



The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.

Header 13

List View

General Information Contact Default Values Discount Document Information Clarification Request

Procurement Folder: 1979110

Procurement Type: Central Purchase Order

Vendor ID: 000000226955

Legal Name: AGILENT TECHNOLOGIES INC

Alias/DBA:

Total Bid: \$406,772.68

Response Date: 06/24/2026

Response Time: 8:56

Responded By User ID: AGILENT

First Name: Georgeann

Last Name: Foster

Email: lscabids@agilent.com

Phone: 800-227-9770

SO Doc Code: CRFQ

SO Dept: 1400

SO Doc ID: AGR2600000044

Published Date: 6/15/26

Close Date: 6/24/26

Close Time: 13:30

Status: Closed

Solicitation Description: GCSM and GC-MS/MS Systems

Total of Header Attachments: 13

Total of All Attachments: 13





Department of Administration  
Purchasing Division  
2019 Washington Street East  
Post Office Box 50130  
Charleston, WV 25305-0130

State of West Virginia  
Solicitation Response

**Proc Folder:** 1979110  
**Solicitation Description:** GCSM and GC-MS/MS Systems  
**Proc Type:** Central Purchase Order

| Solicitation Closes | Solicitation Response        | Version |
|---------------------|------------------------------|---------|
| 2026-06-24 13:30    | SR 1400 ESR06222600000008922 | 1       |

**VENDOR**  
000000226955  
AGILENT TECHNOLOGIES INC

**Solicitation Number:** CRFQ 1400 AGR2600000044  
**Total Bid:** 406772.6799999999930150806903 **Response Date:** 2026-06-24 **Response Time:** 08:56:00  
**Comments:**

**FOR INFORMATION CONTACT THE BUYER**  
Larry D McDonnell  
304-558-2063  
larry.d.mcdonnell@wv.gov

|                    |              |             |
|--------------------|--------------|-------------|
| <b>Vendor</b>      |              |             |
| <b>Signature X</b> | <b>FEIN#</b> | <b>DATE</b> |

All offers subject to all terms and conditions contained in this solicitation

| Line | Comm Ln Desc              | Qty     | Unit Issue | Unit Price    | Ln Total Or Contract Amount |
|------|---------------------------|---------|------------|---------------|-----------------------------|
| 1    | GCMS and GC-MS/MS Systems | 1.00000 | EA         | 406772.680000 | 406772.68                   |

| Comm Code | Manufacturer | Specification | Model # |
|-----------|--------------|---------------|---------|
| 41115703  |              |               |         |

**Commodity Line Comments:** Please refer to attachments for details.

**Extended Description:**

See attached documentation for further details.



Department of Administration  
Purchasing Division  
2019 Washington Street East  
Post Office Box 50130  
Charleston, WV 25305-0130

State of West Virginia  
Centralized Request for Quote  
Laboratory

|                                                   |                            |                         |                                                    |
|---------------------------------------------------|----------------------------|-------------------------|----------------------------------------------------|
| <b>Proc Folder:</b> 1979110                       |                            |                         | <b>Reason for Modification:</b><br>Addendum No. 01 |
| <b>Doc Description:</b> GCSM and GC-MS/MS Systems |                            |                         |                                                    |
| <b>Proc Type:</b> Central Purchase Order          |                            |                         |                                                    |
| <b>Date Issued</b>                                | <b>Solicitation Closes</b> | <b>Solicitation No</b>  | <b>Version</b>                                     |
| 2026-06-15                                        | 2026-06-24 13:30           | CRFQ 1400 AGR2600000044 | 2                                                  |

BID RECEIVING LOCATION

BID CLERK  
DEPARTMENT OF ADMINISTRATION  
PURCHASING DIVISION  
2019 WASHINGTON ST E  
CHARLESTON WV 25305  
US

VENDOR

**Vendor Customer Code:** 000000226955  
**Vendor Name :** Agilent Technologies, Inc.  
**Address :**  
**Street :** 2850 Centerville Road  
**City :** Wilmington  
**State :** DE **Country :** USA **Zip :** 19808  
**Principal Contact :** Georgeann Foster  
**Vendor Contact Phone:** 302-636-3849 **Extension:**

FOR INFORMATION CONTACT THE BUYER

Larry D McDonnell  
304-558-2063  
larry.d.mcdonnell@wv.gov

Vendor  
Signature X

FEIN#

77-0518772

DATE

06/22/2026

All offers subject to all terms and conditions contained in this solicitation

|                                                                       |
|-----------------------------------------------------------------------|
| <b>ADDITIONAL INFORMATION</b>                                         |
| Addendum No. 01<br>To attach answers to vendor questions.             |
| Bid opening date and time still remains 06/24/2026 at 1:30PM EST/EDT. |
| No other changes                                                      |

|                                                                                                               |                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>INVOICE TO</b>                                                                                             | <b>SHIP TO</b>                                                                                                               |
| AGRICULTURE<br>DEPARTMENT OF<br>ADMINISTRATIVE SERVICES<br><br>1900 KANAWHA BLVD E<br><br>CHARLESTON WV<br>US | AGRICULTURE<br>DEPARTMENT OF<br>REGULATORY PROTECTION<br>DIVISION<br>313 GUS R DOUGLAS LN,<br>BLDG 11<br>CHARLESTON WV<br>US |

| Line | Comm Ln Desc              | Qty     | Unit Issue | Unit Price | Total Price |
|------|---------------------------|---------|------------|------------|-------------|
| 1    | GCMS and GC-MS/MS Systems | 1.00000 | EA         |            |             |

|                  |                     |                      |                |
|------------------|---------------------|----------------------|----------------|
| <b>Comm Code</b> | <b>Manufacturer</b> | <b>Specification</b> | <b>Model #</b> |
| 41115703         |                     |                      |                |

**Extended Description:**  
See attached documentation for further details.

|                           |              |                   |
|---------------------------|--------------|-------------------|
| <b>SCHEDULE OF EVENTS</b> |              |                   |
| <u>Line</u>               | <u>Event</u> | <u>Event Date</u> |

# SOLICITATION NUMBER: CRFQ AGR26\*44

## Addendum Number: 01

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The purpose of this addendum is to modify the solicitation identified as (“Solicitation”) to reflect the change(s) identified and described below.

### Applicable Addendum Category:

- ☐ Modify bid opening date and time
- ☐ Modify specifications of product or service being sought
- ☒ Attachment of vendor questions and responses
- ☐ Attachment of pre-bid sign-in sheet
- ☐ Correction of error
- ☐ Other

### Description of Modification to Solicitation:

To attach answers to vendor questions.

Bid opening date and time still remains 06/24/2026 at 1:30PM EST.

No other changes

**Additional Documentation:** Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

### Terms and Conditions:

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.
2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.



Q1: Will the single-quad GCMS be running 2 separate columns for its methods, or will the same be used for both methods?

A1: Same column for both methods

Q2: Will the triple-quad GCMS be running 2 separate columns for its methods, or will the same column be used for both?

A2: Same column for both methods

Q3: Hydrogen carrier gasses are not supported in Oil-less roughing pumps due to their designs. Do you plan to use Hydrogen or do you just want the option to use it in the future? Please explain how Hydrogen carrier will be used.

A3: The option to use in the future

Q4: Section 3.2.1.3 state the GC must have the following injection modes Hot Split/Splitless, Cold Split/Splitless, all in pulsed mode, solvent vent mode, and residue removal mode. Are the listed injection modes going to be used, or do you just want the option to be able to use these modes?

A4: We are going to use them

Q5: In 3.2.4.5 the statement is made that “the software must have offline data review and processing ability”. Do you plan to review the data on another PC or will the data review be done on the same PC?

A5: It will be done on the same PC, but we want the ability to analyze data while the instrument is running.

Q6: In 3.3.3.1 The statement is made that “The Gas Chromatograph shall include a Flame Ionization Detector (FID) fully integrated with the GC System.” How will the FID be used? Will one Inlet of the GCMS be connected to the FID? Please explain how you plan to use the FID.

A6: The FID will use one injector port and the MS will use another injector port. This way we don't have to switch columns back and forth.

Q7: Section 3.3.7.2 states “The following is Performance Verification what should be completed after installing GC-MS and GC-MS/MS: Perform Checkout Tune, Perform Tune Verification, Verify EI Performance, Perform PCI Autotune, Verify PCI Performance, Perform NCI autotune, and Verify NCI Performance.” This mentions that PCI and NCI will be evaluated. Will this GCMS or GCMSMS require PCI/NCI ionization sources or will the system only require EI?

A7: It will require all three

**ADDENDUM ACKNOWLEDGEMENT FORM**  
**SOLICITATION NO.: CRFQ AGR26\*44**

**Instructions:** Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

**Acknowledgment:** I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

**Addendum Numbers Received:**

(Check the box next to each addendum received)

|                                         |                                          |
|-----------------------------------------|------------------------------------------|
| <input type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6  |
| <input type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7  |
| <input type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8  |
| <input type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9  |
| <input type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

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Company

---

Authorized Signature

---

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

# Discover the Possibilities

Agilent 5977C GC/MSD



# A history of leadership in GC and GC/MS

Agilent has over 50 years of leadership in GC and GC/MS. The story of Agilent's leadership in mass spectrometry started with the founding of HP back in 1938. Every step of the way, your goals become our goals: improving user experience, laboratory operation, and business success.



1971

## 5930A Tabletop MS

The first GC/MS from HP with an oscilloscope and strip chart was introduced.



1982

## 5970 MS

This landmark Agilent product was the first of a long line of GC/MS instruments. With a mass range almost as good as the early floor standing models, the sensitivity was comparable to our earlier benchtops.



1994

## GCD

Gas chromatography/mass spectrometry as a technology gained so much popularity that we introduced an easier-to-use model, the GCD.



1996

## 5973 GC/MSD

The 5973 showcased extended mass range and sensitivity. MSD ChemStation and the Local Control Panel allowed two GC/MSDs to be controlled by one PC.



2005

## 5975 GC/MSD

The 5975 GC/MSD further extended the mass range up to 1050 m/z and delivered a sensitivity S/N of 100:1 with 1 pg OFN.



1976

## 5992A Benchtop GC/MS

Up until this time, all GC/MS systems were floor-standing units. The 5992 marked a milestone with the first benchtop instrument.



1988

## Unix and DOS ChemStation

The Unix ChemStation was the successor to the Pascal workstation. The Agilent DOS Chemstation included low-cost PCs and more sophisticated operating systems that made it possible to move to more common computing platforms.



1996

## Hyperbolic gold-coated quartz quadrupole

Hyperbolic, gold-coated, quartz quads enhanced sensitivity, performance, spectra, and isotope ratios.



2007

## MassHunter software

From instrument settings to data analysis and reporting, MassHunter software made GC/MS analysis both powerful and routine for all.



2009

### 7000A triple quadrupole GC/MS

The first GC/MS system from Agilent harnessed the selectivity and associated sensitivity gains of true GC/MS/MS capability.



2012

### 7200 GC/Q-TOF

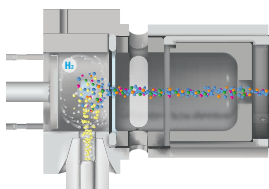
The ideal tool to solve complex problems, the 7200 GC/Q-TOF introduced high-resolution accurate mass to the Agilent GC/MS portfolio.



2015

### 5977B GC/MSD and high-efficiency ion source

Delivered unparalleled analytical sensitivity with extreme operational efficiencies for ultra trace-level applications.



2017

### JetClean self-cleaning ion source

Greatly reduced or eliminated the need for source cleaning, thereby enhancing productivity on the single and triple quadrupole GC/MS systems.



2019

### QuickProbe GC/MS

The Agilent QuickProbe GC/MS system was designed for forensic laboratories looking to do direct analysis in real time without sample preparation.



2022

### 7000E and 7010C

Agilent 7000E and 7010C GC/TQ expand instrument intelligence to enable new acquisition modes and more self-aware diagnostics. The 7000E is also compatible with the Agilent HydroInert source.

2012

### Removable ion source

The removable ion source (RIS) allowed vent-less exchange of EI and CI source technologies on the Agilent 7200 GC/Q-TOF.



2013

### 5977A GC/MSD

The 5977A introduced the Extractor EI Ion Source for enhanced sensitivity and thermal profile improvement. It also featured direct communication between 7890B GC and the MSD.



2016

### 7010B triple quadrupole GC/MS

The Agilent 7010B represented the evolution of proven performance, featuring compatibility with the high efficiency and JetClean sources, plus the introduction of dMRM Acquisition.



2017

### 7250 GC/Q-TOF

Featuring simultaneous high resolution and high dynamic range, the 7250 enhanced and expanded upon the high-resolution accurate mass workflows of its predecessor, the 7200 GC/Q-TOF.



2022

### 5977C

5977C offers improved analytical performance and technologies that maximize instrument uptime. The new HydroInert source improves performance with H<sub>2</sub> as a carrier gas.





The Agilent 5977C GC/MSD system

## Meet Your Business Goals, Today and in the Future

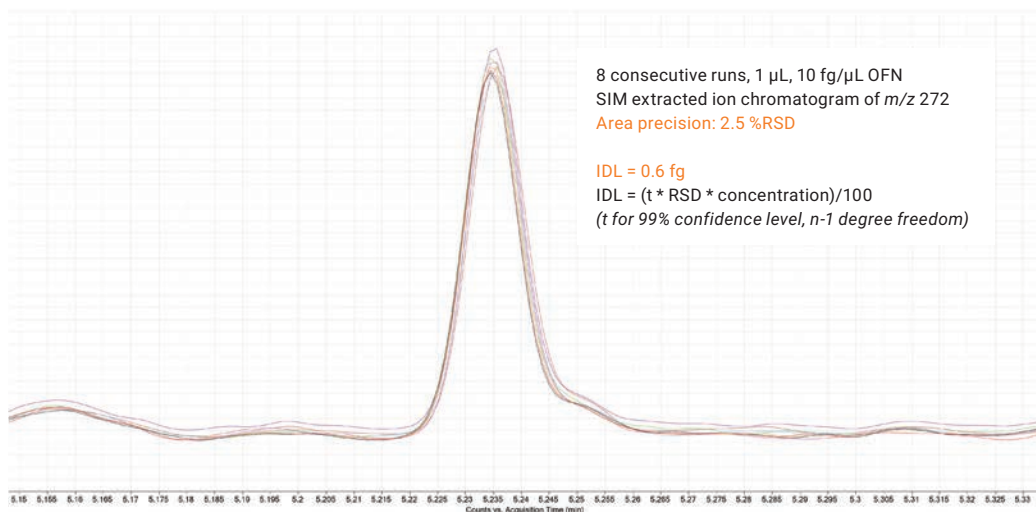
Instrument downtime, quality data, sample reruns, and data reviews are just some of the challenges associated with turnaround times that are critical to your business and reputation. Meet the Agilent 5977C GC/MSD. Coupled with new technologies that drive maximum productivity in your lab, the 5977C is designed to provide robust, day-in, day-out performance so you can focus your time on things that add value to your lab.



## Your GC/MS analyses demand the highest performance standard: The IDL

IDL (instrument detection limit) is based off of the USEPA's definition of MDL (method detection limit) and is based on a statistical analysis of precision (%RSD) of 8 consecutive injections. Since IDL is measured close to the detection limit, it is a meaningful metric for what the instrument can actually achieve.

### The accuracy of instrument detection limit (IDL)



How does the 5977C measure up? All Agilent GC/MS systems include IDL demonstration at installation, with industry-leading performance.

## Mass spectrometry performance that helps you stay competitive

### Stainless steel source

The traditional stainless steel source performs most similarly to previous Agilent MSD instruments at a budget-friendly price. Designed for sample-dependent applications.

Agilent 5977C  
EI MSD

### HydroInert source

The HydroInert source is a novel EI source designed to improve performance with hydrogen carrier gas in GC/MS. It addresses issues such as hydrogenation and dechlorination reactions.

5977C Inert Plus MSD  
with HydroInert source

### Extractor source

The inert extractor EI source enables high analytical 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.

Agilent 5977C  
Inert Plus EI MSD

### Extractor source for EI; CI source for CI

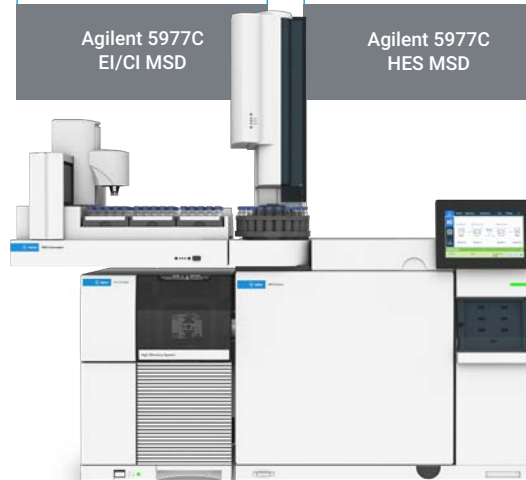
An inert extractor EI source provides high analytical sensitivity. The CI source delivers softer ionization for molecular formula determination and enhanced selectivity.

Agilent 5977C  
EI/CI MSD

### HES source

The inert HES delivers unparalleled analytical sensitivity for ultra trace-level applications. Ideal for high-throughput labs that need to save time and money with extreme operational efficiencies.

Agilent 5977C  
HES MSD







## Reliable and unparalleled GC separation

Building the world's most trusted gas chromatography 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.





### Unlock your lab's revenue potential

The Agilent Intuvo 9000 GC stands in a class by itself. Its innovative compact design offers fast, direct heating, ferrule-free fittings, Guard Chip technology, and no-trim columns to provide faster sample runs as well as fewer and faster column changes. Intuvo continues the Agilent legacy of reliability and gold-standard performance in a compact and powerful complete package.



### Meet your analytical needs today—and tomorrow

The Agilent 8890 GC system offers outstanding flexibility. As the next evolution of the trusted Agilent GCs, the 8890 drives productivity, delivers high-quality data, and provides unparalleled confidence to all users.

- Configure with any GC/MS system and combine with a wide range of GC detector options.
- Helium conservation module provides cost-saving carrier gas options.
- Analyzers provide preconfigured and tested systems for a wide range of specific applications.

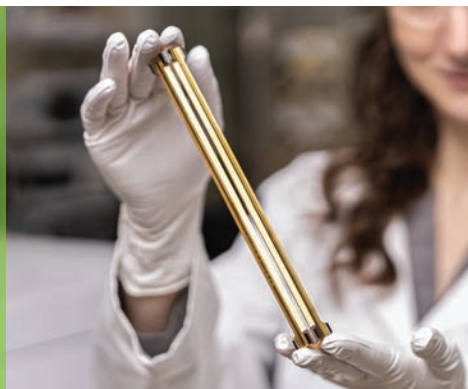


### A new outlook on routine GC

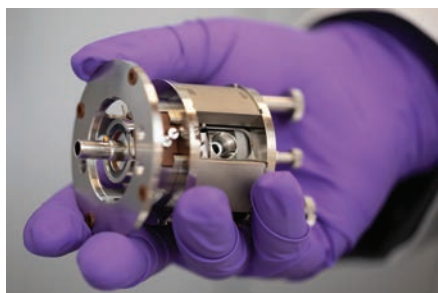
The Agilent 8860 GC system combines simplified operation with the proven reliability expected from Agilent GC systems. It can be configured with a range of GC detectors, and can be upgraded for use with the 5977C GC/MSD with stainless steel source, for reliable delivery of high-quality data. What's more, the 8860 GC enables user-induced instrument diagnostics and has an easy-to-learn touch screen interface that lets you instantly view GC setpoints and status.

# Innovations That Drive Profitability

Throughput. Uptime. Efficiency. Operating costs.



No matter what business you're in, these are fundamental factors that impact profitability. You face constant pressure to analyze more and more samples, even as resources shrink and analytical challenges grow. In your lab, every task has the potential to increase or decrease your profit. Every instrument has to contribute. Every sample counts.



## Agilent JetClean self-cleaning ion source

During routine analysis, matrix deposits inevitably build up. The Agilent JetClean self-cleaning ion source maximizes instrument uptime and sample throughput by greatly reducing or even eliminating the need for manual ion source cleaning, resulting in an additional one to two days per month to perform analyses. JetClean is available as an option on Agilent single quadrupole and triple quadrupole GC/MS systems.



## Built-in GC intelligence

Self-aware GC features enable a variety of useful and convenient diagnostic and maintenance options that prevent common GC problems. The browser interface provides remote connectivity through the lab network and access to features without the need for a data system. Users can view instrument status, run diagnostics, check maintenance logs, and view helpful service videos—all from a mobile device.

*"With the 5977/JetClean combination, time we would usually spend recalibrating, working on methods, or cleaning the ion source can now be spent running more samples, with greater confidence in the quality of results being produced. That translates to a real competitive advantage."*

- **Bob Symons,**  
Regional Technical Manager, Eurofins | Environment Testing, Sydney, Australia



### Smart Alerts

Agilent CrossLab Smart Alerts software monitors instrument health and provides email-based alerts, notifying you when to consider replacing key consumables, when to perform preventive maintenance, and when an instrument stops running anywhere in your lab. The Remote Assist feature allows you to send an immediate service request to Agilent.



### Hyperbolic gold-coated quartz quadrupole

The quartz monolith guarantees perfect alignment for hyperbolic surfaces throughout the life of the mass spectrometer. Gold surfaces stay clean and are maintenance-free at high temperatures—up to 200° C.



### Capillary Flow Technology

Many GC and GC/MS analyses are performed on complex samples that contain high-boiling compounds. Agilent Capillary Flow Technology lets you backflush the column once all peaks of interest have eluted, thus forcing out any remaining components. The benefits include reduced cycle times, less column maintenance, better data, and enhanced productivity.



### Agilent IDP-3 dry scroll pump

The Agilent IDP-3 dry scroll pump offers oil-free operation that lowers your cost of ownership without the worry of oil leaks, spills, or hazardous oil disposal. It also has a small footprint and enables a quieter lab environment. The IDP-3 is compatible with Agilent 5977, 5975, and 5973 GC/MS systems; instruments that use hydrogen as a carrier gas; and JetClean.



### Helium conservation module

Achieve better control of laboratory operating expenses and fewer workflow disruptions by stretching your helium tank usage from weeks to months. This module allows you to use helium for your GC runs and switch to a different gas (typically nitrogen) when your GC is idle.

# HydroInert source: Maximizing efficiencies with H<sub>2</sub> carrier gas

## Overcome the challenges of using hydrogen as a carrier gas

With helium being a finite resource with an inefficient production, it is expensive. Hydrogen is a low cost, renewable gas that is the best alternative to helium. The new HydroInert source minimizes loss in sensitivity and spectral anomalies associated with H<sub>2</sub> gas. These are some of the unique advantages of HydroInert:

- Spectral fidelity, even for compounds highly susceptible to hydrogenation
- Superior high-boiler peak shape, especially for PAHs
- Unchanged source parts and familiar assembly procedure

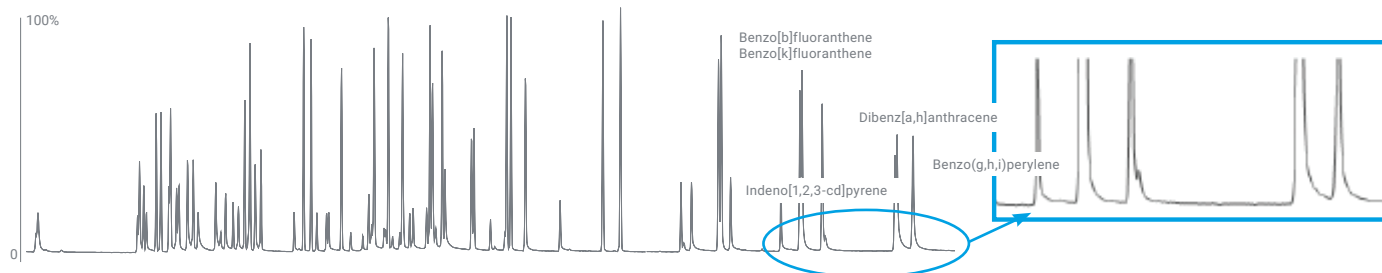


*"Helium shortages are becoming commonplace, so this will be an excellent alternative to He."*

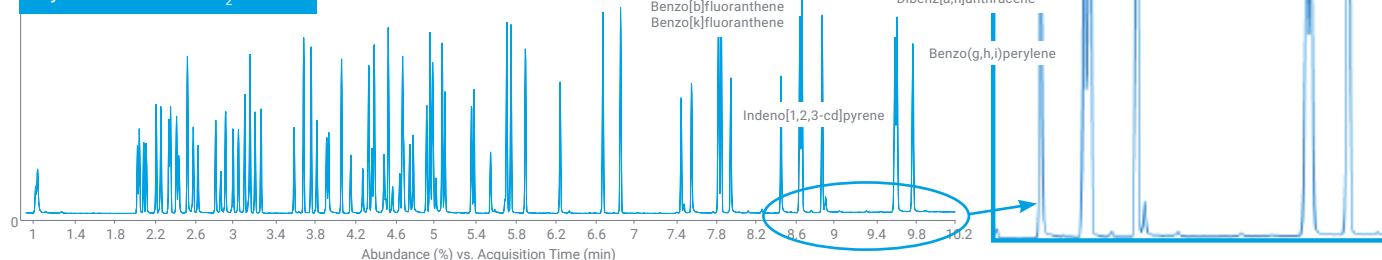
– **Bill Mock,**  
Manager of the Innovation Laboratory  
Pace Analytical Services

## EPA Method 8270 SVOCs analysis: 50 ppm standard in a scan with H<sub>2</sub> carrier

Conventional EI source upgraded with 9 mm extractor lens, H<sub>2</sub> carrier



HydroInert source H<sub>2</sub> carrier



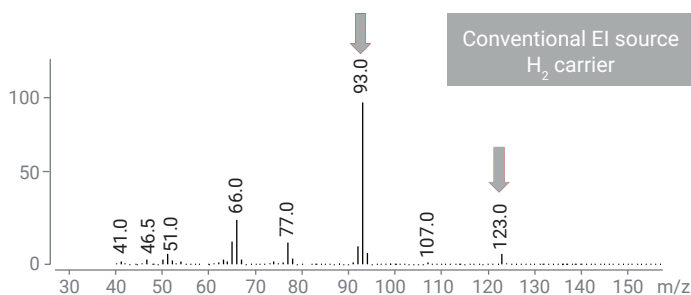
Peak shape and resolution is significantly improved with the HydroInert source with H<sub>2</sub> carrier.

## Safety considerations when converting to hydrogen carrier gas

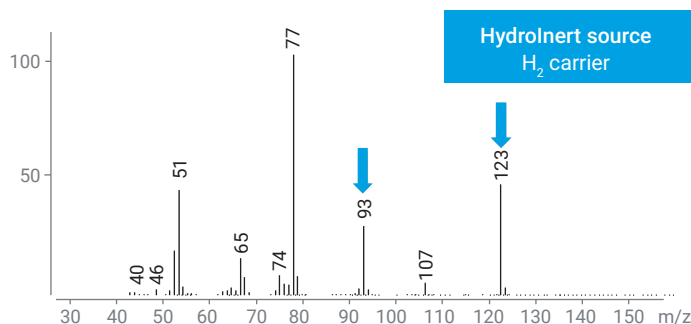
Safety is the most important consideration when handling hydrogen due to the concern of flammability. For detailed safety information, see the Agilent Hydrogen Safety Manual for GC/MS (part number G7006-90053). The entire safety manual must be read and understood before connecting and using hydrogen as the carrier gas.

## Analysis of nitrobenzene—a compound vulnerable to in-source reactions and hydrogenation

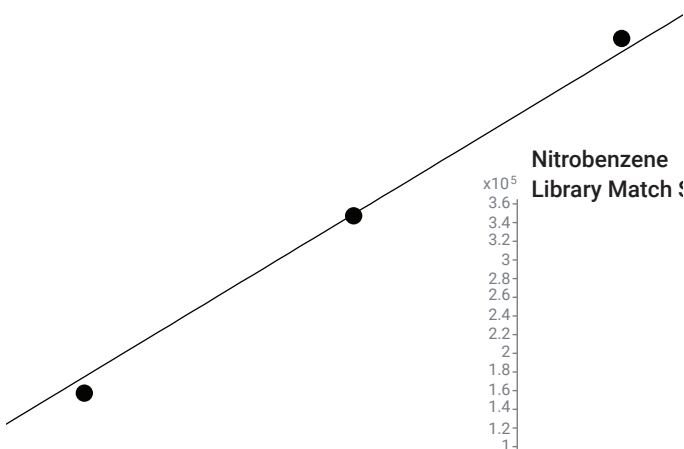
Spectral fidelity, resolution, and peak shape is greatly improved with Hydrolnert while running on H<sub>2</sub> carrier gas



The Extractor source (3 mm extraction lens) showed hydrogenation to aniline with the abundant  $m/z$  93 ion.

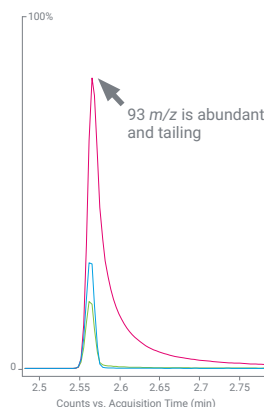


Improved spectral fidelity, showing excellent ratio of  $m/z$  123



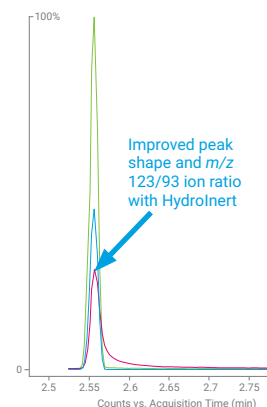
Excellent calibration linearity is achieved with the hydrolnert source as well as spectral accuracy for high confidence comparison to conventional EI libraries.

Conventional EI source  
H<sub>2</sub> carrier



Typical performance showing hydrogenation to aniline with the abundant  $m/z$  93 ion.

Hydrolnert source  
H<sub>2</sub> carrier



The Hydrolnert source showed an improved mass spectrum that correlates to nitrobenzene.

### Resources to help conserve or convert your GC/MS carrier gas

Use these links to help with your GC/MS conversion to hydrogen



#### Handle the Hassles of the Helium Shortage

Explore ways to manage price fluctuations and potential delivery interruptions with helium carrier gas for GC analyses. [www.agilent.com/chem/handle-helium-shortage](http://www.agilent.com/chem/handle-helium-shortage)



#### Helium Conservation Cost Savings Calculator

See how much you could save by using Agilent Gas Saver with and without nitrogen standby. [www.agilent.com/chem/helium-conservation-cost-savings-calculator](http://www.agilent.com/chem/helium-conservation-cost-savings-calculator)



#### Helium Conservation Module

Prevent disruptions by managing your helium usage. [www.agilent.com/chem/helium-conservation-module-for-gc](http://www.agilent.com/chem/helium-conservation-module-for-gc)



#### Agilent EI GC/MS Instrument Helium to Hydrogen Carrier Gas Conversion User Guide

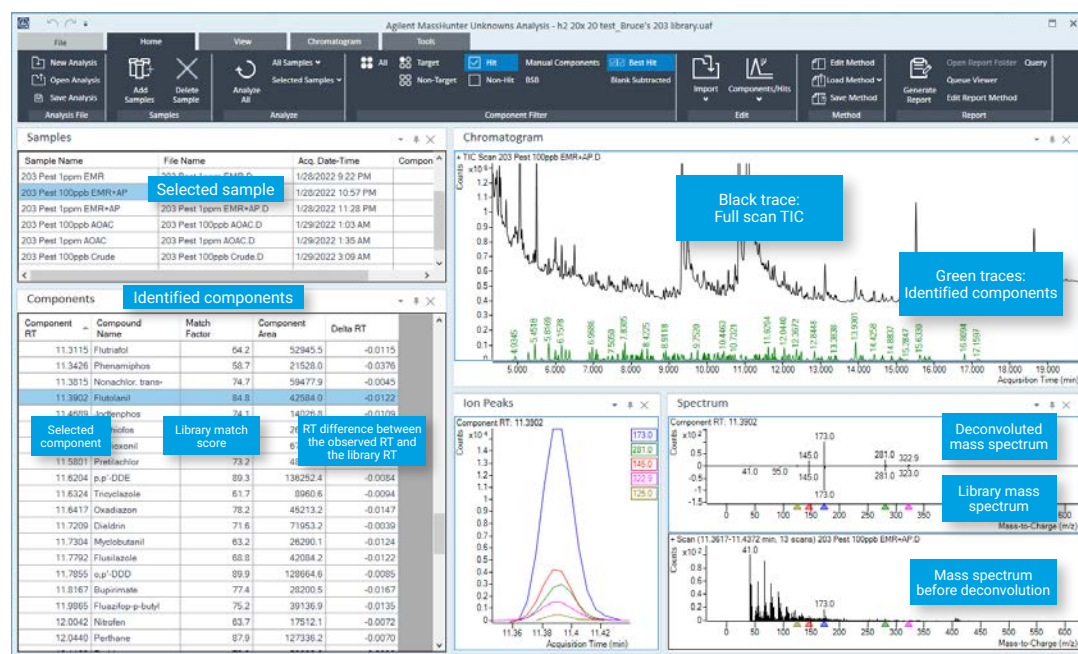
Get detailed instructions on converting your Agilent EI GC/MS system from helium to hydrogen carrier gas. [www.agilent.us/chem/user-guide-coverting-ei-gcms-instruments](http://www.agilent.us/chem/user-guide-coverting-ei-gcms-instruments)



# MassHunter software: Your faster route to insight

Agilent MassHunter software is designed to solve your everyday problems to make your GC/MSD analysis faster, easier, and more productive. What's more, it enables operators of all levels to drive confident results.

This intuitive software supports multiple applications with customizable features, easy-to-use method templates, and a comprehensive spectral library that includes retention time and/or retention index information. It also supports instrument control and data acquisition for your Agilent GC/MSD.



**Easy and intuitive:** Agilent MassHunter Unknowns Analysis software provides automated deconvolution and library searching to identify compounds of concern.

## With the MassHunter Quantitative Analysis software, you get:

- Built-in workflow templates that are dynamically linked in data review.
- Easy selection of parameter-less integrators with built-in peak validation capability allows you to focus exclusively on problem peaks and minimize manual reintegration.
- Customization of workflows with Unknowns Analysis and Library Editor to perform sample analysis against NIST, and creation of custom RT-locked spectral library and quantitation method from acquired scan data with library search.
- Associated peaks, spectra, and calibration data with the click of a result.
- Target deconvolution that enables enhanced confidence in compound identification.
- Enhanced data integrity standards—provides the technical controls to securely acquire, process, report, and store data in laboratories that must follow the compliance guidelines of FDA 21 CFR Part 11, EU Annex 11, GAMP5, as well as ISO/IEC 17025 and EPA's 40 CFR Part 160.

# Mass spectrometry with OpenLab CDS software

OpenLab CDS software offers a single-user interface that can control your Agilent LC, GC, LC/MSD, and GC/MSD. With OpenLab CDS, you can acquire, process, and report mass spectrometry data to meet your requirements and complete your workflow.

## Instrument tune and calibration

- OpenLab CDS allows for full control of GC/MSD instrument tuning, including Autotune, Checktune, and Manual Tune capabilities.
- Optimize analytical methods with multiple scan segments to utilize the scan time efficiently.

## Data analysis

- Display, background correct, and search MS spectra—either ad hoc as part of sample investigation or as part of automated result processing.
- Create extracted chromatograms (EIC) manually from a total ion chromatogram (TIC) or directly from a MS spectrum.

## MS library search

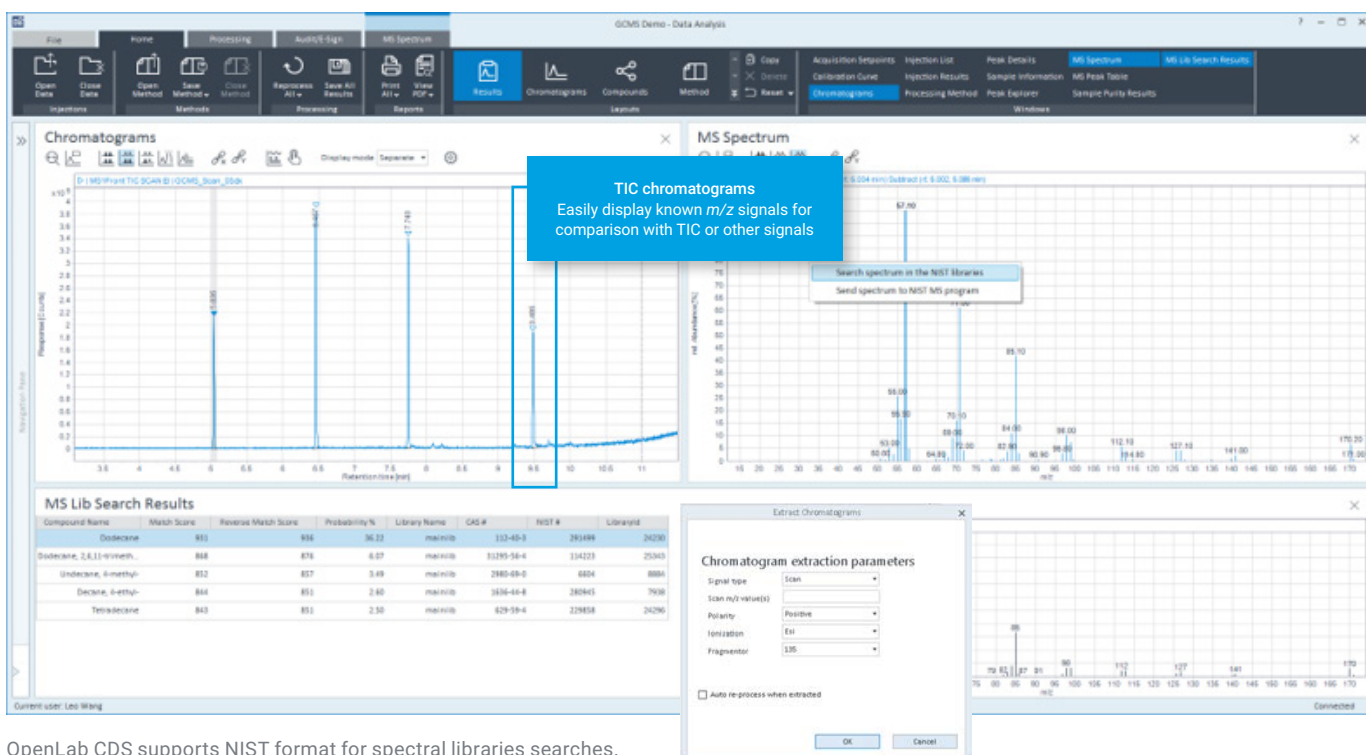
- OpenLab CDS supports NIST format libraries for spectral library screening and ad hoc library searches.

## Reporting

- OpenLab CDS offers multiple predefined MS report templates that can be easily modified to meet your needs.

## Shorten method development and compound confirmation

- Quickly create or update a compound list through automatic MS compound table generation from known samples.
- Use integrated library search to identify target compounds or utilize SIM acquisition method information.
- Confirm target compound identity with qualifier ion and ratio specification or reference spectral comparison.

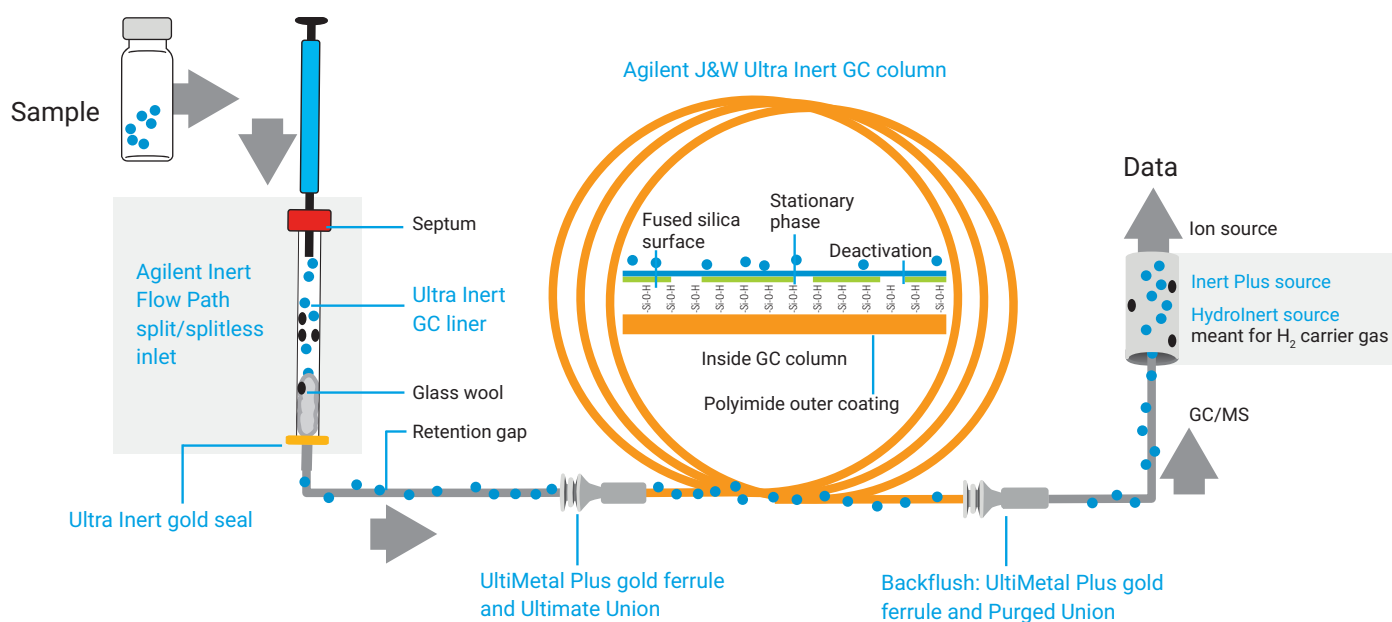


OpenLab CDS supports NIST format for spectral libraries searches.



# Ensuring an inert flow path has never been more critical

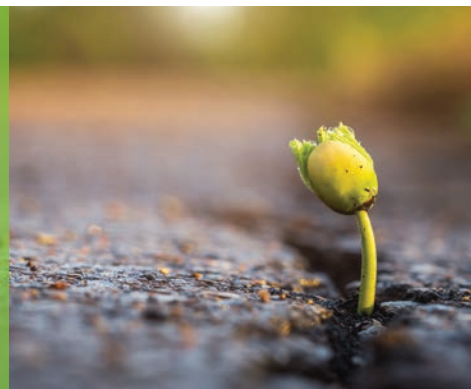
As samples become smaller, increasingly active, and more complex, you cannot afford losses caused by flow path activity. Having to repeat or verify suspect analyses wastes valuable resources, hinders productivity, and hurts your bottom line. With trace amounts of active analytes, you might not even get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



## Don't miss a thing in your GC/MS analysis

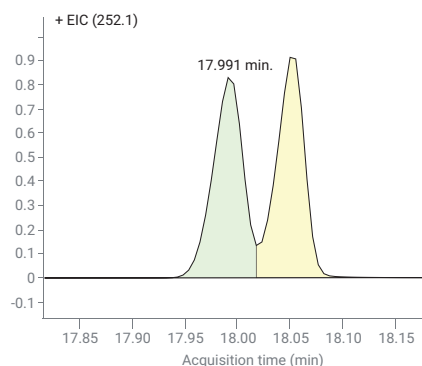
From analyzing active environmental samples to screening for drugs of abuse, Agilent Inert Flow Path solutions help ensure higher analytical sensitivity, accuracy, linearity, and reproducibility.

# Proven Reliability for All of Your Applications

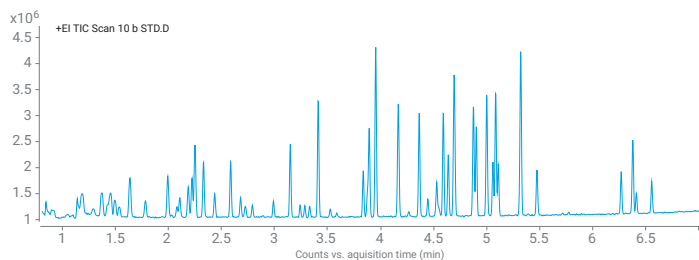


## Staying competitive to meet changing environmental regulations

The methodology described within United States EPA Method 8270 for the analysis of semivolatile organic compounds by GC/MS requires simultaneous measurement of diverse compound classes over a wide concentration range. The 5977C Inert Plus GC/MSD meets these requirements over a range of 0.2 to 160 ppm using a single injection (one calibration). Better initial calibration results lead to longer continuing calibration, so more samples can be analyzed without intervention—lowering your cost of operation. Here, we achieved a wider calibration range and low compound %RSDs, translating into greater laboratory productivity.



Benzo[b and k]fluoranthene isomer resolution at 50 ppm (midpoint). Split is 3:1 (17 ng injected), LPD liner, and 9 mm diameter drawout lens. Sufficient resolution is achieved if the height of the valley between two isomer peaks is less than 50% of the average of the two peak heights at the midpoint concentration level (8270D). This data was collected on an Agilent 7890B GC coupled to an Agilent 5977B Inert Plus GC/MSD equipped with a SSL inlet.



Scan TIC of 10 ppb VOC Cal Standard using H<sub>2</sub> carrier gas and Hydrolnert source.

## Volatile organic compounds analysis in drinking water with headspace GC/MSD using hydrogen carrier gas and Hydrolnert source

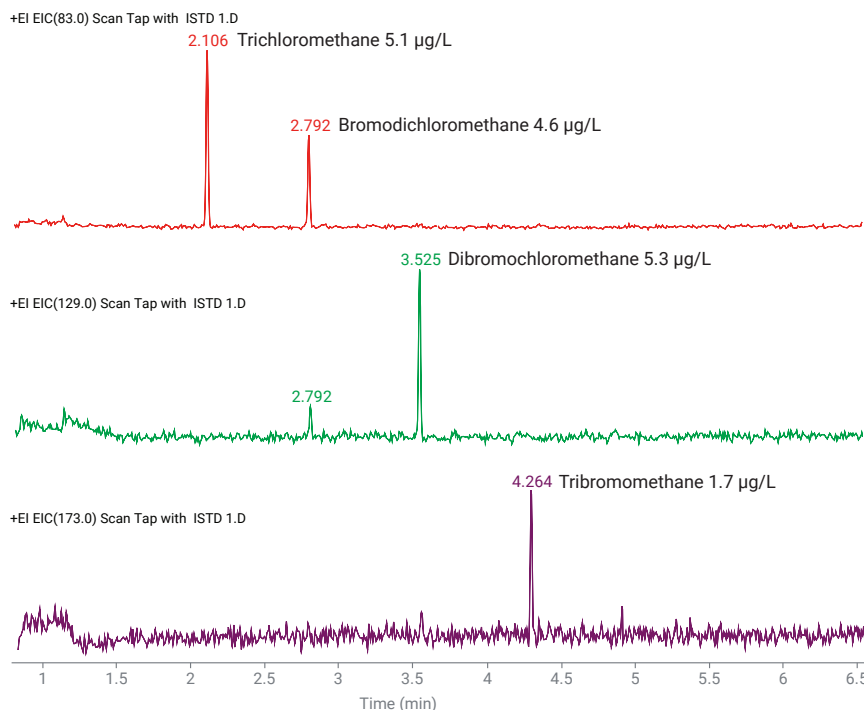
Having a rapid method for identifying and quantitating volatiles at low µg/L levels would be a useful tool for quantitating contaminants in water. Together, the Agilent 8697 headspace sampler, 8890A GC, and 5977C MSD—used with hydrogen carrier gas and the new Hydrolnert EI source—provide this capability. The headspace approach often provides a simpler alternative to purge and trap sampling when local regulations allow it.

## Chinese standard and GB methods for water analysis

Agilent GC/MS systems are widely used for a range of Chinese environmental and food GB methods, as they demonstrate excellent performance in terms of repeatability, sensitivity, and linearity.

| Test     | Method          | Description                                                      |
|----------|-----------------|------------------------------------------------------------------|
| VOC      | GB/T5750.8.4.2  | 55 VOCs—purge and trap GC/MS                                     |
|          | GB/T5750.8.20.1 | Epichlorohydrin—GC/MS                                            |
|          | HJ639           | Water quality VOCs—purge and trap GC/MS                          |
|          | HJ810           | Water quality VOCs—headspace GC/MS                               |
| Off-odor | GB/T5750.8.75.1 | Headspace SPME test of geosmin and 2-methylisoborneol            |
|          | GB/T5750.8.85.1 | 2 thioether test—purge and trap GC/MS                            |
| SVOC     | GB/5750.8.15.1  | 15 SVOCs SPE—GC/MS                                               |
|          | GB/5750.9.41.1  | Acetochlor test—SPE GC/MS                                        |
|          | GB/5750.8.88.1  | 18 PCB test—SPE GC/MS                                            |
|          | GB/5750.10.24.1 | 8 NDMA test—SPE GC/MS                                            |
|          | HJ699           | Water quality—organochlorine pesticides and chlorobenzenes—GC/MS |
|          | HJ715           | Water quality—polychlorinated biphenyls (PCBs)                   |
|          | HJ744           | Water quality—phenols—GC/MS                                      |

## VOCs analysis of municipal tap water



|                      | RT    | NIST LMS |
|----------------------|-------|----------|
| Trichloromethane     | 2.107 | 93       |
| Bromodichloromethane | 2.792 | 86       |
| Dibromochloromethane | 3.526 | 88       |
| Tribromomethane      | 4.267 | 80       |

Deconvoluted scan data searched against NIST confirms identities even at low µg/L levels.

# Increased reliability with lower detection limits for food analysis

## Analysis of PAHs in infant formula with the novel HydrolInert source and hydrogen carrier gas

Manufacturers of infant formula products must comply with strict requirements regarding the allowed concentration of PAHs. The European Commission has established safe level requirements of benzo[a]pyrene, benzo[a]anthracene, chrysene, and benzo[b]fluoranthene as four key PAH markers (requirement no. 835/2011). Regulations require the total concentration of the four key PAHs to be less than 1.0 µg/kg in infant formula powders. High fat content matrices pose a great challenge in sample preparation and can result in interferences in GC/MS analysis.

Our optimized sample preparation procedure provided highly efficient and selective lipid removal from infant formula matrix, while delivering acceptable recoveries for hydrophobic PAHs. The resulting low levels of matrix interferences enabled the use of GC/MS in SIM mode to achieve sub-ppb level sensitivity.



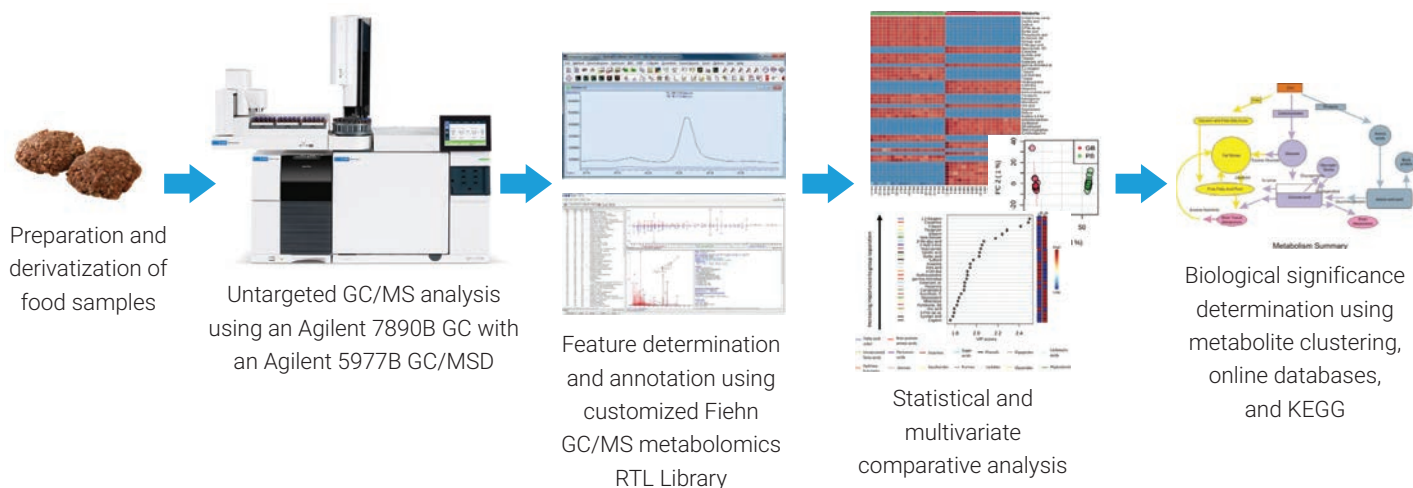
Highly customizable Compounds-at-a-Glance view for 1,2,9,10-dibenzopyrene, 1,2,4,5-dibenzopyrene, and dibenzo[a,i]pyrene-d14 at 0.1, 0.5, 1, calibration levels.

# Reliably confirm metabolites and gain deeper insights into biological systems

## Enhance your research, gain new perspectives on metabolism, and answer challenging biological questions

Metabolomics typically involves global metabolite profiling by hyphenated GC/MS analysis techniques, followed by a familiar software workflow to process the GC/MS data files. Agilent offers software workflows for performing global metabolite profiling by GC/MS. In these workflows, features are found across all data files, and the results are analyzed using multivariate techniques. Important differential features are identified and visualized on pathways to aid biological interpretation.

This advanced analysis software relies on the highly reproducible data produced by the 5977C GC/MSD system—particularly when using Agilent MassHunter Profinder to identify complex metabolomics data. After statistical analysis using Mass Profiler Professional, compounds are identified using the Fiehn retention time locked EI library. The data is then visualized on pathways using Pathway Architect.



Overview of GC/MS-based metabolomics workflow used to compare the chemical profiles of plant-based and traditional meats.



# Perform reliable chemical, petrochemical, and materials identification and quantitation

## GC/MS analysis of phthalate plasticizers

Positive chemical ionization (PCI) lets you unambiguously identify phthalates based on an intense molecular ion response. You can configure the 5977C GC/MSD hardware to handle CI reagents, including hydrocarbons (such as isobutane and methane) and softer reagents (such as  $\text{CO}_2$  and  $\text{NH}_3$ )—all with trace-level analytical sensitivity.

## Biofuel characterization

The 5977C GC/MSD exceeds the criteria for accurate, sensitive biofuel analysis. Its inert flow path, high-efficiency source, and heated gold-plated quartz quadrupole combine to deliver robust, high-analytical sensitivity analysis for the full range of biofuel analytes. The system is easily set up for simultaneous SIM/scan data acquisition to maximize analytical sensitivity and selectivity, while providing full spectra for qualitative analysis.



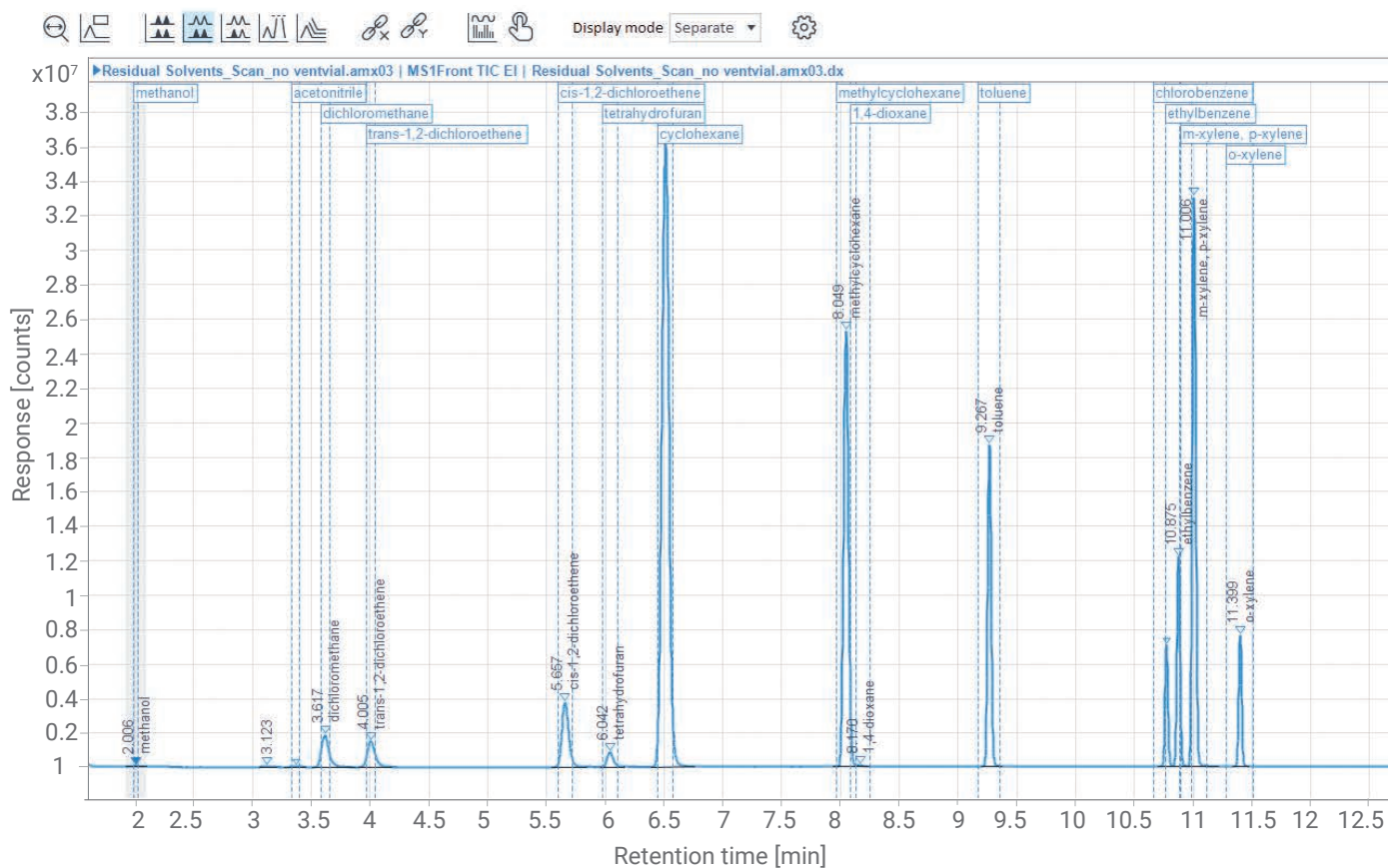


# Improve your compliance-based pharmaceutical residual solvent analysis

## Accurate, sensitive, and trouble-free GC analysis with headspace sampling

The Agilent 8697 headspace sampler is an ideal companion for your 5977C GC/MSD. Designed with advanced hardware features, such as the microchannel-based EPC module with atmospheric pressure compensation and valve-based sampling, the 8697 delivers unprecedented precision and performance.

These features work with the integrated intelligence found in Agilent 8890, 8860, and Intuvo 9000 GCs, plus remote accessibility through the browser interface of those systems. That means you can get instrument status updates wherever you are, inside or outside the lab. In addition, Agilent OpenLab CDS software helps you meet compliance requirements for residual solvent analysis and other relevant applications.



Reference chromatogram for Class 2 (Mix A) residual solvents. Solvents were collected using the Agilent 7697A headspace sampler and the 5977B GC/MSD on OpenLab CDS. The software gives you multiple ways to interact and present your GC/MS data, while ensuring the high degree of data integrity expected in FDA regulated labs.

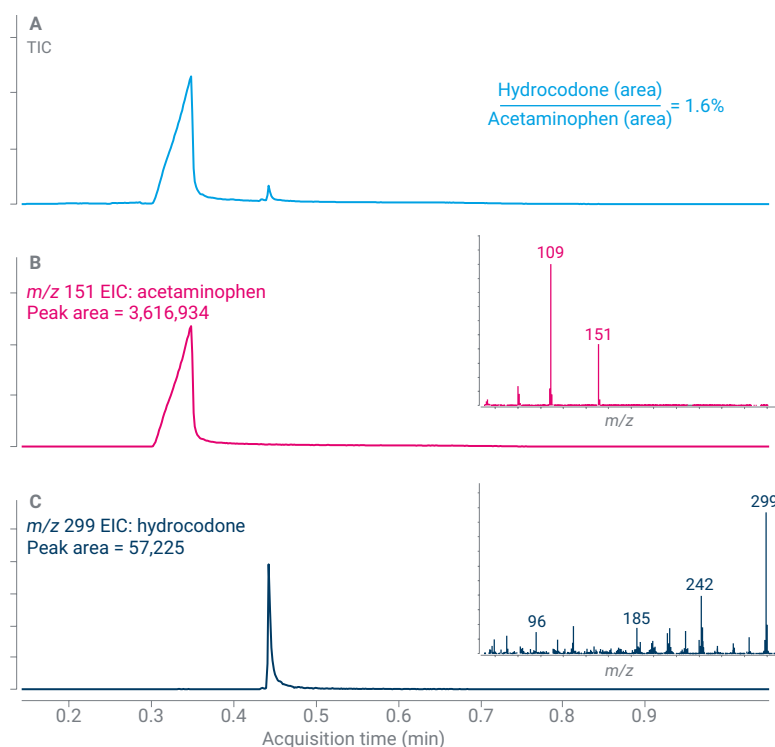
# Quantify drugs and metabolites more quickly and reliably

## QuickProbe GC/MS analysis of a Vicodin tablet in under one minute with no sample preparation

This technique successfully separated acetaminophen and hydrocodone, the two main components. Also, the two active ingredients were identified with a NIST library match of >90—even when the hydrocodone accounted to <2% by weight of acetaminophen.

## Deconvolution reporting software

Broad-range screening for drugs in forensic samples requires full-spectrum identification and confirmation for an unlimited number of targets. It also demands spectral identification of nontargets. The 5977C with deconvolution reporting software and a forensic toxicology database enables screening of a greater number of targets at low-concentrate ions while reducing analysis time. Resulting spectra are classical and NIST searchable.



Pulverized Vicodin tablet (5:300 mg of hydrocodone:acetaminophen) analysis in ~one minute. A) Total ion chromatogram (TIC). Extracted ion chromatograms (EIC) for acetaminophen  $m/z$  151 (B) and hydrocodone  $m/z$  299 (C). NIST library match was >90 for both components



## Partnering for sustainability and business success

Sustainable thinking is transforming the way researchers, scientists, and manufacturers approach their products, processes, and supply chains. However, it can be a challenge for labs to lower their environmental impact while continuing to optimize workflows and lower costs.

At Agilent, we believe that efficiency, productivity, and sustainability are interlinked.

Working toward sustainability is an integral part of how we conduct business and respond to our customers' challenges. Together, we can help your lab achieve its sustainability goals—while increasing output, maintaining accuracy, and staying competitive.



### Partnership with My Green Lab

Agilent has partnered with My Green Lab to have our instruments independently audited for their Accountability, Consistency, and Transparency (ACT) label. ACT labels provide information about the environmental impact of manufacturing, use, and disposal of a product and its packaging, so purchasers can make informed, sustainable choices. Agilent 5977C, 8860, 8890, and Intuvo 9000 GC systems have been comprehensively evaluated and achieved ACT labels.

### Commitment to Net-Zero Emissions

Since our founding, Agilent has worked to reduce our energy, waste, water, and CO<sub>2</sub> emissions. Now we're taking it a step further. We're proud to announce that we will achieve net-zero greenhouse gas emissions by 2050. Our comprehensive approach to net zero includes Paris Agreement climate targets, clearly defined interim goals, and a commitment to the Science-Based Targets Initiative.

## Agilent CrossLab services

CrossLab is an Agilent capability that integrates services and consumables to support workflow success, improve productivity, and enhance operational efficiency. In every interaction, we strive to provide insight that helps you achieve your goals. We offer a wide range of products and services—from method optimization and training to full-lab relocations and operations analytics—to help you manage your instruments and your lab for best performance.

Learn more about CrossLab at [www.agilent.com/crosslab](http://www.agilent.com/crosslab)

### The people behind your service and support

Here's what sets CrossLab service engineers apart

10 years

Average instrument  
repair experience

96%

Parts available  
right away

Millions

Parts accessible at our  
worldwide logistics centers

85%

Repairs fixed during  
first visit



30,000

Technical training days

>1,850

Field service  
engineers worldwide

50+

Technology platforms  
covered

1–2 days

Typical turnaround time  
for priority service calls

## Promising 10 Years of Value

The Agilent Value Promise reflects the utmost confidence in our unrivaled industry standards for quality system design and manufacturing.

From the date you purchase select Agilent chromatography, spectrometry, and spectroscopy instruments, we guarantee at least 10 years use or residual-value credit toward an upgraded replacement. Because we stand behind our systems, our guarantee maximizes your return on investment by ensuring your purchase is safe.

Learn more:

[www.agilent.com/chem/5977c](http://www.agilent.com/chem/5977c)

GC column selection tool:

[selectgc.chem.agilent.com](http://selectgc.chem.agilent.com)

Inert flow path:

[www.agilent.com/en/promotions/inertflowpath](http://www.agilent.com/en/promotions/inertflowpath)

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# Every Sample, Every Day

Operational efficiency for your GC and GC/MS labs  
with the Agilent 8890B gas chromatography system





## The Agilent 8890B GC system

# Drive Your Lab Forward

Maintaining your competitive edge depends on the timeliness and accuracy of the data generated by your instruments and staff. The **Agilent 8890B GC system** helps your lab rise to the challenge. Representing more than the latest generation of the most reliable, most self-aware GC available, the 8890B combines advanced analytical abilities and multi-method flexibility with reduced downtime, simplified operation, and enhanced sustainability. The result: You can expand your productivity and profitability with every sample, every day.



### Performance

If your lab is consistently short on time for daily sample runs, don't waste a single minute. The Agilent 8890B delivers the next level of faster cycle times, so you can maximize sample throughput.



### Intelligence

Increasing accuracy and uptime are easier when your system can check for leaks, detect issues, and walk you through repairs. With Agilent GC Assist, the 8890B lets you maintain your GC like an expert.



### Sustainability

Reducing waste and conserving resources are no longer optional. The 8890B uses technology to meet sustainability goals and improve efficiency, helping you achieve your desired business outcomes.



Working together, performance, intelligence, and sustainability expand the boundaries of **productivity** and **profitability**.



Performance that  
delivers accurate  
data faster than ever



Getting—and staying—ahead requires accurate identification and quantification, high sensitivity for trace-level analytes, and the specificity to differentiate complex mixtures. The 8890B GC expands upon a proven chromatographic platform, delivering industry-leading performance for reliability, retention time, and repeatability. New time-saving technologies also allow you to run more billable samples.

### Analyze more samples every day with faster cycle times

The 8890B GC provides faster maximum oven temperature ramps and cooldown rates for conventional dual-channel GC. If you want even faster cycle times, an optional rapid cooling fan is available.



Cooldown time

Previous model GCs

>4 min.

Agilent 8890B GC

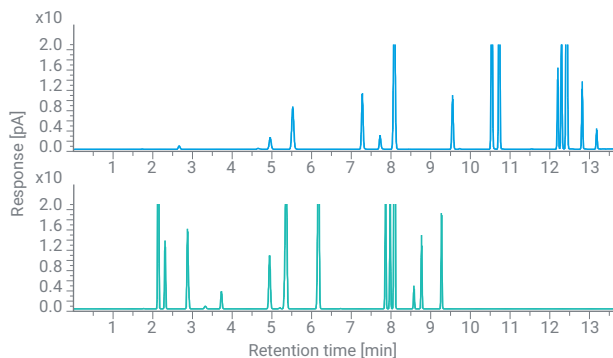
3.5 min.

Agilent 8890B GC  
with rapid cooling

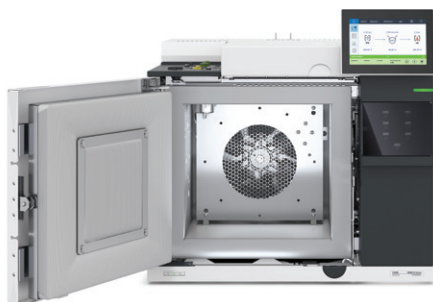
<3 min.

### Achieve excellent repeatability across multiple injections

Consistent retention time and area count performance are the cornerstone of what you can expect from the 8890B GC. The system also meets all specifications required for regulatory methods such as USP Method <467> (residual solvents).



Chromatograms for USP 467 Class 2a compounds.



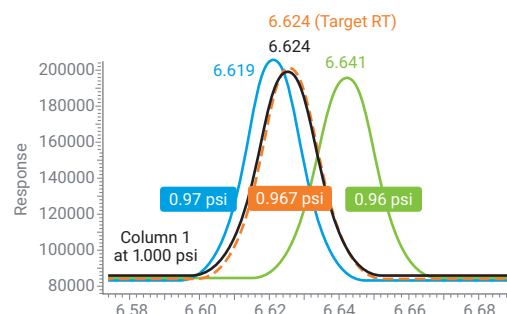
### Shine a new light on your connections and components

Make maintenance easier and faster with a built-in oven light that illuminates the internal space on the 8890B GC. That means you can perform tasks like troubleshooting and column installation in less time—and with fewer errors.

## Retention time locking (RTL) ensures consistency and seamless method transfer

Standardize your QA/QC measurements between systems in the same lab or at different locations using **RTL**. Precisely match retention times between Agilent GC systems using the same method and column configurations, ensuring long-term repeatability and retention time consistency.

RTL works by evaluating the relationship between inlet parameters and retention time during three to five reference runs. It then calibrates the system using the results. Later, you can match the original retention times on the locked method by performing a single relocking analysis.

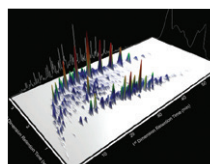
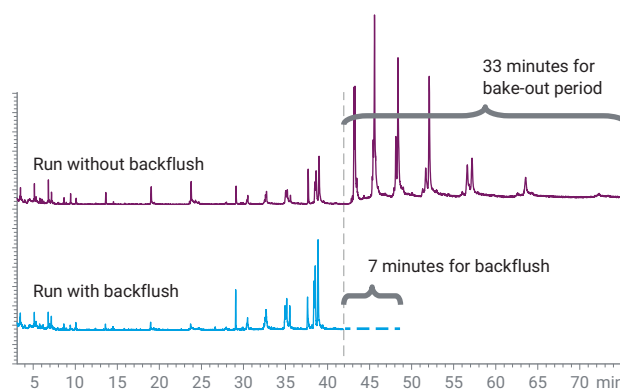


7th-generation EPC and advanced digital electronics set a new benchmark in pressure setpoint precision (to 0.001 psi)—improving RTL precision for very-low-pressure applications.

## Boost GC performance with capillary flow technology

- **Backflush** significantly reduces timing between injections, increasing productivity.
- **Purged Ultimate unions** provide leak-free connections, reducing downtime.
- **Flow splitters** enable data collection from up to three detectors.
- **New CFT calculators** let you download calculated setpoints to your method—avoiding time-consuming, error-prone manual input.
- **Multidimensional chromatography:**
  - **Deans Switch** facilitates heart cutting, enabling resolution of trace compound in complex matrices.
  - **GC x GC flow modulation** enables multidimensional chromatography without the need for cryogen.

Learn more about [Agilent capillary flow technology](#).



3D rendering of a D8396 reference jet fuel GC x GC separation analysis using Agilent GC x GC reverse flow modulation and GC Image GC x GC software.

## Meet the next evolution of GC separation



The **Agilent 8860B GC system** combines simplified operation with the proven reliability you expect from Agilent GC systems.



The **Agilent 8850 GC system** combines intelligence with the smallest, fastest high-performance benchtop GC on the market.

# Intelligence that powers productivity



The Agilent 8890 GC ushered in a new breed of intelligent GC systems that monitored system health, alerted you to potential issues, and helped you solve problems. Now, with cutting-edge onboard processors, the 8890B GC is equipped with **Agilent GC Assist** that guides you in maintaining and diagnosing your GC and MS systems with unprecedented confidence. That means you can reduce downtime, simplify troubleshooting, and shorten turnaround times without sacrificing data quality.

## Experience the benefits of GC Assist—intelligent control right at your fingertips

The next-generation touch screen allows you to monitor system health, access diagnostics, and perform maintenance directly at the instrument. Most functions can also be accessed from your tablet, laptop, or PC, so you can keep tabs on your instrument anytime, anywhere.

### Home screen

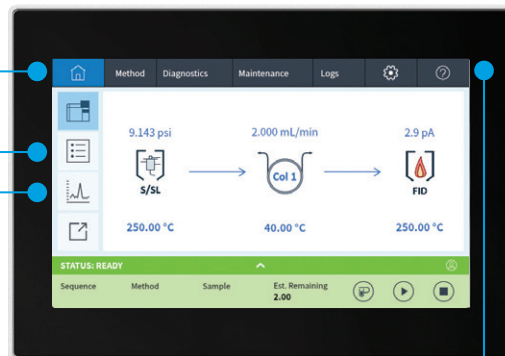
Provides at-a-glance updates on the system configuration and flow path.

### Instrument actuals screen

Allows you to customize and identify frequently used setpoints for quick accessibility.

### Plot screen

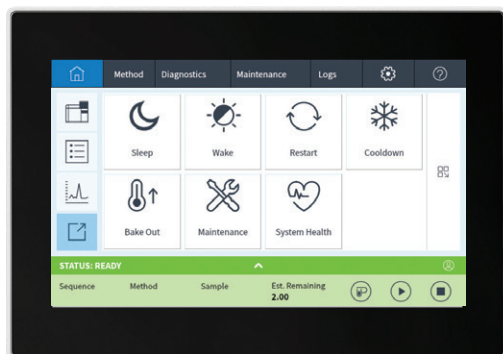
Confirms that analyses are progressing as intended.



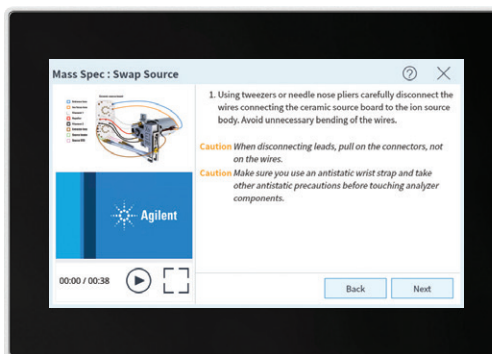
### Additional tabs

Give you quick access to key functions such as:

- Methods
- Diagnostics
- Maintenance
- Logs
- Settings
- Help



Easy access to shortcuts icons take you to your most common tasks quickly.



New onboard videos make common tasks as easy as pushing play.

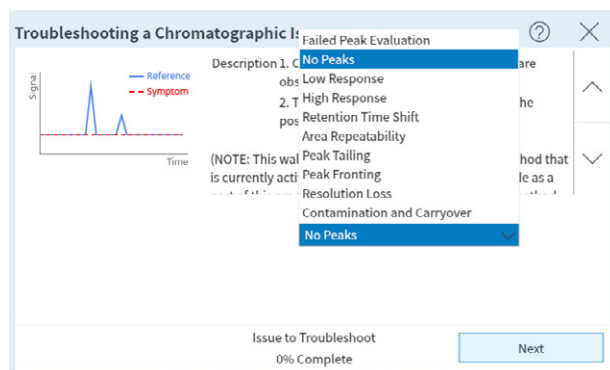


## Newly integrated GC Assist interface reduces downtime and keeps you in control

GC Assist enhances next-level capabilities for maintenance and diagnostics.

| System Health Report |                                |                                 |       |
|----------------------|--------------------------------|---------------------------------|-------|
| Device               | Maintenance Task               | Last Performed                  | Count |
| Front ALS            | Replace Syringe                | -                               | 0     |
| Column 1             | Bakeout Column                 | -                               | 0     |
| Column 1             | Install Column                 | -                               | 0     |
| Column 1             | Remove Column                  | -                               | 0     |
| Column 1             | Replace Column                 | -                               | 0     |
| Column 1             | Trim Column                    | -                               | 0     |
| Front Detector       | Clean FID Collector            | -                               | 0     |
| Front Detector       | Replace FID Collector Assembly | -                               | 0     |
| Front Detector       | Replace FID Ignitor            | -                               | 0     |
| Front Detector       | Replace FID Jet                | -                               | 0     |
| Front Inlet          | Clean Inlet                    | Fri 24 Oct 2025 07:09:12 AM -05 | 2     |
| Front Inlet          | Replace Gold Seal (bottom)     | -                               | 0     |

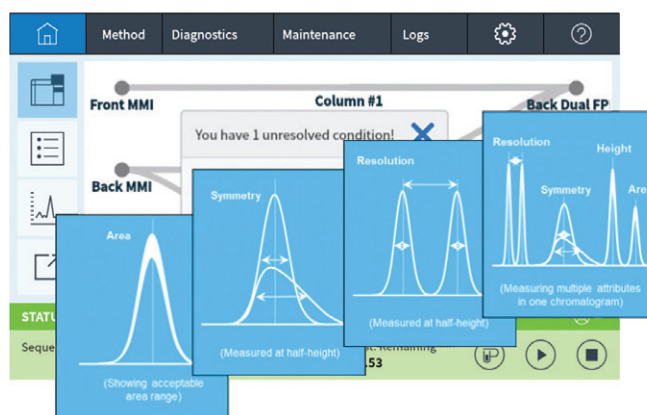
The GC Assist System Health Report delivers a consolidated, real-time snapshot of instrument configuration, operating status, maintenance needs, and diagnostic results to support proactive maintenance and faster troubleshooting.



The troubleshooting capabilities of the 8890 GC combines continuous system monitoring with guided diagnostics and actionable alerts to help users quickly identify the root cause of issues. It not only detects problems early through automated checks, but also provides step-by-step diagnostic guidance and recommended actions directly on the instrument interface.

| Inlets Maintenance        |                   |                  |
|---------------------------|-------------------|------------------|
| Front Inlet - SS          |                   | Back Inlet - MMI |
| Part                      | Status            | Reset All        |
| ✓ Liner o-ring age        | 1 month 4 days    |                  |
| ✓ Liner o-ring injections | 0 injections      |                  |
| ✓ Septum injections       | 0 injections      |                  |
| ✓ Split vent trap age     | 11 months 2 weeks |                  |

Early maintenance feedback (EMF) is a built-in predictive maintenance feature that tracks the usage and condition of key consumables and components. EMF provides advance notification of when maintenance is likely needed, rather than waiting for a failure to occur.



Confirm that your GC/MS chromatography is performing as expected. Diagnostics for peak evaluation of GC detector data allows you to analyze retention time, area, height, and symmetry for targeted peaks. By trending and reporting these results over time, these diagnostics enable users to quickly verify system performance and detect problems before they impact analytical results.

## End-to-end diagnostics maintain system health and maximize uptime with GC Assist

Unexpected instrument downtime disrupts lab operations, especially if you don't know the source of the problem. The 8890B monitors its own vitals, giving you a real-time view of system health.

### System health features:

- User-initiated diagnostic tests
- Automatic diagnostic tests
- GC health parameters monitoring
- Self-guided diagnostic troubleshooting
- Early maintenance feedback (EMF) counters
- GC performance monitoring
- Self-guided maintenance procedures

### Other features:

- Enhanced method diagnostics
- Storage of results
- Improved help guides

# Partnering for sustainability and business success

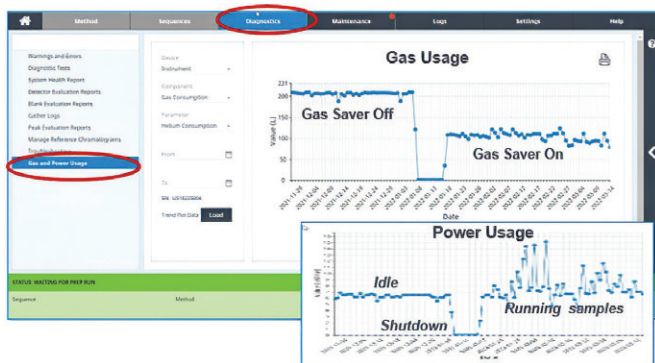


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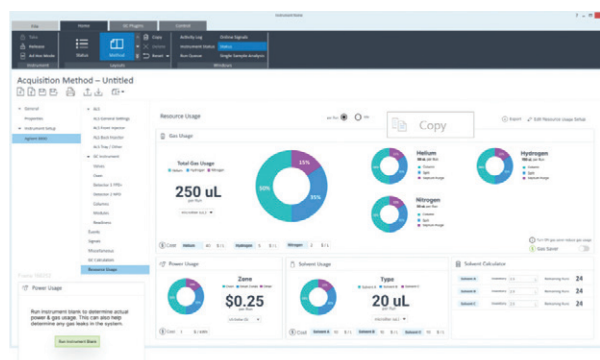
Labs with GC and GC/MS systems have unique sustainability challenges due to the resource-intensive nature of these instruments. The 8890B guides you toward more sustainable practices with new resource management capabilities.

## Monitor resources and improve profitability with new gas and power usage reporting

With sustainability goals now central to laboratory operations, teams increasingly need clear visibility into how instruments and resources are utilized. The 8890B GC features integrated resource management tools—that you can access in seconds from the touch screen or browser interface—to optimize gas consumption, extend consumable life, and minimize your lab's environmental footprint.



Gas and power usage trend charts let you see the effects of gas use during idle, sleep/wake methods, and system shutdown.



Method-based gas, solvent, and power monitoring alerts you to potential waste. For example, if your actual gas use is 10% higher than predicted, a pop-up will warn you of a potential gas leak. You will then be led through a leak and restriction maintenance procedure.



## Prevent disruptions and protect our planet by managing your helium use

Helium has long been the carrier gas of choice for GC and GC/MS analyses. However, the global helium shortage has reduced the availability—and increased the cost—of helium gas, jeopardizing the day-to-day operations of labs that depend on gas chromatography. Here are some strategies for conserving helium and converting to an alternative carrier gas.

### Helium conservation module

Extend the life of your helium tanks by up to 30 times. The [Agilent helium conservation module](#) allows you to use helium for your GC runs and switch to a different gas (typically nitrogen) when your GC is idle. That means you can achieve better control of laboratory operating expenses and avoid workflow disruptions.



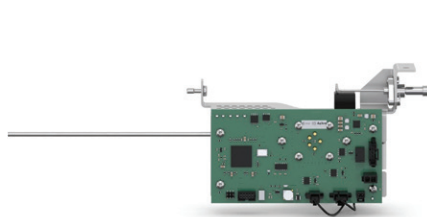
### Alternative carrier gas support

Alternative carrier gases like hydrogen and nitrogen are popular low-cost options.

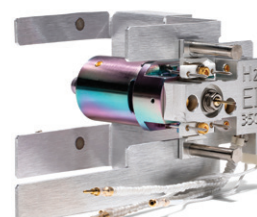
The [Agilent Hydrogen Sensor Module Series 2](#) option adds built-in peace of mind when operating with H<sub>2</sub> gas.

The [Agilent Hydrolnert source](#) minimizes sensitivity loss and spectral anomalies associated with H<sub>2</sub>. It also:

- Maintains spectral fidelity, even for compounds highly susceptible to hydrogenation.
- Improves peak shape for high-boilers, especially polycyclic aromatic hydrocarbons (PAHs).



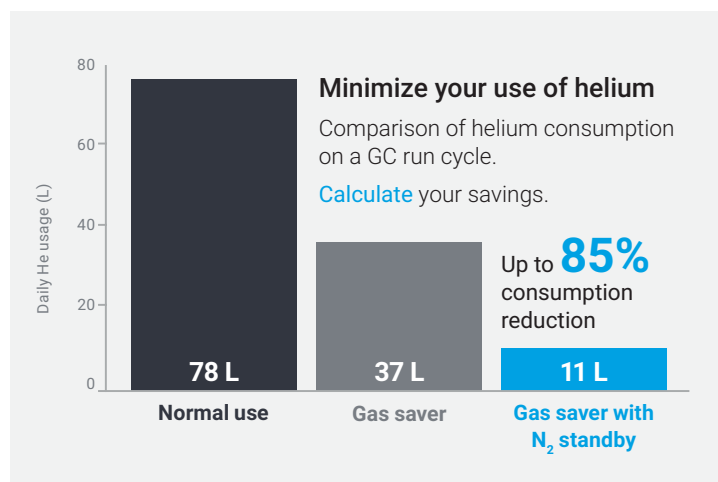
Agilent Hydrogen Sensor Module Series 2



Agilent Hydrolnert source

### Resources to help conserve or convert your GC/MS carrier gas

- [Handle the Hassles of the Helium Shortage](#)
- [Helium Conservation Cost Savings Calculator](#)
- [Agilent EI GC/MS Instrument Helium to Hydrogen Carrier Gas Conversion User Guide](#)
- [Agilent Hydrogen Safety Manual](#)



# At Agilent, we believe that intelligence, productivity, and sustainability are interlinked

Working toward sustainability is an integral part of how we conduct business and respond to our customers' challenges. Together, we can help your lab achieve its sustainability goals—while increasing output, maintaining accuracy, and staying competitive.

## Partnership with My Green Lab

Agilent has joined with My Green Lab to have our instruments independently audited for their **Accountability, Consistency, and Transparency (ACT) label**. ACT labels provide information about the environmental impact of manufacturing, use, and disposal of a product and its packaging, so purchasers can make informed, sustainable choices. Agilent 8860, 8890, and 8850 GC systems have been comprehensively evaluated and have earned ACT labels.

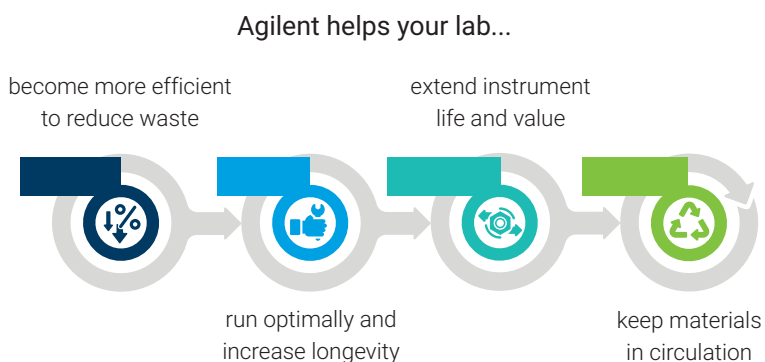


## Trade-in and Buyback

The **Agilent Trade-in and Buyback Program** covers everything from deinstallation, shipping, packaging, and customs fees—free of charge. The program is available in over 20 countries and uses reusable return packaging where possible. You may also get cash or credit for returned instruments.

## Waste reduction strategies for lab instruments

Building a more sustainable laboratory can feel overwhelming. Agilent offers a range of programs and services to help labs **reduce resource consumption and minimize waste**. From relocation and repair to trade-in, recycling, and reuse programs, these solutions support a more sustainable lab environment by extending instrument life and enhancing operational efficiency—all while advancing circular economy principles.



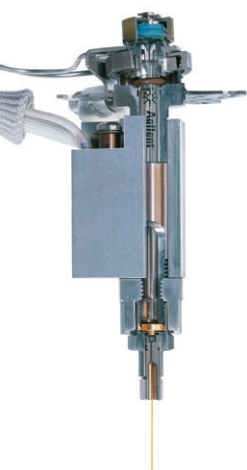
Maximize your investment with an ecosystem of supplies, software, and support designed to ensure your entire analytical workflow operates at peak potential.







## Meet all your analysis needs with flexible GC configurations



### Inlets

Optimize your system with a wide inlet selection:

- Split/splitless (SSL) capillary
- Inert flow path split/splitless (ISSL) capillary
- Multimode inlet (MMI)
- Purged packed injection port (PIIP)
- Programmable cool on-column (PCOC)
- Cool on-column with solvent vapor exit (COC-SVE)
- Programmable temperature vaporizing (PTV)
- Volatiles interface (VI)
- High-pressure gas sample injection
- Gas sampling valve (GSV)
- Liquid sampling valve (LSV)

### Detectors

High-sensitivity detectors accommodate every sample type:

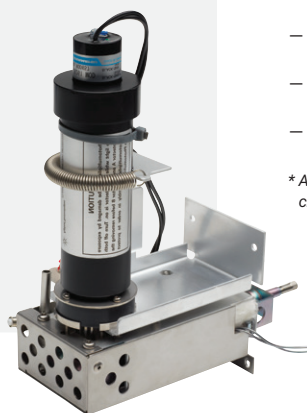
- Mass selective detector (MSD)
- Triple quadrupole MS
- Quadrupole time-of-flight (Q-TOF)
- Triple quadrupole ICP-MS
- Flame ionization detector (FID)
- Thermal conductivity detector (TCD)
- Micro-electron capture detector (Micro-ECD)
- Flame photometric, single- or dual-wavelength detector (FPD)
- Nitrogen-phosphorus detector (NPD)
- Sulfur chemiluminescence detector (SCD)
- Nitrogen chemiluminescence detector (NCD)
- Gas vacuum ultraviolet detector (VUV)
- Atomic emission detector (AED)\*
- Pulsed flame photometric detector (PFPD)\*
- Photoionization detector (PID)\*
- Electrolytic conductivity detector (ELCD)\*
- Halogen specific detector (XSD)\*
- Oxygenate flame ionization detector (O-FID)\*
- Pulsed discharge helium ionization detector (PDHID)\*

### Maximize flexibility and throughput

The Agilent 8890B GC accommodates up to four detector controls and supported sampling valve configurations. It can also collect signals from all four detectors simultaneously:

- |       |                |
|-------|----------------|
| – FID | – FPD/Dual FPD |
| – TCD | – SCD/NCD      |
| – NPD | – ECD          |

What's more, new 6th-generation EPC design—with a core architecture unique to Agilent—allows you to configure up to eight EPC, PCM, and PSDs on an 8890B GC.



\* Available through Agilent channel partners. Contact Agilent for custom configurations and channel partner solutions.

## External valve oven expands your gas sampling options

The Agilent large valve oven (LVO) for GC is a versatile, high-capacity external oven that you can configure to support complex, multivalve GC applications. That means you can implement multiple ASTM and EN methods on a single GC system—with a smaller laboratory footprint.

In addition, the LVO provides a homogeneous isothermal environment for up to six valves, plus open access for maintenance, adjustment, or customization. Accessibility, capacity, and thermal uniformity make the Agilent LVO well suited for combining multiple analyses on a single GC platform. Other advantages include:

- Easy maintenance and servicing
- Configurable analyzers
- Six valve positions plus two micro-valves, with a maximum 14-port valve
- One heated GC zone with optional valve configurations



## Analyzers

More than just instruments, Agilent GC and GC/MS analyzers are complete workflow solutions. They incorporate innovations—such as capillary flow technology and target compound databases—that optimize your system for your unique application.

Each analyzer arrives ready to perform with preset chromatography and checkout samples to verify separation capabilities. Your team can work toward system validation when installation is complete—and significantly reduce your method development costs. And as always, our support team is available should any problems arise.



Energy and chemical GC analyzers



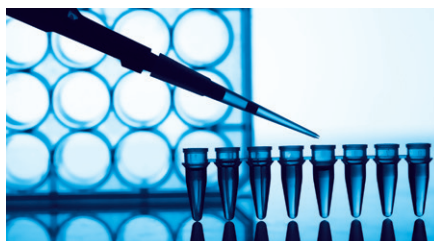
Gas impurities measurements  
GC analyzers



Dissolved gas GC analyzers



Environmental GC analyzers



Forensic GC analyzers



Pharmaceutical GC analyzers



# Agilent autosamplers: The perfect partners for the 8890B GC

Agilent autosamplers eliminate manual errors and provide unmatched reproducibility during sample injection. From smaller runs of up to 16 samples to larger runs of up to 150 samples or more, there's an autosampler that will keep you on track and on time.



7693A ALS  
16/150-vial capacity

Inject new performance into your GC

## Agilent 7693 Series automatic liquid sampler (ALS)

With the fastest injection time of any GC autosampler, the Agilent 7693 Series ALS virtually eliminates thermal discrimination. It minimizes variability and manual errors with enhanced capabilities—such as 3-layer sandwich injections, heating, mixing, and barcode reading. What's more, its modular design lets you upgrade from 16 vials to 150 vials as your lab expands.

Intermediate vial capacity with high precision

## Agilent 7650A automatic liquid sampler (ALS)

For labs that process fewer than 50 samples per day, the robust Agilent 7650A ALS maximizes sample throughput. It provides the same high-speed injection as the 7693 Series ALS to virtually eliminate thermal discrimination. Plus, it includes the enhanced sampling capability of 3-layer sandwich injections.



7650A ALS  
50-vial capacity



PAL3 Series 2 autosampler

Boost output with advanced sample preparation capabilities

## PAL autosampler systems

The versatile PAL3 Series 2 platform is easily configured for liquid injection and offers large-volume injection (LVI), multiple vial sizes, and extended sample vial capacity. It is ideal for liquid injection, headspace, and solid-phase microextraction (SPME) applications.

Automatically introduce volatile compounds from almost any sample matrix

## Agilent 8697 headspace sampler

Agilent 8697 headspace samplers are easy to learn, use, and maintain. They integrate directly with Agilent 8890, 8850, and 8860 GCs, so they can expertly guide users through the tasks required to keep the whole system running optimally. These tasks include automatic leak checks, guided troubleshooting, downloadable system logs, retention time and resolution charting, and consumables tracking.



8697 headspace sampler  
48/120-vial capacity

# Achieve ultimate confidence in detection and identification with mass spectrometry compatibility

The 8890B GC is fully compatible with Agilent single quadrupole, triple quadrupole, and Q-TOF systems.



Discover the possibilities

## **Agilent 5977C GC/MSD**

Designed to provide robust, day-in, day-out performance with mass spectrometry compatibility. The 8860B is fully compatible with an Agilent single quadrupole system, like the 5977C GC/MSD.



Reach a higher plane of productivity

## **Agilent 7000E triple quadrupole GC/MS**

Do you perform multiclass, multiresidue analysis in challenging matrices? The Agilent 7000E GC/TQ gives you the answers you seek with unequivocal robustness. Built-in instrument intelligence—including smart diagnostics and monitoring—reduces downtime and simplifies operations.



Go beyond all limits

## **Agilent 7010D triple quadrupole GC/MS**

Shatter the boundaries of performance with the Agilent 7010D GC/TQ. HES 2.0 ion source technology enables ultratrace-level detection limits, while heated gold quadrupoles deliver unparalleled results with remarkable uptime.



Identify. Quantify. Simplify.

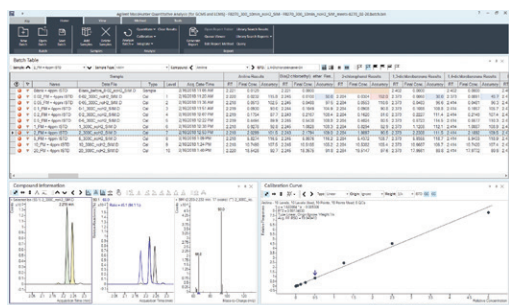
## **Agilent 7250 GC/Q-TOF system**

The all-in-one Agilent 7250 GC/Q-TOF system, together with comprehensive Agilent MassHunter software, provides you with timely, confident answers for your toughest identification, quantification, and exploration challenges.



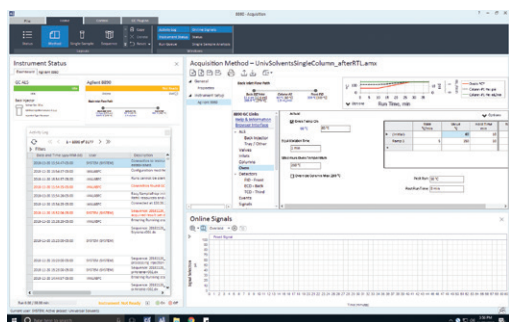
## A complete GC workflow that ensures precision without pressure

In a world of evolving regulations and tightening deadlines, you need more than just hardware. You need a workflow that accelerates your next move. Leverage five decades of analytical innovation to ensure your lab stays compliant, connected, and completely in control.



### Streamline operations and boost productivity **Agilent MassHunter software**

- Enable powerful data collection, processing, and reporting.
- Breeze through application-specific workflows with comprehensive GC and GC/MS support.
- Use one software platform for all Agilent GC and GC/MS instruments, including single quadrupole, triple quadrupole, and GC/Q-TOF.
- Analyze complex samples—including environmental and food matrices—with compound-based analysis and reporting workflows that use MassHunter Quantitative Analysis with Quant-My-Way customization.
- Simplify data analysis with powerful application-specific software, such as retention-time locked MS libraries, MRM databases, and high-resolution personal compound database and libraries.



### Capture, analyze, and share data **Agilent OpenLab CDS**

- Optimize LC, GC, and single quadrupole MS workflows on Agilent and non-Agilent LC/GC instruments.
- Quickly onboard staff with easy-to-use software and intuitive Help and Learning.
- Maintain quality and reliability with role-based access controls and comprehensive audit trails.
- Speed data review by visualizing large data sets with Peak Explorer.
- Identify out-of-spec results with visual highlights in customized reports.
- Automate time-consuming tasks by integrating Sample Scheduler for OpenLab with your LIMS.



## With Agilent columns, supplies, and services, you get more than just products

You also benefit from stringent Agilent specifications and consistent quality, enhancing the sensitivity and performance of your instrument. Agilent is your one-stop source for consumables that let you assemble complete solutions for every application. What's more, comprehensive workflow guides capture the experience and expertise of the Agilent team.



### GC columns

Agilent J&W GC columns deliver the lowest bleed levels, highest inertness, and tightest column-to-column reproducibility. A wide choice of 5" capillary and packed metal columns is available to suit your every need.

[Learn more](#)



### Nonstick BTO inlet septa

Preconditioned, bleed temperature optimized (BTO) septa are designed to sustain inlet operating temperatures up to 400 °C without risk of flow path contamination.

[Learn more](#)



### Ultra Inert gold-plated GC inlet seal

Eliminate leaks at split/splitless injection ports, improving sensitivity and prolonging column life.

[Learn more](#)



### Graphite/Vespel column ferrules

Combining the material properties of high-performance polyimide and graphite, these ferrules resist deformation and prohibit oxygen intrusion into the flow path.

[Learn more](#)



### Ultra Inert inlet liner

These inert liners feature a proprietary deactivation process that eliminates potential active sites located throughout the interior of the liner.

[Learn more](#)



### Gas Clean filter kit

Reduce column damage and sensitivity loss. Gas Clean filters ensure a contaminant-free gas line, and smart sensors alert you when filters are saturated and need replacing.

[Learn more](#)



### ADM Flow Meter and electronic leak detector

The two most critical GC flow path monitoring tasks are combined into a single hand-held cartridge system.

[Learn more](#)



### GC autosampler syringes

Durable syringes feature a specialized plunger head that aligns with the sampler's stroking mechanism to improve injection accuracy and improve plunger longevity.

[Learn more](#)



### Self Tightening column nuts

An innovative design makes these column nuts especially well-suited for oxygen-sensitive detectors such as MS and ECD. Their tight connection remains leak free even after hundreds of injections.

[Learn more](#)



### Genuine replacement parts for Agilent detectors

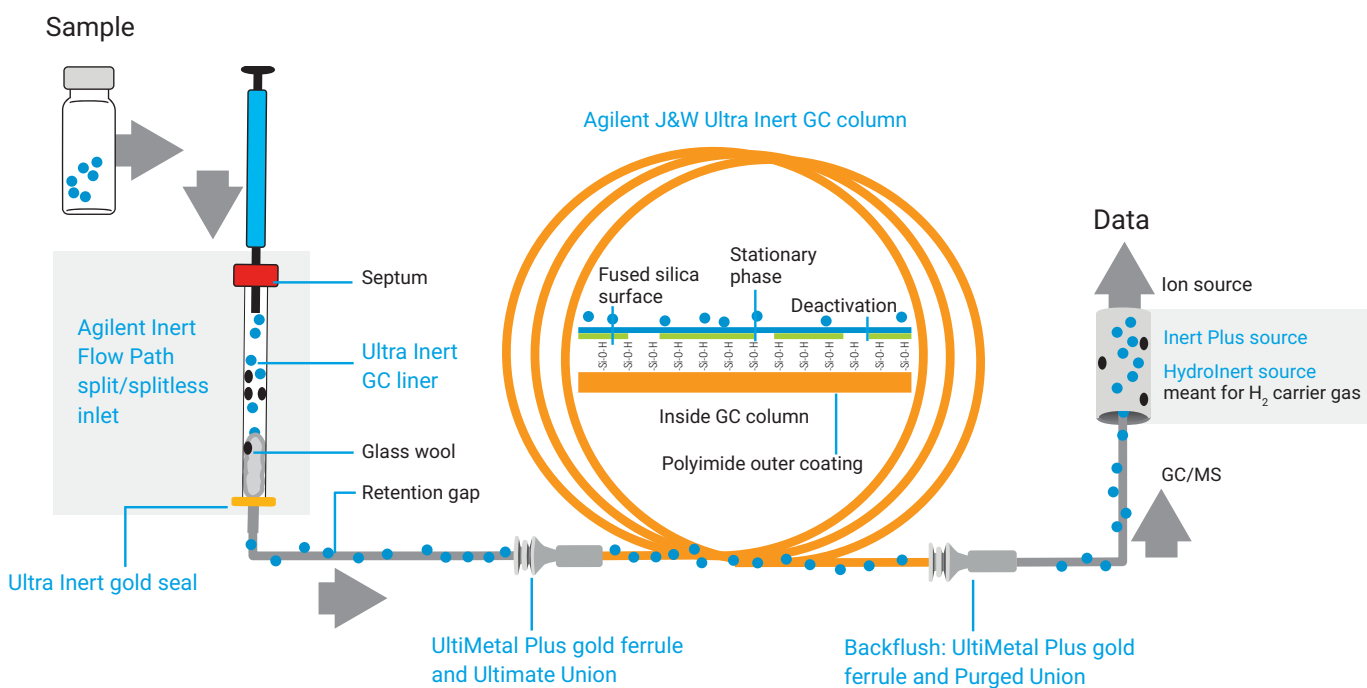
Minimize background interference, low signal counts, and response changes while maximizing performance, signal output, and uptime. All parts are backed by the Agilent service agreement—plus a 90-day warranty from the date of shipment.

[Learn more](#)



## 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. 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.



## Don't miss a thing in your GC/MS analysis

From analyzing active environmental samples to screening for drugs of abuse, [Agilent Inert Flow Path solutions](#) help ensure higher analytical sensitivity, accuracy, linearity, and reproducibility.



# Put our insights to work for you



CrossLab is an Agilent capability that integrates services and consumables to support workflow success, improve productivity, and enhance operational efficiency. In every interaction, we strive to provide insight that helps you achieve your goals. We offer a wide range of products and services—from method optimization and training to full-lab relocations and operations analytics—to help you manage your instruments and your lab for best performance.

Learn more about [Agilent CrossLab services](#).

## New to Agilent GCs? Transitioning from the Agilent 6890 GC?

When it comes to adding new instruments to your lab, no two experiences are quite the same. We're here to help you succeed with flexible service and support options.



### Agilent CrossLab installation

[Agilent CrossLab installation](#) ensures that all hardware and relevant software are unboxed and installed properly. An Agilent expert will make sure your new GC system is free from defects and missing items, tested against manufacturing specifications, and ready for operators to begin training.



### Agilent CrossLab Method Consulting Services and Agilent University

[Method consulting services](#) offer Agilent expertise to customers looking to improve and expand their lab workflows. They consist of four key products: method maintenance, method optimization, method implementation, and method development.

[Agilent University](#) offers flexible, cost-effective training options to help you boost efficiency, minimize downtime, and make a stronger impact on your lab's success. Choose the training format that suits you best—including in person, virtual, and online.



### Agilent CrossLab service plans

[Agilent CrossLab service plans](#), on-demand repairs, and preventive maintenance services help you maintain productivity and minimize downtime.



### Agilent CrossLab Connect Smart Alerts

[Agilent CrossLab Connect Smart Alerts](#) gives you key insights into instrument health—reducing unplanned downtime and sustaining instrument performance for optimal throughput. As part of [CrossLab Connect](#), Smart Alerts notifies you the instant an instrument stops running and when it's time to perform preventive maintenance or replace key consumables. You can also send a service request directly to Agilent using the Remote Assist feature.

## The people behind your service and support

Agilent CrossLab connects you to a global network of experts who strive to deliver insight in every interaction to support your success. From instrument maintenance and repair, relocation and inventory management services, to compliance and software solutions, or consulting and education, Agilent CrossLab is here to help protect your Agilent and non-Agilent instruments. So you can transform your laboratory operations in the best ways possible.



Here's what sets CrossLab service engineers apart

**10 years**

Average instrument  
repair experience

**96%**

Parts available  
right away

**Millions**

Parts accessible at our world-  
wide logistics centers

**85%**

Repairs fixed during  
first visit



**30,000**

Technical training days

**>1,850**

Field service  
engineers worldwide

**50+**

Technology platforms  
covered

**1–2 days**

Typical turnaround time  
for priority service calls

## Promising 10 Years of Value

The **Agilent Value Promise** reflects the utmost confidence in our unrivaled industry standards for quality system design and manufacturing.

From the date you purchase select Agilent chromatography, spectrometry, and spectroscopy instruments, we guarantee at least 10 years use or residual-value credit toward an upgraded replacement. Because we stand behind our systems, our guarantee maximizes your return on investment by ensuring your purchase is safe.

Learn more:

[www.agilent.com/gc/8890b](http://www.agilent.com/gc/8890b)

Buy online:

[www.agilent.com/chem/store](http://www.agilent.com/chem/store)

Find a local Agilent customer center in your country:

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USA and Canada:

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Europe:

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Asia Pacific:

[inquiry\\_lsca@agilent.com](mailto:inquiry_lsca@agilent.com)

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## Agilent 8890B Gas Chromatograph



### Data sheet navigation quick links

[GC system capabilities](#)[Sustainability](#)[Column oven](#)[Electronic pneumatics control \(EPC\)](#)[Inlets](#)[Detectors](#)[Capillary flow technology](#)[Auxiliary EPC devices](#)[Additional specifications](#)

The Agilent 8890B GC delivers high-performance gas chromatography through advanced electronic pneumatic control, precise oven temperature management, and Agilent capillary flow technology, which provides reliable, leak-free, in-oven connections and supports flexible system configurations with minimal method development time.

An upgrade, more responsive 7-inch capacitive touchscreen and a full Agilent GC Assist interface, offer real-time status, configuration, signal monitoring, and remote access for setup, troubleshooting, leak checking, maintenance, and method management across devices.

Sustainability features include programmable sleep and wake modes to reduce resource consumption, along with gas and power usage calculators that track method-level efficiency.

Known for reliability and long life, Agilent GC systems are supported by a 10-year use guarantee to ensure a low cost of ownership.

## GC system capabilities

**Retention time repeatability:** < 0.008% or < 0.0008 minutes

**Area repeatability:** < 0.5% RSD

- Built-in intelligence autonomously monitors the health of the system, alerts the user of potential issues before they affect chromatographic performance, and offers helpful step-by-step guides to resolve issues.
- The 7-inch touch screen gives a visual report of the system configuration, letting you update the active method, perform maintenance routines, and check GC instrument status.
- The GC Assist interface provides remote connectivity enabling you to monitor your smart GC system, check system logs, and perform diagnostics tests, from inside or outside the laboratory.
- Maintenance and service modes, including autonomous leak checks, are easily accessed from the touchscreen and browser interface.
- Atmospheric pressure and temperature compensation are built into every system, so results do not change, even when the laboratory environment does.
- Automatic liquid sampling is fully integrated into mainframe control and includes up to 3-layer sandwich injections and sample preparation capabilities such as heating, mixing, standard addition, and derivatizations.

### Simultaneously supports

- Two inlets
- Five detectors
- Four detectors (with additional large valve oven option)
- Support for up to 10 valves
- Six GC column Smart Key ports

### Instrument dimensions

- **Height:** 49 cm (19.2 in)
- **Width:** 58 cm (22.9 in) with EPC inlet and detectors; 68 cm (26.8 in) with detector as TCD or with certain valving options mounted on the left side of the GC
- **Depth:** 51 cm (20.2 in)
- **Typical weight:** 49 kg (108 lb)

## Maintenance and support services

- Integrated early maintenance counters that allow planned maintenance and help eliminate unnecessary downtime
- Instrument events or shutdowns displayed on keyboard display or data system
- Remote diagnostics
- Performance verification services
- Easy parts identification and part number finder software (standalone software, does not require Agilent CDS)

## Sustainability

- Programmable eco-friendly sleep and wake modes reduce power and gas consumption during periods of inactivity.
- The gas and power usage tracker calculates resource consumption by analytical method.
- Built-in intelligence autonomously monitors the health of the system, alerts the user of potential issues before they affect chromatographic performance, and offers helpful step-by-step guides to resolve issues.
- Helium conservation module, gas saver, and alternative carrier gas solutions can dramatically reduce the amount of helium used (up to 50%), offering flexibility and cost savings.
- The 8890B GC is independently audited for environmental impact throughout the product lifecycle and has received My Green Lab's ACT 2.0 (Accountability, Consistency, Transparency) label.



**Table 1.** Typical 8890B GC power consumption.

| Typical Power Consumption | Operating Conditions (kWh) | Sleep/Idle Conditions (kWh) |
|---------------------------|----------------------------|-----------------------------|
| 8890B                     | 0.856                      | 0.140                       |



## Column oven

- Oven light feature with user-controlled brightness illuminates entire oven, simplifying maintenance tasks
- Column oven dimensions: 28 × 31 × 16 cm
  - Accommodates up to two 105 m × 0.530 mm id capillary columns, or two 10-ft glass-packed columns (9 in coil diameter, 1/4 in od), or two 20-ft stainless steel packed columns (1/8 in od)
- Operating temperature range suitable for all columns and chromatographic separations. Ambient temperature +4 to 450 °C
  - With LN<sub>2</sub> cryogenic cooling: –80 to 450 °C
  - With CO<sub>2</sub> cryogenic cooling: –40 to 450 °C
- Temperature setpoint resolution: 0.1 °C
- Supports 32 oven ramps with 33 plateaus. Negative ramps are allowed.
- Maximum run time: 999.99 minutes (16.7 hours)
- Ambient rejection: < 0.01 °C per 1 °C
- See Table 2 for full oven ramp and cool-down rates

**Table 2.** Typical 8890B GC oven ramp and cool-down rates.

| Temperature Range (°C)    | 120 V Oven* Rates (°C/min) | Faster Ramp Rates** (°C/min) |                   |
|---------------------------|----------------------------|------------------------------|-------------------|
|                           |                            | Dual-Channel                 | Single-Channel*** |
| 50 to 70                  | 100                        | 135                          | 135               |
| 70 to 115                 | 65                         | 100                          | 125               |
| 115 to 175                | 45                         | 80                           | 115               |
| 175 to 300                | 30                         | 50                           | 85                |
| 300 to 450                | 20                         | 35                           | 65                |
| Oven Cool Down (min)****  |                            |                              |                   |
| Without Rapid Cooling Fan | 3.4                        | 3.4                          | 2.5               |
| With Rapid Cooling Fan    | 2.8                        | 2.8                          | 2.0               |

\* Results obtained with line voltage maintained at 120 V.

\*\* Fast ramp rates require power > 200 volts at >15 amps.

\*\*\* Requires G2646-60500 oven insert accessory.

\*\*\*\* Cool-down rates for 120 V and > 200 V GC mainframe.

## Electronic pneumatics control (EPC)

- Up to eight EPC modules can be installed, providing control of up to 19 channels of EPC.
- Compensation for barometric pressure and ambient temperature changes is standard.
- Carrier and makeup gas settings selectable for He, H<sub>2</sub>, N<sub>2</sub>, argon, and methane.
- Pressure has typical control of ±0.001 psi for the range of 0 to 150 psi. Pressure setpoints may be adjusted in increments of 0.001 for the range 0.000 to 99.999 psi, and 0.01 for the range 100.00 to 150.00 psi. See Table 3 for module specifications.

**Table 3.** EPC module specifications.

|                         | Inlet Modules                                     | Flow Modules                               | Detector Modules              |
|-------------------------|---------------------------------------------------|--------------------------------------------|-------------------------------|
| Accuracy                | < ±1% full scale                                  | < ±3% all gases                            | < ±3 mL/min or 7% of setpoint |
| Repeatability           | < ±0.0125 psi (half of 0.025 pressure hysteresis) | < ±0.2% of setpoint                        | < ±0.124% of setpoint         |
| Temperature Coefficient | < ±0.002 psi/°C offset<br>±0.005 psi/°C spa       | < ±0.008 mL/min (NTP) per °C for all gases | N/A                           |

NTP = 25 °C and 1 atmosphere

N/A = Not applicable

## Inlets

### Supported inlets (see Table 4 for specifications)

- Split/splitless (S/SL)
- Multimode inlet (MMI)
- Programmable temperature vaporizer (PTV)
- Temperature-programmable cool on-column injection (PCOC)
- Purged packed injection port (PIPP)
- Volatiles inlet (VI)

**Table 4.** Supported inlets.

|                                                     | S/SL                                                                                                               | MMI                                                                                                                          | PCOC                                                             | PIPP                                                                         | PTV                                                                                                               | VI                                                                                              |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Supported Columns                                   | Suitable for all capillary columns (50 to 530 $\mu$ m id)                                                          | Suitable for all capillary columns (50 to 530 $\mu$ m id)                                                                    | Suitable for all capillary columns (50 to 530 $\mu$ m id)        | Packed, wide-bore capillary<br>1/8-in. packed columns and 0.530 mm capillary | Suitable for all capillary columns (50 to 530 $\mu$ m id)                                                         | Suitable for all capillary columns (50 to 530 $\mu$ m id)                                       |
| Electronic Septum Purge                             | Included                                                                                                           | Included                                                                                                                     | Included                                                         | Included                                                                     | Included                                                                                                          | Included                                                                                        |
| Gas Saver Mode                                      | Available                                                                                                          | Available                                                                                                                    | N/A                                                              | N/A                                                                          | Available                                                                                                         | Available                                                                                       |
| Total Flow Setting                                  | 0 to 600 mL/min N <sub>2</sub><br>0 to 1,350 mL/min H <sub>2</sub> or He<br>0 to 300 mL/min argon/CH <sub>4</sub>  | 0 to 600 mL/min N <sub>2</sub><br>0 to 1,350 mL/min H <sub>2</sub> or He<br>0 to 300 mL/min argon/CH <sub>4</sub>            | 0 to 200 mL/min He, H <sub>2</sub> , N <sub>2</sub> , Ar, and Me | 0.0 to 200.0 mL/min                                                          | 0 to 600 mL/min N <sub>2</sub><br>0 to 1,350 mL/min H <sub>2</sub> or He<br>0 to 300 mL/min argon/CH <sub>4</sub> | 100 mL/min He and H <sub>2</sub>                                                                |
| Injection Mode                                      | Split/splitless, Pulsed split/splitless, Direct                                                                    | Hot or cold Split/splitless, Large volume, Pulsed split/splitless, Solvent vent, Direct                                      | Direct                                                           | Direct                                                                       | Hot or cold Split/splitless, Large volume                                                                         | Split/splitless Direct                                                                          |
| Split Ratio                                         | 12,500:1                                                                                                           | 12,500:1                                                                                                                     | N/A                                                              | N/A                                                                          | 12,500:1                                                                                                          | Up to 100:1 split ratio                                                                         |
| Pressure Range                                      | 0 to 100 psig (0 to 680 kPa) for columns $\geq$ 0.200 mm diameter<br>0 to 150 psig for columns < 0.200 mm diameter | 0 to 100 psig                                                                                                                | 0 to 100 psig                                                    | 0 to 100 psig                                                                | 0 to 100 psig                                                                                                     | H <sub>2</sub> or He carrier, 0.00 to 100 psig pressure control, 0.0 to 100 mL/min flow control |
| Max. Operating Temperature (and Temperature Ranges) | 400 °C                                                                                                             | 450 °C LN <sub>2</sub> (to –160 °C)<br>LCO <sub>2</sub> (to –70 °C)<br>Air (to ambient +10 °C with oven temperature < 50 °C) | 450 °C<br>Sub-ambient control to –40 °C is optional              | 400 °C                                                                       | 450 °C LN <sub>2</sub> (to –160 °C)<br>LCO <sub>2</sub> (to –65 °C)                                               | 400 °C                                                                                          |
| Programable Temperature Ramps                       | N/A                                                                                                                | 10                                                                                                                           | 3                                                                | N/A                                                                          | 3                                                                                                                 | N/A                                                                                             |
| Heating Rate                                        | N/A                                                                                                                | 900 °C/min                                                                                                                   | N/A                                                              | N/A                                                                          | 720 °C/min                                                                                                        | N/A                                                                                             |

N/A = Not applicable

## Detectors

### Flame ionization detector (FID)

- Responds to most organic compounds
- Available in two versions: capillary and packed column optimized. 1/8 in and 1/4 in adapters are available.

|                                             |                                                                                                                 |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Minimum Detectable Level                    | < 1.0 pg C/s                                                                                                    |
| Linear Dynamic Range                        | > 10 <sup>7</sup> (±10%)                                                                                        |
| Max Acquisition Rate                        | 1,000 Hz*                                                                                                       |
| Max Operating Temperature                   | 450 °C                                                                                                          |
| Flameout Detection and Automatic Reignition | Default                                                                                                         |
| Configurations                              | FID can be mounted as an additional detector on the left side of the GC                                         |
| Flow Rate Settings                          | Air: 0 to 800 mL/min<br>H <sub>2</sub> : 0 to 100 mL/min<br>Make-up gas (N <sub>2</sub> or He): 0 to 100 mL/min |

\* Accommodates peaks as narrow as 5 ms at half height.

### Thermal conductivity detector (TCD)

- Universal detector that responds to all compounds, excluding the carrier gas.
- Unique fluidic switching design provides rapid stabilization from turn-on, low-drift performance.
- Signal polarity can be runprogrammed for components having higher thermal conductivity than the carrier gas.

|                           |                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------|
| Minimum Detectable Level  | 400 pg tridecane/mL with He carrier                                                  |
| Linear Dynamic Range      | > 10 <sup>5</sup> ±5%                                                                |
| Max Operating Temperature | 400 °C                                                                               |
| Configurations            | TCD can be mounted as an additional detector on side or as aux detector on top of GC |
| Flow Rate Settings        | Make-up gas: 0 to 12 mL/min<br>Reference gas: 5 to 100 mL/min                        |

### Electron capture detector (ECD)

- A very sensitive detector for electrophilic compounds such as halogenated organic compounds
- Unique micro-cell design minimizes contamination and optimizes sensitivity
- Uses β emission of < 15 mCi <sup>63</sup>Ni as the electron source
- Proprietary signal linearization

|                           |                                                                              |
|---------------------------|------------------------------------------------------------------------------|
| Minimum Detectable Level  | < 3.8 fg/mL lindane                                                          |
| Linear Dynamic Range      | > 5 × 10 <sup>4</sup> with lindane                                           |
| Max Operating Temperature | 400 °C                                                                       |
| Max Acquisition Rate      | 500 Hz                                                                       |
| Configurations            | ECD can be mounted as third detector on side or as aux detector on top of GC |
| EPC Makeup Gas Types      | Argon/5% methane or nitrogen; 0 to 200 mL/min                                |

### Nitrogen-phosphorous detector (NPD)

- A detector specific to nitrogen- or phosphorus-containing compounds
- NPD available - Bloss (glass) bead offering:
  - Longer lifetime
  - More stable operation during the bead's lifetime
- Available for capillary columns only, with adapters available

|                           |                                                                                         |
|---------------------------|-----------------------------------------------------------------------------------------|
| Minimum Detectable Level  | < 0.08 pg N/s, < 0.01 pg P/s with azobenzene/malathion/octadecane mixture               |
| Linear Dynamic Range      | > 10 <sup>5</sup> N, > 10 <sup>5</sup> P with azobenzene/malathion mixture              |
| Selectivity               | 25,000 to 1 g N/g C, 200,000 to 1 g P/g C with azobenzene/malathion/octadecane mixture  |
| Max Operating Temperature | 400 °C                                                                                  |
| Max Acquisition Rate      | Up to 1,000 Hz                                                                          |
| Configurations            | The NPD can be mounted as a third detector on the left side of the GC                   |
| EPC Gases                 | Air: 0 to 200 mL/min<br>H <sub>2</sub> : 0 to 20 mL/min<br>Make-up gas: 0 to 100 mL/min |

### Flame photometric detector (FPD+)

- Class-leading single-wavelength FPD+, or dual-wavelength flame photometric detector (DFPD)—a sensitive, specific detector for sulfur- or phosphorus-containing compounds.
- Available in single- or dual-wavelength versions.

|                           |                                                                                          |
|---------------------------|------------------------------------------------------------------------------------------|
| Minimum Detectable Level  | < 45 fg P/s, < 2.5 pg S/s with methylparathion                                           |
| Linear Dynamic Range      | > 10 <sup>3</sup> S, 10 <sup>4</sup> P with methylparathion                              |
| Selectivity               | 106 g S/g C, 106 g P/g C                                                                 |
| Max Operating Temperature | 400 °C                                                                                   |
| Max Acquisition Rate      | Up to 500 Hz                                                                             |
| Configurations            | The FPD+ can be mounted as an auxiliary detector on top of the GC                        |
| EPC Gases                 | Air: 0 to 200 mL/min<br>H <sub>2</sub> : 0 to 250 mL/min<br>Make-up gas: 0 to 130 mL/min |

### Sulfur chemiluminescence detector (SCD) (Model 8355)

- Highest sensitivity and selectivity for sulfur-containing compounds

|                      |                                               |
|----------------------|-----------------------------------------------|
| MDL                  | Typical < 0.5 pg(S)/sec                       |
| MDL (SCD/FID Tandem) | Typical < 5.0 pg(S)/sec                       |
| Selectivity          | > 2 × 10 <sup>7</sup> (g S/g C <sup>2</sup> ) |
| Linearity            | > 10 <sup>4</sup>                             |
| Repeatability        | < 2% RSD 2 hours<br>< 5% RSD 24 hours         |

## Nitrogen chemiluminescence detector (NCD) (Model 8255)

High selectivity for nitrogen-containing compounds

|                      |                                           |
|----------------------|-------------------------------------------|
| MDL                  | Typical < 3 pg(N)/sec                     |
| MDL (SCD/FID Tandem) | Typical < 30 pg(N)/sec                    |
| Selectivity          | > $2 \times 10^7$ (g S/g C <sup>2</sup> ) |
| Linearity            | > $10^4$                                  |
| Repeatability        | < 1.5% RSD 8 hours<br>< 2% RSD 18 hours   |

**Note:** See Agilent Sulfur Chemiluminescence Detector and Nitrogen Chemiluminescence Detector Specification Guide for additional information regarding performance and physical and environmental specifications.

### Mass spectrometer

#### See specifications for:

- 5977 Series MSD
- 7000 triple quadrupole GC/MS
- 7010 series triple quadrupole GC/MS
- 7250 Q-TOF

#### Other detectors:

Specialized detectors are available through Agilent Channel Partners, including: atomic emission, pulsed flame photometric (PFPD), photoionization (PID), electrolytic conductivity (ELCD), halogen specific (XSD), oxygen-flame ionization (O-FID), and pulsed discharge helium ionization (PDHID).

## Capillary flow technology

Proprietary Agilent capillary flow technology provides devices with reliable, leak-free, in-oven capillary connections to help analyze complex samples and provide gains in productivity. Devices feature:

- Photolithographic chemical milling for low-dead-volume flow pathways
- Diffusion bonding to form a single flow plate
- "Credit card" profile for fast thermal response
- Projection-welded connections for leak-tight fittings
- Deactivation of all internal surfaces in the sample path for inertness

All of the following purged capillary flow devices require one channel from an auxiliary EPC, PCM, or PSD module. Purged capillary flow devices, such as the Deans switch, purged effluent splitters, and purged ultimate unions introduce an additional flow into the sample stream. For detectors that operate at low flow rates, such as the MSD and TCD, some decrease in sensitivity will occur.

### Deans switch

Deans switching provides additional selectivity using two-dimensional GC analysis. Peaks of interest that may be coeluting on one column are diverted to a separate column of different stationary phase. This technique can also reduce maintenance costs by having troublesome solvents or other components bypass detectors or columns.

### Purged effluent splitters

A three-way purged effluent splitter sends column effluent to three detectors. More information can be obtained in a single run to help locate target peaks in unknowns. A two-way purged effluent splitter version is also available.

### Backflush

An Agilent Purged Ultimate Union, or any of the above purged capillary flow devices, also provides the ability to backflush. An auxiliary EPC or PCM can be used for backflushing, but a PSD module is preferred. By reversing column flow immediately after the last compound of interest has eluted, you can eliminate long bake-out times for highly retained (or high-boiling) contaminants, thereby shortening cycle times and protecting the column and detector. As backflush occurs after peaks of interest have eluted, the chromatographic method for peaks of interest does not need to change. Backflush is available when the column is attached to a split/splitless, volatiles interface, multimode, or PTV inlet.

The 8890 GC firmware has been optimized for backflush operation:

- Displays positive and negative flows
- Inlet/outlet pressures settable to the limits of the controlling EPC devices
- EPC can be introduced at any column or restrictor connection
- Capillary flow configuration of up to six columns/restrictors

Backflush Wizard software works with Agilent Chemstation and Agilent MassHunter software to provide a step-by-step procedure for configuring the backflush hardware and column plumbing. The chromatogram must have three well separated peaks. See backflush brochure for additional system requirements.

## Auxiliary EPC devices

The 8890B GC has four positions for auxiliary EPC devices located on the back of the GC. Each position can be any combination of auxiliary EPC or pneumatics control module. Two of the positions also accommodate detectors.

**Note:** The communication for a third detector such as a TCD or ECD EPC module (located on the left side of the GC) interfaces through one of these auxiliary EPC module positions. If a third detector (TCD or ECD) is installed, one of these auxiliary positions is taken. Two of these positions are also compatible with a top-mounted or side-mounted detector.

### Auxiliary EPC module

- Three channels of pressure control
- EPC compensated for atmospheric pressure and temperature variation when connected to a user-defined capillary column
- Psig (gauge) pressure control
- Forward pressure regulated
- Maximum of three auxiliary EPC modules per GC

### Pneumatics control module (PCM)

- Two channels for operation
- EPC compensated for atmospheric pressure and temperature variation when connected to a user-defined capillary column

#### First channel:

- Pressure or flow control
- Psig (gauge) pressure control
- Forward pressure regulated

#### Second channel:

- Pressure control
- Psig (gauge) and psia (absolute) pressure control
- Forward pressure or back pressure regulated
- PCM can be located in either/both inlet EPC positions, and any auxiliary position on the back of the 8890 GC
- Maximum of four PCMs/PSDs per GC

### Pneumatics switching device (PSD)

- EPC compensated for atmospheric pressure and temperature variation when connected to a user-defined capillary column
- The PSD is a pneumatic module specifically designed for backflush
- First channel: same as PCM; engineered bleed restrictor built in

## Additional specifications

### Automated sample injectors and samplers

- The 7693A ALS interface on the 8890B provides power and communications for up to two 7693A automatic injectors, one automatic sampler tray, and one heater/mixer/bar code reader. Injectors and tray install easily without the need for alignment.
- Agilent PAL injector on 8890B. Specialized software controls available on OpenLab CDS ChemStation and EzChrom editions, MassHunter, and MSD Productivity ChemStation.
- The 7650A ALS interface on the 8890B provides power and communications for one 7650 automatic injector. It is also compatible with one additional 7693A mounted on the back inlet. The injector installs easily without the need for alignment.

### Data communications

- LAN
- Two analog output channels (1 V and 10 V output available) as standard
- Remote start/stop
- Touchscreen control of the Agilent automatic liquid sampler (ALS)
- Binary-coded decimal input for a stream selection valve
- Serial port interface for Remote Advisor

### Environmental conditions

- Ambient operating temperature: 15 to 35 °C
- Ambient operating humidity: 5 to 90% (noncondensing)
- Storage extremes: –40 to 70 °C
- Power requirements:
  - Line voltage: 120/200/220/230/240 volts  $\pm 10\%$  of nominal
  - Frequency: 50/60 Hz  $\pm 5\%$
- Operating altitude: 4,600 m



## Safety and regulatory certifications

### Conforms to the following safety standards:

- Canadian Standards Association (CSA) C22.2 No. 61010-1
- Nationally Recognized Test Laboratory (NRTL): ANSI/UL 61010-1
- International Electrotechnical Commission (IEC): 61010-1, 61010-2-010, 61010-2-081
- EuroNorm (EN): 61010-1

### Conforms to the following regulations on electromagnetic compatibility (EMC) and radio frequency interference (RFI):

- CISPR 11/EN 55011: Group 1, Class A
- IEC/EN 61326-1
- AS/NZS CISPR 11
- This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada. ISM 1-A
- Designed and manufactured under a quality system registered to ISO 9001; Declaration of Conformity available

### Other specifications

- Four internal 24-volt connections (up to 150 mA)
- Two external 24-volt connections (up to 150 mA)
- Two on/off contact closures (48 V, 250 mA max)
- 550 Timed events through a data system
- Support for up to 10 valves:
  - Valves 1 to 6, 12 V DC, 13 watts in a heated valve box
  - Valves 7 and 8, externally powered as a remote event from separate contact closure
  - Valves 9 to 10, 24 V DC, 100 mA unheated, for low-power valve applications
- Independent heated zones, not including oven: Eight (two inlets, three detectors, and three auxiliary). Third/fourth detector can use any available zone from inlet or auxiliary zones.
- Maximum operating temperatures for auxiliary zones: 400 °C
- Six GC column Smart Key ports

## References

1. A Guide to Interpreting Detector Specifications for Gas Chromatography. *Agilent Technologies*, publication number 5989-3423EN, **2005**.
2. The Importance of Area and Retention Time Precision in Gas Chromatography. *Agilent Technologies*, publication number 5989-3425EN, **2012**.

[www.agilent.com/gc/8890b](http://www.agilent.com/gc/8890b)

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# Multiple Injection Techniques for Maximum Flexibility

Agilent PAL3 Series 2 autosampler systems



Increase your lab productivity by enhancing your sampler preparation and injection capabilities

Every day, you perform several types of sample injection and manipulation. And now, the PAL3 Series 2 brings you flexible, high-capacity, and traceable options for sample preparation and injection into Agilent gas chromatographs.

The PAL3 Series 2 offers multiple sample injection techniques, including liquid injection, static and dynamic headspace, and solid phase microextraction. Smart chip technology inspires confidence by tracking syringe or SPME specifications and usage history through Agilent OpenLab and MassHunter software.

Take a closer look: [www.agilent.com/chem/pal3](http://www.agilent.com/chem/pal3)



## Integration with Agilent software lets you reduce downtime by planning preventive maintenance

Smart chip technology connects OpenLab and MassHunter software with details of the consumables in use:

- Specification and lot number
- First- and last-use dates
- Time spent within or above multiple headspace temperature ranges
- SPME phase details, maximum/minimum conditioning temperatures, and conditioning duration times
- Plunger counts

These and other details are reported to the Agilent data system used by your GC or GC/MS— with no need for added software or handheld controls.

# PAL3 Series 2 Autosampler

## Overview for gas chromatography samples

### General specifications

#### Dimensions

|        | 50 cm X-Axis     | 85 cm X-Axis     | 120 cm X-Axis      | 160 cm X-Axis     |
|--------|------------------|------------------|--------------------|-------------------|
| Width  | 600 mm (23.6 in) | 915 mm (36.6 in) | 1,270 mm (50.8 in) | 1768 mm (70.7 in) |
| Depth  | 795 mm (31.8 in) | 795 mm (31.8 in) | 795 mm (31.8 in)   | 795 mm (31.8 in)  |
| Height | 770 mm (30.8 in) | 770 mm (30.8 in) | 770 mm (30.8 in)   | 770 mm (30.8 in)  |

#### Weight

Weights without optional modules

| RSI 50 cm               | RSI 85 cm               | RSI 120 cm              | RTC 120 cm              | RSI 160 cm              | RTC 160 cm              |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 12.24 kg<br>(29.68 lbs) | 14.05 kg<br>(30.97 lbs) | 16.09 kg<br>(35.47 lbs) | 18.79 kg<br>(41.42 lbs) | 18.42 kg<br>(40.61 lbs) | 21.12 kg<br>(46.46 lbs) |

#### Environmental conditions

|                                           |                               |
|-------------------------------------------|-------------------------------|
| Operating Temperature Range               | 5 to 40 °C (41 to 104 °F)     |
| Non-Operating (Storage) Temperature Range | –30 to +65 °C (–22 to 149 °F) |
| Altitude                                  | Up to 3,000 m above sea level |

### Sample capacity

|                                        | 50 cm X-Axis                                                                                                                                | 85 cm X-Axis                                                                                                                                     | 120 cm X-Axis                                                                                                                                      | 160 cm X-Axis                                                                                                                                    |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Ambient                                | 2 tray holders<br>420 1 mL vials<br>324 2 mL vials<br>90 10/20 mL vials<br>6 microtiter/deep-well plates                                    | 4 tray holders<br>840 1 mL vials<br>648 2 mL vials<br>240 10/20 mL vials<br>12 microtiter/deep-well plates                                       | 6 tray holders<br>1,260 1 mL vials<br>972 2 mL vials<br>360 10/20 mL vials<br>18 microtiter/deep-well plates                                       | 9 tray holders<br>1890 1 mL vials<br>1458 2 mL vials<br>405 10/20 mL vials<br>27 microtiter/deep-well plates                                     |
| Temperature Controlled<br>(4 to 40 °C) | Maximum 1 Peltier stack<br>Up to with 6DW stacks:<br>420 1 mL vials<br>324 2 mL vials<br>90 10/20 mL vials<br>6 microtiter/deep-well plates | Maximum 3 Peltier stacks<br>Up to with 6DW stacks:<br>1,260 1 mL vials<br>972 2 mL vials<br>240 10/20 mL vials<br>18 microtiter/deep-well plates | Maximum 4 Peltier stacks<br>Up to with 6DW stacks:<br>1,680 1 mL vials<br>1,296 2 mL vials<br>360 10/20 mL vials<br>24 microtiter/deep-well plates | Maximum 6 Peltier stacks<br>Up to with 6DW stacks:<br>2500 1 mL vials<br>1944 2 mL vials<br>540 10/20 mL vials<br>36 microtiter/deep-well plates |

## Compatible modules

|                                                 | RSI | RTC |
|-------------------------------------------------|-----|-----|
| Agitator                                        | ✓   | ✓   |
| Barcode Reader                                  | ✓   | ✓   |
| Centrifuge, 8 × 2 mL Vials                      | ✓   | ✓   |
| Centrifuge 2 × 10 mL, 2 × 20 mL, 4 × 2 mL Vials | ✓   | ✓   |
| Cool On-Column Tool                             | ✓   | ✓   |
| Dilutor (Single or Multi)                       | ✓   | ✓   |
| Fast Wash Module                                | ✓   | ✓   |
| Headspace                                       | ✓   | ✓   |
| ITEX Dynamic Headspace                          | ✓   | ✓   |
| Large Wash Module                               | ✓   | ✓   |
| Micro SPE Solid Phase Extraction                |     | ✓   |
| Peltier Stack (2- or 6-Racks or Plates)         | ✓   | ✓   |
| Solvent Module                                  | ✓   | ✓   |
| SPME                                            | ✓   | ✓   |
| SPME Arrow                                      | ✓   | ✓   |
| Tray Cooler                                     | ✓   | ✓   |
| Vortex Mixer                                    | ✓   | ✓   |

## Typical power consumption

The PAL3 operates with a primary 200 W power supply, which powers the core components for typical workflows including the robotic system, electronics, and control of standard modules (e.g., Agitator, Tools, Drives, etc.). Some power-intensive modules such as the Tray Cooler, Cooled Stack, or Centrifuge Module, have their own 200 W power supply.

Total power consumption depends on system configuration and operation. Some guidelines are as follows:

- Standby mode on typical configuration uses < 20 W.
- When the robotic arm is in motion, power consumption typically increases by approximately 15 W.
- Active heating of a module or tool will further increase the overall power usage during the time of the heating.

## Agitator

|                     |                                                                                                      |
|---------------------|------------------------------------------------------------------------------------------------------|
| Sample Capacity     | Six heated vial positions for 2/10/20 mL vials (Spacers for 2 mL and 10 mL are optionally available) |
| Temperature Control | 30 to 200 °C Selectable in 1 °C increments                                                           |
| Agitation           | Orbital interval shaking, speed selectable from 250 to 750 rpm                                       |
| Dimensions          | Width 114 mm (4.5 in)                                                                                |
|                     | Depth 180 mm (7.1 in)                                                                                |
|                     | Height 176 mm (6.9 in)                                                                               |
| Weight              | 2.38 kg (5.25 lbs)                                                                                   |

## Vortex mixer

|                 |                                                                  |
|-----------------|------------------------------------------------------------------|
| Sample Capacity | 1 vial treated at once                                           |
| Agitation       | Orbital interval shaking, speed selectable from 250 to 2,000 rpm |
| Dimensions      | Width 82 mm (3.3 in)                                             |
|                 | Depth 180 mm (7.1 in)                                            |
|                 | Height 170 mm (7.0 in)                                           |
| Weight          | 2.10 kg (4.63 lbs)                                               |

## 1D Barcode reader

|                           |                                                                                                         |
|---------------------------|---------------------------------------------------------------------------------------------------------|
| Approved Vial Sizes       | 1, 2, 10, 20 mL                                                                                         |
| Dimensions                | Width: 30 mm (1.18 in)                                                                                  |
|                           | Depth: 273 mm (10.75 in)                                                                                |
|                           | Height: 128 mm (5.04 in)                                                                                |
| Weight                    | 0.83 kg (1.83 lbs)                                                                                      |
| Supported Barcode Symbols | UPC-A, UPC-E, EAN-13, EAN-8, Code-128, EAN128/GS1-128, Code 39 3 of 9, 2 of 5 interleaved, and ISTB 128 |

## Fast wash module

|            |                        |
|------------|------------------------|
| Dimensions | Width 60 mm (2.4 in)   |
|            | Depth 315 mm (16.7 in) |
|            | Height 135 mm (5.3 in) |
| Weight     | 0.75 kg (1.7 lbs)      |

## Peltier stack modules

|                     | 2DW                                                                                                                                               | 6DW                                                                                                                                               |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample Capacity     | 2 racks for 54 2 mL vials<br>2 racks for 15 10 mL vials<br>2 racks for 70 1 mL vials<br>2 microtiter or deep-well plates with 96 or 384 positions | 6 racks for 54 2 mL vials<br>6 racks for 15 10 mL vials<br>6 racks for 70 1 mL vials<br>6 microtiter or deep-well plates with 96 or 384 positions |
| Temperature Control | 4 to 40 °C in 0.1 °C increments                                                                                                                   |                                                                                                                                                   |
| Dimensions          | Width 197 mm (7.8 in)                                                                                                                             | Width 197 mm (7.8 in)                                                                                                                             |
|                     | Depth 425 mm (16.7 in)                                                                                                                            | Depth 425 mm (16.7 in)                                                                                                                            |
|                     | Height 103 mm (4.1 in)                                                                                                                            | Height 230 mm (9.1 in)                                                                                                                            |
| Weight              | 3.6 kg (7.9 lbs)                                                                                                                                  | 8.1 kg (17.8 lbs)                                                                                                                                 |

## SPME conditioning module

|                     |                                 |
|---------------------|---------------------------------|
| Temperature Control | 30 to 350 °C in 1 °C increments |
| Dimensions          | Width 44 mm (1.7 in)            |
|                     | Depth 190 mm (7.5 in)           |
|                     | Height 166 mm (6.5 in)          |
| Weight              | 1.2 kg (2.6 lbs)                |

## Dilutor module

|                    |                                                                 |
|--------------------|-----------------------------------------------------------------|
| Number of Channels | Available for single (2 port) or up to five diluents (6 port)   |
| Dimensions         | Width 115 mm (4.5 in)                                           |
|                    | Depth 260 mm (10.2 in)                                          |
|                    | Height 430 mm (16.9 in)                                         |
| Weight             | Single dilutor 2.3 kg (5.1 lbs), multidilutor 4.9 kg (10.8 lbs) |

## Centrifuge modules

|                 |                                                     |                                                                                                                                         |
|-----------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions      | Width 222.6 mm (87.6 in)                            |                                                                                                                                         |
|                 | Depth 326.2 mm (128.4 in)                           |                                                                                                                                         |
|                 | Height 185.0 mm (72.8 in)                           |                                                                                                                                         |
| Weight          | 10.5 kg (23.2 lbs)                                  |                                                                                                                                         |
| Sample Capacity | 2 mL centrifuge:<br>8 vial positions for 2 mL vials | Multicentrifuge:<br>4 vial positions for 2 mL vials<br>or<br>2 vial positions for 10 mL vials<br>or<br>2 vial positions for 20 mL vials |

## Heatex stirrer

|            |                                                                                        |
|------------|----------------------------------------------------------------------------------------|
| Agitation  | Cycloid shaped mixing, speed selectable from 0 to 1,600 rpm (0 to 200 cycloidal loops) |
| Dimensions | Width 85 mm (3.4 in)                                                                   |
|            | Depth 188 mm (7.4 in)                                                                  |
|            | Height 177 mm (7.0 in)                                                                 |
| Weight     | 2.6 kg (5.7 lbs)                                                                       |

## Tray cooler

|                   |                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------|
| Dimensions        | Width 213 mm (8.4 in)                                                                           |
|                   | Depth 446 mm (17.6 in)                                                                          |
|                   | Height 187 mm (7.4 in)                                                                          |
| Temperature Range | 4 to 40 °C                                                                                      |
| Sample Formats    | (with matching insert) 1 mL, 2 mL, 10 mL, 20 mL vials, and microtiter plates                    |
| Sample Capacity   | Three sample racks. Each rack can hold 70 1 mL, 54 2 mL, or 15 10/20 mL vials depending on rack |



## LCMS-P module

### Technical data

| Item                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Needle                        | Gauge 22, Pst 3, Length 51 mm<br>Optional: Gauge 23, Pst AS, Length 51 mm                                                                                                                                                                                                                                                                                                                                                                                 |
| Pump Module                   | 2 solenoid diaphragm pumps, self-priming<br>Flow rate range: 100 mL/min at atmospheric pressure                                                                                                                                                                                                                                                                                                                                                           |
| Transfer tubing               | PFA tube ID 0.787 mm (1/32") / OD 1.58 mm (1/16") including connection fittings and guiding wire, length of transfer tubing: 1300 mm                                                                                                                                                                                                                                                                                                                      |
| Solvent Reservoir Kit (2 pcs) | 100 mL borosilicate glass bottle including:<br>– Glass Filter, 40 µm pore size (1000-SV)<br>– Aspiration Tubing (PFA)                                                                                                                                                                                                                                                                                                                                     |
| Wetted Parts                  | Tubing from Wash Bottle to Pump:<br>– Tubing: PFA<br>– Frit: Glass Filter<br><br>Pumps: Ryton PPS and Kalrez (FFPM)<br><br>Transfer tubing from Pump to LCP Tool:<br>– Tubing: PFA<br><br>LCP manifold: PEEK<br><br><b>Warning:</b> Do not bring tetrahydrofuran (THF), dimethyl sulfoxide (DMSO), chlorinated organic solvents, concentrated mineral acids such as nitric, phosphoric or sulfuric acids, or any related compounds, in contact with PEEK. |
| Electrical Connectors         | 2 x PALbus for daisy chaining<br>M12, 4 position, male, reserved for future use                                                                                                                                                                                                                                                                                                                                                                           |
| PAL Firmware                  | Version 2.1.0 or higher                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Dimensions

(LCMS-P module including mounting) in mm (inches)

|             |                                                                                               |
|-------------|-----------------------------------------------------------------------------------------------|
| Width       | 63 (2.48)                                                                                     |
| Depth       | 270 (10.62)<br>350 (13.78) including connectors                                               |
| Height      | 85 (3.35)<br>550 (21.65) including transfer tube                                              |
| Bench Space | Consider bench space for the Wash Solvent reservoir<br>Bottles, size 1000 mL (or as required) |

### Weight in kg (pounds)

|                       |                                                                    |
|-----------------------|--------------------------------------------------------------------|
| Pump Module           | 0.370 (0.82)                                                       |
| Mounting Bracket      | 0.220 (0.49)                                                       |
| Associate Cable       | 0.15 (0.33)                                                        |
| Solvent Reservoir Kit | Aspiration kit 0.06 (0.13)<br>Reservoir bottle 1000 mL 0.58 (1.28) |

## Analytical specifications

### GC liquid samples

#### Repeatability

##### Specifications

| Alkane          | RSD (Area) |
|-----------------|------------|
| C <sub>14</sub> | ≤0.6%      |
| C <sub>15</sub> | ≤0.6%      |
| C <sub>16</sub> | ≤0.6%      |

##### Conditions

|                                                                                              |
|----------------------------------------------------------------------------------------------|
| Alkane Agilent FID Performance Test Solution (p/n 18710-60170)                               |
| Evaluation Sample Kit, 0.218 g/L C <sub>14</sub> /C <sub>15</sub> /C <sub>16</sub> in hexane |
| 2 mL vials filled with 0.5 mL sample                                                         |

#### PAL sample control method:

##### GC liquid injection

|                            |          |
|----------------------------|----------|
| Sample Volume              | 1 µL     |
| Air Volume                 | 1 µL     |
| Vial Penetration Depth     | 30 mm    |
| Preclean with Solvent 1    | 3        |
| Preclean with Sample       | 1        |
| Fill Volume                | 3 µL     |
| Fill Speed                 | 1 µL/s   |
| Fill Strokes               | 5        |
| Pullup Delay               | 2,000 ms |
| Injector Penetration Depth | 40 mm    |
| Inject Speed               | 50 µL/s  |
| Pre-Inject Delay           | 4,000 ms |
| Post Inject Delay          | 2,000 ms |
| Post Clean with Solvent 1  | 3        |

#### GC Method:

##### SSL (split/splitless injector model)

|                   |                       |
|-------------------|-----------------------|
| Mode              | Split                 |
| Heater            | 280 °C                |
| Pressure          | 52.268 kPa            |
| Total Flow        | 137.6 mL/min          |
| Septum Purge Flow | 5 mL/min              |
| Gas Saver         | 20 mL/min after 2 min |
| Split Ratio       | 50:1                  |
| Split Flow        | 130 mL/min            |

##### Oven

|                     |                                                     |
|---------------------|-----------------------------------------------------|
| Equilibration Time  | 0.5 min                                             |
| Max Temperature     | 300 °C                                              |
| Temperature Program | 80 °C for 1 min, then 25 °C/min to 200 °C for 1 min |

##### Column

|                  |            |
|------------------|------------|
| Constant Flow    |            |
| Pressure         | 52.268 kPa |
| Flow             | 2.6 mL/min |
| Average Velocity | 50.19 cm/s |

##### FID

|                     |            |
|---------------------|------------|
| Heater              | 300 °C     |
| H <sub>2</sub> Flow | 30 mL/min  |
| Air Flow            | 400 mL/min |
| Make-Up Flow        | 25 mL/min  |

##### GC column/injector liner

|        |                                                                                 |
|--------|---------------------------------------------------------------------------------|
| Column | Phenomenex ZB5, 15 m × 0.32 mm, 0.25 µm, 5% diphenyl, 95% dimethyl polysiloxane |
| Liner  | Agilent: Split Liner 4 mm × 6.3 × 78.5, glass wool nondeactivated               |

#### Carryover

##### Specifications

| Alkane | Carryover in blank 1 (ppm) | Carryover in blank 2 (ppm) |
|--------|----------------------------|----------------------------|
| C14    | ≤40                        | Not detectable             |
| C15    | ≤40                        | Not detectable             |
| C16    | ≤40                        | Not detectable             |

##### Conditions

|                                                   |
|---------------------------------------------------|
| Alkane mix, 6.0 g/L in cyclohexane, 1 µL injected |
| 2 mL vials filled to 50%                          |
| Wash solvent: cyclohexane                         |

#### PAL sample control method:

##### GC liquid injection

|                            |          |
|----------------------------|----------|
| Sample Volume              | 1 µL     |
| Air Volume                 | 1 µL     |
| Vial Penetration Depth     | 30 mm    |
| Preclean with Solvent 1    | 3        |
| Preclean with Sample       | 1        |
| Fill Volume                | 3 µL     |
| Fill Speed                 | 1 µL/s   |
| Fill Strokes               | 5        |
| Pullup Delay               | 2,000 ms |
| Injector Penetration Depth | 40 mm    |
| Inject Speed               | 50 µL/s  |
| Pre-Inject Delay           | 4,000 ms |
| Post Inject Delay          | 2,000 ms |
| Post Clean with Solvent 1  | 3        |

GC method:

SSL (split/splitless injector model)

|                   |                       |
|-------------------|-----------------------|
| Mode              | Split                 |
| Heater            | 280 °C                |
| Pressure          | 52.268 kPa            |
| Total Flow        | 137.6 mL/min          |
| Septum Purge Flow | 5 mL/min              |
| Gas Saver         | 20 mL/min after 2 min |
| Split Ratio       | 50:1                  |
| Split Flow        | 130 mL/min            |

Oven

|                     |                                                     |
|---------------------|-----------------------------------------------------|
| Equilibration Time  | 0.5 min                                             |
| Max Temperature     | 300 °C                                              |
| Temperature Program | 80 °C for 1 min, then 25 °C/min to 200 °C for 1 min |

Column

|                  |            |
|------------------|------------|
| Constant Flow    |            |
| Pressure         | 52.268 kPa |
| Flow             | 2.6 mL/min |
| Average Velocity | 50.19 cm/s |

FID

|                     |            |
|---------------------|------------|
| Heater              | 300 °C     |
| H <sub>2</sub> Flow | 30 mL/min  |
| Air Flow            | 400 mL/min |
| Make-Up Flow        | 25 mL/min  |

GC column/injector liner

|        |                                                                                 |
|--------|---------------------------------------------------------------------------------|
| Column | Phenomenex ZB5, 15 m × 0.32 mm, 0.25 µm, 5% diphenyl, 95% dimethyl polysiloxane |
| Liner  | Agilent: Split Liner 4 mm × 6.3 × 78.5, glass wool non deactivated              |

## GC needle discrimination

Specifications

|                                                   |                                                                          |
|---------------------------------------------------|--------------------------------------------------------------------------|
| Peak area C <sub>40</sub> /C <sub>20</sub> ≥ 0.98 | Restek Florida Mix, 1 µL injected, 100 ms fast split/splitless injection |
|---------------------------------------------------|--------------------------------------------------------------------------|

Conditions

|                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Restek Florida mix (p/n 31266) C <sub>8</sub> , C <sub>10</sub> , C <sub>12</sub> , C <sub>14</sub> , ...C <sub>40</sub> , 500 µg/mL in hexane, diluted to 10 ppm with <i>n</i> -hexane |
| Syringe: Hamilton 10 µL, gauge 26s, 57 mm needle length, point style AS (p/n 207837)                                                                                                    |

PAL sample control method: GC liquid injection

|                            |                              |
|----------------------------|------------------------------|
| Sample Volume              | 1 µL                         |
| Air Volume                 | 1 µL                         |
| Vial Penetration Depth     | 30 mm                        |
| Preclean with Solvent 1    | 1                            |
| Preclean with Sample       | 1                            |
| Fill Volume                | 3 µL                         |
| Fill Speed                 | 1 µL/s                       |
| Fill Strokes               | 10                           |
| Pullup Delay               | 2,000 ms                     |
| Injector Penetration Depth | 35 mm                        |
| Inject Speed               | 10 µL/s, fast injection mode |
| Pre-Inject Delay           | 0 ms, fast injection mode    |
| Post Inject Delay          | 0 ms, fast injection mode    |
| Post Clean with Solvent 1  | 1                            |

GC method:

Oven

|                                                     |         |
|-----------------------------------------------------|---------|
| Equilibration Time                                  | 0.5 min |
| 70 °C for 1 min, then 25 °C/min to 340 °C for 1 min |         |

SSL (Split / Splitless Injector Model)

|                   |                                |
|-------------------|--------------------------------|
| Heater            | 280 °C                         |
| Mode              | Constant Flow, 2.5 mL/min (He) |
| Septum Purge Flow | 5 mL/min                       |
| Gas Saver         | 20 mL/min after 2 min          |
| Split Flow        | 80 mL/min                      |
| Splitless Time    | 0.8 min                        |

GC Column

|               |            |
|---------------|------------|
| Constant Flow |            |
| Flow          | 2.5 mL/min |

FID

|                     |            |
|---------------------|------------|
| Heater              | 330 °C     |
| H <sub>2</sub> Flow | 35 mL/min  |
| Air Flow            | 350 mL/min |
| Make-Up Flow        | 30 mL/min  |

GC column/injector liner

|        |                                                                                     |
|--------|-------------------------------------------------------------------------------------|
| Column | Thermo (p/n 26080001) 5% diphenyl, 95% dimethyl polysiloxane, 7 m × 0.32 mm 0.25 µm |
| Liner  | Thermo (p/n 453A1925) (id 4 mm, with glass wool, 4.0 × 6.3 × 78.5)                  |

## Headspace samples

Syringe up to 150 °C

## Repeatability

Specifications

| Syringe            | % RSD |
|--------------------|-------|
| Headspace 2,500 µL | <1    |

Conditions

|                                                                                                      |
|------------------------------------------------------------------------------------------------------|
| n = 7                                                                                                |
| iso-Octane, 5 µL out of microcapillary in a 20 mL headspace vial, sealed immediately 500 µL injected |

PAL sample control method:

headspace injection general

|                            |           |
|----------------------------|-----------|
| Sample Volume              | 500 µL    |
| Incubation Temperature     | 90 °C     |
| Incubation Time            | 600 s     |
| Syringe Temperature        | 100 °C    |
| Fill Speed                 | 100 µL/s  |
| Pullup Delay               | 10,000 ms |
| Pre-Inject Delay           | 2,000 ms  |
| Inject Speed               | 100 µL/s  |
| Injector Penetration Depth | 40 mm     |
| Post Inject Delay          | 5,000 ms  |
| Purge Time                 | 90 s      |

GC Method:

Oven

|                              |         |
|------------------------------|---------|
| Equilibration Time           | 0.5 min |
| Max Temperature              | 300 °C  |
| 200 °C for 2.5 min, isotherm |         |

SSL (split/splitless injector model)

|                   |                       |
|-------------------|-----------------------|
| Mode              | Split                 |
| Heater            | 250 °C                |
| Pressure          | 56.204 kPa            |
| Total Flow        | 17.55 mL/min          |
| Septum Purge Flow | 5 mL/min              |
| Gas Saver         | 20 mL/min after 2 min |
| Split Ratio       | 1:250                 |
| Split Flow        | 12.5 mL/min           |

GC column/GC injector liner

|        |                                                       |
|--------|-------------------------------------------------------|
| Column | Agilent: Retention Gap, FS deactivated, 0.100 mm, 5 m |
| Liner  | Thermo: Straight Split Liner, 990 µL volume, 4 mm id  |

## Carryover

Specifications

| Syringe            | Carryover in blank 1 (ppm) | Carryover in blank 2 (ppm) |
|--------------------|----------------------------|----------------------------|
| Headspace 2,500 µL | 1,000                      | 500                        |

Conditions

iso-Octane, 5 µL out of microcapillary in a 20 mL headspace vial, sealed immediately, 500 µL injected

PAL sample control method:

headspace injection general

|                            |           |
|----------------------------|-----------|
| Sample Volume              | 500 µL    |
| Incubation Temperature     | 90 °C     |
| Incubation Time            | 600 s     |
| Syringe Temperature        | 100 °C    |
| Fill Speed                 | 100 µL/s  |
| Pullup Delay               | 10,000 ms |
| Pre-Inject Delay           | 2,000 ms  |
| Inject Speed               | 100 µL/s  |
| Injector Penetration Depth | 40 mm     |
| Post Inject Delay          | 5,000 ms  |
| Purge Time                 | 90 s      |

## LC samples

LCMS-P tool

Specifications

| Syringe | Loop size (µL) | Injected Volume (µL) | Specification                      |
|---------|----------------|----------------------|------------------------------------|
| 100 µL  | 20             | 80                   | Full loop injection: RSD ≤ 0.1%    |
| 100 µL  | 20             | 10                   | Partial loop injection: RSD ≤ 0.5% |
| 100 µL  | 2              | 8                    | Full loop injection: RSD ≤ 0.1%    |
| 100 µL  | 2              | 1                    | Partial loop injection: RSD ≤ 0.5% |

LC conditions

|                                                                                                            |
|------------------------------------------------------------------------------------------------------------|
| Full Loop Injection: n = 10                                                                                |
| 4 x overfill Sample for 2 µL Loops: Caffeine, 80 µg/mL in H <sub>2</sub> O : ACN = 90 : 10 v/v + 0.1 % TFA |
| Sample for 20 µL Loops: Caffeine, 8 µg/mL in H <sub>2</sub> O : ACN = 90 : 10 v/v + 0.1 % TFA              |
| Partial Loop Injection: n = 10                                                                             |
| Sample for 2 µL Loops: Caffeine, 80 µg/mL in H <sub>2</sub> O : ACN = 90 : 10 v/v + 0.1 % TFA              |
| Sample for 20 µL Loops: Caffeine, 80 µg/mL in H <sub>2</sub> O : ACN = 90 : 10 v/v + 0.1 % TFA             |
| Injection Valve: Vici Valco Cheminert C72VX-1676D-CTC                                                      |

PAL sample control method:

LC injection LCMS standard general

|                            | Full Loop  | Partial Loop |
|----------------------------|------------|--------------|
| Sample Volume              | 80 µL (8)* | 10 µL (1)*   |
| Rear Air Gap               | 3 µL       | 3 µL (1)*    |
| Front Air Gap              | 3 µL       | 3 µL (1)*    |
| Rear Volume                | 5 µL       | 5 µL         |
| Front Volume               | 5 µL       | 5 µL         |
| Fill Speed                 | 5 µL/s     | 5 µL/s       |
| Inject Speed               | 5 µL/s     | 5 µL/s (1)*  |
| Pre Inject Delay           | 500 ms     | 500 ms       |
| Post Inject Delay          | 2000 ms    | 2000 ms      |
| Pullup Delay               | 2000 ms    | 2000 ms      |
| Post Clean with Solvent 1  | 1          | 1            |
| Post Clean with Solvent 2  | 1          | 1            |
| Valve Clean with Solvent 1 | 80 µL      | 80 µL        |
| Valve Clean with Solvent 2 | 80 µL      | 80 µL        |
| Stator Wash                | Off        | Off          |
| Clean Valve Flow Rate      | 20 µL/s    | 20 µL/s      |

\* Numbers in parentheses are valid for 2 µL loop size only,  
all other numbers are valid for both loop sizes.

LC method

|                    |                                                                         |
|--------------------|-------------------------------------------------------------------------|
| Gradient           | Isocratic: 100 % A A = H <sub>2</sub> O : ACN = 90 : 10 v/v + 0.1 % TFA |
| Runtime            | 2.0 min                                                                 |
| Flow               | 0.5 mL/min                                                              |
| Detection          | UV 273 nm                                                               |
| Flow Cell          | L: 60 mm<br>Volume: 4 µL                                                |
| Column             | HALO C18; 2.1 × 50 mm, 2.7 µm                                           |
| Column temperature | 40 °C                                                                   |
| HPLC System        | Agilent 1290 Infinity                                                   |

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## Agilent 5977C GC/MSD System

The Agilent 8890/5977C Series gas chromatograph/mass selective detector (GC/MSD) builds on a tradition of leadership in GC and MS technology, with the world's most competitive performance and productivity features.

### Agilent GC/MSD system features

**Agilent 5977C GC/MSD** – the most sensitive and robust MSD provides:

- Four EI source options including the revolutionary high-efficiency source (HES), which offers the industry's lowest instrument detection limit (IDL) and best signal-to-noise ratio (S/N) and a HydroInert source for H<sub>2</sub> carrier gas applications.
- A heated monolithic quartz gold quadrupole (heatable up to 200 °C) for rapid elimination of contamination to keep the analyzer clean.
- A second-generation triple-axis detector (TAD) for eliminating neutral noise.
- Scan speeds up to 20,000 u/sec (extractor ion source and HES).
- An optional oil-free IDP-3 roughing pump: a cleaner, quieter, and greener alternative (for use with turbo molecular pump systems).

### 10-Year value promise

Support is guaranteed for 10 years from the date of purchase, or Agilent will provide credit for the residual value of the system toward a model upgrade.

## Installation checkout specifications

Agilent verifies GC/MSD system performance at the customer site. IDL is a statistically based metric that more accurately confirms system performance than an S/N measurement. Test specifications are based on splitless injection into an Agilent J&W HP-5ms Ultra Inert 30 m × 0.25 mm, 0.25 µm column for helium and a 20 m × 0.18 mm, 0.18 µm column for HydroInert with hydrogen. IDL analyses use lab helium (hydrogen for HydroInert) with GC gas filters installed. See more about the IDL test at <http://www.chem.agilent.com/Library/technicaloverviews/Public/5990-8341EN.pdf>

| Instrument Detection Limit (IDL)                                                         |
|------------------------------------------------------------------------------------------|
| The industry's most rigorous performance metric                                          |
| Based on eight consecutive injections and their statistical analysis of precision (%RSD) |
| Measured at an amount near the detection limit                                           |
| Accurate assessment of the true detection limit and lower limit of quantification (LLOQ) |
| IDL tested and proved at installation for applicable configurations                      |

| IDL Specifications                        |                           |                             |                                                  |
|-------------------------------------------|---------------------------|-----------------------------|--------------------------------------------------|
| Instrument                                | IDL* (Helium Carrier Gas) | IDL* (Hydrogen Carrier Gas) | Source                                           |
| Installation Specifications               |                           |                             |                                                  |
| Agilent 5977C HES MSD                     | 1.5 fg                    | –                           | HES                                              |
| Agilent 5977C EI/CI MSD                   | 10 fg                     | –                           | Extractor for EI                                 |
| Agilent 5977C Inert Plus EI MSD           | 10 fg                     | –                           | Extractor                                        |
| Agilent 5977C EI MSD                      | 20 fg                     | –                           | Stainless steel                                  |
| Agilent 5977C EI MSD with Agilent 8860 GC | 40 fg                     | –                           | Stainless steel                                  |
| Agilent 5977C HydroInert MSD              | –                         | 50 fg                       | HydroInert source for H <sub>2</sub> carrier gas |
| Reference Specifications                  |                           |                             |                                                  |
| Agilent 5977C HES MSD                     | 1.0 fg                    | 10 fg                       | HES                                              |
| Agilent 5977C EI/CI MSD                   | –                         | 50 fg                       | Extractor for EI                                 |
| Agilent 5977C Inert Plus EI MSD           | –                         | 50 fg                       | Extractor                                        |
| Agilent 5977C EI MSD                      | –                         | 70 fg                       | Stainless steel                                  |

\* IDL was statistically derived at 99% confidence level from the area precision of eight sequential splitless injections of OFN (octafluoronaphthalene). Demonstration of IDL specifications require a compatible system configuration, including a liquid autosampler with a 5 µL syringe.

- HES IDL was measured using 10 fg injection, 1 µL injection.
- Other IDLs were measured using 100 fg, 1 µL injection.
- A 30 m column was used for helium IDL checkout; a 20 m column was used for hydrogen IDL checkout.
- Helium carrier gas for Installation Specifications of the HES, Extractor, and Stainless steel sources; hydrogen carrier gas for Installation Specification of the HydroInert source only.
- Reference IDL specifications from the above table will be confirmed only when purchased as an additional service with a compatible new system (GC and MS) installation.

## Signal-to-noise (S/N) specifications

| S/N Reference Specifications <sup>a</sup> |                                            |                                   |                                     |                                       |                           |                           |                                        |
|-------------------------------------------|--------------------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|---------------------------|---------------------------|----------------------------------------|
| Instrument Configuration                  | Source                                     | EI Scan S/N <sup>b</sup> (Helium) | EI Scan S/N <sup>b</sup> (Hydrogen) | Sample Concentration (1 µL Injection) | PCI Scan S/N <sup>c</sup> | NCI Scan S/N <sup>d</sup> | High Vacuum System                     |
| Agilent 5977C HES MSD                     | HES                                        | 2,000:1                           | 1,000:1                             | 0.1 pg/µL OFN                         |                           |                           | Turbo molecular pump                   |
| Agilent 5977C EI/CI MSD                   | Extractor for EI; Agilent CI source for CI | 5,000:1 (EI)                      | –                                   | 1 pg/µL OFN                           | 1,200:1                   | 2,000:1                   | Turbo molecular pump                   |
| Agilent 5977C Inert Plus EI MSD           | Extractor                                  | 5,000:1                           | 2,500:1                             | 1 pg/µL OFN                           |                           |                           | Turbo molecular pump                   |
| Agilent 5977C HydroInert MSD              | HydroInert                                 | –                                 | 2,500:1                             | 1 pg/µL OFN                           |                           |                           | Turbo molecular pump                   |
| Agilent 5977C EI MSD                      | Stainless steel                            | 600:1                             | 300:1                               | 1 pg/µL OFN                           |                           |                           | Turbo molecular pump or diffusion pump |
| Agilent 5977C with Agilent 8860 GC        | Stainless steel                            | 250:1                             | –                                   | 1 pg/µL OFN                           |                           |                           | Turbo molecular pump or diffusion pump |

<sup>a</sup> S/N checkout is performed only if there is no compatible autosampler (which is required for IDL checkout). Helium carrier gas, manual injection using a 30 m × 0.25 mm, 0.25 µm column and in scan mode. Hydrogen carrier gas, manual injection using 20 m × 0.18 mm, 0.18 µm column and in scan mode. When the autosampler (ALS) is present, these specifications are a reference of the performance. Reference S/N specifications from the above table will not be confirmed at installation or introduction for ALS equipped systems.

<sup>b</sup> Standard scanning from 50 to 300 u at nominal 272.0 u ion.

<sup>c</sup> 1 µL injection of 100 pg/µL benzophenone (BZP) standard, 80 to 230 u scan at nominal 183 u ion, using methane reagent gas.

<sup>d</sup> 2 µL injection of 100 fg/µL OFN standard scanning from 50 to 300 u at nominal 272 u ion, using methane reagent gas.

| Agilent 5977C Series GC/MSD System Specifications            |                                                                                                                                                             |
|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ionization Mode (Standard)                                   | EI                                                                                                                                                          |
| Ionization Modes (Optional)                                  | PCI, NCI                                                                                                                                                    |
| EI Ion Source Type                                           | Five supported sources: stainless steel, inert, extractor, HydroInert, HES                                                                                  |
| Electron Energy                                              | 5 to 241.5 eV                                                                                                                                               |
| Emission Current                                             | 0 to 315 $\mu$ A                                                                                                                                            |
| CI Gases                                                     | Dual gas inlet                                                                                                                                              |
| Filaments                                                    | Dual for EI, single for CI                                                                                                                                  |
| Transfer Line Temperature                                    | 100 to 350 °C                                                                                                                                               |
| Ion Source Temperature                                       | 150 to 350 °C                                                                                                                                               |
| Quadrupole Temperature                                       | 106 to 200 °C                                                                                                                                               |
| Mass Filter                                                  | Heated monolithic hyperbolic quadrupole                                                                                                                     |
| Ion Source – Mass Filter Interface                           | Dynamically rampable entrance lens                                                                                                                          |
| Mass Range                                                   | 0.6 to 1,091 u                                                                                                                                              |
| Mass Resolution                                              | Unit mass                                                                                                                                                   |
| Mass Accuracy                                                | 1 $\mu$ L injection of a 100 pg/ $\mu$ L OFN standard scanning from 50 to 300 u will give its monoisotope at $m/z$ 271.987 $\pm$ 0.005 <sup>a</sup>         |
| Spectral Accuracy                                            | 1 $\mu$ L injection of a 100 pg/ $\mu$ L OFN standard scanning from 50 to 300 u will give 99.0% spectral accuracy <sup>a</sup>                              |
| Mass Axis Stability                                          | Better than 0.10 u/48 hours                                                                                                                                 |
| Detector                                                     | Series II triple-axis detector with high energy dynode and long-life electron multiplier (EM)                                                               |
| Dynamic Range (Electronic)                                   | 10 <sup>6</sup>                                                                                                                                             |
| Scan Rate <sup>b</sup>                                       | Agilent 5977C Inert Plus (extractor source and HydroInert source) and Agilent 5977C HES up to 20,000 u/sec;<br>Agilent 5977C (SS source) up to 12,500 u/sec |
| SIM                                                          | 60 ions $\times$ 100 groups                                                                                                                                 |
| Pumping System (Helium)                                      | 65 L/s diffusion pump (available only with the 5977C EI MSD) and 255 L/s turbo pump with 2.5 m <sup>3</sup> /hr mechanical pump                             |
| Maximum Recommended Analytical Gas Flow                      | 1.5 mL/min (diffusion pump)<br>4 mL/min (turbo pump)                                                                                                        |
| Recommended Maximum Sustained Column Flow to MS <sup>c</sup> | 3 mL/min (diffusion pump)<br>50 mL/min (turbo pump)                                                                                                         |
| Instrument Control                                           | Agilent MassHunter data system or OpenLab CDS                                                                                                               |
| Maintenance Accessibility                                    | Source (including filaments, lenses), mass filter <sup>d</sup> , and detector on removable plate for easy access                                            |
| Maintenance Scheduling                                       | Early maintenance feedback (EMF) for GC and MSD, user-defined maintenance schedule, with display of current status                                          |
| Source cleaning                                              | Automated and vent-free with proprietary JetClean option                                                                                                    |
| Direct/Real-time sample analysis or probe                    | QuickProbe when added to the GC/MSD, enables direct analysis in real time of samples and liquids with minimal-to-no sample preparation, in under 1 minute.  |
| Support Life                                                 | Guaranteed 10 years useable life with support for seven years                                                                                               |

<sup>a</sup> Only applicable with optional Accurate Mass software package. Scan mode only. Not verified during installation.

<sup>b</sup> As scan rate increases, sensitivity will decrease, and resolution may degrade.

<sup>c</sup> A high flow rate into a fixed ion source will cause a loss in sensitivity.

<sup>d</sup> The heated quadrupole mass filter should not require maintenance, but if maintenance is required, it should be performed by an Agilent service engineer.

| GC (Agilent 8890, 8860 and Intuvo 9000 GC) |                                                                                                                                                                                                                  |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GC                                         | Intuvo 9000 GC, 8890 GC and 8860 GC – see <a href="http://www.agilent.com">www.agilent.com</a> for details.                                                                                                      |
| Sample Introduction                        | Agilent 7693A automatic liquid sampler, 7650A automatic liquid sampler, CTC PAL3, 8697A headspace sampler, 7697A headspace sampler, thermal desorption, headspace, purge and trap, and other third party devices |
| Liner Replacement                          | Compatible with turn-top system                                                                                                                                                                                  |
| Inlet (Up to Two)                          | Split-splitless inlet (standard), multimode inlet (MMI) (on the 8890 and Intuvo GC), cool on column (COC) inlet, and others (optional)                                                                           |
| Oven Temperature                           | <b>8890 and Intuvo GC:</b> Ambient +4 to 450 °C<br><b>8860 GC:</b> Ambient +8 to 425 °C                                                                                                                          |
| Oven Ramps/Plateaus                        | 20/21 with negative ramps allowed<br><b>Max Heating Ramp:</b><br><b>8890 GC:</b> 120 C/min<br><b>8860 GC:</b> 75 C/min<br><b>Intuvo 9000 GC:</b> 250 C/min                                                       |
| Carrier Gases                              | helium, hydrogen, nitrogen                                                                                                                                                                                       |
| Electronic Pneumatic Control (EPC)         | EPC split/splitless, septum purge and auxiliary EPC modules                                                                                                                                                      |
| Carrier Gas Control Modes                  | Constant flow, constant pressure, programmable flow and programmable pressure                                                                                                                                    |
| Pressure Range                             | <b>8890 GC and Intuvo 9000 GC:</b> 0 to 100 psi (standard), 0 to 150 psi (optional) with 0.001 psi resolution<br><b>8860 GC:</b> 0 to 100 psi with 0.01 psi resolution                                           |
| Flow Control                               | <b>8890 GC and Intuvo 9000 GC:</b> Compatible with optional capillary flow device controller (not supported with 8860 GC)                                                                                        |
| Retention-Time Locking                     | RTL-ready                                                                                                                                                                                                        |

| Ease of Maintenance                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Turn top inlet sealing system is built in standard with each 8890 and 8860 GC S/SL inlet (and 8890 multimode inlet) for quick, easy injector liner changes. <sup>a</sup> |
| A glass window shows ion source type, filament operation, and ion source connections.                                                                                    |
| The source (including filaments and lenses) and electron multiplier can be removed from the instrument in less than one minute after venting.                            |
| The optional micro ion gauge <sup>b</sup> can be replaced without removal of the mass spectrometer covers.                                                               |

<sup>a</sup> Inlet temperature should be cool enough to touch when performing maintenance.

<sup>b</sup> A micro ion gauge is shipped standard for the CI system, and is available optionally for EI systems.

| Data System                                                      |                                                                                                                                                                                                                     |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Acquisition Software                                             | Agilent MassHunter GC/MS Acquisition and OpenLab CDS Acquisition                                                                                                                                                    |
| Simultaneous MS and GC Signals                                   | Up to two MSD signals (SIM/scan) and four GC detector signals per instrument                                                                                                                                        |
| Instrument Connections (Agilent MassHunter Acquisition)          | Four instruments total: up to two GC/MSDs or four GCs                                                                                                                                                               |
| SIM/scan                                                         | Automated SIM setup and synchronous SIM/scan operation; CI optimization in both PCI and NCI modes for common reagent gases                                                                                          |
| Chemical ionization Setup                                        | Electronic mass flow control of reagent gases                                                                                                                                                                       |
| High-Mass Confirmation                                           | Verification test kit (optional)                                                                                                                                                                                    |
| Tune Options                                                     | Autotune (Atune.U), Extraction source tune (Etune.U), BFB Autotune (BFB_Atune.U), Standard Spectra Tune (Stune.U), DFTPP (target tune for USEPA semivolatile method 8270), BFB (target tune for VOC analysis)       |
| Data Analysis Software                                           | Agilent MassHunter and classic Agilent MSD ChemStation or Agilent OpenLab CDS (version 2.0 or greater)                                                                                                              |
| Application Reports                                              | Environmental, drugs-of-abuse, aromatics in gasoline                                                                                                                                                                |
| Custom Reporting                                                 | Agilent MassHunter: Microsoft Excel, classic Agilent MSD ChemStation: custom reporting                                                                                                                              |
| Spectral Libraries (optional)                                    | NIST, Wiley/NIST, Maurer/Pfleger/Weber Drug                                                                                                                                                                         |
| Agilent Retention Time Locked Mass Spectral Libraries (Optional) | Pesticides and endocrine disrupter databases, volatiles, PCBs, toxicology, hazardous chemicals, indoor air toxics, Japan Positive List, forensic toxicology, environment semivolatiles, metabolomics (Fiehn method) |
| Target Deconvolution                                             | Integrated deconvolution and spectral matching for identification and quantitation of low-level targets in complex matrices                                                                                         |
| Security                                                         | Data and result security and tamper detection                                                                                                                                                                       |
| 21CFR11 Compliance                                               | Agilent MassHunter Quantitative Analysis and Agilent MassHunter GC/MS Acquisition tools or Agilent OpenLab CDS (version 2.0 or greater)                                                                             |
| Multivariate Analysis (Optional)                                 | Agilent Mass Profiler Professional                                                                                                                                                                                  |
| Sample Class Prediction (Optional)                               | Sample Class Predictor or Agilent Mass Profiler Professional                                                                                                                                                        |
| Other Capabilities (Optional)                                    | Deconvolution reporting software linked with RTL database for classic MSD ChemStation Accurate mass data with Cerno MassWorks Software                                                                              |

| Safety, Regulatory Compliance, and Operational Conditions                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| This instrument is manufactured and distributed under a quality system certified to ISO9001. It complies with international regulatory, safety, and electromagnetic compatibility requirements. In addition, further testing was performed according to Agilent standards, to ensure operation after delivery and long-term usage. |                                                                                                                                                                                                                       |
| Safety                                                                                                                                                                                                                                                                                                                             | Canadian Standards Association (CSA): CAN/CSA-C22.2<br>No. 61010-1<br>CSA/Nationally Recognized Test Laboratory (NRTL): UL 61010-1 International Electrotechnical Commission (IEC): 61010-1<br>EuroNorm (EN): 61010-1 |
| Electromagnetic Compatibility                                                                                                                                                                                                                                                                                                      | CISPR11/EN55011:Group1, Class A<br>EN61326-1                                                                                                                                                                          |
| Sound Emission                                                                                                                                                                                                                                                                                                                     | ISO 7779 and ISO 3744- sound pressure Lp<br>For noisy lab space: $L_{pA}$ max. = 65 dB operator, 70 dB bystander                                                                                                      |
| Power                                                                                                                                                                                                                                                                                                                              | 120 V, 50/60 Hz, 1,100 VA;<br>200 V, 50/60 Hz, 1,100 VA;<br>220 to 240 V, 50/60 Hz, 1,100 VA                                                                                                                          |
| Operating Environment                                                                                                                                                                                                                                                                                                              | Operational: 15 to 35 °C, 20 to 80%, relative humidity – noncondensing<br>Storage: –40 °C to +70 °C, 0 to 95%, relative humidity – noncondensing                                                                      |
| Operating Altitude                                                                                                                                                                                                                                                                                                                 | Turbo models: to 15,000 ft (4,572 m)<br>Diffusion pump models: 12,000 ft (3,658 m)                                                                                                                                    |
| Nonoperating Storage                                                                                                                                                                                                                                                                                                               | Turbo and diffusion pump models: 30,000 ft (9,144 m)                                                                                                                                                                  |

| Physical Requirements with the 8890 and 8860 GC |                                                                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Dimensions (GC/MS)                              | 88 cm (w), 56 cm (d), 50 cm (h) Additional space should be added for the auto injector, sample tray, data system, and printer. |
| Weight (GC/MS)                                  | 81 to 112 kg (depending on configuration)                                                                                      |

[www.agilent.com](http://www.agilent.com)

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 5994-4846EN

# Discover the Possibilities with Mass Spectrometry Intelligence

7000E triple quadrupole GC/MS





# A history of leadership in GC and GC/MS

Agilent has over 50 years of leadership in GC and GC/MS. The story of Agilent's leadership in mass spectrometry started with the founding of HP back in 1938. Every step of the way, your goals become our goals: improving user experience, laboratory operation, and business success.



1971

## 5930A Tabletop MS

The first GC/MS from HP with an oscilloscope and strip chart was introduced.



1982

## 5970 MS

This landmark Agilent product was the first of a long line of GC/MS instruments. With a mass range almost as good as the early floor standing models, the sensitivity was comparable to our earlier benchtops.



1994

## GCD

Gas chromatography/mass spectrometry as a technology gained so much popularity that we introduced an easier-to-use model, the GCD.



1996

## 5973 GC/MSD

The 5973 showcased extended mass range and sensitivity. MSD ChemStation and the Local Control Panel allowed two GC/MSDs to be controlled by one PC.



2005

## 5975 GC/MSD

The 5975 GC/MSD further extended the mass range up to 1050 m/z and delivered a sensitivity S/N of 100:1 with 1 pg OFN.



1976

## 5992A Benchtop GC/MS

Up until this time, all GC/MS systems were floor-standing units. The 5992 marked a milestone with the first benchtop instrument.



1988

## Unix and DOS ChemStation

The Unix ChemStation was the successor to the Pascal workstation. The Agilent DOS Chemstation included low-cost PCs and more sophisticated operating systems that made it possible to move to more common computing platforms.



1996

## Hyperbolic gold-coated quartz quadrupole

Hyperbolic, gold-coated, quartz quads enhanced sensitivity, performance, spectra, and isotope ratios.



2007

## MassHunter software

From instrument settings to data analysis and reporting, MassHunter software made GC/MS analysis both powerful and routine for all.



2009

### 7000A triple quadrupole GC/MS

The first GC/MS system from Agilent harnessed the selectivity and associated sensitivity gains of true GC/MS/MS capability.



2012

### 7200 GC/Q-TOF

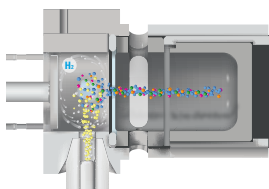
The ideal tool to solve complex problems, the 7200 GC/Q-TOF introduced high-resolution accurate mass to the Agilent GC/MS portfolio.



2015

### 5977B GC/MSD and high-efficiency ion source

Delivered unparalleled analytical sensitivity with extreme operational efficiencies for ultra trace-level applications.



2017

### JetClean self-cleaning ion source

Greatly reduced or eliminated the need for source cleaning, thereby enhancing productivity on the single and triple quadrupole GC/MS systems.



2019

### QuickProbe GC/MS

The Agilent QuickProbe GC/MS system was designed for forensic laboratories looking to do direct analysis in real time without sample preparation.



2022

### 7000E and 7010C

Agilent 7000E and 7010C GC/TQ expand instrument intelligence to enable new acquisition modes and more self-aware diagnostics. The 7000E is also compatible with the Agilent Hydrolnert source.

2012

### Removable ion source

The removable ion source (RIS) allowed ventless exchange of EI and CI source technologies on the Agilent 7200 GC/Q-TOF.



2013

### 5977A GC/MSD

The 5977A introduced the Extractor EI Ion Source for enhanced sensitivity and thermal profile improvement. It also featured direct communication between the 7890B GC and the MSD.



2016

### 7010B triple quadrupole GC/MS

The Agilent 7010B represented the evolution of proven performance, featuring compatibility with the high efficiency and JetClean sources, plus the introduction of dMRM Acquisition.



2017

### 7250 GC/Q-TOF

Featuring simultaneous high resolution and high dynamic range, the 7250 enhanced and expanded upon the high-resolution accurate mass workflows of its predecessor, the 7200 GC/Q-TOF.



2022

### 5977C

5977C offers improved analytical performance and technologies that maximize instrument uptime. The new Hydrolnert source improves performance with H<sub>2</sub> as a carrier gas.



2024

### 7010D

Novel HES 2.0 ion source technology maximizes uptime while delivering industry-leading limits of detection.

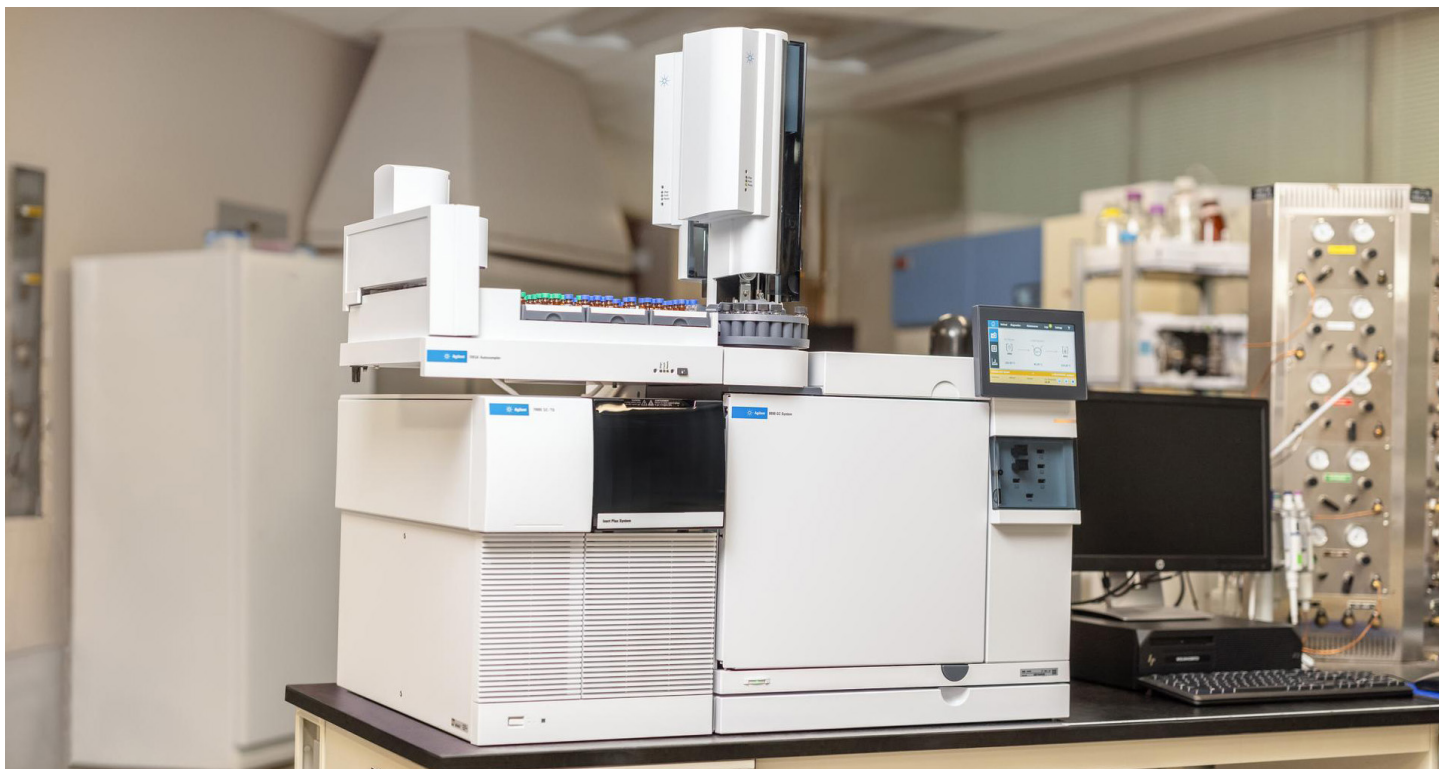


The Agilent 7000E GC/TQ

## Designed to Meet Your Business Goals

Turnaround times are critical to your lab's reputation. Yet, every day brings new productivity challenges—including instrument downtime, sample reruns, and data reviews. Meet the Agilent 7000E triple quadrupole GC/MS (GC/TQ) system. The 7000E GC/TQ delivers reliable, consistent performance every day, offering exceptional sensitivity and dynamic range to support a broad spectrum of targeted and untargeted workflows. It is powered by new technologies that drive maximum lab productivity, so you can focus on moving your lab forward.





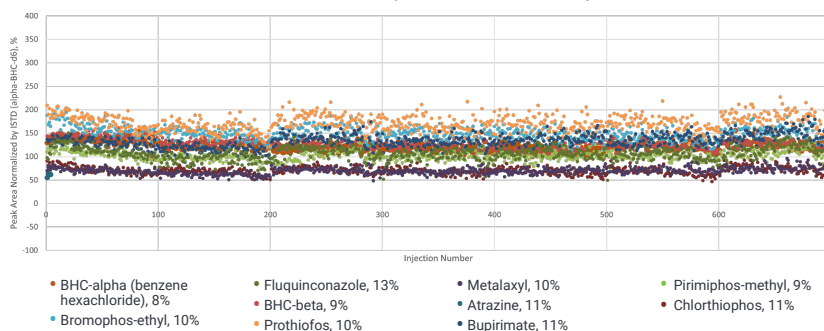
## Mass spec performance that keeps you competitive



### 7000E: Robustness and reproducibility

The Inert Plus Extractor EI source enables high analytical 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.

Peak area normalized by the ISTD over 700 injections



Peak area response for pesticides spiked into a spinach extract prepared by QuEChERS extraction followed with Captiva EMR-HCF cleanup at 20 ppb was shown to be stable over 700 injections when analyzed with the 7000E GC/TQ. The run time of the analysis was 10 minutes. The only performed maintenance included GC liner and septum replacement every 100 injections. 7000E GC/TQ demonstrated excellent response stability and reproducibility over time.





## Intelligence that powers ultimate productivity

The new Agilent 7000E triple quadrupole GC/MS instruments incorporate intelligent technology that reduces instrument downtime and improves run times for maximum productivity in analytical labs.

### End-to-end intelligent diagnostics

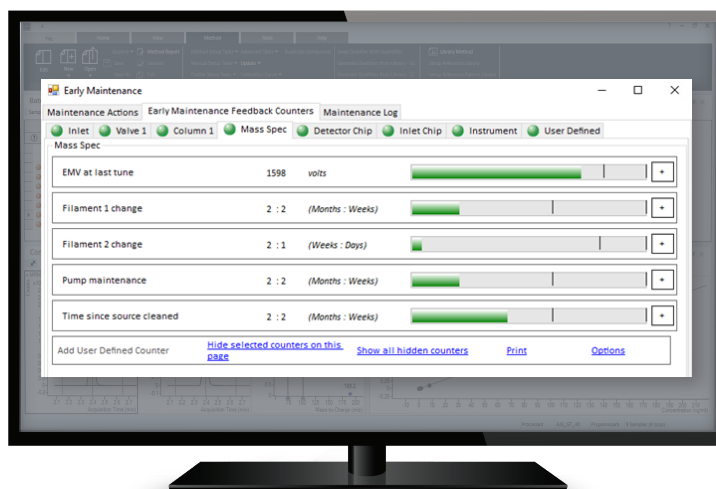
Before each tune, the GC/TQ performs a 360° system readiness check to ensure your instrument is ready when you are. In addition to the detailed system screening and system evaluation processes, self-aware GC features provide convenient diagnostic and maintenance tools including self-guided maintenance procedures with step-by-step instructions for common tasks that can be viewed from mobile devices anywhere.

### Peak performance, no guesswork

Tweaking and fine-tuning your GC/TQ to optimize performance is challenging and time-consuming. The innovative, fully automated, rapid SWARM autotune algorithm in the 7000E GC/TQ takes the guesswork out of achieving peak instrument performance.

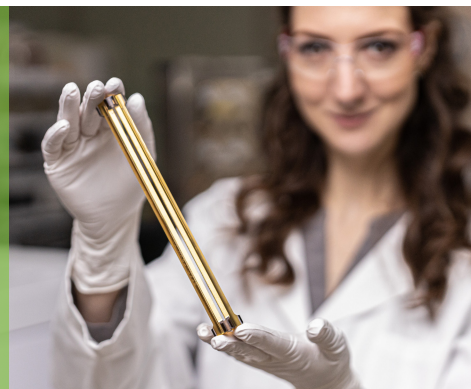
### Maximize uptime, anticipate downtime

Unexpected instrument issues and the resulting downtime is extremely disruptive to lab operations, especially if you don't know the source of the problem. The 7000E GC/TQ monitors its own vitals, giving you a real-time view of the system's overall health with Early Maintenance Feedback.

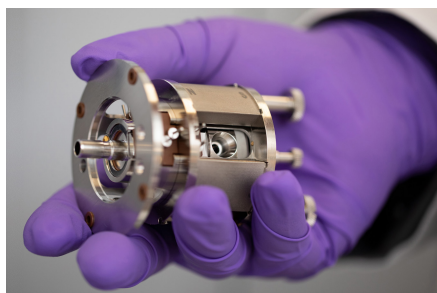


# Innovations That Drive Profitability

Throughput. Uptime. Efficiency. Operating costs.



No matter what business you're in, these are fundamental factors that impact profitability. You face constant pressure to analyze more and more samples, even as resources shrink and analytical challenges grow. In your lab, every task has the potential to increase or decrease your profit. Every instrument has to contribute. Every sample counts.



## Agilent JetClean self-cleaning ion source

During routine analysis, matrix deposits inevitably build up. In the past, you would have to remove the ion source, scrub the lens, then put it all back together. The Agilent JetClean self-cleaning ion source maximizes instrument uptime and sample throughput by greatly reducing or even eliminating the need for manual ion source cleaning, resulting in an additional one to two days per month to perform analyses. JetClean is available as an option on Agilent single quadrupole and triple quadrupole GC/MS systems.

[Learn more](#) about the JetClean self-cleaning ion source



## Hyperbolic gold-coated quartz quadrupole

The quartz monolith guarantees perfect alignment for hyperbolic surfaces throughout the life of the mass spectrometer. Gold surfaces stay clean and are maintenance free at high temperatures—up to 200° C.





## Capillary Flow Technology

Many GC and GC/MS analyses are performed on complex samples that contain high-boiling compounds. Agilent Capillary Flow Technology lets you backflush the column once all peaks of interest have eluted, thus forcing out any remaining components. The benefits include reduced cycle times, less column maintenance, better data, and enhanced productivity.

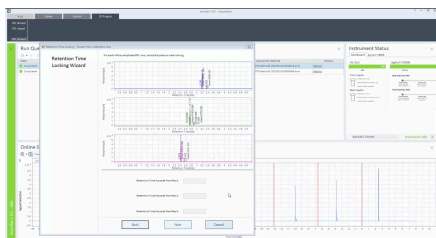
[Learn more](#) about Agilent Capillary Flow Technology



## Agilent IDP-10 dry scroll pump

The Agilent IDP-10 dry scroll pump is an oil-free, compact, quiet, isolated vacuum pump with remote speed control. It uses an inverter-driven motor, providing uniform vacuum performance at all global frequencies and input voltages. IDP pumps use a single-sided scroll design that offers a 15-minute maintenance procedure with simple tools. Compatible with 7000 series and 7010 series GC/TQ systems, instruments that use hydrogen as a carrier gas, and JetClean.

[Learn more](#) about the Agilent IDP-10 dry scroll pump



## Retention Time Locking (RTL)

RTL provides an easy and flexible tool that can be used to reduce the time and complexity often associated with updating expected retention times after routine chromatographic maintenance. It also allows different GC systems in the same lab or across a laboratory network to have the same retention times when running the same GC method. This allows easy data comparison and can simplify quality control checks.

# Hydrolnert source: Maximizing efficiencies with H<sub>2</sub> carrier gas

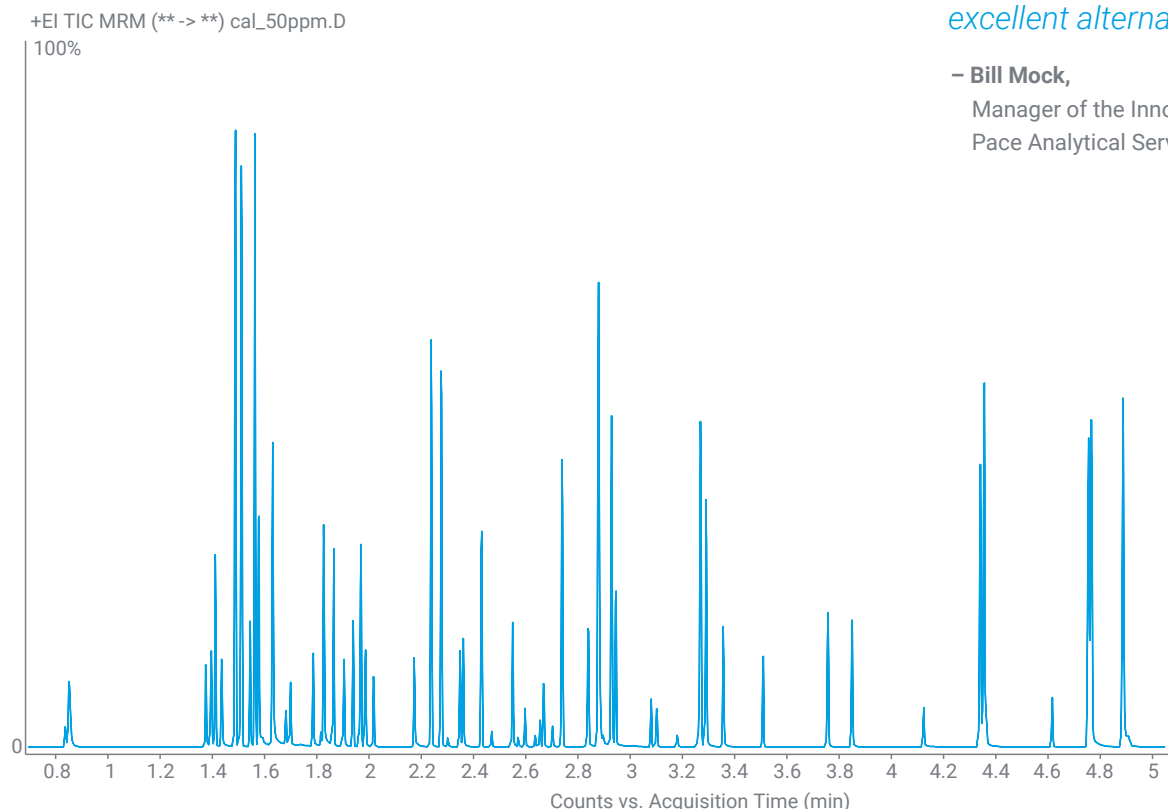
## Overcome the challenges of using hydrogen as a carrier gas

Helium being a finite resource with an inefficient production, makes it expensive. Hydrogen is a low cost, renewable gas that is the best alternative to helium. The new Hydrolnert source minimizes loss in sensitivity and spectral anomalies associated with H<sub>2</sub> gas. These are some of the unique advantages of Hydrolnert:

- Spectral fidelity, even for compounds highly susceptible to hydrogenation
- Superior high-boiler peak shape, especially for PAHs
- Unchanged source parts and familiar assembly procedure



## EPA Method 8270 SVOCs analysis: 50 ppm standard in MRM mode with H<sub>2</sub> carrier



U.S. EPA 8270 SVOCs full mixture was analyzed with the 7000E equipped with Hydrolnert source running H<sub>2</sub> as a carrier gas. The analysis benefitted from improved peak shapes compared to helium as a carrier gas as well as a faster run time at 5.8 minutes.

*"Helium shortages are becoming commonplace, so this will be an excellent alternative to He."*

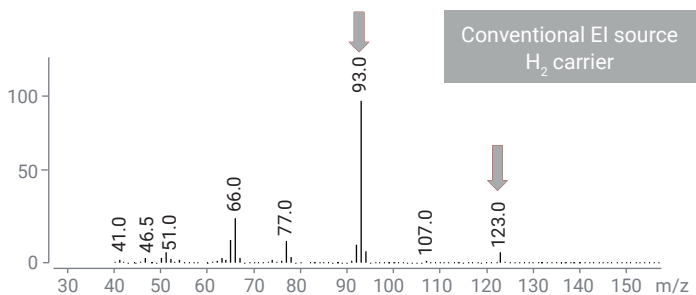
– **Bill Mock**,  
Manager of the Innovation Laboratory  
Pace Analytical Services

## Safety considerations when converting to hydrogen carrier gas

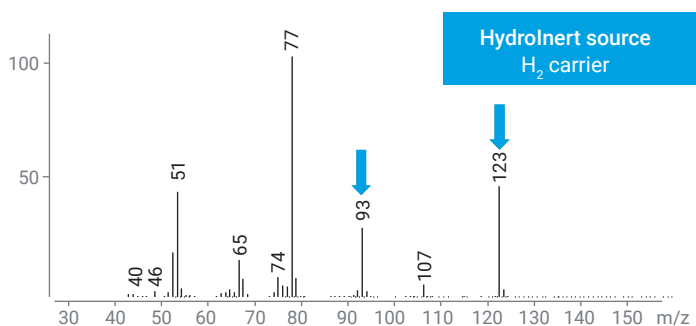
**Safety is the most important consideration when handling hydrogen due to the concern of flammability. For detailed safety information, see the Agilent Hydrogen Safety Manual for GC/MS (part number [G7003-90053](#)). The entire safety manual must be read and understood before converting and using hydrogen as the carrier gas.**

## Analysis of nitrobenzene—a compound vulnerable to in-source reactions and hydrogenation

Spectral fidelity, resolution, and peak shape is greatly improved with Hydrolnert while running on H<sub>2</sub> carrier gas

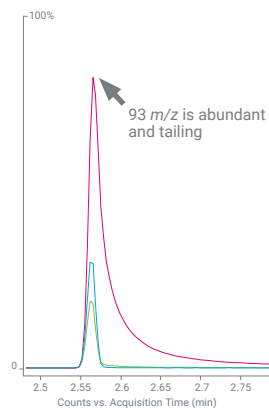


The Extractor source (3 mm extraction lens) showed hydrogenation to aniline with the abundant  $m/z$  93 ion.



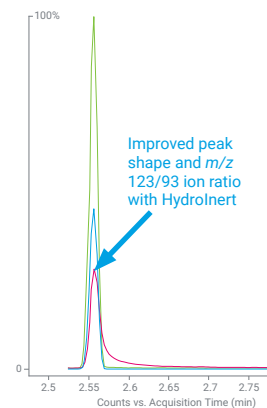
Improved spectral fidelity, showing excellent ratio of  $m/z$  123

Conventional EI source  
H<sub>2</sub> carrier

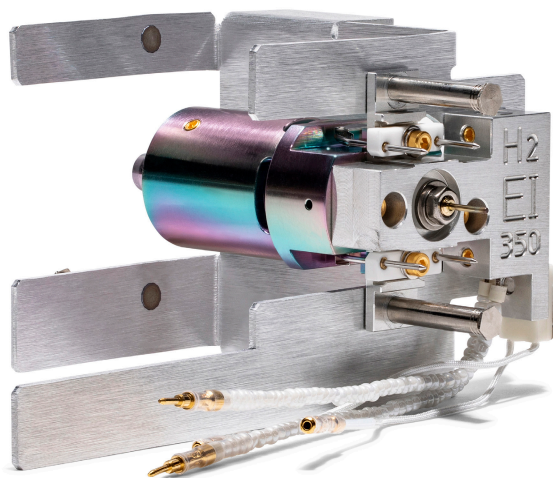


Typical performance showing hydrogenation to aniline with the abundant  $m/z$  93 ion.

Hydrolnert source  
H<sub>2</sub> carrier



The Hydrolnert source showed an improved mass spectrum that correlates to nitrobenzene.



The new Agilent Hydrolnert source

### Resources to help conserve or convert your GC/MS carrier gas

Use these links to help with your GC/MS conversion to hydrogen

#### [Handle the Hassles of the Helium Shortage](#)

Explore ways to manage price fluctuations and potential delivery interruptions with helium carrier gas for GC analyses.

#### [Helium Conservation Cost Savings Calculator](#)

See how much you could save by using Agilent Gas Saver with and without nitrogen standby.

#### [Helium Conservation Module](#)

Prevent disruptions by managing your helium usage.

#### [Agilent EI GC/MS Instrument Helium to Hydrogen Carrier Gas Conversion User Guide](#)

Get detailed instructions on converting your Agilent EI GC/MS system from helium to hydrogen carrier gas.



## MassHunter Acquisition 13.0: Modern, intelligent, and familiar

Introducing MassHunter Acquisition 13.0 for all GC/MS applications—including single quadrupole, triple quadrupole, and Q-TOF.

- New streamlined retention time locking interface improves usability.
- Easy sample prep technology simplifies the automation of extraction, addition, heating, and mixing to perform derivatizations, internal standard additions, serial dilutions, and similar tasks.
- What's more, MassHunter software unifies operators of all levels to drive confident results.
- It also supports multiple applications with easy-to-use method templates.





## Make data management smarter, simpler, and safer

Traditional data management systems are error prone and burdensome, because each instrument's data must be managed individually and manually. Partner with Agilent to accelerate your transition to a networked model, and bring these advantages to your lab:

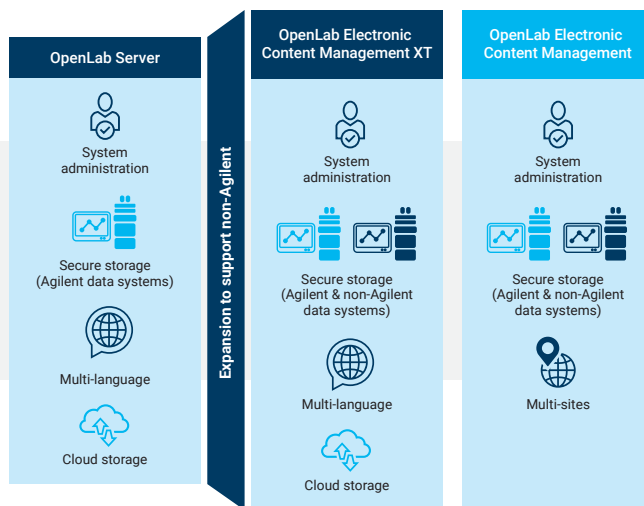
- **Connectivity:** Instrument integration makes it easy to collect, organize, and secure data.
- **Efficiency:** Collaborate and find the right information to answer questions quickly, and save both time and money when updating instruments and software.
- **Security:** Employ and enforce data integrity strategies while minimizing the risk of data breach or loss.
- **Compliance:** Ensure data security, control access, and comply with national and EU electronic record regulations.

The Agilent approach to data management provides a single point of access to data generated from instruments, data systems, and lab software. What's more, all of this integration happens behind the scenes. Your lab staff do not have to change the way they work or how they interact with their software.

With access to data from a single source, analysts can collaborate without compromising data integrity, and create consistent processes for workflows such as method rollouts. Information quality, information sharing, and efficiency can improve dramatically as well.

### Flexible solutions for all data management

Overcome the limitations of ad hoc data management with a range of integrated, centralized options that can support instrument data in all formats.



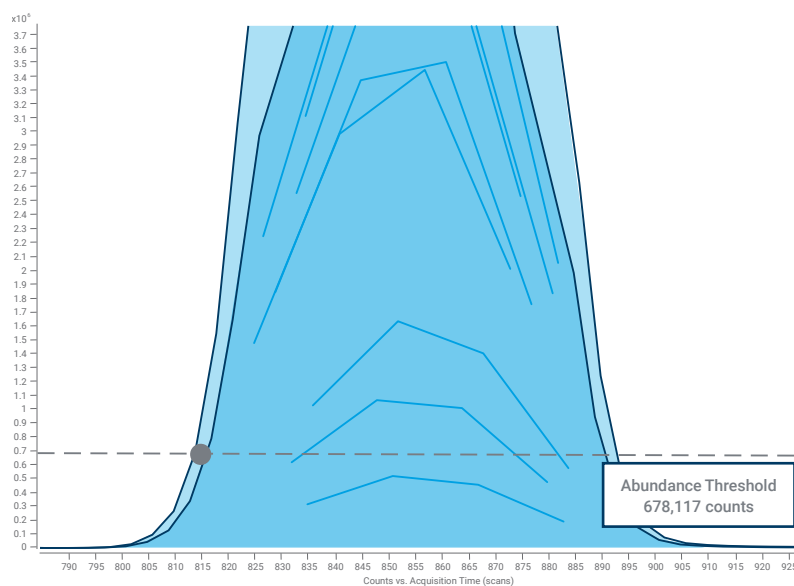
## New acquisition modes on Agilent GC/TQ

### Triggered MRM (tMRM)

tMRM is a data-dependent scan function that increases throughput, provides both quantitative and qualitative information, and minimizes the cost of analysis.

#### Target Analyte

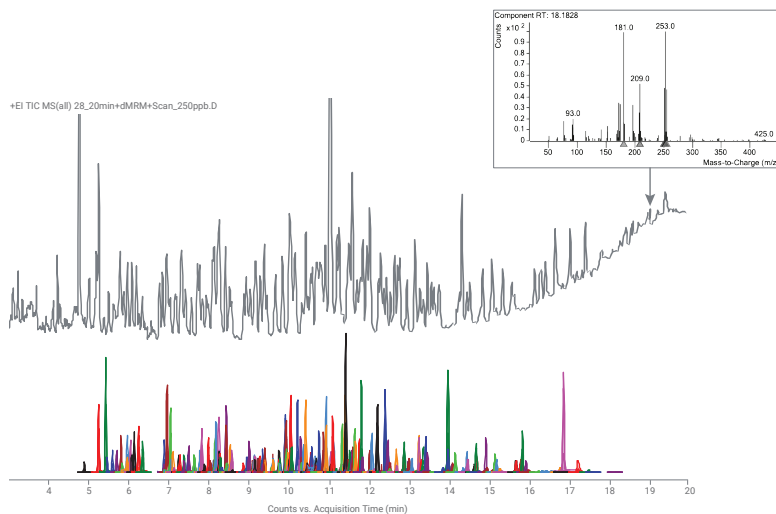
| Precursor | Product | CE | Primary | Trigger | Threshold |
|-----------|---------|----|---------|---------|-----------|
| 287.9     | 272.7   | 15 |         |         |           |
| 287.9     | 92.9    | 20 | X       |         |           |
| 285.9     | 270.9   | 15 |         |         |           |
| 285.9     | 93      | 25 | X       | X       | 678,117   |
| 285.9     | 63      | 45 |         |         |           |
| 196.9     | 168.9   | 15 |         |         |           |
| 125       | 79      | 5  |         |         |           |
| 124.9     | 47      | 15 |         |         |           |
| 108.9     | 78.9    | 5  |         |         |           |
| 78.9      | 47      | 10 |         |         |           |



A tMRM experiment with two primary transitions for each analyte. Secondary MRM transitions are triggered when the primary MRM signals cross a user-defined threshold.

### Simultaneous Dynamic MRM and scan (dMRM/scan)

MassHunter Acquisition software allows the user to perform dynamic MRM with a simultaneous scan. In addition to the dwell time savings brought on by dMRM, the simultaneous scan grants the ability to perform retrospective analysis without the need for reinjection. More details on the dynamic MRM acquisition mode can be found in the technical overview, New Dynamic MRM Mode Improves Data Quality and Triple Quad Quantification in Complex Analyses ([5990-3595EN](#)).



dMRM/scan acquisition data from a QuEChERS spinach extract demonstrates comparable sensitivity and great linearity. Additionally, the acquired full scan data enables reliable retrospective analysis even in complex matrices.



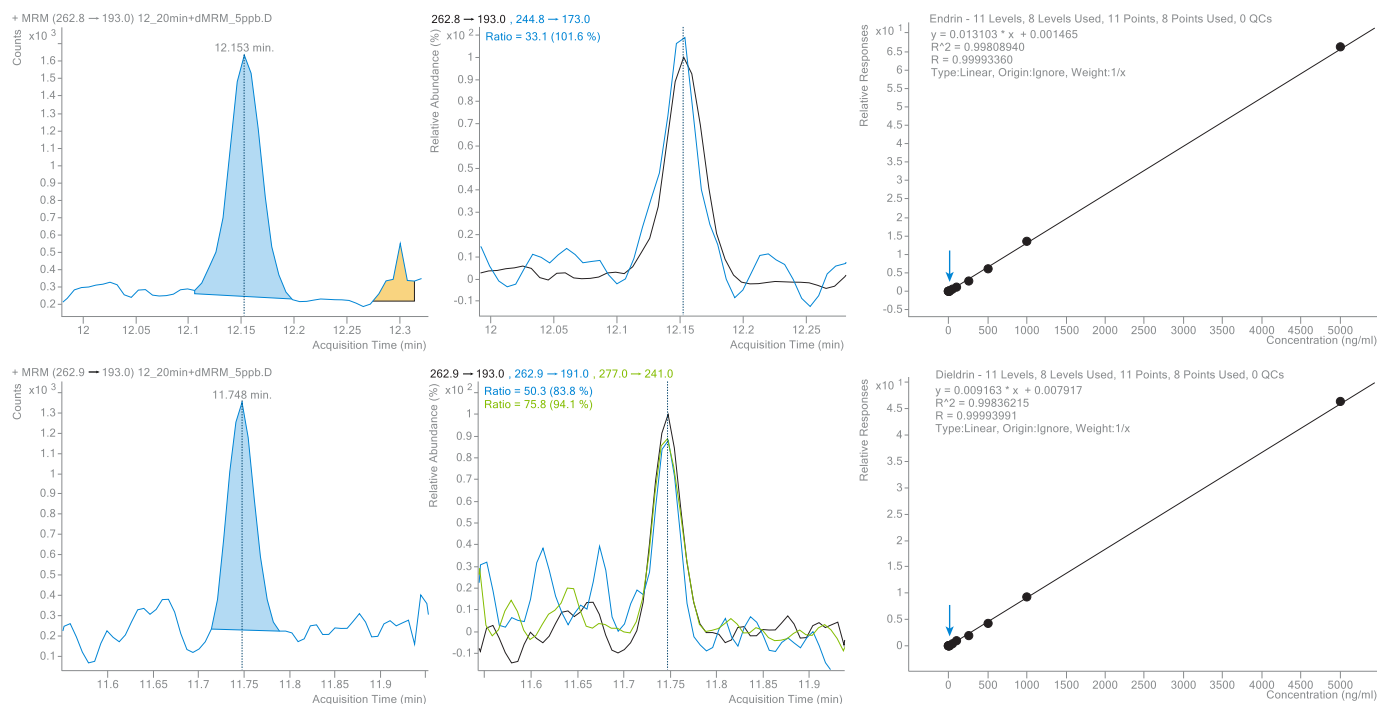


## Solutions that elevate productivity

The Agilent Pesticides and Environmental Pollutants Database has over 1,100 compounds with multiple transitions per compound and over 7,500 matrix-optimized MRM transitions to help you build acquisition methods that reduce matrix interferences and get the most out of your triple quadrupole GC/MS.

## Set up your lab faster with ready-to-run eMethods.

Agilent eMethods accelerate your startup time by condensing large amounts of technical information and optimized analytical methods into a ready-to-run, downloadable, digital information package.

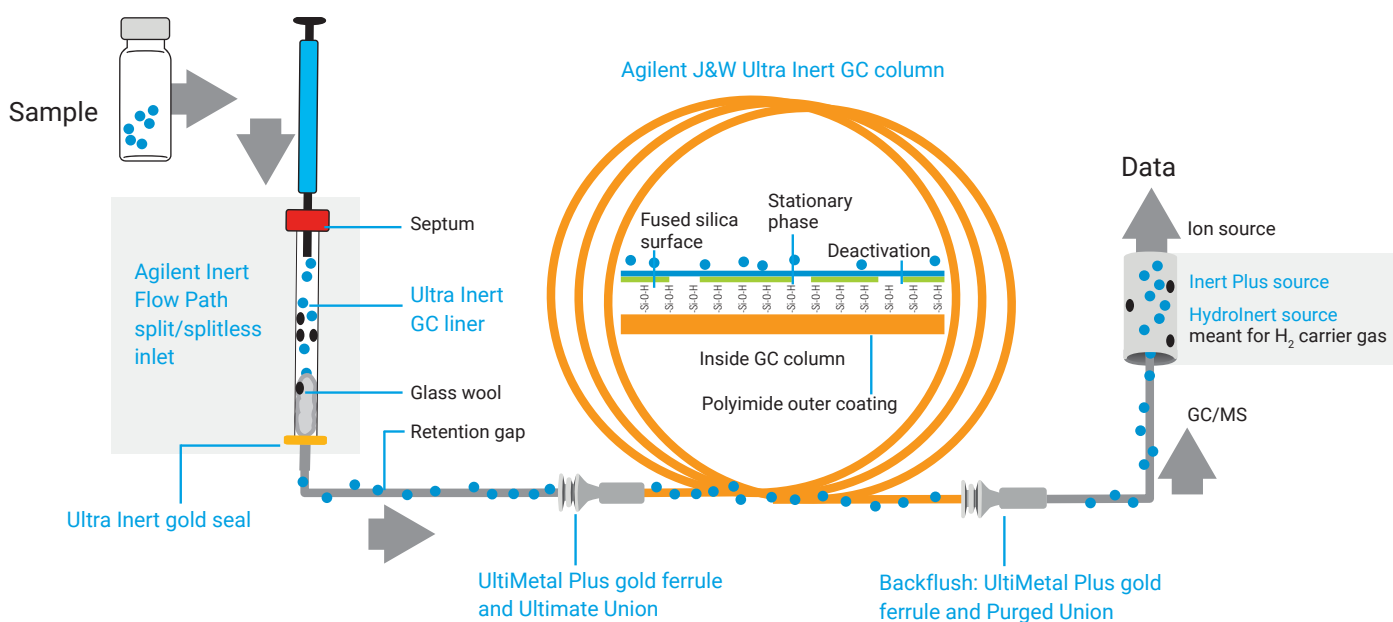


Endrin and dieldrin are organochlorine pesticides commonly monitored in food safety and environmental assays. These compounds can present a challenge for GC/MS analysis at low concentrations. High sensitivity coupled with extended dynamic range with the 7000E is demonstrated with chromatograms of endrin (top) and dieldrin (bottom) at 5 ppb in QUEChERS cayenne pepper extract. For these challenging analytes, the 7000E demonstrated excellent linearity ( $R^2 > 0.995$ ) from 5 ppb to 5,000 ppb.

**Learn more** about what Agilent MassHunter software can do for your lab.

# 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. 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.



## Don't miss a thing in your GC/MS analysis

From analyzing active environmental samples to screening for drugs of abuse, Agilent Inert Flow Path solutions help ensure higher analytical sensitivity, accuracy, linearity, and reproducibility. [Learn more](#)



## Reliable and Unparalleled GC Separation

Building the world's most trusted gas chromatography 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.



### Meet your analytical needs today—and tomorrow

The [Agilent 8890 GC system](#) offers outstanding flexibility. As the next evolution of the trusted Agilent GCs, the 8890 drives productivity, delivers high-quality data, and provides unparalleled confidence to all users.

- Configure with any GC/MS system and combine with a wide range of GC detector options
- [Helium conservation module](#) provides cost-saving carrier gas options
- Analyzers provide preconfigured and tested systems for a wide range of specific applications



### Unlock your lab's revenue potential

The [Agilent Intuvo 9000 GC](#) stands in a class by itself. Its innovative compact design offers fast, direct heating, ferrule-free fittings, Guard Chip technology, and no-trim columns to provide faster sample runs as well as fewer and faster column changes. Intuvo continues the Agilent legacy of reliability and gold-standard performance in a compact and powerful complete package.

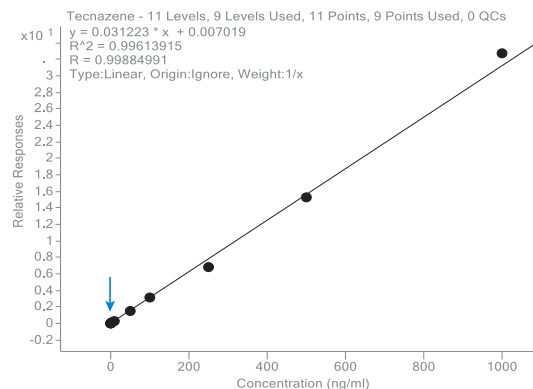
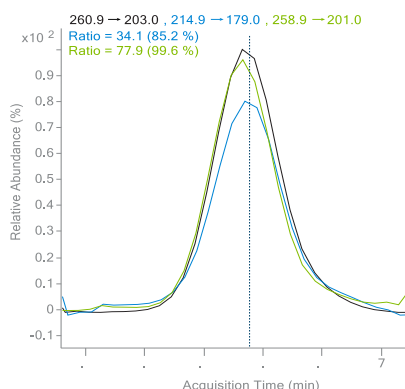
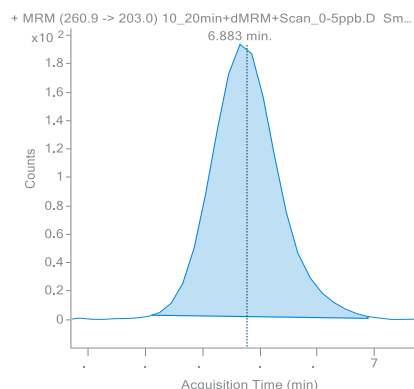
# Reimagine What's Possible for Your Applications



## Detect potentially harmful pesticides at trace levels

Concern about trace-level food and environmental pollutants is driving the demand for more rapid and reliable methods for the identification and quantitation of pesticides and pesticide residues. Recently developed techniques include:

- **Midcolumn backflushing**—reverses the carrier gas flow after the last analyte has exited the column, eliminating sample carryover.
- **Pulsed splitless injection**—maximizes the transfer of analytes from the inlet onto the GC column, minimizing the residence time and breakdown in the inlet.
- **Retention time locking**—allows a new column or instrument to have retention times that precisely match the MRM database, greatly simplifying method maintenance.
- **The Agilent MassHunter Pesticide and Environmental Pollutant MRM Database (P&EP 4)**—provides up to eight MRM transitions per analyte, allowing users to build acquisition methods without having to develop MRMs. The database includes retention times for constant flow 20 and 40-minute GC oven programs.

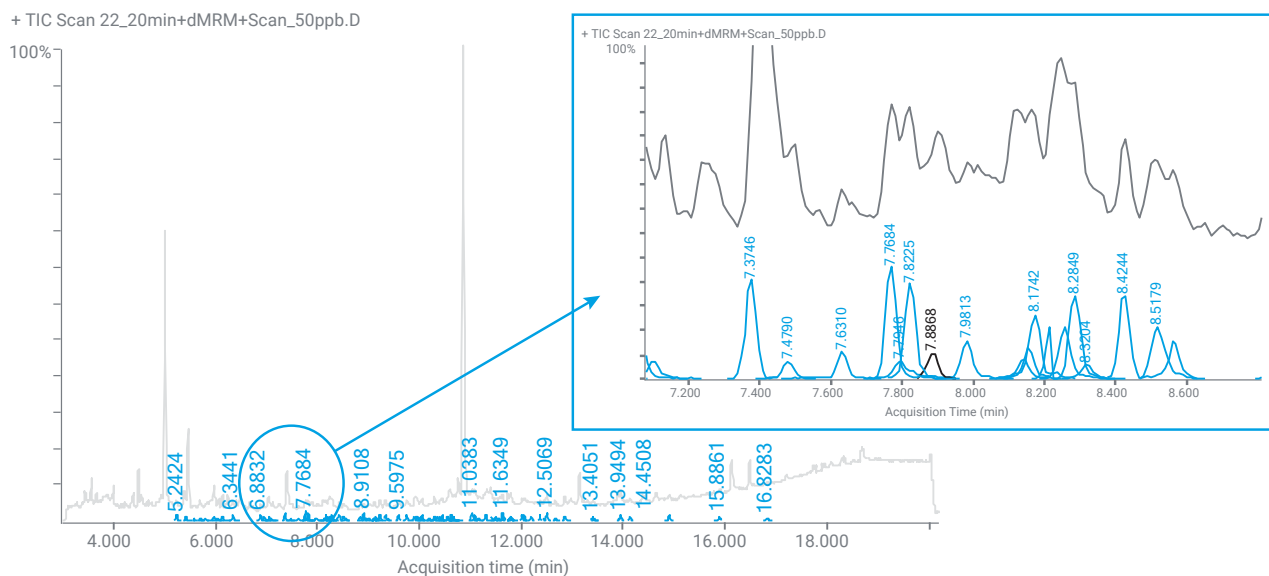


High sensitivity was maintained with the 7000E when operating in the Simultaneous dMRM/scan mode as demonstrated with the chromatogram for tecnazene at LOQ level of 0.5 ppb in QuEChERS spinach extract. In this dMRM/Scan acquisition mode, excellent linearity was maintained for the 7000E over 0.5 – 1,000 ppb

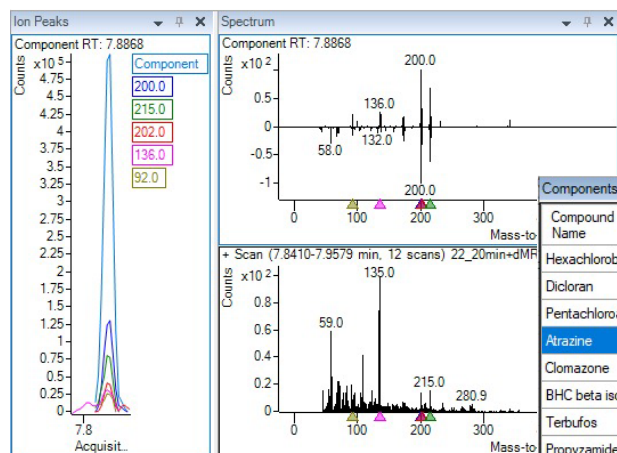


## Sensitive analysis of targets and unknowns

Using simultaneous dMRM/scan acquisition mode, a comparable sensitivity and linearity is maintained. This mode also enables users to identify compounds that they might not be targeting with dMRM and MassHunter Unknowns Analysis. Additionally, it helps to ensure that the source is not overloaded and allows for retrospective analysis.



Identification of Atrazine at 50 ppb in spinach QuEChERS extract using simultaneous dMRM/scan mode with MassHunter Unknowns Analysis based on spectral deconvolution.



The deconvoluted spectrum of the component found at the RT of fludioxonil compared to the inverted library reference spectrum. The deconvolution process has removed the interfering ions, producing a high-quality library match score.

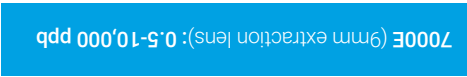
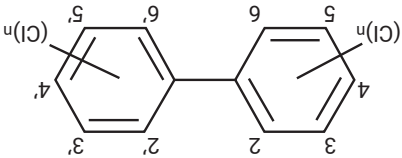
| Components             |               |               |               |              |                                     |                  |                                  |                  |
|------------------------|---------------|---------------|---------------|--------------|-------------------------------------|------------------|----------------------------------|------------------|
| Compound Name          | Compone RT    | Library RT    | Delta RT      | Match Factor | Best Hit                            | Formula          | CAS#                             | Component Area   |
| Hexachlorobenzene      | 7.7684        | 7.7840        | 0.0156        | 84.7         | <input checked="" type="checkbox"/> | C6Cl6            | <a href="#">118-74-1</a>         | 5177510.3        |
| Dicloran               | 7.7946        | 7.8010        | 0.0064        | 56.8         | <input checked="" type="checkbox"/> | C6H4Cl2N2O2      | <a href="#">99-30-9</a>          | 1328222.9        |
| Pentachloroanisole     | 7.8225        | 7.8410        | 0.0185        | 63.2         | <input checked="" type="checkbox"/> | C7H3Cl5O         | <a href="#">1825-21-4</a>        | 4416232.7        |
| <b>Atrazine</b>        | <b>7.8868</b> | <b>7.8870</b> | <b>0.0002</b> | <b>56.3</b>  | <input checked="" type="checkbox"/> | <b>C8H14ClN5</b> | <b><a href="#">1912-24-9</a></b> | <b>1189030.6</b> |
| Clomazone              | 7.9813        | 7.9850        | 0.0037        | 87.2         | <input checked="" type="checkbox"/> | C12H14ClNO2      | <a href="#">81777-89-1</a>       | 1891239.2        |
| BHC beta isomer        | 8.1412        | 8.0300        | -0.1112       | 64.7         | <input checked="" type="checkbox"/> | C6H6Cl6          | <a href="#">319-85-7</a>         | 1016865.3        |
| Terbufos               | 8.1558        | 8.1640        | 0.0082        | 56.4         | <input checked="" type="checkbox"/> | C9H21O2PS3       | <a href="#">13071-79-9</a>       | 1545178.9        |
| Propyzamide            | 8.1742        | 8.1730        | -0.0012       | 62.1         | <input checked="" type="checkbox"/> | C12H11Cl2NO      | <a href="#">23950-58-5</a>       | 3581712.3        |
| Pentachloronitroben... | 8.2134        | 8.2260        | 0.0126        | 62.7         | <input checked="" type="checkbox"/> | C6Cl5NO2         | <a href="#">82-68-8</a>          | 1180843.6        |
| Pentachlorobenzonit... | 8.2564        | 8.2620        | 0.0056        | 72.3         | <input checked="" type="checkbox"/> | C7Cl5N           | <a href="#">20925-85-3</a>       | 2699208.9        |



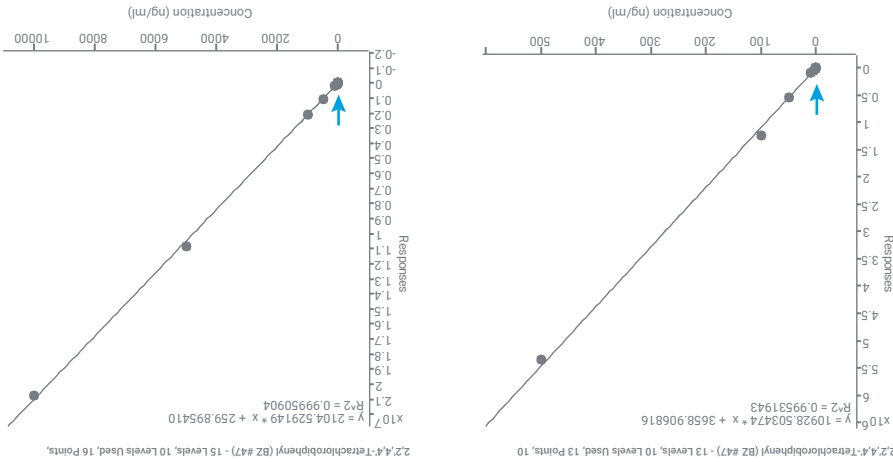
# Perform complex PCB analysis at high dynamic range

For years, PCBs were widely used as dielectrics and in electrical apparatus coolant fluid. When they were identified as environmentally toxic, however, PCBs became classified as persistent organic pollutants. As a result of broad use and environmental persistence, PCBs still exist in the environment, especially in water sources and soils. GC/TQ analyses are useful for identifying quantities of PCB compounds in especially complex matrices.

The general chemical structure of polychlorinated biphenyl (PCB).



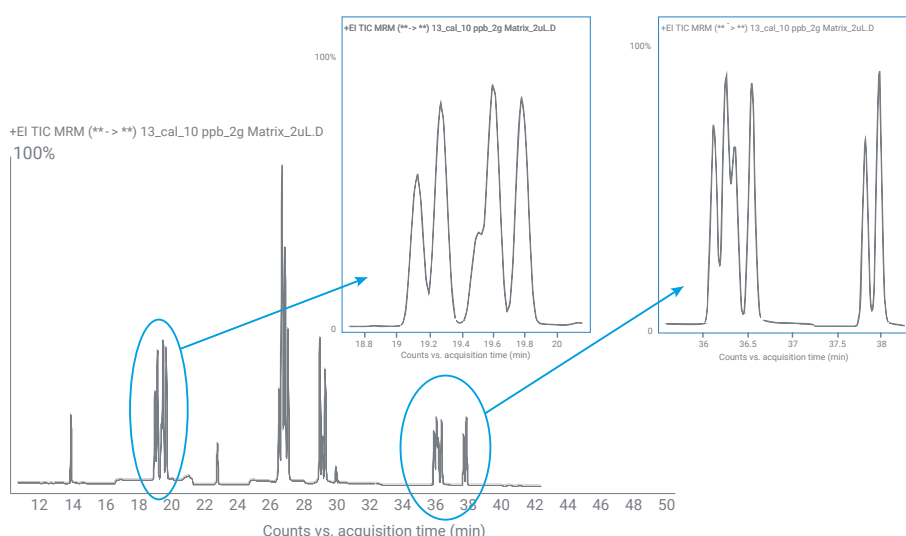
The linear calibration curves with the 7000E (3mm & 9mm extraction lenses) for 2,2',4,4'-tetrachlorobiphenyl feature great linearity ( $R^2 > 0.995$ ) over a wide dynamic range providing the flexibility to meet the needs of your PCB analysis based on the target concentration range.



## Expand your use of hydrogen for analyzing trace contaminants

Given their ubiquitous nature, PAHs are monitored as trace contaminants in many food products, ranging from seafood to edible oils to smoked meats. They are also monitored in air, water, and soil.

Most commonly, helium is used as a carrier gas for GC/TQ. However, hydrogen can be substituted in this application, so the user can reap the benefits of faster analysis times and improved resolution. The Agilent 7000E GC/TQ paired with the Agilent HydroInert source offers excellent sensitivity, resolution, and throughput compared to helium. It also drastically reduces ion source interactions without the increasingly high costs of helium.



The 7000E with the new HydroInert source enables the use of hydrogen as a carrier gas for this PAH analysis. In this EU PAH analysis, 10 ppb of PAH analytes of interest to the EU were spiked in an infant formula matrix extract and injected into the 7000E with HydroInert. All isomers of interest were chromatographically resolved and demonstrated excellent peak shape.

| Name                   | Transition     | RT     | CF Limit Low | CF Limit High | CF R2  |
|------------------------|----------------|--------|--------------|---------------|--------|
| 7H-Benzo[c]fluorene    | 216.0 -> 215.0 | 14.089 | 0.01         | 100           | 0.9990 |
| Benz[a]anthracene      | 228.0 -> 228.0 | 19.333 | 0.01         | 100           | 0.9991 |
| Cyclopenta[cd]pyrene   | 226.0 -> 224.0 | 19.520 | 0.1          | 100           | 0.9990 |
| Chrysene               | 228.0 -> 226.0 | 19.812 | 0.01         | 100           | 0.9974 |
| 5-Methylchrysene       | 242.0 -> 239.0 | 22.909 | 0.05         | 100           | 0.9974 |
| Benzo[b]fluoranthene   | 252.0 -> 252.0 | 26.834 | 0.01         | 100           | 0.9987 |
| Benzo[k]fluoranthene   | 252.0 -> 252.0 | 27.016 | 0.01         | 100           | 0.9985 |
| Benzo[j]fluoranthene   | 252.0 -> 252.0 | 27.199 | 0.01         | 100           | 0.9984 |
| Benzo[e]pyrene         | 252.0 -> 252.0 | 29.140 | 0.01         | 100           | 0.9984 |
| Benzo[a]pyrene         | 252.0 -> 252.0 | 29.464 | 0.01         | 100           | 0.9989 |
| Indeno[1,2,3-cd]pyrene | 276.0 -> 274.0 | 36.222 | 0.05         | 100           | 0.9987 |
| Dibenz[a,h]anthracene  | 278.0 -> 275.7 | 36.524 | 0.01         | 100           | 0.9977 |
| Benzo[ghi]perylene     | 276.0 -> 276.0 | 38.023 | 0.01         | 100           | 0.9988 |
| 1,2,9,10-Dibenzopyrene | 302.0 -> 299.9 | 44.387 | 0.01         | 100           | 0.9992 |
| 1,2:4,5-Dibenzopyrene  | 302.0 -> 302.0 | 45.970 | 0.05         | 100           | 0.9988 |
| Dibenzo[a,i]pyrene     | 302.0 -> 302.0 | 46.854 | 0.05         | 100           | 0.9994 |
| 3,4:8,9-Dibenzopyrene  | 302.0 -> 299.9 | 47.367 | 0.05         | 100           | 0.9992 |

For all EU PAH analytes, the 7000E and HydroInert source demonstrates excellent linearity over a wide dynamic range.



## Partnering for sustainability and business success

Sustainable thinking is transforming the way researchers, scientists, and manufacturers approach their products, processes, and supply chains. However, it can be a challenge for labs to lower their environmental impact while continuing to optimize workflows and lower costs.

At Agilent, we believe that efficiency, productivity, and sustainability are interlinked.

Working toward sustainability is an integral part of how we conduct business and respond to our customers' challenges. Together, we can help your lab achieve its sustainability goals—while increasing output, maintaining accuracy, and staying competitive.



### Partnership with My Green Lab

Agilent has partnered with My Green Lab to have our instruments independently audited for their Accountability, Consistency, and Transparency (ACT) label. ACT labels provide information about the environmental impact of manufacturing, use, and disposal of a product and its packaging, so purchasers can make informed, sustainable choices. Agilent 7000E, 7010D, 5977C, 8860, 8890, and Intuvo 9000 systems have been comprehensively evaluated and achieved ACT labels.

[Learn more about My Green Lab.](#)

### Commitment to Net-Zero Emissions

Since our founding, Agilent has worked to reduce our energy, waste, water, and CO<sub>2</sub> emissions. Now we're taking it a step further. We're proud to announce that we will achieve net-zero greenhouse gas emissions by 2050. Our comprehensive approach to net zero includes Paris Agreement climate targets, clearly defined interim goals, and a commitment to the Science-Based Targets Initiative.

[Read more in our news release.](#)



## Agilent CrossLab services

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Learn more about CrossLab at [www.agilent.com/crosslab](http://www.agilent.com/crosslab)

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10 years

Average instrument  
repair experience

96%

Parts available  
right away

Millions

Parts accessible at our  
worldwide logistics centers

85%

Repairs fixed during  
first visit



30,000

Technical training days

>1,850

Field service  
engineers worldwide

50+

Technology platforms  
covered

1–2 days

Typical turnaround time  
for priority service calls

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From the date you purchase select Agilent chromatography, spectrometry, and spectroscopy instruments, we guarantee at least 10 years use or residual-value credit toward an upgraded replacement. Because we stand behind our systems, our guarantee maximizes your return on investment by ensuring your purchase is safe.

Learn more:

[www.agilent.com/chem/7000e](http://www.agilent.com/chem/7000e)

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[selectgc.chem.agilent.com](http://selectgc.chem.agilent.com)

Inert flow path:

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5994-4921EN



# Agilent 7000E Triple Quadrupole GC/MS System



Compatible with both Agilent 8890 and Intuvo 9000 GC systems, the Agilent 7000E mass spectrometer (MS) is the best choice for routine GC/MS/MS analysis with a low 4 fg octafluoronaphthalene instrument detection level (IDL) specification. The 4 fg IDL is demonstrated at installation, verifying total system performance of the automatic liquid sampler (ALS), GC, and MS.

Improved mass spec intelligence combined with over five decades of innovation and quality embody the Agilent 7000E GC/TQ as it provides robust, day-in, day-out performance. The 7000E GC/TQ is powered by new technologies that drive maximum lab productivity, so you can focus on moving your lab forward.

## 7000E triple quadrupole GC/MS

| Parameter              | Value                                                                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode of Operation      | El standard, CI optional                                                                                                                                                                     |
| Ion Source Material    | Noncoated, proprietary inert source                                                                                                                                                          |
| Ion Source Temperature | 150 to 350 °C                                                                                                                                                                                |
| Filaments              | Dual filaments for EI                                                                                                                                                                        |
| Source Cleaning        | Automated and vent-free with patented Agilent JetClean option                                                                                                                                |
| Electron Energy        | 10 to 300 eV                                                                                                                                                                                 |
| Mass Filters (2)       | Proprietary monolithic hyperbolic gold-coated quadrupole                                                                                                                                     |
| Mass Axis Stability    | <±0.10 u over 24 hours (10 to 40 °C)                                                                                                                                                         |
| Quadrupole Temperature | 106 to 200 °C                                                                                                                                                                                |
| Mass Range             | <i>m/z</i> 10 to 1,050                                                                                                                                                                       |
| Dynamic Range          | >6.0 ×10 <sup>7</sup> counts, resulting in up to seven orders of linear dynamic range from the LOD                                                                                           |
| Resolution             | Selectable, 0.7 to 2.5 Daltons, default tune<br>Settable, 0.4 to 4.0 Daltons, custom tune                                                                                                    |
| Scan Rate              | Up to 20,000 u/s                                                                                                                                                                             |
| Tuning                 | Autotune or manual                                                                                                                                                                           |
| Detector               | Agilent triple-axis HED-EM with extended-life EM and dynamically ramped iris                                                                                                                 |
| MRM Speed              | 800 transitions/sec                                                                                                                                                                          |
| Minimum MRM Dwell      | 0.5 msec                                                                                                                                                                                     |
| Collision Cell         | Linear hexapole                                                                                                                                                                              |
| Collision Cell Gas     | Nitrogen with helium quench gas                                                                                                                                                              |
| Collision Energy       | Selectable up to 60 eV                                                                                                                                                                       |
| Vacuum System          | Dual stage turbomolecular pump<br>Total gas flow up to 8 mL/min                                                                                                                              |
| Software               | Agilent MassHunter Acquisition, data handling (quantitative/qualitative) and reporting Pesticides and Environmental Pollutants MRM database with over 8,000 optimized transitions (optional) |
| Data Acquisition Modes | Full scan, SIM, MRM, dMRM, tMRM, dMRM/scan, and tMRM/scan                                                                                                                                    |

## 8890 GC

For more specifications, refer to the GC data sheet.

| Parameter                    | Value                                                                |
|------------------------------|----------------------------------------------------------------------|
| Injector                     | Split/splitless, multimode inlet, PTV, and others                    |
| Autosampler                  | Agilent 7693 ALS, CTC PAL3, Agilent 7697A headspace sampler          |
| Oven Temperature             | Ambient +4 to 450 °C                                                 |
| Oven Ramps/Plateaus          | Supports 20 oven ramps and 21 plateaus<br>Negative ramps are allowed |
| Ramp Rate                    | 120 °C/min (200 +V), 75 °C/min (120 V)                               |
| Capillary Flow Technology    | Effluent splitting, backflushing, column switching                   |
| Retention Time Locking (RTL) | RTL-ready, constant flow or pressure                                 |

## Intuvo 9000 GC

For more specifications, refer to the GC data sheet.

| Parameter                    | Value                                                                |
|------------------------------|----------------------------------------------------------------------|
| Injector                     | Split/splitless and multimode inlet                                  |
| Autosampler                  | Agilent 7693 ALS, CTC PAL3, Agilent 7697A headspace sampler          |
| Oven Temperature             | Ambient +10 to 450 °C                                                |
| Oven Ramps/Plateaus          | Supports 20 oven ramps and 21 plateaus<br>Negative ramps are allowed |
| Ramp Rate                    | 250 °C/min                                                           |
| Capillary Flow Technology    | Effluent splitting, backflushing, column switching                   |
| Retention Time Locking (RTL) | RTL-ready, constant flow or pressure                                 |

## Integrated GC/MS system features

| Parameter                        | Value                                                                                                            |
|----------------------------------|------------------------------------------------------------------------------------------------------------------|
| Early Maintenance Feedback (EMF) | Monitors GC and MS resources: injection counter, operation times, and electronic logs to aid planned maintenance |
| Parts Finder                     | Easy, convenient access to pertinent consumables part numbers                                                    |
| Quick Vent                       | Automated, rapid venting of the MS                                                                               |
| Eco-Friendly Operation           | User-scheduled sleep/wake mode saves carrier gas and power                                                       |
| Integrated Calculators           | Vapor volume calculator, solvent vent calculator, method translator, and so on                                   |

## Instrument dimensions

| Parameter       | Value                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------------|
| 7000E MS        | 35 cm (w) × 86 cm (d) × 47 cm (h), Weight: 59 kg<br>Additional space for the data system and optional printer |
| Mechanical Pump | 18 cm (w) × 35 cm (d) × 28 cm (h), Weight: 21.5 kg                                                            |
| 8890 GC         | 58 cm (w) × 51 cm (d) × 49 cm (h), Weight: 49 kg                                                              |

## Reference specifications\*

| Parameter                | Value                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EI MRM S/N (He Carrier)  | 1 µL of 10 fg/µL OFN produces >1,500:1 RMS S/N for the transition of $m/z$ 272 → 222<br>1 µL of 100 fg/µL of OFN produces >15,000:1 RMS S/N for the transition of $m/z$ 272 → 222 |
| PCI MRM S/N (He Carrier) | 1 µL of 100 fg/µL BZP produces >50:1 RMS S/N for the transition of $m/z$ 183 → 105 ( $\text{CH}_4$ )                                                                              |
| NCI SIM S/N (He Carrier) | 1 µL of 100 fg/µL OFN produces >2,000:1 RMS S/N for $m/z$ 272 ( $\text{CH}_4$ )                                                                                                   |

\* Reference specifications represent typical performance, and are not confirmed at installation.

## Installation checkout specifications

IDL is a more accurate indication of true sensitivity (minimum detectable quantity) than signal-to-noise (S/N), particularly when background noise levels are very low, as with MS/MS measurements when only standard is injected.

IDL verification is a more extensive (eight consecutive injections versus one, in the case of S/N) and reliable test that is performed at installation to ensure proper system qualification.

| Parameter                                     | Value                                                                                                                                                                                                                                                     |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EI MRM IDL                                    | 4 fg or less octafluoronaphthalene (OFN)<br>Statistically derived at 99% confidence level from the area precision of eight sequential splitless injections* of 1 µL, 10 fg/µL OFN standard.<br>MS/MS transition of $m/z$ 272 → 222<br>100 msec dwell time |
| HydroInert EI MRM IDL ( $\text{H}_2$ carrier) | 8 fg or less octafluoronaphthalene (OFN)<br>Statistically derived at 99% confidence level from the area precision of eight sequential splitless injections* of 1 µL, 10 fg/µL OFN standard.<br>MS/MS transition of $m/z$ 272 → 222<br>100 msec dwell time |
| PCI MRM S/N                                   | 1 µL of 5 pg/µL benzophenone (BZP) produces >2,500:1 RMS S/N for the MS/MS transition of $m/z$ 183 → 105 ( $\text{CH}_4$ )                                                                                                                                |

– EI MRM IDL and PCI MRM S/N tests were carried out on a 30 m × 0.25 mm, 0.25 µm column.

– HydroInert EI MRM IDL test carried out on a 20 m × 0.18 mm, 0.18 µm column.

\* IDL specification is only demonstrated if an autosampler is part of the installed system. If an autosampler is not present, the EI MRM S/N specification is performed.

[www.agilent.com/chem/gc-ms-ms](http://www.agilent.com/chem/gc-ms-ms)

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5994-5761EN

**EXHIBIT A - Pricing Page**  
**Triple Quadrupole GC/MS and Single Quadrupole GC/MS**  
**CRFQ AGR26\*XX**

| Section No.           | Description                                                                                                                                                                                                                                                                          | Model #/Brand Name                                             | Quantity           | Unit Price | Extended Amount |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------|------------|-----------------|
| 3.3                   | Single Quadrupole Gas Chromatograph Mass Spectrometer (GC/MS) with Robotic Multiple Injection Techniques including Liquid Injection, Static and Dynamic Headspace, Flame Ionization Detector (FID), and Solid Phase Microextraction, workstation, and all required parts/accessories | Agilent 8890 GC, 5977C MSD, PAL3 Series II Autosampler         | 1                  | 189,785.98 | \$ 189,785.98   |
| 3.2                   | Triple Quadrupole Gas Chromatograph Mass Spectrometer (GC/MS/MS) with a Robotic Multiple Injection Techniques, including Liquid Injection, Static and Dynamic Headspace, and Solid Phase Microextraction, workstation, and all required parts/accessories                            | Agilent 8890 GC, 7000E Triple Quad, PAL3 Series II Autosampler | 1                  | 212,913.70 | \$ 212,913.70   |
| 3.3.6                 | Warranty/Preventative Maintenance Service                                                                                                                                                                                                                                            | 1 Year Warranty                                                | 1                  | Included   | \$ -            |
| 3.3.7                 | Installation                                                                                                                                                                                                                                                                         |                                                                | 1                  | Included   | \$ -            |
|                       | Shipping and Handling                                                                                                                                                                                                                                                                | Shipping and Handling                                          |                    |            | \$ 4,073.00     |
|                       | Failure to use this form may result in disqualification                                                                                                                                                                                                                              |                                                                | <b>GRAND TOTAL</b> |            | \$ 406,772.68   |
|                       | Bidder / Vendor Information                                                                                                                                                                                                                                                          |                                                                |                    |            |                 |
| Name:                 | Agilent Technologies, Inc.                                                                                                                                                                                                                                                           |                                                                |                    |            |                 |
| Address:              | 2850 Centerville Road                                                                                                                                                                                                                                                                |                                                                |                    |            |                 |
|                       | Wilmington, DE 19808                                                                                                                                                                                                                                                                 |                                                                |                    |            |                 |
|                       |                                                                                                                                                                                                                                                                                      |                                                                |                    |            |                 |
| Phone:                | 800-227-9770                                                                                                                                                                                                                                                                         |                                                                |                    |            |                 |
| Email Address:        | <a href="mailto:georgeann_foster@agilent.com">georgeann_foster@agilent.com</a>                                                                                                                                                                                                       |                                                                |                    |            |                 |
| Authorized Signature: |                                                                                                                                                                                                 |                                                                |                    |            |                 |