

Thermo Scientific TSQ Quantum GC™ Triple Quadrupole GC-MS/MS



The Next Evolution in GC Triple Quadrupoles

Excellent selectivity, even in the dirtiest samples

Fast acquisition rate for optimal productivity

Simultaneous quantitation and
confirmation (QED-MS/MS)

Convertible between GC/MS and LC/MS

THERMO SCIENTIFIC TSQ QUANTUM GC

Continuing over 25 years of triple quadrupole GC/MS technology leadership, Thermo Fisher Scientific introduces the TSQ Quantum GC, a high-performance GC-MS/MS system that offers class-leading features and specifications that match your most demanding quantitative needs.

The TSQ Quantum GC is the next evolution in GC triple quadrupole mass spectrometry, offering unique features including Highly Selective Reaction Monitoring (H-SRM), which enables increased analyte selectivity in complex matrices, and Quantitation-Enhanced Data-Dependent MS/MS (QED-MS/MS), which provides simultaneous quantitation and structural confirmation.

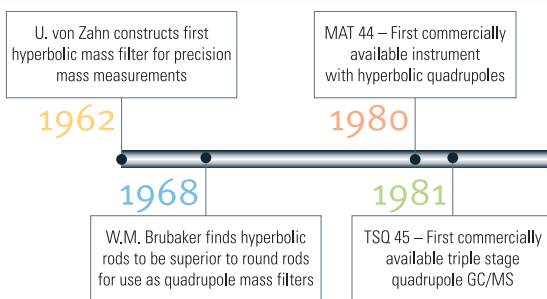
In addition, the option to switch between GC and LC modes or to change from EI to CI provides an extremely flexible system to meet your mass spectrometry needs.



Signature Benefits

- Multi-residue screening – quantitate hundreds of compounds in a single run with 1 ms dwell time
- Higher selectivity and more confidence with H-SRM
- Simultaneous quantitation and structural confirmation with QED-MS/MS
- Eliminate false positives with Zero Cross-Talk Collision Cell
- 21 CFR Part 11 enabled software for regulatory compliance

History of the TSQ Quantum



TSQ Quantum GC key benefits:

- Highest selectivity (H-SRM)
- Lowest limits of quantitation
- Simultaneous quantitation and structural confirmation with QED-MS/MS
- High-speed data acquisition for multi-component analysis
- Structure-Selective Detection (SSD) using MS/MS
- Unique zero cross-talk collision cell

TSQ Quantum GC versatility:

- Exchangeable ion volumes for EI and CI without breaking vacuum
- Combination ion volume for automated EI/CI operation
- Convertible between GC/MS and LC/MS
- Mass range up to m/z 3000
- Scan speeds up to 5000 u/s
- Specify up to 3000 SRM transitions per run
- Digital reagent gas control
- PPINICI™ – pulsed positive ion negative ion chemical ionization for sample screening
- DEP and DIP solid probe inlets



标志性优

- 多残留筛查 – 只需一次进样即可测定数百种化合物的含量，驻留时间仅 1 毫秒
- H-SRM 的选择性更强，可信度更高
- QED-MS/MS 可同时进行定量分析和结构确认
- 零串扰碰撞室消除了假阳性结果
- 符合 21 CFR Part 11 (美国联邦法规第 21 章第 11 款) 要求的软件确保合规性

TSQ 46 – First commercially available triple stage quadrupole with hyperbolic rods

1984

TSQ 700 – First commercially available API interface on a triple stage quadrupole with hyperbolic rods

1990

TSQ Quantum – First commercially available triple stage quadrupole with H-SRM (0.1 FWHM)

2000

TSQ Quantum Ultra – Ion Max source introduced

2003

TSQ Quantum GC introduced

2007

1986

TSQ 70 – First fully computer-controlled TSQ with hyperbolic quadrupoles

1997

TSQ 7000 – API 2 interface

2002

TSQ Quantum AM – First commercially available triple stage quadrupole with accurate mass capability

2005

TSQ Quantum Ultra – H-ESI introduced

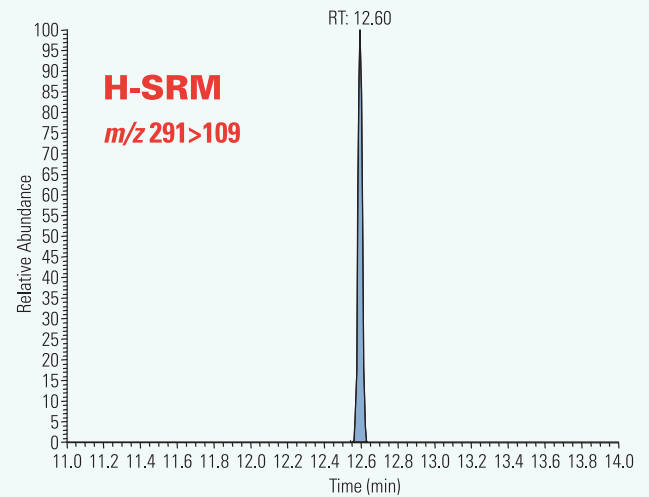
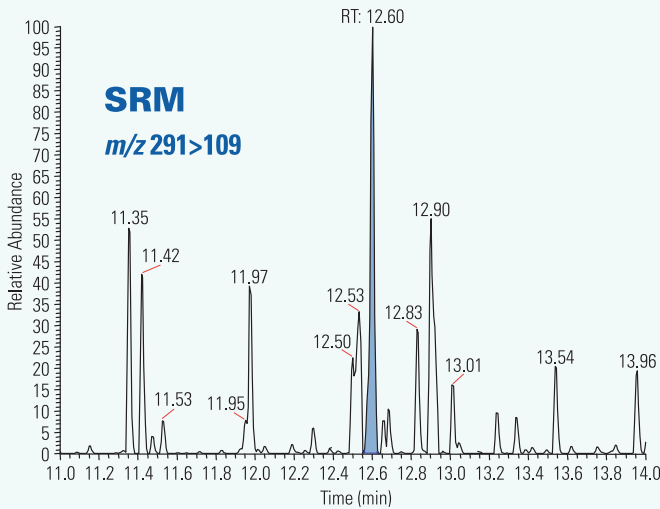
HIGHLY SELECTIVE REACTION MONITORING (H-SRM) – CLASS-LEADING SELECTIVITY

Reduce false positives with high transmission at enhanced resolution

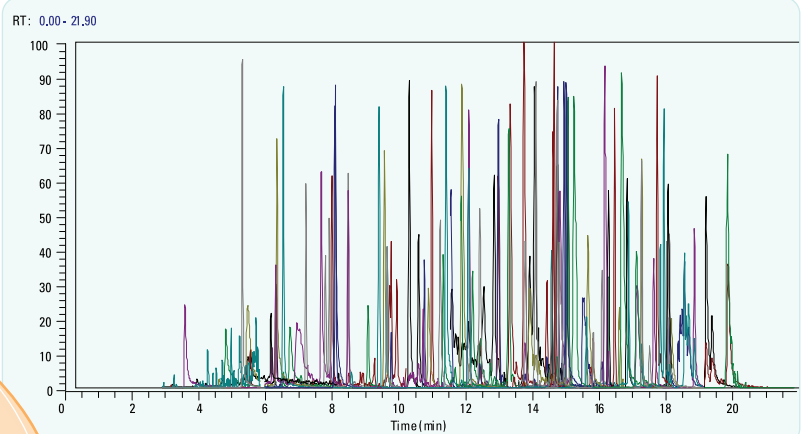
Selected Reaction Monitoring (SRM) is the primary technique used with a triple quadrupole mass spectrometer for quantitative analysis. However, selection of a precursor ion at a normal unit resolution often suffers chemical noise interferences from endogenous biological and environmental matrices.

Highly Selective Reaction Monitoring (H-SRM) allows the user to have more stringent tolerance for precursor ion selection in Q1, which leads to increased analyte selectivity. This can result in lower limits of detection, and improved precision and accuracy at the LOD.

Our high-precision hyperbolic quadrupoles are the only quadrupoles on the market capable of such mass selectivity without a significant loss in transmission.



Comparison of chromatograms for residue analysis of Parathion in green pepper at 1 pg/ μ L. Left shows unit resolution (SRM) and right shows H-SRM with enhanced resolution.



Fast analysis of 170 pesticides using SRM and H-SRM

特長と利点

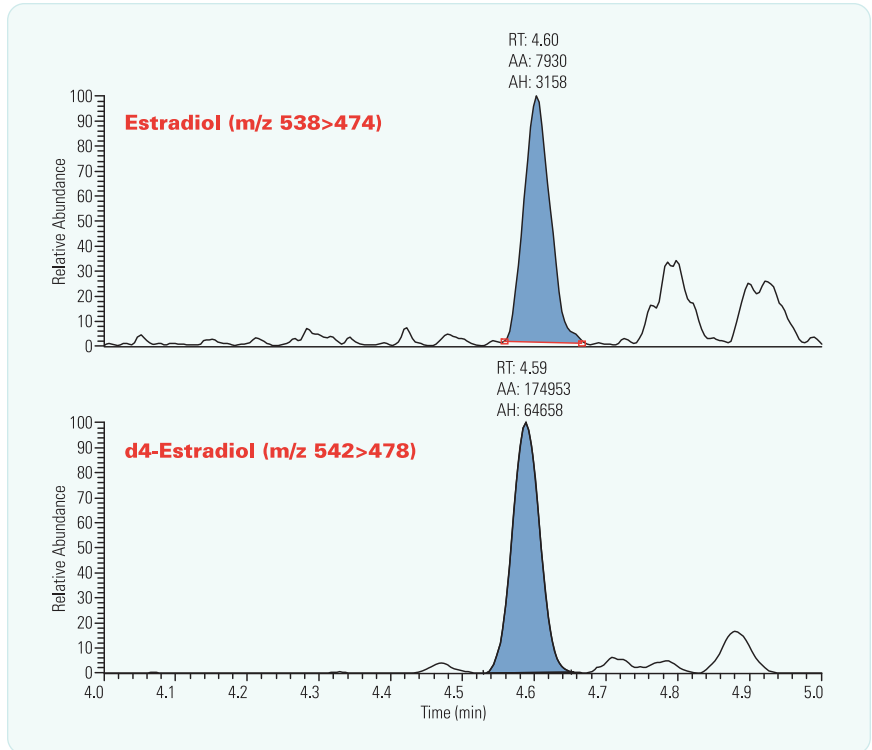
- 複数の残留を同時にスクリーニング – Dwellタイム 1 ms の一回の分析で数百の化合物を同時に定量
- 選択性を高め、H-SRMの精度を向上
- QED-MS/MSで定量と構造確認を同時に実行
- クロストークの発生しないコリジョンセルで擬陽性を排除
- 21 CFR Part 11 規制遵守のソフトウェア

SENSITIVITY FOR THE MOST DEMANDING ASSAYS

Excellent sensitivity, vital for routine quantitation in every laboratory

Detection of endogenous estrogens such as estradiol in biological fluids has wide applications. The hormone is suspected to be an indicator of disease states. The analytical method for estradiol is often compromised as a result of interferences from the endogenous biological matrices.

The TSQ Quantum GC offers a highly selective, sensitive and robust method for analyzing these compounds using negative CI and selected reaction monitoring. Figure at right illustrates a representative chromatogram of low-level estradiol in plasma samples.



Chromatograms of pentafluorobenzoyl and MSTFA derivatized estradiol (55 fg injected on column, 2.5 pg/mL sample concentration) and its d4 analogue (as internal standard) extracted from plasma sample (Sample provided by Taylor Technology, Inc.)

특징적인 혜택

- 다성분 잔류 분석 - 1 ms Dwell Time 으로 한 번의 시료 주입으로 수백 가지 화합물 정량
- H-SRM의 높은 선택성 및 강화된 신뢰성
- QED-MS/MS로 정량과 동시에 구조 확인
- Cross-Talk이 전혀없는 Collision Cell로 정량 오류 제거
- 21 CFR Part 11 규제에 적합한 소프트웨어

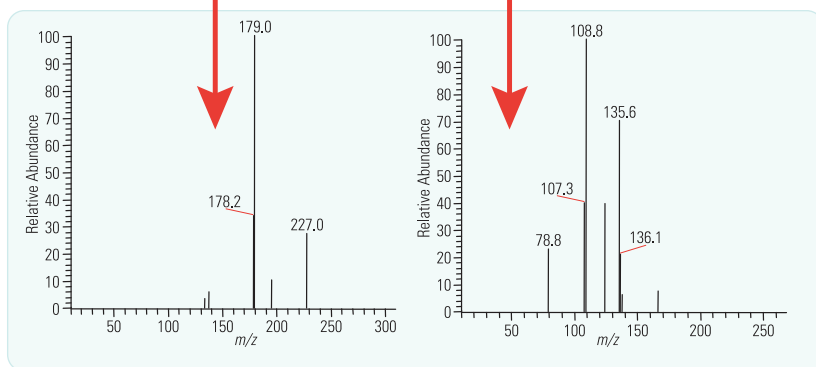
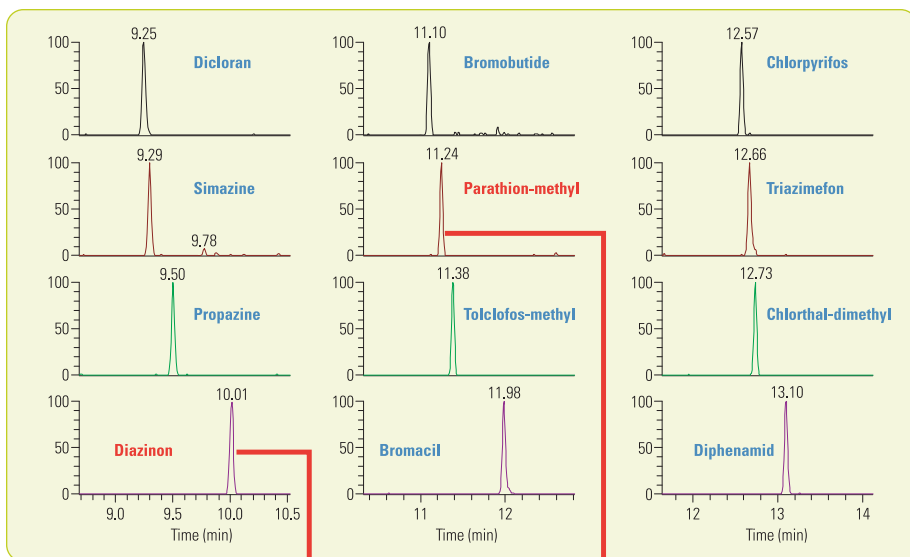
SIMULTANEOUS QUANTITATION AND CONFIRMATION IN A SINGLE RUN

Quantitation-Enhanced Data-Dependent MS/MS (QED-MS/MS)

This innovative scanning mode, available as a standard feature on the TSQ Quantum GC, provides simultaneous quantitation (H-SRM)

and structural confirmation (MS/MS product ion spectra). The feature is extremely beneficial for multi-residue screening experiments.

With enhanced resolution, the higher quality MS/MS spectra are easily searchable against spectral libraries for added structural confirmation.



QED-MS/MS of Pesticides in Green Pepper

Scan Event 1 shows multi-residue analysis of pesticides at 10 pg/μL. Scan event 2 confirms the structures of Diazinon (left) and Parathion-methyl (right) at the same concentration. QED-MS/MS provides simultaneous quantitation and structural confirmation in metabolite identification or multi-residue screens.

Beneficios exclusivos

- Análisis multiresiduales: cuantifica cientos de compuestos en un solo barrido con un tiempo de permanencia de 1 ms
- Mayor selectividad y más confiabilidad con H-SRM
- Confirmación de estructuras y cuantificación simultáneas con QED-MS/MS
- Elimina los positivos falsos gracias a la celda de colisión de cero "crosstalk"
- Software preparado para el cumplimiento de la norma 21 CFR Parte 11



EASY-TO-USE ADVANCED GC-MS/MS TECHNOLOGY

High performance and high throughput – maximum value for your GC-MS/MS instrument investment

Thermo Scientific TRACE GC Ultra™

The process of GC-MS/MS begins with the gas chromatograph. The Thermo Scientific TRACE GC Ultra is a versatile laboratory GC with a full range of detectors and injectors designed to dramatically increase sample throughput, making the TRACE GC Ultra the ideal partner for the TSQ Quantum GC. Automated features result in a tremendous increase in sample throughput, with analyses performed up to 30 times faster than before, without compromising precision.

- Exceptional system usability, automation, and speed of analyses
- Industry-leading Split/Splitless, PTV, and Cold On-column injectors, all also available in Large Volume modes to maximize sensitivity
- Proprietary Automatic Column Characterization (ACC) and leak check functions improve ease of use and reduce column-to-column and instrument-to-instrument variations
- Direct coupling of the TSQ Quantum GC ion source to the GC/MS interface provides uniform temperature distribution and precise temperature control up to 350 °C
- Integrated control of TSQ Quantum GC, TRACE GC Ultra, injector and interface temperatures, and valve timing using the Thermo Scientific Xcalibur™ data system

Thermo Scientific Direct Sample Probe – Switch to probe in under three minutes, leaving the GC interface undisturbed. Available in two styles: Direct Exposure Probe (DEP) with rapid-heating filament, or Direct Insertion Probe (DIP) with slower volatilization for bulk samples and mixture analysis.



Thermo Scientific Autosamplers – Flexible Sampling Solutions

Automate routine sample injections and improve productivity with the Thermo Scientific AI/AS 3000 Series II liquid autosampler. Or, experience the flexible Thermo Scientific TriPlus™ autosampler as the ideal partner for your TSQ Quantum GC system.

AI/AS 3000 Series II

- Easy setup and simple self-alignment
- AI 3000 II with switchable sample trays for routine injections
- AS 3000 II with 105-vial sample tray increases productivity
- Four rinsing stations virtually eliminate carryover and cross-contamination

TriPlus

- TriPlus AS for versatile liquid injections
- TriPlus HS for syringe-based headspace analyses
- TriPlus Duo to easily change from liquid to headspace mode
- TriPlus SPME* for automated sample prep using solid phase microextraction
- Cooled/heated tray option for the handling of very volatile solvents and very viscous samples at ambient temperature



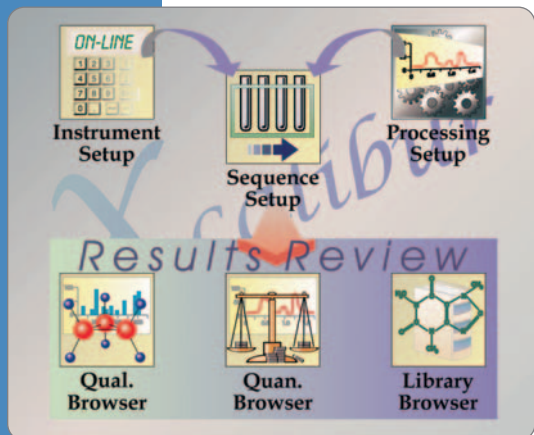
* Sold under license from Supelco®

Avantages Signature

- Analyse multi-résidus - quantification de centaines de composés en une seule acquisition avec une vitesse de balayage de 1 ms
- Sélectivité et fiabilité plus élevées en mode H-SRM
- Quantification et confirmation structurale simultanées en mode QED-MS/MS
- Élimine les faux positifs avec la cellule de collision sans effet cross-talk
- Logiciel prêt pour la conformité aux normes 21 CFR Part 11

THERMO SCIENTIFIC XCALIBUR – A UNIFIED SOFTWARE PLATFORM

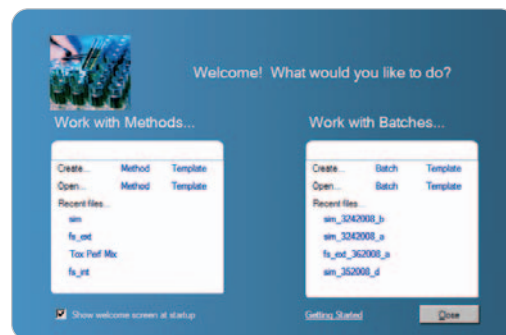
One intuitive platform for GC/MS, LC/MS, and Advanced MS instruments provides confident control from method development to reporting.



Xcalibur's home page (left) offers easy navigation through the process of instrument setup, sequence setup, and data acquisition. Data can be reviewed in three browsers: Qual Browser, Quan Browser, and Library Browser.

Xcalibur is the most powerful and robust data system available, delivering a unique combination of functionality, system control, and ease of use. The software is designed to guide the user through daily analytical tasks. This powerful simplicity combined with the advanced features of the Microsoft® Windows® operating system and Microsoft Office productivity tools provides an analytical platform that's second to none.

Xcalibur provides complete control of the TSQ Quantum GC, the TRACE GC Ultra, and the TriPlus or AI/AS 3000 autosampler, as well as other devices. Xcalibur contains a built-in audit trail to ensure compliance with a laboratory's SOPs and quality programs. Xcalibur also lays the solid foundation for a set of layered applications, which offer tailored approaches to routine quantitative workflows.



Workflow-oriented applications make routine GC-MS/MS analyses easier and more productive.

POWERFUL SOFTWARE PACKAGES FOLLOW LABORATORY WORKFLOWS FOR MAXIMUM PRODUCTIVITY

The Thermo Scientific TSQ Quantum GC is ideal for challenging GC-MS/MS applications from research to routine. Thermo Scientific Lab Forms software packages provide optimal productivity and complement routine applications. Lab Forms

packages offer standard features that streamline your workflows. Innovative new *Method Forge* provides an automated pathway to generating full scan methods. Wizards and templates make programming daily batches straightforward, greatly reducing the time needed to queue samples and begin acquiring data.

integration – if it's as simple as re-drawing the peak integration, then this change can be made within Data Review. Return to the active report and the new integration is immediately reflected – no reprocessing, no re-analyzing the data.

Where the Lab Forms software packages truly redefine workflows is with a revolutionary approach to data review and reporting. Through powerful *Smart Reporting*, data review and data reporting are dynamically linked, allowing for real-time changes to reports based on changes to the data. For example, if the Active Report shows an out-of-range ion ratio, simply double-click the result to go straight to that compound, for that sample. Review the

The Lab Forms packages include general purpose software, Thermo Scientific QuanLab™ Forms, ideal for GC/MS quantitation across a wide range of applications. Thermo Scientific EnviroLab™ Forms provides reporting options that facilitate workflows for routine environmental GC/MS applications. Thermo Scientific ToxLab™ Forms includes report styles and quality control settings that suit the needs of forensic and toxicology laboratories.

Caratteristiche esclusive

- Dosaggio multi-residuo - Determinazione quantitativa di centinaia di composti in una singola analisi con tempo di scansione (dwell time) di 1 ms
- Migliore selettività e più sicurezza con H-SRM
- Determinazione quantitativa e simultanea conferma strutturale con QED-MS/MS
- Eliminazione dei falsi positivi grazie alla cella di collisione con eliminazione totale delle interferenze (Zero Cross-Talk)
- Programma software conforme ai requisiti della norma 21 CFR Parte 11

QuanLab Forms

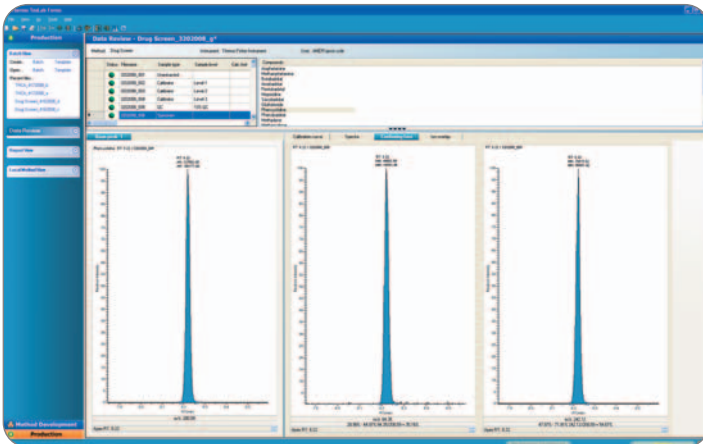
QuanLab Forms provides a powerful productivity tool for quantitative and semi-quantitative GC/MS experiments across a broad range of applications. QuanLab Forms provides an integrated, workflow-oriented approach to GC/MS data analysis and reporting. A wide selection of standard reports allows for easily reporting data in a style that suits your lab's needs. Generate reports in real time during sample acquisition, or review and report data through the intuitive Data Review screen. QuanLab Forms is ideally suited for applications where management of long lists of target compounds is critical.



Data Review in Lab Forms packages



Innovative Method Forge simplifies method creation



Clearly display and review peak integrations

EnviroLab Forms

Today's environmental labs must balance high productivity and throughput with stringent quality control protocols. EnviroLab Forms has been designed to follow environmental laboratory workflows, from sample to result. EnviroLab Forms features a wide range of report options tailored to the needs of environmental laboratories.

ToxLab Forms

ToxLab Forms is designed to offer an intuitive, workflow oriented approach to GC/MS acquisition, analysis, and reporting in the clinical or forensic toxicology laboratory. ToxLab Forms streamlines the path from unknown sample to known result in a manner that is secure, defensible and aligned with your lab's specific needs. Enhancements specific to your toxicology lab's needs are built into the system, including standard report formats to simplify reporting. ToxLab Forms provides automated spectral library searching on non-target peaks and report semi-quantitative results.

Entscheidende Vorteile

- Multikomponenten-Screening - Quantifizieren Sie Hunderte von Verbindungen in einem einzigen Lauf mit einer „Dwell Time“ von 1 ms
- Höhere Selektivität und mehr Vertrauen mit H-SRM
- Simultane Quantifizierung und Strukturbestätigung mit QED-MS/MS
- Eliminieren Sie falsch-positive Ergebnisse mit der Kollisionszelle ohne „Cross-Talk“
- Die Software unterstützt die im Regelwerk der „21 CFR Part 11“ festgelegten Anforderungen der Qualitätssicherung

Laboratory Solutions Backed by Worldwide Service and Support

Tap our expertise throughout the life of your instrument. Thermo Scientific Services extends its support throughout our worldwide network of highly trained and certified engineers who are experts in laboratory technologies and applications. Put our team of experts to work for you in a range of disciplines – from system installation, training and technical support, to complete asset management and regulatory compliance consulting. Improve your productivity and lower the cost of instrument ownership through our product support services. Maximize uptime while eliminating the uncontrollable cost of unplanned maintenance and repairs. When it's time to enhance your system, we also offer certified parts and a range of accessories and consumables suited to your application.

To learn more about our products and comprehensive service offerings, visit us at www.thermo.com.



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