The Agilent 5977B GC/MSD

THE SOURCE OF NEW POSSIBILITIES

The Measure of Confidence

Agilent Technologies

INSTRUMENT RELIABILITY AND PERFORMANCE: THE KEY TO A GOOD DAY IN THE LAB

Built for laboratories that focus on environmental, chemical, petrochemical, food, forensic, pharmaceutical, or material testing, the Agilent 5977B GC/MSD gives you the ability to improve your sample throughput, analytical performance, and business outcome.

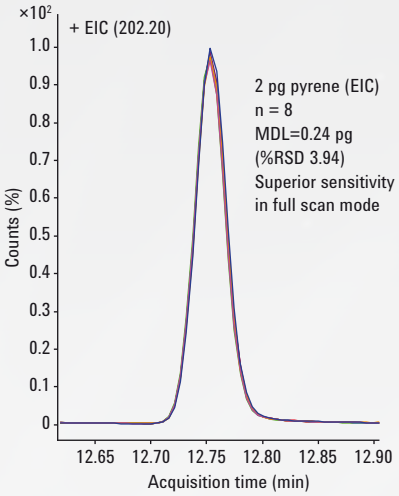
The 5977B GC/MSD builds on a long tradition of leadership and innovation, bringing together the technologies of the industry's best GC and MS systems. Agilent has pushed the technological frontier even further by introducing the High-Efficiency Ion Source (HES).

Agilent's GC/MS system's proven robustness and reliability mean less maintenance and more uninterrupted laboratory productivity. Simply put, the 5977B GC/MSD can help you meet your toughest challenges and your most ambitious business goals... today and in the future.

Analytical challenge	Agilent 5977B HES System benefits
More to do, fewer people to do it	Design innovations increase performance, for high sensitivity and simpler workflows, with less maintenance and increased instrument uptime.
Demanding measurement challenges	**10x Greater sensitivity** Take advantage of the improved sensitivity and see instrument detection limits (IDL) as low as 1.5 fg – performance that brings yesterday's triple-quadrupole limits of detection into today's single-quadrupole laboratory.
Lab efficiency and profitability	**10x Less sample required** Spend less time performing sample prep and maintenance, while saving on shipping costs at the same time. Reliable and consistent performance enables the analysis of large sample batches over longer periods of time.

The accuracy of the Instrument Detection Limit (IDL)

Today's high-performance GC/MS detection demands a more accurate, rigorous, and statistically based performance standard than classic signal-to-noise ratios. The IDL follows guidelines established by the International Union of Pure and Applied Chemistry, the U.S. Environmental Protection Agency, and other organizations. The IDL is measured at realistically low analytical levels, and is a practical indicator of sensitivity for your quantitative assays. For more information about IDL, see Agilent publication 5990-8341EN.



Take advantage of the improved sensitivity and see detection limits as low as 1.5 fg IDL – performance that brings yesterday's triple-quadrupole limits of detection into today's single-quadrupole laboratory.

	Agilent 5977B EI MSD	Agilent 5977B Inert Plus EI MSD	Agilent 5977B EI/CI MSD	Agilent 5977B HES MSD
IDL	24 fg	10 fg	10 fg (EI)	1.5 fg
Analytical and business solution	The traditional stainless steel source provides performance most similar to previous Agilent MSD instruments at an economic price. Designed for sample-dependent applications.	The inert Extractor EI source enables high sensitivity for active compounds that are most likely to interact with noninert surfaces. Designed for routine labs across various industry applications for optimum operational efficiency.	The inert Extractor EI source provides high sensitivity. The CI source provides softer ionization for molecular formula determination and for enhanced selectivity.	The inert HES delivers unparalleled sensitivity for ultra-trace level applications. Designed for high-throughput labs – save time and money with extreme operational efficiencies.
Source	Stainless steel	Extractor	Extractor for EI, CI source for CI	HES

INNOVATIVE TECHNOLOGIES FOR HIGH OPERATIONAL EFFICIENCY

Boost your lab's operational capabilities and achieve your business goals

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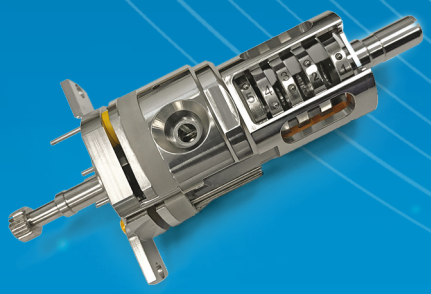
High-Efficiency Source



This state-of-the-art ion source incorporates a novel design not seen in previous EI source generations. The source increases the ionization efficiency, and maximizes the ions transferred into the quadrupole analyzer, providing industry-leading benefits in lab operational efficiency and the best analytical performance.

Advantages and benefits

- Minimized maintenance frequency (less frequent liner maintenance, longer column life, faster sample prep) by injecting less sample
- Industry-leading detection limits
- Better business performance through decreased shipping, storage, disposal, and maintenance costs

Clean less, analyze more

Agilent JetClean Self-Cleaning Ion Source

During routine analysis, matrix deposits inevitably build up. As a result, users have had to routinely remove the ion source, scrub the lens and other components, then put it all back together and recalibrate the instrument. Using a carefully controlled hydrogen flow, the JetClean self-cleaning ion source automatically removes even the most stubborn deposits. JetClean is available as an option on Agilent single quadrupole and triple quadrupole GC/MS systems.

Advantages and benefits

- No more disassembling and reassembling the source
- No more scrubbing lenses and other components
- No need for specialized mass spec expertise to ensure that the source is kept clean

Clean, quiet, reliable, oil-free

Agilent IDP-3 Dry Scroll Pump

The Agilent IDP-3 dry scroll pump is an affordable way to make GC/MS productivity happen, and put the hassles of oil-sealed pumps behind you once and for all.

Advantages and benefits

- Oil-free operation lowers your cost of ownership and minimizes pump failures.
- No more hassles with oil leaks, oil spills or hazardous waste disposal of used oil.
- Quieter and more peaceful lab environment, to keep you focused.
- Small footprint and lightweight construction are ideal for any instrument configuration—even inside cabinets.
- The IDP-3 scroll pump is MSD qualified, is compatible with Agilent 5977, 5975, and 5973 GC/MS systems, systems using hydrogen as a carrier gas, and with the JetClean option.

Intelligent, intuitive, innovative

Agilent Intuvo 9000 GC system

Modern GC labs face constant pressure to solve real problems in practical ways. Issues such as handling challenging sample matrices, maintaining the integrity of critical data, and accommodating user training needs can become a significant investment in time and resources. Intuvo proves its worth by providing a fresh new perspective and previously unavailable approaches for overcoming these challenges.

Advantages and benefits

From ferrule-free click-and-run connections and no-trim columns to column-protecting guard chips and smart ID keys, the Intuvo 9000 keeps lab technicians running more samples, more easily, with the data quality you expect.

A FASTER ROUTE TO INSIGHT

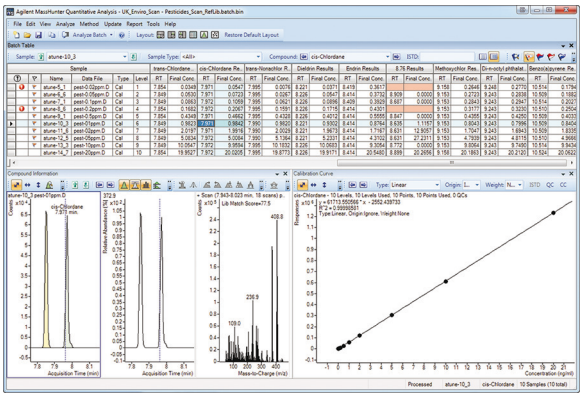
Get the most out of your system with Agilent Software

MassHunter is the right choice for high-throughput quantitation and compound identification in the food, environmental, forensics, and research markets. OpenLAB CDS is the right choice for quality control testing in the pharmaceutical, chemical, and energy markets.

Faster route to insight

Agilent MassHunter transforms data into insight with a suite that includes MassHunter Qualitative Analysis, profiling tools such as Mass Profiler and Mass Profiler Professional, and MassHunter Quantitative Analysis that has:

- Time-saving features such as batch-at-a-glance and compounds-at-a-glance that facilitate a review-by-exception approach
- Almost 50 integrated quality test criteria, and a parameter-less integrator with built-in peak validation capability that lets you focus exclusively on problem peaks and minimize the need for manual integration
- Click a result and all associated peaks, spectra, and calibration data are immediately displayed. Additional pop-up information is available.

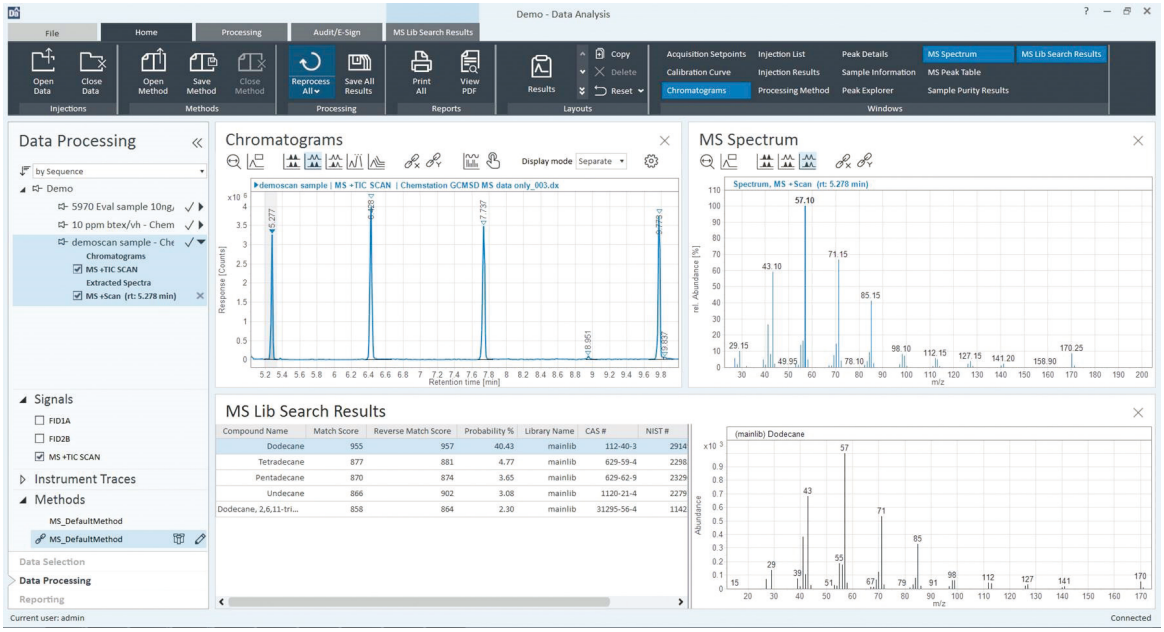


Improve the quality and speed of your data review with automated metrics and Unified Data Analysis for Agilent MS systems.

Confidence and efficiency for mass detection in chromatography laboratories

Agilent OpenLAB CDS has a simple interface so staff can quickly create methods and analyze results on the Agilent 5977B GC/MSD. Implement the highest standards of data integrity, and automate time-consuming tasks to deliver fast and accurate results.

- Built-in technical controls make it easy to achieve the highest levels of data integrity.
- Templates, intuitive report creation, and custom calculation capabilities make generating complex reports faster and easier.
- Cutting-edge data analysis enables you to process and review large data sets quickly.



Agilent OpenLAB CDS.

RELIABLE AND UNPARALLELED GC SEPARATION WITH GOLD-STANDARD PERFORMANCE

Building the world's most trusted GC system is an ongoing process. With every step, we increase speed, improve functionality, and incorporate new analytical capabilities, while never losing sight of the most important objective: business results

Like all Agilent GCs, Intuvo is built on a legacy of robust excellence and unparalleled, gold-standard performance. Intuvo expands on this legacy by introducing a suite of innovative, key enabling technologies available nowhere else: fast direct heating, ferrule-free fittings, guard chip retention gap technology, and no-clip columns.

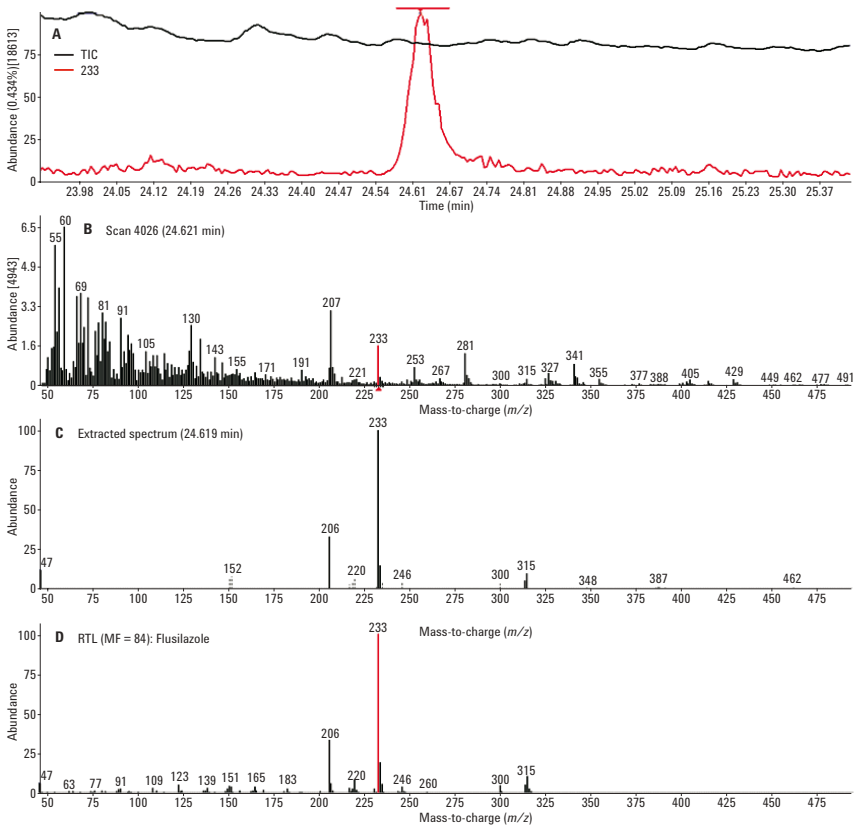
The Agilent 7890B GC system has everything you need to boost productivity, protect our environment through better resource management, and generate data with confidence. In addition, its seamless communication with the Agilent 5977B Series GC/MSD provides faster vent times and system protections when using hydrogen carrier gas. With various carrier gas options such as Helium Conservation Module, Hydrogen Sensors, and Alternate Carrier Gas Solutions, dramatically reduce the amount of helium used to offer flexibility in your laboratory.

The Agilent 7820A GC provides simplified operation with the proven reliability expected from Agilent GC systems. This is an affordable, high-quality GC system for labs concerned with routine analyses using standard GC methods. The 7820A GC was designed to maximize uptime, and minimize maintenance and complexity, providing a quick return on your investment.

LOWER DETECTION LIMITS AND STREAMLINED WORKFLOWS FOR FOOD AND ENVIRONMENTAL TESTING

Identify More Pesticides Faster

For comprehensive pesticide screening, analysts need a rapid way to set up their full-scan GC/MS method and confirm that it produces accurate results for hundreds of pesticides in complex matrices. The Agilent Pesticide Deconvolution Reporting Software (DRS) Screening GC/MSD Analyzer, which is based on the Agilent 7890 GC and the Agilent 5977 GC/MSD, enables quick screening and quantitation of large numbers of pesticides and endocrine disruptors in a single analysis. Agilent DRS and a Pesticides and Endocrine Disruptors retention-time-locked database accelerate reporting and increase the number of targets screened. When configured with the new Agilent 5977B GC/MSD with a high efficiency source (HES), this analyzer delivers a greater number of pesticides identified with reduced analysis time.



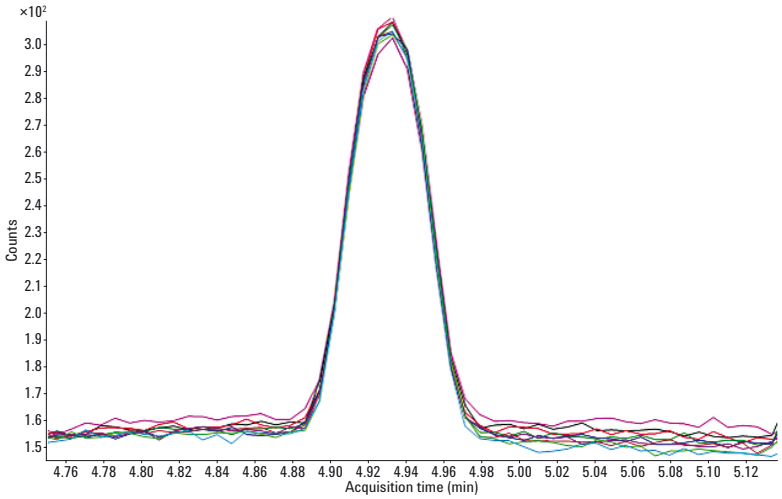
Analysis of 10 pg flusilazole in tomato using AMDIS. A) Overlay of extracted ion m/z 233 (red) and TIC (black); B) raw spectrum; C) extracted spectrum for the component; D) library spectrum, AMDIS match factor = 84. The reported NIST reverse match score is 73.

Lower detection limits for semivolatile compounds in water

Semivolatile organic compounds (SVOCs) are a broad class of environmentally significant contaminants of global interest. Although listed as targets and appropriate to selected ion monitoring (SIM) in GC/MS analysis, surveying samples by scanning GC/MS provides advantages such as full scan spectra for compound confirmation, tentatively identifying unexpected unknowns in samples that would escape SIM. The High Efficiency Source (HES) of the Agilent 5977B GC/MSD represents a revolution in ion source design with greatly enhanced sensitivity that can be exploited to produce picogram or sub-picogram scan detection limits for SVOCs that were formerly only approached by SIM.

Improved volatiles analysis using static headspace, and the Agilent 5977B HES GC/MSD

The revolutionary design of the HES produces a higher ion current yield for many compounds (greater sensitivity), which allows flexible approaches to sample analysis such as lowering detection limits, reducing sample size, speeding up analysis. Analysis was performed in selected ion monitoring mode of a mixture of volatile organic aromatic (VOA) compounds spiked into reverse osmosis (RO) water over a calibration range of 0.02–20 µg/L. Replicate injections were made at 0.04 µg/L to assess the method detection limits (MDLs). A study of replicates of local tap water was used to demonstrate long-term stability for some naturally occurring compounds. The results suggest that a significant improvement in detection limits is possible in VOA applications using the HES of the 5977B GC/MSD.



Overlay of the EIC for nine replicate injections of vinyl chloride at 0.04 µg/L.

Routine qualitative water screening in minutes

The Agilent SureTarget GC/MS Water Pollutants Screener confidently identifies pollutants in water samples using an automated workflow, reducing data analysis time by over 90 %. It rapidly performs screening of over 1,000 pollutants in water samples with minimal data processing time and fast report generation.

PERFORM RELIABLE CHEMICAL, PETROCHEMICAL, AND MATERIALS IDENTIFICATION AND QUANTIFICATION

Phthalate plasticizers

Positive chemical ionization (PCI) allows unambiguous identification of different phthalates based on an intense molecular ion response. You can configure the 5977B GC/MSD hardware to handle a wide range of CI reagents, including hydrocarbons (such as isobutane and methane) and softer reagents (such as CO_2 and NH_3) with trace-level sensitivity.

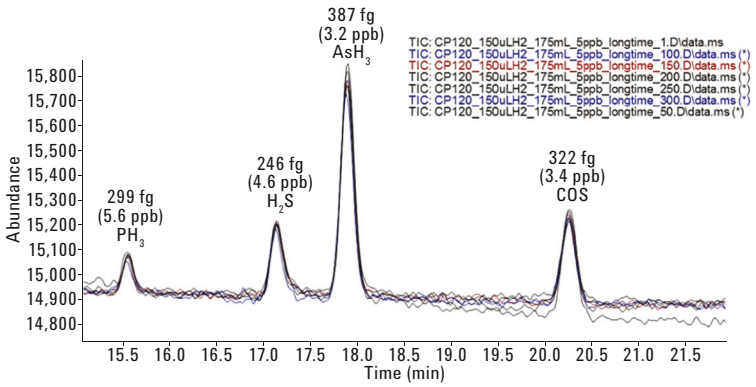
Biofuel characterization

The 5977B GC/MSD exceeds the criteria for accurate, sensitive biofuel analysis. The system's inert flow path, high-efficiency source, and heated gold-plated quartz quadrupole combine to deliver robust, high-sensitivity analysis for the full range of biofuel analytes.

The system is easily set up for simultaneous SIM/SCAN data acquisition to maximize sensitivity and selectivity, while providing full spectra for qualitative analysis.

Measure impurities with confidence, in-house

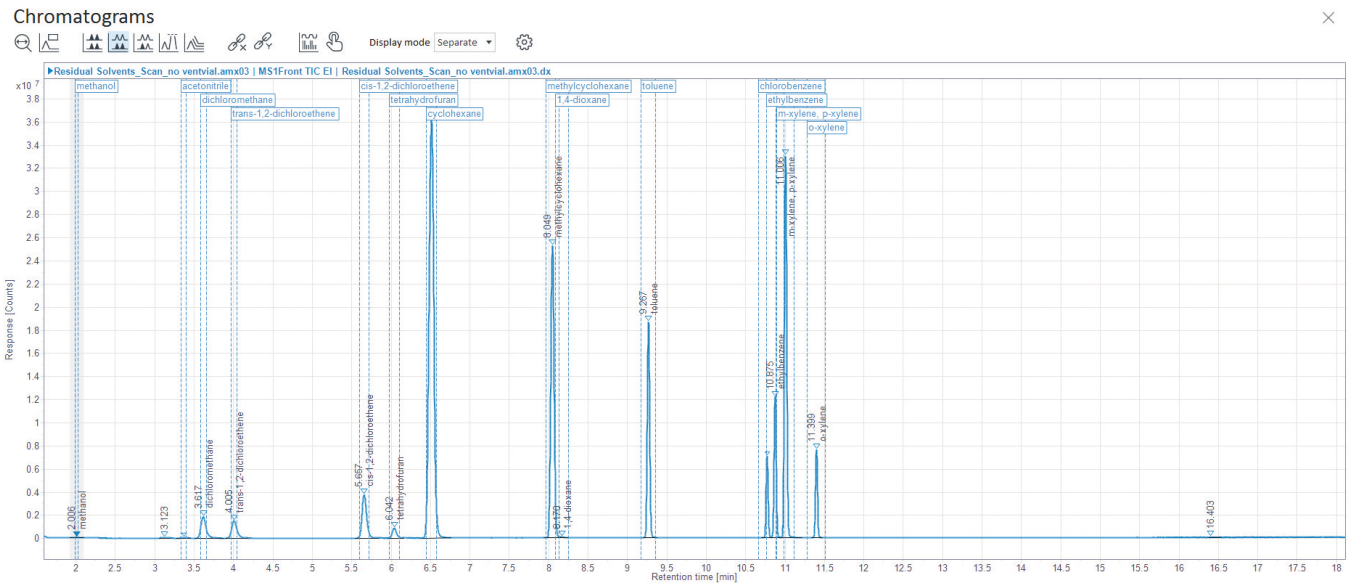
The Agilent Arsine Phosphine GC/MS analyzer provides a robust solution for routine monitoring of arsine and phosphine impurities in olefin production at single-digit ppb concentrations. Based on 7890 Gas Chromatograph and 5977B Mass Spectrometer platforms, each system is factory pretested and preconfigured to perform sensitive analysis in monomer-grade ethylene and propylene.



Overlay of the total ion chromatograms (TICs) for every 50th run out of 300 runs completed over 4.5 days with ~5 ppb concentration analytes in helium. Runs 1, 50, 100, 150, 200, 250, and 300 are shown.

IMPROVE YOUR COMPLIANCE-BASED PHARMACEUTICAL RESIDUAL SOLVENT ANALYSIS

For pharmaceutical quality-control labs performing GC analysis with headspace sampling, the 5977B GC/MSD ensures trouble-free operation, superior sensitivity, and high accuracy. With features such as independent vial pressurization, automatic vial leak check, barcode reader, flexible vial sizes, and energy conservation mode, the Agilent 7697A Headspace Sampler is an ideal companion for your Agilent 5977B Series GC/MSD. In addition, our OpenLAB CDS software helps you meet compliance requirements for residual solvent applications and other relevant applications.

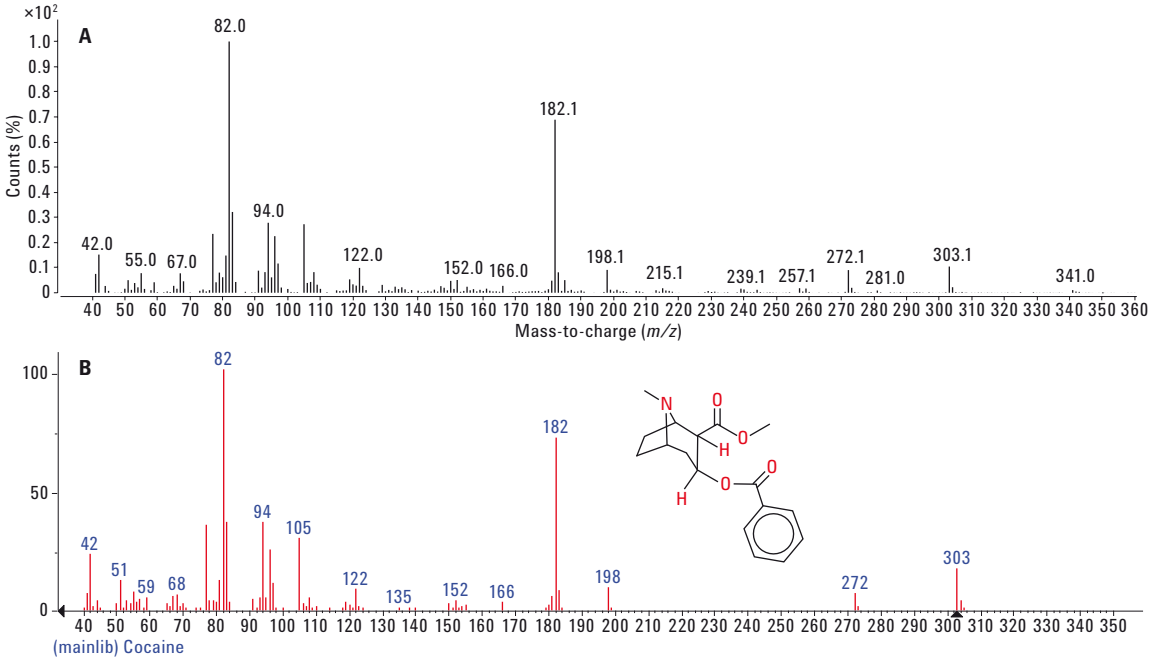


Shown above is the reference chromatogram for the Class 2 (Mix A) residual solvents collected using the Agilent 7697A Headspace Sampler and the Agilent 5977B Series GC/MSD on OpenLAB CDS. The software provides multiple ways of interacting and presenting your GC/MS data while ensuring the high degree of data integrity expected in FDA regulated labs.

QUANTIFY DRUGS AND METABOLITES MORE QUICKLY AND RELIABLY

Screen more drugs with the Agilent GC/MS Toxicology Analyzer

Broad-range screening for drugs in biological samples requires full-spectrum identification confirmation for an unlimited number of targets, as well as spectral identification of nontargets. The Agilent GC/MS Toxicology Analyzer uses DRS, the Forensic Toxicology Database Library, and the 5977B GC/MSD. In combination, these technologies screen a greater number of targets at low concentrate ions while reducing analysis time. Resulting spectra are classical and NIST searchable.

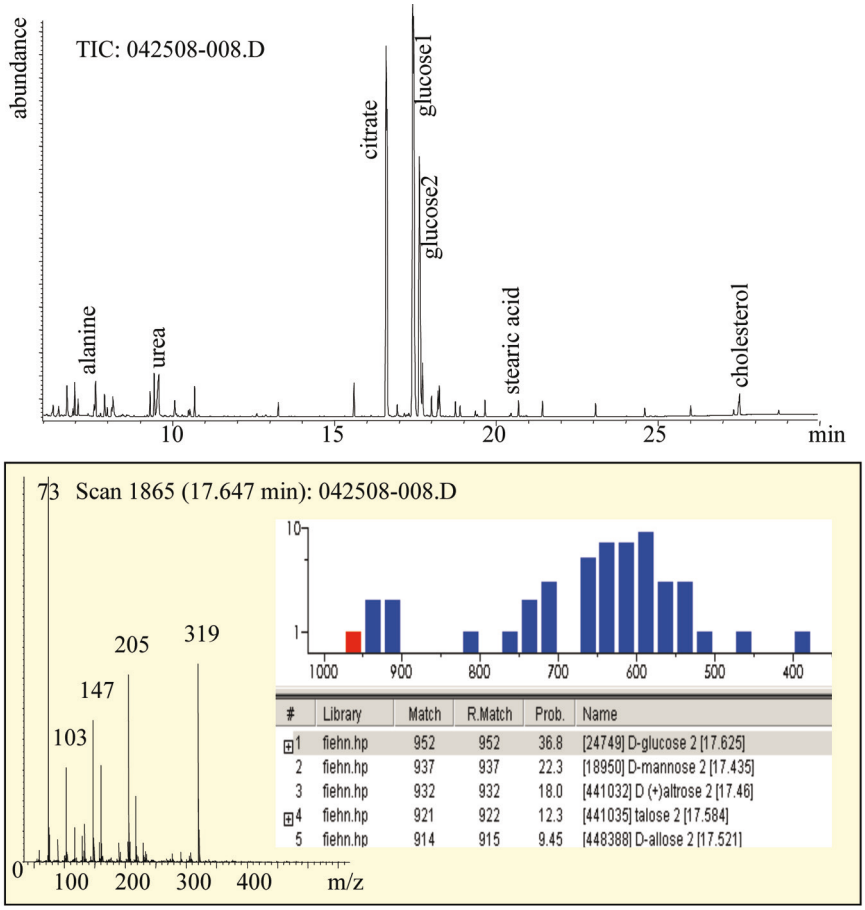


Mass spectrum of 100 pg of cocaine spiked into serum (A) compared with NIST spectrum (B). Cocaine is the first hit in NIST. The match factor is 810 (good) [3], and is differentiated from psuedococaine, which has a match factor of 788 (fair). The equivalent concentration is 5 ng/mL based on complete recovery. Excellent NIST library matches (≥900) for cocaine as a first hit are returned at concentrations above this level.

For Forensic Use.

RELIABLY CONFIRM METABOLITES AND GAIN DEEPER INSIGHTS INTO BIOLOGICAL SYSTEMS

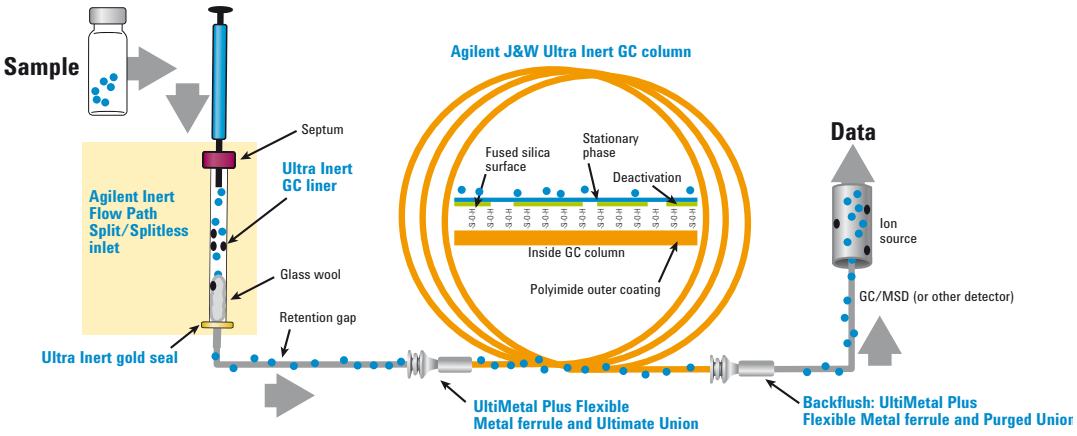
Metabolomics typically involves global profiling of metabolites by hyphenated MS techniques. A well-known software workflow is used to process the GC/MS data files. Features are found across all data files, and the results are analyzed using multivariate techniques. The important differential features are identified and visualized on pathways to aid biological interpretation. Agilent has developed software workflows for performing global metabolite profiling by GC/MS. The advanced analysis software relies on the highly reproducible data produced by the 5977B GC/MS system when finding features in complex metabolomics data using Profinder. After statistical analysis using Mass Profiler Professional, compounds are identified using the Fiehn retention time locked EI library, then data is visualized on pathways using Pathway Architect.



Metabolite identification in human blood plasma by GC/MS after methoximation and trimethylsilylation and use of the Agilent Fiehn library. Top panel: Total ion chromatogram, split 1:10 injection. Lower panel: Identification of glucose using the NIST MS search and retention time information.

ENSURING AN INERT FLOW PATH HAS NEVER BEEN MORE CRITICAL

As samples become smaller, increasingly active, and more complex, you cannot afford losses caused by flow path activity. For starters, having to repeat or verify suspect analyses wastes valuable resources, hinders productivity, and hurts your bottom line. With trace amounts of active analytes, you might not even get a second chance, because there may be no more sample left to analyze.



An integrated approach to inertness: the Agilent advantage

As the GC industry's premier measurement company, Agilent is uniquely positioned to help ensure the inertness of every surface that touches your sample, so you can achieve the parts-per-billion, or parts-per trillion, detection levels that today's analyses demand.

- **Agilent J&W Ultra Inert GC columns** are tested with the industry's toughest test probe mixture to ensure consistent column inertness and exceptionally low column bleed.
- **Ultra Inert liners** deliver a robust, reproducible, and reliable inert flow path, with or without glass wool.
- **Inert Flow Path Split/Splitless inlet option** provides an extra measure of inertness to the sample pathway.
- **Ultra Inert gold seals** feature deactivation chemistry applied on top of their gold plating for the most inert surface and highest-quality seal.
- **UltiMetal Plus Flexible Metal ferrules** are compatible with Capillary Flow Technology fittings, promoting a leak-free seal that requires less torque, and reduces the risk of column breakage.
- **Gas Clean filter systems** deliver the cleanest possible gas, reducing column damage, sensitivity loss, and downtime.

For more information about creating an inert GC flow path, visit www.agilent.com/chem/inert

GC/MS ANALYZERS THAT LET YOU FOCUS ON SYSTEM VALIDATION AND DATA GENERATION... NOT METHOD DEVELOPMENT

Agilent GC/MS Analyzers are factory configured and chemically tested to meet method requirements for materials, food safety, environmental, and forensic/toxicology testing applications. These workflow solutions get you on the fast track to producing quality data, and processing sample backlogs.

Each Analyzer arrives ready to perform with preset chromatography and checkout samples to verify separation capabilities. That means your team can work toward system validation as soon as installation is complete, and reduce method development costs by up to 80%. As always, our support team is available, should any problems arise.

Application-optimized columns and supplies

Application setup

			Amount (ng)		AMDIS		NIST	
R.T.	Cas #	Compound Name	Chem station	AMDIS	Match	R.T. Diff sec.	Reverse Match	Hit Num.
5.8773	62759	N-Nitrosodimethylamine	7.33	7	95	0.6	92	1
6.2524	62533	Aniline	10.21	8.4	99	0.3	96	1
6.569	3855821	1,4-Dichlorobenzene-d4	10	10	98	0.4	93	1
7.3429	78591	Isophorone	10.19	10.36	97	0.7	96	1
7.7494	91203	1,3-dimethyl-2-nitrobenzene (ss)	10.64	11.4	97	0.3	97	1
7.9060	1146552	Naphthalene-d8	10	10	100	0.4	90	1
8.6450	77474	Hexachlorocyclopentadiene	12.88	12.8	96	-1.0	85	1
8.9436	7786347	Mevinphos	11.96	11.36	96	-1.0	91	2
9.5301	15067262	Acenaphthene-d10	10	10	99	0.4	85	1
9.5652	51285	2,4-Dinitrophenol	18.86	17.57	91	-1.1	92	1
9.6000	100027	4-Nitrophenol	12.32	13.17	95	-0.8	91	1
9.6937	121142	2,4-dinitrotoluene	11.8	11.18	97	-0.9	92	1
10.0725	86737	Fluorene	10.33	9.22	98	-0.6	94	1
10.0944	534521	4,6-Dinitro-2-methylphenol	15.32	15.32	95	-0.6	93	1
10.2014	1582098	Trifluralin	11.65	11.93	97	-0.6	93	1
10.6528	122349	Simazine	12.47	10.77	93	-0.7	85	2
10.6773	1912249	Atrazine	11.21	11.11	96	-0.7	93	1
10.8004	87865	Pentachlorophenol	12.56	12.26	95	-0.1	90	1
10.8239	13071799	Terbufos	11.7	11.3	97	-0.1	91	1
10.9811	1897456	Chlorothalonil	10.76	10.29	97	0.0	93	1
11.0072	1517222	Phenanthrene-d10	10	10	96	0.4	85	2
11.0128	309002	Aldrin	10.5	9.86	95	0.4	92	1
12.1117	1024573	Heptachlor epoxide -isomer B	11.47	11.34	94	0.4	92	1
12.9199	72208	Endrin	13.13	13.36	94	0.6	94	1
13.1403	50293	4,4'-DDT	13.11	13.39	92	0.6	91	1
13.5762	91941	3,3'-Dichlorobenzidine	11.09	10.88	93	0.8	97	1
13.8369	1719035	Chrysene-d12	10	10	91	0.7	92	1
14.8057	205992	Benzo[b]fluoranthene	9.79	9.64	100	1.1	94	1
15.3217	1520963	Perylene-d12	10	10	97	1.3	84	1

Customized reporting

Training and consulting

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GC column selection tool
selectgc.chem.agilent.com

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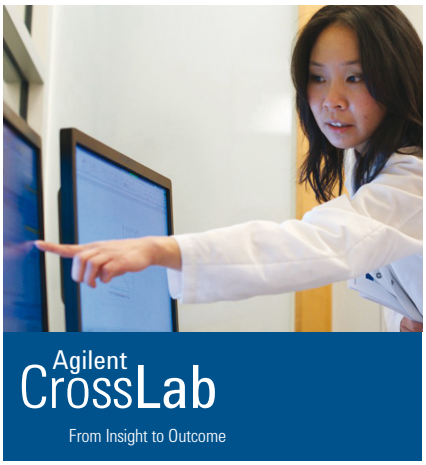
Serving the entire analytical lab

End-to-end laboratory support from the Agilent CrossLab service experts to deliver valuable insights and keep your instruments running at peak performance with minimal downtime is available. We offer solutions and service agreements that include transition services, application consulting, repair, preventative maintenance, compliance verification, education, and a host of other services tailored to meet your needs. Ask us how we can support your laboratory today!



5977B INDUSTRY AWARDS

The Agilent 5977B GC/MSD won the award of the most popular instrument given by the 2017 (11th) Annual Conference of China Scientific Instruments (ACCSI 2017), held by Instrument.com.cn and the China Instrument Association, representing the highest recognition in this industry in China.

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