

GC and GC/MS

Thermo Scientific TRACE™ GC Columns offer high temperature stability and exhibit low bleed and long lifetimes. From general purpose non-polar to polar columns, many of which are MS-compatible, TRACE GC columns provide excellent quality and performance, with guaranteed reproducibility.

Thermo Scientific TRACE GC Capillary Columns

A leap forward in column performance

- Low bleed even at elevated temperatures
- Outstanding robustness for difficult separations
- Reliable and reproducible performance
- Complete range of GC consumables for all instruments



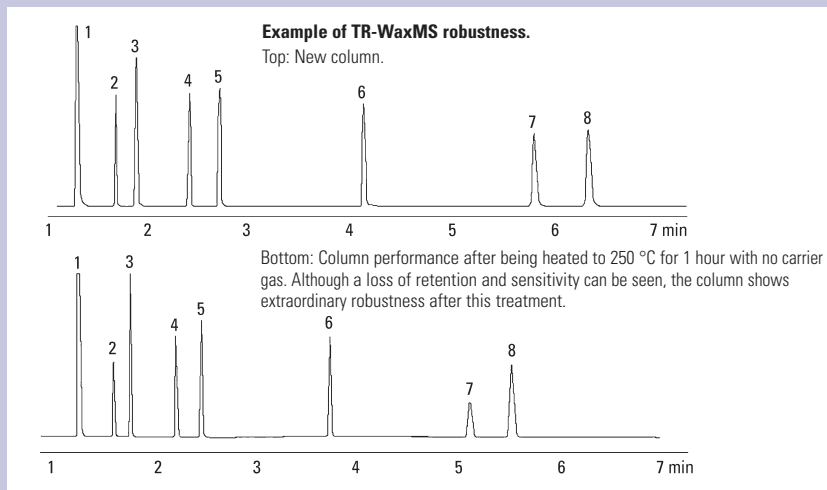
The heart of any gas chromatograph is the column. We have used the knowledge gained over 30 years of HPLC column production and 50 years in GC and GC/MS instrument manufacturing to offer a range of columns and consumables that are unsurpassed in the most important aspects of their performance.

Low Bleed

Bleeding phases cause problems including low sensitivity, detector contamination, lower temperature limits and short lifetimes. All manufacturers have at some time claimed their columns have the lowest bleed, but use supporting chromatograms that lack reproducible scale information or methodology. By quantifying the amount of phase bleeding from the column, we can show that the Thermo Scientific TRACE™ column range has less than **half** the bleed of other popular columns.

Robustness

Moisture and oxygen pose a danger to GC columns. Oxygen contamination can come from many sources, leading to shortened lifetimes, increased bleed and increased cost. TRACE GC columns have been manufactured with improved phase bonding to minimize the risk of damage due to contaminated carrier gas or difficult samples as shown in the two figures above.



Reproducibility

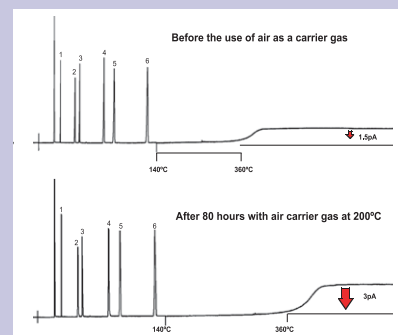
As well as focusing on individual column performance, we work to improve column-to-column reproducibility, arising from major improvements in the production processes. A column bought today will have the same characteristics or better as one obtained a year or ten years from now.

Guaranteed Performance

All TRACE columns have passed rigorous testing procedures to ensure the highest possible performance and are delivered with a serialized certificate to show their performance and assist with traceability. All Thermo Scientific columns come with a 100% guarantee. If for any reason the column does not perform up to our claims, we will replace it with one that does.

Technical Support

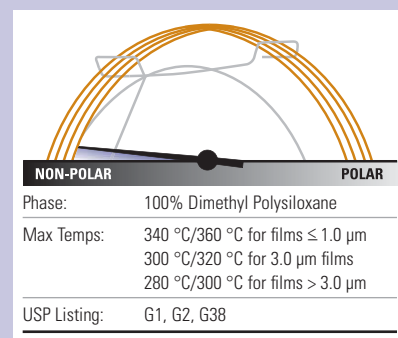
Our quality technical support will help you solve your problems quickly, via phone, our web resource center or the technical section of this catalog. Please refer to the GC Column Selection Guide on page 17 for information to help you select the appropriate column for your separation. If you are looking for a column for a NIOSH, ASTM or EPA method, Thermo Scientific column recommendations are given on pages 21-27. Should you need assistance with column selection or method development, please contact one of our technical support desks and our highly trained team of scientists will be able to help.



The stability of a TR-5MS column after three days at 200 °C using air as a carrier gas. Very little change in the chromatography is evident below the column's maximum operating temperature.

Quick Reference Icon

The reference graphic (below) on each column page gives easy access to the specifications of each phase type. It gives a relative measure of polarity, its chemistry and its maximum temperature limits as well as its USP classification.



TRACE TR-1 GC Columns

General purpose non-polar column

- Low bleed for increased sensitivity
- High operating temperature for easy reconditioning
- 100% polydimethylsiloxane

The Thermo Scientific TRACE™ TR-1 GC column is a general purpose, non-polar column for a wide range of compounds and applications. The TRACE TR-1, an industry standard, has a low phase bleed and a maximum operating temperature of 360 °C. The high operating temperature makes it easy to bake out and recondition the column in the event of column contamination. The TR-1 is suitable for a range of detectors including mass spectrometry, and is solvent washable.

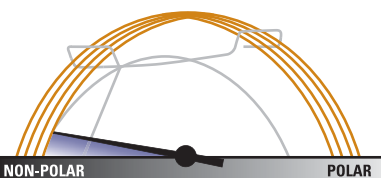
Applications

The TRACE TR-1 is suitable for a very wide range of applications including hydrocarbons, PONA, esters, pesticides, drugs and amines.

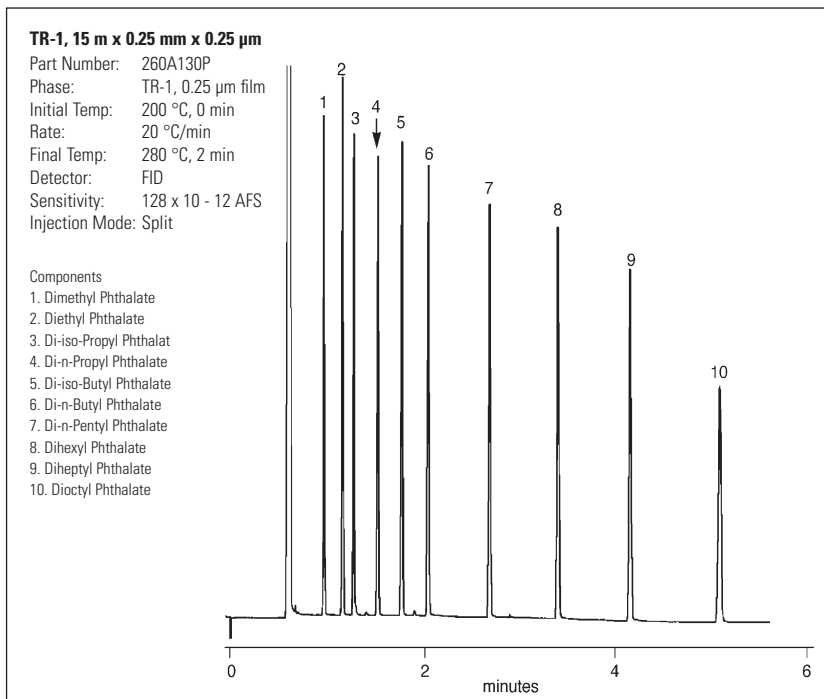
Similar to:

DB™-1, DB-Petro, BP™-1, HP™-1, HP-1MS, Rtx™-1, Ultra-1, SPB™-1, SPB-1 Sulfur, Petrocol DH, CP-Sil™ 5CB, RSL-150, RSL-160, ZB™-1, CB™-1, OV-1, PE™-1, 007-1(MS), SP™-2100, SE-30, RH-1, CC™-1, CP-Sil 5CB MS, VF-1ms

See also Liners page 153.



Phase:	100% Dimethyl Polysiloxane
Max Temps:	340 °C/360 °C for films ≤ 1.0 µm 300 °C/320 °C for 3.0 µm films 280 °C/300 °C for films > 3.0 µm
USP Listing:	G1, G2, G38



Analysis of phthalate esters on TRACE TR-1 column

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.10	0.10	10	260A020P
0.15	0.50	50	260A227P
0.25	0.25	15	260A130P
0.25	0.25	30	260A142P
0.25	0.25	60	260A154P
0.25	0.50	30	260A223P
0.25	0.50	100	260A241P
0.25	1.00	30	260A296P
0.25	1.00	60	260A308P
0.32	0.25	15	260A131P
0.32	0.25	30	260A143P
0.32	0.25	60	260A155P
0.32	0.50	30	260A224P
0.32	5.00	60	260A481P
0.32	1.00	30	260A297P
0.32	1.00	60	260A309P
0.32	3.00	30	260A395P
0.53	0.50	15	260A213P
0.53	0.50	30	260A225P
0.53	3.00	30	260A396P
0.53	5.00	30	260A470P

TRACE TR-1MS GC Columns

Extremely low bleed non-polar column

- High operating temperature
- Inert phase suited for environmental analyses
- Extremely low bleed phase

With an extremely low bleed and a maximum operating temperature of 380 °C, the Thermo Scientific TRACE™ TR-1MS column is ideal for all GC/MS applications. The column is particularly suited for applications such as GC/MS environmental analyses which require a high temperature phase that is also inert.

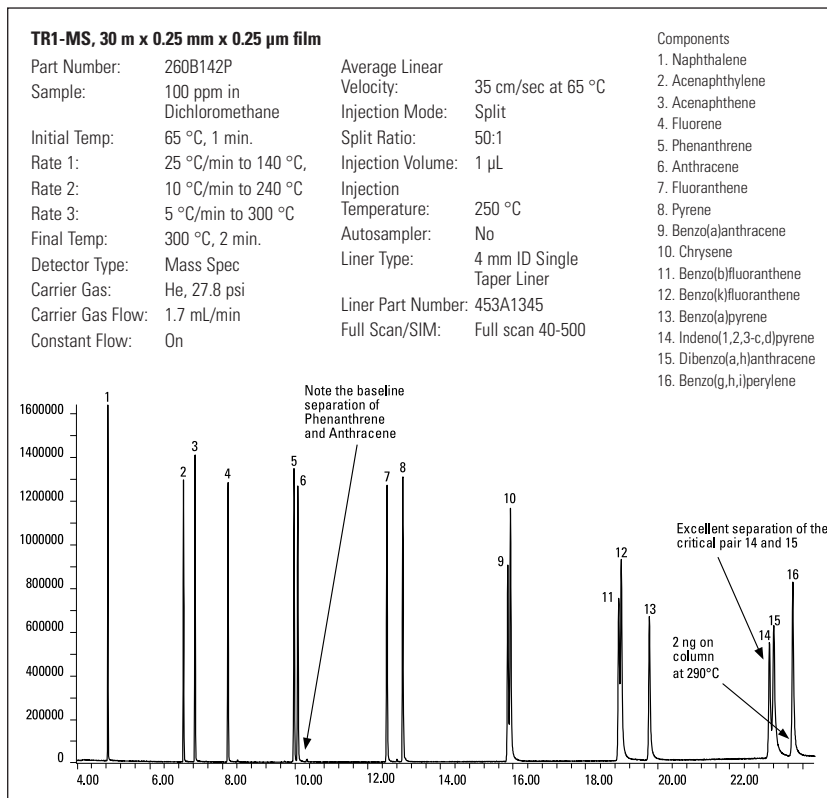
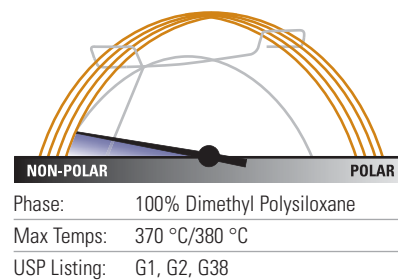
Applications

The TRACE TR-1MS is suitable for the analysis of chlorinated and nitroaromatic compounds and other GC/MS applications. The inertness and high temperature capability of the column are features which are well suited to GC/MS environmental analyses.

Similar to:

DB-1, DB-Petro, BP1, HP-1, HP-1MS, Rtx-1, Ultra-1, SPB-1, SPB-1 Sulfur, Petrocol DH, CP-Sil 5CB, RSL-150, RSL-160, ZB-1, CB-1, OV-1, PE-1, 007-1(MS), SP-2100, SE-30, RH™-1, CC-1, CP-Sil™ 5CB MS, VF-1ms

See also Gas Filters on pages 150-151.



Analysis of polynuclear aromatic hydrocarbons (PAH)

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.25	0.25	15	260B130P
0.25	0.25	30	260B142P
0.25	0.25	60	260B154P
0.32	0.25	30	260B143P
0.32	0.25	60	260B155P

TRACE TR-5 and TR-5HT GC Columns

The most widely used phase in gas chromatography

- High operating temperature
- Ideal start for method development
- Wide variety of applications

The TRACE™ TR-5 column is a 5% phenyl column with a slight increase in polarity compared to the 100% methyl columns, TR-1 and TR-1MS. The TRACE TR-5 is a universal column with a wide application range, an extremely low bleed and maximum operating temperature of 350 °C. It is an ideal starting column for method development and is capable of performing most required separations.

The TRACE TR-5HT columns extend the upper temperature limits as high as 400 °C allowing the elution of higher boiling Hydrocarbons up to C₁₀₀.

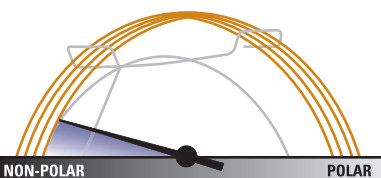
Applications

The TRACE TR-5 and TR-5HT are suitable for applications such as alcohols, free fatty acids, aromatics, flavors and low polarity pesticides. The universal use of the TR-5 column is illustrated by the separation of substituted aromatics. The chromatogram shows excellent peak shape of all components and separation is based on boiling points.

Similar to:

DB-5, BP5, Rtx-5, HP-5, Ultra-2, PTE™-5, SPB5, MDN™-5, CP-Sil 8CB, SPB-5, AT™-5, ZB-5, 007-2(MPS-5), SE-52, SE-54

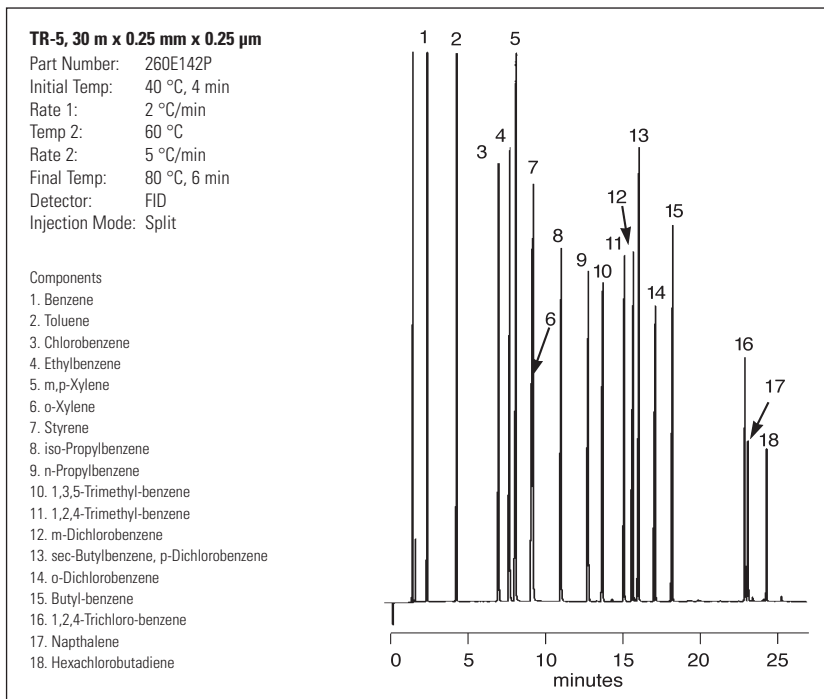
See also Liners on page 153.



Phase: 5% Phenyl Methylpolysiloxane (TR-5)
5% Phenyl Polycarborane Siloxane (TR-5HT)

Max Temps: 340 °C/350 °C for films ≤ 1.5 µm
280 °C/300 °C for films > 1.5 µm
380 °C/400 °C for TR-5HT columns

USP Listing: G27, G36



Analysis of substituted aromatics

Ordering Information

Phase	ID (mm)	Film Thickness (µm)	Length (m)	Part Number
TR-5	0.25	0.25	15	260E130P
TR-5	0.25	0.25	30	260E142P
TR-5	0.25	0.25	60	260E154P
TR-5	0.25	0.50	30	260E223P
TR-5	0.25	1.00	30	260E296P
TR-5	0.25	1.00	60	260E308P
TR-5	0.32	0.25	7	260E113P
TR-5	0.32	0.25	15	260E131P
TR-5	0.32	0.25	30	260E143P
TR-5	0.32	0.25	60	260E155P
TR-5	0.32	0.50	30	260E224P
TR-5	0.32	1.00	30	260E297P
TR-5	0.32	1.00	60	260E309P
TR-5	0.53	0.50	30	260E225P
TR-5	0.53	1.00	15	260E286P
TR-5	0.53	1.00	30	260E298P
TR-5	0.53	1.50	15	260E334P
TR-5	0.53	1.50	30	260E336P
TR-5	0.53	5.00	30	260E470P
TR-5HT	0.32	0.1	12	260H030P
TR-5HT	0.25	0.1	30	260H047P

TRACE TR-5MS GC Columns

The most popular MS phase in gas chromatography

- Silphenylene phase
- Lowest bleed, highest stability
- High signal-to-noise increases sensitivity
- High robustness to oxygen and water contamination

The Thermo Scientific TRACE™ TR-5MS column is a silphenylene-based phase ideal for most GC/MS applications. This low bleed column is especially important for mass spectrometry because contamination of source components will quickly lead to poor results and costly instrument downtime. The TR-5MS column is slightly more polar compared to the TR-1 columns, and operates up to a maximum temperature of 370 °C.

The TR-5MS column is a universal column with a wide range of applications from environmental semi-volatile methods to food and fragrance applications. The column is very inert (no active sites) thus reducing breakdown of labile compounds such as DDT and Endrin. The inertness of the column also results in minimal peak tailing. This, together with high efficiency, results in narrow peaks and excellent separation based on boiling points. If the GC/MS is exposed to many varied methods, then this is the preferred column for the instrument.

To demonstrate the robustness of the TR-5MS column, a new column was subjected to 80 hours at 200 °C using air as a carrier gas. A comparison of its performance before and after shows little change below its maximum operating temperature (see page 48).

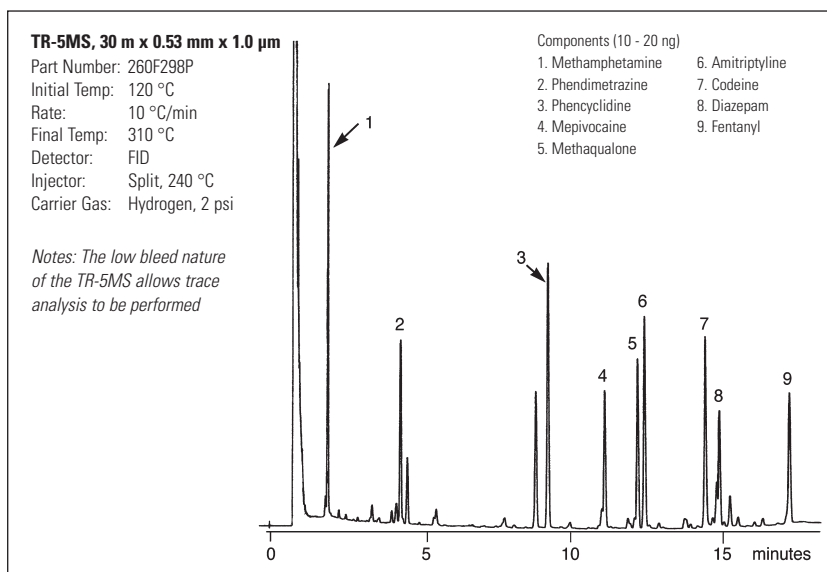
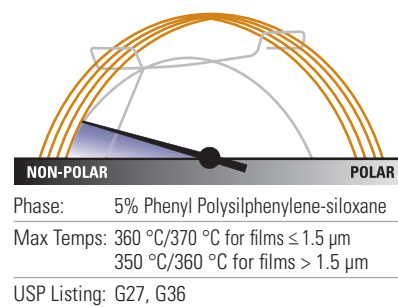
Applications

The TRACE TR-5MS is ideal for all GC/MS applications, particularly if the column is required for many different methods.

Similar to:

DB-5, DB-5MS, DB-5.625 XTI-5, BPX5, Rtx-5MS, Rtx- 5, SiIMS, AT-5, AT-5MS, 007-5MS, SPB-5, CP-Sil 8CB, Ultra-2, HP-5, HP-5MS, HP5-TA, SPB-5, MDN-5S, VF-5ms, RSL-200, CB-5, OV™-5, PE-5, 007-2(MP-5), SE-52, SE-54, PTE-5, CC-5, RH-5ms, ZB-5

See also Syringes on page 163.



Basic drug screen on a TR-5MS (10 - 20 ng/component)

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.10	0.10	10	260F020P
0.10	0.10	20	260F145P
0.15	0.25	25	260F134P
0.18	0.18	20	260F578P
0.25	0.10	15	260F035P
0.25	0.10	30	260F047P
0.25	0.25	15	260F130P
0.25	0.25	30	260F142P
0.25	0.25	60	260F154P
0.25	0.50	30	260F223P
0.25	1.00	15	260F284P
0.25	1.00	30	260F296P
0.25	1.00	60	260F308P
0.32	0.25	15	260F131P
0.32	0.25	30	260F143P
0.32	0.25	60	260F155P
0.32	0.50	30	260F224P
0.32	1.00	15	260F285P
0.32	1.00	30	260F297P
0.32	1.00	60	260F309P
0.53	0.50	15	260F213P
0.53	0.50	30	260F225P
0.53	1.00	30	260F298P
0.53	1.50	30	260F336P
0.53	3.00	15	260F384P
0.53	3.00	30	260F396P

TRACE TR-35MS GC Columns

Mid-polarity column ideal for many applications

- Exceptionally low surface activity
- Suitable for pesticide analysis
- Pharmaceutical confirmational column

The Thermo Scientific TRACE™ TR-35MS is a silphenylene-based phase ideal for GC/MS applications, particularly applications requiring a high temperature phase and more polarity than a 5% phenyl column. The TR-35MS phase has extremely low bleed, especially important in limiting contamination of source components that can degrade results and cause costly instrument downtime. This also leads to a high signal-to-noise ratio, improving your sensitivity. The inertness of the column phase and its high efficiency results in minimal peak tailing, narrow peaks and excellent separation. The TR-35MS column operates up to a maximum temperature of 370 °C.

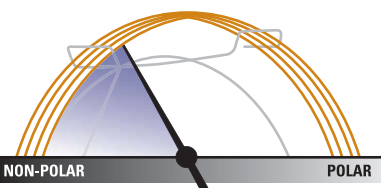
Applications

The TR-35MS column is a universal, mid-polarity column used in a wide range of applications from environmental semi-volatile methods to food and fragrance applications.

Similar to:

DB-35, DB-35MS, HP-35, HP-35MS, MDN-35, Rtx-35, SPB-35, BPX35

See also Gas Filters on pages 150-151.



Phase: 35% Phenyl Polysilphenylene-siloxane

Max Temps: 360 °C/370 °C

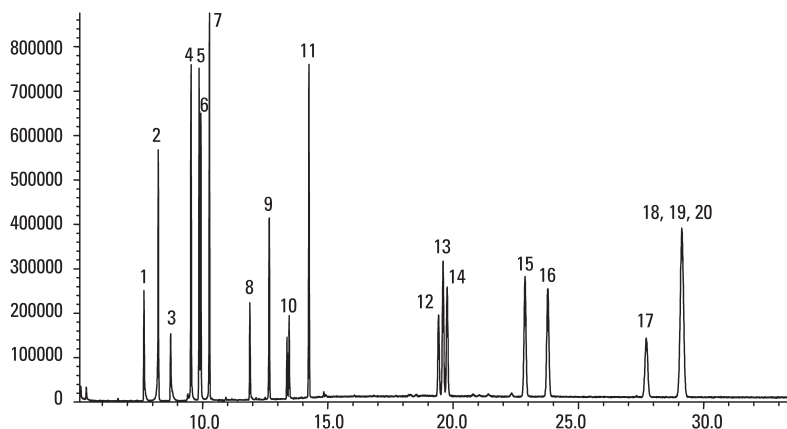
USP Listing: G42

TR-35MS, 30 m x 0.25 mm x 0.25 µm

Part Number: 260C142P
 Azo Dyes standard: 10 ppm solution in DCM
 Initial Temp: 50 °C, 2 min
 Rate 1: 15 °C to 240 °C
 Rate 2: 10 °C to 280 °C
 Final Temp: 280 °C, 25 min
 Detector Type: Mass Spec
 Carrier Gas: Helium, 7.1 psi
 Carrier Gas Flow: 1.0 mL/min
 Constant Flow: On
 Average Linear Velocity: 36 cm/sec at 50 °C
 Injection Mode: Splitless
 Splitless Time: 1.0 min
 Splitflow: 60 mL/min
 Injection Volume: 1 µL
 Injection Temperature: 250 °C
 Autosampler: No
 Liner Type: 4 mm ID Double Taper Liner

Components

1. Indolin
2. o-Toluidine
3. 2,4-Diaminoanisole
4. p-Chloroaniline
5. p-Cresidine
6. 2,4,6-Trimethylaniline
7. 4-Chlorotoluidine
8. Unknown
9. 2-Naphthylamine
10. Unknown
11. 4-Aminodiphenyl
12. 4,4'-Ox ydianiline
13. 4,4'-Diaminodiphenylmethane
14. Benzidine
15. 3,3'-Dimethyl-4,4'-diaminodiphenyl ethane
16. 3,3'-dimethylbenzidine
17. 4,4'-Thiodianiline
18. 3,3'-Dichlorobenzidine
19. 4,4'-Methylene-bis(2-chloroaniline)
20. 3,3'-Dimethoxybenzidine



Analysis of aromatic amines from diazo dyes

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.22	0.25	15	260C129P
0.25	0.25	15	260C130P
0.25	0.25	30	260C142P
0.25	0.25	60	260C154P
0.32	0.25	30	260C143P
0.32	0.25	60	260C155P
0.25	0.50	30	260C223P
0.32	0.50	30	260C224P
0.53	0.50	30	260C225P
0.53	1.00	15	260C286P
0.53	1.00	30	260C298P

TRACE TR-1701 GC Columns

Mid-polarity column with alternative selectivity

- Low bleed
- Ideal for pesticide analysis
- Low surface activity

The Thermo Scientific TRACE™ TR-1701 column is a popular mid-polarity column that sits between the TR-50MS and the TR-35MS on the polarity scale. It displays low bleed and high temperature stability compared with other similar columns. The TR-1701 column's cyano and phenyl groups increase polarity of the column while offering alternative selectivity. The alternate selectivity of the TR-1701 column when compared to a column of different polarity is particularly useful for the analysis of pesticides and other applications where a change in elution order is required for confirmation purposes.

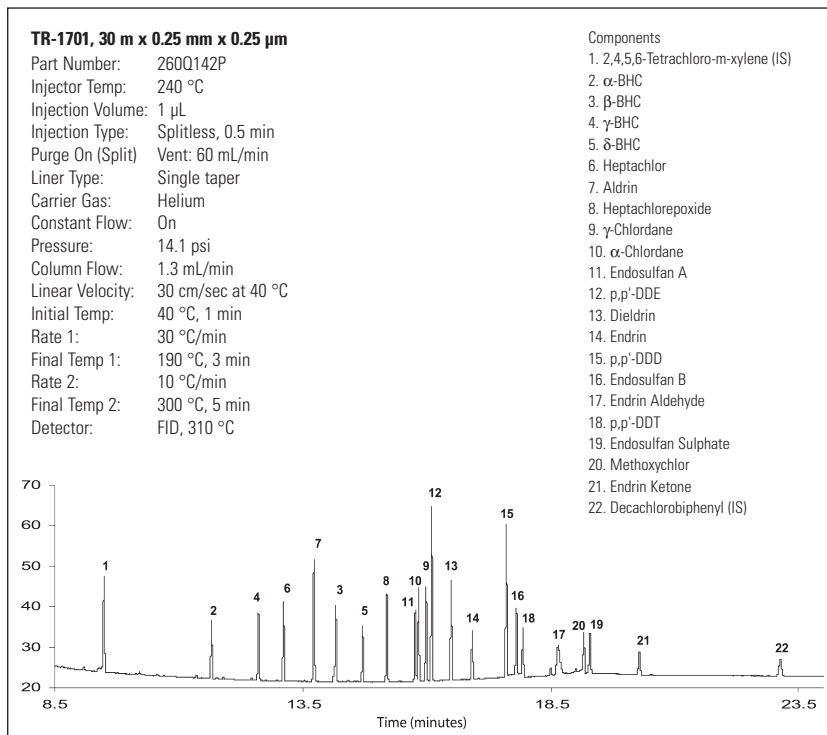
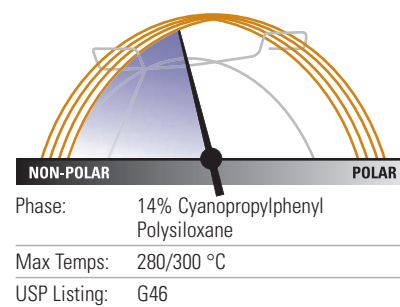
Applications

The mid-polarity TRACE TR-1701 is particularly useful for the analysis of pesticides, PCBs, PAHs, organic acids, drugs and steroids.

Similar to:

DB-1701, Rtx-1701, HP-1701, BP10, OV-1701, 007-1701, CP-Sil 19 CB

See also SPE on page 30.



Analysis of organochlorine pesticides

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.25	0.25	15	260Q130P
0.25	0.25	30	260Q142P
0.25	0.25	60	260Q154P
0.32	0.25	15	260Q131P
0.32	0.25	30	260Q143P
0.32	0.25	60	260Q155P
0.32	0.50	30	260Q224P
0.53	1.00	30	260Q298P

TRACE TR-50MS GC Columns

Mid-polarity GC column

- Silphenylene phase
- Low bleed decreases MS contamination
- Pesticide and confirmational column

The Thermo Scientific TRACE™ TR-50MS column is a silphenylene-based phase ideal for all GC/MS applications. A low bleed column is especially important for GC/MS as contamination of source components will quickly lead to a degradation of results and costly instrument downtime. This phase is extremely low bleed with a maximum operating temperature of 370 °C. The inertness of the column also results in minimal peak tailing and decreased breakdown of sensitive samples. This together with high efficiency results in narrow peaks and excellent separation.

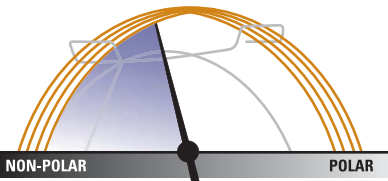
Applications

The TR-50MS column is particularly suited for applications that require a higher temperature and more polarity than a 5% phenyl column. The TR-50MS is often used in combination with a 5% phenyl column, such as the TR-5MS, to help confirm the identity of unknown analytes.

Similar to:

OV-17, SP-2250, DB-17, DB-17ms, DB-17ht, BPX50, Rtx-50, SPB-50, HP-50+, HP-17, AT50, RSL-300, PE-17, CC-17, 007-17(MPS-50), SPB-17, ZB-50

See also Septa on page 159.



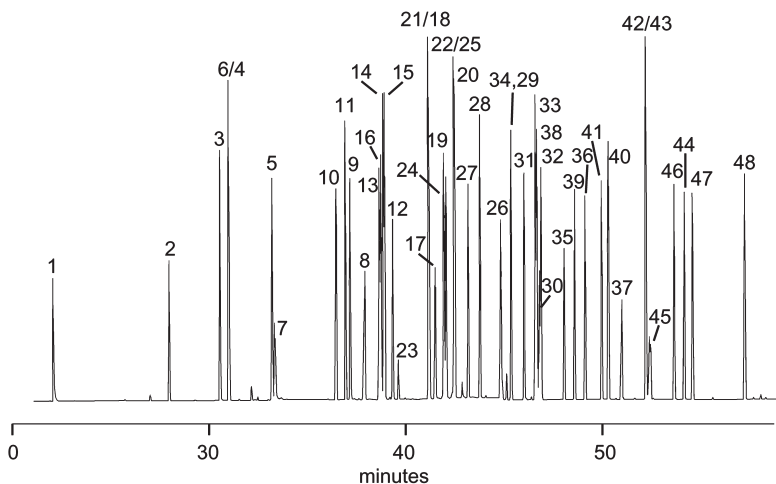
Phase:	50% Phenyl Polysilphenylene-siloxane
Max Temps:	360 °C/370 °C
USP Listing:	G3

TR-50MS, 30 m x 0.25 mm x 0.25 µm

Part Number: 260R142P
 Initial Temp: 50 °C, 1 min
 Rate 1: 4 °C/min
 Final Temp: 280 °C, 1.5 min
 Detector: Mass Spec
 Injector Mode: Splitless, 0.50 min
 Carrier Gas: Helium, 33 cm/sec
 Injection Volume: 0.5 µL

Components

1. DDVP	17. MEP-ox	33. Flutolurin
2. Etridiazole	18. Tolclophos-Methyl	34. Prethirachlor
3. Chloroneb	19. Simetryn	35. Isoxathion-ox
4. Molinate	20. MEP	36. Isoprothiolate
5. BPMC	21. Esprocarb	37. Tricyclazole
6. Benfluralin	22. Malathion	38. Buprofezine
7. Pencycurone	23. Probenazole	39. Isoxathion
8. Simazin	24. Chloropyrifos	40. Mepronil
9. Diazinon-ox	25. Thiobancarb	41. Chloronitrofen
10. Propyzamide	26. Fthalide	42. EDDP
11. Diazinon	27. Pendimetaline	43. EPN-ox
12. TPN	28. Isofenfos	44. Pyridaphenthion
13. IBP	29. Methyl-Dymron	45. Iprodione
14. ECP	30. Captan	46. EPN
15. MBPMC	31. Butamifos	47. Bifenox
16. Bromobutide	32. Napropamide	48. Mefenacet



Analysis of chlorine, phosphorus and nitrogen-based pesticides

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.10	0.10	10	260R020P
0.25	0.15	30	260R050P
0.25	0.25	15	260R130P
0.25	0.25	30	260R142P
0.25	0.25	60	260R154P
0.32	0.25	15	260R131P
0.32	0.25	30	260R143P
0.32	0.25	60	260R155P
0.53	0.50	15	260R213P
0.53	0.50	30	260R225P

TRACE TR-WAX GC Columns

General purpose high polarity column

- Polyethylene glycol phase for polar compounds
- Cross-linked
- Solvent washable

The Thermo Scientific TRACE™ TR-WAX is a polyethylene glycol-based phase ideal for the analysis of all polar compounds. The phase is highly cross-linked and fully deactivated, providing excellent peak shape, even with short chain alcohols.

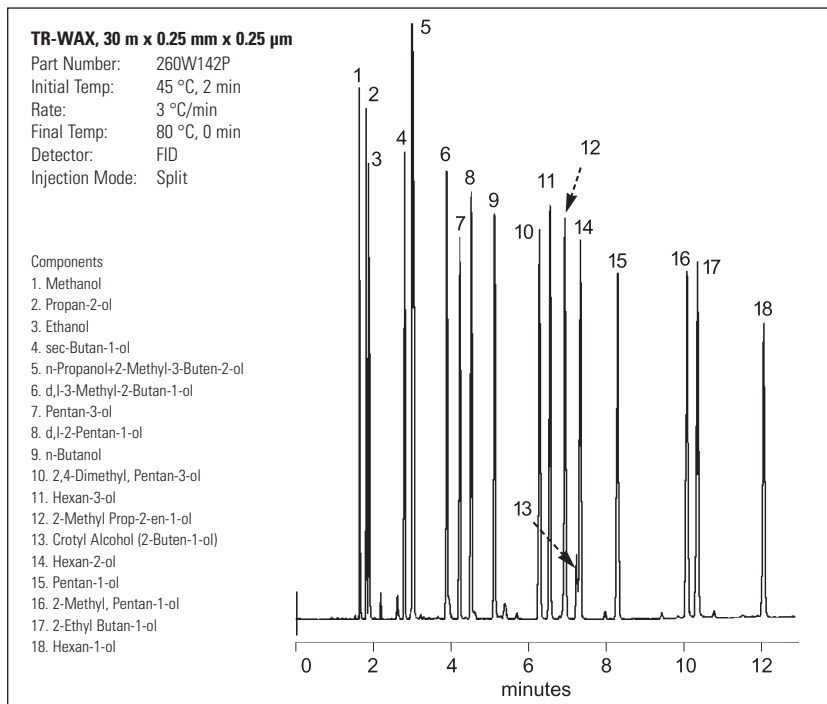
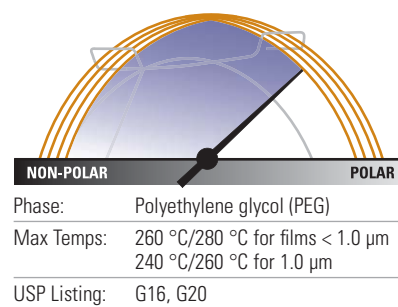
Application

The TRACE TR-WAX is ideal for polar compound analysis, particularly esters, alcohols, ketones, glycols and aromatic isomers.

Similar to:

DB-Wax, BP20, Rtx-Wax, Stabilwax, HP20M, HP-Wax, HP-INNOWax™, Supelcowax-10, AT-Wax, Nukol, CP Wax™52CB, SUPEROX II, Carbowax™, PE™-WAX, ZBWAX

See also Retention Gaps on page 152.



Analysis of 18 alcohols

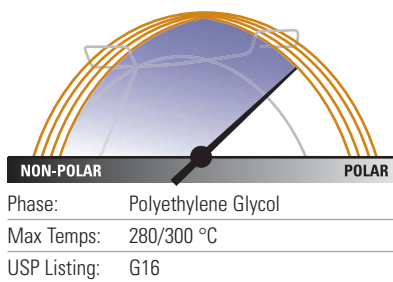
Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.10	0.10	10	260W020P
0.25	0.25	15	260W130P
0.25	0.25	30	260W142P
0.25	0.25	60	260W154P
0.25	0.50	30	260W223P
0.25	0.50	60	260W235P
0.25	1.00	30	260W296P
0.32	0.25	15	260W131P
0.32	0.25	30	260W143P
0.32	0.25	60	260W155P
0.32	0.50	30	260W224P
0.32	0.50	60	260W236P
0.32	1.00	30	260W297P
0.32	1.00	60	260W309P
0.53	0.50	30	260W225P
0.53	1.00	15	260W286P
0.53	1.00	30	260W298P
0.53	1.00	60	260W310P

TRACE TR-WaxMS GC Columns

High polarity phase designed for mass spectrometry detectors

- Proprietary bonding method expands operating temperatures
- Extremely low bleed improves sensitivity
- High stability with oxygen and water



The Thermo Scientific TRACE™ TR-WaxMS GC column is a low bleed, highly stable polar GC column. The TRACE TR-WaxMS column uses a proprietary bonding technique that produces a column with significantly lower bleed levels and extended maximum allowable operating temperature (280 °C) than other high polarity columns available. The low bleed characteristics of this column make it especially suitable for use with a mass spectrometric detector, resulting in higher sensitivity, better library matches and less instrument cleaning. The column is strongly resistant to water, making the TR-WaxMS one of the most versatile, sensitive, stable and long lifetime PEG phase columns on the market. Please see page 48 for demonstration of the TR-WaxMS stability under adverse treatments.

Applications

The TRACE TR-WaxMS is ideally suited to the analysis of aromatic hydrocarbons, food additives, essential oils, alcohols, esters, aldehydes and ketones. The highly stable, high polarity TR-WaxMS column is suitable for all PEG analyses, with low bleed to enhance sensitivity.

Similar to:

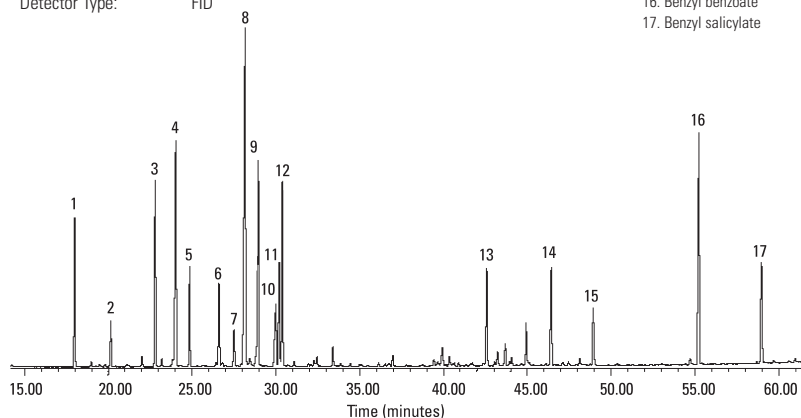
DB-Wax, Rtx-Wax, Stabilwax™, HP20M, BP20, HP-Wax, HP-INNOWax, SUPELCOWAX 10, AT-Wax, Nukol™, CP Wax 52CB, ZB-Wax

See also Siltite Ferrules on page 156.

TR-WaxMS, 30 m x 0.25 mm x 0.25 µm

Part Number: 260X142P
 Sample: Ylang Ylang oil (neat)
 Injection Temp: 250 °C
 Injection Mode: Split
 Split Ratio: 120:1
 Injection Volume: 0.1 µL
 Initial Temp: 40 °C, 2 min
 Rate 1: 3 °C/min to 260 °C,
 Final Temp: 260 °C, 10 min
 Carrier Gas: helium, 25.7 psi
 Carrier Gas Flow: 1.8 mL/min
 Constant Flow: On
 Average Linear Velocity: 35 cm/sec at 40 °C
 Detector Type: FID

1. p-Methyl anisole
2. α-Copaene
3. Linalool L
4. β-Caryophyllene
5. Methyl benzoate
6. α-Humulene
7. α-Amorphene
8. Germacrene
9. Benzyl acetate
10. δ-Cadinene
11. α-Farnesene
12. Geranyl acetate
13. trans-Cinamyl acetate
14. Farnesyl acetate
15. Farnesol
16. Benzyl benzoate
17. Benzyl salicylate



Analysis of ylang ylang oil

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.25	0.25	30	260X142P
0.25	0.25	60	260X154P
0.25	1.00	30	260X296P
0.32	0.25	30	260X143P
0.32	0.25	60	260X155P
0.32	0.50	30	260X224P
0.53	1.00	30	260X298P

TRACE TR-SimDist GC Columns

Low polarity phase for high temperature analysis

- Optimized for simulated distillation analysis
- High temperature limits
- Reproducible low bleed

The Thermo Scientific TRACE™ TR-SimDist column is a strongly cross-linked, high temperature column for use in simulated distillation analysis. The TR-SimDist column meets the demanding requirements of simulated distillation analysis with a temperature limit of 400 °C. The phase is strongly cross-linked, and the stable low bleed profile also allows for consistent background subtraction which is common practice.

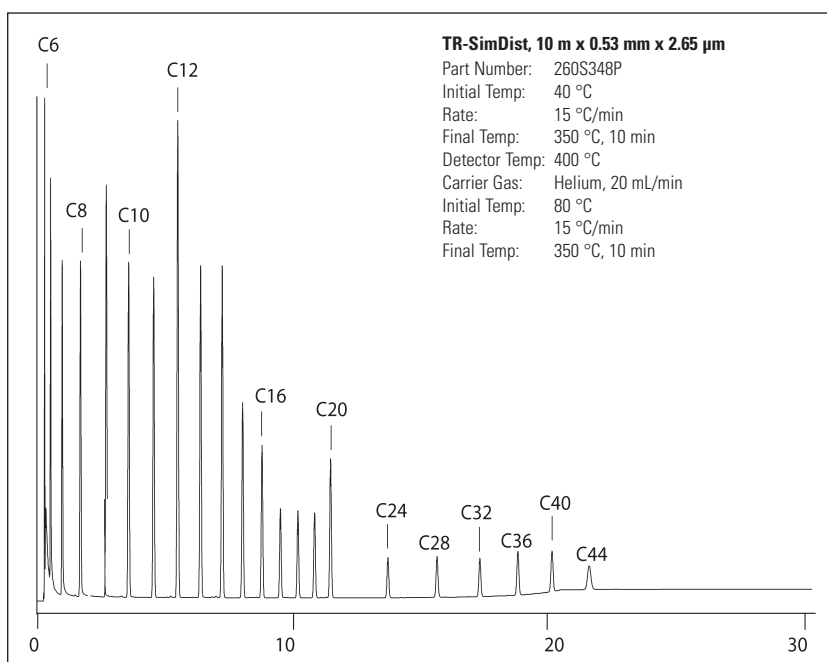
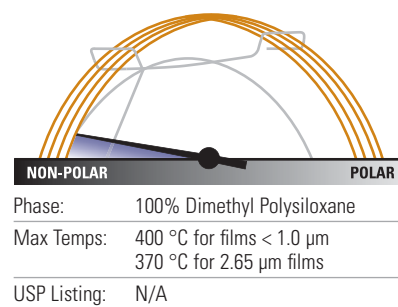
Applications

The TRACE TR-SimDist is suited for simulated distillation analysis using high temperatures to elute high molecular weight hydrocarbons.

Similar to:

DB-HT Sim Dis, DB-2887, BPX1, Rtx-2887, HP-1, Petrocol™ 2887, Petrocol EX2887

See also Liners on pages 150-151.



Analysis of standard mix for ASTM D2887

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.10	0.10	10	260S020P
0.53	0.10	10	260S025P
0.53	0.90	10	260S250P
0.53	2.65	6	260S347S
0.53	2.65	10	260S348P

TRACE TR-V1 GC Columns

Mid-polarity, thick film GC column

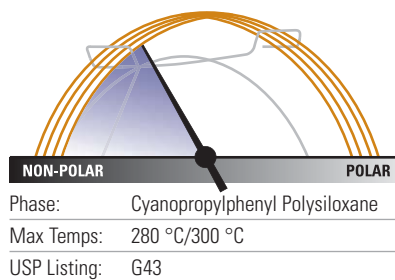
- Thick films for the analysis of volatile analytes
- Low bleed suitable for MS detection
- Ideal for EPA Methods 624 and 608

The Thermo Scientific TRACE™ TR-V1 column is a cyanopropylphenyl-based phase ideal for the analysis of volatile compounds. The selectivity and film thickness of TR-V1 ensures good retention and separation of volatile compounds at low oven temperatures. The column has a high maximum operating temperature of 300 °C which provides versatility for samples containing less volatile

compounds. The column can also be heated quickly to remove contaminants thus reducing cycle times and increasing sample throughput.

Applications

The TRACE TR-V1 is ideal for the analysis of volatile compounds, including use with EPA Methods 624 and 502, with good retention and separation at low oven temperatures. The



TR-V1 provides excellent resolution from both the front and back ends of chromatograms.

Similar to:

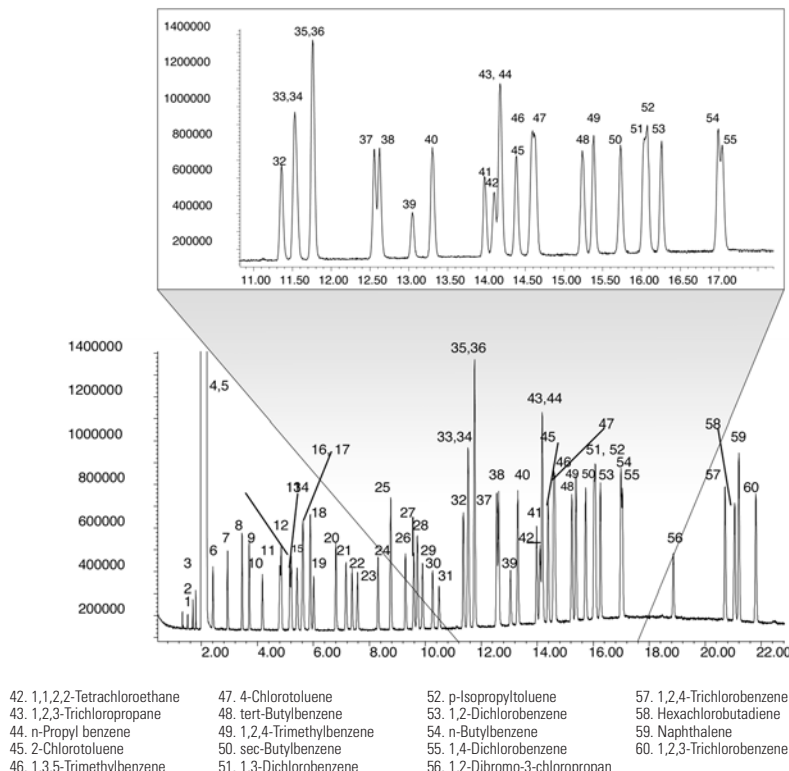
DB-624, BPX Volatiles, Rtx Volatiles, VOCOL 56, OV-624, AT-624, HP-VOC, CP-Select™ 624CB, 007-624, ZM-624

See also Syringes on page 163.

TR-V1, 30 m x 0.25 mm x 1.4 µm

Part Number: 260V332P
 USEPA 502.2 mix: 200 ppm in Methanol
 Injection Mode: Split
 Split Ratio: 50:1
 Injection Volume: 1 µL
 Initial Temp: 40 °C, 1 min
 Injection Temp: 250 °C
 Rate 1: 6 °C/min to 210 °C
 Rate 2: 15 °C/min to 240 °C
 Liner Type: 4 mm ID Single Taper Liner
 Final Temp: 240 °C, 5 min
 Carrier Gas: Helium, 22.8 psi
 Carrier Gas Flow: 1.3 mL/min
 Average Linear Velocity: 35 cm/sec at 40 °C
 Detector Type: Mass Spectrometer
 Full scan: 45 - 450

Components	
1. Dichlorodifluoromethane	21. 1,2-Dichloropropane
2. Chloromethane	22. Dibromomethane
3. Vinyl chloride	23. Bromodichloromethane
4. Bromomethane	24. cis-1,3-Dichloropropene
5. Chloroethane	25. Toluene
6. Trichlorofluoromethane	26. trans-1,3-Dichloropropene
7. 1,1-Dichloroethene	27. 1,1,2-Trichloroethane
8. Dichloromethane	28. Tetrachloroethene
9. trans-1,2-Dichloroethene	29. 1,3-Dichloropropane
10. 1,1-Dichloroethane	30. Dibromochloromethane
11. 2,2-Dichloropropane	31. 1,2-Dibromoethane
12. cis-1,2-Dichloroethene	32. Chlorobenzene
13. Bromochloromethane	33. Ethylbenzene
14. Chloroform	34. 1,1,1,2-Tetrachloroethane
15. 1,1,1-Trichloroethane	35. m-Xylene
16. 1,1-Dichloropropene	36. p-Xylene
17. Carbon tetrachloride	37. o-Xylene
18. Benzene	38. Styrene
19. 1,2-Dichloroethane	39. Bromoform
20. Trichloroethene	40. Isopropylbenzene
	41. Bromobenzene



Analysis of US EPA 502.2 mix

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.18	1.00	20	260V495P
0.18	1.00	40	260V496P
0.25	1.40	30	260V332P
0.25	1.40	60	260V333P
0.32	1.80	30	260V339P
0.32	1.80	60	260V341P
0.53	3.00	30	260V396P
0.53	3.00	60	260V408P
0.53	3.00	75	260V490P

TRACE TR-FAME GC Columns

High polarity phase optimized for FAME analysis

- Silphenylene based phase
- Low bleed for mass spectrometry use
- Separation of fatty acid methyl esters
- Separation of cis/trans isomers

The Thermo Scientific TRACE™ TR-FAME column is a cyanopropylphenyl-based phase specifically designed for the separation of Fatty Acid Methyl Esters (FAMES). The unique selectivity of the TR-FAME column provides excellent separation of cis/trans isomers and FAMES with various degrees of unsaturation. The maximum allowable operating temperature of 260 °C also provides versatility for the analysis of high molecular weight FAMES.

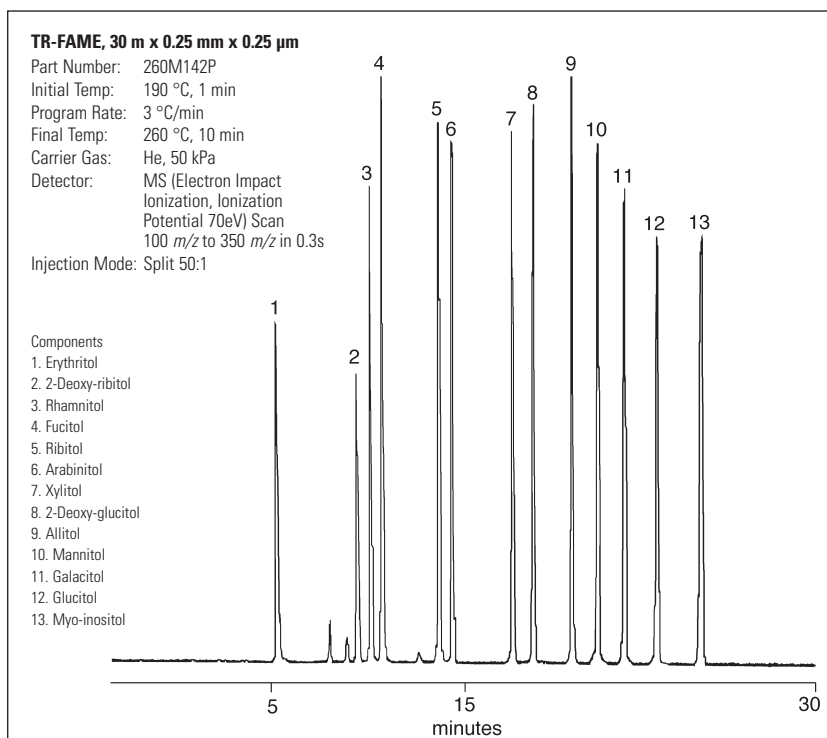
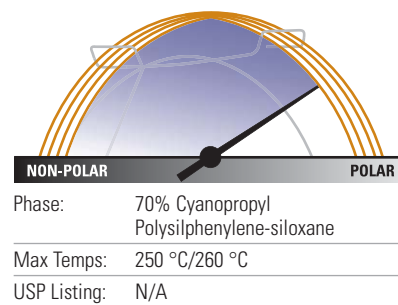
Applications

The TRACE TR-FAME is ideal for the separation of cis/trans isomers and fatty acid methyl esters (FAMES) with various degrees of unsaturation. It is also suitable for any application that requires a high polarity column for use with MS detection.

Similar to:

DB-23, BPX70, Rtx-2330, SP-2330, CP-Sil 88, SP-2380, HP-23, VF-23ms, 007-23, AT-Silar, PE-23

See also Gas Filters on pages 150-151.



Analysis of 13 sugar component alditol acetate mixture on TR-FAME

Ordering Information

ID (mm)	Film Thickness (µm)	Length (m)	Part Number
0.10	0.20	10	260M096P
0.22	0.25	25	260M135P
0.22	0.25	30	260M141P
0.22	0.25	50	260M147P
0.22	0.25	60	260M153P
0.25	0.25	30	260M142P
0.25	0.25	60	260M154P
0.25	0.25	120	260M166L
0.32	0.25	25	260M137P
0.32	0.25	30	260M143P
0.32	0.25	50	260M149P
0.32	0.25	60	260M155P

Application Specific TRACE GC Columns

A range of dedicated application TRACE GC columns engineered and validated for specific industry methods and applications

- Engineered with the same low bleed and temperature stable performance of the TRACE™ range of columns
- Dedicated columns for a range of EPA methodologies (524, 525, 527, 8270, 8095)
- Columns for BioDiesel, Dioxins and Drugs of Abuse methods and applications
- The same columns found in the Thermo Scientific Productivity Solutions for the DSQ II GC/MS

In addition to the standard range of Thermo Scientific TRACE GC columns, we also provide a range of application specific columns, tailored for specific industry methods and applications. These columns have been designed, manufactured and tested to provide specific solutions for chromatographers analyzing samples using these industry test methods and are also incorporated into productivity solution kits in some cases.

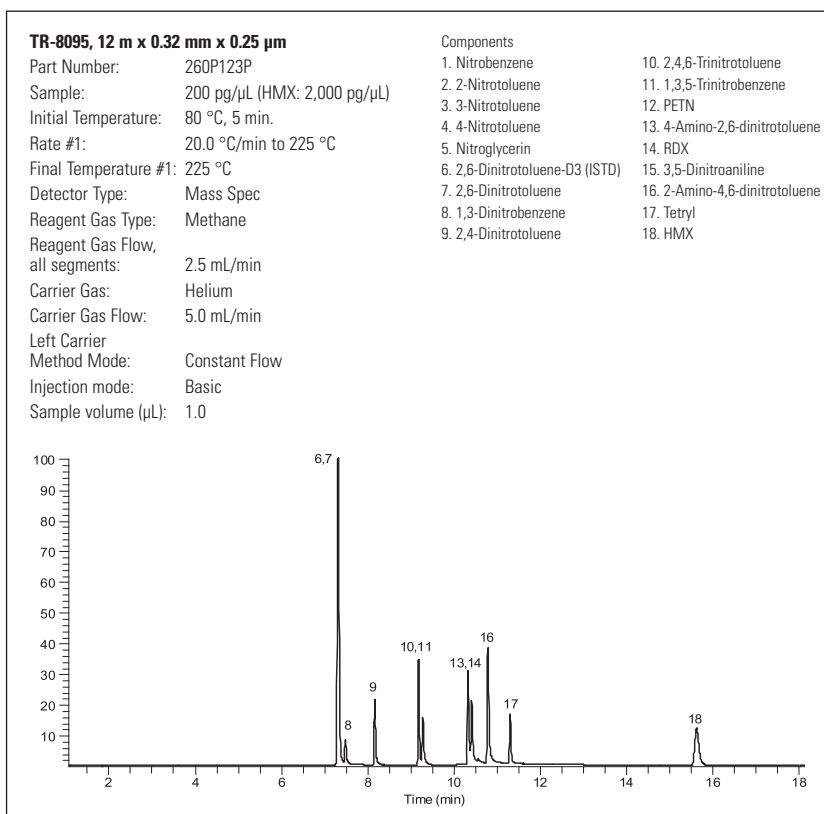
EPA Method Specific Columns

We offer specific application columns for the determination of Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds using the EPA methods 524, 525 and 8270. The Thermo Scientific TRACE columns TR-524 and TR-525 are used in the US EPA Drinking Water Test Methods 524 and 525 respectively, and the TR-8270 for use in the US EPA Solid Waste Test Method 8270.

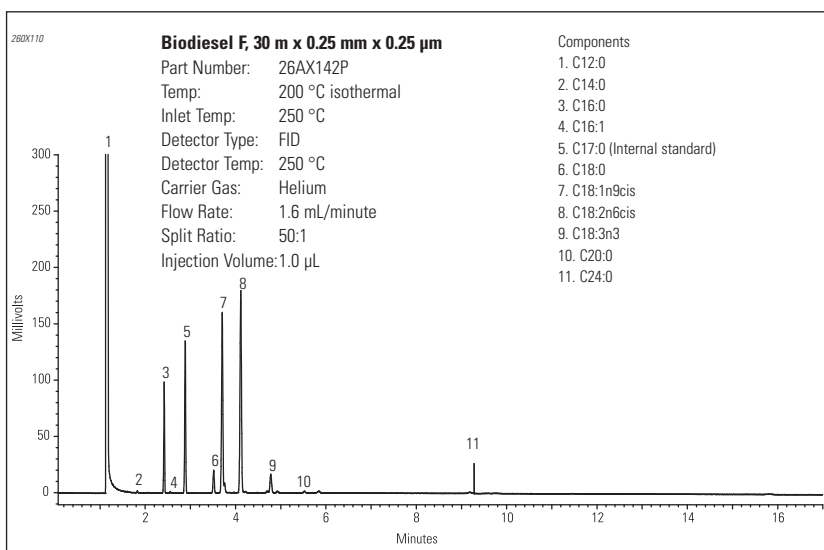
Additionally for analysis using the EPA 8095 method, the TRACE TR-8095 has been tested with the EPA 8095 explosives mixture and combines a high maximum temperature and low surface activity to make it ideal for this method. Also, for the determination of selected pesticides and flame retardants using the US EPA Drinking Water Test Method 527, the TRACE TR-527 provides robust, low bleed performance designed to meet the EPA method requirements for these analytes.

Columns for BioDiesel Analysis

BioDiesel is an important component in the development of carbon neutral fuels and specific GC columns within the TRACE range meet the methodology demands for this application area. A combination of columns are offered, to cover the analytical requirements of the BioDiesel methods to determine the methanol (TR-BioDiesel (M)), FAMES (TR-BioDiesel (F)) and glycerides (TR-BioDiesel (G)).



Total ion chromatogram for a soil extract spiked to contain 200 pg/μL of certain components (HMX at 2,000 pg/μL).



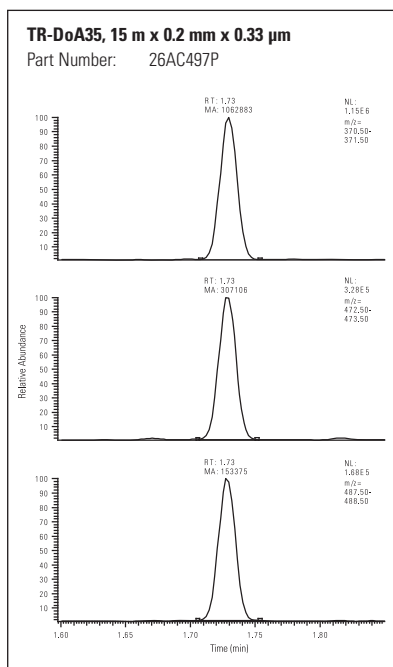
Application Specific TRACE GC Columns

Columns For Drugs of Abuse

We offer two columns specifically designed for the analysis of common drugs of abuse. The Thermo Scientific TR-DoA5 column is widely used for the analysis and determination of a range of toxicological target compounds including amphetamines, codeine and morphine. The higher polarity of the TR-DoA35 column makes it ideal for the determination of Carboxy-THC and is the recommended column for use in drug testing labs for the confirmation of THC.

High-Throughput Confirmation and Quantitation of a THC Metabolite in Urine Using the DSQ II GC/MS.

GC/MS analysis was performed using the TRACE™ TR-DoA35 GC columns. For details on the sample preparation procedure and the conditions used for the GC/MS analysis, please request Application Note TN10161.



Columns for Dioxin and PCB Analysis

To meet the requirements for High Resolution GC/MS methods for the analysis of polychlorinated di-benzo-p-dioxins (PCDDs), polychloro di-benzofurans (PCDFs) and polychlorinated bi-phenyls (PCBs), we have designed a range of dedicated TRACE columns. These TRACE columns ensure optimum performance for HR GC/MS with exceptional stability and very low bleed. The TRACE columns developed for dioxin and PCB are low polarity and provide wide coverage of the 17 congeners with highest toxicological significance (2,3,7,8 – chlorine substituted congeners).

Ordering Information

Phase	ID (mm)	Film Thickness (μm)	Length (m)	Use	Part Number
TR-524	0.18	1.0	20	Volatile Organic Compounds	26RV495P
TR-525	0.25	0.25	30	Semi-Volatile Organic Compounds	26RX142P
TR-527	0.25	0.25	30	Selected Pesticides and Flame Retardants	26RF142P
TR-8095	0.32	0.25	12	Explosives	260P123P
TR-8270	0.25	0.5	30	Semi-Volatile Organic Compounds	26RF223P
TR-8270	0.25	1.0	30	Semi-Volatile Organic Compounds	26RF296P
TR-DoA5	0.25	0.25	15	Amphetamines	26AF130P
TR-DoA35	0.20	0.33	15	Carboxy-THC	26AC497P
TR-BioDiesel (M)	0.32	3.0	30	BioDiesel (Methanol)	26AA395P
TR-BioDiesel (F)	0.25	0.25	30	BioDiesel (FAMEs)	26AX142P
TR-BioDiesel (G)	0.32	0.1	10	BioDiesel (Glycerides)	26AF024P
TR-Dioxin 5MS	0.25	0.1	60	Dioxins	26AF059P
TR-Dioxin 5MS	0.25	0.25	60	Dioxins	26AF154P
TR-Dioxin 5MS	0.25	0.1	30	Dioxins	26AF047P
TR-PCB 8MS	0.25	0.25	50	PCBs	26AJ148P

Columns for the Thermo Scientific UltraFast Instrument

- Dramatically shorter analysis times
- Increase sample throughput by a factor of 20
- Lengthen column lifetimes

The Thermo Scientific UltraFast TRACE™ GC is the first integrated commercially affordable gas chromatograph with direct column heating technology designed to significantly boost your lab's productivity.

Incorporated in a robust GC platform this innovative technology combines a "turbo heating", linear temperature ramp of up to 1,200 °C/min with short, narrow bore (0.1 mm ID) columns. By reducing the analytical run time by a factor of up to 20, this solution permits an extremely high sample/day throughput to be achieved.

Applications

A large variety of column phases opens up this innovative technology to all major applications in the Chemical, Petrochemical, Environmental and Flavors and Fragrances industries.

The list below provides the available columns, standard and non-standard, with the dimensions and a short description of their use. Any existing column in our TRACE GC column range can be custom-prepared for UFM use on request.



The UltraFast columns fit into the Thermo Scientific TRACE GC Ultra™ instrument

Ordering Information

Phase	ID (mm)	Film Thickness (µm)	Length (m)	Use	Part Number
UFC-1	0.1	0.1	5	General	UFMC00001010401
UFC-1	0.32	3.0	10	ASTM D-3710	UFMC00002070414
UFC-1	0.32	0.1	2.5	ASTM D-2887	UFMC00000070401
UFC-1	0.32	0.1	5	ASTM D-2887	UFMC00001070401
UFC-1	0.32	0.25	5	ISO 9377-2	UFMC00001070404
UFC-5	0.1	0.4	2.5	General	UFMC00100000000
UFC-5	0.1	0.4	5	General	UFMC00200000000
UFC-5	0.1	0.1	5	General	UFMC00300000000
UFC-5	0.1	0.4	10	General	UFMC00002010006
UFC-1701	0.1	0.1	5	General	UFMC00400000000
UFC-WAX	0.1	0.2	5	General	UFMC00001010503
UFC-WAX	0.1	0.1	5	FAMEs, Essential Oils	UFMC00001010501
UFC-264	0.1	0.5	10	Volatiles	UFMC00002010207
UFC-200	0.18	0.4	10	Alcohols/ketones	UFMC00002030306
UFC-23	0.18	0.2	10	FAMEs	UFMC00002030603