

# Thermo Scientific GC/MS Solutions for Environmental and Food Safety

HCMC, Vietnam | 12 May 2022

**Nguyen Thanh Le – Director**

Equipment and Technical Service International Company Ltd  
(IETS)



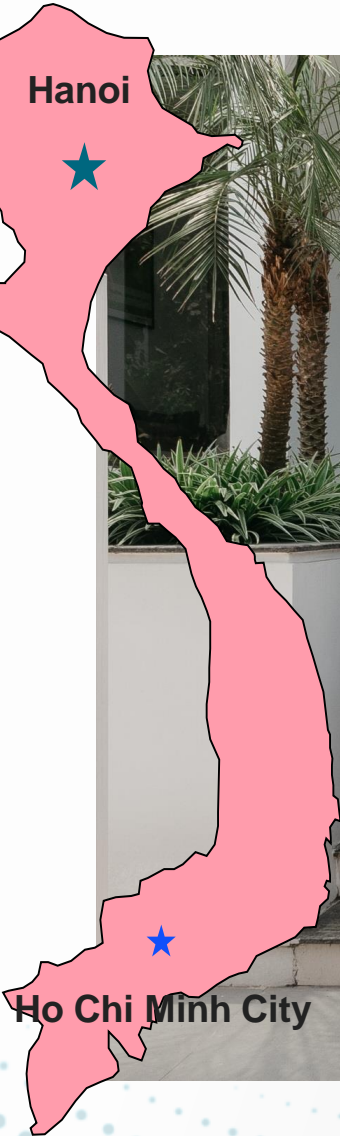


IETS

thermo  
scientific

---

Authorized Distributor



IETS



A scientist wearing a wide-brimmed hat and a red shirt is crouching in a lush green field, holding a clipboard and a pen. The background shows rolling hills and a bright sun setting over a line of trees, creating a warm, golden glow. The entire scene is overlaid with a semi-transparent white banner containing the ThermoFisher Scientific logo and tagline, and a row of five product category boxes at the bottom.

**ThermoFisher**  
S C I E N T I F I C

The world leader in serving science

**thermo**  
scientific

Analytical precision and  
diagnostics excellence

**applied**  
biosystems

Inspiring meaningful  
genetic analysis

**invitrogen**

Accelerating discovery  
research

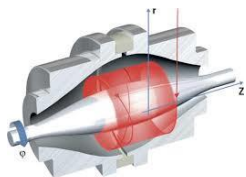
**f** **fisher**  
scientific

One-stop access for  
scientific products

**unity**  
lab services

Instrument and  
enterprise services

thermo  
scientific



- Chromatography & Mass Spectrometer (IC, GC, GC/MS, GC-MS/MS, GC-HRMS, HPLC, LC/MS, LC-MS/MS, Orbitrap)
- TEA (OEA, Comb EA, AAS/ICP/ICP-MS, ICP-MS/MS)
- BEA (XRF/XRD)
- Molecular (FT-IR, NIR, Raman)
- PAI (Portable XRF/Raman/IR/NIR)



IETS

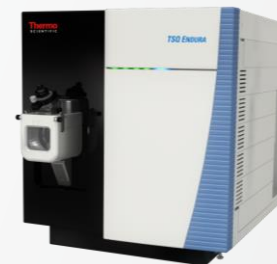




Sample preparation



Separation



Detection (Identification/  
Quantification)

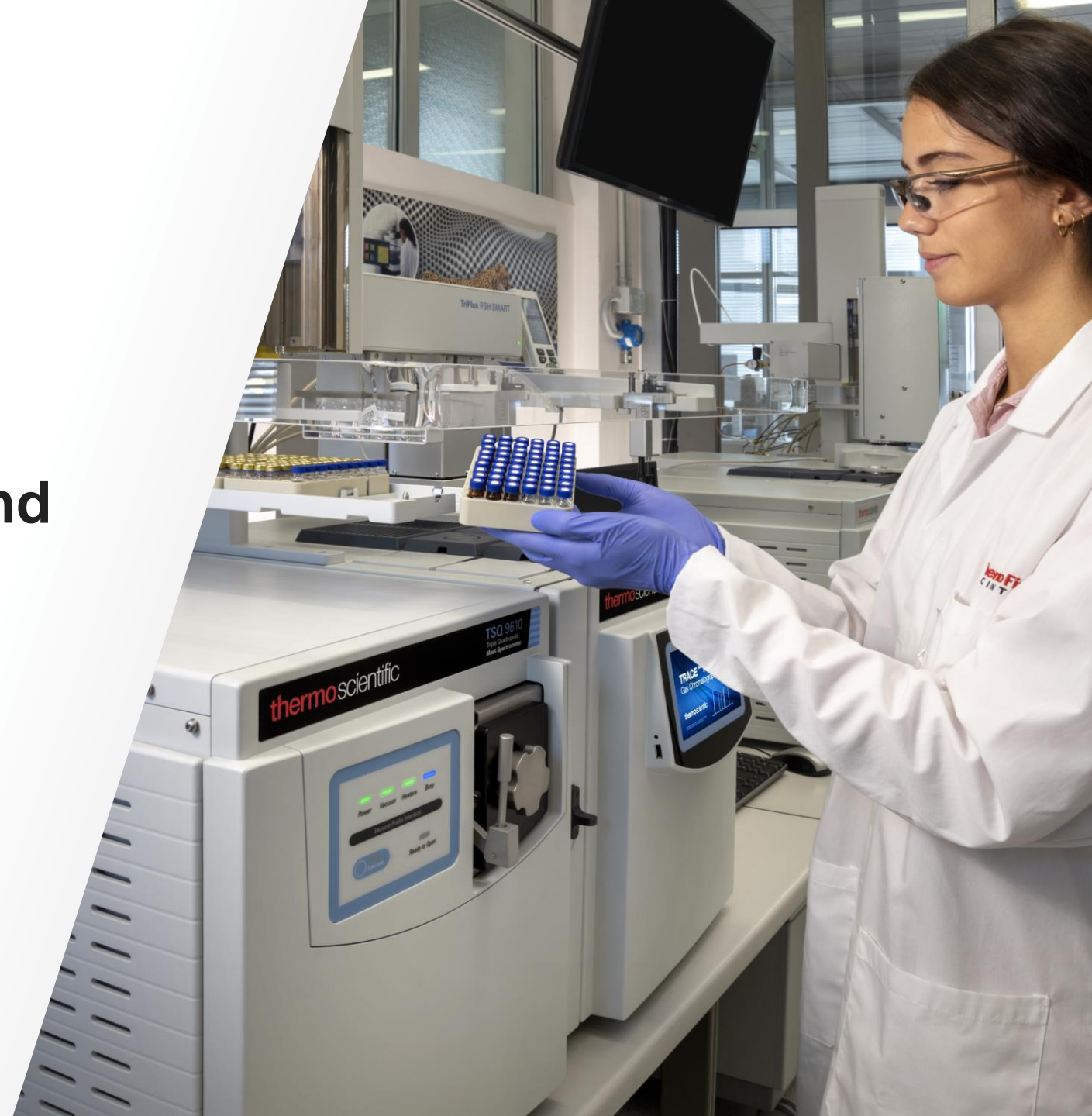
## Chromleon & SampleManager



Data Integrity and  
Management

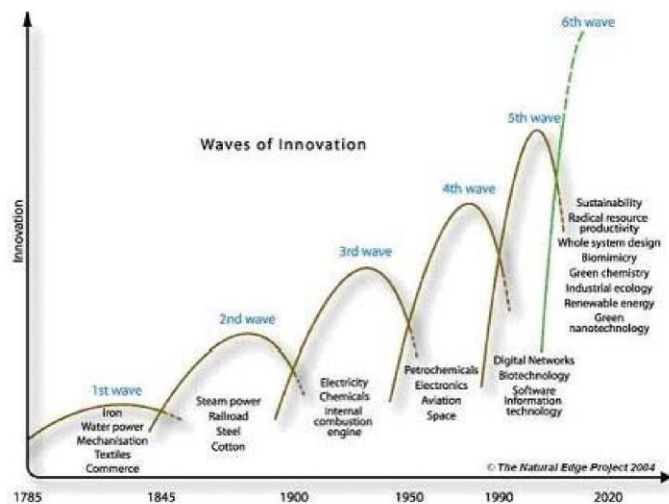
# Thermo Scientific GC/MS Solutions for Environmental and Food Safety

 The world leader in serving science

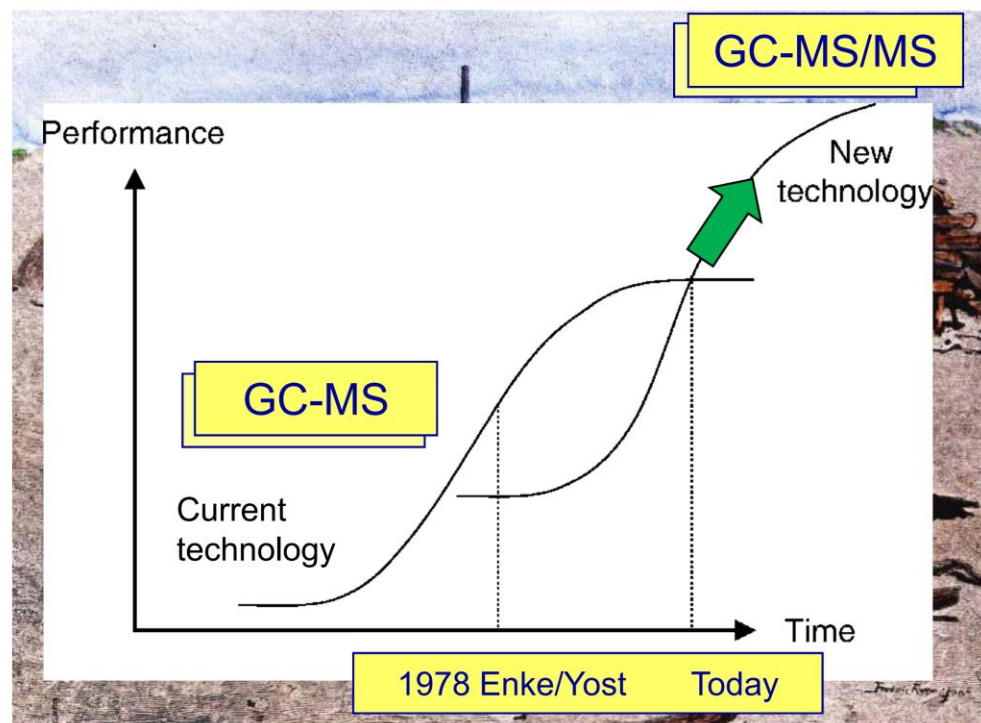


# Technology Shifts Occur in Waves

- Communication: Pony Express ► Telegraph ► ► Internet
- GC Detection: GC-FID ► GC-MS ► GC-MS/MS



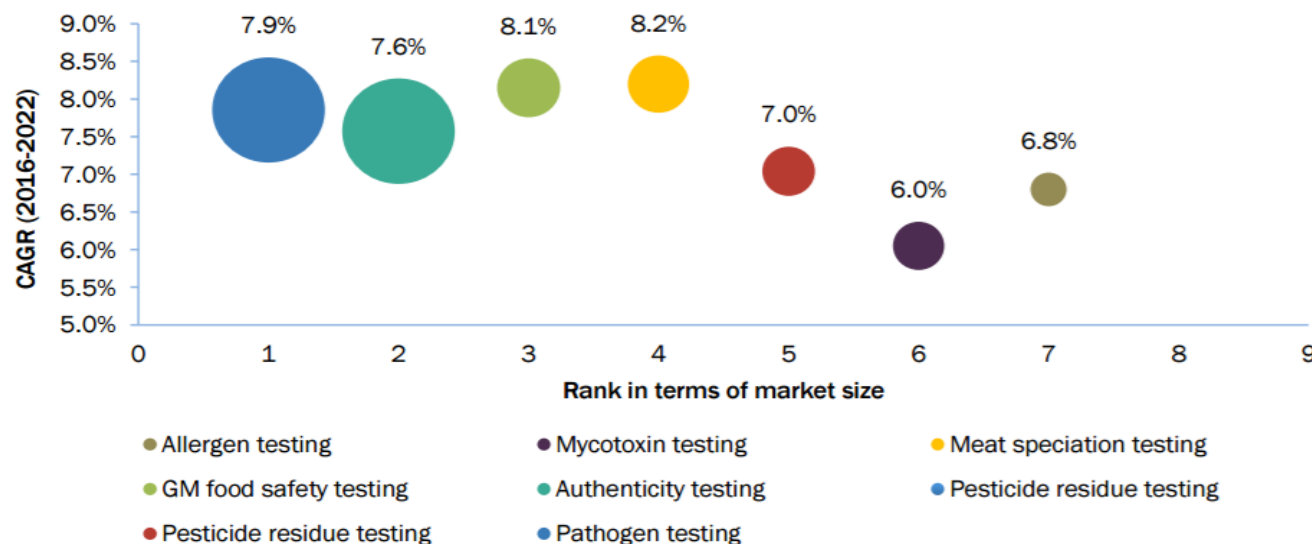
Thomas Kuhn 1970 "The structure of scientific revolution"





# Global Food Safety Testing

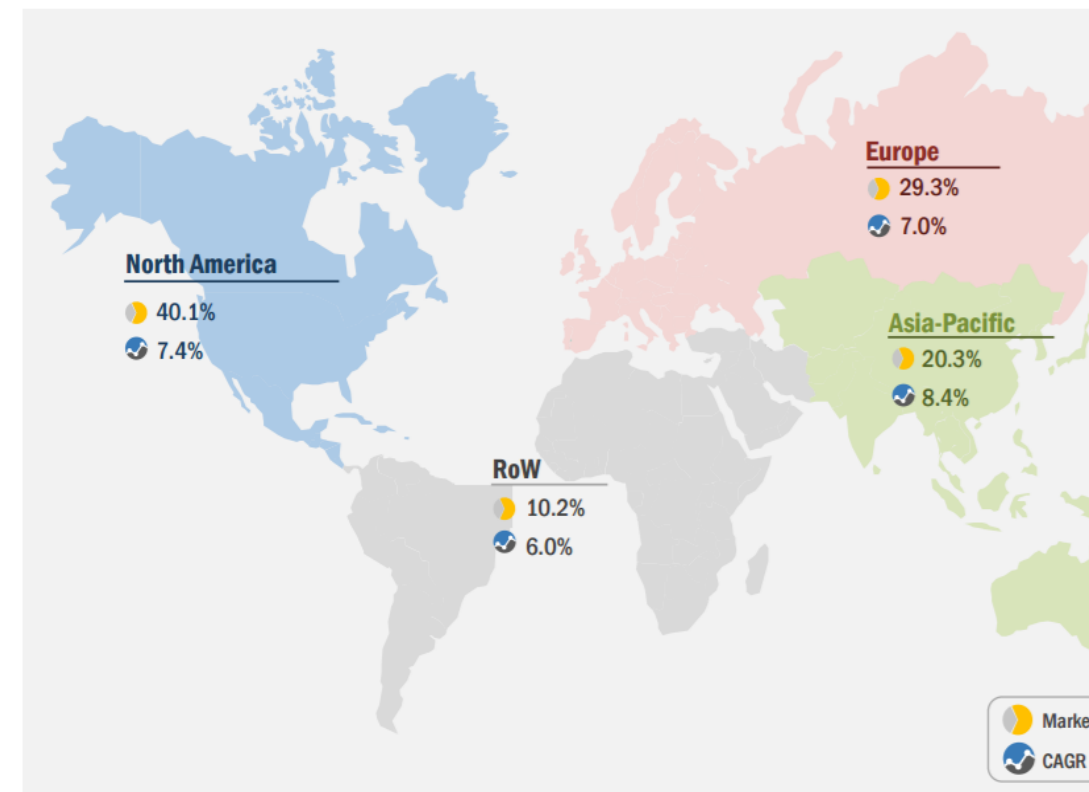
**FIGURE 8** FOOD SAFETY TESTING MARKET SNAPSHOT, BY SUB MARKETS



Note: Bubble size indicates the projected market size (USD million) by 2022.

Source: Press Releases, Expert Interviews, and MarketsandMarkets Analysis

**FIGURE 15** FOOD SAFETY TESTING MARKET SHARE (VALUE), BY REGION, 2015

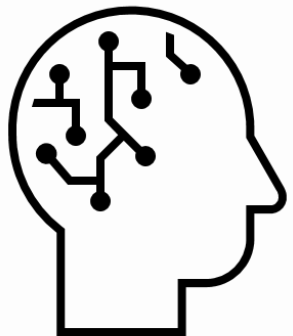


Source: Secondary Research, Primary Interviews, Related Research Publications, Industry Journals, Press Releases, and MarketsandMarkets Analysis

- Global food safety testing market is projected to grow from USD 4.5 Billion in 2015 to USD 18.4 Billion by 2022
- All regions have a good growth rate, highest growth will come from Asia



# Challenges faced by analytical testing laboratories



**“The instrument runs fail just after I leave the lab, meaning I must maintain the system”**

**“New software is unfamiliar and takes a long time to learn”**

**“Instrument maintenance takes a lot of time and impacts productivity”**

**“My sensitivity is great but drops off after time and I cannot predict when the system will fail”**

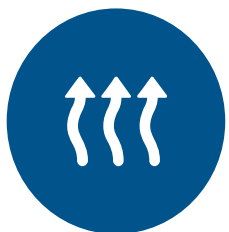
**“I have to use multiple calibration curves for different matrices”**

**“I have to use separate methods for different compound classes as the concentration range is different”**

**“Adopting new technology takes a lot of training and time”**

# TriPlus RSH Robotic Sample Handling

Automate most of the sample preparation procedures



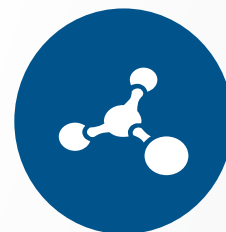
Heating/Mixing



Vortexing



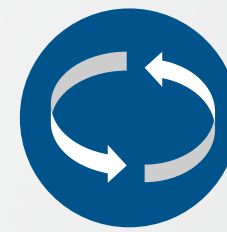
Dilution



Derivatization



Cooling



Centrifugation





# Highest level of sample handling automation

- Several tools to reliably automate common sample preparation procedures
- Ready-to-use pre-compiled set of basic operations (PrepCycles) available as a default
- Additional dedicated PrepCycles can be developed on-demand by the factory to satisfy specific requirements



**Confident sample handling through automated workflow**

The role of sample preparation  
in gas chromatography

TriPlus RSH robotic sample  
handling

Sampling Workflow Editor  
software

Calibration workflows

Derivatization workflows

Liquid/liquid extraction  
workflows

LLE for organic contaminants  
(SVOC) in water

Dispersive micro-LLE for organic  
contaminants (SVOC) in water  
samples

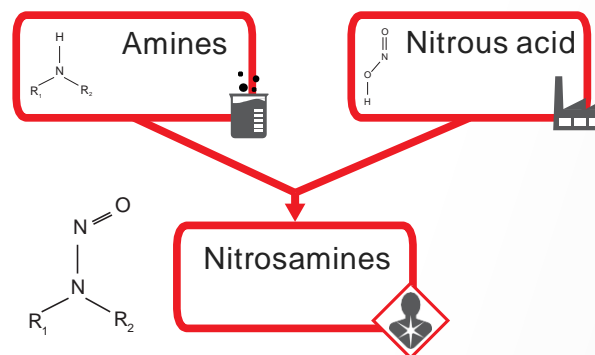
LLE for Hydrocarbon Index in  
water

[LLE of Nitrosamines in Metformin  
drug substance](#)

Micro-SPE clean-up

## LLE of Nitrosamines in Metformin drug substance

Nitrosamines are considered a matter of concern as mutagenic carcinogens or probable carcinogens. Since 2018, the presence of nitrosamine impurities has been highlighted by the Food and Drug Administration (FDA) within several widely employed active principles such as angiotensin receptor blockers commonly known as 'sartans' used in the treatment of hypertension and metformin, which is employed to treat diabetes. This has sometimes led to these drugs being recalled.

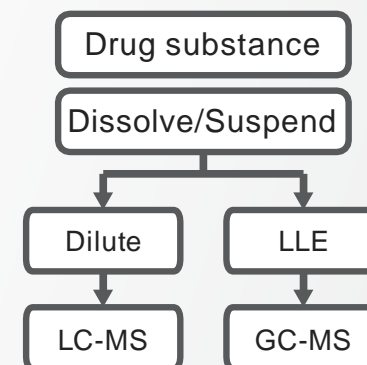


Nitrosamine impurities in pharmaceutical substances typically originate from the reaction between a secondary or tertiary amine present as an unintentional contaminant of raw materials, reagents, and solvents with nitrous acid, generated from nitrites through acid catalysis during the production process.

For LC-MS nitrosamine analysis, sample preparation involves a dissolution/suspension step with an aqueous/methanolic solution, followed by dilution and injection.

In the case of GC-MS, a liquid-liquid extraction step is also carried out to make the sample amenable to GC analysis.

Automation of the extraction procedures reduces the sample preparation time while improving data repeatability.





The role of sample preparation in gas chromatography

TriPlus RSH robotic sample handling

Sampling Workflow Editor software

Calibration workflows

Derivatization workflows

Liquid/liquid extraction workflows

LLE for organic contaminants (SVOC) in water

Dispersive micro-LLE for organic contaminants (SVOC) in water samples

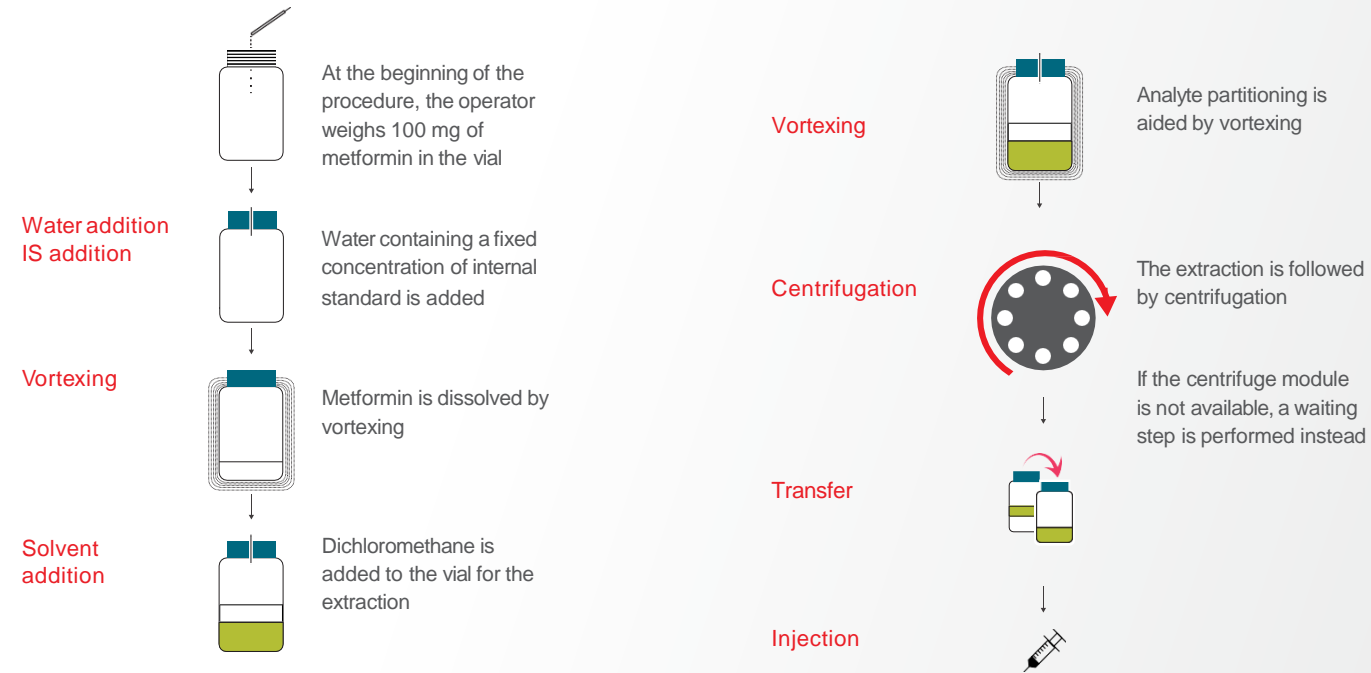
LLE for Hydrocarbon Index in water

[LLE of Nitrosamines in Metformin drug substance](#)

Micro-SPE clean-up

# LLE of Nitrosamines in Metformin drug substance

## Automated workflow



## Resources

[Webinar: Confidence in Process: A Fully Automated Solution for Nitrosamine Impurity Analysis Applicable to LC-MS and GC-MS](#)

[Application Brief AB000390](#)

[Analyte Guru Blog](#)

## Highlights

- Centrifugation is optional but recommended
- On-line injection is optional. The system can be used as a bench station for off-line sample preparation
- This PrepCycle can be reproduced with the SWE to modify or create additional steps

The role of sample preparation in gas chromatography

TriPlus RSH robotic sample handling

Sampling Workflow Editor software

Calibration workflows

Derivatization workflows

Liquid/liquid extraction workflows

LLE for organic contaminants (SVOC) in water

Dispersive micro-LLE for organic contaminants (SVOC) in water samples

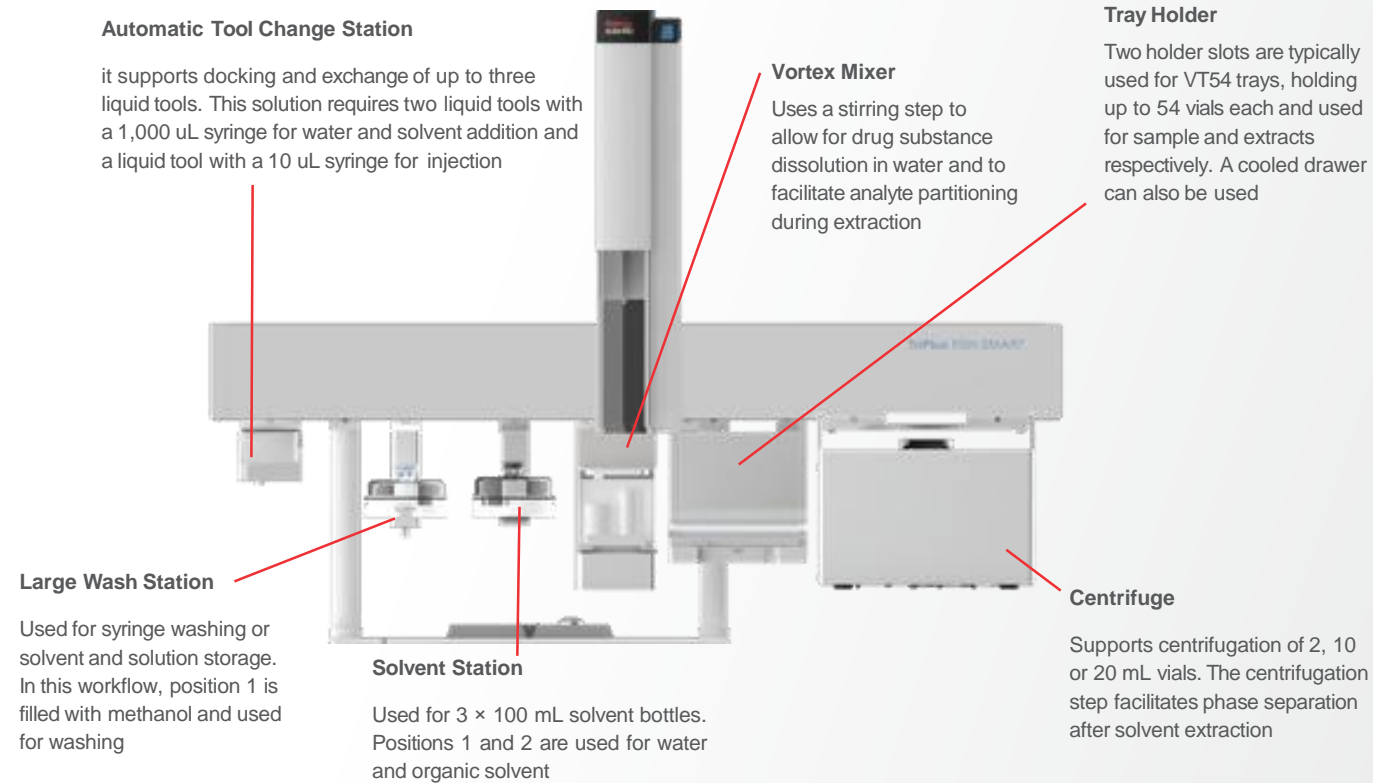
LLE for Hydrocarbon Index in water

[LLE of Nitrosamines in Metformin drug substance](#)

Micro-SPE clean-up

# Automated LLE of Nitrosamines in Metformin drug substance

## Instrument set-up



## Resources

[Automated Workflows Brochure](#)

[TriPlus RSH SMART Web Page](#)

[Sampling Workflow Editor Tutorial](#)

## Highlights

- Fits a regular x-rail
- Bench working station or on-line configuration



# Introducing the new ISQ 7610 GC-MS and TSQ 9610 GC-MS/MS

The Thermo Scientific™ ISQ 7610™ GC-MS and Thermo Scientific™ TSQ 9610™ GC-MS/MS offer **unstoppable confidence** and allow your customer to **stay ahead** by:



Increasing instrument uptime



Maximizing sample throughput



Providing a rapid ROI



ISQ 7610 GC-MS



TSQ 9610 GC-MS/MS

# Increasing instrument uptime

## NeverVent Technology



Thermo Scientific™ NeverVent™ technology allows analytical laboratories to perform maintenance without interrupting their workflow



Available on the ISQ 7610 with the Thermo Scientific™ ExtractaBrite™ source



Available on the TSQ 9610 with the ExtractaBrite and Advanced Electron Ionization (AEI) source

		Maintenance activity		
		Column change (hrs:mins)	Exchange ion source (hrs:mins)	Replace filaments (hrs:mins) (only available on NV-AEI)
Standard GC-MS	Requires vacuum system venting and pump down operations	4:35	4:00	4:00
NeverVent GC-MS	Venting and pump down not required	00:35	00:05	00:05
NeverVent time savings		87%	98%	98%



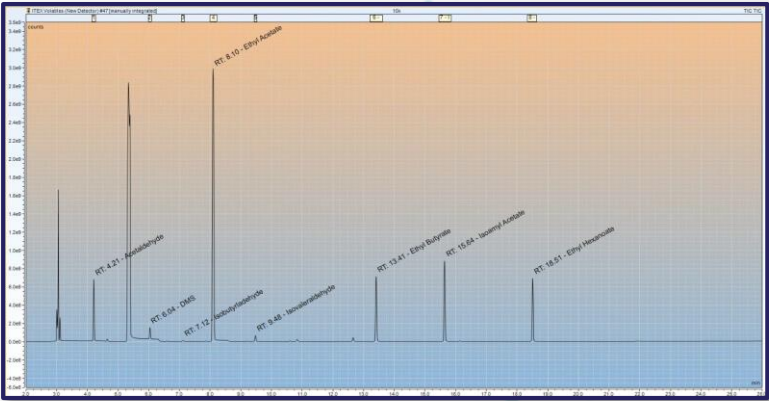
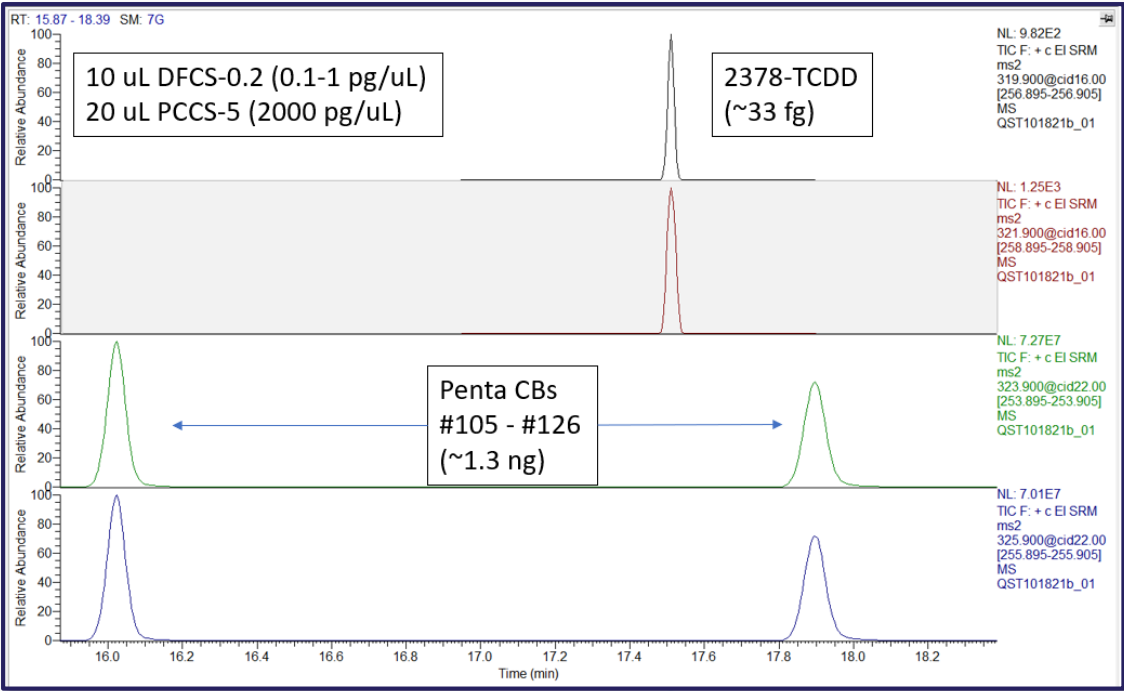
# Maximizing sample throughput



Extended dynamic range and lifetime detector



The XLXR detector provides extended dynamic range and lifetime allowing method consolidation and increased instrument uptime



Combined methods for Beer 29, Beer 44, and Beer 48 on ISQ 7610



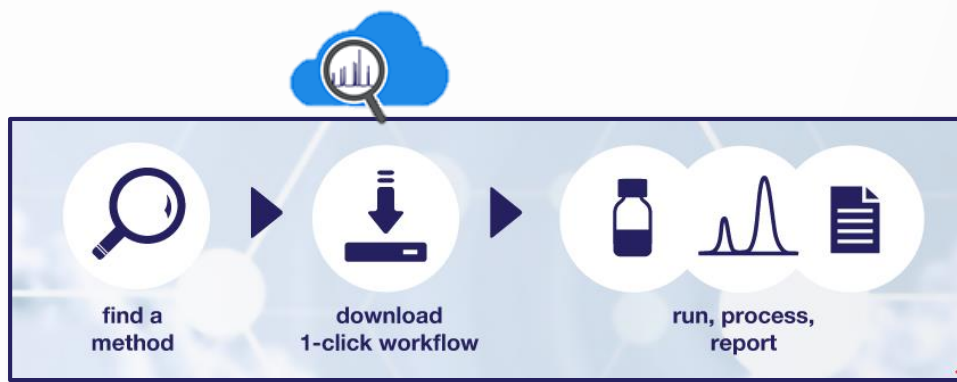
7x longer between detector replacements

# Providing a rapid return on investment

Ready to use methods, optimization tools and instrument health



Apps Lab provides methods that are ready to implement. Intelligent software tools allow methods to be optimized with ease. Instrument health enables real-time maintenance decisions to be made.



Instrument health records:

- Injections on current consumables
- Column health
- Filament lifetime
- Tuning status
- Detector lifetime

Gives user intelligent data to make maintenance decisions

IETS

Retention Time Alignment

Column information (read only)

Carrier gas: He

Pressure units: kPa

Column length: 30.000 m

Column internal diameter: 0.250 mm

Film thickness: 1.00 µm

☐ Precolumn installed

Precolumn length: 2.000 m

Precolumn internal diameter: 0.530 mm

Method information (read only)

Flow mode: Constant Flow

Flow: 1.800 ml/min

Oven temperature: 60 °C

Actual column void time and reference retention time

Void time determination method: Measured

Theoretical void time: 1.021 min

Measured void time: 1.250 min [0.001...1000.000 min]

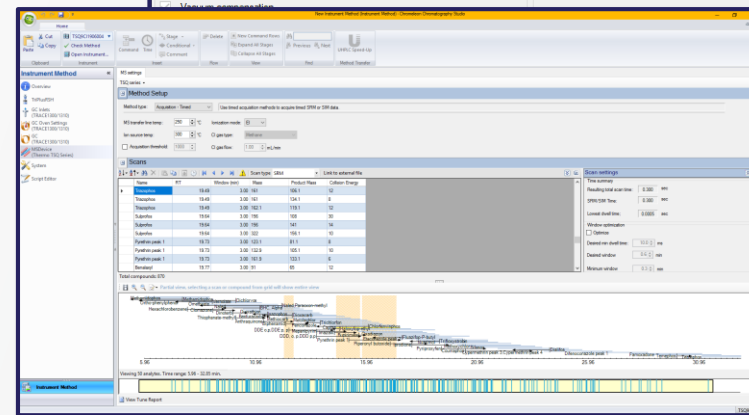
Measured reference retention time (nC10): 9.000 min [0.001...1000.000 min]

Target reference retention time: 9.000 min [0.001...1000.000 min]

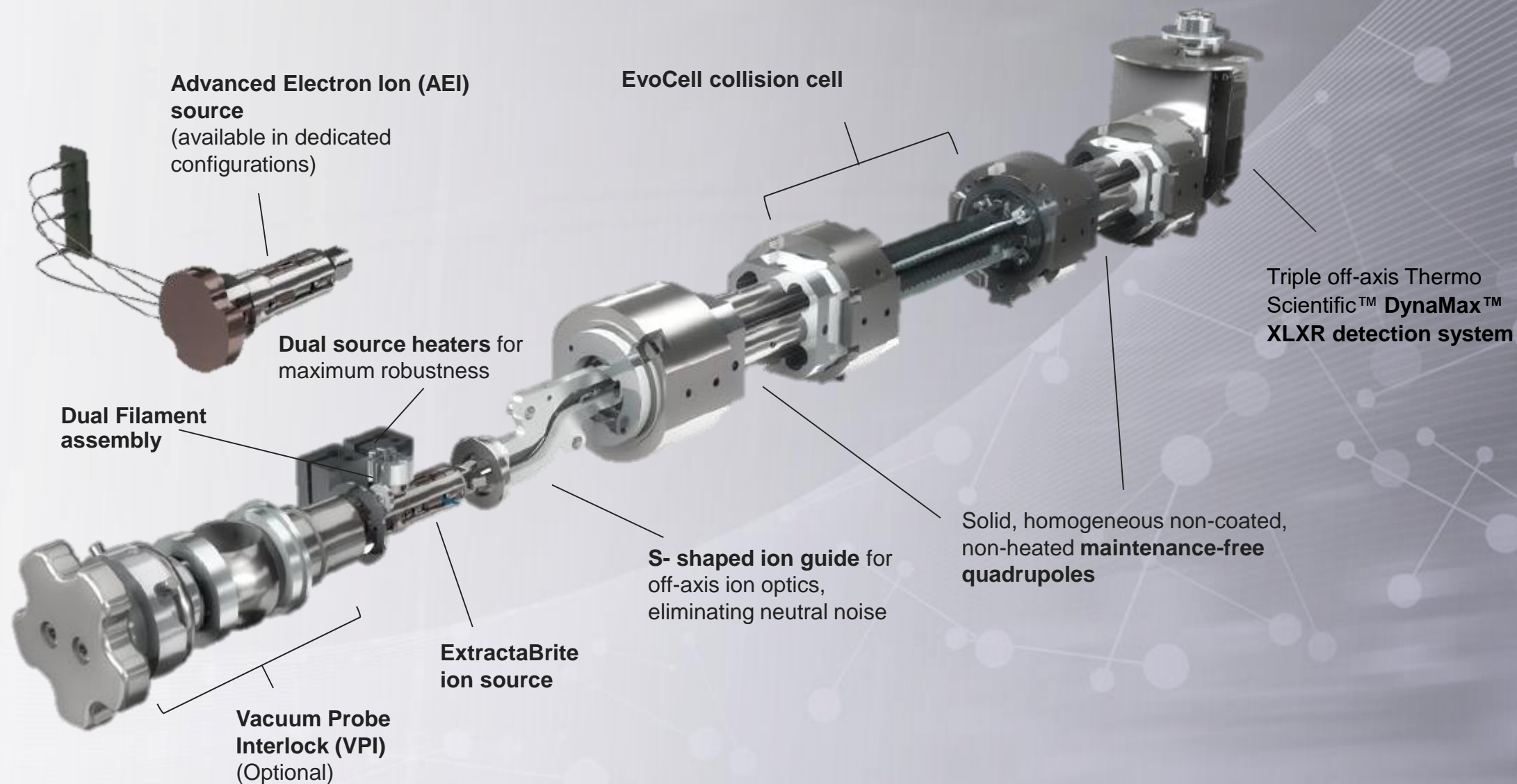
Calculated flow/pressure

Calculated flow (for method): 1.800 ml/min

Calculated pressure (information only): 117.696 kPa



Intelligent software tools including retention time alignment and Time SRM for optimizing methods





# TSQ 9610 GC-MS/MS summary



## NeverVent technology

- Available with ExtractaBrite and AEI
- Increases instrument uptime

## Off-axis ion guide pre-filter

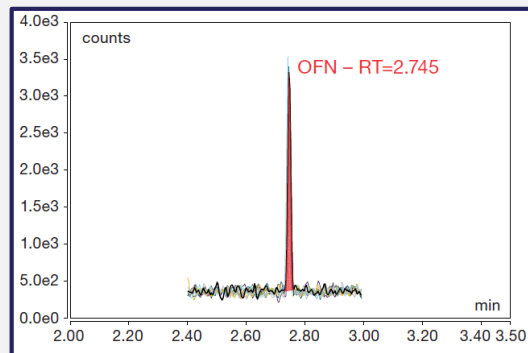
- Eliminates the neutral noise



## Evo collision cell

- Allows analysis of more compounds
- Shortens runtimes without loss of signal

## Class-leading sensitivity



8 x 1 fg on-column OFN injections  
with %RSD of 4.1%. IDL is 0.12 fg



## XLXR detector as standard

- Extended dynamic range (2X more than previous model)
- Extended lifetime (7X more than previous model)

## TRACE 1600 GC series

- Unique modular injector and detector design
- Easy-to-use touchscreen with real-time instrument monitoring and video guides



## Software productivity tools

- Compliant-ready software
- Instrument health



# New additions to the Orbitrap Exploris portfolio 2021

## Orbitrap Exploris™ GC *Efficiency transformed*



## Orbitrap Exploris™ GC 240 *Lead discovery*



March 2021

# Orbitrap Exploris GC – configure to your need



## Orbitrap Exploris GC



30,000

30,000  
MS/MS

60,000

60,000  
MS/MS

Analytical Testing

## Orbitrap Exploris GC 240



240,000  
MS/MS

Scientific Research

Sample matrix complexity

Target Quantitation & screening  
Food safety, Environmental, Anti-doping, Clinical, Forensic

Unknowns/Structural elucidation  
Metabolomics, E&L, Pharma, Industry research



# Thermo Scientific DFS Magnetic Sector GC-HRMS – *worldwide compliance*



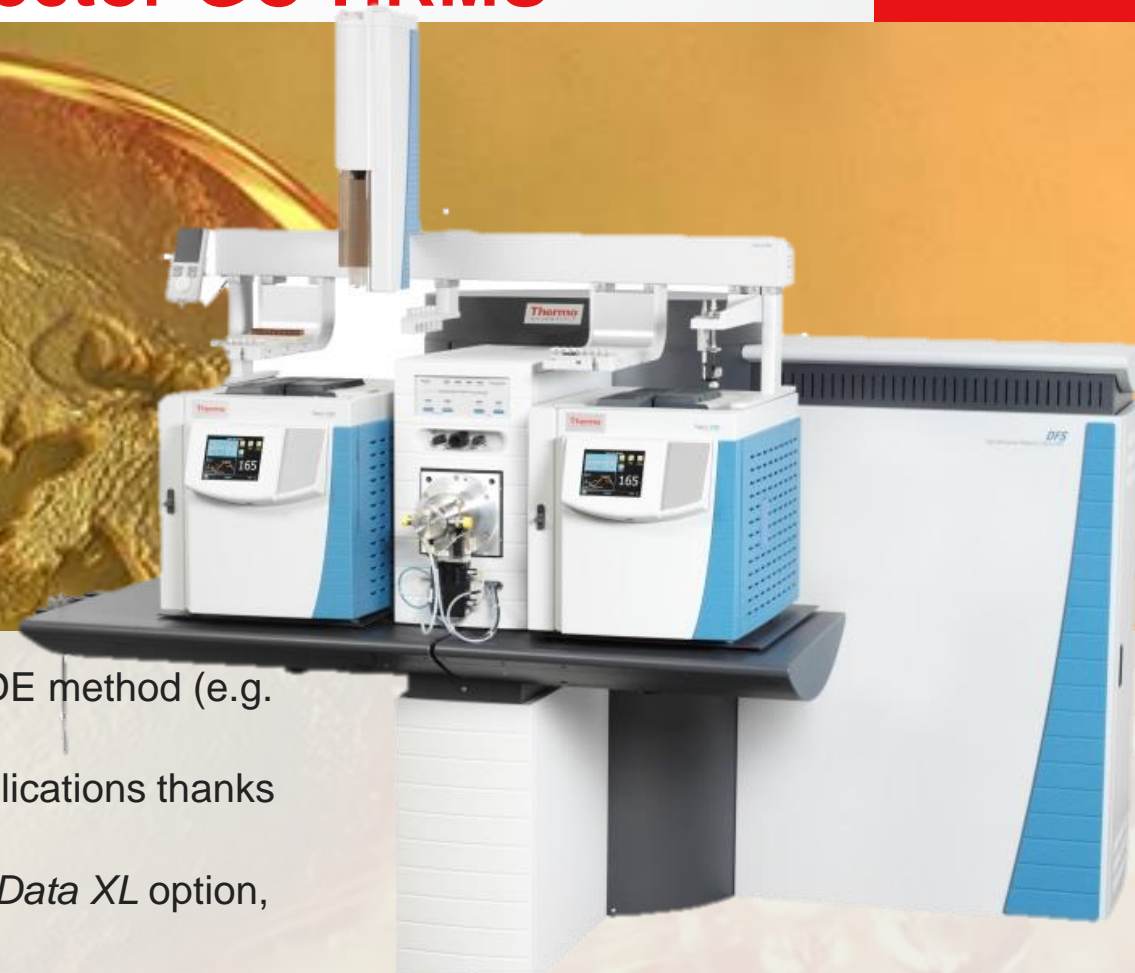
- **Global compliance** with any official Dioxin, PCB, or PBDE method (e.g. EPA 1613, 1668..)



- **Proven leadership** with *robust sensitivity* for routine applications thanks to large-volume ion source



- **Exceptional productivity and flexibility** with *New DualData XL* option, for up to doubled sample throughput
- **Future committed** for Dioxins and POPs *regulations compliance* today and tomorrow



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

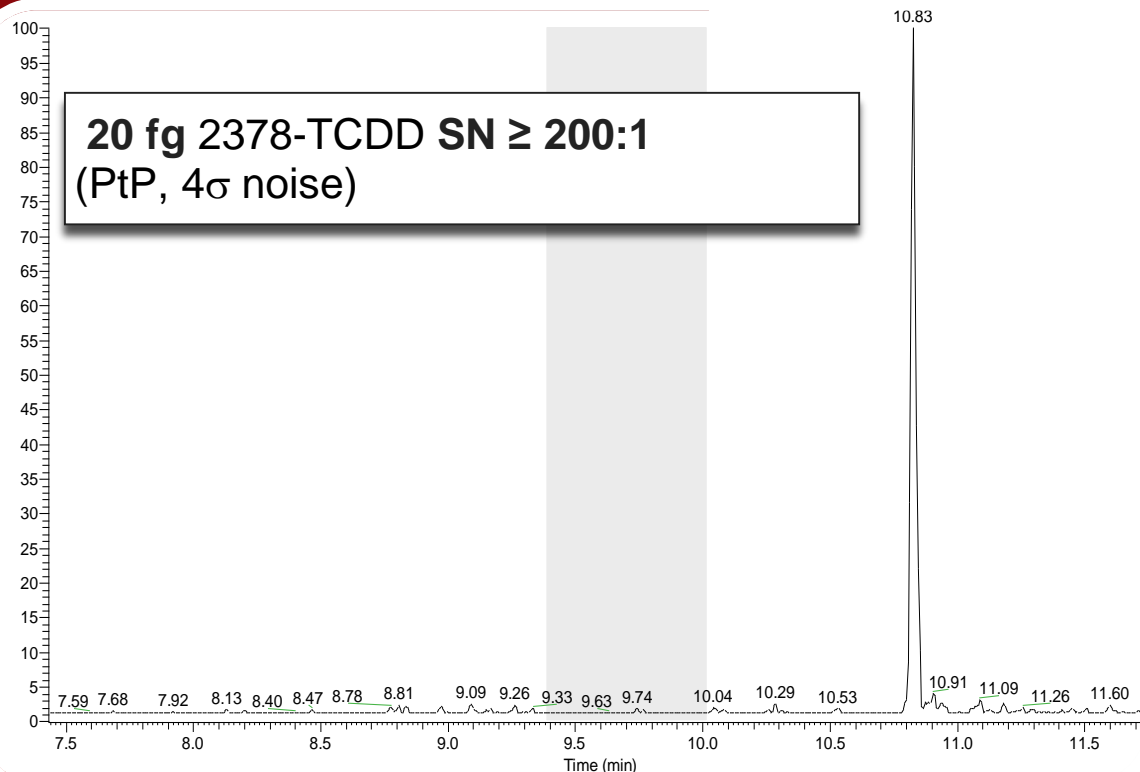
# Worldwide Compliance - Official Methods Recognizing Magnetic Sector Technology

Application	Regulation/Norm	DFS Magnetic Sector GC-HRMS
Food safety	EU Regulatory Feed Control (at ML)	Approved
Food safety	EN 16215	Approved
Food safety	Background food studies (<1/5 <sup>th</sup> EU ML)	Recommended by EURL
Clinical research	Human studies at trace levels	Recommended by EURL
Environmental	EN 1948	Approved
Environmental: Dioxins and Furans	US EPA 1613 B for strict EPA compliance	Approved
Environmental: PBDEs	US EPA 1614	Approved
Environmental	US EPA Method 23	Approved
Environmental	US EPA Method 8290	Approved
Environmental: PCBs	US EPA Method 1668	Approved
Environmental: Pesticides	US EPA Method 1699	Approved
Environmental: Hormones and steroids	US EPA 1698	Approved
Environmental	JIS K0311	Approved
Environmental	JIS K0312	Approved

# DFS - Ultimate Sensitivity Combined with Robustness

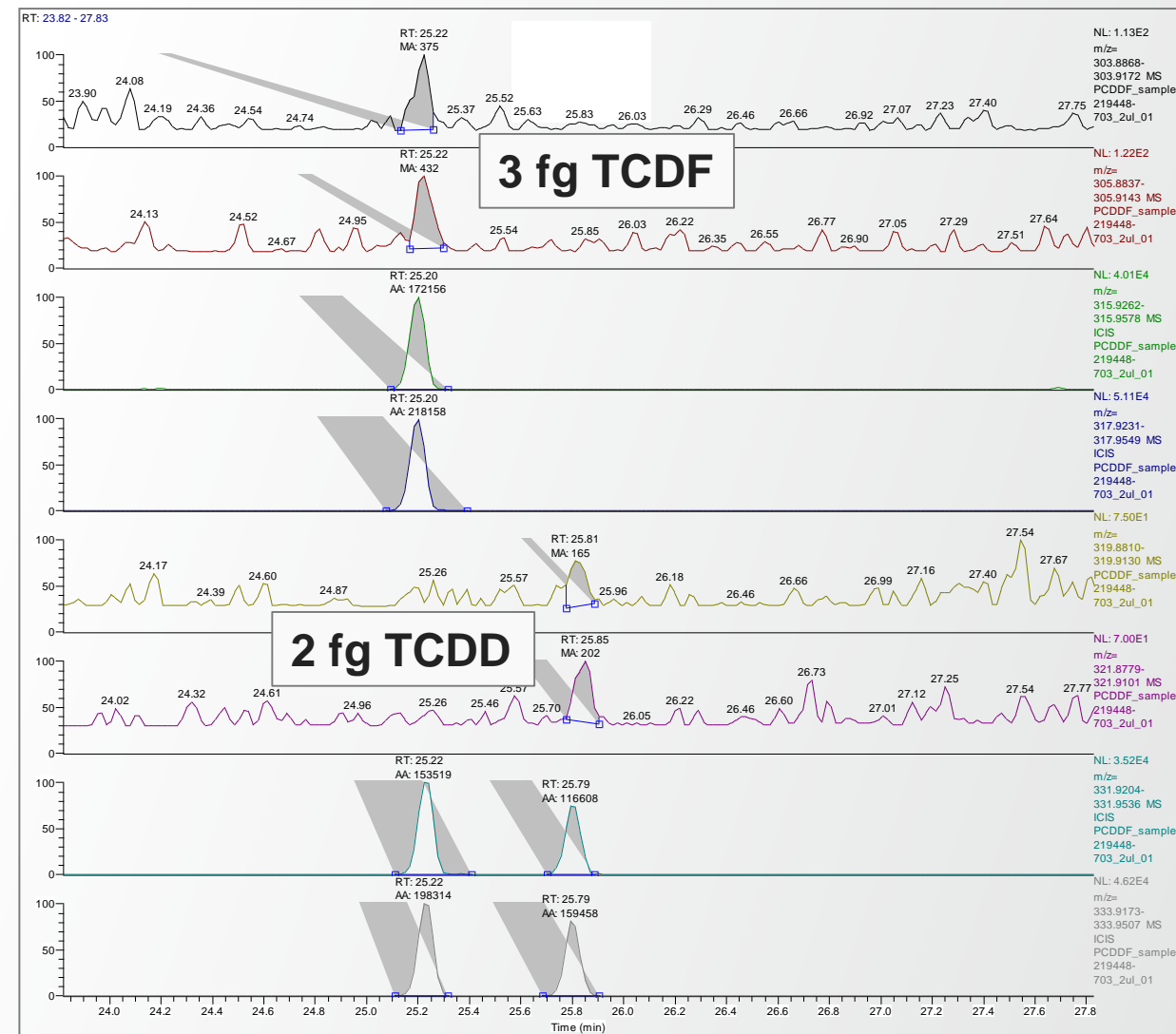
ThermoFisher  
SCIENTIFIC

Best Dioxin specification  
on the market



*Proof spec demonstrated to customers  
during DFS GC-HRMS installation*

Real sample: serum extract (col.: TG-5 60m x 0.25mm x 0.25um)

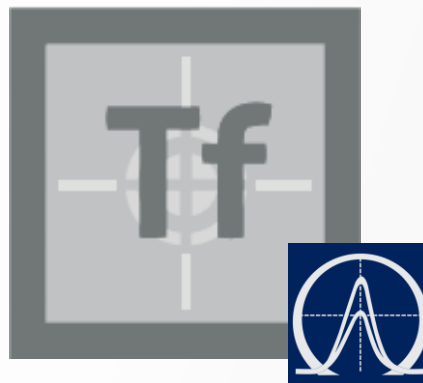






## Thermo Scientific Chromeleon CDS

- Data acquisition
- Targeted quantitation
- Regulatory-compliant quantitation
- Analytical testing applications
- Food safety, environmental, E&L



## Thermo Scientific TraceFinder 5.1

- Data acquisition
- Targeted quantitation and screening
- Deconvolution & spectral matching
- Customizable user interface
- Analytical testing applications



## Thermo Scientific Compound Discoverer

- Post acquisition software
- Omics applications/Unknowns
- Now includes GC EI/CI deconvolution
- Statistical comparison tools
- Spectral matching and unknowns

Options for all applications

# Some customers equipped with multiple Thermo GC/MS



IETS

# Công ty TNHH Thiết bị và Dịch vụ Kỹ thuật Quốc tế

**www.iets.vn**

**Xin chân thành cảm ơn!**

