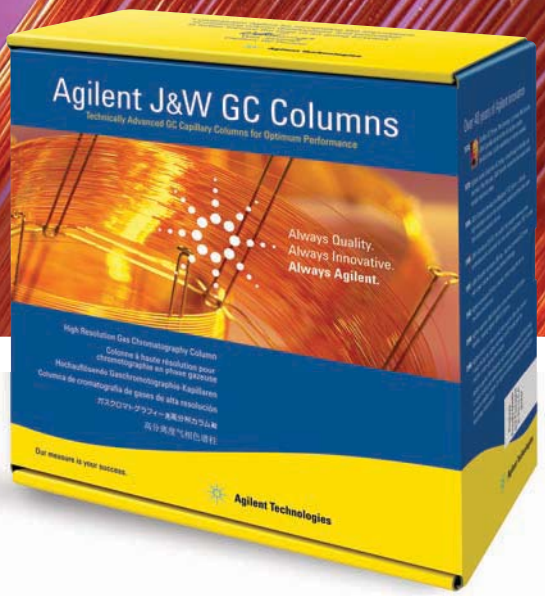
Cut through the noise

and stop worrying about peak tailing for active compounds



Agilent J&W Ultra Inert and GC/MS GC Column Portfolio

Our measure is your success.

products | applications | software | services

Agilent Technologies

Agilent J&W Ultra Inert and GC/MS GC Columns **minimize baseline elevation and peak tailing for active compounds** and deliver a better bottom line

Testing drinking water for semi-volatile contaminants that are public health threats

Detecting melamine and other dangerous substances in wheat gluten

Determining drugs of abuse for regulatory compliance

In today's demanding lab environment, you're under intense pressure to deliver fast, accurate results while conforming to an increasingly regulatory landscape.

With all this in mind, you simply cannot afford interferences caused by column bleed or activity. For starters, having to repeat or verify suspect analyses wastes valuable resources, hinders productivity and hurts your bottom line. Even worse, unreliable results can have catastrophic implications in terms of environmental safety and the quality of the foods we eat.

Agilent J&W Ultra Inert and GC/MS GC columns can help you achieve the lowest possible detection limits for difficult analytes

By itself, low column bleed increases the signal to noise ratio; however, your results will be flawed if *any* analyte is adsorbed by active sites in the column. Similarly, if a well-deactivated column has a high bleed rate, some of the analyte-generated signal could be smothered by the bleed signal. Again, your results will be flawed.

Only Agilent J&W Ultra Inert and GC/MS GC columns deliver low column bleed and low column activity for your sensitive, trace-level applications – regardless of detector type.

Benefits of high column inertness

- Trace level detection of active compounds
- Minimum peak tailing for active analytes
- Longer maintenance-free instrument uptime
- Minimal compound loss and degradation for more accurate quantitation

Benefits of low column bleed

- Improved mass spectral clarity and faster, more accurate peak identification
- Increase column lifetime at higher operating temperatures
- Less maintenance for GC detectors that are sensitive to bleed-related contamination
- Reduced baseline noise and interference
- Faster baseline stabilization and column exchange for shorter conditioning time and improved productivity

Robust columns for demanding GC and GC/MS applications

Agilent J&W GC/MS columns deliver reliable performance and low column bleed – even at high temperatures – for a broad range of benign and difficult sample types.

These unique columns utilize special surface deactivation and siloxane chemistries that enhance the performance of siloxane polymers. They also adhere to tight quality control specifications for separation efficiency, retention characteristics, column bleed, and peak height ratio.

As a result of our stringent QC tests, you can be certain you're getting the highest column-to-column reproducibility and column performance for the widest range of compound types – including chemically active compounds.

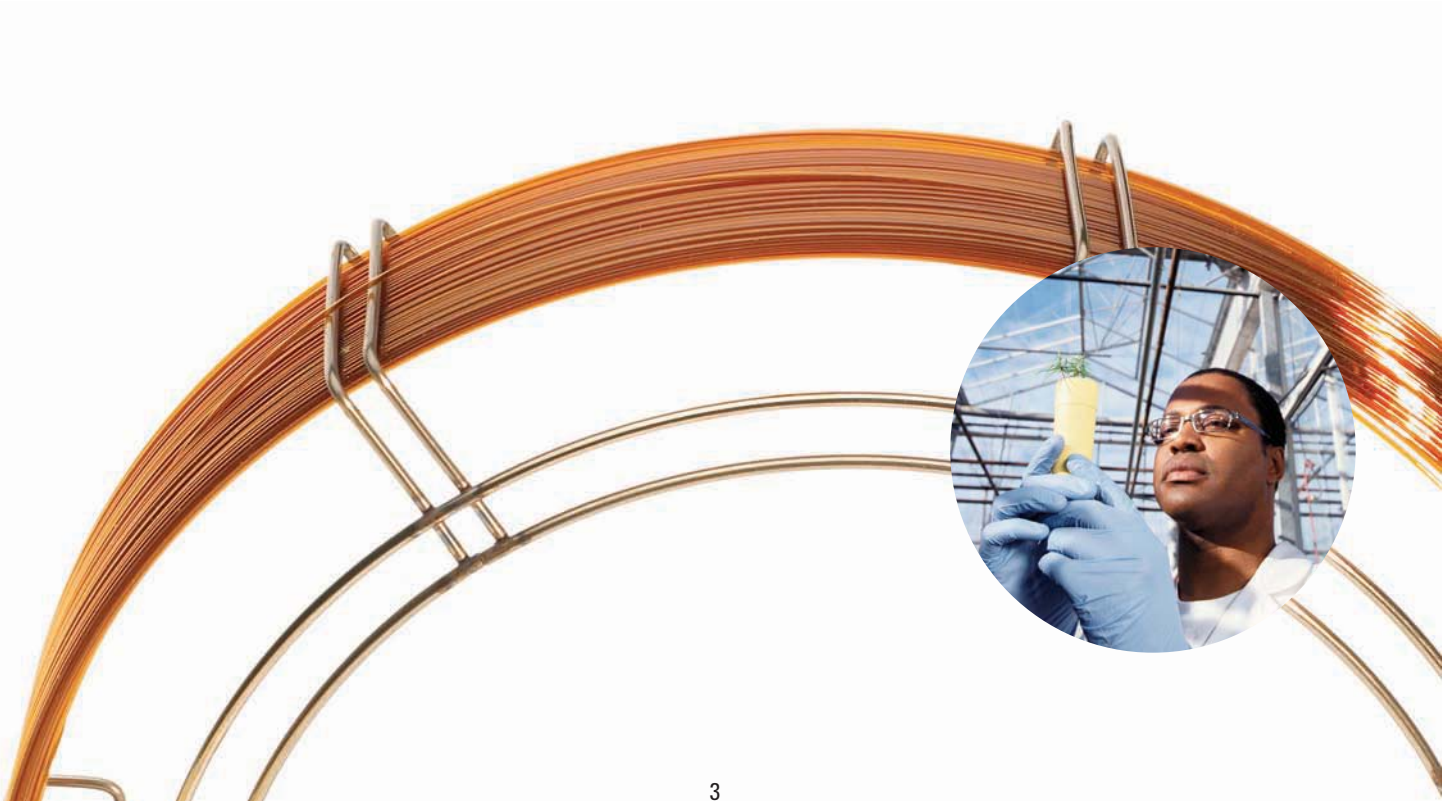
Ultra Inert Columns: Same selectivity with improved column inertness for trace-level analysis of active compounds

In 2008, Agilent introduced a new breakthrough: Agilent J&W Ultra Inert GC columns. Ultra Inert columns feature superior column inertness while maintaining the *same selectivity* as their MS counterparts. So you don't have to waste time with method re-validation.

Like *all* Agilent columns, Ultra Inert GC columns undergo tight QC testing procedures. However, Ultra Inert columns must *also* pass through a more difficult set of test parameters, including:

- A demanding test probe mixture that contains compounds with low molecular weights, low boiling points, and no steric shielding of active functional groups. This allows the probative portion of the test molecule to penetrate and fully interact with the column's stationary phase and surface.
- Testing at lower isothermal temperatures (65° C vs. 120° C for GC/MS columns). Higher-temperature testing increases the kinetic energy of probes in the mobile phase, allowing molecules to sweep past active sites on the column. This can mask solute/column interactions. Conversely, lower test temperatures allow a true evaluation of column surface activity, ensuring consistent column inertness.

Together, these conditions enhance the opportunity for solute/column interactions, and expose column deficiencies that traditional GC/MS testing might not detect.

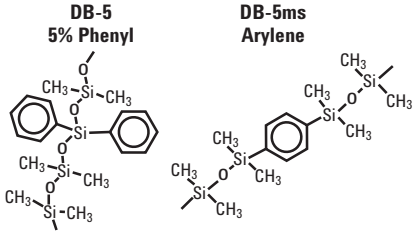


Optimized bonded phases **maximize sensitivity and thermal stability**

Together, Agilent's arylene phase technology and optimized siloxane manufacturing processes ensure excellent column performance for the broadest range of compounds, including chemically active analytes such as acids, bases and highly substituted compounds.

Arylene phases

Arylene columns utilize special surface deactivations and siloxane chemistries, which enhance the chromatographic performance of siloxane polymers. The inclusion of arylene in the siloxane polymer strengthens the polymer backbone, reducing stationary phase degradation and column bleed.



Each arylene MS phase was designed to be virtually identical to its "parent" polymer, so selectivity differences are very subtle.

Optimized siloxanes

DB-1 and HP-1 columns are 100% dimethylpolysiloxane. They *cannot be mimicked* by strengthening the polymer backbone through arylene inclusion, because the addition of other functional groups significantly changes phase selectivity.

Agilent developed the optimized siloxane column phase specifically to retain the selectivity of non-MS columns. This translates into improved deactivation and greatly reduced background level, even at elevated temperatures.

Arylene phase columns

	DB-5ms/ Ultra Inert	DB-XLB	DB-35ms	DB-17ms	DB-225ms
Phase	Arylene	Second generation arylene	Second generation arylene	Second generation arylene	Second generation arylene
Selectivity	Virtually identical to 5% phenyl-methylpoly-siloxane	Unique selectivity. Slightly more polar than a 5% phenyl-methylpoly-siloxane	Virtually identical to 35% phenyl-methylpoly-siloxane	Virtually identical to 50% phenyl-methylpoly-siloxane	Virtually identical to 50% cyano-propylphenyl-methylpoly-siloxane
Polarity	Low	Low	Mid	Mid	Mid/High
Upper Temperature Limit	325/350° C same as DB-5	340/360° C	340/360° C compared to DB-35 300/320° C	320/340° C compared to DB-17 280/300° C	240° C compared to DB-225 220/240° C

Note: Good for all general applications, the DB-XLB's unique selectivity makes it the first choice for the GC/MS analysis of specific PCB congeners.

Note: DB-35ms and DB-XLB or DB-17ms and DB-XLB are also ideal for dual column ECD methods such as CLP pesticides, chlorinated herbicides, Aroclors, and haloacetic acids.

Optimized siloxane columns *(GC/MS and Ultra Inert)*

	DB-1ms	HP-1ms	HP-5ms
Phase	100% Dimethylpolysiloxane	100% Dimethylpolysiloxane	5% phenyl Dimethylpolysiloxane
Selectivity	Exactly the same as DB-1	Exactly the same as HP-1	Exactly the same as HP-5
Upper Temperature Limit	340/360° C compared to DB-1 325/350° C	325/350° C same as HP-1	325/350° C same as HP-5

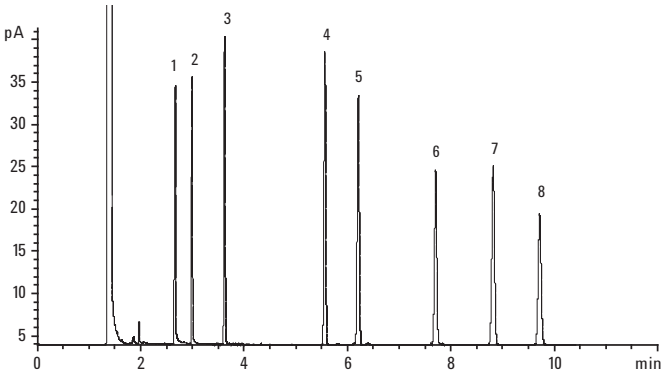
Confidently analyze active compounds, trace level samples and unknowns **without changing selectivity**

Agilent's leading-edge manufacturing processes – combined with our optimization of chemistries and advancements in manufacturing equipment design – improve the inertness of our Ultra Inert columns while maintaining the selectivity of their DB- and HP-5ms and 1ms counterparts.

In addition, Ultra Inert columns leverage the unique polymer chemistry and proprietary surface deactivation that are the hallmarks of Agilent J&W DB- and HP-columns. So you can be sure they adhere to the industry's toughest specifications for bleed, selectivity and efficiency.

(Note that Agilent DB- and HP-5ms and 1ms columns will be maintained in our portfolio of column phases.)

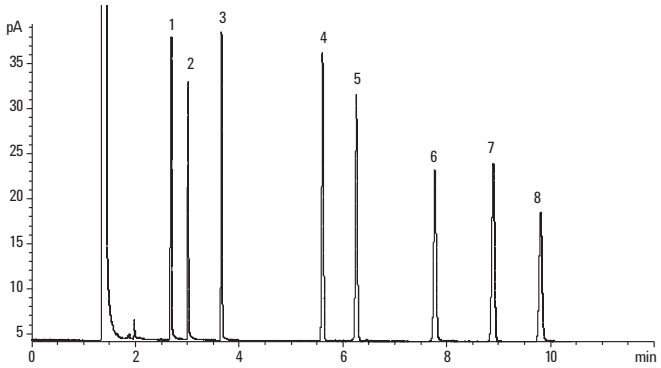
DB-5ms



DB-5ms Test Probe Mixture

1. 2-Ethylhexanoic acid
2. 1,6-Hexanediol
3. 4-Chlorophenol
4. n-Tridecane
5. 1-Methylnaphthalene
6. 1-Undecanol
7. n-Tetradecane
8. Dicyclohexylamine

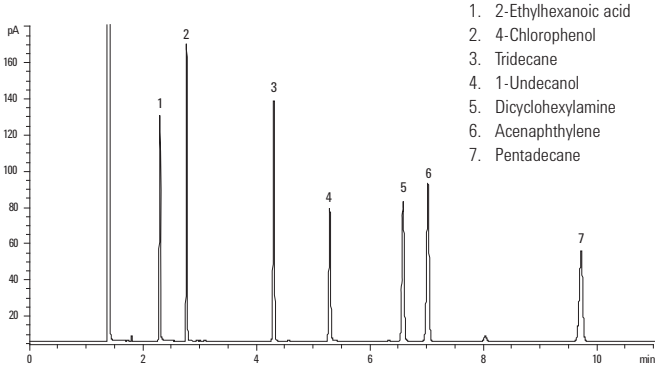
DB-5ms Ultra Inert



Here you can see that, compared to existing DB-5ms columns, 5ms Ultra Inert columns provide the same selectivity, so there's no need for method re-validation.

Set your sights on **ultimate reliability** for your routine and trace level analysis

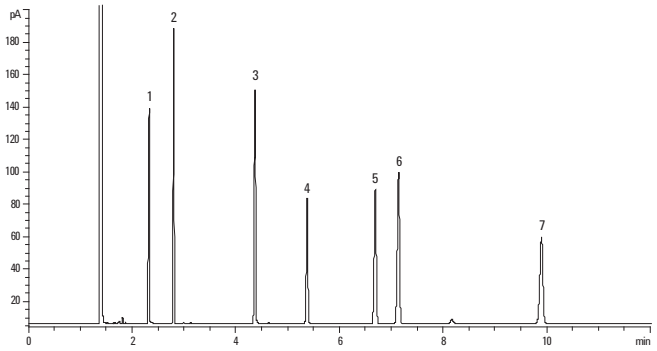
DB-1ms



Components:

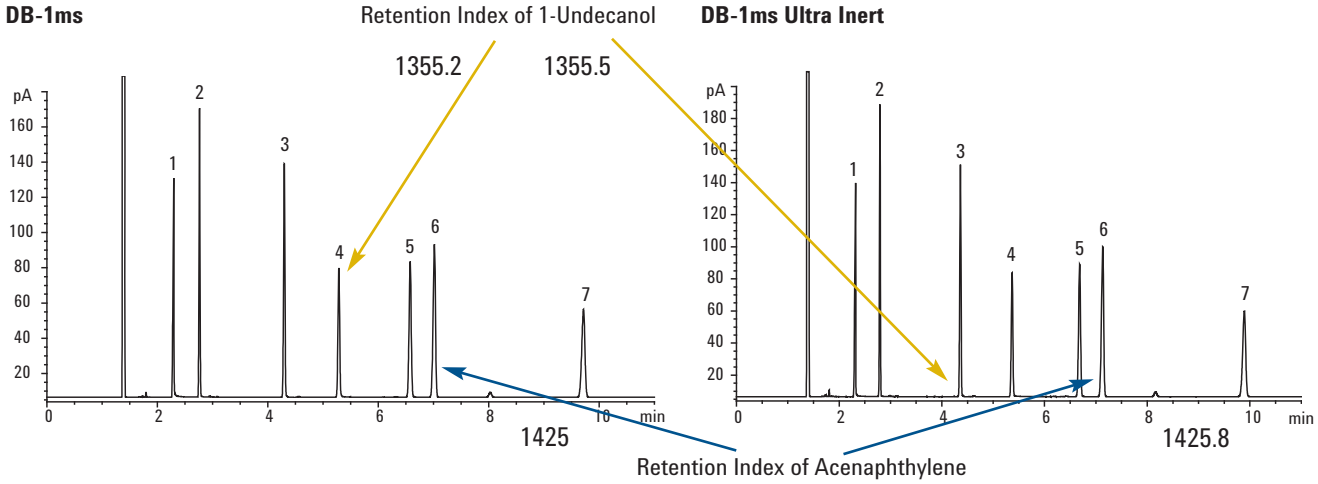
1. 2-Ethylhexanoic acid
2. 4-Chlorophenol
3. Tridecane
4. 1-Undecanol
5. Dicyclohexylamine
6. Acenaphthylene
7. Pentadecane

DB-1ms Ultra Inert



Every Agilent J&W Ultra Inert GC column is consistently tested using probes with varying chemical characteristics to avoid subtle polymer selectivity variations. This ensures that Ultra Inert GC columns have the same selectivity as Agilent MS columns – eliminating the need for method re-validation.

Retention Index Comparison



Consistent, predictable separations reduce the need for costly re-runs and troubleshooting. Note that the retention indices of 1-Undecanol (yellow arrows) and Acenaphthylene (blue arrows) are the same for DB-1ms and DB-1ms Ultra Inert columns.

Put **40 years of Agilent quality and innovation** behind your every separation

Uncompromising standards ensure unbeatable column performance

At Agilent, we take column performance seriously. Our rigorous QC testing protocols ensure the highest column-to-column reproducibility for the widest range of analytes and conditions. For example:

- **Maximum reproducibility.** Every Agilent J&W Ultra Inert and GC/MS columns are *individually tested* for low column bleed, consistent selectivity, accurate column dimensions, superior inertness, and high efficiency – the proof is the Performance Summary Sheet shipped with every column. You can be sure of minimal method adjustment when changing columns.
- **Better precision and reliability.** All columns must adhere to tight retention factor (k) specifications and narrow retention indexes to ensure reproducible peak separation from column to column.
- **More accurate quantification.** A high number of theoretical plates per meter promotes narrow peaks and improves the resolution of closely eluting peaks.
- **Improved signal-to-noise ratios.** We are constantly developing new ways to reduce column bleed and activity, so you can minimize background noise and maximize sensitivity.
- **Better peak shape for challenging active compounds.** We measure peak height ratios or peak tailing factors for active compounds such as acids and bases to ensure excellent peak shape for a broad range of difficult-to-chromatograph compounds.

Agilent has utilized over four decades of GC/MS column manufacturing experience to design innovative new phases for today's trace-analysis applications.

Our 40-year commitment to innovation is marked by these critical milestones:

- **1974:** Capillary GC Pioneer, Walt Jennings, co-founds J&W Scientific, which introduces the first all-glass capillary bonded phase – quickly establishing an industry standard.
- **1979:** Hewlett-Packard (now Agilent) invents fused silica capillary columns for gas chromatography, a breakthrough in flexibility and inertness. Also that year: J&W Scientific creates the first cross-linked bonded stationary phase.
- **1991:** J&W Scientific introduces DB-5ms – the first commercial GC phase with lower column bleed using arylene technology.
- **1992:** Hewlett-Packard (now Agilent) introduces HP-5ms columns, further raising the bar on low-bleed performance.
- **2000:** Agilent acquires J&W Scientific, uniting the DB and HP column families and creating Agilent J&W GC columns.
- **2008:** Agilent ushers in a new era with the launch of Ultra Inert columns – raising the bar for column inertness and QC testing with the industry's most rigorous test mixture.

Watch Agilent's commitment to quality in action! View a virtual tour at **www.agilent.com/chem/myGCcolumns**

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.

That is why the test probes in **Agilent's 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.

Less Demanding Test Probe Mixture Components

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

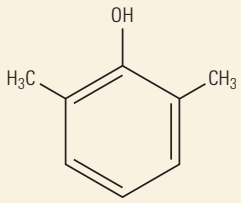
Agilent's New, More Demanding Ultra Inert Test Probe Mixture for 5ms Columns

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	Hydrocarbon marker

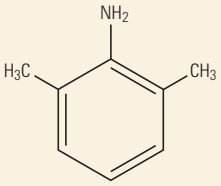
Agilent's New, More Demanding Ultra Inert Test Probe Mixture for 1ms Columns

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	Hydrocarbon marker

Chemical Structures

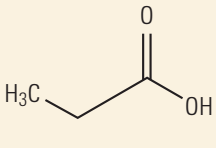


2, 6-Dimethylphenol

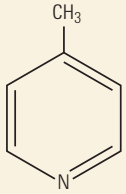


2, 6-Dimethylaniline

Weak probe molecules: *The acidic and basic portions of these molecules are shielded by the two methyl groups on their phenyl rings, making them less probative.*



1-Propionic acid



4-Picoline

Strong probe molecules: *The probes in Agilent's Ultra Inert test probe mixture are highly probative of the stationary phase and surface. Note, too, that the active end of each compound is available to interact with any active sites on the column.*

"[Agilent's] breakthroughs in surface pretreatments and improvements in surface deactivation came much more rapidly than I had anticipated. The quality of the new Inert series of columns exceed my wildest dreams."

"I am satisfied that customers with the most demanding analyses of active analytes can have confidence that the DB-5ms and HP-5ms Ultra Inert columns will provide the highest level of performance."

– Walt Jennings,
Professor Emeritus, University of California;
Co-Founder, J&W Scientific, Inc.

Less Demanding Test Probe Mixture

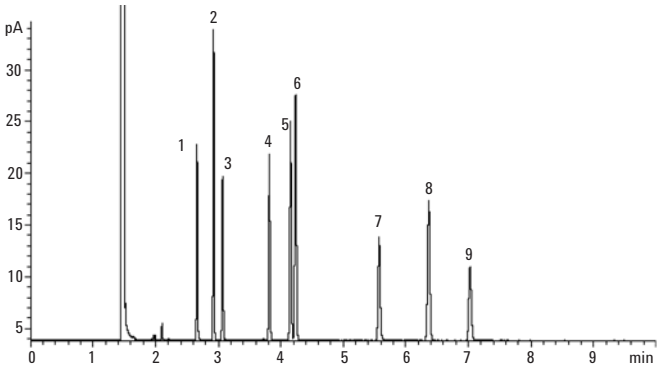


Figure 1: *Here you can see the separation of a series of probes that are undemanding by today's standards (see 'Less Demanding Test Probe Mixture Compounds,' page 8) – and which are used by many GC column manufacturers.*

Experimental Conditions for Figure 1:

GC	Agilent 6890N
Sampler	Agilent 7683B, 5 µL syringe (Agilent Part No. 5181-1273), 1.5 µL split injection, 4 ng each component on column
Carrier	Hydrogen, constant pressure, 38 cm/s
Inlet	Split/splitless; 250° C, 1.4 ml/min; column flow, split flow 75 ml/min
Inlet Liner	Deactivated single taper with glass wool (Agilent Part No. 5183-4647)
Column	5%-Phenyl column 30 m x 0.25 mm x 0.25 µm (competitor column)
Oven	120° C isothermal
Detector	FID at 325° C; 450 ml/min air, 40 ml/min hydrogen, 45 ml/min nitrogen makeup

Agilent's Ultra Inert Test Probe Mixture

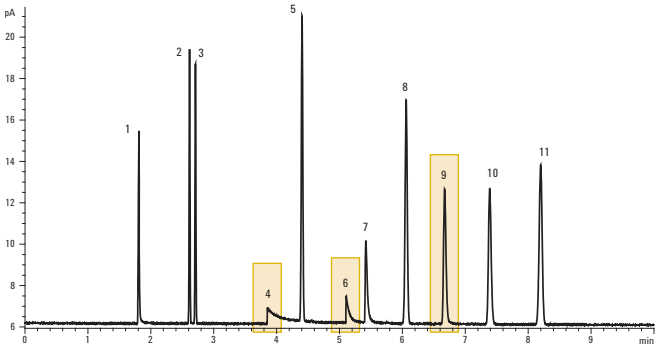


Figure 2: *When the competitive column in Figure 1 was evaluated with Agilent's new Ultra Inert test probe mixture, very poor performance was observed for both the 4-picoline and the trimethylphosphate (peaks 4 and 6, respectively). There was also increased tailing of the 1,2-pentanediol (Peak 9), indicating poor deactivation or possible oxygen damage to the stationary phase.*

Contrary to the results of the QC test in Figure 1, this column would not perform well with demanding analytes and would fail Agilent's new column inertness QC testing.

Experimental Conditions for Figure 2 and 3:

GC	Agilent 6890N
Sampler	Agilent 7683B, 0.5 µL syringe (Agilent Part No. 5188-5246), 0.02 µL split injection
Carrier	Hydrogen, constant pressure, 38 cm/s
Inlet	Split/splitless; 250° C, 1.4 ml/min; split column flow 900 ml/min; gas saver flow 75 ml/min at 2.0 min
Inlet Liner	Deactivated single taper with glass wool (Agilent Part No. 5183-4647)
Column 1 (Figure 2)	5%-Phenyl column 30 m x 0.25 mm x 0.25 µm (competitor column)
Column 2 (Figure 3)	DB-5ms Ultra Inert 30 m x 0.25 mm x 0.25 µm (Agilent Part No. 122-5532UI)
Oven	65° C isothermal
Detection	FID at 325° C; 450 ml/min air, 40 ml/min hydrogen, 45 ml/min nitrogen makeup

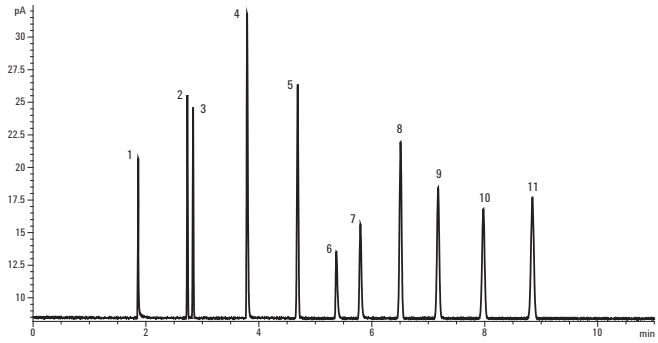


Figure 3: *A properly deactivated DB-5ms Ultra Inert column delivers symmetrical peak shapes, along with increased peak heights, which allow for accurate integration and detection of trace analytes.*

Peak tailing or lost response of the acids indicates that the column is basic; conversely, poor peak behavior of the bases confirms that the column is acidic. The alcohol uncovers any oxygen damage or exposed silanols. If the peak shapes for all of these compounds are symmetrical, then the column is considered to be inert toward them.

To learn more about our groundbreaking test probe mixture, go to **www.agilent.com/chem/ultrainert**

Raising the bar on **consistent column inertness and exceptionally low column bleed**

By itself, low column bleed increases the signal-to-noise ratio; however, your results will be flawed if *any* analyte is adsorbed by active sites on the column. Similarly, if a well-deactivated column has a high bleed rate, some of the analyte-generated signal could be smothered by the bleed signal. Again, your results will be flawed.

Agilent J&W Ultra Inert 5ms and 1ms GC Capillary Columns give you *both* low bleed and low activity for your most reliable results

If your GC column lacks inertness, active compounds such as acids, bases, phenols, or pesticides, will exhibit severe peak tailing, which can lead to inaccurate quantification. Even worse, the column might "eat up" the compounds you are trying to analyze, resulting in false negatives when screening for unknown samples.

But with Ultra Inert GC columns, introduced in 2008, you can count on:

- **The industry's highest degree of column inertness** for sharper peaks, better signal-to-noise ratios and longer column life
- **The lowest column bleed in the business** for increased detector sensitivity, faster baseline stabilization and reduced instrument downtime
- **Minimal compound adsorption** for more accurate quantification
- **Superior column-to-column consistency** for improved productivity and reliable, reproducible results

In addition, our new Ultra Inert phase lets you perform trace-level analysis on a greater number of active compounds – including pesticides, flavors and fragrances, drugs of abuse, and unknown sample screening.

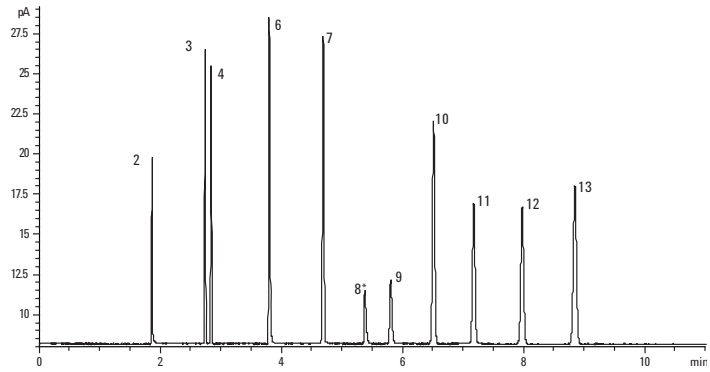
A new era of column inertness QC testing

Like all Agilent columns, Ultra Inert GC columns must pass through the tightest quality control checkpoints for column bleed, theoretical plate efficiency and retention index.

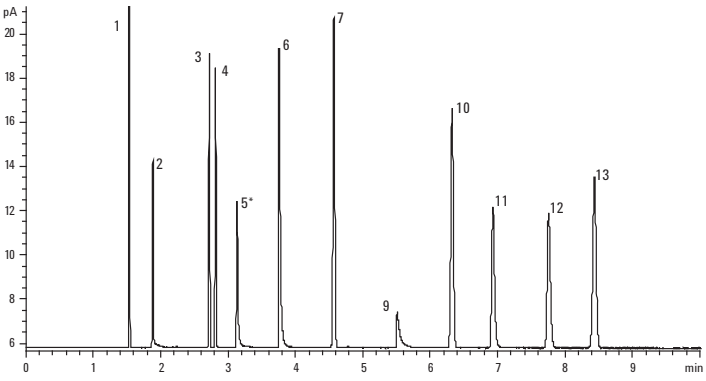
But we don't stop there. *All* Agilent J&W Ultra Inert GC columns are also individually tested against Agilent's exclusive Ultra Inert test probe mixture, so you know they can meet the demands for inertness that today's applications require.

A side-by-side comparison: Agilent vs. two leading competitors

Agilent, DB-5ms Ultra Inert Agilent Part No. 122-5532UI



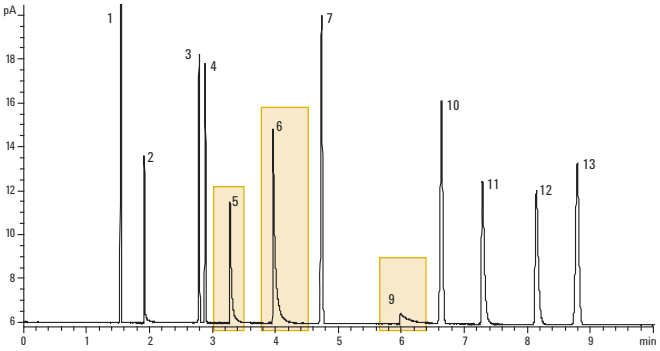
Agilent, HP-5ms Ultra Inert Agilent Part No. 19091S-433UI



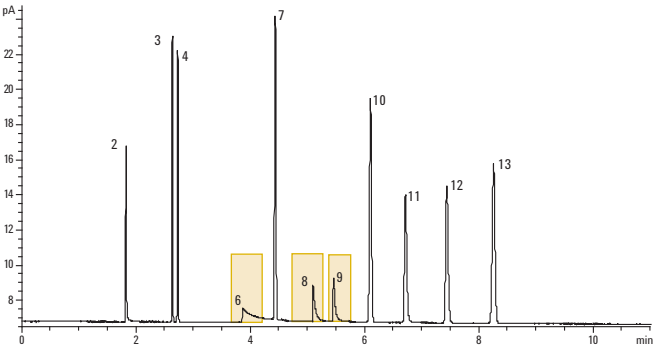
Experimental conditions are listed on the following page.

Competitive 5ms columns just don't make the grade – and these examples *prove it*

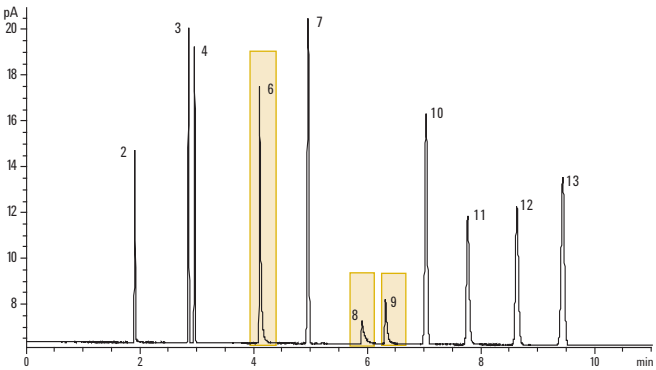
Restek, Rxi-5ms (similar to HP-5ms Ultra Inert)



Restek, Rtx-5Sil MS (similar to DB-5ms Ultra Inert)



Varian, VF-5ms (similar to DB-5ms Ultra Inert)



Agilent J&W Ultra Inert GC columns significantly reduce peak tailing and test probe adsorption for these challenging analytes.

Note that the competitors' peaks (highlighted) show severe tailing, resulting in reduced analyte sensitivity. When you compare these poor peaks with the sharp peaks produced by the Agilent columns, it becomes clear that Agilent low-bleed columns are also the most inert.

Experimental Conditions:

GC	Agilent 6890N
Sampler	Agilent 7683, 0.5 µL syringe (Agilent Part No. 5188-5246), 0.02 µL injection
Carrier	Hydrogen (38 cm/sec)
Inlet	Split/splitless; 250° C, split flow 900 mL/min, gas saver flow 75 mL/min at 2 minutes; 1 ng each component on-column
Inlet Liner	Deactivated single taper w/ glass wool (Agilent Part No. 5183-4647); gold-plated seal with cross (Agilent Part No. 5182-9652)
Column	30 m x 0.25 mm x 0.25 µm
Oven	65° C isothermal
Detection	FID

Ultra Inert Test Probe Mixture (For 5ms columns)

1. Methylene Chloride (solvent)
2. 1-Propionic acid
3. 1-Octene
4. n-Octane
5. 1,3-Propanediol*
6. 4-Picoline
7. n-Nonane
8. 1,2-Pentanediol*
9. Trimethyl phosphate
10. n-Propylbenzene
11. 1-Heptanol
12. 3-Octanone
13. n-Decane

*Due to differences in selectivity between DB-5ms Ultra Inert and HP-5ms Ultra Inert, 1,2-Pentanediol has been replaced by 1,3-Propanediol in the HP-5ms Ultra Inert test probe mixture.

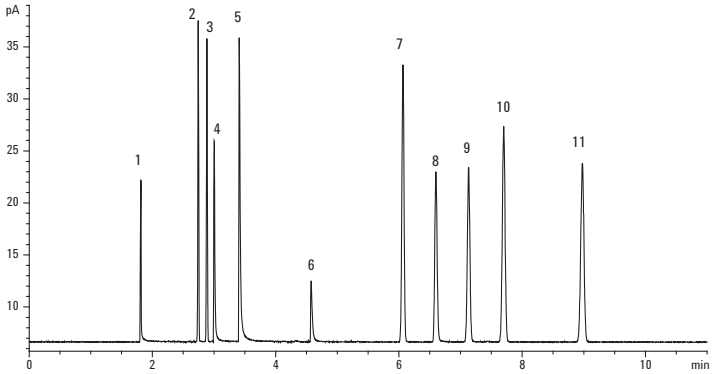
Highlighted peaks are poorly shaped, indicating column activity toward these compounds.

See how Agilent 1ms Ultra Inert GC Columns **clearly surpass the leading competitors' 1ms columns**

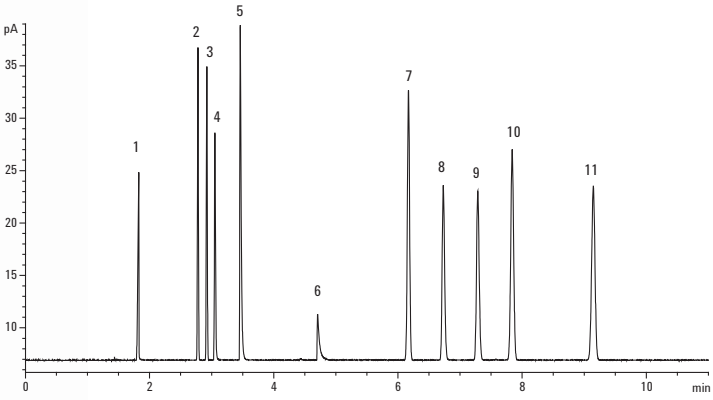
For this comparison, we used Agilent's challenging Ultra Inert 1ms test probe mixture. Note how Agilent 1ms Ultra Inert GC columns significantly reduce peak tailing and test probe adsorption, while improving bleed performance.

Agilent vs. two leading competitors

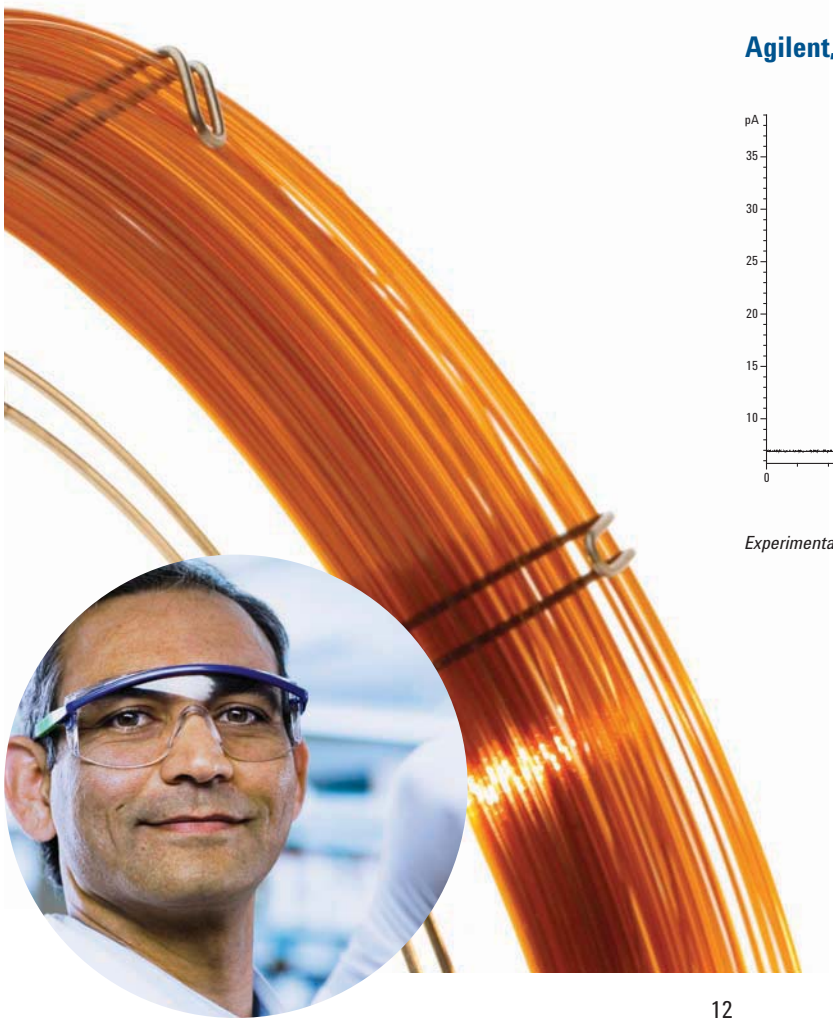
Agilent, DB-1ms Ultra Inert Agilent Part No. 122-0132UI



Agilent, HP-1ms Ultra Inert Agilent Part No. 19091S-933UI

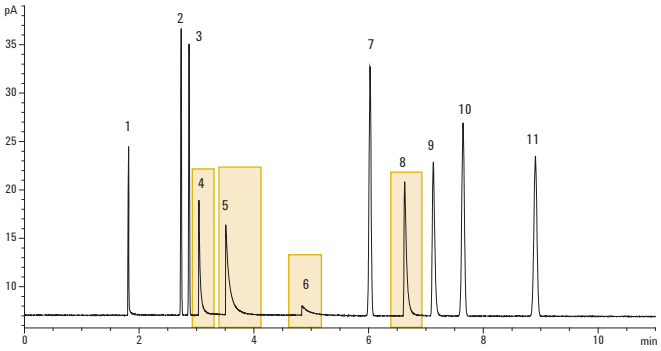


Experimental conditions are listed on the following page.



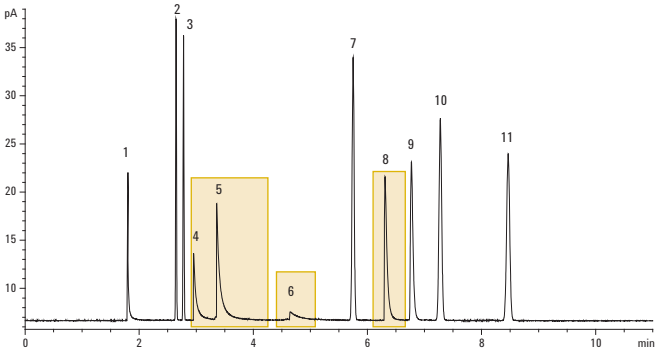
Phenomenex ZB-1ms

(Similar to DB-1ms/HP-1ms Ultra Inert)



GL Sciences InertCap 1ms

(Similar to DB-1ms/HP-1ms Ultra Inert)



The highlighted peaks show severe peak tailing and compound adsorption, both of which can lead to reduced sensitivity and false analytical results for these challenging active analytes.

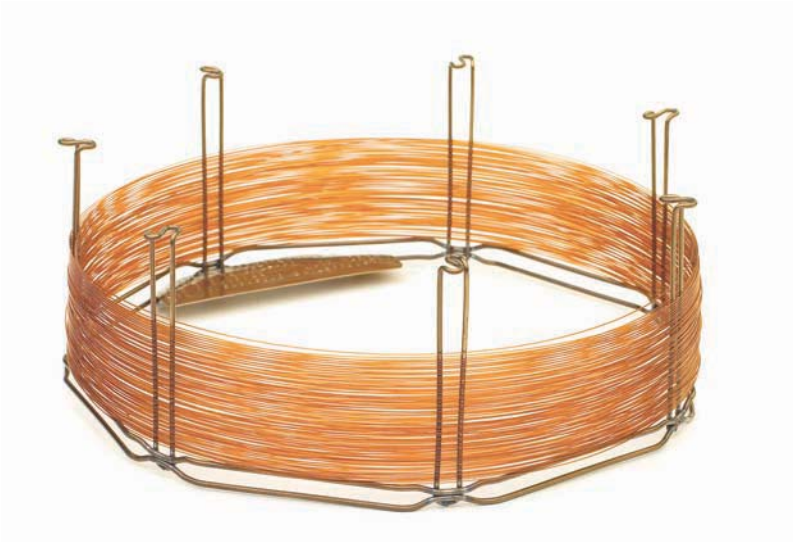
Compared to competitive columns, Agilent J&W 1ms Ultra Inert columns provide better peak shape, greater signal-to-noise ratio and minimal compound loss, ensuring reliable peak identification and accurate quantitation.

Experimental Conditions:

GC	Agilent 6890N
Sampler	Agilent 7683, 0.5 µL syringe (Agilent Part No. 5188-5246), 0.02 µL injection
Carrier	Hydrogen (40 cm/sec)
Inlet	Split/splitless; 250° C, split flow 900 mL/min, gas saver flow 75 mL/min at 2 minutes; 2 ng each component on-column
Inlet Liner	Deactivated single taper w/ glass wool (Agilent Part No. 5183-4647); gold-plated seal with cross (Agilent Part No. 5182-9652)
Column	30 m x 0.25 mm x 0.25 µm
Oven	65° C isothermal
Detection	FID

Ultra Inert Test Probe Mixture (for 1ms columns)

1. 1-Propionic acid
2. 1-Octene
3. n-Octane
4. 1,2-Butanediol
5. 4-Picoline
6. Trimethyl phosphate
7. n-Propylbenzene
8. 1-Heptanol
9. 3-Octanone
10. *tert*-Butylbenzene
11. n-Decane



The proof is in the **performance**

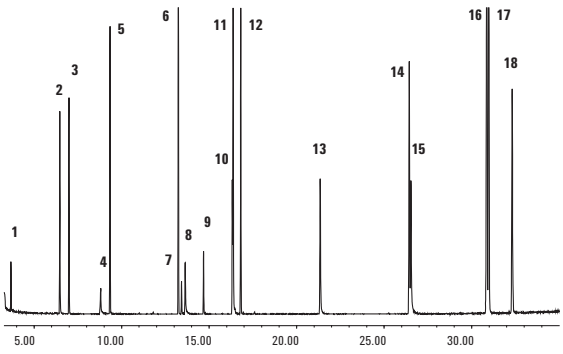
These real-world separations demonstrate how Agilent J&W Ultra Inert columns put even "impossible" analyses well within your reach.

Semi-volatile analysis using methods similar to US EPA Method 8270 is becoming increasingly important in environmental laboratories worldwide. Acidic compounds such as benzoic acid or 2,4-dinitrophenol – along with strong bases such as pyridine or benzidine – are examples of active species found in the semi-volatile sample set.

US EPA Method 8270 Short Mix DB-5ms Ultra Inert (30 m x 0.25 mm x 0.25 µm)

Agilent Part No. 122-5532UI

1. N-nitrosodimethylamine
2. Aniline
3. 1,4 dichoronezene-D4
4. Benzoic acid
5. Naphthalene- D8
6. Acenapthene-D10
7. 2,4-dinitrophenol
8. 4-nitrophenol
9. 2-methyl-4,6-dinitrophenol
10. Pentachlorophenol
11. 4-aminobiphenyl
12. Phenanthrene- D10
13. Benzidine
14. Chrysene-D12
15. 3,3'-dichlorobenzidine
16. Benzo [b] fluoranthene
17. Benzo [k] fluoranthene
18. Perylene-D12



Here, we injected a "short mix" of the most active analytes in a semi-volatile set to demonstrate application-specific column inertness.

Experimental Conditions:

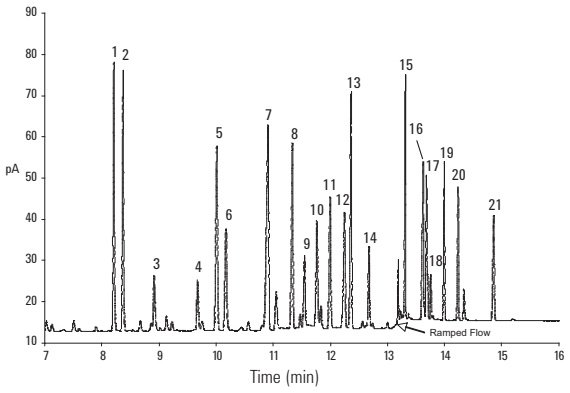
GC	Agilent 6890N/5975B MSD
Sampler	Agilent 7683B, 5.0 µL syringe (Agilent Part No. 5188-5246) 1.0 µL splitless injection, 5 ng each component on column
Carrier	Helium constant flow 30 cm/s
Inlet	Split/splitless; 260° C, 53.7 ml/min. total flow, purge flow 50 ml/min. on at 0.5 min., gas saver flow 80 ml/min. on at 3.0 min.
Inlet Liner	Direct Connect Single Taper Deactivated Inlet Liner, (Agilent Part No. G1544-80730)
Column	DB-5ms Ultra Inert 30 m x 0.25 mm x 0.25 µm (Agilent Part No. 122-5532UI)
Oven	40° C (1 min) to 100° C (15° C/min), 10° C to 210° C (1 min), 5° C/min. to 310° C (8 min)
Detection	MSD source at 300° C, quadrapole at 180° C, transfer line at 290° C, full scan m/z 50-550

Analysis of benzodiazepines and other drugs is particularly challenging because of their high level of activity. For this reason, all aspects of the sample path – particularly the GC Column – must be as inert as possible.

Benzodiazepines DB-5ms Ultra Inert (30 m x 0.25 mm x 0.25 µm)

Agilent Part No.122-5532UI

1. Medazepam
2. Halazepam
3. Oxazepam
4. Lorazepam
5. Diazepam
6. Desalkyl Aurazepam
7. Nordazepam
8. Clonazam
9. Oxazopam
10. Temazepam
11. Flunitrazepam
12. Bromazepam
13. Prazepam
14. Lormetazepam
15. Nitrazepam
16. Chlordiazepoxide
17. Clonazepam
18. Demoxepam
19. Estazolam
20. Alprazolam
21. Triazolam



Agilent J&W Ultra Inert columns provide superior inertness for these demanding analytes, as this chromatogram demonstrates.

Experimental Conditions:

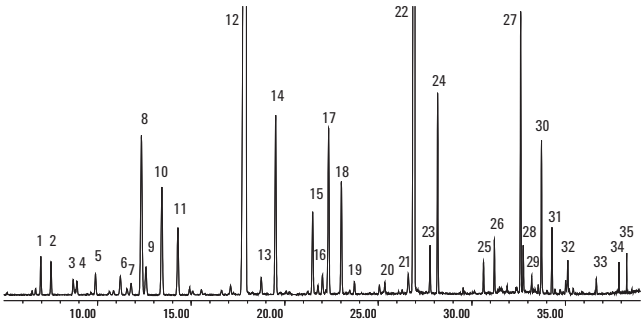
Column	DB-5ms Ultra Inert Agilent Part No.122-5532UI 30 m x 0.25 mm x 0.25 µm
Carrier	Hydrogen, 53 cm/sec, constant flow
Flow Program (mL/min)	1.6 for 11 min 1.6 to 2.4 at 60 mL/min² hold 2 min 2.4 to 5.0 at 50 mL/min² hold 9 min
Oven	170° C for 3.2 min 170-250° C at 24.7° C/min, hold 5.3 min 250-280° C at 18.6° C/min, hold 4.0 min 280-325° C at 50.0° C/min, hold 4 min
Injection	Pulsed Splitless, 280° C 20 psi pulse pressure for 0.38 min 50 mL/min purge at 0.40 min Direct Connect liner G1544-80730
Detector	FID, 350° C
Sample	1 µL of 5-10 ppm

ISO 3515 standards for lavender oil include minimum and maximum percentages of thirty-five natural components.

Lavender Oil Agilent J&W DB-1ms Ultra Inert (30 m x 0.25 mm x 0.25 µm)

Agilent Part No. 122-0132UI

1. α Pinene
2. Camphene
3. 1-Octen-3-ol
4. 3-Octanone
5. ß Myrcene
6. 3-Carene
7. o-Cymene
8. Eucalyptol
9. D Limonene
10. ß Trans-Ocimene
11. ß Cis-Ocimene
12. ß Linalool
13. Octen-1-ol acetate
14. Camphor
15. Borneol
16. Lavandulol
17. Terpine-4-ol
18. α Terpinol
19. hexyl butyrate
20. cumic aldehyde
21. cis Geraniol
22. Linalool acetate
23. Borneol acetate
24. lavandulyl acetate
25. Nerol acetate
26. Geranyl acetate
27. Caryophyllene
28. α-Santoloene
29. α-Bergamotene
30. ß Farnesene
31. Germacrene D
32. γ Cardinene
33. Caryophyllene oxide
34. tau Cardinol
35. α Bisabolol



In this example, a total of 35 components were successfully identified using Agilent DB-1ms Ultra Inert GC columns.

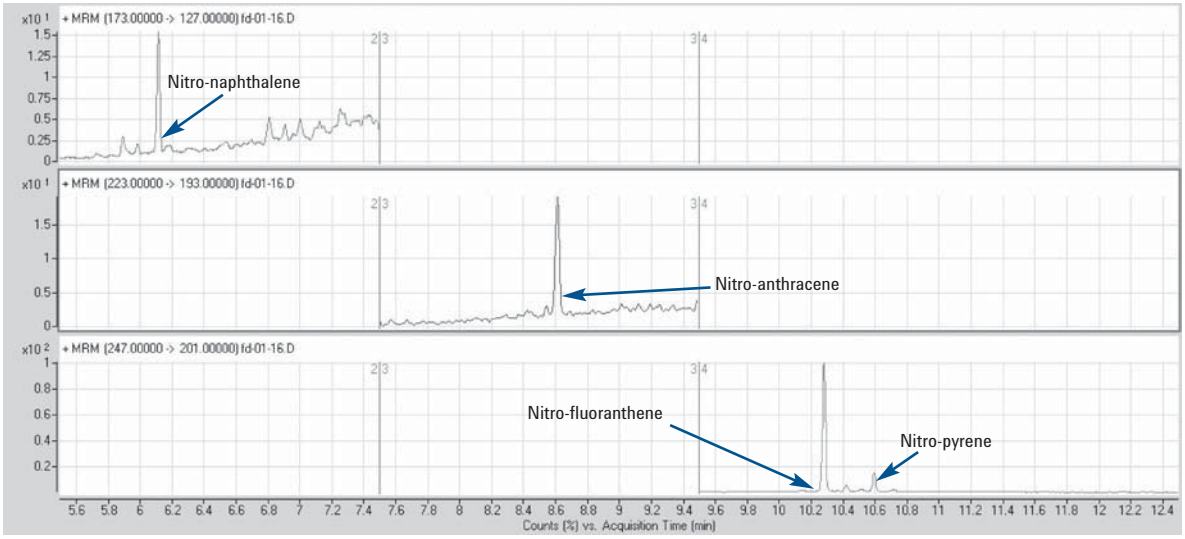
Experimental Conditions:

Sample	Lavender Oil 1:20 in acetone
Column	Agilent J&W DB-1ms Ultra Inert 30 m x 0.25 mm x 0.25 µm (Agilent Part No. 122-0132UI)
Carrier	He 40 cm/sec constant flow
Oven	62° C (12.5min) to 95° C (3° C/min), 5° C/min to 165° C ,100° C/min to 310° C (2.5 min)
Inlet	250° C 1 µl injection, split 200:1, gas saver 50 ml/min on at 2.0 minutes
MSD	300° C source, 180° C quad, 280° C transfer line temperatures scanning mode

MRM chromatograms of nitro-PAHs in an extract of urban air particulate sample.

Agilent J&W DB-5ms Ultra Inert (15 m x 0.25 mm x 0.25 µm)
Agilent Part No. 122-5512UI.

The concentrations for nitro-naphthalene, nitro-anthracene, nitro-fluranthene and nitro-pyrene are 21 pg/m3, 10 pg/m3, 77 pg/m3 and 14 pg/m3, respectively.



Column: Agilent J&W DB-5ms Ultra Inert 15 m x 0.25 mm x 0.25 µm (Agilent Part No. 122-5512UI). *In this example, 1ms Ultra Inert columns, together with the Agilent 7000A Triple Quadrupole GC/MS system, allowed a reliable determination of trace-level nitro-PAHs in this complex matrix – without labor-intensive sample preparation. Note that solutes were selectively detected at the pg/µL level, which corresponds to pg/m3 in air.*

For additional proof chromatograms, go to
www.agilent.com/chem/ultrainert

The "Agilent Advantage" **extends to our standard MS columns**

If you do not work with trace samples or active compounds, you may not need the added inertness of Agilent J&W Ultra Inert GC columns. For you, Agilent J&W GC/MS columns are the most reliable choice.

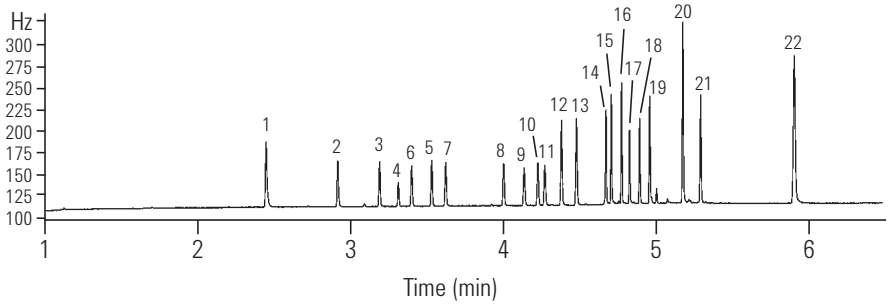
Like our Ultra Inert GC columns, every Agilent J&W GC/MS column must meet consistently rigid performance criteria, such as tight retention factor (k) specifications, narrow retention indexes, and a high number of theoretical plates per meter.

We also *individually* test every column to ensure maximum reproducibility with minimal adjustment when you change columns.

It all adds up to supreme confidence in your qualitative and quantitative results, especially for difficult-to-chromatograph compounds.

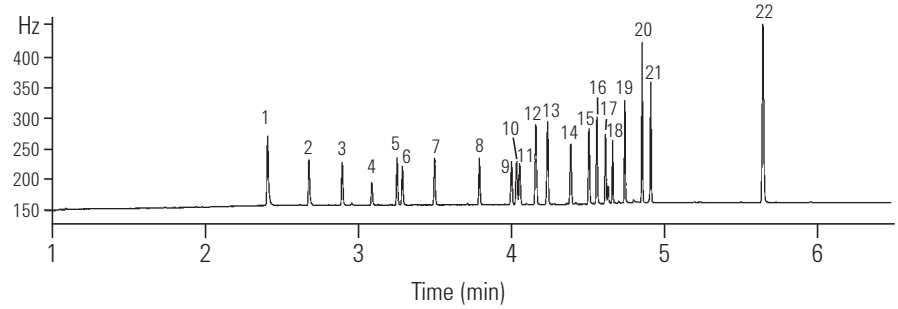
A direct column-performance comparison: Rapid CLP (Contract Laboratory Program) Pesticide Analysis

Agilent, DB-17ms primary column Agilent Part No. 121-4722



Agilent's DB-17ms primary analysis column resolved all 22 peaks of interest in less than 6 minutes with sharp symmetry and minimal baseline drift. Conversely, Restek's primary analysis column resolved only 20 of 22 peaks – and displayed evidence of peak tailing.

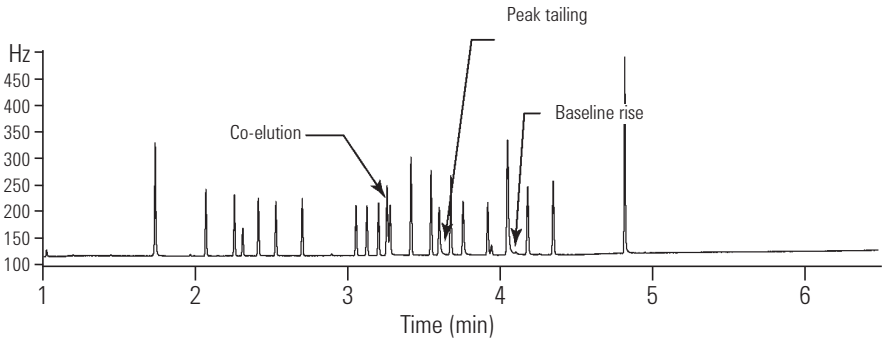
Agilent, DB-XLB confirmatory column Agilent Part No. 121-1222



Agilent's DB-XLB confirmatory analysis column resolved 20 peaks of interest in less than 6 minutes (the remaining peaks were close to being baseline resolved and sufficient for peak confirmation.).

Experimental conditions are listed on the following page.

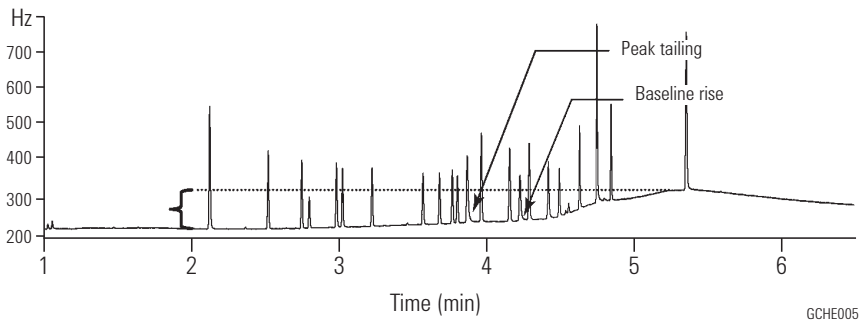
Restek primary column



Experimental Conditions:

Carrier	Hydrogen (69 cm/sec at 120° C, ramped at 99 mL/min to 106 cm/sec at 4.4 minutes)
Oven	120° C (0.32 min); 120° C/min to 160° C; 30° C/min to 258° C (0.18 min); 38.81° C/min to 300° C (1.5 min)
Injection	Split/splitless; 220° C, pulsed splitless (35 psi for 0.5 min, purge flow of 40 mL/min on at 1 minute, gas saver flow 20 ml/min on 3 minutes)
Detector	µECD 320° C; nitrogen makeup; constant column + makeup flow 60 mL/min

Restek confirmatory column



1. Tetrachloro-m-xylene
2. Alpha BHC
3. Gamma BHC
4. Beta BHC
5. Delta BHC
6. Heptachlor
7. Aldrin
8. Heptachlor Epoxide
9. Gamma Chlordane
10. Alpha Chlordane
11. Endosulfan I
12. 4,4' DDE
13. Dieldrin
14 Endrin
15. 4,4' DDD
16. Endosulfan II
17. 4,4' DDT
18. Endrin Aldehyde
19. Endosulfan Sulfate
20. Methoxychlor
21. Endrin Ketone
22. Decachlorobiphenyl

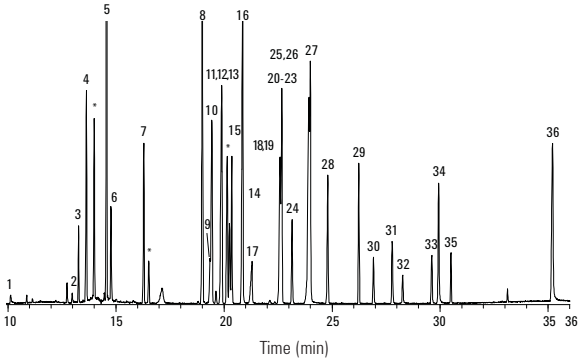
Restek's confirmatory column resolved all 22 peaks of interest; however there is evidence of peak tailing, as well as an unacceptable level of temperature-dependent baseline drift. Compare that to Agilent's results, which show sharp, symmetrical peaks and minimal temperature-dependent baseline drift.

Proven speed and accuracy for target analytes

The following examples confirm that Agilent J&W GC/MS columns deliver results you can be sure of for both routine and difficult sample types.

Herbicide analysis using DB-XLB (30 m x 0.25 mm x 0.25 µm)
Agilent Part No.122-1232

1. Monuron
2. Diuron
3. EPTC
4. Dichlobenil
5. Vernolate
6. Pebulate
7. Molinate
8. Sulfallate
9. Atraton
10. Prometon
11. Atrazine
12. Propazine
13. Simazine
14. Terbuthylazine
15. Pronamide
16. Secbumeton
17. Terbacil
18. Alachlor
19. Propanil
20. Ametryne
21. Prometryne
22. Simetryn
23. Metribuzin
24. Terbutryn
25. Metolachlor
26. Bromacil
27. Dacthal
28. Diphenamid
29. Butachlor
30. Napropamide
31. Carboxin
32. Tricyclazole
33. Norflurazon
34. Hexazinone
35. Difolotan
36. Fluridone
*Impurity



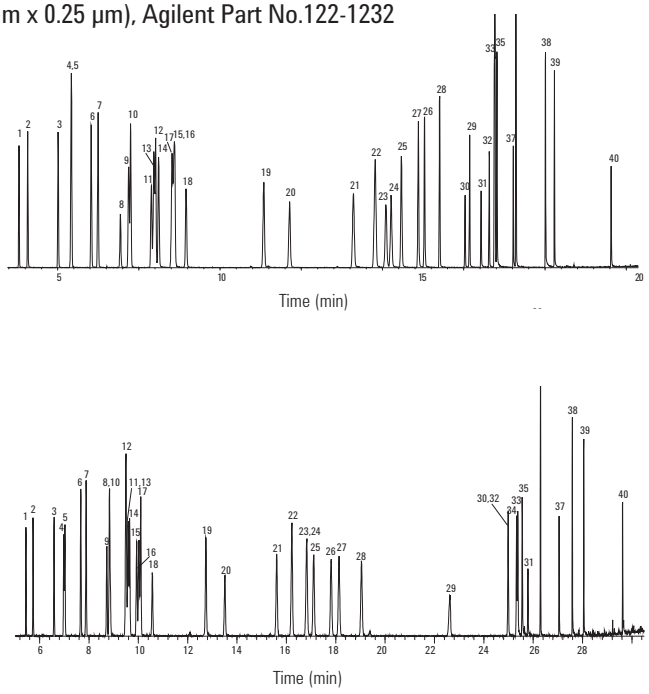
This chromatograms shows the excellent resolution of 36 herbicides using a DB-XLB column. DB-XLB utilize a proprietary second generation arylene technology giving these columns an upper temperature of 360° C while exhibiting minimal column bleed. This increase in thermal stability results in improved sensitivity for late eluting analytes.

Experimental Conditions:

Column	DB-XLB 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-1232
Carrier	Helium at 32 cm/sec, measured at 50° C
Oven	50° C for 1 min 50-180° C at 10°/min 180-230° C at 5°/min 230-320° C at 10°/min 320° C for 2 min
Injector	Splitless, 250° C 30 sec purge activation time 2 µL x 10-50 ng/µL solution in acetone
Detector	MSD, 50-400 full scan Transfer line 300° C

Phenol analysis using DB-5ms and DB-XLB columns
DB-5ms (30 m x 0.25 mm x 0.25 µm), Agilent Part No.122-5532
DB-XLB (30 m x 0.25 mm x 0.25 µm), Agilent Part No.122-1232

1. Phenol
2. 2-Chlorophenol
3. 2-Methylphenol
4. 4-Methylphenol
5. 3-Methylphenol
6. 2-Chloro-5-methylphenol
7. 2,6-Dimethylphenol
8. 2-Nitrophenol
9. 2,4-Dimethylphenol
10. 2,5-Dimethylphenol
11. 2,4-Dichlorophenol
12. 2,3-Dimethylphenol
13. 2,5-Dichlorophenol
14. 2,3-Dichlorophenol
15. 2-Chlorophenol
16. 4-Chlorophenol
17. 3,4-Dimethylphenol
18. 2,6-Dichlorophenol
19. 4-Chloro-2-methylphenol
20. 4-Chloro-3-methylphenol
21. 2,3,5-Trichlorophenol
22. 2,4-Dibromophenol
23. 2,4,6-Trichlorophenol
24. 2,4,5-Trichlorophenol
25. 2,3,4-Trichlorophenol
26. 3,5-Dichlorophenol
27. 2,3,6-Trichlorophenol
28. 3,4,-Dichlorophenol
29. 3-Nitrophenol
30. 2,5-Dinitrophenol
31. 2,4-Dinitrophenol
32. 4-Nitrophenol
33. 2,3,5,6-Tetrachlorophenol
34. 2,3,4,5-Tetrachlorophenol
35. 2,3,4,6-Tetrachlorophenol
36. 3,4,5-Trichlorophenol
37. 2-Methyl-4,6-dinitrophenol
38. Pentachlorophenol
39. Dinoseb
40. 2-Cyclohexyl-4,6-dinitrophenol



Good separation of phenols was achieved with DB-5ms and DB-XLB columns. Both columns exhibit excellent low bleed characteristics, inertness, and robustness – which make them well-suited to the phenol analysis, including active phenols (e.g. nitro-group substituents) which are well-known to be active or difficult compounds that are easily degraded or "lost" in the GC flow path.

Experimental Conditions:

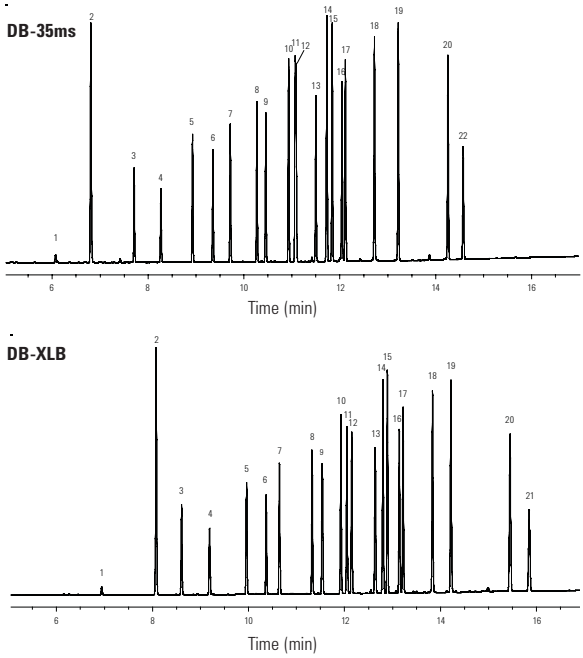
Column	DB-5ms 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-5532
Column	DB-XLB 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-1232
Carrier	He at 1.2 ml/min Constant Flow
Oven	40° C for 2.00 min 40-100° C at 40° C/ min 100° C for 0.50 min 100-140° C at 2° C/min 140-340° C at 30° C/min
Injector	Pulsed Splitless, 200° C Pulse Pressure & Time: 25.0 psi for 1.00 min Purge Flow & Time: 50.0 ml/min for 0.25 min Gas Saver Flow & Time: 20.0 ml/min for 3.00 min
Detector	MSD Transfer Line Temp at 320° C Quadrapole at 150° C Source at 230° C

PCB analysis by EPA Method 8082

DB-35ms (30 m x 0.32 mm x 0.25 µm), Agilent Part No.123-3832
DB-XLB (30 m x 0.32 mm x 0.50 µm), Agilent Part No.123-1236

1. IUPAC 1
2. Tetrachloro-m-xylene (IS/SS)
3. IUPAC 5
4. IUPAC 18
5. IUPAC 31
6. IUPAC 52
7. IUPAC 44
8. IUPAC 66
9. IUPAC 101
10. IUPAC 87
11. IUPAC 110
12. IUPAC 151
13. IUPAC 153
14. IUPAC 141
15. IUPAC 137
16. IUPAC 187
17. IUPAC 183
18. IUPAC 180
19. IUPAC 170
20. IUPAC 206
21. Decachlorobiphenyl (IS/SS)

IS/SS - Internal Standard/Surrogate Standard



Rapid analysis of PCBs with arylene-phase column pair (primary DB-35ms and conformation DB-XLB) and GC/ECD. The column pair enables baseline resolution of all EPA Method 8082 analytes under 16 minutes. The increased sensitivity and upper temperature limit of 340/360° C of these columns provide a much improved signal-to-noise ratio, shorter analysis times, and longer column lifetime without excess bake out.

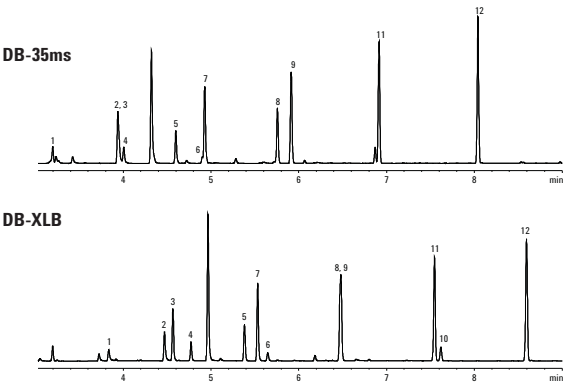
Experimental Conditions:

Column	DB-35ms 30 m x 0.32 mm x 0.25 µm Agilent Part No.123-3832
Column	DB-XLB 30 m x 0.32 mm x 0.50 µm Agilent Part No.123-1236
Carrier	Helium at 45 cm/sec (EPC in constant flow mode)
Oven	110° C for 0.5 min 110-320° C at 15° C/min 320° C for 5 min
Injector	Splitless, 250° C 30 sec purge activation time 50 pg per component
Detector	µECD, 350° C Nitrogen makeup gas (column + makeup flow = 30 mL/min constant flow)

Analysis of Haloacetic Acids by EPA Method 552.2

DB-35ms (30 m x 0.32 mm x 0.25 µm), Agilent Part No.123-3832
DB-XLB (30 m x 0.32 mm 0.50 µm), Agilent Part No.1123-1236

1. Chloroacetic acid
2. Bromoacetic acid
3. Dichloroacetic acid
4. Dalapon
5. Trichloroacetic acid
6. 1,2,3-Trichloropropane (IS)
7. Bromochloroacetic acid
8. Bromodichloroacetic acid
9. Dibromoacetic acid
10. 2,3-Dibromopropionic acid (SS)
11. Chlorodibromoacetic
12. Tribromoacetic acid



Primary column DB-35ms and conformation column DB-XLB provides excellent identification and confirmation capabilities for haloacetic acids found in EPA Method 552.2

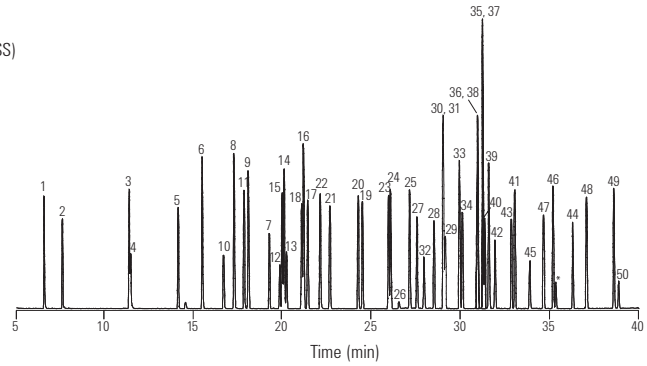
Experimental Conditions:

Column	DB-35ms 30 m x 0.32 mm x 0.25 µm film thickness Agilent Part No.123-3832
Column	DB-XLB 30 m x 0.32 mm x 0.50 µm film thickness Agilent Part No.1123-1236
Carrier	Helium at 45 cm/sec (EPC in constant flow mode) measured at 50° C
Oven	40° C for 0.5 min 40-200° C at 15°/min 200° C for 2 min
Injector	Splitless, 250° C 30 sec purge activation time 50 pg per component
Detector	µECD, 350° C Nitrogen makeup gas (column + makeup flow = 30 mL/min constant flow)

Organochlorine Pesticide Analysis by EPA Method 8081A

DB-35ms (30 m x 0.25 mm x 0.25 µm), Agilent Part No.122-3832

1. 1,2-Dibromo-3-chloropropane
2. 4-Chloro-3-nitrobenzotrifluoride (SS)
3. Hexachloropentadiene
4. 1-Bromo-2-nitrobenzene (IS)
5. Terrazole
6. Chloroneb
7. Trifluralin
8. 2-Bromobiphenyl (SS)
9. Tetrachloro-m-xylene (SS)
10. α, α-Dibromo-m-xylene
11. Propachlor
12. Di-allate A
13. Di-allate B
14. Hexachlorobenzene
15. α-BHC
16. Pentachloronitrobenzene (IS)
17. γ-BHC
18. *β*-BHC
19. Heptachlor
20. Alachlor
21. *δ*-BHC
22. Chlorothalonil
23. Aldrin
24. Dacthal™
25. Isodrin
26. Kelthane
27. Heptachlor epoxide
28. γ-Chlordane
29. *trans*-Nonachlor



Here shows the analysis of 50 common chlorinated pesticides found in EPA Method 8081 using DB-35ms. Baseline resolution of all analytes is easily achieved.

30. α–Chlordane
31. Endosulfan I
32. Captan
33. *p,p'*-DDE
34. Dieldrin
35. Chlorobenzilate™
36. Perthane™
37. Chloropropylate
38. Endrin
39. *p,p'*-DDD
40. Endosulfan II
41. *p,p'*-DDT
42. Endrin aldehyde
43. Endosulfan sulfate
44. Dibutylchlorendate (SS)
45. Captafol
46. Methoxychlor
47. Endrin ketone
48. Mirex™
49. *cis*-Permethrin
50. *trans*-Permethrin

* Breakdown Products
SS - Surrogate Standard
IS - Internal Standard

Experimental Conditions:

Column	DB-35ms 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-3832
Carrier	Helium at 35 cm/sec, measured at 50° C
Oven	50° C for 1 min 50-100° C at 25°/min 100-300° C at 5°/min 300° C for 5 min
Injector	Splitless, 250° C 30 sec purge activation time 1 µL of 35 µg/mL composite 8081A standards, Accustandard Inc.
Detector	MSD, 300° C transfer line full scan at m/z 50-500

Standards used were a composite of individual solutions supplied courtesy of Accustandard Inc., 25 Science Park, New Haven, CT 06511, 800-442-5290.

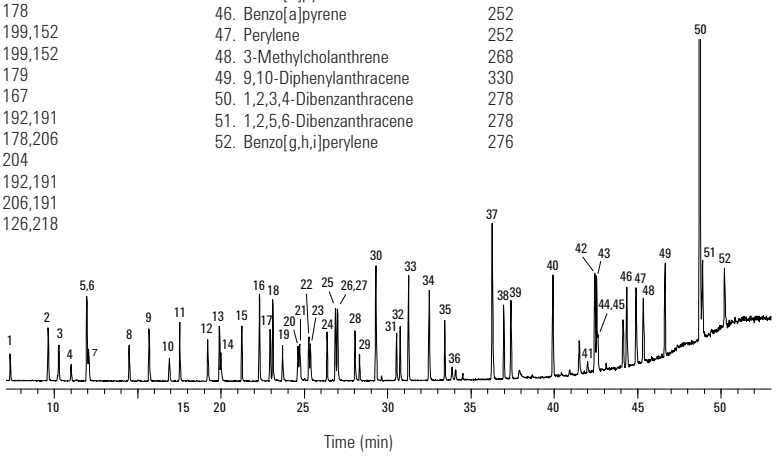
PAH analysis using DB-17ms columns (30 m x 0.25 mm x 0.25 µm)

Agilent Part No.122-4732

Name	Ion
1. Naphthalene	128
2. 2-Methylnaphthalene	142,141
3. 1-Methylnaphthalene	142,141
4. Azulene	128
5. Acenaphthene	154
6. Biphenyl	154
7. 2,6-Dimethylnaphthalene	156,155
8. Acenaphthalene	152
9. Dibenzofuran	168,139
10. Dibenzo-p-dioxin	184
11. Fluorene	166,165
12. 1-Nitronaphthalene	127,173
13. 9,10-Dihydroanthracene	179,180
14. 2-Nitronaphthalene	127,173
15. 2-Nitrobiphenyl	152,115
16. Dibenzothiophene	184
17. Phenanthrene	178
18. Anthracene	178
19. 3-Nitrobiphenyl	199,152
20. 4-Nitrobiphenyl	199,152
21. 5,6-Benzoquinoline	179
22. Carbazole	167
23. 2-Methylanthracene	192,191
24. 1,2,3,4-Tetrahydrofluoranthene	178,206
25. 2-Phenylnaphthalene	204
26. 9-Methylanthracene	192,191
27. 3,6-Dimethylphenanthrene	206,191
28. 1,3-Dinitronaphthalene	126,218
29. 1,5-Dinitronaphthalene	218,114
30. Fluoranthene	202
31. 2,2'-Dinitrobiphenyl	198,139
32. Pyrene	202
33. 2-Methylfluoranthene	216,215
34. 2,3-Benzofluorene	216,215
35. Dodecahydrotriphenylene	240,198
36. 1-Amino-4-nitronaphthalene	188,115
37. 9-Phenylanthracene	254,253
38. 1,2-Benzanthracene	228
39. Chrysene	240
40. Benz[a]anthracene-7,12-dione	258,202
41. 2,7-Dinitrofluorene	256,163
42. Benzo[b]fluoroanthene	252
43. Benzo[k]fluoranthene	252
44. 7,12-Dimethylbenz[a]anthracene	256,241
45. Benzo[e]pyrene	252
46. Benzo[a]pyrene	252
47. Perylene	252
48. 3-Methylcholanthrene	268
49. 9,10-Diphenylanthracene	330
50. 1,2,3,4-Dibenzanthracene	278
51. 1,2,5,6-Dibenzanthracene	278
52. Benzo[g,h,i]perylene	276

Experimental Conditions:

Column	DB-17ms 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-4732
Guard Column:	1 m x 0.53 mm Agilent Part No.160-2535
Carrier	Helium at: 34.1 cm/sec, measured at 150° C
Oven	95° C for 0.5 min 95-340° C at 5°/min 340° C for 5 min
Injector	Split 1:40, 300° C 2 µL, PAH standard
Detector	MSD, 340° C transfer line Scan 80-330 amu

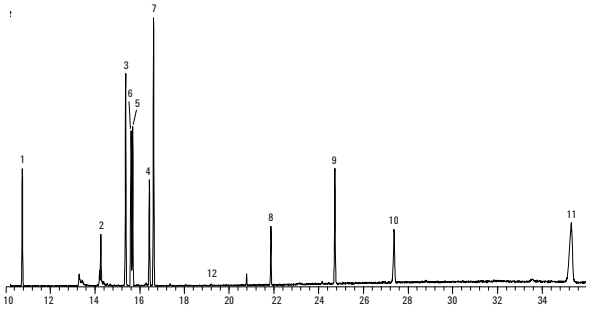


DB-17ms is an excellent column for PAH analysis where good separation was achieved for 52 PAHs.

Hallucinogen detection using DB-17ms columns (30 m x 0.25 mm x 0.25 µm)

Agilent Part No.122-4732

1. 4-Methylaminorex
2. Mescaline
3. Dimethyltryptamine
4. Ketimine
5. TCP (Tenocyclidine)
6. PCP
7. Diethyltryptamine
8. Bufotenine
9. Fentanyl
10. Ibogaine
11. LSD
12. Psilocin (peak not shown)



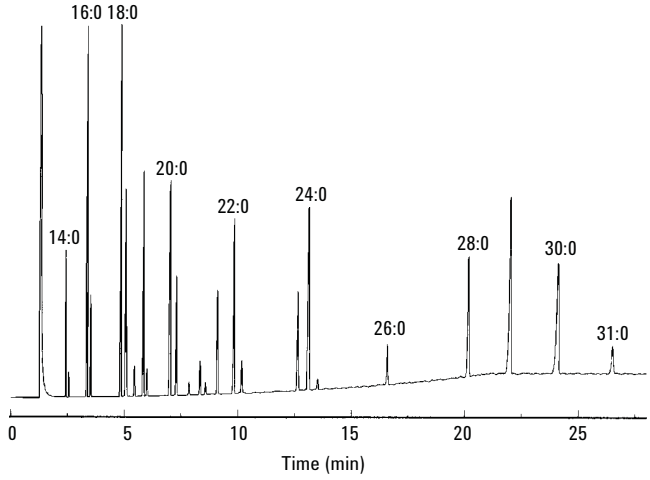
GC/MS has become a common tool in identifying illicit drugs seized by law enforcement agencies. In this example, a DB-17ms column successfully separated 12 hallucinogens.

Experimental Conditions:

Column	DB-17ms 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-4732
Carrier	Helium at 30 cm/sec, measured at 50° C
Oven	50° C for 0.5 min 50-125° C at 25°/min 125-255° C at 10°/min 255-320° C at 25°/min 320° C for 16 min
Injector	Splitless, 250° C 30 sec purge activation time 1 µL of 10-50 ng/µL standard in methanol
Detector	MSD, 300° C transfer line full scan at m/z 40-350

FAME analysis using DB-225ms columns (30 m x 0.25 mm x 0.25 µm)

Agilent Part No.122-2932



As you can see, the higher isothermal upper temperature limit of DB-225ms columns (260° C vs. 220° C for DB-225 columns) allows the elution of higher molecular weight FAMEs (above 24:0) while maintaining a reasonable run time.

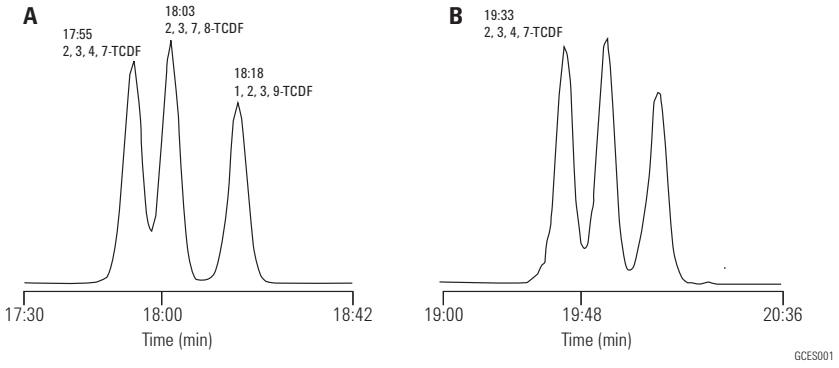
Experimental Conditions:

Column	DB-225ms 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-2932
Carrier	Hydrogen at 40 cm/sec
Oven	200° C for 1 min 200-260° C at 3°/min
Injector	Split 1:50, 250° C
Detector	FID Nitrogen make-up gas at 30 mL/min

Comparative analysis of 2-Tetrachlorodibenzo-p-furans using DB-225 and DB-225ms columns

DB-225 (30 m x 0.25 mm x 0.25 µm), Agilent Part No.122-2232

DB-225ms (30 m x 0.25 mm x 0.25 µm), Agilent Part No.122-2932



Note the separation between 2,3,7,8-TCDF and 2,3,4,7-TCDF on the DB-225 column is also easily achievable and actually better on the DB-225ms column.

Experimental Conditions:

Column A:	DB-225 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-2232
Column B:	DB-225ms 30 m x 0.25 mm x 0.25 µm Agilent Part No.122-2932
Carrier	Helium at 12 mL/min
Oven	160-250° C at 7°/min 250° C until compounds elute
Injector	Splitless, 240° C
Detector	VG Autospec Ultima

Agilent offers the industry's **widest column portfolio** engineered for low bleed, high thermal stability, and excellent inertness.

Applications: Semivolatiles, halogenated compounds, pesticides, herbicides, drugs of abuse, amines, unknown sample screen

Ultra Inert 5ms Capillary 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
	25	0.25	122-5522UI
	30	0.25	122-5532UI
		0.50	122-5536UI
		1.00	122-5533UI
	50	0.25	122-5552UI
	60	0.25	122-5562UI
		1.00	122-5563UI
0.32	30	0.25	123-5532UI
		0.50	123-5536UI
		1.00	123-5533UI
	60	1.00	123-5563UI
HP-5ms Ultra Inert			
0.18	20	0.18	19091S-577UI
0.25	15	0.25	19091S-431UI
	30	0.25	19091S-433UI
		0.50	19091S-133UI
		1.00	19091S-233UI
	60	0.25	19091S-436UI
0.32	30	0.25	19091S-413UI
		1.00	19091S-213UI

Applications: Amines, hydrocarbons, pesticides, PCBs, phenols, sulfur compounds, flavors and fragrances

Ultra Inert 1ms Capillary GC columns

ID (mm)	Length (m)	Film (µm)	Part No.
DB-1ms Ultra Inert			
0.18	20	0.18	121-0122UI
0.25	15	0.25	122-0112UI
	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	15	0.25	19091S-931UI
	30	0.25	19091S-933UI
		0.50	19091S-633UI
		1.00	19091S-733UI
0.32	15	0.25	19091S-911UI
	25	0.52	19091S-612UI
	30	0.25	19091S-913UI
		1.00	19091S-713UI

Applications: Amines, hydrocarbons, pesticides, PDBs, phenols, sulfur compounds, flavors and fragrances

DB-1ms

ID (mm)	Length (m)	Film (µm)	Part No.
0.10	10	0.10	127-0112
		0.40	127-0113
	20	0.10	127-0122
		0.40	127-0123
0.18	20	0.18	121-0122
0.20	12	0.33	128-0112
	25	0.33	128-0122
0.25	15	0.25	122-0112
	30	0.10	122-0131
		0.25	122-0132
	60	0.25	122-0162
0.32	15	0.25	123-0112
	30	0.10	123-0131
		0.25	123-0132
	60	0.25	123-0162

Applications: Amines, hydrocarbons, pesticides, PDBs, phenols, sulfur compounds, flavors and fragrances

HP-1ms

ID (mm)	Length (m)	Film (µm)	Part No.
0.18	20	0.18	19091S-677
0.20	25	0.33	19091S-602
0.25	15	0.25	19091S-931
	30	0.10	19091S-833
		0.25	19091S-933
		0.50	19091S-633
		1.00	19091S-733
	60	0.25	19091S-936
0.32	15	0.25	19091S-911
	25	0.52	19091S-612
	30	0.25	19091S-913
		1.00	19091S-713
	60	0.25	19091S-916

Applications: Semivolatiles, alkaloids, drugs, FAMEs, halogenated compounds, pesticides, herbicides

DB-5ms

ID (mm)	Length (m)	Film (µm)	Part No.
0.18	20	0.18	121-5522
		0.36	121-5523
	40	0.18	121-5542
0.20	12	0.33	128-5512
	25	0.33	128-5522
	50	0.33	128-5552
0.25	15	0.10	122-5511
		0.25	122-5512
		0.50	122-5516
		1.00	122-5513
	25	0.25	122-5522
		0.40	122-552A
	30	0.10	122-5531
		0.25	122-5532
		0.50	122-5536
		1.00	122-5533
	50	0.25	122-5552
	60	0.10	122-5561
		0.25	122-5562
		1.00	122-5563

Applications: Semivolatiles, alkaloids, drugs, FAMEs, halogenated compounds, pesticides, herbicides

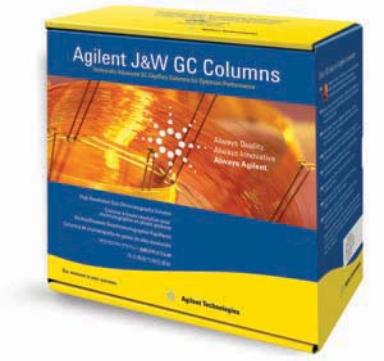
DB-5ms

ID (mm)	Length (m)	Film (µm)	Part No.
0.32	15	0.10	123-5511
		0.25	123-5512
		1.00	123-5513
	25	0.52	123-5526
	30	0.10	123-5531
		0.25	123-5532
		0.50	123-5536
		1.00	123-5533
	60	0.10	123-5561
		0.25	123-5562
		0.50	123-5566
		1.00	123-5563
0.53	15	1.50	125-5512
	30	0.50	125-5537
		1.00	125-553J
		1.50	125-5532

Applications: Semivolatiles, alkaloids, drugs, FAMEs, halogenated compounds, pesticides, herbicides

HP-5ms

ID (mm)	Length (m)	Film (µm)	Part No.
0.18	20	0.18	19091S-577
0.20	12	0.33	19091S-101
	25	0.33	19091S-102
	50	0.33	19091S-105
0.25	15	0.10	19091S-331
		0.25	19091S-431
		1.00	19091S-231
	30	0.10	19091S-333
		0.25	19091S-433
		0.50	19091S-133
		1.00	19091S-233
	60	0.10	19091S-336
		0.25	19091S-436
0.32	25	0.52	19091S-112
	30	0.10	19091S-313
		0.25	19091S-413
		0.50	19091S-113
		1.00	19091S-213
	60	0.25	19091S-416



Agilent's leading-edge manufacturing processes – combined with our optimization of chemistries and advancements in manufacturing equipment design – improve the inertness of our Ultra Inert columns while maintaining the selectivity of their DB- and HP-5ms and 1ms counterparts.

In addition, Ultra Inert columns leverage the unique polymer chemistry and proprietary surface deactivation that are the hallmarks of Agilent J&W DB- and HP-columns. So you can be sure they adhere to the industry's toughest specifications for bleed, selectivity and efficiency.

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Applications: PCB Congener Analysis (209 Congeners) CLP Pesticides, Chlorinated Herbicides, PCBs, 508.1 Pesticides

DB-XLB

ID (mm)	Length (m)	Film (µm)	Part No.
0.18	20	0.18	121-1222
	30	0.18	121-1232
0.20	12	0.33	128-1212
	25	0.33	128-1222
0.25	15	0.10	122-1211
		0.25	122-1212
	30	0.10	122-1231
		0.25	122-1232
		0.50	122-1236
		1.00	122-1233
	60	0.25	122-1262
0.32	30	0.25	123-1232
		0.50	123-1236
	60	0.25	123-1262
0.53	15	1.50	125-1212
	30	1.50	125-1232

Applications: CLP Pesticides, Chlorinated Herbicides, PCBs 508.1 Pesticides

DB-35ms

ID (mm)	Length (m)	Film (µm)	Part No.
0.18	20	0.18	121-3822
0.20	15	0.33	128-3812
	25	0.33	128-3822
0.25	15	0.25	122-3812
	30	0.15	122-3831
		0.25	122-3832
	60	0.25	122-3862
0.32	15	0.25	123-3812
	30	0.25	123-3832
0.53	30	0.50	125-3837
		1.00	125-3832

Applications: Drugs, glycols, pesticides, steroids

DB-17ms

ID (mm)	Length (m)	Film (µm)	Part No.
0.18	20	0.18	121-4722
0.25	15	0.15	122-4711
		0.25	122-4712
	30	0.15	122-4731
		0.25	122-4732
	60	0.25	122-4762
0.32	15	0.25	123-4712
	30	0.25	123-4732

Applications: FAMEs, alditol, acetates, neutral sterols

DB-225ms

ID (mm)	Length (m)	Film (µm)	Part No.
0.25	15	0.25	122-2912
	30	0.25	122-2932
	60	0.25	122-2962
0.32	30	0.25	123-2932

To order, contact your local Agilent Representative or Agilent Authorized Distributor, or go to **www.agilent.com/chem/contactus**

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These **Agilent-engineered supplies** are an essential part of your trace-analysis toolbox, because they help ensure an inert GC flow path, which is essential for sensitivity, performance and the validity of your results.

Premium non-stick septa: Other suppliers coat their septa with powder to prevent sticking. However, this coating can accumulate inside split vent lines and interfere with your analysis of active analytes.

Conversely, Agilent non-stick septa are *plasma coated*, which eliminates chemical bleed and contamination from foreign substances. So your GC system will maintain its integrity, stay cleaner and require less maintenance. *(Always remember to change septa often to prevent leakage.)*

Agilent vespel/graphite ferrules are the ideal hardness for GC/MS applications – unlike graphite ferrules that can flake and contaminate your detector. Be sure to replace all ferrules when installing a new column.

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SDi 2008 Worldwide Report named Agilent the top GC column supplier in its "Most Favorable" category, based on column selection, batch-to-batch reproducibility, price, delivery time and application support.

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