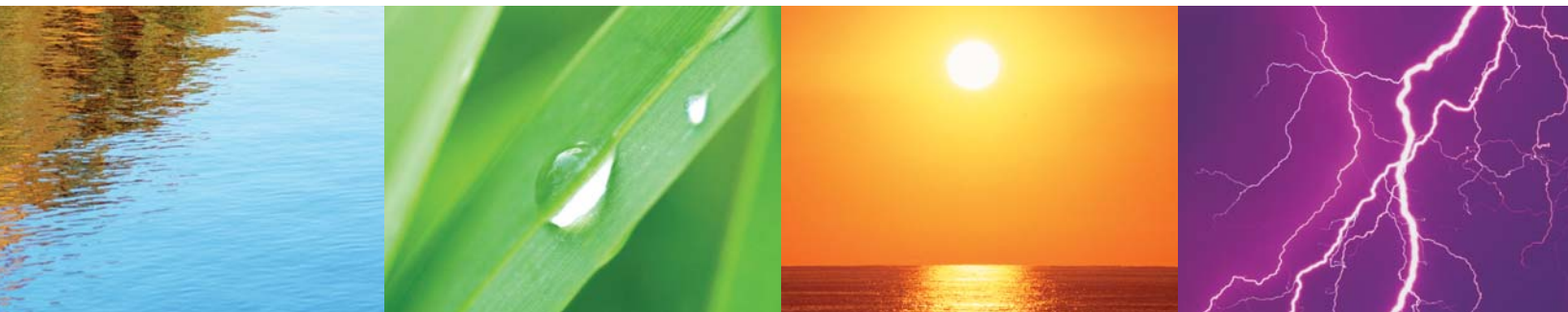


# New Rxi™ columns

from Restek—the innovators in column technology



**Unsurpassed inertness**

**Ultra-low bleed**

**Guaranteed reproducibility**

**Unmatched performance**



**Turning Visions into Reality™**

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



# New Rxi<sup>™</sup> Columns

## Exceptionally Inert Capillary Columns

- Unsurpassed inertness for low level basic and acidic compounds.
- Ultra-low bleed.
- Assured column-to-column reproducibility.
- Guaranteed to work perfectly with retention time-locking software.

## Rxi™ columns were developed from Restek's unwavering passion to create capillary columns superior to all others.

Our mission was to invent a column that had the **highest inertness**, the **lowest bleed**, and the **greatest reproducibility** in every measurable facet of performance. The end result of our work had to be clearly observable as better than any column used in the past, by chromatographers in any laboratory around the world. **Clearly different and absolutely the best** were the non-negotiable goals of our research.

To achieve these aims, we hired the world's best polymer chemists and built a new, fully-equipped facility. The products this team is developing, Rxi™ columns, genuinely have exceeded our goals. The first of these new columns, Rxi™-1ms and Rxi™-5ms columns, are absolutely the best on the market today. How are they different? Until now, powerful new MS systems have been capable of analyzing low levels of active compounds, but column limitations have kept analysts from using this ability to their advantage. Now, with Rxi™ columns, you can chromatograph sub-nanogram levels of acidic and basic compounds in one analysis. Other columns exhibit peak tailing for these active compounds, causing integration errors and producing non-linear calibration curves, and thereby limiting low-level analysis. Only Rxi™ technology will enable you to reliably chromatograph both acidic and basic compounds at previously unattainable trace levels.



A new industry standard

We guarantee bleed from Rxi™ columns will be the lowest bleed of any column you have ever used.

In addition, we tightened our column dimension and column production specifications, to ensure the

highest efficiency and most

reproducible retention indices,

thereby creating a new industry

standard. You will find support of

our claims and enthusiasm on the succeeding pages of this booklet. Simply put, an Rxi™ column will be the

best of the best columns you have ever used, unequivocally – you have our 100% satisfaction guarantee!

**An Rxi™ column will be the best of the best  
columns you have ever used – you have our  
100% satisfaction guarantee!**



Unsurpassed inertness

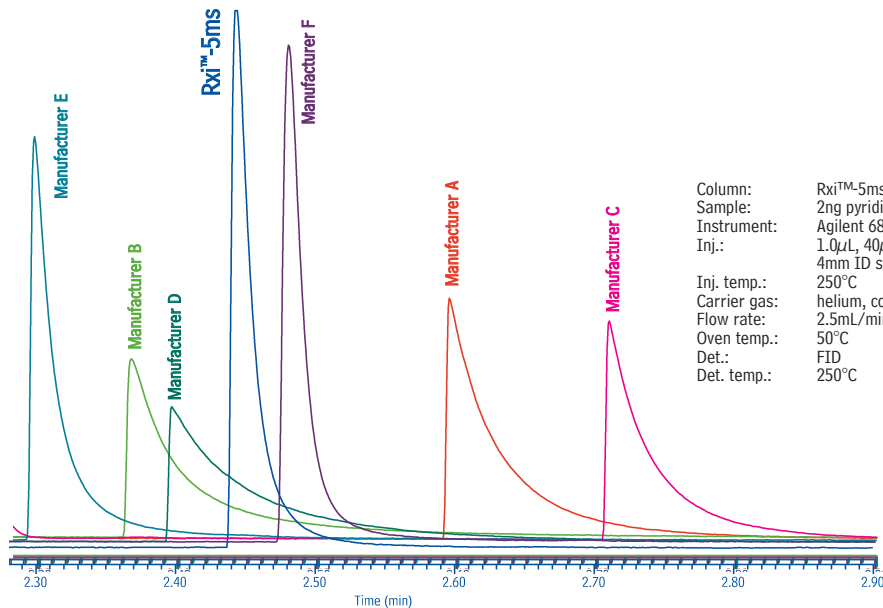
Tailing peaks and poor responses for active compounds reveal surface activity in a column. In contrast, the peak shapes for 0.5ng of pyridine (basic) and for 2,4-dinitrophenol (acidic), on page 9, demonstrate the excellent inertness of Rxi™-5ms columns. Basic and acidic compounds can be analyzed on the same column, often under the same conditions.

**An Rxi™ column's inertness allows analysis of active compounds at levels not attainable with other manufacturers' columns.**

## Unsurpassed inertness

### An Rxi™-5ms column provides the most symmetric peak for pyridine, a basic compound.

Among columns from 7 manufacturers, the Rxi™-5ms column produces the most symmetric peak for pyridine. Each overlay is 2ng of pyridine on-column, at 50°C, on a 30m x 0.25mm ID, 0.25µm column.



Column: Rxi™-5ms, 30m, 0.25mm ID, 0.25µm (cat.# 13423)  
Sample: 2ng pyridine on-column  
Instrument: Agilent 6890  
Inj.: 1.0µL, 40µg/mL pyridine (2ng on column), split (20:1),  
4mm ID split inlet liner w/ fused silica wool (cat#20781)  
Inj. temp.: 250°C  
Carrier gas: helium, constant flow  
Flow rate: 2.5mL/min.  
Oven temp.: 50°C  
Det.: FID  
Det. temp.: 250°C

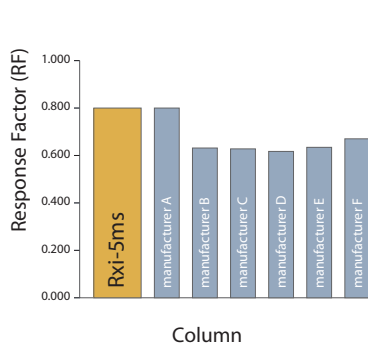
GC\_EV00857



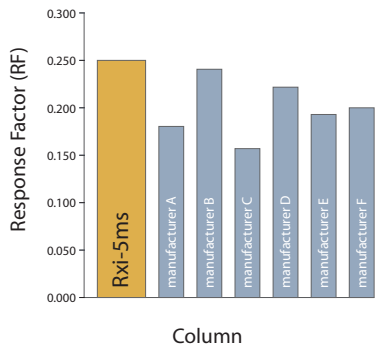
## An Rxi™-5ms column gives the best overall performance for both basic and acidic compounds.

In addition to pyridine, 2,4-dinitrophenol, an acidic compound, was acquired at 2ng on-column. An Rxi™-5ms column gives the best response for both the basic compound and the acidic compound. Comparison of 30m x 0.25mm ID, 0.25µm columns.

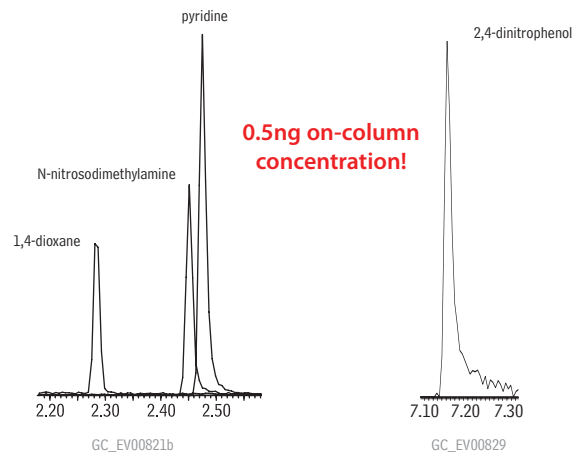
Mean response factor for 2ng of pyridine



Mean response factor for 2ng of 2,4-dinitrophenol



## Peak symmetry for pyridine or 2,4-dinitrophenol is excellent from an Rxi™-5ms column, even with 0.5ng on-column!





Ultra-low bleed

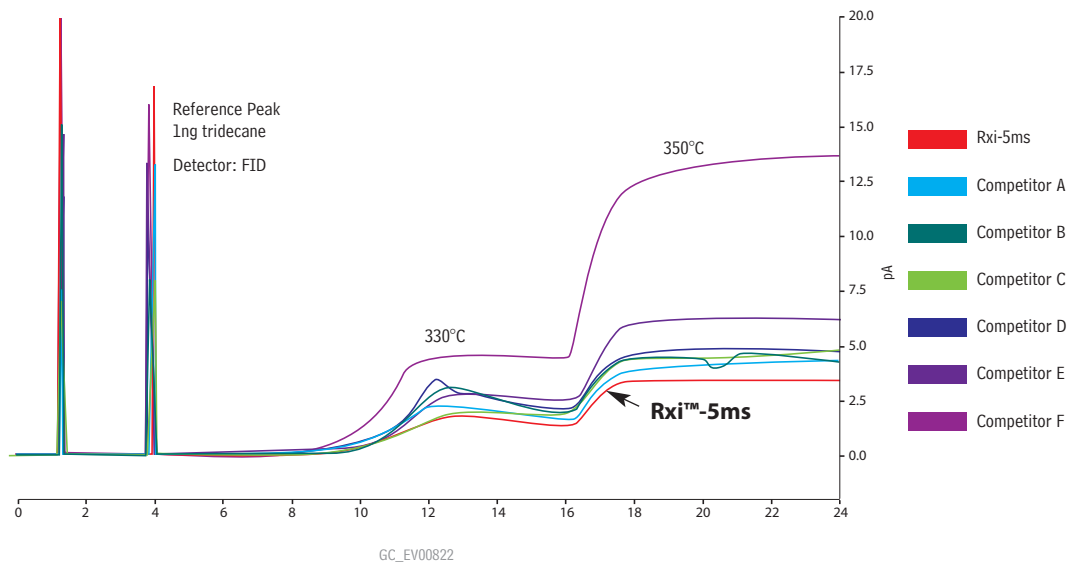
With the lowest column bleed in the industry, Rxi™-5ms columns improve detection for trace level GC/MS analysis. Ultra-low bleed also reduces conditioning time after instrument maintenance.

**Save time and money through  
faster baseline stabilization.**

## Ultra-low bleed

### Rxi™-5ms columns have the lowest bleed among all major brands of columns.

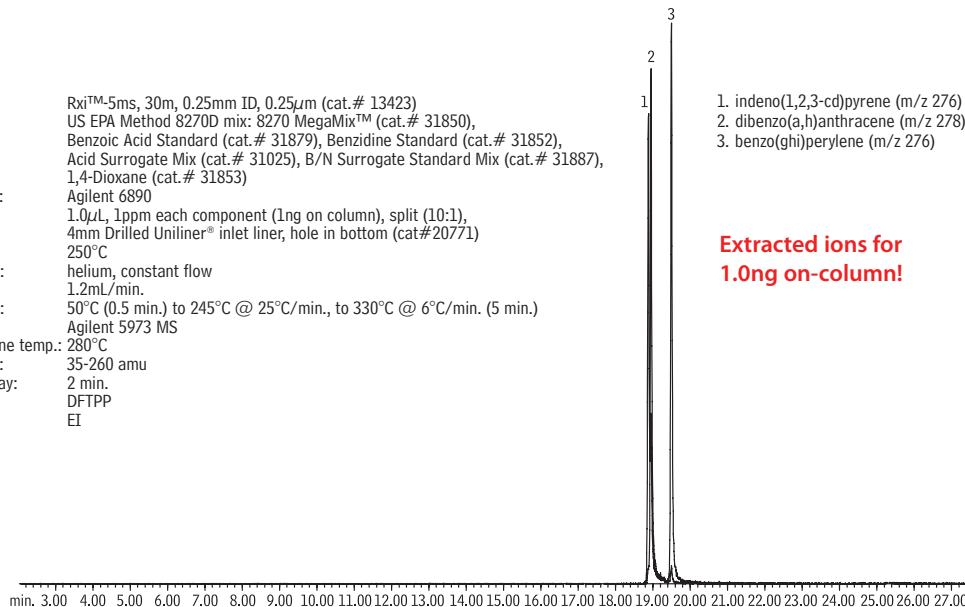
Comparison of 30m x 0.25mm ID, 0.25µm columns. Bleed was compared at 330°C and 350°C; hydrogen carrier gas; flame ionization detection.



## Ultra-low bleed makes Rxi™ columns ideal for GC/MS applications.

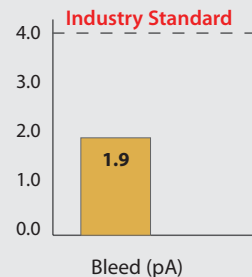
This chromatogram shows an excellent signal-to-noise ratio for late-eluting polycyclic aromatic hydrocarbons (PAHs), using an Rxi™-5ms column and MS detection.

Column: Rxi™-5ms, 30m, 0.25mm ID, 0.25 $\mu$ m (cat.# 13423)  
Sample: US EPA Method 8270D mix: 8270 MegaMix™ (cat.# 31850), Benzoic Acid Standard (cat.# 31879), Benzidine Standard (cat.# 31852), Acid Surrogate Mix (cat.# 31025), B/N Surrogate Standard Mix (cat.# 31887), 1,4-Dioxane (cat.# 31853)  
Instrument: Agilent 6890  
Inj.: 1.0 $\mu$ L, 1ppm each component (1ng on column), split (10:1), 4mm Drilled Uniliner® inlet liner, hole in bottom (cat#20771)  
Inj. temp.: 250°C  
Carrier gas: helium, constant flow  
Flow rate: 1.2mL/min.  
Oven temp.: 50°C (0.5 min.) to 245°C @ 25°C/min., to 330°C @ 6°C/min. (5 min.)  
Det.: Agilent 5973 MS  
Interface line temp.: 280°C  
Scan range: 35-260 amu  
Solvent delay: 2 min.  
Tune: DFTPP  
Ionization: EI



GC\_EV00858

Consistently low bleed, column after column.



Our average is less than half of the industry standard!

Mean = 1.9 pA  
Std. dev. = 0.7 pA



Guaranteed  
reproducibility

Consistency is everything. You want every new column you install to provide the

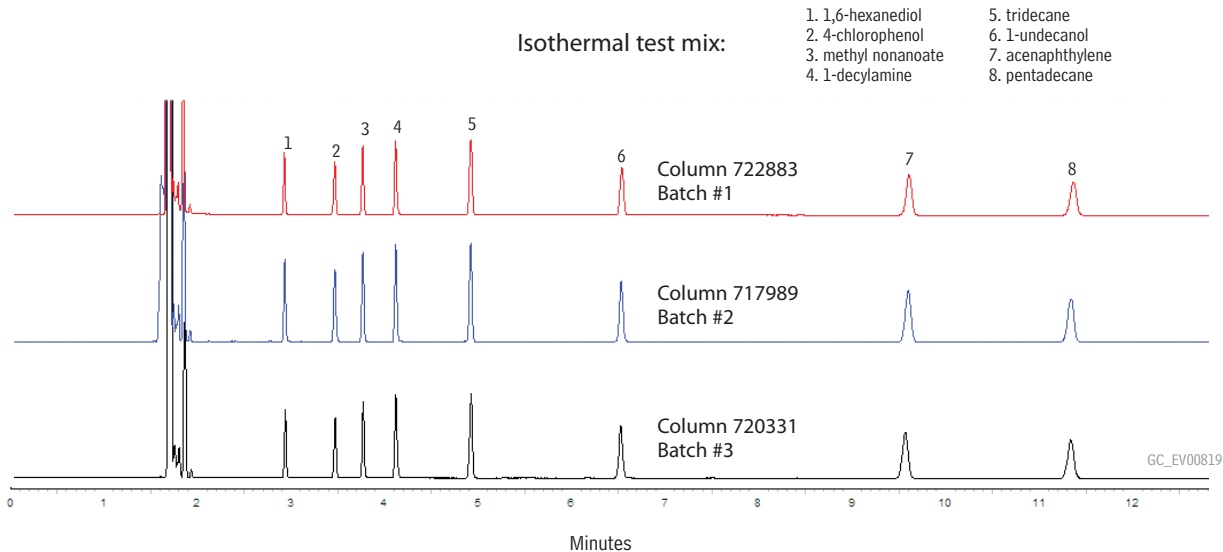
same performance. With Rxi™ column technology, we guarantee it: every new column will perform exactly as the column it replaces.

**Rxi™ -1ms and Rxi™ -5ms columns are perfect for use with Retention Time Locking (RTL) or other retention indices software.**

# Guaranteed reproducibility

## Rxi™ column technology assures reliable column-to-column performance.

The examples shown here are for 30m x 0.25mm ID, 0.25µm Rxi™-5ms columns from three manufactured batches. We perform this isothermal test on every column, to verify that our tight quality control specifications are met.





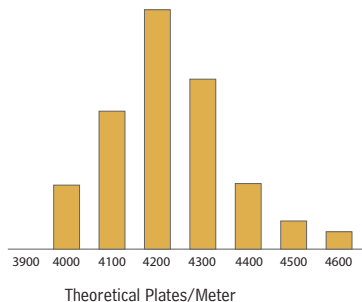
## Rxi™ columns are held to rigorous quality control standards, to guarantee column to column reproducibility.

Every column is individually tested for coating efficiency, selectivity, film thickness, inertness, and bleed, and is proven to meet our stringent specifications.

### Theoretical Plates/Meter

Rxi™-5ms  
(30m x 0.25mm, 0.25µm)

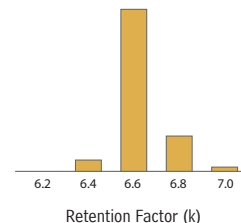
Narrow distribution ensures high column coating efficiency, which means the resolution power will be consistent, column-to-column.



### Retention Factor (k)

Rxi™-5ms  
(30m x 0.25mm, 0.25µm)

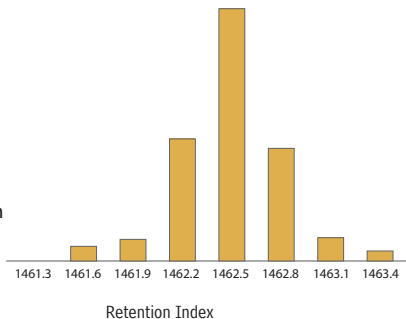
Narrow distribution ensures consistent polymer film thickness, which means retention times will be consistent, column-to-column



### Retention Index: Acenaphthalene

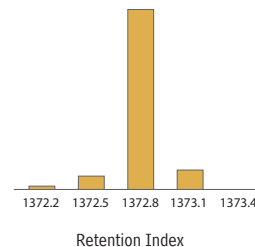
Rxi™-5ms  
(30m x 0.25mm, 0.25µm)

Narrow distribution ensures consistent column selectivity, which means relative retention times will be consistent, column-to-column



### Retention Index: Undecanol

Rxi™-5ms  
(30m x 0.25mm, 0.25µm)





Unmatched performance

No other column guarantees the combination of inertness, ultra-low bleed, and reproducibility of Rxi™-1ms and Rxi™-5ms columns.

Every Rxi™ column is held to stringent performance specifications for coating efficiency, selectivity, film thickness, inertness, and bleed. This guarantees

you the most reliable columns available anywhere. It is our promise that every new

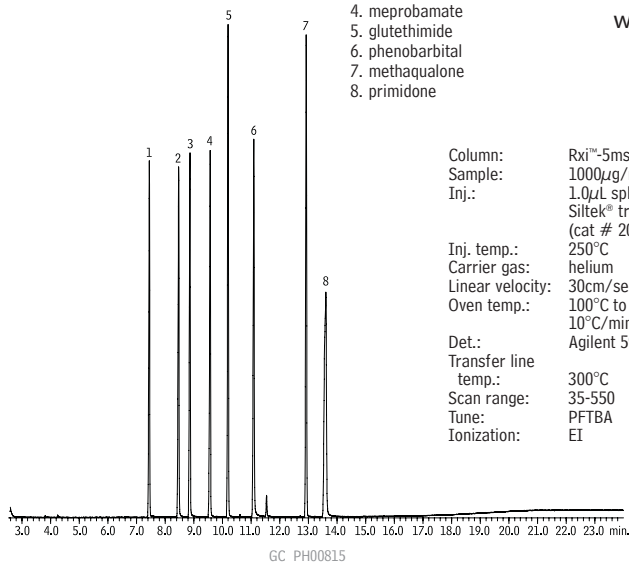
Rxi™ column will be as good as the one it replaces.

**The Rxi™ column combination of inertness, ultra-low bleed, and column-to-column reproducibility guarantees you columns that will have the longest lifetimes of any columns on the market.**

## Unmatched performance

Use an inert Rxi™-5ms column to analyze acidic and basic compounds under the same conditions.

### Underivatized Acidic/Neutral Drugs

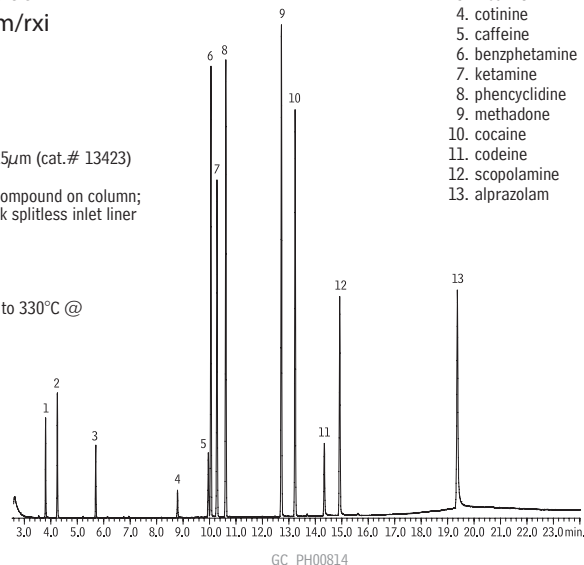


1. methprylon
2. butalbital
3. amobarbital
4. meprobamate
5. glutethimide
6. phenobarbital
7. methaqualone
8. primidone

For additional applications  
please visit us at  
[www.restek.com/rxi](http://www.restek.com/rxi)

Column: Rxi™-5ms 30m, 0.25mm ID, 0.25 $\mu$ m (cat.# 13423)  
Sample: 1000 $\mu$ g/mL each in methanol  
Inj.: 1.0 $\mu$ L split (50:1), 20ng each compound on column;  
Siltek® treated 4mm gooseneck splitless inlet liner  
(cat # 20799-214.5)  
Inj. temp.: 250°C  
Carrier gas: helium  
Linear velocity: 30cm/sec., constant pressure  
Oven temp.: 100°C to 220°C @ 15°C/min., to 330°C @  
10°C/min. (hold 5 min.)  
Det.: Agilent 5973 MSD  
Transfer line temp.: 300°C  
Scan range: 35-550  
Tune: PFTBA  
Ionization: EI

### Underivatized Basic Drugs



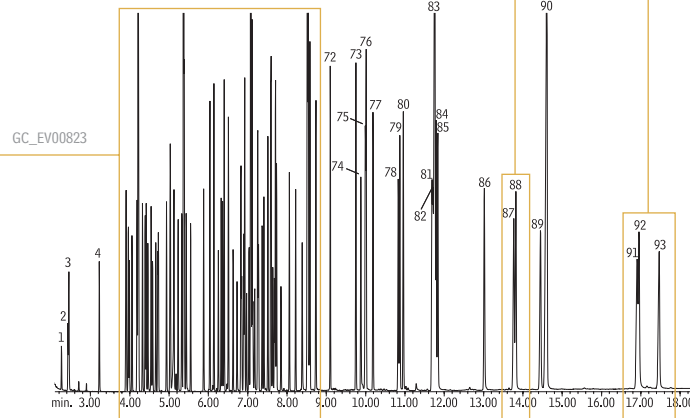
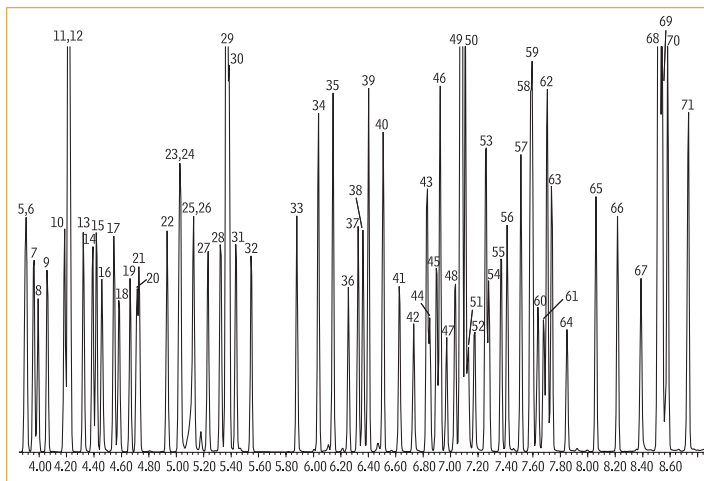
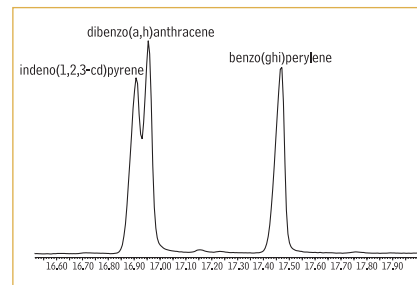
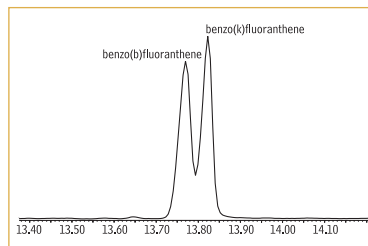
1. amphetamine
2. methamphetamine
3. nicotine
4. cotinine
5. caffeine
6. benzphetamine
7. ketamine
8. phencyclidine
9. methadone
10. cocaine
11. codeine
12. scopolamine
13. alprazolam

[www.restek.com/rxi](http://www.restek.com/rxi)

## Use an Rxi™-5ms column to analyze acidic and basic compounds in semivolatiles methods.

Column: Rxi™-5ms, 30m, 0.25mm ID, 0.25 $\mu$ m (cat.# 13423)  
 Sample: 1.0 $\mu$ L, US EPA Method 8270D mix (cat.# 31850, cat.# 31879, cat.# 31852, cat.# 31025, cat.# 31887, cat.# 31853)  
 10ppm each analyte (10ng on column), splitless (hold 0.1 min.)  
 4mm Drilled Uniliner® inlet liner (cat.# 20771)  
 Instrument: Agilent 6890  
 Inj. temp.: 250°C  
 Carrier gas: helium, constant flow, 1.2mL/min.  
 Oven temp.: 50°C (hold 0.5 min.) to 265°C @ 25°C/min., to 330°C @ 6°C/min. (hold 2 min.)  
 Det.: Agilent 5973 GC/MS: transfer line temp.: 280°C scan range: 35-550 amu, solvent delay: 2 min., tune: DFTPP, ionization: EI

For peak identifications, please visit [www.restek.com/rxi](http://www.restek.com/rxi)

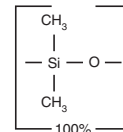


## replace these similar phases

DB-1, DB-1ms, HP-1,  
HP-1ms, Ultra-1, SPB-1,  
Equity-1, ZB-1, VF-1ms,  
Rtx-1, Rtx-1ms

### Rxi™-1ms Fused Silica Columns

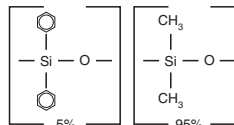
- General purpose columns for drugs of abuse, essential oils, hydrocarbons, pesticides, polychlorinated biphenyl (PCB) congeners or (e.g.) Aroclor® mixes, sulfur compounds, amines, solvent impurities, simulated distillation, oxygenates, gasoline range organics (GRO), refinery gases.
- Nonpolar phase (Crossbond® 100% dimethyl polysiloxane) Equivalent to USP G2 phase.
- Temperature range: -60°C to 330/350°C  
(330°=bleed tested temperature/350°=maximum operating temperature).



ID	df (μm)	temp. limits	15-Meter	30-Meter	60-Meter	
0.25mm	0.25	-60 to 330/350°C	13320	13323	13326	
	0.50	-60 to 330/350°C	13335	13338	13341	
	1.00	-60 to 330/350°C	13350	13353	13356	
0.32mm	0.25	-60 to 330/350°C	13321	13324	13327	
	0.50	-60 to 330/350°C	13336	13339	13342	
	1.00	-60 to 330/350°C	13351	13354	13357	
0.53mm	0.50	-60 to 330/350°C	13337	13340		
	1.00	-60 to 330/350°C	13352	13355		
	1.50	-60 to 330/350°C	13367	13370		
ID	df (μm)	temp. limits	12-Meter	20-Meter	25-Meter	50-Meter
0.18mm	0.18	-60 to 330/350°C		13302		
0.20mm	0.33	-60 to 330/350°C	13397		13398	13399

## Rxi™-5ms Fused Silica Columns

- General purpose columns for alcohols, amines, aromatic hydrocarbons, bile acids, drugs, US EPA methods, esters, fatty acid methyl esters (FAMES), flavors and aromas, glycerides, halogenated hydrocarbons, herbicides, hydrocarbons, organic acids, oxygenates, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, phenols, polymers, solvents, steroids, sugars, sulfur compounds. Most widely used general purpose column.
- Nonpolar phase (Crossbond® 5% diphenyl / 95% dimethyl polysiloxane) Equivalent to USP G27 phase.
- Temperature range: -60°C to 330/350°C  
(330° = bleed tested temperature/350° = maximum operating temperature).



## replace these similar phases

DB-5, DB-5ms, HP-5,  
HP-5ms, SPB-5, SLB-5,  
Equity-5, Ultra-5, BPX-5,  
007-5, AT-5, Optima-5,  
ZB-5, ZB-5ms, VF-5ms,  
CP-Sil 8 CB, Rtx-5,  
Rtx-5ms, Xti-5

Selectivity of Rxi-5ms is  
equivalent to HP-5 and HP-5ms.

ID	df (μm)	temp. limits	15-Meter	30-Meter	60-Meter	
0.25mm	0.25	-60 to 330/350°C	13420	13423	13426	
	0.50	-60 to 330/350°C	13435	13438	13441	
	1.00	-60 to 330/350°C	13450	13453	13456	
0.32mm	0.25	-60 to 330/350°C	13421	13424	13427	
	0.50	-60 to 330/350°C	13436	13439	13442	
	1.00	-60 to 330/350°C	13451	13454	13457	
0.53mm	0.25	-60 to 330/350°C	13422	13425		
	0.50	-60 to 330/350°C	13437	13440		
	1.00	-60 to 330/350°C	13452	13455		
	1.50	-60 to 330/350°C	13467	13470		
ID	df (μm)	temp. limits	12-Meter	20-Meter	25-Meter	50-Meter
0.18mm	0.18	-60 to 330/350°C		13402		
	0.36	-60 to 330/350°C		13411		
0.20mm	0.33	-60 to 330/350°C	13497		13498	13499

Want more information about Rxi™ Columns?  
[www.restek.com/rxi](http://www.restek.com/rxi)



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