

Agilent Inert Flow Path Solutions

LOWER YOUR DETECTION LIMITS AND QUANTIFY ACTIVE ANALYTES WITH CONFIDENCE

The Measure of Confidence

AGILENT
INERT
FLOW PATH



Agilent Technologies

Ensuring an inert flow path from injection through detection is critical – and now, easy to achieve



Detecting melamine and other dangerous substances in milk, milk products, and eggs



Performing trace-level analyses of active analytes in environmental matrices



Testing drinking water for semi-volatile contaminants that threaten public health



Determining drugs of abuse in biological fluids

As regulatory agencies drive limits of detection lower for increasingly active and more complex samples, you cannot afford adsorption caused by flow path activity. This is particularly critical for food, environmental, and forensic sample matrices.

Having to repeat or verify suspect analyses wastes valuable resources, hinders productivity, and hurts your bottom line. With the clock ticking on sample viability and limited available sample, you might not get a second chance because there is no viable sample left to analyze.

Unreliable results can also have catastrophic implications in terms of environmental safety, the quality of the foods we eat, and inaccurate drugs-of-abuse accusations. Since identification and quantification are more difficult in complex matrices such as fruits, vegetables, soils, and biological fluids, you must be especially vigilant to make sure your flow path is not compromising your results by adsorbing analytes of interest.

An integrated approach to inertness:

The Agilent advantage

Flow path inertness is vital to your analysis; it is also on the cutting edge of GC.

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

In 2008, Agilent laid the groundwork for flow path inertness with **Agilent J&W Ultra Inert columns** – the *first* GC columns proven to deliver on the promise of consistent column inertness and exceptionally low column bleed. Since then, we have *continued* to lead the way with Ultra Inert liners and – most recently – inert fittings, ferrules, and supplies for inlets and detectors.

By minimizing activity along every step of the GC and GC/MS flow path, Agilent Inert Flow Path solutions improve system performance, ensure better results, and allow you to process more samples without unplanned maintenance and recalibration.



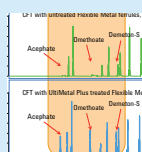
Agilent Inert Flow Path solutions

ensure a reliably inert GC flow path for higher sensitivity, accuracy, and reproducibility... especially at trace levels.

Inside: everything you need to build your inert flow path



Solutions: liners, components, columns, and instruments
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To learn how Agilent Inert Flow Path solutions can give you the utmost confidence in your results, visit www.agilent.com/chem/inert

With Agilent Inert Flow Path solutions, you won't miss a thing in your GC and GC/MS analysis



1 Ultra Inert liners



2 Inert Flow Path Split/Splitless inlet



3 Ultra Inert gold seals



5 Inert Capillary Flow Technology devices, including UltiMetal Plus 3-way splitter



6 UltiMetal Plus Flexible Metal ferrules



7 Agilent J&W Ultra Inert GC column



8 Gas Clean purifier



4 Inert MS source



1 Ultra Inert liners

With or without deactivated glass wool, Ultra Inert liners are certified to provide both low surface activity and highly reproducible sample vaporization, facilitating best-in-class delivery for active analytes.

2 Inert Flow Path Split/Splitless inlet

The hot metal surfaces of each weldment are treated to prevent adsorption and degradation.

3 Ultra Inert gold seals

Only Agilent combines the best mechanical sealing with an inert surface. Unlike traditional machined seals, Ultra Inert gold inlet seals are manufactured using metal injection molding, followed by gold plating to ensure a smooth, consistent surface. We then apply our Ultra Inert chemistry on top of the gold plating to produce a leak-free seal that reduces active analyte adsorption.

4 Inert MS source

Precision design, material selection, surface deactivation, and rigorous testing ensure unmatched sensitivity when analytes reach the mass spectrometer.

5 Inert Capillary Flow Technology devices, including UltiMetal Plus 3-way splitter

With their highly inert surfaces, Capillary Flow Technology tools extend your GC capabilities by modifying the flow path *without the risk of sample loss*. Our purged union allows you to backflush high boilers in heavy-matrix samples, increasing column lifetime and system productivity.

6 UltiMetal Plus Flexible Metal ferrules

With their proprietary surface deactivation, Agilent's NEW UltiMetal Plus Flexible Metal ferrules are the *only* ferrules that won't introduce active sites into the flow path. Unlike graphite/Vespel ferrules, our inert flexible metal ferrules *don't* have to be retightened. Their flexible metal construction also solves the problem of column breakage (or leakage) associated with standard metal ferrules. Compatible with Capillary Flow Technology (CFT) and inlet/detector fittings. (Note: color variations between ferrules are a normal result of the UltiMetal coating).

7 Agilent J&W Ultra Inert GC column

Each column is rigorously tested to ensure exceptionally low bleed and consistently high inertness for optimal active analyte delivery to the GC or MS detector. Available in a variety of phases to support environmental, food safety, and toxicology applications.

8 Gas Clean purifier

Contaminants such as oxygen, moisture, and hydrocarbons can increase the risk of column damage, sensitivity loss, and instrument downtime. Installing an Agilent Gas Clean purifier in your carrier gas line removes these contaminants, which helps maintain flow path inertness, ensure the highest quality gas, and keep your gas lines clean and leak-free. Sensitive indicators protect your instrument and GC column, while fast stabilization enhances productivity and reduces helium gas consumption.

Visit www.agilent.com/chem/gasclean for more strategies on clean gas delivery.

See how Agilent Inert Flow Path components work together to enhance productivity and performance. Visit www.agilent.com/chem/inert

Ensure a reliably inert flow path – and improve response with active analytes

Whether you are analyzing difficult, active environmental samples or screening for drugs of abuse, Agilent Inert Flow Path solutions help ensure an inert GC flow path for higher sensitivity, accuracy, linearity, and reproducibility, especially at trace levels. They also minimize the need for frequent inlet maintenance and system recalibration.

Agilent Ultra Inert liners:

Best-in-class deactivation performance makes trace-level analysis easier

Inertness is critical inside the heated injection port, where labile analytes are prone to adsorption or degradation. Agilent’s proprietary manufacturing process produces Ultra Inert liners with superior deactivation coverage that ensures reproducibility, reliability, and more accurate sample transfer onto the GC column.

- Highly inert glass wool is compatible with samples containing active compounds
- Liners with inert wool keep non-volatiles inside the inlet, extending column life and increasing the time between source maintenance
- Greater sensitivity boosts your productivity by allowing you to run more samples

Remember, too, that Agilent CrossLab Ultra Inert GC liners deliver flawless performance for *all* instruments in your lab – regardless of make or model.



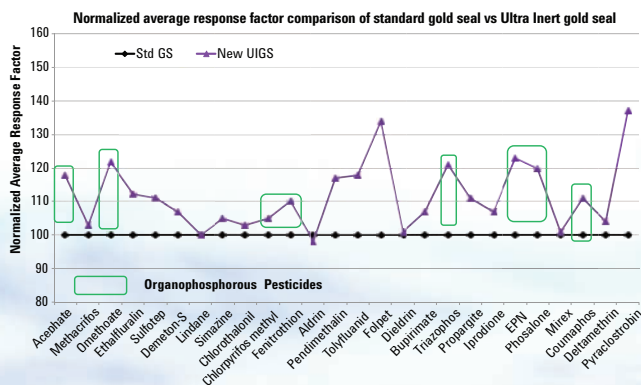
Inert Flow Path components:

Prevent active sites from ruining your analysis

All flow path surfaces can contribute to sample loss or degradation, which is why Agilent now applies proprietary chemistries to *all* sample flow path surfaces:

- **Ultra Inert gold seals** offer the best inlet sealing surface with unsurpassed inertness
- **UltiMetal Plus Flexible Metal ferrules** prevent sample loss while using inert capillary flow technology devices, such as backflush or ultimate unions. The novel design of these ferrules provide a reliable leak-free seal, and robust column connections even at high temperatures for extended periods of time.
- **UltiMetal Plus treatment** of inlet weldments further reduces the chance of analyte interaction with active sites on the inlet

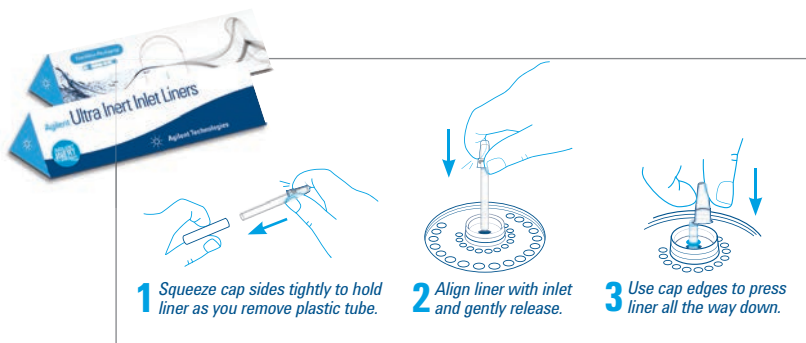
Improvement on organophosphorous pesticide peak shapes and responses using Ultra Inert gold seal



Ultra Inert gold seals give you better response and results than standard gold seals.

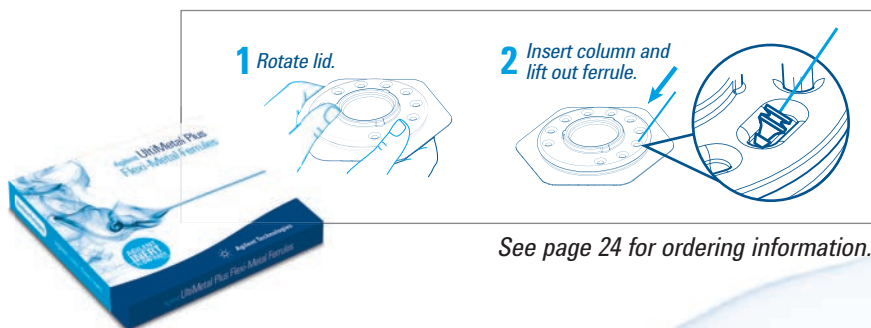
Touchless packaging – an Agilent exclusive – reduces contamination concerns

Agilent Ultra Inert liners are packaged with a **pre-installed O-ring** that has been cleaned, conditioned, and non-stick plasma treated. This unique touchless packaging allows you to easily install the new liner without searching for and installing the O-ring – saving time and reducing the risk of contamination from touching.



View the Touchless Packaging demonstration video at www.agilent.com/chem/touchless

UltiMetal Plus Flexible Metal ferrules are conveniently packaged to let you thread the column through the ferrule *while the ferrule is still in the package* – so you don't risk handling or dropping.



Certified performance:

Each Ultra Inert Liner deactivation lot is certified to ensure efficient, consistent coverage using both acidic and basic probes at trace (2 ng) levels on-column. In addition, every liner is packaged with a Performance Certificate that you can peel and stick into your lab notebook for quick compliance reference.



Easy traceability: The deactivation lot number is printed directly on the Performance Certificate; the liner lot number and part number are permanently etched on the glass.

Agilent proprietary surface treatments further expand your inert flow path

Ultra Inert and UltiMetal Plus surfaces are tested for inertness with stringent chromatographic quality control processes based on decades of GC experience and leadership.

Stop losing analytes to active sites in your sample flow path.
Visit www.agilent.com/chem/inert

Agilent J&W Ultra Inert GC columns:

Perform trace-level analysis with the utmost confidence

The Agilent J&W Ultra Inert GC column family pushes industry standards for consistent column inertness and exceptionally low column bleed, resulting in lower detection limits and more accurate data for difficult analytes. Each Ultra Inert GC column is tested with the industry's most demanding test probe mixture – and we *prove* it with a performance summary sheet shipped with each column.

Confidently analyze active compounds, trace-level samples, and unknowns without changing selectivity

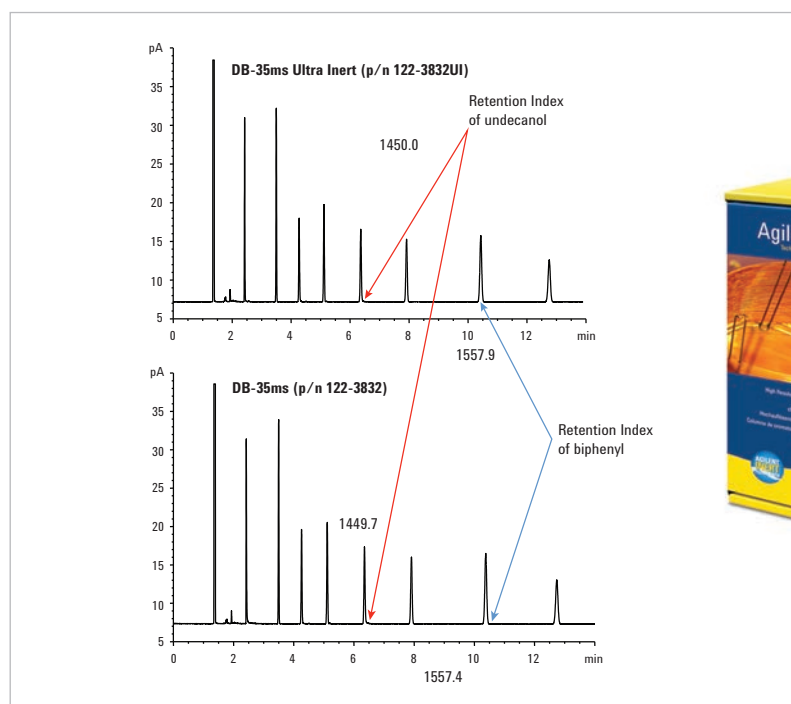
Agilent's leading-edge manufacturing processes – combined with our optimization of chemistries and manufacturing design advancements – improve the inertness of our Ultra Inert columns while maintaining the selectivity of their non-ultra inert counterparts.

In addition, every Agilent J&W Ultra Inert GC column is tested using probes with varying chemical characteristics to avoid subtle polymer selectivity variations. This ensures that Agilent J&W Ultra Inert GC columns have the same selectivity as Agilent MS columns – eliminating the need for method revalidation, as you can see below.

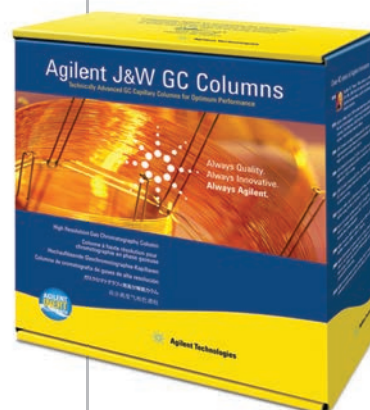
Low column activity for your sensitive, trace-level applications

Benefits of high column inertness

- Increased signal for more accurate peak identification
- Minimum peak tailing for active analytes
- Longer maintenance-free instrument uptime
- Minimal compound loss and degradation for more accurate quantitation



With Agilent J&W Ultra Inert GC columns, selectivity remains the same, allowing you to confidently integrate Ultra Inert columns into your current methods.



The industry's most rigorous test probe mixture ensures consistent column inertness – and results

A strong test probe mixture can highlight deficiencies in column activity, while a weak mixture can actually mask such deficiencies.

The test probes in the **Agilent Ultra Inert test probe mixture** have low molecular weights, low boiling points, and no steric shielding of their active groups. These characteristics allow the probative portion of the test molecules to penetrate – and fully interact with – the stationary phase and column surface.

Commonly used, less demanding test probes

1. 1-Octanol	4. 2,6-Dimethylaniline	7. 1-Decanol
2. n-Undecane	5. n-Dodecane	8. n-Tridecane
3. 2,6-Dimethylphenol	6. Naphthalene	9. Methyldecanoate

Agilent's more demanding Ultra Inert test probe mixtures

Ultra Inert 5ms columns

Elution Order	Test Probe	Functional Test
1	1-Propionic acid	Basicity
2	1-Octene	Polarity
3	n-Octane	Hydrocarbon marker
4	4-Picoline	Acidity
5	n-Nonane	Hydrocarbon marker
6	Trimethyl phosphate	Acidity
7	1,2-Pentanediol	Silanol
8	n-Propylbenzene	Hydrocarbon marker
9	1-Heptanol	Silanol
10	3-Octanone	Polarity
11	n-Decane	Efficiency

Ultra Inert 1ms columns

Elution Order	Test Probe	Functional Test
1	1-Propionic acid	Basicity
2	1-Octene	Polarity
3	n-Octane	Hydrocarbon marker
4	1,2-Butanediol	Silanol
5	4-Picoline	Acidity
6	Trimethyl phosphate	Acidity
7	n-Propylbenzene	Hydrocarbon marker
8	1-Heptanol	Silanol
9	3-Octanone	Polarity
10	tert-Butylbenzene	Hydrocarbon marker
11	n-Decane	Efficiency

Ultra Inert 35ms columns

Elution Order	Test Probe	Functional Test
1	1-Octene	Polarity
2	1-Butyric acid	Basicity
3	n-Nonane	Hydrocarbon marker
4	4-Picoline	Acidity
5	n-Propylbenzene	Polarity
6	1-Heptanol	Silanol, Polarity
7	1,2-Pentanediol	Silanol
8	3-Octanone	Polarity
9	Trimethyl phosphate	Acidity
10	n-Undecane	Hydrocarbon marker
11	tert-Butylbenzene	Efficiency

Ultra Inert DB-624 columns

Elution Order	Test Probe	Functional Test
1	Ethanol	Activity
2	Methylene chloride	Polarity
3	1-Propanol	Activity
4	Acetic acid	Basicity
5	Pyridine	Acidity
6	Octane	Hydrocarbon marker
7	1-Pentanol	Polarity
8	1,2-Propanediol	Silanol
9	Butyric acid	Basicity
10	m-Xylene	Polarity/efficiency
11	4-Methylpyridine	Acidity
12	Bromoform	Polarity
13	Dimethyl-methylphosphonate	Acidity
14	Decane	Hydrocarbon marker

Ultra Inert DB-8270D columns

Elution Order	Test Probe	Functional Test
1	Propionic acid	Basicity
2	Pyridine	Acidity
3	1-Pentanol	Silanol
4	1-Octene	Polarity
5	n-Octane	Hydrocarbon marker
6	1,2-Butanediol	Silanol
7	1-Chloro-2-fluorobenzene	Polarity
8	m-Xylene	Polarity
9	p-Xylene	Efficiency
10	2-Heptanone	Polarity
11	n-Nonane	Hydrocarbon marker
12	Isopropylbenzene	Efficiency

View the Ultra Inert DB-8270D test chromatogram at www.agilent.com/chem/library and search for 5991-0250EN.

To learn more about creating the most inert flow path, visit www.agilent.com/chem/inert

Agilent GC/MSD and GC instruments:

Maximize your quantification sensitivity and accuracy

To ensure accurate quantification and high sensitivity, the entire flow path must be highly inert, including detector surfaces. This is especially true for mass spectrometers, as they are often used for sensitive analyses.

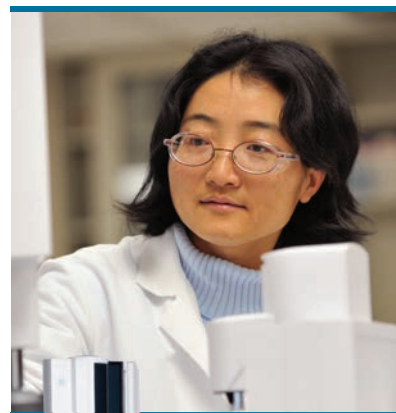
Our industry-leading GC/MS systems combine an inert ion source with the analytical capabilities you need to keep pace with the most stringent new methods – and your most demanding sample loads. Our instrument portfolio includes **GC single quadrupole MSD, GC ion trap MS, GC triple quadrupole MS, and GC/Q-TOF MS.**

Agilent 5977 Series GC/MSD

Resolve your search for performance and integration

The Agilent 5977 Series GC/MSD takes your lab to a higher plane of productivity and confidence with increased sensitivity, superior workflow, and software tools that simplify method optimization and lower your operating costs.

- **The most sensitive MSD:** With its new extractor source – plus the *only* quadrupole operating up to 200 °C – the Agilent 5977 GC/MSD prevents contamination by high-boiling compounds and ensures long-lasting tune and calibration
- **Maximum productivity:** Integrated hardware and software features simplify your workflow and help you get more done with fewer resources
- **Eco-friendly GC/MSD:** Integrated sleep/wake modes – plus smart startup features in the turbo pump – reduce gas and energy usage
- **The best software options:** Continue to use our versatile and robust ChemStation – or choose our proven MassHunter software



The Agilent 5977 Series GC/MSD has all the elements for faster vent times, eco-friendly resource management, and GC/MSD system protection – including the ability to use hydrogen as a carrier gas.

Agilent 7890B GC

Resolve your search for value

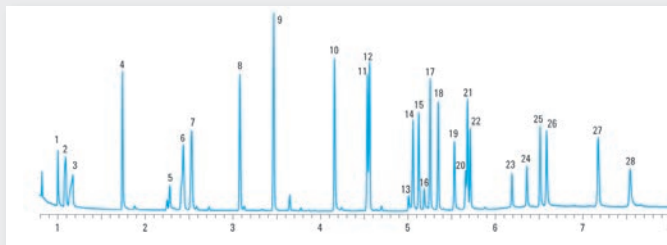
Agilent's 7890B GC system has everything you need to boost productivity and generate data with confidence. Its seamless communication with the Agilent 5977 MSD provides faster vent times, better resource management, and safer operation.

- **Inert Flow Path option – an Agilent exclusive:** Inert inlets, together with Ultra Inert liners and columns, ensure that your entire sample reaches the detector for confident trace-level analysis
- **Enhanced Capillary Flow Technology:** CFT modules enable leak-free, inert in-oven connections while improving throughput and reliability
- **Choice of inlets and detectors:** A variety of inlet and detector modules allows you to customize your GC in minutes
- **GC and GC/MS system tools:** Reduce downtime with simplified maintenance and status monitoring
- **Intuitive system and data handling software:** Choose the software package that fits *your* lab's needs – and turn your results into answers, faster
- **Less dependence on helium:** Integrated calculators help you convert He methods to more available – and less expensive – gases such as hydrogen or nitrogen
- **Interactive Parts Finder software:** Image-based inventory helps you quickly identify the parts and supplies you need.



The Agilent 7890B GC adds powerful capabilities and productivity features to the industry-leading GC platform.

5 ng test mix: Agilent Inert Fast Toxicology Analyzer



- | | |
|---|----------------------|
| 1. Amphetamine | 16. Lorazepam |
| 2. Phentermine | 17. Diazepam |
| 3. Methamphetamine | 18. Hydrocodone |
| 4. Nicotine | 19. Oxycodone |
| 5. Methylenedioxyamphetamine (MDA) | 20. Temazepam |
| 6. Methylenedioxymethamphetamine (MDMA) | 21. Diacetylmorphine |
| 7. Methylenedioxyethylamphetamine | 22. Flunitrazepam |
| 8. Meperidine | 23. Nitrazepam |
| 9. Phencyclidine | 24. Clonazepam |
| 10. Methadone | 25. Alprazolam |
| 11. Cocaine | 26. Verapamil |
| 12. SKF-525a (RTL Compound) | 27. Strychnine |
| 13. Oxazepam | 28. Trazodone |
| 14. Tetrahydrocannabinol | |
| 15. Codeine | |

NPD chromatogram of underivatized drugs of abuse 5 ng/component.

The above example shows the separation of 28 underivatized drugs of abuse. The check-out mix contained a broad range of basic and acidic drugs from several drug classes, providing an effective tool for quick assessment of column and system performance.

In this study, the liner, column, and instrument performed well. Note that the peak shapes for these very active analytes are sharp and symmetrical – even at relatively low levels – facilitating good quantification and demonstrating the value of system inertness.

To learn how these highly evolved systems can increase your productivity, visit www.agilent.com/chem/inert

Foods and flavors:

Ensure consistent quality and uncompromising safety throughout the food production chain

Food supply globalization, novel food-borne pathogens, and aging populations have combined to increase the demand for highly sensitive food testing applications.

Flow path inertness is the next frontier in food analyses, and Agilent is breaking new ground with our ongoing development of inert flow path solutions including liners, columns, and instruments – as well as test mixes and procedures. Together, these innovations ensure a highly inert flow path, improving your ability to analyze difficult, active compounds at trace levels.

Organophosphorus residues in olive oil

Chromatographically active compounds such as organophosphorus (OP) pesticides can adsorb onto active sites in the sample flow path (particularly at trace levels), compromising analyte response and increasing the risk of peak tailing. An inert flow path is, therefore, essential for accurate quantitation.

In this study, we demonstrate that the complete transfer of analytes from inlet to detector is critical. To avoid activity, we recommend using a total Agilent Inert Flow Path.

Test conditions:

GC/MSD	Agilent 7890/5975C
Sampler	Agilent 7683B, 5.0 µL syringe
CFT device	Purged 2-way splitter, split ratio 1:1 MSD:FPD
Inlet	1 µL splitless, 250 °C, purge flow 60 mL/min at 0.25 min, gas saver on at 2 min 20 mL/min
Column	Agilent J&W DB-35ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm
Postrun backflush	7.5 min at 290 °C, Aux EPC pressure 54 psi during backflush, 2 psi inlet pressure during backflush
MSD	300 °C Transfer line, 300 °C source, 150 °C quad
FPD	230 °C, Hydrogen 75 mL/min, air 100 mL/min, carrier + makeup (N ₂) 60 mL/min

Flow path supplies:

Vials	Amber crimp top glass vials (p/n 5183-4496)
Vial caps	Crimp caps (p/n 5181-1210)
Vial inserts	250 µL Glass/polymer feet (p/n 5181-8872)
Syringe	5 µL (p/n 5181-1273)
Septum	Advanced Green (p/n 5183-4759)
Inlet liner	Ultra Inert single taper splitless liner with wool (p/n 5190-2293)
Ferrules	0.4 mm id short, 85/15 Vespel/graphite (p/n 5181-3323)

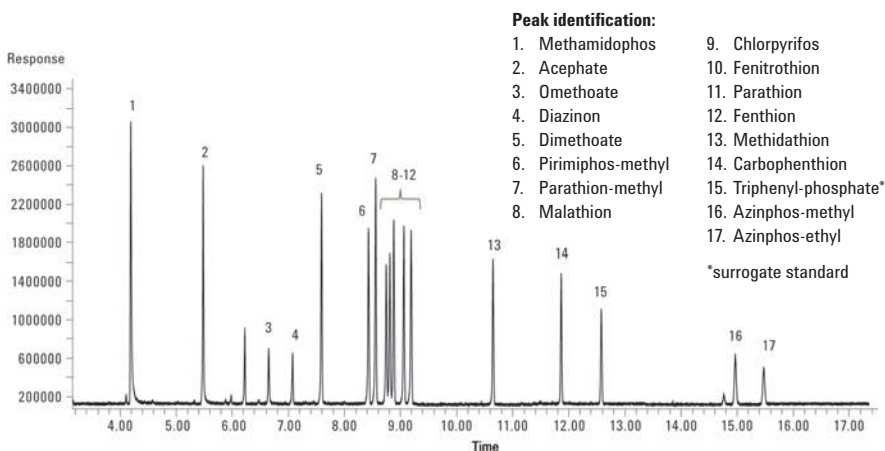




Organophosphorus residues test

The Agilent J&W DB-35ms Ultra Inert capillary column and Ultra Inert liner with wool resolved the targeted OP pesticides and provided excellent peak shape for the polar pesticides – allowing for more reliable quantitation at low levels.

Resolution of 16 organophosphorus pesticides with an Agilent J&W DB-35ms Ultra Inert column



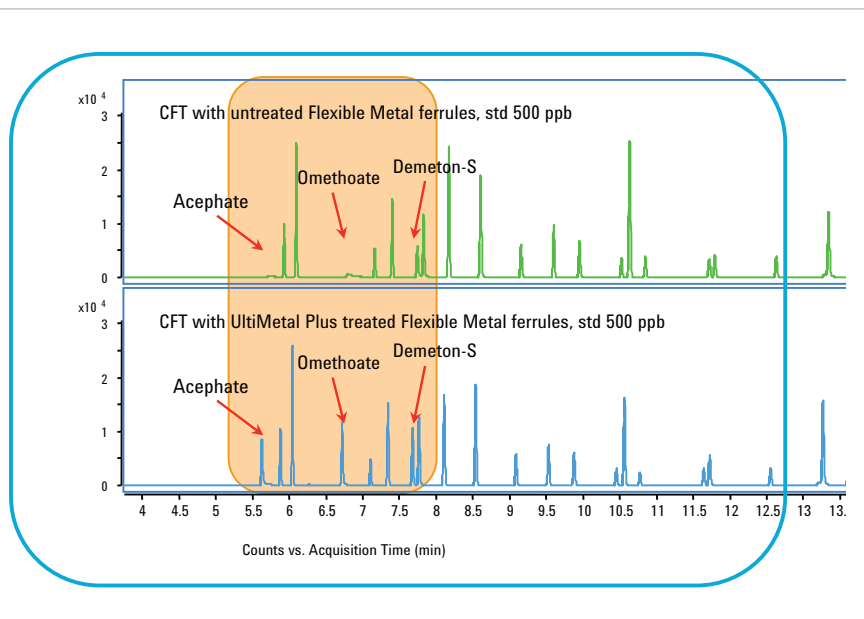
GC/FPD chromatogram of a 100 ng/mL matrix-matched organophosphorus pesticide standard with analyte protectant analyzed on an Agilent J&W DB-35ms Ultra Inert, 30 m x 0.25 mm, 0.25 μm capillary GC column (Agilent p/n 122-3832UI).



Optimal recovery of active analytes

At trace levels, even the exposed surface of metal ferrules can be a source of activity – causing loss of active, labile analytes. Agilent UltiMetal Plus Flexible Metal with proprietary UltiMetal Plus treatment reduce active analyte loss, increase response, and improve your results.

Note: we recommend post-column backflush to increase the productivity of heavy-matrix samples, common in food safety labs.



UltiMetal Plus Flexible Metal ferrules, which connect the column to the backflush module, reduce the loss of analyte response for pesticides acephate, omethoate, and demeton-S.

To learn how to create an inert flow path for *your* applications, visit www.agilent.com/chem/inert

Environmental:

Meet present and future demands for speed, accuracy, and productivity

Whether you're quantifying pesticide residues in water, analyzing contaminants in soil, or measuring atmospheric impurities – environmental analysis must be done more reliably, more efficiently, and with higher quality data than ever before. Agilent's Inert Flow Path solutions let you address these challenges head-on. An inert flow path helps you achieve excellent peak shapes for problematic compounds – plus reliable quantitation at low levels. So you can get the right answers the *first* time.

US EPA Method 8270 test for active semi-volatiles

US EPA Method 8270 is widely used to determine the concentration of semi-volatile organic compounds in environmental matrices – many of which contain a mix of acids, bases, and neutrals. This test is challenging, due to interactions between analytes and flow path surfaces. In this evaluation, the test mix included difficult compounds in the 8270 method.

Test conditions:

Column 1:	Agilent J&W DB-UI 8270D, 20 m × 0.18 mm, 0.36 μm (p/n 121-9723)
Column 2:	1.0 m × 0.15 mm id deactivated fused silica tubing (p/n 160-1625-10)
Carrier:	Helium, constant flow 1.58 mL/min set at 40 °C
Oven:	40 °C (2.5 min), 25 °C/min to 320 °C (4.8 min)
Inlet:	S/SL 1 μL pulsed splitless, 300 °C, 44 psi pulse to 1.4 min, purge flow 50 mL/min at 1.42 min, gas saver off
Inlet liner:	Agilent Ultra Inert single taper with wool (p/n 5190-2293) MSD, 325 °C transfer line, 300 °C source, 150 °C quad, 30-550 AMU range
GC/MSD:	Agilent 7890 Series GC/5975C Series GC/MSD
Sampler:	Agilent 7683B liquid sampler (5.0 μL syringe, p/n G4513-80206)
Aux EPC:	2 psi with 5 mL/min bleed during run
Backflush:	Post run 3.5 min at 75 psi aux EPC, 2 psi inlet pressure

Flow path supplies:

Vials	Amber silanized screw top vials (p/n 5183-2072)
Vial caps:	Blue screw caps (p/n 5185-5820)
Vial inserts:	250 μL Glass/polymer feet (p/n 5181-8872)
Syringe:	5 μL (p/n 5181-1273)
Septum:	Advanced Green (p/n 5183-4759)
Inlet liner:	Ultra Inert single taper (p/n 5190-3162)
Gold seal:	Ultra Inert gold seal with washer (p/n 5190-6144)
Ferrules:	0.4 mm id short, 85/15 Vespel/graphite (p/n 5181-3323)
CTF fittings:	Internal nut (p/n G2855-20530)
CTF ferrules:	UltraMetal Plus Flexible Metal ferrules, 0.25 mm id columns (p/n G3188-27501)
Magnifier:	20× Magnifier loop (p/n 430-1020)

Download the full version of this Application Note 5991-0250EN at www.agilent.com/chem/inert



Ensure the highest-quality gas – and clean, leak-free gas lines – with Agilent's high-capacity gas filter.

Learn more at www.agilent.com/chem/gasclean



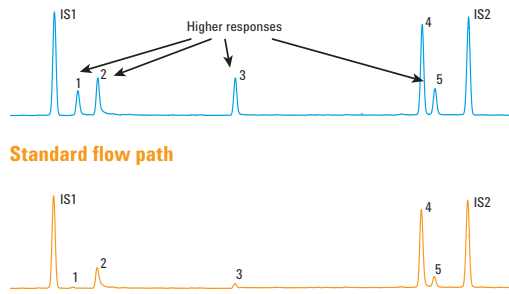
US EPA Method 8270 semi-volatiles test

Ultra Inert liners with wool are perfect for high throughput analyses of environmental samples. The glass wool traps non-volatiles present in the samples, preventing residue build-up.

The Ultra Inert deactivation also gives the wool a highly inert surface so recovery of active analytes such as 2,4-DNP is not compromised.

Download the full version of this Application Note 5991-0250EN at www.agilent.com/chem/inert

Semi-volatiles suitability Agilent Inert Flow Path



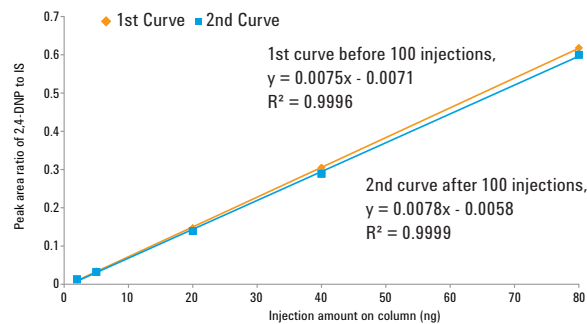
Peak identification:

1. 2,4-Dinitrophenol
2. 4-Nitrophenol
3. 4,6-Dinitro-2-methylphenol
4. 4-Aminobiphenyl
5. Pentachlorophenol
- IS1. Acenaphthene-d10
- IS2. Phenanthrene-d10

Agilent Inert Flow Path provides high responses for sensitive acidic compounds such as semi-volatile 2,4 DNP. A standard flow path, similarly configured, shows activity and adsorption.

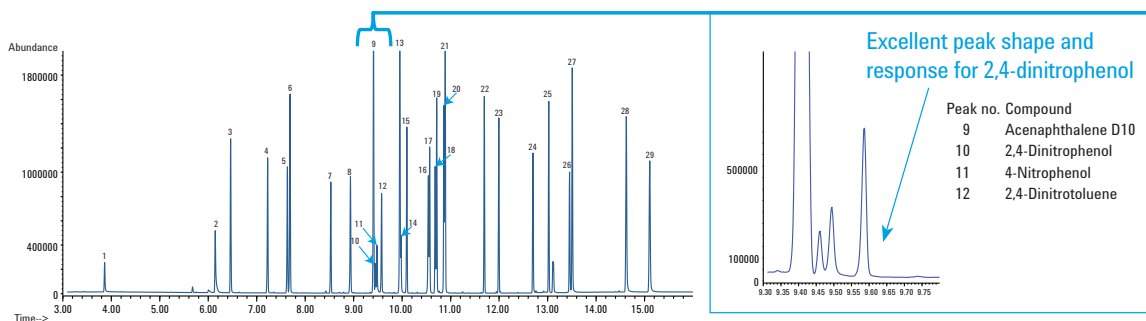
Excellent linearity of calibration curves and reliable durability for active semi-volatile compound

2,4-DNP calibration curves before and after 100 injections using Agilent Inert Flow Path components



Improved deactivation provides excellent linearity over an extensive calibration range (2 to 80 ng) for active compounds such as 2,4-dinitrophenol.

10 ng/μL semi-volatile checkout standard on an Agilent J&W DB-UI 8270D, 20 m x 0.18 mm, 0.36 μm capillary GC column using an Ultra Inert liner with wool



Excellent peak shape and response for 2,4-dinitrophenol

- | Peak no. | Compound |
|----------|--------------------|
| 9 | Acenaphthalene D10 |
| 10 | 2,4-Dinitrophenol |
| 11 | 4-Nitrophenol |
| 12 | 2,4-Dinitrotoluene |

2,4 Dinitrophenol expanded view

- | | | | | | |
|--------------------------------|------------------------------|---------------------------------|-----------------------|------------------------|----------------------------|
| 1. N-Nitrosodimethylamine | 6. Naphthalene | 11. 4-Nitrophenol | 16. Simazine | 21. Phenanthrene-d10 | 26. 3,3'-Dichlorobenzidine |
| 2. Aniline | 7. Hexachlorocyclopentadiene | 12. 2,4-Dinitrotoluene | 17. Atrazine | 22. Aldrin | 27. Chrysene d-12 |
| 3. 1,4-Dichlorobenzene-d4 | 8. Mevinphos | 13. Fluorene | 18. Pentachlorophenol | 23. Heptachlor epoxide | 28. Benzo[b]fluoranthene |
| 4. Isophorone | 9. Acenaphthene-d10 | 14. 4,6-Dinitro-2-methyl phenol | 19. Terbufos | 24. Endrin | 29. Perylene-d12 |
| 5. 1,3-Dimethyl-2-nitrobenzene | 10. 2,4-Dinitrophenol | 15. Trifluralin | 20. Chlorothalonil | 25. 4,4'-DDT | |

Example chromatogram of a 29-component mix on an Agilent J&W DB-UI 8270D, 20 m x 0.18 mm, 0.36 μm capillary GC column (Agilent p/n 121-9723).

Optimized Volatile Organic Compound Analysis using Agilent's VOC Application Solution

In many regions of the world, the primary method for VOC analysis of drinking water is based on US EPA Method 524.2 and 8260B. The Agilent 5975C GC/MS has a very successful legacy of implementing these methods that goes back many years. Requirements for lower levels of detection drive this analysis, and so new and improved technologies play a significant part in its success.

The Agilent VOC solution optimizes instrument setup and conditions by incorporating Ultra Inert technology, important components, updated software, and method setup tips – to get the highest level of sensitivity, robustness, and stability while meeting all of the required method quality control elements.

For comprehensive VOC method and instrument configuration details, see Application Note *Volatile Organic Compound Analysis Using Purge and Trap* (5991-0029EN).

Test conditions:

GC Acquisition	Agilent 7890/5975C
GC/MSD Column	Agilent J&W DB-624UI, 20 m x 0.18 mm, 1.0 µm (p/n 121-1324UI)
Oven	35 °C for 4 min, 15 °C/min to 240 °C for 0.3333 min (run time 18 min)
Front split/splitless inlet	He, split 150:1 at 200 °C
Septum purge flow	5 mL/min
Thermal aux 2 (MSD transferline)	
Temperature	250 °C
Initial temperature	35 °C
Constant flow	0.7 mL/min
MS Acquisition	
Solvent delay	1.05 min
Scan	Low mass 35.0, high mass 260.0
MS zones	MS Source 250 °C, MS Quad 200 °C
Sampler conditions:	Atomx
Method	Method 524_5 mL – VOCARB
Sample volume	5.0 mL
Sweep sample time	0.25 min
Sweep sample flow	100 mL/min
Spurge vessel heater/temperature	OFF/20 °C
Purge	11.0 min, 40 mL/min, 20 °C
Dry purge time	2.00 min
Dry purge flow	100 mL/min
Desorb preheat temperature	245 °C
Desorb time/flow	4.00 min/100 mL per min
Desorb temperature	250 °C

Agilent VOC Kit (p/n G7022A)

Description	Part No.
6 mm Drawout Plate (Inert) for Agilent 5973 and Agilent 5975 MSD Inert EI Ion Source	G2589-20045
DB-624UI Column (20 m x 0.18 mm, 1.0 µm film)	121-1324UI
Straight-through 1.0 mm Ultra Inert straight 1 mm id liner	5190-4047
Tekmar VOCARB 3000 (#K) Trap	5188-8820
Agilent GC/MS VOC Application Kit Disk with application note, kit instructions, instrument methods, and applicable technical notes	G7022-60001



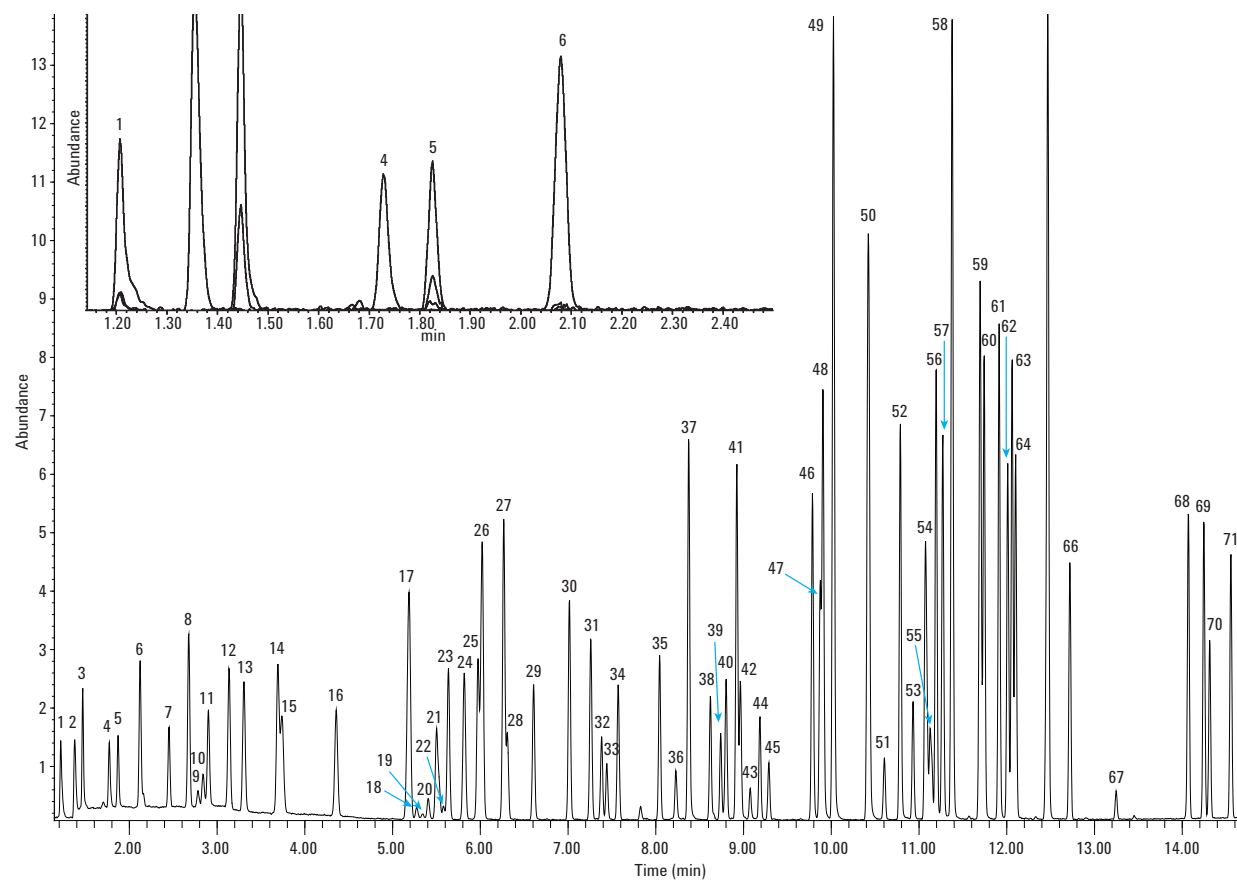
Confidently detect compounds at trace levels and comply with global regulations for environmental monitoring

Specifically created for environmental labs, this brochure demonstrates how Agilent J&W GC columns deliver low column bleed and the lowest column activity for sensitive, trace-level applications.

Get more information on Agilent's leading products for environmental analysis: DB-CLP1, DB-CLP2, DB-UI8270D, DB-624UI, Select PAH and more. Also highlighted are Agilent Ultra Inert GC liners – great companion tools with Agilent J&W Ultra Inert GC columns for trace-level analysis.

View the GC column environmental portfolio brochure (5990-5873EN) at www.agilent.com/chem/envportfolio

EPA method 524.2 Volatiles ICAL standard



Total Ion Chromatogram of Method 524.2 ICAL standard. Inset: extracted ion chromatogram of the gases from left to right: dichlorodifluoromethane (85 m/z), chloromethane (50 m/z), vinyl chloride (62 m/z), bromomethane (94 m/z), chloroethane (64 m/z), and trichlorofluoromethane (101 m/z) in order of their elution. For a detailed list of compound identification, see *Optimized Volatile Organic Compound Analysis Using Agilent VOC Application Solution (5991-0896EN)*.

To learn more about creating the most inert flow path, visit www.agilent.com/chem/inert

Forensic/Toxicology:

Make sure your data can withstand the toughest scrutiny

In the forensic and toxicology fields, both lives and professions depend on the accuracy of your results – whether you're screening for drugs, checking a crime scene for explosive residue, or monitoring chemotherapy doses. To complicate matters, the continuing emergence of new drugs and toxins can increase your list of target compounds by hundreds every year.

An inert flow path, obtained with Agilent's Ultra Inert and UltiMetal solutions, delivers the selectivity and sensitivity you need for excellent peak shapes and consistent recovery of low-level analytes. The Inert Flow Path Split/Splitless inlet with treated seal and weldments prevents adsorption or degradation, while Ultra Inert liners with wool capture non-volatiles, and help transfer active analytes of interest onto the Ultra Inert column. UltiMetal Plus Flexible Metal ferrules and purged capillary flow union allow backflushing of high boilers in heavy-matrix samples.

Hint: For GC-compatible compounds, you can significantly reduce sample preparation and clean up by using GC/MS in SIM-Scan mode with electron impact ionization (EI).

Basic drugs of abuse

Heavy-matrix samples (such as plasma or urine extracts) deteriorate the performance of the analytical column and detector, shortening column life and increasing the need for MS source maintenance. This problem can be overcome by using inlet liners with wool to protect the entire GC/MS system; however, if these liners are poorly deactivated, they can cause adsorption or decomposition of target analytes.

Agilent's Ultra Inert deactivation process significantly improves the efficacy and robustness of glass wool deactivation, allowing liners with glass wool to be used for the first time in GC/MS analysis of basic drugs of abuse. For this test, flow path inertness was evaluated using Agilent's Forensic/Toxicology analyzer checkout standards, including 28 popular and difficult basic drugs.

Test conditions:

Column	Agilent J&W DB-5MS Ultra Inert, 15 m x 0.25 mm, 0.25 μ m
Sample	5 ppm checkout mixture for GC/MS Forensic/Toxicology analyzer (p/n 122-5512UI)
Injection	1 μ L splitless at 280 °C (hold 0.75 min)
Oven	100 °C (0.5 min) to 325 °C at 20 °C/min and hold 2.5 min.
Detector	Agilent 5975C MSD

Flow path supplies:

Vials	Amber screw cap (p/n 5182-0716)
Vial caps	Blue screw cap (p/n 5182-0717)
Vial inserts	150 μ L Glass with polymer feet (p/n 5183-2088)
Septum	Advanced Green non-stick 11 mm (p/n 5183-4759)
Ferrules	0.4 mm id, 85/15 vespel/graphite (p/n 5181-3323)
Capillary Flow Technology	Ultimate Union (p/n G3182-61580), internal nut (p/n G2855-20530); UltiMetal Flexible Metal ferrule, (p/n G3188-27501)
Inlet seal	Ultra Inert gold seal with washer (p/n 5190-6144)
Inlet liners	Agilent Ultra Inert deactivated single taper splitless liner with wool (p/n 5190-2293)

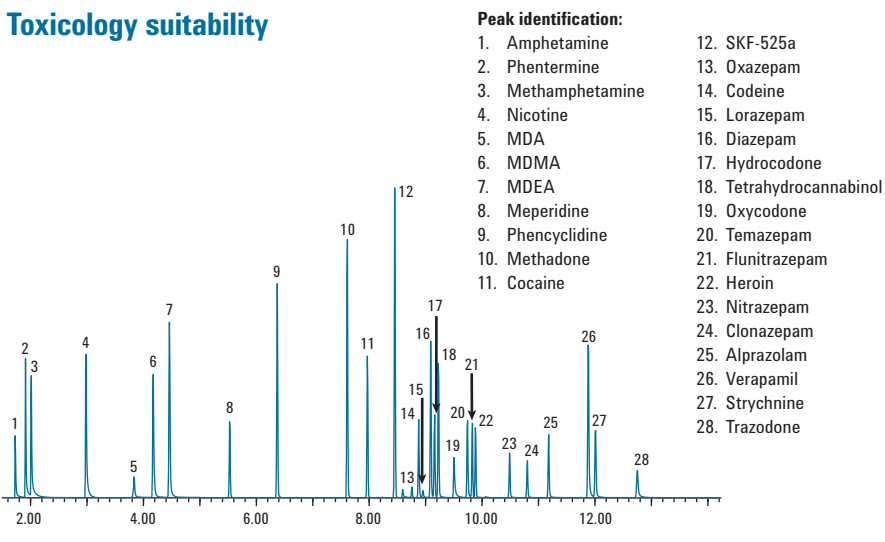




Drugs of abuse test

In this example, we performed a GC/MS analysis on a complex forensic/toxicology standard at 5 ng on-column using an Agilent Ultra Inert single taper splitless liner with wool. Peak shapes and responses demonstrate a high degree of inertness in both the liner and wool, preventing analyte adsorption and decomposition.

Toxicology suitability



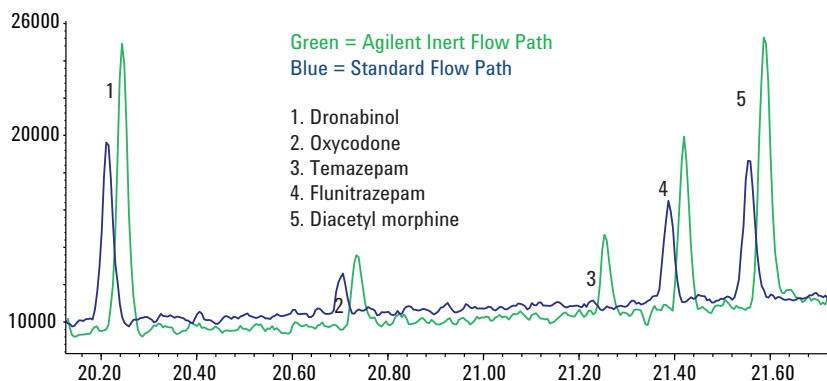
Complex and challenging forensic/toxicology standard at 5 ng on-column using an Agilent GC/MS with Inert Flow Path.



Better peak shape and higher response for active drugs

Here, inlet and consumable inertness during MSD were compared using the same HP-5MS Ultra Inert column. Always install inert components to reduce inlet activity and avoid significant signal loss – or total analyte adsorption.

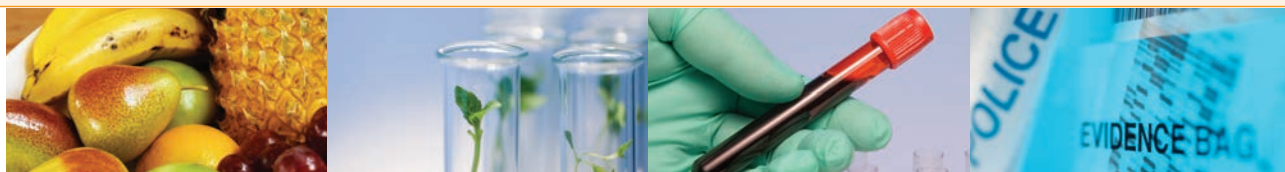
Drugs of abuse overlay 500 ppb complete flow path comparison



Column: Agilent J&W HP-5ms UI 30 m x 0.25 mm, 0.25 µm
 Oven: 100 °C 4 min hold, 10°/min to 280 °C, 6 °/min to 300 °C (4.67 min hold)
 Carrier: Helium 52.7 cm/s (2 mL/min) set at 100 °C, EPC-Constant Flow
 Inlet: Pulsed Splitless 35 PSI pulse until 0.73 min, 0.75 min purge 50 mL/min, gas saver 20, mL/min at 2 min
 Inlet liner: Ultra Inert with wool/Standard single taper liner with wool (p/n 5190-3165)
 Gold Seal: UI gold seal/Standard gold seal
 Detector: MSD Scan mode 40 to 450 m/z, 230 °C source temp, 150 °C Quad temp, 310 °C transfer line

An UltiMetal Plus Inert Flow Path Split/Splitless inlet, Ultra Inert liner with wool, and Ultra Inert gold seal prevent the adsorption and loss of active analytes.

Download the full version of this Application Note
 5990-7596EN at www.agilent.com/chem/library



Our global applications team has developed an Application Note library to demonstrate the performance advantage of Agilent's Inert Flow Path.

Food

Ultra Inert (UI) Wool Liner Performance Using an Agilent J&W DB-35ms UI Column (5990-8235EN)

Analysis of Pesticides in Food by GC/MS/MS using the Ultra Inert Liners with Wool (5990-7706EN)

Organophosphorus Residues in Olive Oil by GC/FPD with Agilent J&W DB-35ms Ultra Inert (5990-7722EN)

Organophosphorus Pesticides in Apple Matrix by GC/MS/FPD Using an Agilent J&W DB-35ms Ultra Inert GC Column (5990-7165EN)

Agilent J&W DB-624 Ultra Inert Capillary Column's Utility in Screening Distilled Spirits by GC/MS Static Headspace (5991-0659EN)

Analysis of Trace Amounts of Volatile Organic Acids using the New Agilent J&W DB-624UI Ultra Inert GC column (5991-1136EN)

Screen Beer by GC/MS Static Headspace with the Agilent J&W DB-624 Ultra Inert Capillary Column (5991-1136EN)

Endrin and DDT Breakdown Using an Inert Flow Path Equipped Agilent 7890A GC (5991-1862EN)

Environmental

Evaluation of the Ultra Inert Liner Deactivation for Active Compounds Analysis by GC (5990-7380EN)

Analysis of Semivolatiles by GC/FID using the Ultra Inert Inlet Liners with Wool (5990-7381EN)

Sub $\mu\text{g/L}$ Level Analysis of Chlorinated Pesticide and Herbicide Analysis in Water by GC/ μECD using Agilent J&W DB-35ms UI GC Column (5990-9735EN)

Plaguicides Using Agilent J&W HP-1ms Ultra Inert and Agilent J&W DB-1301 Capillary GC Columns (5990-4352EN)

Determination of Haloacetic Acids in Water by GC/ μECD Using Agilent J&W DB-35ms Ultra Inert and DB-XLB Columns (5990-8765EN)

PBDE Analysis Using an Agilent J&W DB-5ms Ultra Inert GC Column (5990-5651EN)

PAH Analysis Using an Agilent J&W DB-5ms Ultra Inert Capillary GC Column (5990-5652EN)

Volatile Organic Compound [VOC] Analysis via Purge and Trap: Success with VOC Analysis using the Agilent 5975C Mass Selective Detector [MSD] (5991-0029EN)

Semivolatile Analysis with Specially Designed Agilent J&W DB-UI 8270D Columns (5991-0250EN)

Analysis of Pesticides by GC/QQQ Using Agilent Ultra Inert Flow Path Solutions (5991-1860EN)

Quantitative and Repeatability Analysis of Trace Level Pesticides in Plantation Food by GC/MS/MS (5990-9317EN)

Optimized Method Development of Large Volume Injection for GC/MS/MS of Food Pesticides (5991-1196EN)

Forensic/Toxicology

Agilent Inert Flow Path Enhancements Impact on Drugs of Abuse Testing (5991-1859EN)

Analysis of Drugs of Abuse by GC/MS using the Ultra Inert Inlet Liners with Wool (5990-7596EN)

Separation of Oxymorphone and Oxycodone Hydroxyl-imino Tri-methyl Silyl Derivatives Using an Agilent Fast Toxicology Analyzer and an Agilent J&W DB-35ms Ultra Inert Capillary GC Column (5990-6577EN)

Fast and Comprehensive Doping Agent Screening in Urine by Triple Quadrupole GC/MS (5990-7234EN)



More Ultra Inert application and technical notes

Analysis of Carcinogenic Tobacco-Specific Nitrosamines in Mainstream Cigarette Smoke Using an Agilent J&W DB-35ms Ultra Inert GC Column (5990-8849EN)

Addressing Concerns in QC Tests for GC Columns (5990-9961EN)

Residual Solvent Analysis with Specifically Designed and Tested Agilent J&W DB-Select 624UI <467> Columns (5991-0616EN)

Agilent UltiMetal Plus Deactivation for Inertness of Metal Surfaces in the Sample Flow Path (5991-1861EN)

UltiMetal Plus Deactivation for Inertness of Metal Surfaces in the Sample Flow Path (5991-1861EN)

PHARMACEUTICAL APPLICATION

Residual solvent testing of process intermediates, excipients, and formulated drug products provides an important safeguard to assure the safety of pharmaceutical products worldwide. Changes to United States Pharmacopeia (USP) General Chapter <467> Residual Solvents are closely aligned with International Committee on Harmonization (ICH) Q3C Guidelines for Residual Solvents. Both groups have taken a toxicity/dosage-based approach to assess the level of risk that the presence of these solvents or organic volatile impurities (OVIs) present to the public. The analysis is typically conducted by static headspace with FID detection using a thick film G43-based stationary phase.

Agilent J&W DB-Select 624UI <467> GC columns are designed specifically for United States Pharmacopeia Method <467>.

For more details consult Application Note *Residual Solvent Analysis with a Specifically Designed and Tested Agilent J&W DB-Select 624UI for USP <467> Column (5991-0616EN)*, and *Lower Detection Limits and Quantify Trace-Level Organic Volatile Impurities (5991-0552EN)*.

To get your copy of these applications go to www.agilent.com/chem/library and search by publication number.

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As the world's chromatography leader, Agilent is uniquely positioned to offer industry-leading GC supplies and sample preparation products. All supplies are engineered or selected by our experienced design teams, manufactured to our demanding specifications, and tested under a variety of strict conditions.

Inert flow path accessory kit

This all-in-one kit contains the components you need to upgrade your existing split/splitless inlet to an Inert Flow Path Split/Splitless inlet. Includes inlet weldment, shell weldment, Ultra Inert gold seal, and Ultra Inert splitless liner.

MS analyzed vial kits stop unknown peaks from impacting your results

Agilent vial kits eliminate the possibility of vials being the source of contamination, giving you greater confidence in your results and eliminating the need to pre-test or rerun samples because of unexpected peaks. All kits include a Certificate of Analysis that details critical physical dimensions, as well as lot-specific and fully traceable LC/MS and GC/MS signal traces.



Premium non-stick septa

Other suppliers coat their septa with foreign substances such as powder to prevent sticking. However, this coating can accumulate inside split vent lines and interfere with your analysis of active analytes.

Agilent non-stick septa are plasma coated, which eliminates chemical bleed and contamination from foreign substances, and they are delivered in blister packs, to keep each septum clean and ready for use. So your GC system will maintain its integrity, stay cleaner, and require less maintenance. (Always remember to change septa often to prevent leakage.)



Blue Line autosampler syringes

Designed to support the higher productivity features of the 7693 autosampler, Agilent Blue Line syringes come in a wide range of volumes and configurations to suit your application.



Bulk GC Supplies

Ideal for high usage labs, our bulk supplies provide the same quality and consistency of Agilent GC supplies in convenient and economical packaging:

- Ultra Inert liners in 100 packs
- Ultra Inert gold seals in 10 and 50 packs
- Non-Stick septa in 400 packs

Sample preparation:

Reliable and accurate results with fewer repeated samples

Only Agilent offers a complete line of sample preparation products for any type of GC and GC/MS analysis across the full spectrum of instrumentation.

Agilent sample preparation products help you move easily from sample to successful analytical result:

- Extend instrument performance with Captiva filtration
- Reduce costs and save time with Bond Elut QuEChERS Kits
- Achieve lower detection limits with Bond Elut silica and polymeric SPE products

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Stock up now, and always ensure your most inert flow path, visit www.agilent.com/chem/GCsupplies

Agilent Ultra Inert liners and touchless packaging: High inertness, productivity, and reproducibility



Description	Volume (µL)	ID (mm)	1/pk	5/pk	25/pk	Bulk 100/pk*
Splitless Inlet Liners						
Single taper, Ultra Inert liner	900	4	5190-2292	5190-3162	5190-3166	5190-3170
Single taper, Ultra Inert liner with glass wool	900	4	5190-2293	5190-3163	5190-3167	5190-3171
Double Taper, Ultra Inert liner	800	4	5190-3983	5190-4007		
Dimpled 200 µL 2 mm id			5190-2297			
Split Inlet Liners						
Straight, Ultra Inert liner with glass wool	990	4	5190-2294	5190-3164	5190-3168	5190-3172
Low pressure drop, Ultra Inert liner with glass wool	870	4	5190-2295	5190-3165	5190-3169	5190-3173
SPME, Headspace Injection						
Straight, 0.75 mm id	35	0.75	5190-4048			
Straight, 1 mm id	65	1	5190-4047			

Each liner ships with a pre-installed, non-stick O-ring

* Bulk 100/pk are not in touchless packaging

Agilent Ultra Inert gold seals and washers: A smooth, leak-free surface for active analytes

Description	1/pk	10/pk	50/pk
Inert gold seal and washer	5190-6144	5190-6145*	5190-6149*

* Available March 2013



Agilent UtiMetal Plus Flexible Metal ferrules: No column breakage, no leaks, no activity

Description	Part No.
UtiMetal Plus Flexible Metal ferrule with 0.4 mm id for fused silica tubing 0.1-0.25 µm id 10/pk	G3188-27501
UtiMetal Plus Flexible Metal ferrule with 0.5 mm id for fused silica tubing 0.32 µm id 10/pk	G3188-27502
UtiMetal Plus Flexible Metal ferrule with 0.8 mm id for fused silica tubing 0.45-0.53 µm id	G3188-27503
UtiMetal Plus Flexible Metal ferrule with no hole to plug Capillary Flow Technology fittings	G3188-27504
UtiMetal Plus Flexible Metal ferrule for use with 0.25 mm and 0.32 mm UtiMetal column tubing	G3188-27505
UtiMetal Plus Flexible Metal ferrule for use with 0.53 mm UtiMetal column tubing	G3188-27506



Agilent Inert Flow Path upgrade kit: The components you need, all in one place

Description	Part No.
Complete Inert Flow Path upgrade kit	5190-6150*
Cap Inlet Shell Weldment Assembly, UltiMetal Plus treated	G3452-60570
Insert weldment, UltiMetal-Plus treated	G3452-60586
Ultra Inert gold seal	5190-6144
Ultra Inert single taper splitless liner with wool	5190-2293
UltiMetal ferrules for 0.25 mm id fused silica columns	G3188-27501

* Available March 2013

Four easy ways to create your Inert Flow Path:

1. Request **Option 114** when you purchase the new Agilent 7890B GC system
2. Upgrade with our new split/splitless inlet accessory: **p/n G3453B**
3. Order our new inert flow path accessory kit (**p/n 5190-6150**), which contains the essential weldment parts and consumables
4. Purchase individual Inert Flow Path components separately, as needed

Additional flow path supplies: Complete your inert flow path

Description	Part No.
Purged Ultimate Union Assembly, inert	G3186B
3-Way Splitter with Makeup Gas, inert	G3183B
Ultimate Union Kit, UltiMetal Plus deactivated	G3182-60581
Compact Deans Switch Manifold Assembly, UltiMetal Plus treated	G2855B
Compact Splitter with Makeup Gas, inert	G3180B



Ensuring an inert GC flow path has never been more critical

OPTIMIZING YOUR GC FLOW PATH FOR INERTNESS

Top 5 TIPS for GC flow path inertness

1. Maximize the size
2. Purge samples first at injection
3. Select a column with optimized inertness
4. Remember your detector
5. Use a gas analyzer

Agilent offers four GC inertness levels and gas sets.

Agilent UltiMetal Plus. The new Inert Flow Path.

Agilent GC and GC-MS inertness.

Maximize peak performance and productivity.

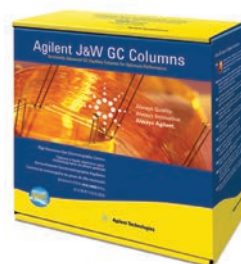
Learn how to optimize your flow path for inertness so you can achieve the ultra low detection levels today's demanding analyses require.

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Agilent J&W Ultra Inert GC columns:

Engineered for low bleed, high thermal stability, and excellent inertness



Ultra Inert 5ms GC columns

ID (mm)	Length (m)	Film (μm)	Part No.		
DB-5ms Ultra Inert					
0.18	20	0.18	121-5522UI		
		0.36	121-5523UI		
0.25	15	0.25	122-5512UI		
		1.00	122-5513UI		
		0.25	122-5522UI		
	25	30	0.25	122-5532UI	
			0.50	122-5536UI	
	50	60	1.00	122-5533UI	
			0.25	122-5552UI	
			0.25	122-5562UI	
0.32	30	1.00	122-5563UI		
		0.25	123-5532UI		
		0.50	123-5536UI		
		1.00	123-5533UI		
60	1.00	123-5563UI	123-5563UI		
		HP-5ms Ultra Inert			
		0.18	20	0.18	19091S-577UI
				0.25	19091S-431UI
0.25	15	0.25	19091S-433UI		
		0.50	19091S-133UI		
	30	60	1.00	19091S-233UI	
			0.25	19091S-436UI	
0.32	30	0.25	19091S-413UI		
		1.00	19091S-213UI		

Ultra Inert DB-624 GC columns

ID (mm)	Length (m)	Film (μm)	Part No.
DB-624 Ultra Inert			
0.18	20	1.0	121-1324UI
0.25	30	1.4	122-1334UI
	60	1.4	122-1364UI
0.32	30	1.8	123-1334UI
	60	1.8	123-1364UI
0.53	30	3.0	125-1334UI
	75	3.0	125-1374UI
DB-Select 624 Ultra Inert for <467> GC columns			
0.25	30	1.4	122-0334UI
	60	1.4	122-0364UI
0.32	30	1.8	123-0334UI
	60	1.8	123-0364UI
0.53	30	3.0	125-0334UI

Ultra Inert 1ms GC columns

ID (mm)	Length (m)	Film (μm)	Part No.
DB-1ms Ultra Inert			
0.18	20	0.18	121-0122UI
		0.25	122-5512UI
		0.25	122-0132UI
0.25	15	0.25	122-5512UI
	30	0.25	122-0132UI
	60	0.25	122-0162UI
0.32	15	0.25	123-0112UI
	30	0.25	123-0132UI
HP-1ms Ultra Inert			
0.18	20	0.18	19091S-677UI
		0.25	19091S-931UI
		0.25	19091S-933UI
		0.50	19091S-633UI
0.25	30	0.50	19091S-633UI
		1.00	19091S-733UI
		0.32	15
25	30	0.52	19091S-612UI
		0.25	19091S-913UI
		0.25	19091S-713UI

Ultra Inert 35ms GC columns

ID (mm)	Length (m)	Film (μm)	Part No.
DB-35ms Ultra Inert			
0.18	20	0.18	121-3822UI
0.25	15	0.25	122-3812UI
	30	0.25	122-3832UI
0.32	15	0.25	123-3812UI
0.32	30	0.25	123-3832UI

Ultra Inert DB-UI 8270D GC columns

ID (mm)	Length (m)	Film (μm)	Part No.
DB-UI 8270D Ultra Inert			
0.18	20	0.36	121-9723
0.25	30	0.25	122-9732
0.25	30	0.50	122-9736
Economical 6-Packs*			
0.18	20	0.36	621-9723
0.25	30	0.25	622-9732

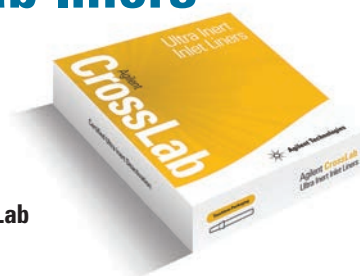
*Available only in the United States

Need Ultra Inert liners for other manufacturer's instruments in your lab?

Not a problem with Agilent CrossLab liners



Agilent CrossLab liners perform seamlessly with a variety of instruments, regardless of make or model.

Below is a sample of the CrossLab Ultra Inert liner part numbers for specific instrument vendors. For the complete listing, please see the Agilent CrossLab GC Supplies Selection Guide (publication 5990-9065EN) or visit www.agilent.com/chem/SelectCrossLab



Agilent CrossLab liners for Bruker*

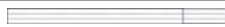

Liners for 1177 Split/Splitless Injector Ports

	Description	ID (mm)	OD (mm)	Length (mm)	Volume (µL)	Unit	Agilent Ultra Inert Deactivation	Similar to OEM Part No.
Split Liners								
	Straight-through	4.0	6.3	78.5	1000	5/pk	8004-0156	RT207732145 SG092007
	With frit, gooseneck	4.0	6.3	78.5	1000	5/pk	8004-0158	RT210462145

* Formerly Varian GC instruments, now Bruker products



Agilent CrossLab liners for PerkinElmer

Liners for AutoSystem, AutoSystem XL, Clarus Systems

	Description	ID (mm)	OD (mm)	Length (mm)	Volume (µL)	Unit	Agilent Ultra Inert Deactivation	Similar to OEM Part No.
Splitless Liners								
	Straight	2.0	6.2	92.1	300	5/pk	8003-0162	N6101372
Split Liners								
	Straight-through	4.0	6.2	92.1	1150	5/pk	8003-0151	



Agilent CrossLab liners for Shimadzu

Liners for 2014 Systems

	Description	ID (mm)	OD (mm)	Length (mm)	Volume (µL)	Unit	Agilent Ultra Inert Deactivation	Similar to OEM Part No.
Splitless Liners								
	Straight-through	2.6	5.0	95	500	5/pk	8001-0151	220-94767-00
Split Liners								
	Straight-through	3.4	5.0	95	860	5/pk	8001-0153	

Agilent CrossLab liners for Thermo Scientific

Liners for Trace, Focus Systems

	Description	ID (mm)	OD (mm)	Length (mm)	Volume (µL)	Unit	Agilent Ultra Inert Deactivation	Similar to OEM Part No.
Splitless Liners								
	Single taper	3.0	8.0	105		5/pk	8002-0154	45350032
Split Liners								
	Straight	5.0	8.0	105	2000	5/pk	8002-0151	45350030

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. Agilent CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the Agilent CrossLab products may have slightly different designs as compared to the OEM counterparts.

Order now at www.agilent.com/chem/store

An Agilent Inert Flow Path is a *must* for active analytes

The increasing need for high-sensitivity analyses of harmful substances is placing new demands on GC methods. Agilent is committed to improving your ability to analyze difficult, active compounds – even at trace levels – by giving you the tools required to ensure a highly inert flow path.

- **Agilent Ultra Inert inlet liners** deliver a robust, reproducible, and reliable inert flow path – with or without glass wool
- **Agilent J&W Ultra Inert GC columns** push the industry standards for consistent column inertness and exceptionally low column bleed
- **Agilent GC and GC/MS instruments** bring together all the elements for trace-level analysis, dramatically improving MS resolution, spectral integrity, and detection limits
- **Agilent-engineered supplies** prevent adsorption or degradation to help you maintain the integrity of your results
- **Ultra Inert gold seals and Inert Flow Path Split/Splitless inlet** reduce analyte loss due to contact with hot metal surfaces
- **UltiMetal Plus Flexible Metal ferrules with Capillary Flow Technology devices** allow you to improve your results using techniques such as backflushing, heart-cutting, flow splitting, and Deans switching – *without* the fear of leaks or activity.



To learn more about Agilent Inert Flow Path solutions, visit www.agilent.com/chem/inert

To find your local Agilent Representative or Agilent Authorized Distributor, visit www.agilent.com/chem/contactus

To download additional application examples, visit www.agilent.com/chem

This information is subject to change without notice.

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