



# Rtx<sup>®</sup> - 200

capillary columns

from **RESTEK**

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# Rtx<sup>®</sup>-200 Capillary GC Column

- ✓ Unique selectivity provides better separation for intermediate polarity compounds.
- ✓ Higher thermal stability ensures low bleed with sensitive detectors.
- ✓ Good for a wide range of applications: solvents, free acids, drugs, and more.

## Unique Selectivity

Rtx<sup>®</sup>-200 gas chromatography (GC) columns are coated with a trifluoropropyl methyl polysiloxane stationary phase, which provides a unique selectivity for compounds that display lone pair electrons such as ketones, aldehydes, nitro-containing compounds, and halogen-containing compounds. The distinctive polarity of the Rtx<sup>®</sup>-200 capillary column ensures separations that often cannot be achieved with either non-polar or polar columns. Using Pro *exGC*<sup>™</sup> software, a computer program that models GC separations, the retention of several common solvents was determined for three columns of different polarities: a non-polar Rtx<sup>®</sup>-1 column (100% dimethyl polysiloxane), a polar Stabilwax<sup>®</sup> column (polyethylene glycol), and an intermediate-polarity Rtx<sup>®</sup>-200 column (Figure 1). Under identical analysis conditions, the Rtx<sup>®</sup>-200 column provides complete resolution of these solvents and a different elution order compared to either the Rtx<sup>®</sup>-1 or Stabilwax<sup>®</sup> column.

## Excellent Thermal Stability & Low Bleed

The Rtx<sup>®</sup>-200 polymer features thermal stability to 360°C. This produces a phase that exhibits low bleed with very sensitive detectors. A true test of column bleed for a fluorine-containing phase is an evaluation using an electron capture detector (ECD), which is highly selective for halogenated compounds. At its maximum operating temperature of 360°C, the Rtx<sup>®</sup>-200 column exhibits only 20pA of bleed (Figure 2).

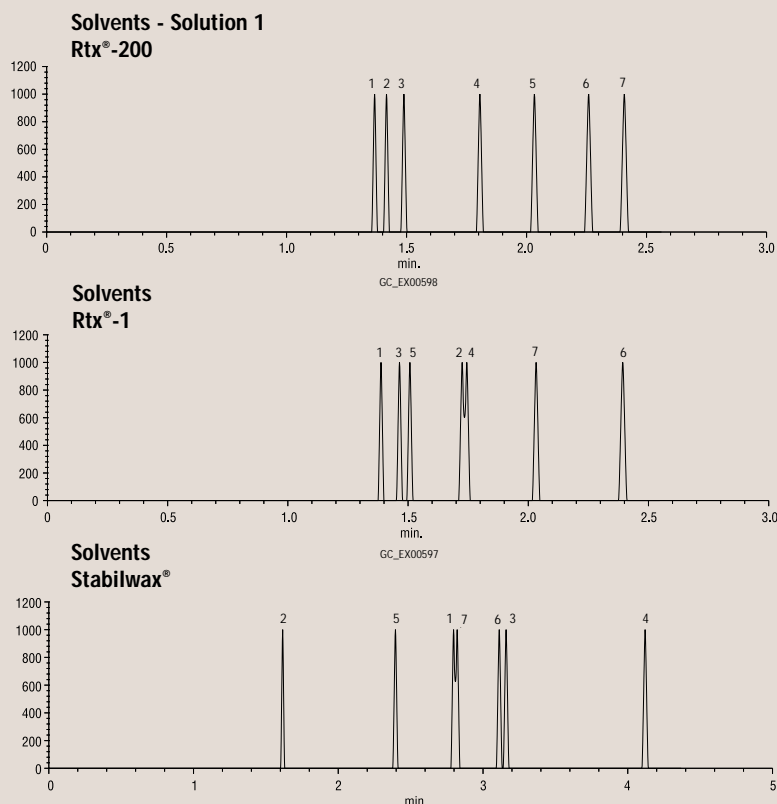
The Rtx<sup>®</sup>-200MS column is available for applications that require even lower bleed. The bleed specification for the Rtx<sup>®</sup>-200MS column is lower than that for the Rtx<sup>®</sup>-200 column, making it ideal for extremely sensitive instruments, such as the Agilent 5973 GC/MS and ion trap mass spectrometers.

Don't be fooled  
by inferior  
imitations!

Only the Rtx<sup>®</sup>-200 column offers superior inertness and has a 360°C maximum operating temperature.

Figure 1

The unique polarity of the Rtx<sup>®</sup>-200 column separates common solvents better than a non-polar Rtx<sup>®</sup>-1 column or a polar Stabilwax<sup>®</sup> column.

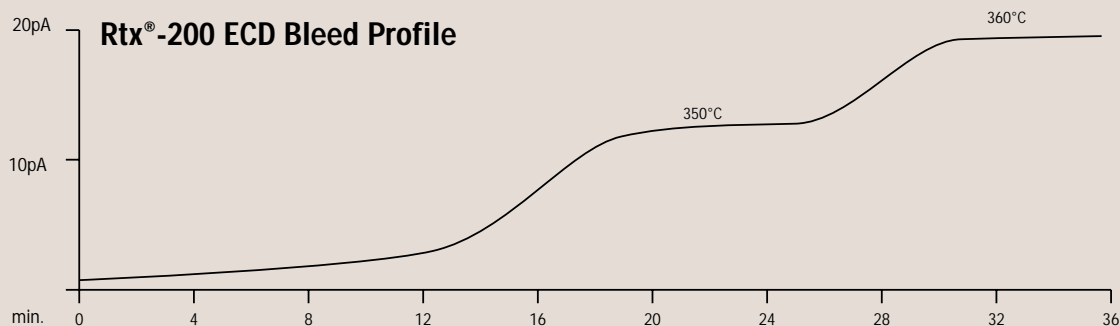


### Conditions for Figure 1

30m, 0.32mm ID, 1.0 $\mu$ m  
Carrier gas: helium, constant flow  
Flow rate: 2.48mL/min.  
Oven temp.: 50°C @ 12°C/min. to 225°C

1. methanol
2. pentane
3. ethanol
4. 1-propanol
5. acetone
6. benzene
7. ethyl acetate

**Figure 2**  
Despite the presence of fluorine in its structure, the Rtx®-200 column exhibits only 20pA of bleed by ECD.



## Versatile

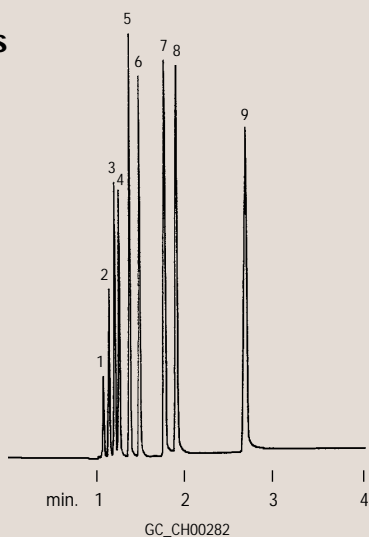
Rtx®-200 columns are offered in a wide range of lengths, IDs, and film thicknesses, and can be used for applications ranging from solvents to free acids to drug compounds. Due to its neutrality and inertness, an Rtx®-200 column can be used to analyze acidic, basic, or neutral compounds. Its unique polarity also makes it an ideal confirmation column for many analyses, because it will produce a different elution pattern compared to most other stationary phases.

## Volatile Free Fatty Acids

The inertness and selectivity of the Rtx®-200 phase makes it ideal for the analysis of volatile free fatty acids. A 30m, 0.25mm ID, 0.25µm Rtx®-200 column resolves C2 to C7 free fatty acids in less than three minutes (Figure 3). All compounds show excellent peak symmetry, even at on-column concentrations of 10 to 20ng.

**Figure 3**  
Achieve excellent peak symmetry and fast analysis of volatile free fatty acids using an Rtx®-200 column.

**Organic Acids**  
**Rtx®-200**  
(split injection)



1. acetic acid
2. propionic acid
3. isobutyric acid
4. *n*-butyric acid
5. isovaleric acid
6. *n*-valeric acid
7. isocaproic acid
8. caproic acid
9. heptanoic acid

### Conditions for Figure 3

30m, 0.25mm ID, 0.25µm Rtx®-200 (cat.# 15023)  
0.8µL split injection of a free fatty acid standard.  
Conc.: approximately 10 to 20ng/µL.

Oven temp.: 90°C isothermal  
Inj. & det. temp.: 250°C  
Carrier gas: hydrogen  
Linear velocity: 40cm/sec. (flow rate: 1.4cc/min.)  
FID sensitivity: 4 x 10<sup>-11</sup> AFS  
Split vent: 40cc/min.

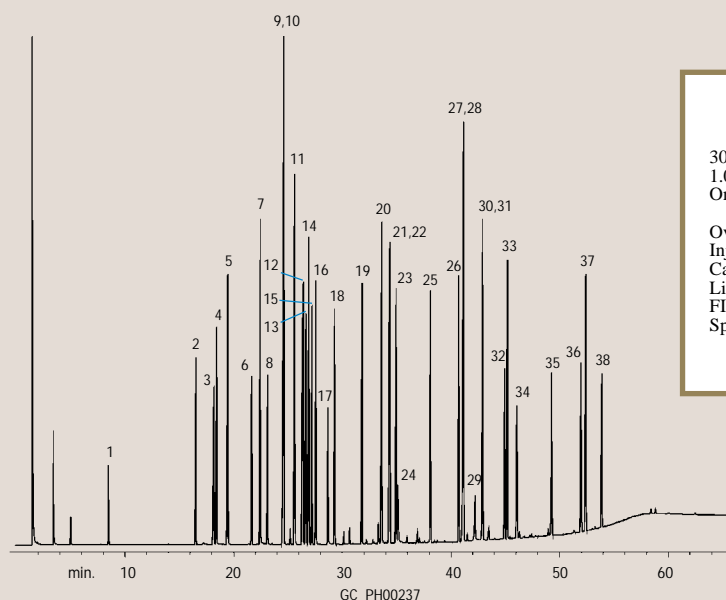
## Toxicological Analyses

The inertness and selectivity of an Rtx®-200 column make it an excellent choice for toxicological analyses of a wide variety of drug compounds. Compounds with electron-donating groups, such as carbonyl, azo, and nitro compounds, are preferentially retained on the Rtx®-200 phase, compared to compounds with similar base structures that do not contain these groups. The analysis of a wide range of drug compounds on an Rtx®-200 column shows a significantly different separation and elution order from other phases used for toxicological analysis, making the Rtx®-200 column ideal for confirmational analysis (Figure 4).

Figure 4

The unique selectivity of an Rtx®-200 column can provide confirmation of many common drug compounds.

**Basic Drugs  
Underivatized  
Rtx®-200**  
(split injection)



Conditions for Figure 4

30m, 0.25mm ID, 0.25µm Rtx®-200 (cat.# 15023)  
1.0µL split injection of a basic drug sample (1mg/mL)  
On-column conc.: 20ng per compound

Oven temp.: 100°C to 325°C @ 4°C/min. (hold 10 min.)  
Inj. / det. temp.: 250°C / 320°C  
Carrier gas: helium  
Linear velocity: 30cm/sec. set @ 100°C  
FID sensitivity: 1.28 x 10<sup>-10</sup> AFS  
Split ratio: 50:1

- |                     |                      |                    |                   |
|---------------------|----------------------|--------------------|-------------------|
| 1. nicotine         | 11. methadone        | 21. bupivacaine    | 31. papaverine    |
| 2. benzocaine       | 12. dextromethorphan | 22. chlorpromazine | 32. flunitrazepam |
| 3. meperidine       | 13. phenothiazine    | 23. scopolamine    | 33. thioridazine  |
| 4. benzphetamine    | 14. amitriptyline    | 24. morphine       | 34. haloperidol   |
| 5. diphenhydramine  | 15. lidocaine        | 25. diazepam       | 35. clonazepam    |
| 6. phenyltoloxamine | 16. trimipramine     | 26. acetopromazine | 36. trazodone     |
| 7. tripeleennamine  | 17. pyrilamine       | 27. bromazepam     | 37. alprazolam    |
| 8. ketamine         | 18. medazepam        | 28. prazepam       | 38. triazolam     |
| 9. cotinine         | 19. tetracaine       | 29. temazepam      |                   |
| 10. caffeine        | 20. codeine          | 30. flurazepam     |                   |

## Solvents

Testing solvent purity or analyzing residual solvents from manufacturing processes requires a column that quickly and accurately resolves a variety of industrial solvents. An Rtx®-200 column is an ideal choice for a wide range of common industrial solvents (Figure 5).

## Chlorosilanes

Chlorosilanes are volatile, reactive compounds used as silylating agents and intermediates for silicone synthesis. Due to their highly reactive nature, these compounds are difficult to analyze by GC. A 60m, 0.53mm ID, 3.0µm Rtx®-200 column can successfully analyze a wide range of chlorosilane compounds (Figure 6).

## Conclusion

The combination of unique selectivity, high thermal stability, and excellent inertness makes the Rtx®-200 column an ideal choice for either GC or GC/MS analyses; and for primary or confirmational analyses. The Rtx®-200 phase is available in a wide variety of column configurations to solve your most demanding analytical separations.

# Rtx®-200

## capillary columns

**RESTEK**

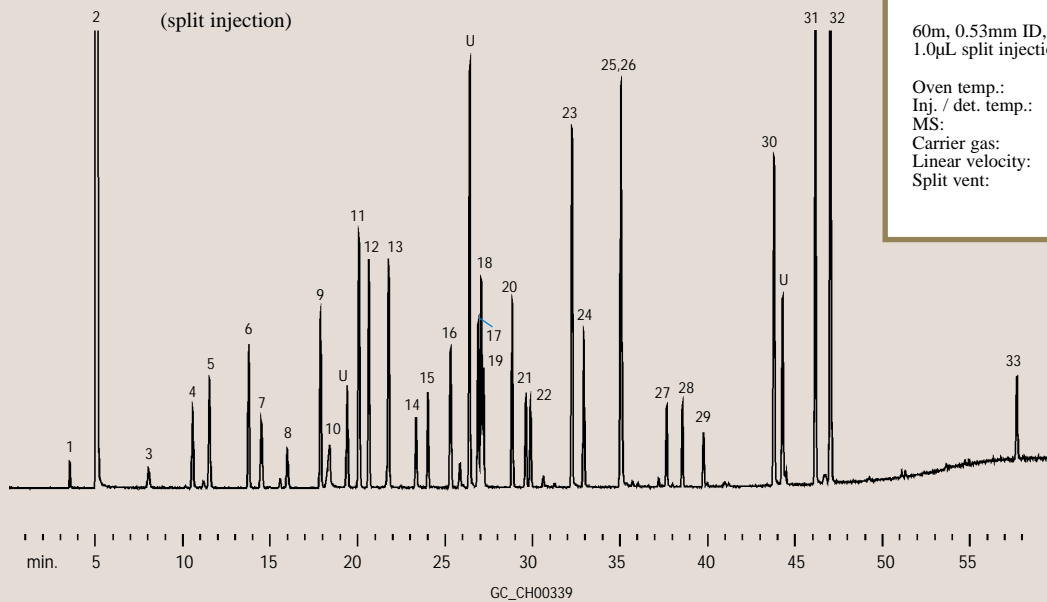
800-356-1688  
814-353-1300

**Figure 5**  
An Rtx®-200 column quickly and accurately analyzes a wide variety of common solvents.

**Solvent Mixture #2**

**Rtx®-200**

(split injection)



**Conditions for Figure 5**

60m, 0.53mm ID, 3.0µm Rtx®-200 (cat.# 15088)  
1.0µL split injection of solvent mix #2

Oven temp.: 40°C (hold 5 min.) to 285°C @ 5°C/min.  
Inj. / det. temp.: 275°C / 285°C  
MS: full scan  
Carrier gas: helium  
Linear velocity: 40cm/sec.  
Split vent: 50mL/min.

- |                        |                              |                       |                          |
|------------------------|------------------------------|-----------------------|--------------------------|
| 1. pentane             | 10. formamide                | 19. dimethylacetamide | 28. 2-dodecanone         |
| 2. methylene chloride  | 11. sec-tetrachloroethane    | 20. 5-nonanone        | 29. dibenzyl             |
| 3. heptane             | 12. ethyl chloroacetate      | 21. tridecane         | 30. tetraethylene glycol |
| 4. 2-buten-1-ol        | 13. o-chlorotoluene          | 22. nonanal           | 31. diethyl phthalate    |
| 5. 3-pentanol          | 14. undecane                 | 23. 1-decanol         | 32. tributyl phosphate   |
| 6. toluene             | 15. dimethylformamide        | 24. decanal           | 33. diphenyl sulfone     |
| 7. 2-methyl-3-pentanol | 16. 2,6-dimethyl-4-heptanone | 25. 1-undecanol       | U = unknown              |
| 8. nonane              | 17. 2-octanone               | 26. pentadecane       |                          |
| 9. p-xylene            | 18. a-methylbenzyl alcohol   | 27. 1-dodecanol       |                          |

**Figure 6**  
Reactive chlorosilanes analyzed using a 60m Rtx®-200 Column.

**Silanes**

**Rtx®-200**

(split injection)



1. dimethylchlorosilane
2. methylchlorosilane
3. trimethylchlorosilane
4. methyltrichlorosilane
5. dimethyldichlorosilane

**Conditions for Figure 6**

60m, 0.53mm ID, 3.0µm Rtx®-200 (cat.# 15088)  
0.5µL split injection of methyl silanes

Oven temp.: 40°C to 250°C @ 8°C/min.  
(hold 5 min.)  
Inj. / det. temp.: 200°C / 270°C  
Carrier gas: hydrogen  
Linear velocity: 40cm/sec.  
FID sensitivity: 1.02 x 10<sup>9</sup> AFS  
Split vent: 40cc/min.



## Rtx®-200 (Fused Silica)

ID	df (µm)	temp. limits*	15-Meter	30-Meter	60-Meter	105-Meter
0.25mm	0.10	-20 to 320/340°C	15005	15008	15011	
	0.25	-20 to 320/340°C	15020	15023	15026	15029
	0.50	-20 to 310/330°C	15035	15038	15041	15044
	1.00	-20 to 290/310°C	15050	15053	15056	15059
0.32mm	0.10	-20 to 320/340°C	15006	15009	15012	
	0.25	-20 to 320/340°C	15021	15024	15027	15030
	0.50	-20 to 310/330°C	15036	15039	15042	15045
	1.00	-20 to 290/310°C	15051	15054	15057	15060
	1.50	-20 to 280/300°C	15066	15069	15072	15075
0.53mm	0.10	-20 to 310/330°C	15007	15010	15013	
	0.25	-20 to 310/330°C	15022	15025	15028	
	0.50	-20 to 300/320°C	15037	15040	15043	
	1.00	-20 to 290/310°C	15052	15055	15058	
	1.50	-20 to 280/300°C	15067	15070	15073	
	3.00	-20 to 260/280°C	15082	15085	15088	15091
ID	df (µm)	temp. limits	10-Meter	20-Meter	40-Meter	
0.18mm	0.20	-20 to 310/330°C	45001	45002	45003	
	0.40	-20 to 310/330°C	45010	45011	45012	

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

## Intermediate-Polarity Deactivated Guard Columns & Transfer Lines

Nominal ID	Nominal OD	1-Meter	5-Meter	5-Meter/6-pk.
0.025mm**	0.363 ± 0.012mm	10097		
0.05mm	0.363 ± 0.012mm	10098	10040	10040-600
0.075mm**	0.363 ± 0.012mm	10099		
0.10mm	0.363 ± 0.012mm	10100	10041	
0.15mm	0.363 ± 0.012mm	10101	10042	
0.18mm	0.37 ± 0.04mm	10102	10046	
0.25mm	0.37 ± 0.04mm		10043	10043-600
0.28mm	0.37 ± 0.04mm		10003	10003-600
0.32mm	0.45 ± 0.04mm		10044	10044-600
0.45mm	0.69 ± 0.04mm		10005	10005-600
0.53mm	0.69 ± 0.05mm		10045	10045-600

\*\* Not tested with the Grob test mix because of a high pressure drop.

## Rtx®-200MS (Fused Silica)

ID	df (µm)	temp. limits	15-Meter	30-Meter
0.25mm	0.10	-20 to 320/340°C	15605	15608
	0.25	-20 to 320/340°C	15620	15623
	0.50	-20 to 310/330°C	15635	15638
	1.00	-20 to 290/310°C	15650	15653
0.32mm	0.10	-20 to 320/340°C	15606	15609
	0.25	-20 to 320/340°C	15621	15624
	0.50	-20 to 310/330°C	15636	15639
0.53mm	1.00	-20 to 290/310°C	15651	15654
	0.50	-20 to 300/320°C	15637	15640
	1.00	-20 to 290/310°C	15652	15655
	1.50	-20 to 280/300°C	15667	15670

## Pro ezGC™ Method Development Software

Description	qty.	cat.#
Pro ezGC™ Method Development Software CD-ROM	ea.	21487

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