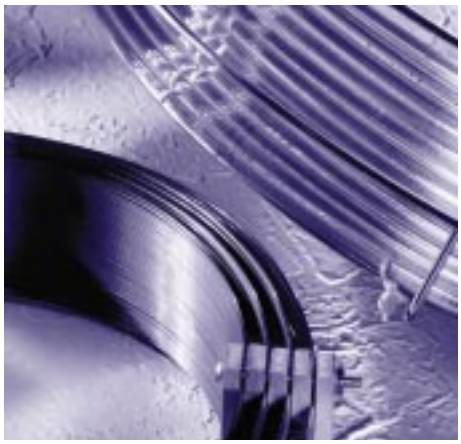
FAST FACTS At-a-Glance Product Information from Restek

Rtx®/MXT®-200 Capillary Columns

trifluoropropyl methyl polysiloxane

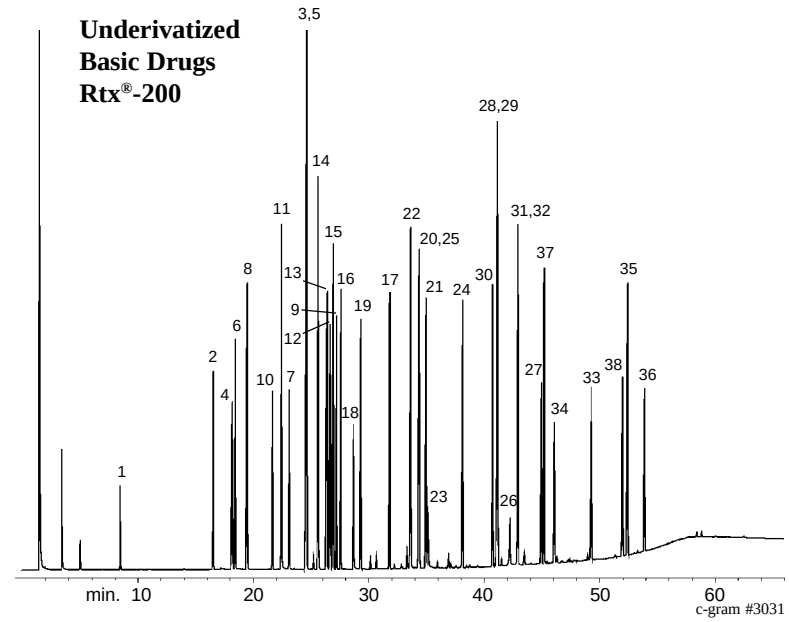
The 200 phase is extremely versatile and can be used for a wide range of pharmaceutical, environmental, and chemical applications.



What are the Rtx®/MXT®-200 columns?
The Rtx®- and MXT®-200 columns are fused silica and silica-lined stainless steel capillary columns (respectively) coated with a trifluoropropyl methyl polysiloxane stationary phase. Rtx®/MXT®-200 columns are of intermediate polarity.

Why use a trifluoropropyl methyl polysiloxane phase?
The Rtx®/MXT®-200 columns posses a unique selectivity resulting from the interaction of the trifluoropropyl group with the electronegative centers. This provides selectivity for compounds displaying lone pair electrons or having electron-rich molecules, such as ketones, aldehydes, esters, ethers, and azo-, nitro-, and carbonyl-groups. Rtx®/MXT®-200 columns have bonded phases featuring a high maximum operating temperature, permitting column rinsing with a variety of common solvents or high thermal bake-outs to remove sample residue from the polymer. This increases column lifetime and minimizes instrument downtime.

For which applications should I use an Rtx®- or MXT®-200 column?
Due to the unique selectivity and versatility of this phase, it can be used for many different applications. An Rtx®/MXT®-200 column has been used successfully for the analysis of environmental pollutants, solvent purity, residual solvents in pharmaceutical products, explosives, clinical/toxicological samples (e.g., drugs of abuse), chlorofluorocarbons or Freon®, silanes, glycols, and alcohols.



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, 30cm/sec. set @ 100°C;
FID sensitivity: 1.28 x 10^{-10}; AFS **Split ratio:** 50:1

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

See our Chromatography Products catalog or visit www.restekcorp.com to see additional application chromatograms on the Rtx®/MXT®-200 columns!

Features & Benefits

Feature	Benefit
Fused silica or MXT® tubing	*Tubing material versatility—same price regardless of tubing.*
High thermal stability	*Low bleed* *Increased detector sensitivity.* *Reduced system maintenance.*
Crossbonded phase	*Increased column lifetime.* *Low bleed.* *Solvent rinsable.*

RESTEK 800-356-1688
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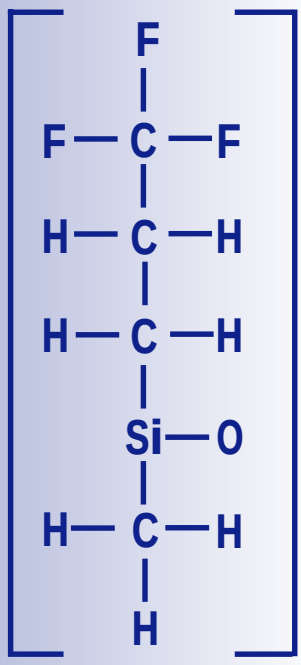
trifluoropropylmethyl polysiloxane



Polarity: selective for lone pair electrons
Uses: environmental samples, solvents, Freon® samples, drugs, ketones, alcohols

Similar Phases

J&W:
DB-210, DB-200

Alltech:
AT-210

Quadrex:
007-210

USP Nomenclature:
G6

Choosing the Best Phase for Your Sample

When choosing a stationary phase for capillary GC separations, remember the saying "like dissolves like." The stationary phase basically is a nonvolatile liquid coated on the inside walls of the column and acts as a solvent for the sample. The more soluble the solute or your analyte is in the stationary phase, the more retention it has in the column. Separations in GC are the result of the relative solubility and selective interactions of the solute and stationary phase. Table 1 shows the four main forces responsible for solute-stationary phase interactions. The sum of all four forces serves as a measure of the ***polarity*** of the stationary phase. ***Selectivity*** is the ability of a phase to preferentially retain one compound over another based on specific solute-stationary phase interactions, and it is determined by the type and amount of substituted functional groups in the stationary phase.

Table I: Selective Solute-Stationary Phase Interactions

Dispersion forces Arise from electric intermolecular fields that result from the induction of in-phase dipoles. These are present in all phases.

Orientation Interactions that occur between a stationary phase and a compound, both of which possess a permanent dipole.

Induction Interactions between a stationary phase with a permanent dipole and a compound that forms a dipole as a result of the interaction with the stationary phase.

Hydrogen bonding Bonding between a strong polar group (FH, OH, NH) and a compound with strong electronegativity (F, O, N). The strongest interaction force.

Retention indices on a Rtx®-200 column is listed below.* Retention indices (RI) are mathematical calculations used to indicate the elution point of a probe with respect to two hydrocarbons. The probes used to measure retention indicies are of different functionalities; each one designated to measure a specific solute-stationary phase interaction. As the difference in RI for a probe on a given phase increases, the degree of specific interaction increases. The cumulative effect is a measure of overall stationary phase polarity.

Table II: Retention Indices for a methyl trifluoropropyl polysiloxane

RI probe	RI	Measured interaction
Benzene	738	Electron density for aromatic and olefinic hydrocarbons
n-Butanol	758	Proton donor and acceptor capabilities (alcohols and nitriles)
2-Pentanone	884	Proton acceptor interaction (ketones, ethers, esters, aldehydes)
Nitropropane	980	Dipole interactions

Rtx®/MXT®-200 columns are intermediate in polarity and are coated with a trifluoropropyl methyl stationary phase. Solute-stationary phase interactions occurring in the Rtx®/MXT®-200 phase are strong proton acceptor and dipole interactions. Rtx®/MXT®-200 columns can provide separations of compounds with lone pair electrons or electron-rich compounds that a phenyl/methyl, cyano, or Carbowax® phase cannot.

In summary, when selecting a stationary phase, choose a phase with similar functional groups as those present in your analyte. For a versatile, intermediate-polarity stationary phase or a good confirmational column to a methylpolysiloxane (e.g., Rtx®-1) or polar Carbowax® column, select an Rtx®/MXT®-200 column.

**MXT®-200 columns are made with a different polymer and posses slightly different retention indices than the Rtx® 200 column.*

Commonly Asked Questions

What is the difference between an Rtx®-200 and an MXT®-200 column?
Rtx®-200 columns are made with polyimide-coated, fused silica tubing that is deactivated with an intermediate-polarity layer. The fused silica tubing provides the highest degree of inertness, and the maximum operating temperature for both of these columns is 340°C. MXT®-200 columns are made from unbreakable Silcosteel®-treated stainless steel tubing. The Silcosteel® process bonds a thin, flexible coating to the stainless steel surface. The thin-walled tubing offers comparable efficiency and inertness to fused silica tubing, but with increased durability. MXT® columns are caged in 4" diameter coils or smaller, making them the column of choice for compact, portable, or process GCs; or for use with with hydrogen carrier gas.

Is the Rtx®-200 phase the same as the DB-210 phase?
No. The Rtx®-200 phase is a trifluoropropyl methyl polysiloxane. The DB-210 phase is 50% trifluoropropyl polysiloxane. Although the trifluoropropyl functionality is the same on the Rtx®-200 and DB-210 columns, there may be slight retention time differences between your compounds of interest between the two phases.

What is the thermal stability of the Rtx®/MXT®-200 columns?
The Rtx®/MXT®-200 polymers are thermally stable to 340°C. We have found that the small percentage of methyl groups in the phase creates a very thermally stable polymer for an intermediate-polarity column. This high maximum operating temperature can provide longer column lifetimes and less instrument downtime because the column can be thermally conditioned at 340°C to remove sample residue or high molecular weight contaminants. Trifluoropropyl phases have lower maximum operating temperatures (e.g., 320°C [DB-200] and 260°C [DB-210]).

What types of applications should use an Rtx®/MXT®-200 column for confirmation?
Toxicological samples: The "1" or "5" columns are the most common phases for drug overdoes and drug screening testing. The Rtx®/MXT®-200 columns are an excellent confirmational choice for toxicological samples because of their selectivity for nucleophilic drugs. Compounds with electron-rich groups, such as carbonyl, azo, and nitro, are preferentially retained on the Rtx®/MXT®-200 columns.

Pharmaceutical samples: The Rtx®/MXT®-200 columns provide excellent selectivity and resolution of residual solvents in pharmaceutical products and antestetics. The phase is similar to USP Phase G6.

Solvents and chemicals: Solvent manufacturers typically use a non-polar column (e.g., Rtx®-1) and a polar column (e.g., Stabilwax®) for dual-column confirmation of solvent purity analysis. The Rtx®/MXT®-200 columns are an excellent confirmational column choice because of its selectivity towards compounds with lone pair electrons and azo-, nitro-, and carbonyl groups. The Rtx®/MXT®-200 columns have been particularly successful in the analysis of Freon®, silanes, glycols, alcohols, and ketones.

Environmental pollutants: Because of its unique selectivity and high thermal stability, the Rtx®/MXT®-200 columns are an excellent confirmation to the Rtx®-5 column for the analysis of phenols, nitrosamines, chlorinated pesticides, chlorinated hydrocarbons, and chlorophenoxy herbicides.

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Column Selection Made Easy

1 Contact **Restek's Technical Service** at **800-356-1688 or 814-353-1300, ext. 4**. We have over 25 trained chemists with direct laboratory and applications experience, ready to assist you in choosing the best column.

2 Consult the applications section (over 135 pages of applications chromatograms) in **Restek's Chromatography Products Catalog**.

3 ***ezGC***™ **software**: Restek has Retention Index Libraries that contain more than 3000 compounds analyzed on the most commonly used stationary phases, in 10 different application areas including: petroleum hydrocarbons, solvents & chemicals, flavors & fragrances, FAMEs, pesticides, PCBs, dioxins/ furans, semivolatile, volatile, and drugs of abuse.

Rtx®/MXT®-200 Columns

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Product Listing

Rtx®-200 (fused silica) (Crossbond® trifluoropropylmethyl polysiloxane) Stable to 340°C						
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	

MXT®-200 (Silcosteel®) (Crossbond® trifluoropropylmethyl polysiloxane) Stable to 340°C					
ID	**df (µm)**	**temp. limits***	**15-Meter**	**30-Meter**	**60-Meter**
0.25mm	0.50	-20 to 330°C	75035	75038	
	1.00	-20 to 310°C	75050	75053	
0.53mm	1.00	-20 to 290/310°C	75052	75055	75058
	1.50	-20 to 280/300°C	75067	75070	75073
	3.00	-20 to 260/280°C	75082	75085	75088
ID	**df (µm)**	**temp. limits**	**10-Meter**	**20-Meter**	**40-Meter**
0.18mm	0.20	-20 to 310/330°C	71881	71882	71883
	0.40	-20 to 310/330°C	71884	71885	71886

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

See Restek's Chromatography Products catalog for additional product information, or visit www.restekcorp.com.

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