

Restek's New GC Columns

Fused Silica, MXT[®], Packed, & PLOT

- Rxi[®]-5Sil MS
- Rxi[®]-XLB
- Rtx[®]-CLPesticides & Rtx[®]-CLPesticides2
- MXT[®]-Biodiesel TG
- Rt[™]-QSPLIT
- D3606 Column Set
- Stabilwax[®]



HRoMalytic Chromatography
Australian Distributors **ECH**nology Products '08

www.chromtech.net.au E-mail : info@chromtech.net.au Tel : +61 3 9762 2034 Fax : +61 3 9761 1169

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Chromatography Products

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Rxi®-5Sil MS GC Capillary Columns

- Low polarity Crossbond® silarylene phase; selectivity close to 5% diphenyl/95% dimethyl polysiloxane
- Engineered to be a low bleed GC/MS column.
- Excellent inertness for active compounds.
- General purpose columns—ideal for GC/MS analysis of chlorinated hydrocarbons, phthalates, phenols, amines, organochlorine pesticides, organophosphorus pesticides, drugs, solvent impurities, and hydrocarbons.

Rxi®-5Sil MS columns are ideal for the analysis of semivolatile analytes, such as those found in EPA Method 8270. Low bleed profiles assure accurate quantification of late eluting compounds, such as polycyclic (polynuclear) aromatic hydrocarbons (PAHs), including the challenging separation of benzo(b)fluoranthene and benzo(k)fluoranthene (Figure 1).

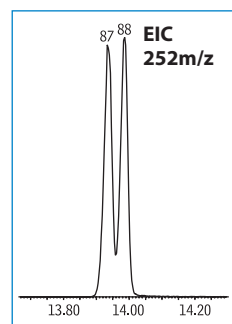
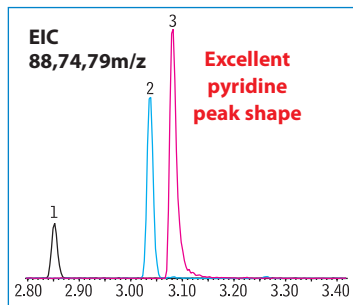
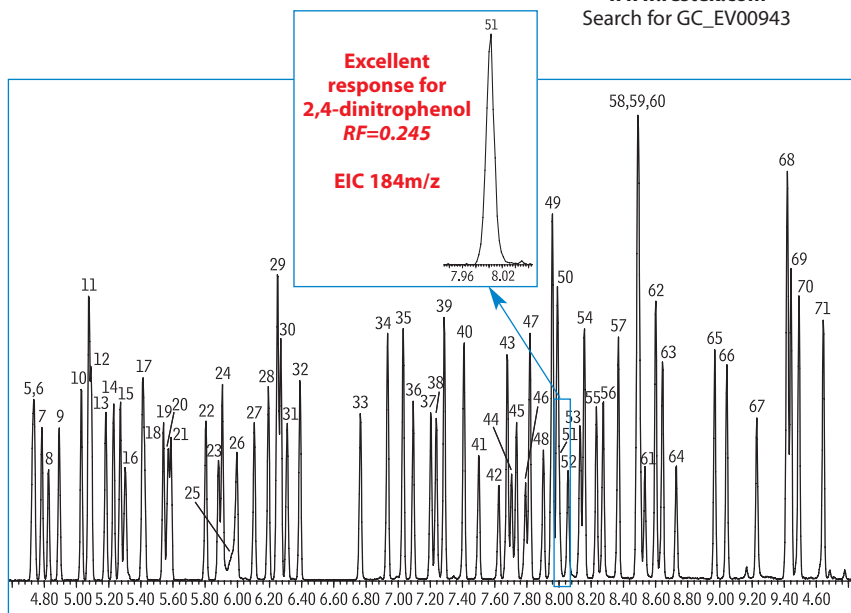
The inertness of the Rxi®-5Sil MS column is shown through the peak shapes and responses of active analytes, such as pyridine (basic) and 2,4-dinitrophenol (acidic), at low levels. Peak symmetry is good and analyte responses exceed method requirements even at single nanogram on-column levels (Figure 2). Chromatography, and thus quantification, of many active semivolatile compounds is improved by the inertness of Rxi®-5Sil MS columns.

Figure 1 Separate difficult PAHs easily using a 30m, 0.25mm ID, 0.25µm Rxi®-5Sil MS column. For full peak listing, please visit us at

www.restek.com

Search for GC_EV00943

Column: Rxi®-5Sil MS, 30m, 0.25mm ID, 0.25µm (cat.# 13623)
 Sample: US EPA Method 8270D Mix, 1µL of 10µg/mL (IS 40µg/mL) 8270 MegaMix® (cat.# 31850) Benzoic Acid (cat.# 31879) 8270 Benzidines Mix (cat.# 31852) Acid Surrogate Mix (4/89 SOW) (cat.# 31025) Revised B/N Surrogate Mix (cat.# 31887) 1,4-Dioxane (cat.# 31853) SV Internal Standard Mix (cat.# 31206)
 Inj.: 1.0µL (10ng on-column concentration), 4mm Drilled Uniliner® (hole near bottom) inlet liner (cat.# 20756), pulsed splitless: pulse 25psi @ 0.2 min., 60mL/min. @ 0.15 min.
 Inj. temp.: 250°C
 Carrier gas: helium, constant flow
 Flow rate: 1.2mL/min.
 Oven temp.: 40°C (hold 1.0 min.) to 280°C @ 25°C/min. to 320°C @ 5°C/min. (hold 1 min.)
 Det.: MS
 Transfer line temp: 280°C
 Scan range: 35-550amu
 Ionization: EI
 Mode: scan



87. benzo(b)fluoranthene
 88. benzo(k)fluoranthene

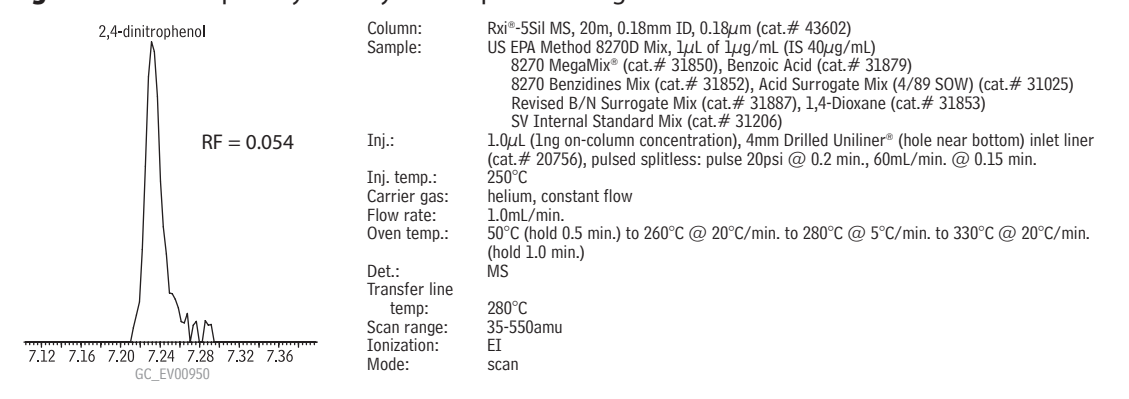
Excellent resolution of PAHs

91. indeno(1,2,3-cd)pyrene
 92. dibenzo(a,h)anthracene
 93. benzo(ghi)perylene

GC_EV00943

3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 min.

Figure 2 Excellent peak symmetry and response at 1ng on-column.



Rxi®-5Sil MS Columns (fused silica)

(Crossbond®, selectivity close to 5% diphenyl/95% dimethyl polysiloxane)

ID	df (µm)	temp. limits	15-Meter	30-Meter	60-Meter
0.25mm	0.10	-60 to 330/350°C	13605	13608	
	0.25	-60 to 330/350°C	13620	13623	13626
	0.50	-60 to 330/350°C	13635	13638	
	1.00	-60 to 325/350°C	13650	13653	13697
0.32mm	0.25	-60 to 330/350°C	13621	13624	
	0.50	-60 to 330/350°C		13639	
	1.00	-60 to 325/350°C		13654	
0.53mm	1.50	-60 to 310/330°C		13670	

ID	df (µm)	temp. limits	10-Meter	20-Meter
0.10mm	0.10	-60 to 330/350°C	43601	
0.18mm	0.18	-60 to 330/350°C		43602
	0.36	-60 to 330/350°C		43604

Rxi®-XLB GC Capillary Columns

Improvements in polymer synthesis and tubing deactivation enable us to make inert, stable Rxi®-XLB columns especially well-suited for analyzing active, high molecular weight compounds with sensitive GC/MS systems, including ion trap detectors. Excellent efficiency, coupled with inertness, low bleed, and high thermal stability, make Rxi®-XLB columns ideal for analyzing semivolatiles compounds in drinking water (e.g., US EPA Method 525).

Rxi®-XLB Columns (fused silica)

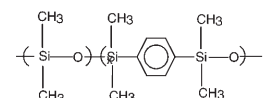
(low-polarity proprietary phase)

ID	df (µm)	temp. limits*	15-Meter	30-Meter	60-Meter
0.25mm	0.10	30 to 340/360°C	13705	13708	
	0.25	30 to 340/360°C	13720	13723	13726
	0.50	30 to 340/360°C		13738	
	1.00	30 to 340/360°C	13750	13753	
0.32mm	0.10	30 to 340/360°C		13709	
	0.25	30 to 340/360°C	13721	13724	13727
	0.50	30 to 340/360°C		13739	
	1.00	30 to 340/360°C		13754	
0.53mm	0.50	30 to 340/360°C		13740	
	1.50	30 to 320/340°C	13767	13770	

ID	df (µm)	temp. limits	10-Meter	20-Meter
0.10mm	0.10	30 to 340/360°C	43701	
0.18mm	0.18	30 to 340/360°C		43702

*Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

Rxi®-5Sil MS Structure



also **available**

Rxi®-5Sil MS columns are available with Integra-Guard™ built-in guard columns. Get the protection without the connection!

For more information about Restek's Rxi® columns, visit us at www.restek.com/rxi

- Very low bleed
- Faster analysis

Rtx®-CLPesticides/Rtx®-CLPesticides2 GC Capillary Columns

- Application-specific columns for organochlorine pesticides and herbicides.
- Low bleed—ideal for GC/ECD or GC/MS analyses.
- Baseline separations in less than 7 minutes.
- Stable to 340°C.

Improved resolution and faster analyses, compared to 1701 or phenyl phases, make these the pesticide columns of choice. Rtx®-CLPesticides columns are specially designed to overcome the coelutions and analyte breakdown typically encountered in chlorinated pesticide analyses for EPA Methods 8081, 608, and CLP. By achieving baseline resolution of the 20 target analytes, more accurate qualitative data can be obtained, providing reliable identification without GC/MS.

Column bleed, measured by ECD, is extremely low at temperatures up to 330°C, which is critical for baking-out the column to remove high-boiling compounds commonly found in pesticide/PCB extracts. An analysis time of less than 7 minutes improves throughput compared to other stationary phases.

Rtx®-CLPesticides Columns (fused silica)

ID	df (µm)	temp. limits	10-Meter	15-Meter	20-Meter	30-Meter	60-Meter
0.10mm	0.10	-60 to 310/330°C	43101				
0.18mm	0.18	-60 to 310/330°C	42101		42102		
0.25mm	0.25	-60 to 320/340°C		11120		11123	11126
0.32mm	0.32	-60 to 320/340°C				11141	
	0.50	-60 to 320/340°C		11136		11139	
0.53mm	0.50	-60 to 300/320°C		11137		11140	

Rtx®-CLPesticides2 Columns (fused silica)

ID	df (µm)	temp. limits	10-Meter	15-Meter	20-Meter	30-Meter	60-Meter
0.10mm	0.10	-60 to 310/330°C	43301		43302		
0.18mm	0.14	-60 to 310/330°C	42301		42302		
0.25mm	0.20	-60 to 320/340°C		11320		11323	11326
0.32mm	0.25	-60 to 320/340°C		11321		11324	
	0.50	-60 to 320/340°C				11325	
0.53mm	0.42	-60 to 300/320°C		11337		11340	

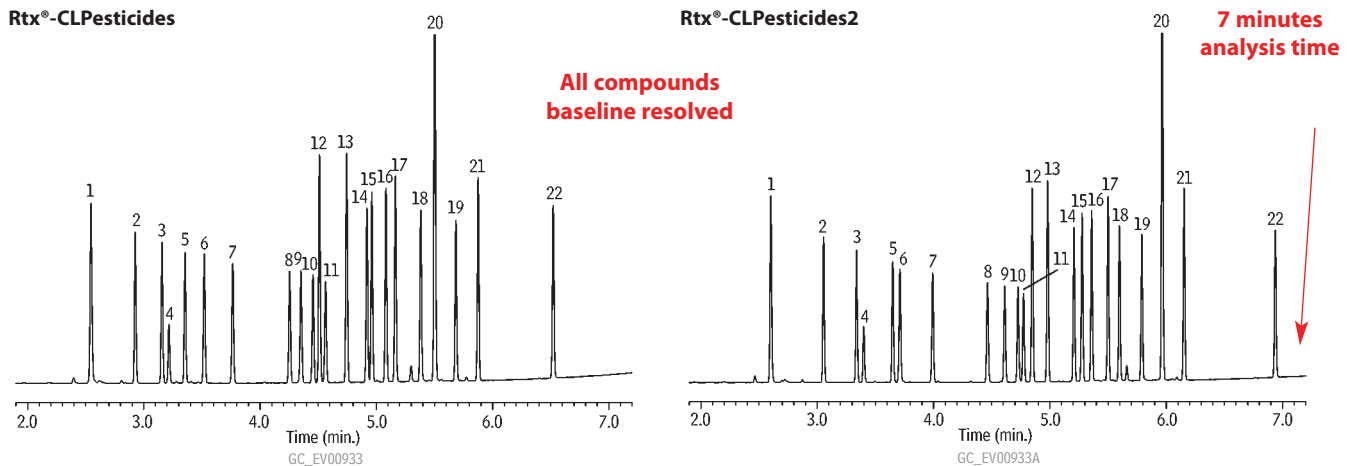
free literature

Fast GC Analysis of Chlorinated Pesticides

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lit. cat.# 59547A

Fast GC analyses of chlorinated pesticides on Rtx®-CLPesticides and Rtx®-CLPesticides2 columns.



Columns: Rtx®-CLPesticides, 30m, 0.32mm ID, 0.32µm (cat.# 11141) and Rtx®-CLPesticides2, 30m, 0.32mm ID, 0.25µm (cat.# 11324) with 5m x 0.32mm ID Rxi® deactivated guard tubing (cat.# 10039), connected using Deactivated Universal "Y" Press-Tight® connector (cat.# 20405-261)

Sample: Organochlorine Pesticide Mix AB #2, 8-80µg/mL each component in hexane/toluene (cat.# 32292), Pesticide Surrogate Mix, 200µg/mL each component in acetone (cat.# 32000)

Inj.: 1.0µL splitless (hold 0.3 min.), 4mm single gooseneck inlet liner (cat.# 20799)

Inj. temp.: 250°C

Carrier gas: helium, constant flow

Linear velocity: 60cm/sec. @ 120°C

Oven temp.: 120°C to 200°C @ 45°C/min. to 230°C @ 15°C/min. to 330°C (hold 2 min.) @ 30°C/min.

Det.: ECD @ 330°C

1. 2,4,5,6-tetrachloro-*m*-xylene (SS)
2. α-BHC
3. γ-BHC
4. β-BHC
5. δ-BHC
6. heptachlor
7. aldrin
8. heptachlor epoxide (isomer B)
9. γ-chlordane
10. α-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 (SS)

MXT®-Biodiesel TG Metal Capillary Columns

For Analysis of Total Glycerin in Biodiesel Fuels

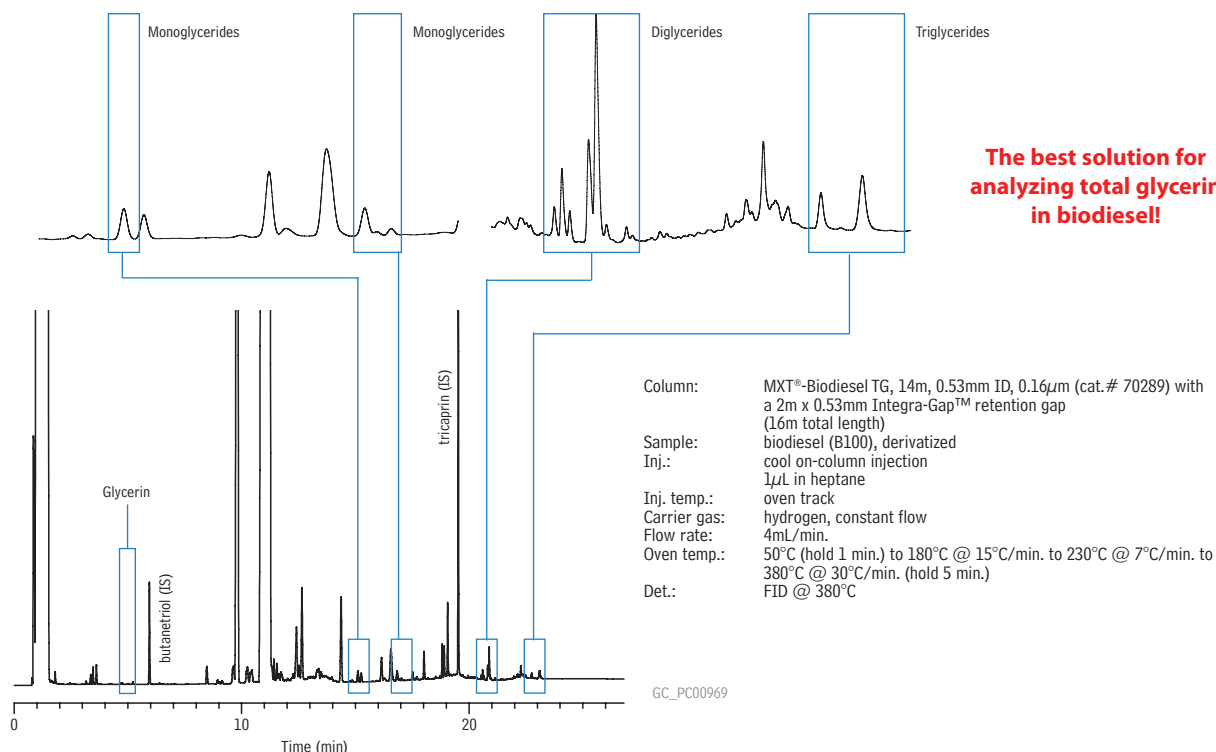
- 0.32mm MXT®-Biodiesel TG column with a 0.53mm retention gap, factory coupled with a low-dead-volume union.
- 0.53mm MXT®-Biodiesel TG column with a built-in 0.53mm Integra-Gap™ integrated retention gap.

Metal MXT® columns are more stable at high temperatures than fused silica columns. This means they will exhibit lower bleed, improving analytical performance, and have longer lifetimes, making them a cost-effective option. They also can be brought to high temperatures (430°C) allowing nonvolatile material to be baked off of the column, removing carryover contamination and improving cycle times.

Metal MXT®-Biodiesel TG columns are offered in the same column dimensions as their fused silica counterparts. Two different column configurations are available for cool on-column injection: 1) a 10m (or 15m) x 0.32mm ID MXT®-Biodiesel TG column factory coupled to a 2m x 0.53mm retention gap using a low-dead-volume union, and 2) a 16m x 0.53mm ID MXT®-Biodiesel TG column with a built-in 2m x 0.53mm ID Integra-Gap™ integrated retention gap.

The 0.53mm MXT®-Biodiesel TG column with the Integra-Gap™ integrated retention gap eliminates the need for a connector, making connector-related leaks a thing of the past. Peak shape for butanetriol is very good, demonstrating inertness, and the resolution and response for the mono-, di- and triglycerides is excellent (Figure 1). The leak-proof 0.53mm MXT®-Biodiesel TG column with the Integra-Gap™ integrated retention gap is the ultimate biodiesel solution (Figure 2).

Figure 1 Derivatized B100 samples resolve well on the 16m x 0.53mm MXT®-Biodiesel TG column, with built in 2m x 0.53mm Integra-Gap™ integrated retention gap.



MXT®-Biodiesel TG

- Fast analysis times and sharp mono-, di-, and triglyceride peaks.
- Stable at 430°C for reliable, consistent performance.
- Integra-Gap™ built-in retention gap on 0.53mm ID column eliminates column coupling completely.

MXT®-Biodiesel TG Columns (Siltek® treated stainless steel)

Description	temp. limits	cat.#
14m, 0.53mm ID, 0.16 w/2m Integra-Gap™*	-60 to 380/430°C	70289
10m, 0.32mm ID, 0.10	-60 to 380/430°C	70292
10m, 0.32mm ID, 0.10 w/2m x 0.53mm retention gap**	-60 to 380/430°C	70290
15m, 0.32mm ID, 0.10	-60 to 380/430°C	70293
15m, 0.32mm ID, 0.10 w/2m x 0.53mm retention gap**	-60 to 380/430°C	70291

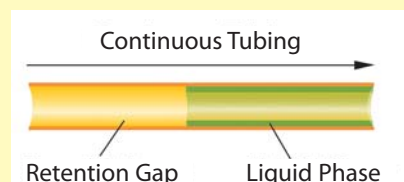
*Total column length=16 meters.

**Connected with low-dead-volume union.

Figure 2 The Ultimate Biodiesel Solution: MXT®-Biodiesel TG column with Integra-Gap™ integrated retention gap.

The 0.53mm MXT®-Biodiesel TG columns are an innovative alternative to using a 0.32mm column coupled to a 0.53mm retention gap. Restek applied the Integra-Gap™ integrated retention gap technology to the 0.53mm MXT®-Biodiesel TG columns, eliminating the column coupling.

These 100% leak-proof columns feature a built-in retention gap, reducing the risk of peak broadening and tailing, and guaranteeing the user many analyses without downtime.



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did you know?

Intermediate polarity porous polymer Rt™-QSPLIT columns—100% resolution of ethylene, acetylene, and ethane.

Rt™-QSPLIT Columns

Restek has developed unique polymer technology and coating processes, to make excellent porous polymer PLOT columns. Unlike molecular sieve and alumina columns, porous polymer PLOT columns are not moisture sensitive, making them particularly useful for applications in which moisture is of major concern.

Chromatographic selectivity, in terms of polarity or chemical functionality, can be modified by incorporating polar functional groups in the styrene/divinylbenzene matrix. The least polar, or nonpolar, Rt™-QPLOT columns are made with divinyl benzene. Rt™-SPLOT columns incorporate 4-vinylpyridine, providing intermediate polarity. The new Rt™-QSPLIT column has been engineered to have a polarity between the Rt™-QPLOT and Rt™-SPLOT columns. The Rt™-QSPLIT column fully resolves ethylene, acetylene, and ethane.

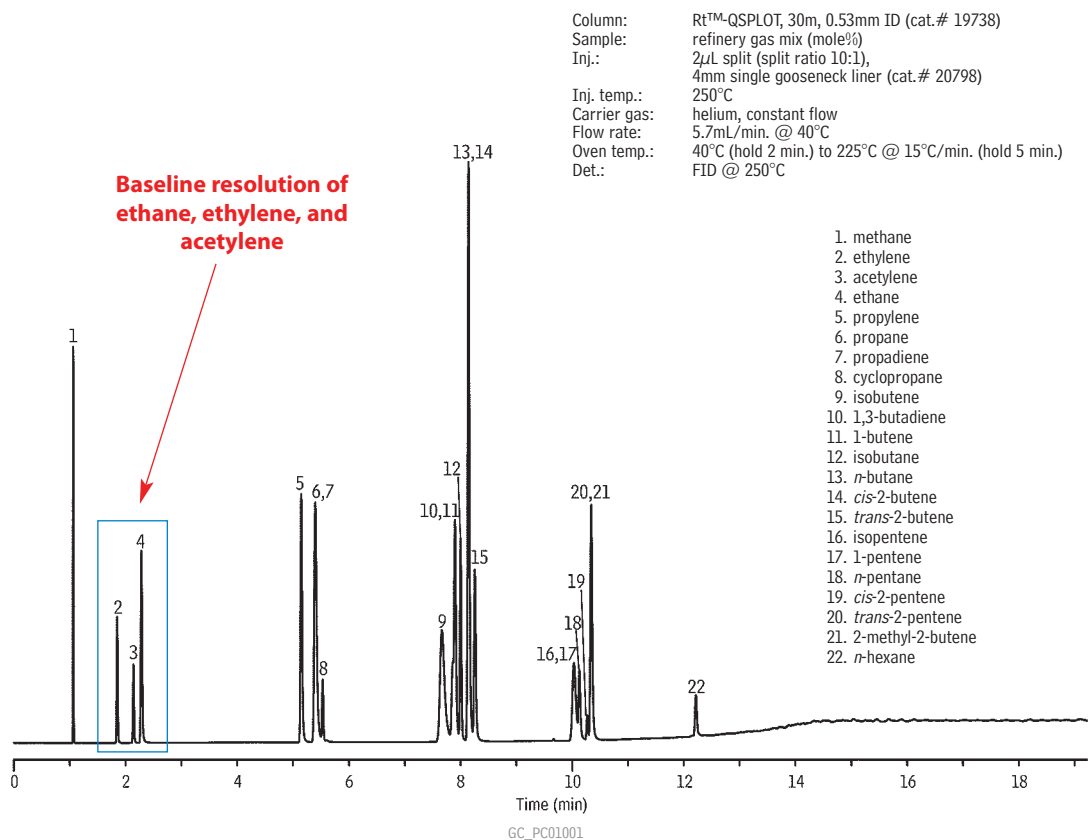
Rt™-QSPLIT columns can be used for a wide variety of separations. Permanent gases can be separated at subambient temperatures. Gases such as CO and CO₂ can be analyzed on the Rt™-QSPLIT columns. These columns also are designed for analysis of various polar and nonpolar solvents.

Rt™-QSPLIT Columns (fused silica PLOT)

porous divinyl benzene homopolymer

ID	df (μm)	temp. limits	15-Meter	30-Meter
0.32mm	10	-60 to 270/290°C	19739	19740
0.53mm	20	-60 to 270/290°C	19737	19738

Refinery gas mix on an Rt™-QSPLIT column.



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D3606 Application Column (2 column set)

Resolves Benzene and Toluene in Spark Ignition Fuels Containing Ethanol

- Complete resolution of benzene from ethanol—no compromising coelutions.
- Easy, accurate quantification of aromatics.
- Fully conditioned column set—ready to use out of the box.
- Each set is tested for method applicability and includes chromatogram.

restek
exclusive!

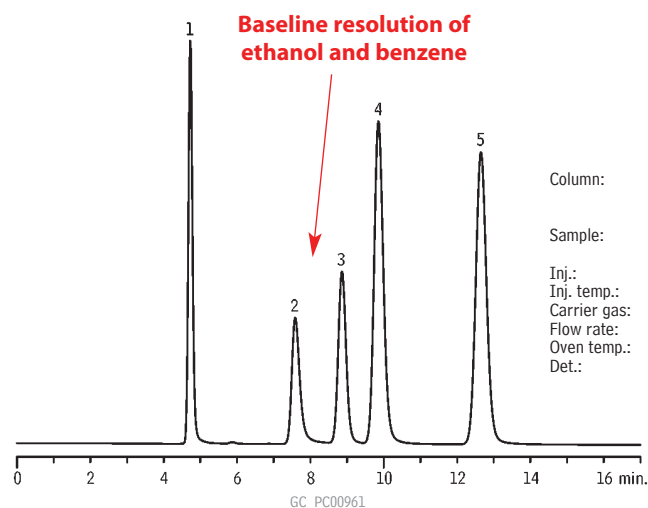
Laboratories analyzing reformulated spark ignition fuels that contain ethanol for the determination of benzene and toluene must use a modified ASTM D3606-06e1 method to prevent the coelution of ethanol and benzene. This method modification is also a requirement of the US EPA. The benzene range of determination is 0.1 to 5% by volume, and the toluene range is 2 to 20% by volume. The primary challenge in this analysis is twofold: the tailing of the ethanol peak, and the retention time shift of the aromatics towards ethanol, specifically benzene merging quickly into the ethanol peak and preventing accurate quantification.

Restek has resolved these issues by developing a new D3606 column set for this modified ASTM D3606-06e1 application. Column 1 is a 6' x 1/8" nonpolar Rtx®-1 phase, which separates components by boiling point. After the elution of *n*-octane (C8), Column 1 is backflushed to prevent heavier compounds from entering Column 2, the main analytical column. The light compounds pass into Column 2, a 16' x 1/8" column packed with a new proprietary polymer that fully resolves the aromatics compounds.

To demonstrate the performance of this new column set, we installed it in an Agilent 6890 GC equipped with a flame ionization detector (FID). Helium was used as the carrier gas at 20mL/min. in the constant flow mode. ChemStation® was used as the data acquisition software. The data in Figure 1 show that the aromatic compounds are fully resolved, and can easily be quantified using the internal standard, *sec*-butanol.

This column set is fully conditioned, and ready to use right out of the box. Only a brief (10 min.) carrier gas purge at ambient temperature, followed by a 30 min. hold at 165°C, is required. If your laboratory has been struggling with ASTM method D3606-06e1 for reformulated fuels containing ethanol, Restek's new column set is the solution.

Figure 1 Complete resolution of benzene from ethanol using a D3606 column set and modified ASTM D 3606-06e1 method.



1. C7
2. ethanol
3. benzene
4. *sec*-butanol (IS)
5. toluene

Column: D3606 Column Set
 column 1: 6' x 1/8" OD (1.8m x 2mm ID), nonpolar Rtx®-1 polymer
 column 2: 16' x 1/8" OD (4.9m x 2mm ID), proprietary packing
 Sample: 0.05µg/µL; C7 (26%), ethanol (10%) benzene(10%),
sec-butanol (26%), toluene (26%)
 Inj.: 0.05µL, direct injection
 Inj. temp.: 200°C
 Carrier gas: helium, constant flow
 Flow rate: 20mL/min.
 Oven temp.: 135°C, isothermal
 Det.: FID @ 250°C

Column Instrument Configurations

General Configuration
Suffix -800

Agilent 5880, 5890, 5987, 6890:
Suffix -810

Varian 3700, Vista Series, FID:
Suffix -820

PE 900-3920
 8 3/4" Sigma 1,2,3:
Suffix -830

PE Auto System 8300, 8400, 8700 (Not On-Column):
Suffix -840

See our general catalog or website for custom configurations

D3606 Application Column (2 column set)

Description	cat.##
D3606 Application Column (2 column set)** Column 1: 6' (1.8m), 1/8" OD, 2.0mm ID, nonpolar Rtx®-1 Column 2: 16' (4.9m), 1/8" OD, 2.0mm ID, proprietary packing material	83606-

*Please add column instrument configuration suffix number to cat.# when ordering. See chart on this page.

**This column set is for a valving system; therefore, packing material is filled to ends of columns.

Note: Initial 2" of column will be empty, to accommodate a needle. For a completely filled column (not on-column) add suffix -901.

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new &
improved!

- Lower bleed.
- Excellent column-to-column reproducibility.

Stabilwax® GC Capillary Columns

- General purpose columns for FAMES, flavor compounds, essential oils, solvents, xylene isomers, and US EPA Method 603 (acrolein/acrylonitrile).
- Resistant to oxidative damage.
- Equivalent to USP G14, G15, G16, G20, and G39 phases.

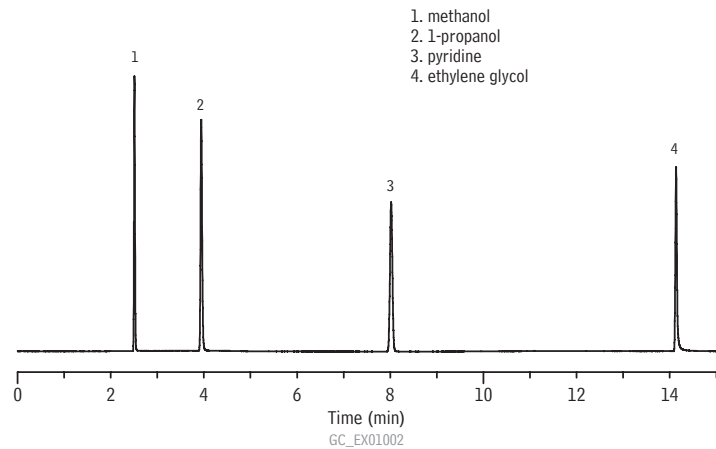
Our polar-deactivated surface tightly binds the Carbowax® polymer and increases thermal stability, relative to competitive columns. The bonding mechanisms produce a column that can be rejuvenated by solvent washing. Compared to silicone stationary phases, PEG phases are more resistant to damage from strongly acidic or basic volatile compounds.

Stabilwax® Columns (fused silica)

(Crossbond® Carbowax® polyethylene glycol)

ID	df (µm)	temp. limits	15-Meter	30-Meter	30-Meter/6plr.	60-Meter
0.25mm	0.10	40 to 250°C	10605	10608		10611
	0.25	40 to 250°C	10620	10623		10626
	0.50	40 to 250°C	10635	10638		10641
0.32mm	0.10	40 to 250°C	10606	10609		10612
	0.25	40 to 250°C	10621	10624		10627
	0.50	40 to 250°C	10636	10639		10642
	1.00	40 to 240/250°C	10651	10654	10654-600	10657
0.53mm	0.10	40 to 250°C	10607	10610		10613
	0.25	40 to 250°C	10622	10625		10628
	0.50	40 to 250°C	10637	10640		10643
	1.00	40 to 240/250°C	10652	10655	10655-600	10658
	1.50	40 to 230/240°C	10666	10669		10672
2.00	40 to 220/230°C	10667	10670			

Alcohols on a Stabilwax® column.



Column: Stabilwax®, 30m, 0.25mm ID, 0.25µm (cat.# 10623)
 Sample: alcohol test mix, 1,000µg/mL in water
 Inj.: 0.5µL, split (split ratio 40:1), 4mm single gooseneck splitless inlet liner w/wool (cat.# 22406)
 Inj. temp.: 250°C
 Carrier gas: helium, constant flow
 Flow rate: 1.5mL/min.
 Oven temp.: 60°C (hold 8 min.) to 140°C @ 25°C/min. (hold 4 min.)
 Det: FID @ 330°C

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Other Trademarks:
Carbowax (Union Carbide Corp.)

RESTEK

ISO 9001:2000
cert.# FM80397

Lit. Cat.# GNTS1050

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