

Liquid Chromatograph Mass Spectrometer

LCMS-8045

UFMS
ULTRA FAST MASS SPECTROMETRY



UPLC

ULTRA FAST MASS SPECTROMETRY

Speed Beyond Comparison

LCMS-8045

—*Best-in-class sensitivity*

■ Accomplishes Both High Sensitivity and Ultra-High-Speed Detection

Equipped with a heated ESI probe, the LCMS-8045 has the highest* sensitivity in its class. The instrument is capable of providing accurate and stable data over long periods of time. The inclusion of Shimadzu's ultra-high-speed high-voltage power supply enables the world's fastest* scan speed (30,000 u/s) and polarity switching time (5 ms). High-speed acquisition benefits the laboratory by reducing run times for increased throughput, and also shortens method development time.

* As of August 2016, according to a Shimadzu survey

■ Superior Robustness Assures That High Sensitivity Is Maintained Over the Long Term

The LCMS-8045 was designed to be robust. The heated ESI probe, high-temperature heating block, heated desolvation line, drying gas, and focusing optics all act to maximize sensitivity and minimize contamination. This means long periods of continuous operation in the laboratory with reliable data collection, even with complex biological fluids or food samples.

■ LabSolutions LCMS Software and Wide-Ranging Method Packages

LabSolutions LCMS features an intuitive user interface, and offers the latest features designed to enhance laboratory productivity and streamline workflows. Numerous pre-configured MRM method packages are available. Predetermined LC separation conditions and MRM parameters allow analysis to be started without long hours of method development, enhancing the efficiency of your laboratory.

■ Heated ESI Probe

High-temperature gas supplements the nebulizer gas, improving desolvation efficiency. This facilitates the ionization of a wide range of compounds.

■ Ultrafast High-Voltage Power Supply for Polarity Switching



■ Ionization Unit

Designed without cables or tubes; utilize a one-touch lever to perform simple attachment and detachment of the unit.

■ DL (Desolvation Line)

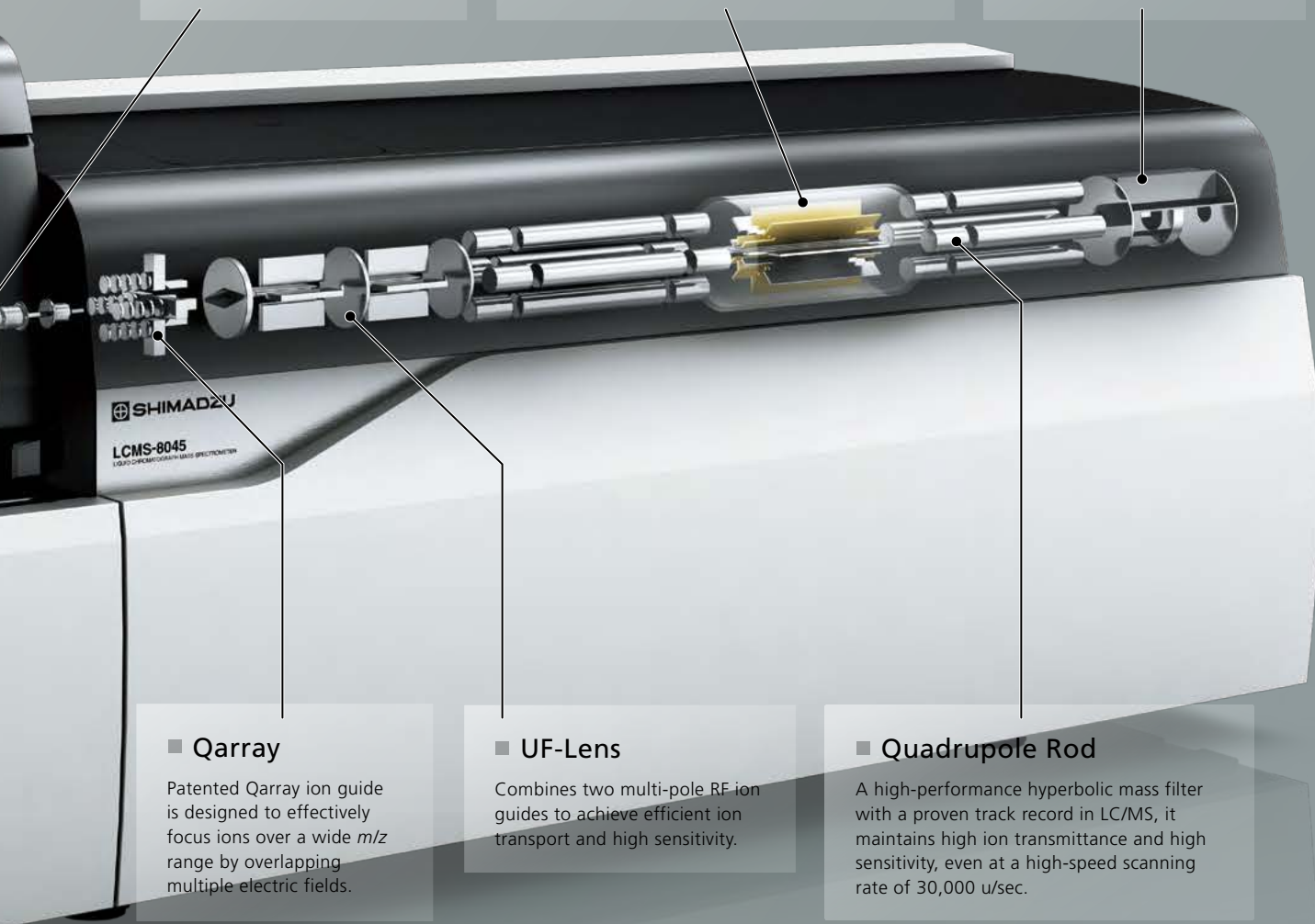
Perform maintenance without breaking vacuum.

■ UFsweeper II Collision Cell

The UFsweeper II is a high-sensitivity, high-speed collision cell that features improved ion focusing by using high-speed ion transport technology. This yields better product ion transmission in the collision cell, maintaining signal intensity and suppressing crosstalk, even for high-speed or simultaneous multi-component analysis. The capability for high-throughput analysis is thus maintained at lower levels of detection.

■ Ultrafast Pulse-Counting Detector

Makes ultrafast sampling and polarity switching possible.



■ Qarray

Patented Qarray ion guide is designed to effectively focus ions over a wide m/z range by overlapping multiple electric fields.

■ UF-Lens

Combines two multi-pole RF ion guides to achieve efficient ion transport and high sensitivity.

■ Quadrupole Rod

A high-performance hyperbolic mass filter with a proven track record in LC/MS, it maintains high ion transmittance and high sensitivity, even at a high-speed scanning rate of 30,000 u/sec .

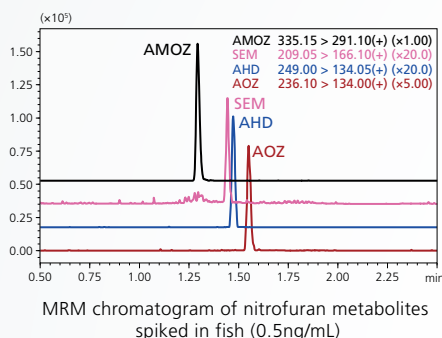
High Performance for a Variety of Applications

Veterinary Drugs

■ Nitrofuran metabolites in fish

Nitrofurans are a class of synthetic antibiotics. The use of nitrofurans for edible animal and fishery products is banned in many countries. The chromatogram below shows the recovery of nitrofuran metabolites from fish using the LCMS-8045. Excellent linearity and accurate quantitative

results ranging from 0.05 to 20 ng/mL were obtained. The LCMS-8045 is shown to be an excellent platform for routine high-sensitivity analysis in challenging matrices.



Calibration range, accuracy and limit of detection (LOD)

Compound	Calibration range (ng/mL)	Accuracy (%)	LOD (ng/mL)
AMOZ	0.05 – 20	94.5 – 103.8	0.00024
SEM	0.05 – 20	93.2 – 111.6	0.015
AHD	0.05 – 20	95.5 – 102.1	0.001
AOZ	0.05 – 20	94.0 – 108.4	0.00096

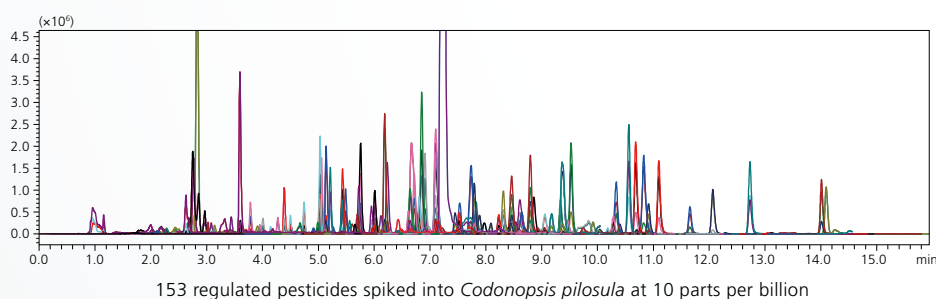
* Limit of detection (LOD) was calculated at signal-to-noise ratio (S/N) = 3.

Residual Pesticides

■ Simultaneous analysis of residual pesticides in herbal supplements

Regulatory agencies worldwide provide oversight for an extensive and ever-increasing list of pesticides in order to promote food safety and protect public health. The MRM chromatogram below shows the simultaneous analysis of 153 pesticides spiked into *Codonopsis pilosula* at 0.01 mg/kg. Plant matrices can be very challenging due to background

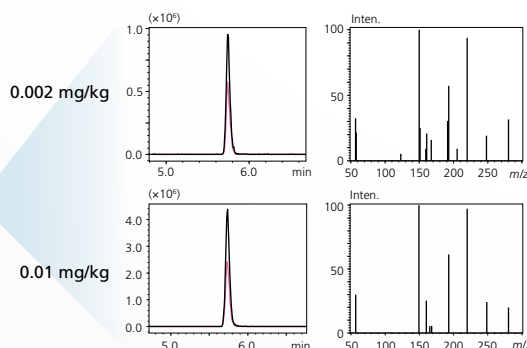
interferences, but the LCMS-8045 provides enough sensitivity to analyze most pesticides at the trace level of 10 parts per billion. Many pesticides methods also benefit from polarity switching, which the LCMS-8045 can accomplish in just 5 msec.



Use Synchronized Survey Scan (SSS) to obtain both qualitative and quantitative information from a single injection. Full scan MS² spectra will be obtained when an MRM peak intensity threshold is exceeded.

Type	Event#	+/-	Compound Name m/z	Time (0.000 min – 15.939 min)
MRM	63	±	Metalaxyl 280.10>220.20, 2	
Product Ion Scan	64	+	> CE: -18.0, 50.00:300.00	
MRM	65	+	Atrazine 216.10>174.05, 2	
Product Ion Scan	66	+	> CE: -20.0, 50.00:250.00	
MRM	67	+	Fenulfosfain-sulfone 324	
Product Ion Scan	68	+	> CE: -28.0, 50.00:350.00	
MRM	69	+	N-desethyl-pirimphos-me	
Product Ion Scan	70	+	> CE: -25.0, 50.00:300.00	

Method settings and Synchronized Survey Scan results for Metalaxyl



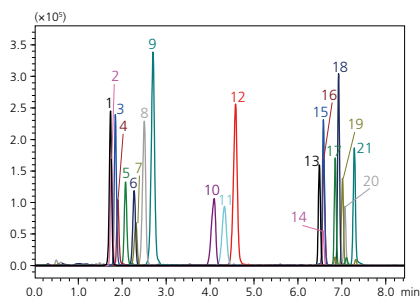
Water Quality Analysis



High-sensitivity analysis of 21 pharmaceuticals and personal care products in less than eight minutes

Pharmaceutical and personal care products (PPCPs) encompass a family of compounds used by individuals for health and cosmetic purposes. As populations increase, and the use of these products increases, PPCPs will

become a significant threat to our water supply. The LCMS-8045 is capable of trace-level quantitation of many PPCPs without extensive sample preparation.



MRM chromatograms of 21 PPCPs (1.0 ng/mL)

The limit of detection (LOD) and limit of quantitation (LOQ) for 21 PPCPs

No.	Compound	LOD (ng/mL)	LOQ (ng/mL)	No.	Compound	LOD (ng/mL)	LOQ (ng/mL)	No.	Compound	LOD (ng/mL)	LOQ (ng/mL)
1	Lincomycin	0.01	0.04	8	Metoprolol	0.013	0.04	15	Clarithromycin	0.0034	0.01
2	Trimethoprim	0.01	0.04	9	Dicorantil	0.005	0.015	16	Roxithromycin	0.0071	0.022
3	Pirenzepine	0.01	0.03	10	Sulfamethoxazole	0.003	0.01	17	Carbamazepine	0.01	0.03
4	Ofloxacin	0.01	0.03	11	Antipyrine	0.01	0.03	18	DEET	0.0062	0.018
5	Ciprofloxacin	0.002	0.006	12	Ifenprodil	0.0075	0.022	19	Crotamiton	0.005	0.015
6	Sulphapyridine	0.002	0.006	13	Erythromycin	0.015	0.045	20	Bezafibrate	0.0025	0.075
7	Carbazochrome	0.015	0.045	14	Azithromycin	0.01	0.03	21	Triclocarban	0.01	0.03

* Limit of detection (LOD) was calculated at signal-to-noise ratio (S/N) = 3. Limit of quantitation (LOQ) was calculated at S/N = 10.

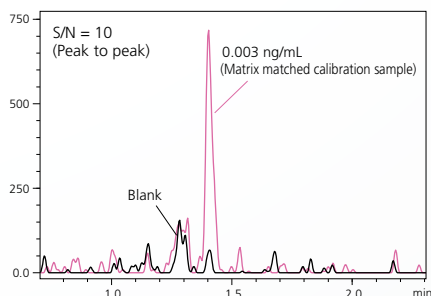
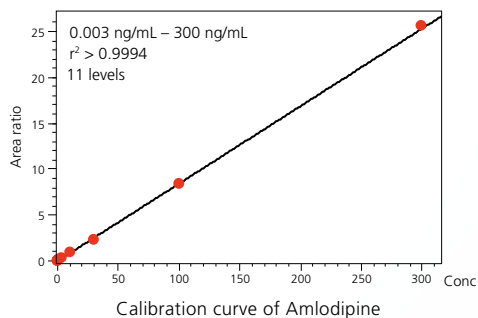
Bioanalysis



High-sensitivity quantitation of Amlodipine in plasma

Amlodipine is widely utilized for the treatment of high blood pressure and angina. A high-sensitivity method for the quantitation of amlodipine in human plasma using LCMS-8045 has been developed. Appropriate linearity ranging from 0.003 to 300 ng/mL with excellent accuracy was

achieved. Both interday and intraday variabilities were assessed for quality control samples. Percent RSD (Relative Standard Deviation) results were less than 5%.



MRM chromatogram of Amlodipine at the lower limit of quantitation
Black: Blank, Pink: Matrix matched calibration sample (0.003 ng/mL)

Quantitative results of Amlodipine

Lv	Actual conc. (ng/mL)	Calculated Conc. (ng/mL)	Accuracy (%)
1	0.003	0.003	104.5
2	0.01	0.01	97.2
3	0.03	0.031	103
4	0.1	0.107	107.1
5	0.3	0.268	89.4
6	1	1.062	106.2
7	3	2.958	98.6
8	10	10.293	102.9
9	30	27.37	91.2
10	100	98.722	98.7
11	300	303.619	101.2

Interday and intraday variations of Amlodipine spiked in human plasma

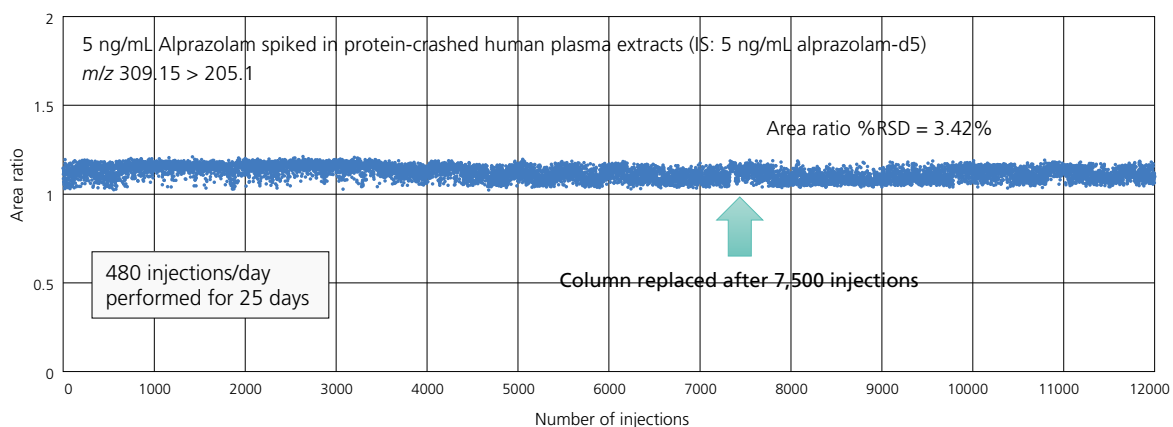
QC sample	Concentration (ng/mL)	%RSD	accuracy (%)	
Interday Variation (n = 6)	Low	0.1	3.78	97.8–109.1
	Medium	5	3.16	90.0–95.4
	High	240	0.85	95.9–97.6
Intraday Variation (n = 18)	Low	0.1	4.5	87.5–110.3
	Medium	5	4.92	88.1–102.9
	High	240	4.25	88.3–104.0

Consistent High-Sensitivity Performance

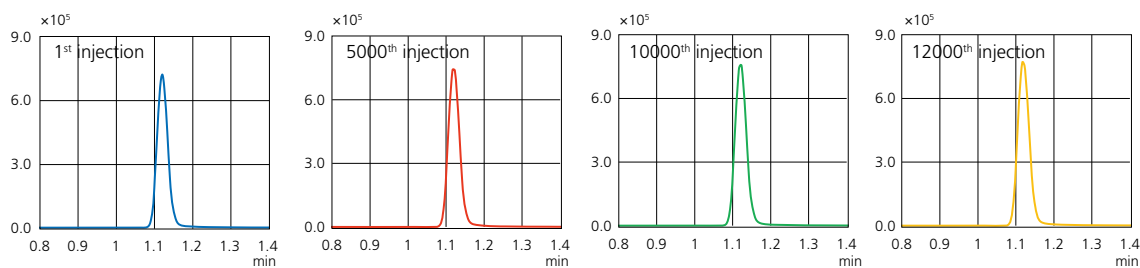
■ Robust Ion Source and Sample Introduction System

Shimadzu's MS interface includes a high-sensitivity heated ESI source, heated capillary sample introduction, and proprietary ion transfer optics. These design features combine to produce robust MS performance.

12,000 plasma samples were injected over 25 days (over 480 samples per day). Picogram levels of alprazolam were analyzed with an RSD of 3.42%.



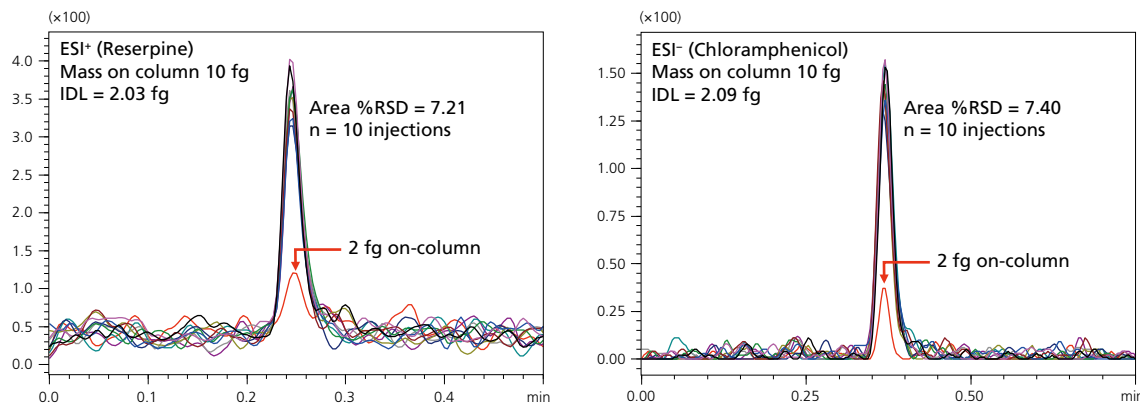
LCMS-8045 Instrument Stability Test



MRM Chromatograms of Alprazolam

■ Instrument Detection Limits: IDL

IDL is one measure of sensitivity for analytical instrumentation. The chromatograms below show the IDL for Reserpine and Chloramphenicol, obtained using ESI⁺ and ESI⁻, respectively. The IDL for Reserpine is 2.03 femtograms and 2.09 femtograms for Chloramphenicol.



■ Newly Designed Ionization Unit

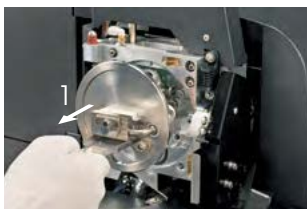
Designed without cables or tubes, removing the new ionization unit is simple: release a one-touch lever to open the unit and lift it out. In addition, no tools are needed to detach the needles fitted in APCI and DUIS units, allowing for easy maintenance.



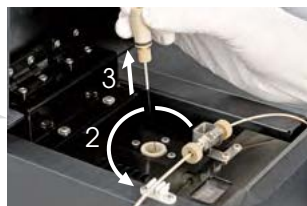
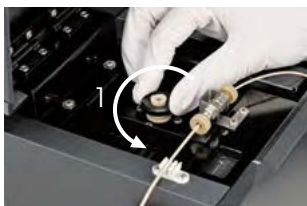
■ Easy System Maintenance Reduces Downtime

As with Shimadzu's other triple quad systems, maintaining the LCMS-8045 is simple. Replacing the desolvation line (DL) and ESI capillary is quick and easy. Additionally, the design allows users to replace the DL without breaking vacuum, providing greater uptime and usability.

● Steps for DL Replacement



● Steps for ESI Capillary Replacement

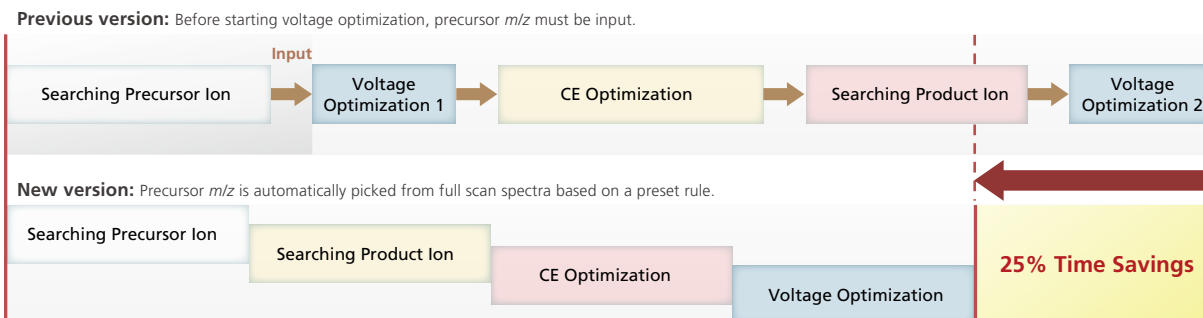


LabSolutions LCMS

Shimadzu's data acquisition software provides a single point of control for LC and MS parameters. In addition, by incorporating critical input from customers, Shimadzu provides laboratories with software tools to address specific laboratory workflows and improve productivity.

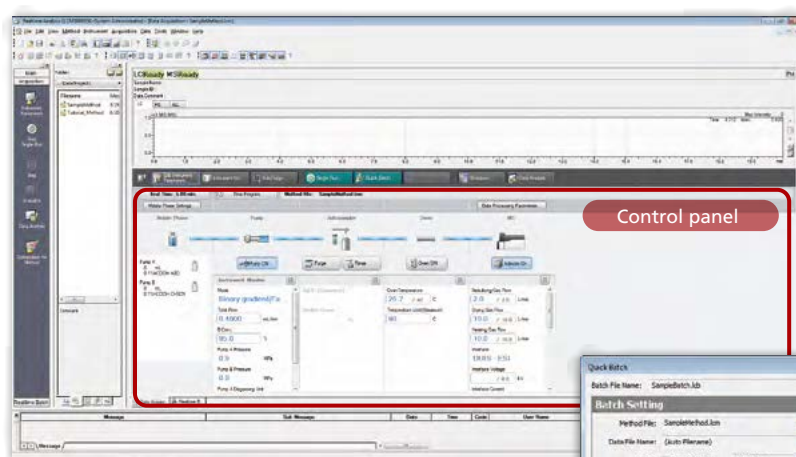
■ Fully Automated MRM Optimization

It's faster and easier to optimize quantitative parameters with updated software that reduces MRM optimization time by 25%.



■ Intuitive User Interface

A new approach helps simplify the user experience for high-throughput laboratories. Quick batch makes it easier to perform routine LC/MS/MS analyses and changes to the Control Panel help method development.



Method development

An updated Control Panel makes it easier to change LC/MS/MS methods.

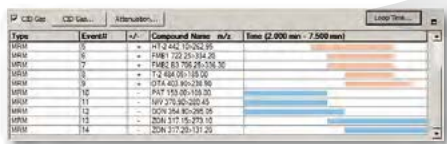


Quick Batch

Streamlines sample submission. A simple color-coded autosampler graphic offers quick visualization of the sample queue. Three color codes have been designed for standards (sky blue), unknowns (purple) and controls (yellow).

Automatic Calculation of Dwell Time

The optimum dwell time is calculated automatically from the number of overlapping MRM channels and maximum loop time, thereby obtaining the necessary data points for the entire analysis.



Optional Software Programs

Shimadzu offers numerous options to address specific customer requirements. Combining LabSolutions LCMS with these programs improves workflow efficiency.

LC/MS/MS Method Packages and MRM Libraries

A variety of method packages and MRM libraries, which include analysis conditions such as MRM parameters, enable efficient implementation of simultaneous multi-component analyses. The method parameter list included in these packages can be used to create methods that analyze targeted components only. These packages can save laboratories a great deal of method development time.



	Description	Flyer code
Method Packages	Residual Pesticides	C146-E306
	Veterinary Drugs	C146-E161
	Water Quality Analysis	C146-E180
	Drugs of Abuse	C146-E181
	Rapid Toxicology Screening	C146-E224
	Primary Metabolites	C146-E227
	Lipid Mediators	C146-E225
	Cell Culture Profiling	C146-E279
MRM Libraries	D/L Amino Acids	C146-E336
	Metabolic Enzymes in Yeast	C146-E275
	Phospholipid Profiling	C146-E314

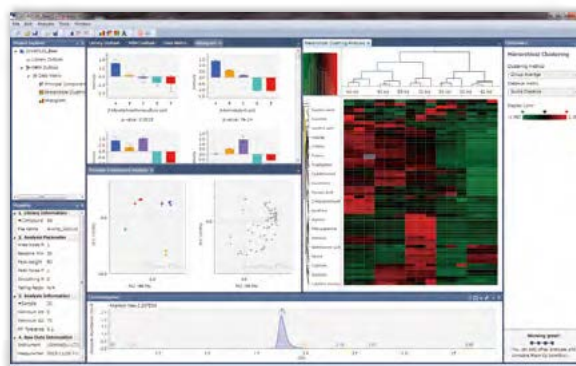
Note: Optimization of analysis parameters will be necessary in some cases when using the LCMS-8045.

Traverse MS

Multivariate Analysis Software Supports MRM Data

Traverse MS data analysis software is intended for high-speed processing of MRM data acquired with Shimadzu triple quadrupole LCMS systems in the field of targeted metabolomics.

Using multiple samples and multiple components, the software is able to create graphical and statistical analysis for metabolic pathway analysis.



Brochure: C146-E308

Multi-analyte Quantitation Software LabSolutions Insight

Laboratory efficiency is driven by highly automated mass spectrometry platforms delivering large volumes of high-quality data. However, manual data review can limit sample turnaround times and reduce productivity. LabSolutions Insight has been designed to drastically simplify the review process and transform data processing.

Multi-Analyte Data Review

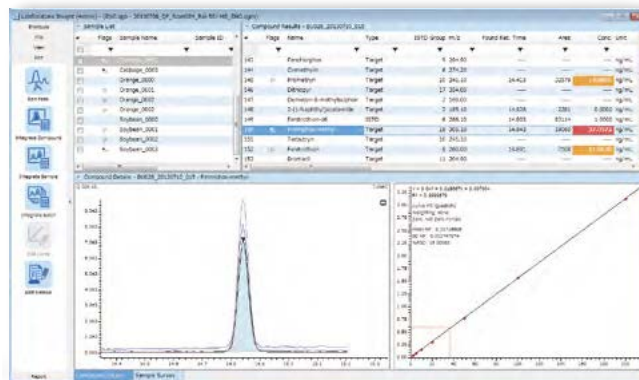
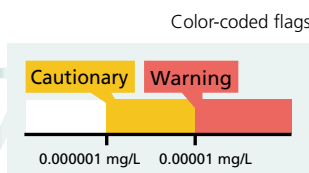
Results can be re-integrated and re-quantified directly from LabSolutions Insight.

Color-coded QA/QC Flags

In LabSolutions Insight, quantitative results can be compared to established criteria, and any outliers are color-coded for easy identification and further review. Color-coded criteria levels can be defined, making it easy to determine which data points are outliers, and which specific QC criteria were not met. Any changes made to calibration curves or manual peak integration are immediately reflected in the color-coded flags.



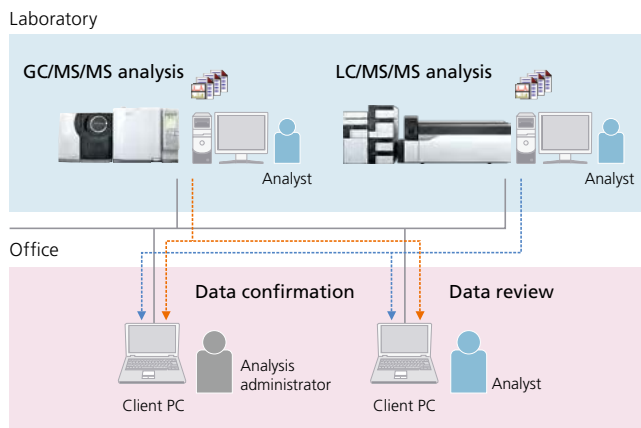
Sample Survey



Compound Information

Multiple Workspaces

Insight supports data review over a network, creating new opportunities in remote data review, and enables multiple panel display for two monitors.



Nexera UHPLC Series

Shimadzu's unique approach to delivering high-quality, high-speed LC/MS/MS analysis combines the Nexera UHPLC and LCMS-8045 as a seamlessly integrated system.



Key elements of Nexera and LCMS-8045 performance to maximize your productivity

Nexera

- The fastest gradient cycle and sample injection time
- Eliminates carryover even with high-sensitivity LC/MS/MS
- Solvent blending and sample preparation are possible

LCMS-8045

- Pause time 1 msec, Dwell time 0.8 msec
- 5 msec polarity switching speed
- No signal loss even at lower dwell time with UFsweeper technology

Nexera X2



Brochure: C196-E079

Nexera XR



Brochure: C196-E082

Nexera MP



Brochure: C193-E030

Nexera-i



Brochure: C196-E084

Nexera UC On-line SFE-SFC-MS System

This revolutionary system combines on-line SFE and SFC in a single flow path. Target compounds are extracted from solid samples and then automatically transferred to SFC/MS so that no human intervention is required. The Nexera UC on-line SFE-SFC system reduces the time for pretreatment of samples and acquires highly accurate data.



Brochure: C190-E185

LCMS-8045
Liquid Chromatograph Mass Spectrometer



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