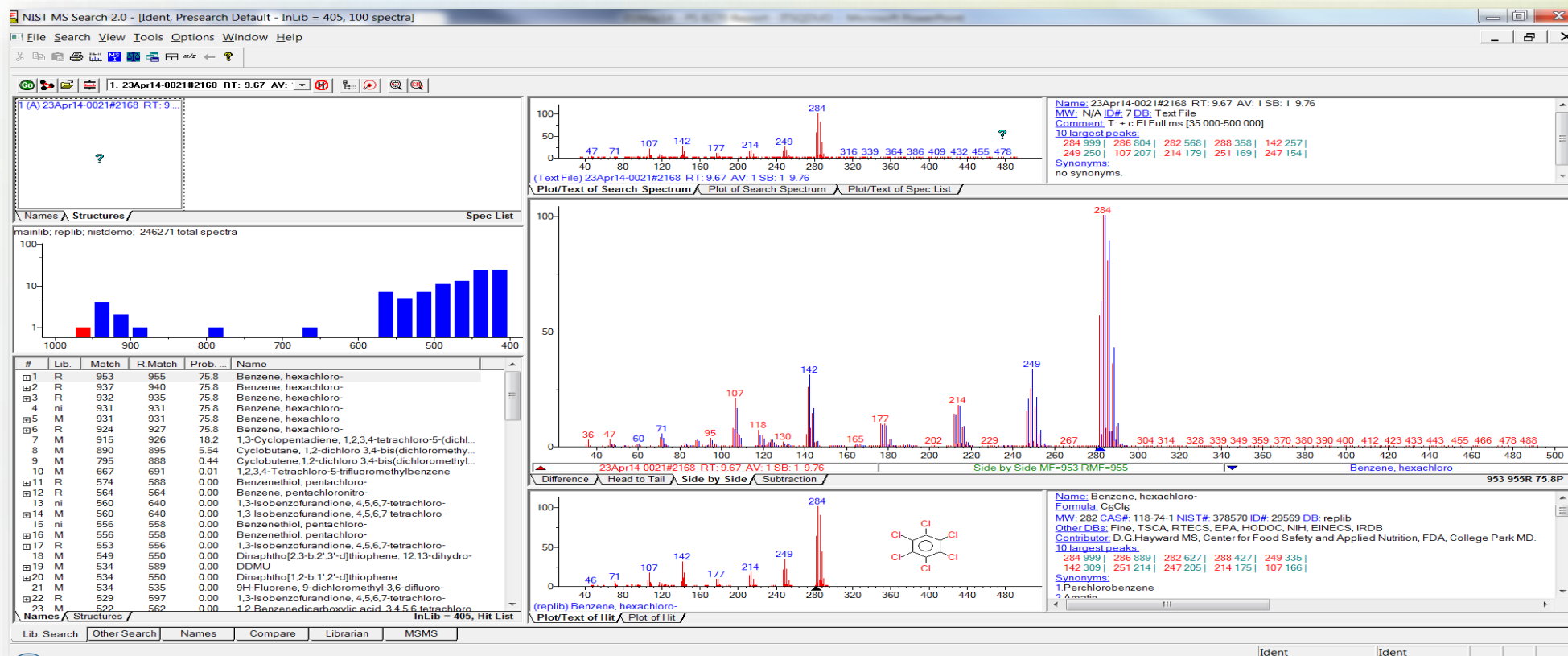


SQ Mode: Full Scan



SVOC in full scan on TSQ Duo GC-MS/MS

SQ Mode: Single Quad Spectral quality

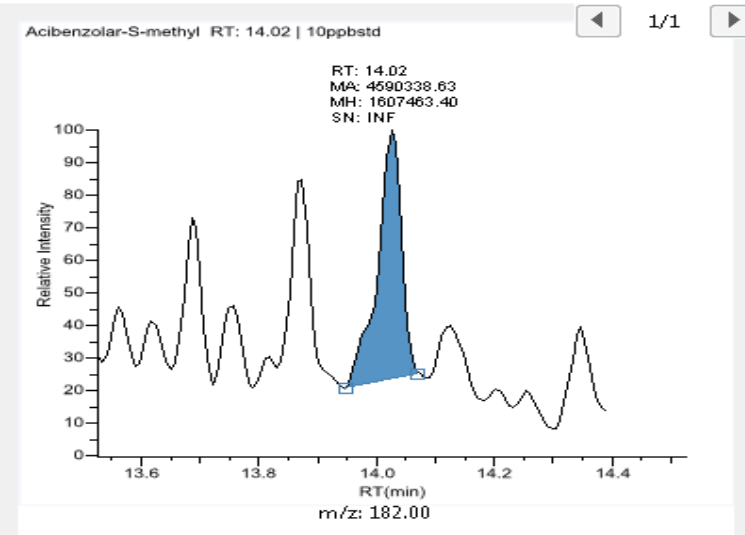


- Fully library searchable mass spectra generated
- No spectral distorting gases in ion path

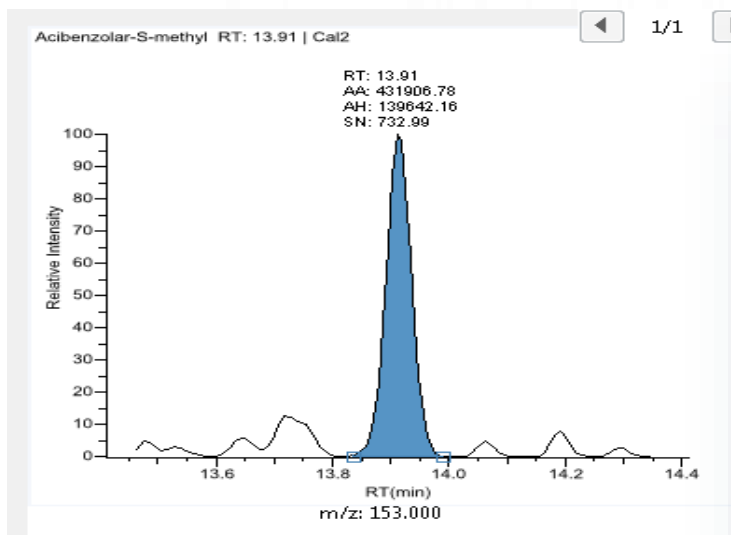
Triple Quad GC-MS: Selectivity Advantages

What does it allow?	What does this mean?	What do I get?
Reduced selectivity in sample prep	<ul style="list-style-type: none">• Less steps• More compounds• More matrices	<ul style="list-style-type: none">• Faster turnaround• More efficient methods• Less costly analysis• More flexible
Consolidated GC-MS methods	<ul style="list-style-type: none">• More compounds together in one run	<ul style="list-style-type: none">• Faster turnaround• More efficient methods• Less costly analysis• More flexible
Compressed chromatography	<ul style="list-style-type: none">• Faster run times	<ul style="list-style-type: none">• Faster turnaround• More efficient methods
Easy data processing	<ul style="list-style-type: none">• Auto-integrators work!	<ul style="list-style-type: none">• Faster turnaround
More confidence	<ul style="list-style-type: none">• Less susceptible to changeable matrix composition	<ul style="list-style-type: none">• Faster turnaround• Higher quality

Triple Quad GC-MS: Selected Reaction Monitoring (SRM)



SIM on m/z 182



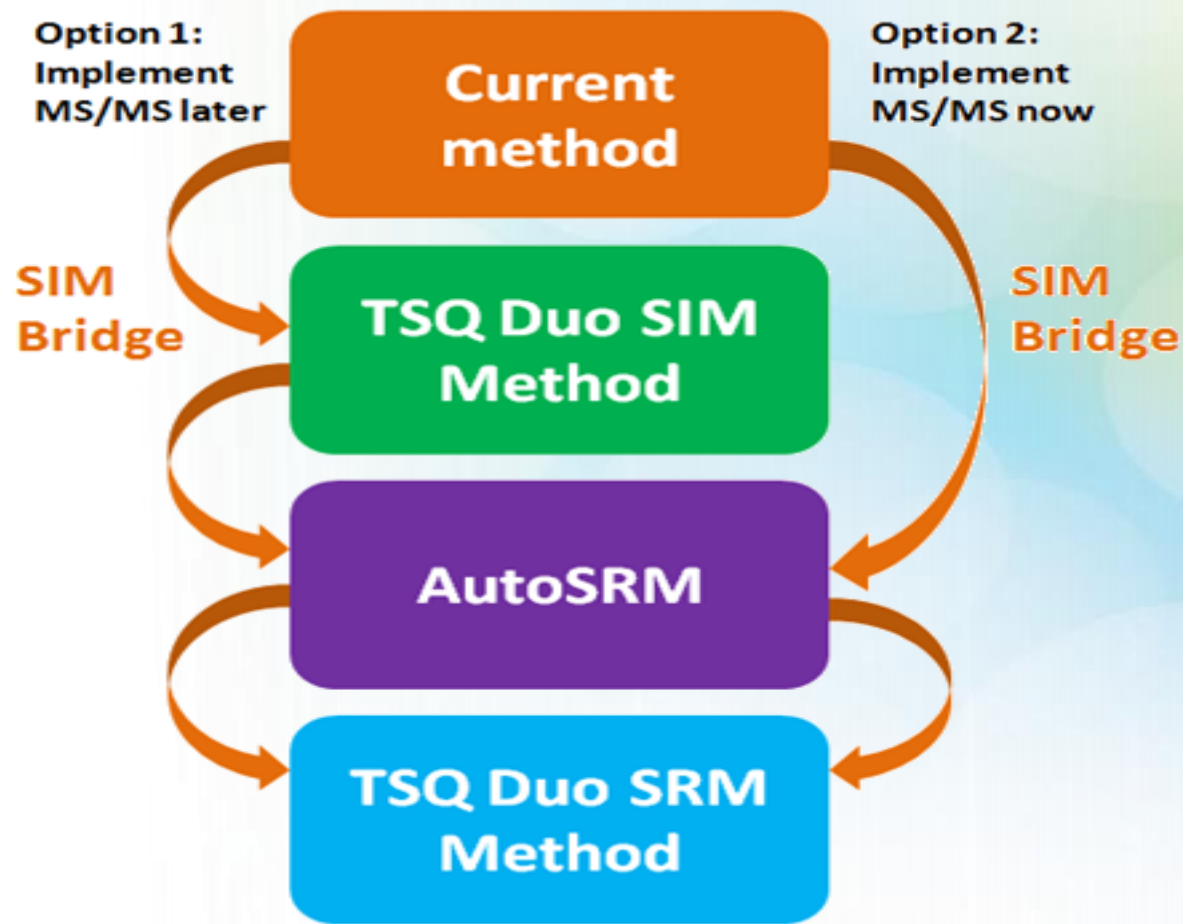
SRM on m/z 182 > 153

High Selectivity

- Reduce selectivity in sample preparation
- Consolidated GC-MS methods due to high performance
- Compressed chromatography possible
- Easy data processing

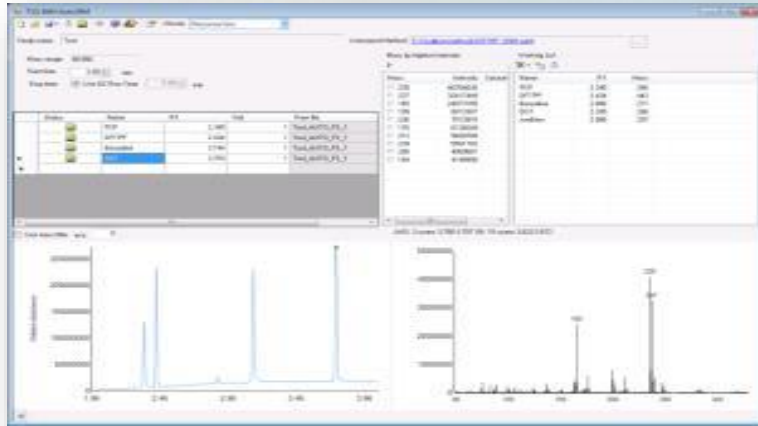
- Acibenzolar-S-Methyl in difficult matrix

Make the step to triple quad when you choose

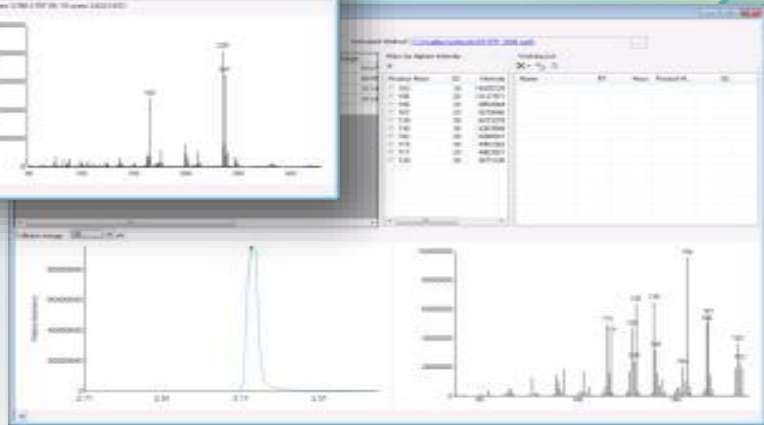


- Translate your current method into TSQ Duo method using SIM bridge
- Continue with SIM analysis now and move to MS/MS later
- Or immediately go to MS/MS analysis

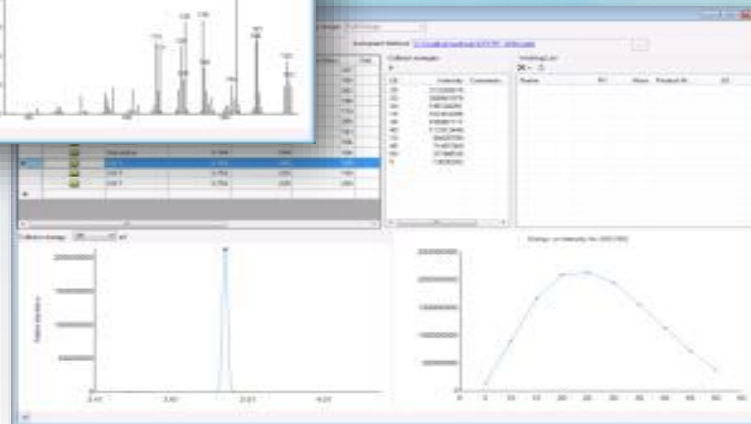
1) Precursor ion selection



2) Product ion selection



3) Collision energy optimization



Triple Stage
Quadrupole

T SQ

AutoSRM automates the development of SRM methodology

- **Triple quadrupole GC-MS brings many advantages to the lab and can improve the quality and efficiency of traditional single quadrupole GC-MS analyses**
- **The transition to this technology from single quadrupole is especially easy with systems specifically designed with this in mind, such as the Thermo Scientific TSQ DuoTriple Quadrupole GC-MS/MS**

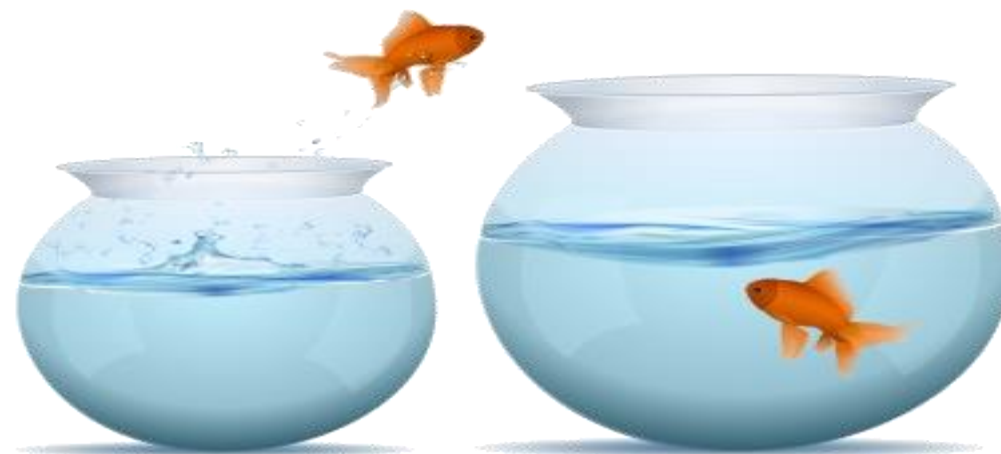
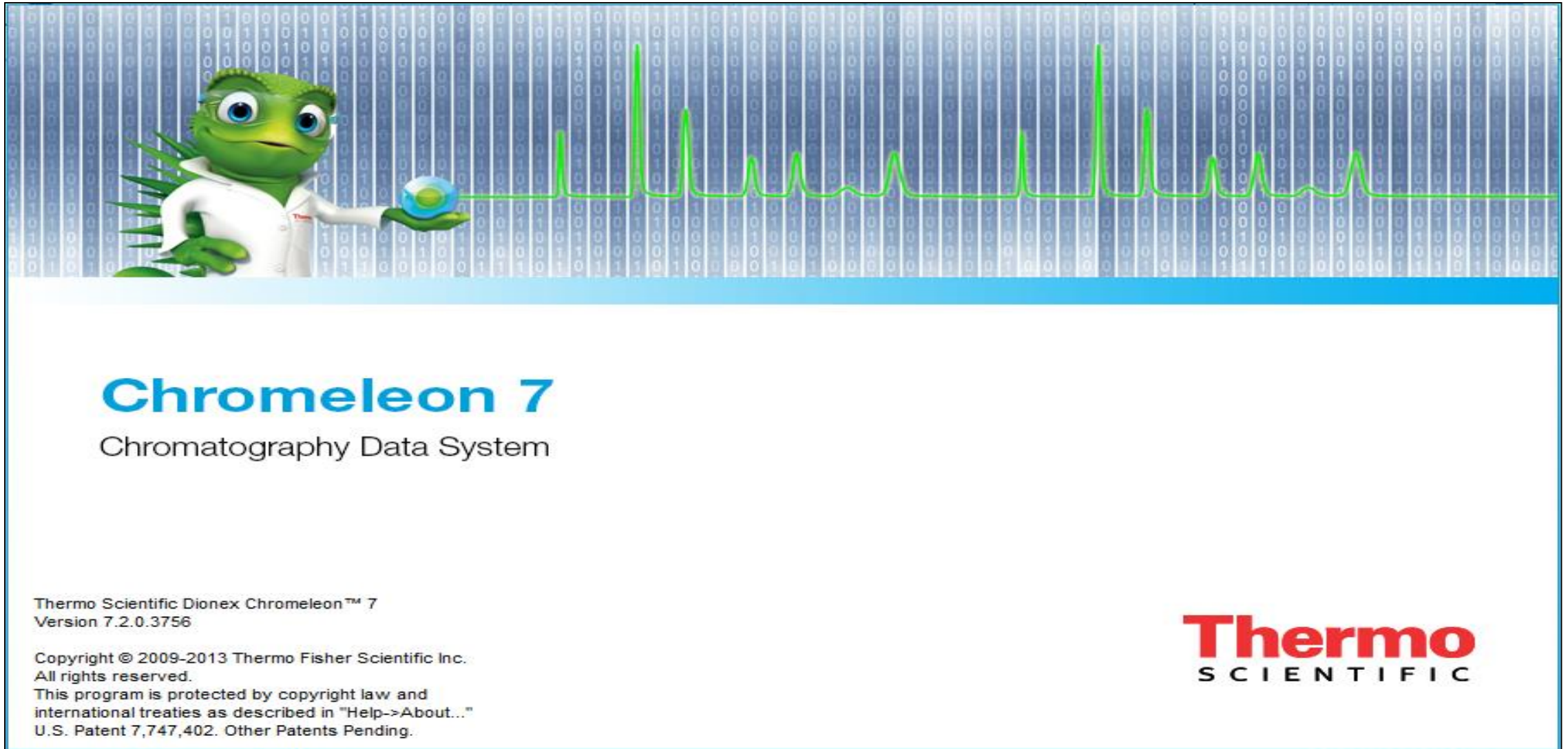


Image courtesy of digital art FreeDigitalPhotos.net

Chromeleon 7.2 Software (Workstation and Enterprise Solutions)



Thermo Scientific Dionex Chromeleon™ 7
Version 7.2.0.3756

Copyright © 2009-2013 Thermo Fisher Scientific Inc.
All rights reserved.
This program is protected by copyright law and
international treaties as described in "Help->About..."
U.S. Patent 7,747,402. Other Patents Pending.

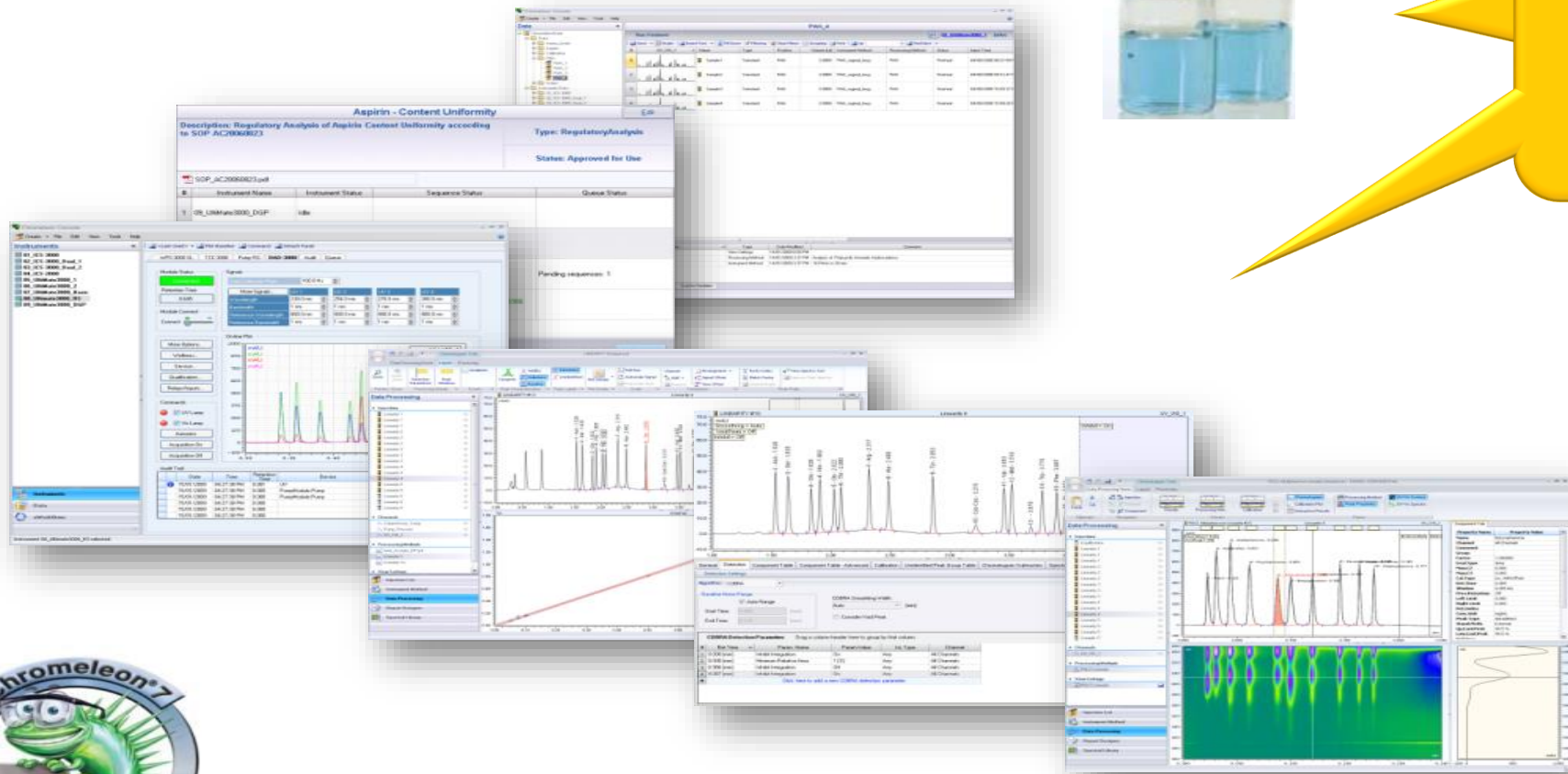
Thermo
SCIENTIFIC

Chromeleon CDS Simplifies Chromatography Process

Intelligent Functionality – it does everything you need



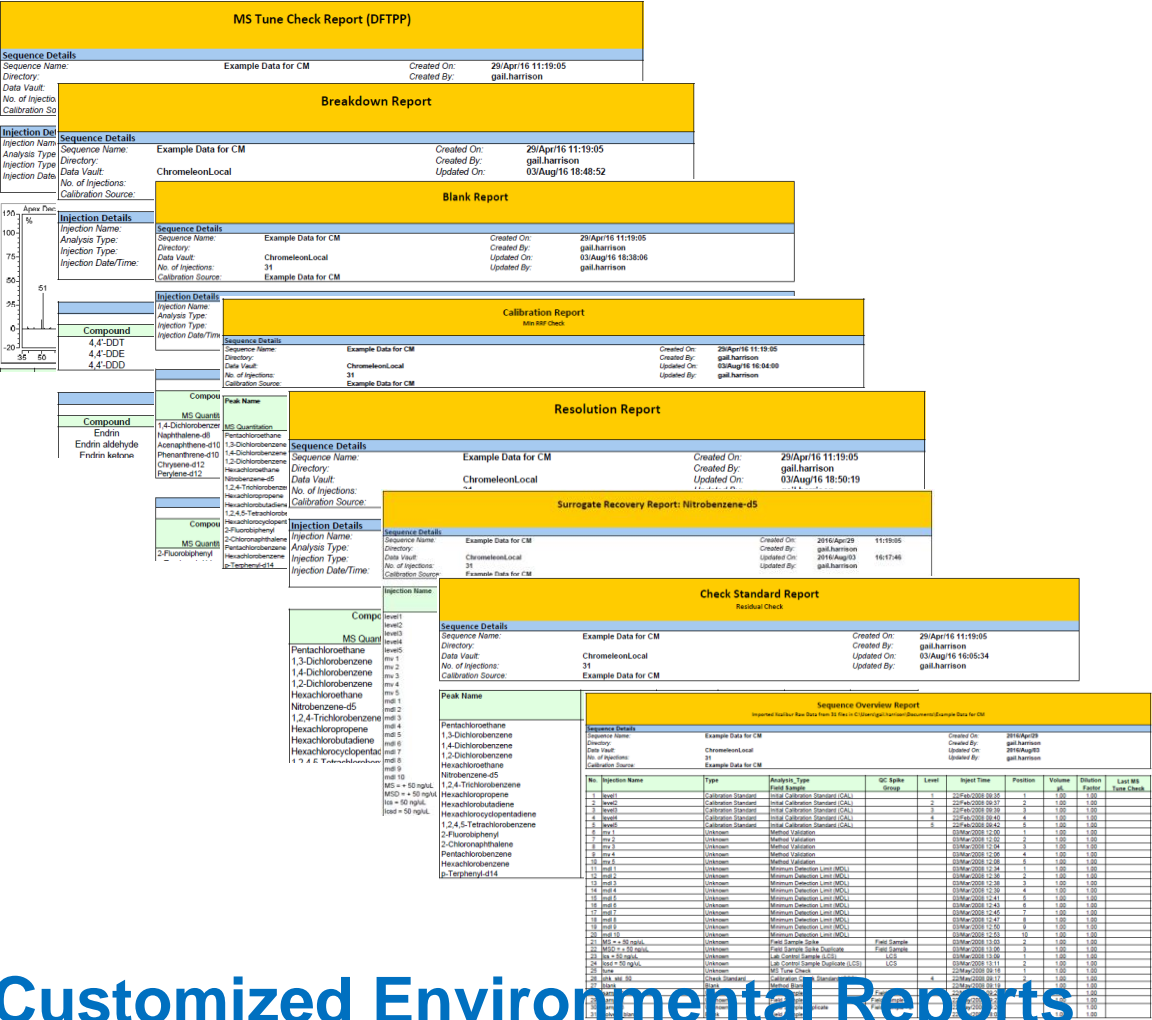
Chromeleon 7 manages the steps in between



Workstation and Enterprise solution

Customizable Environmental Reports

Chromeleon



Customized Environmental Reports

Unique GC & GC-MS Innovated Productivity Breakthroughs

Instant Connect Modules



- Interchangeable injector & detectors
- No special training
- No dedicated tools
- No on-site service
- Tailored GC configurations

Vent Free Source Removal



- High performance, reliable & easy to use
- Maximize instrument up time

Vent Free Column Maintenance



- Quick, reliable column maintenance without breaking vacuum

Dual Detector Microfluidics Kit



- Splits single column effluent between two GC detectors (including MS)

Leadership Technology with Unstoppable Productivity

MORE...Unique Innovated Productivity Breakthroughs

Automated Tool Change (ATC)



- Increase analytical flexibility and lab productivity by automating sample prep and calibration procedures, thus eliminating human error

Chromeleon



- Scalable Chromeleon CDS platform for Chromatography and MS

TSQ Duo Easy Single Quad to Triple Quad Transition



- Transition to Triple Quad Technology on your Timetable at Single Quad Costs

Support Services



- Instrument Support Plans
- On-site Application Support
- On-site Training Support

Leadership Technology with Unstoppable Productivity

Increasing Analytical Specificity



TRACE 1300



ISQ Series



TSQ Duo



TSQ 8000 Evo



DFS



Q Exactive GC

Instant Connect Modular GC	Single Quadrupole MS	SQ & TQ MS	Triple Quadrupole MS	Magnetic Sector HRMS	Orbitrap
Detection with Multiple Detectors	Confirmation by Mass Spectrum or SIM	Mass Spectrum and MS ⁿ	High performance, easy to use MS/MS for non-experts	High-Resolution Full Scan and SIM	HRAM GC-MS/MS
Pesticides, PCBs, Volatiles	EPA Regulated Methods (524, 525, 8260, 8270)	EPA Regulated and PBMs (524, 525, 8260, 8270)	Target Analysis in Complex Matrix	Dioxins, PCBs, Other POPs	Discovery (Unknown Unknowns)
Petrochemical and Chemical	Forensic chemistry and toxicology	Academic research and teaching	Pesticides in Food, Drugs in body fluid	EPA 1613, 8270A, 8290	Revolutionizing the field of GC-MS

Solutions at every level of specificity

Thank You for Your Attention!

Get Connected!

Join our Environmental
Community



http://info1.thermoscientific.com/content/CMD_KL_Preferences

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<http://www.facebook.com/ChromatographySolutions>



Pinterest
<http://pinterest.com/chromsolutions/>



Protecting the future while saving bottom lines.

It's a **BALANCING** act for a brand new age.

