Teknokroma®

Professionally Friendly

COLUMNAS CAPILARES

Equipamientos Analíticos S.A

DESDE 1989 | BRINDANDO SOLUCIONES

Teknokroma Capillary Columns

Teknokroma has been at the forefront of chromatographic developments in Spain. From its beginnings at 1978, and in order to find the right solutions to the wide array of analytical problems that appear daily in a laboratory, Teknokroma has always been involved in the Spanish and European market, not only with columns from the leading world manufactures, but also of those of our own manufacture.

A few years ago, Teknokroma introduced the basic line of high resolution capillary columns (Teknokroma columns) which were very well received in the market.
Due to the on going research effort carried out by our Research Department in collaboration with the Consejo Superior de Investigaciones Científicas (CSIC) and the Instituto Químico de Sarriá (IQS) and the support obtained from various public administrations (CDTI, CIDEM, MINER and FCTAC) we have been able to continuously update and expand our product line with other stationary phases.

All of our columns are manufactured according to a strict established protocol, and within the ISO 9001:2000 quality rules.

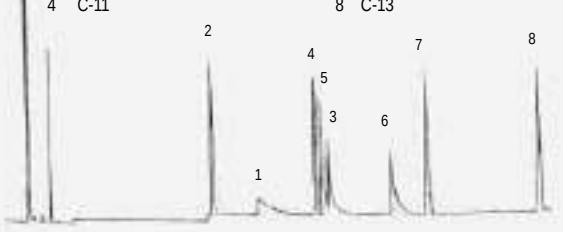
Stage 1: Hydrothermal treatment
Stage 2: Deactivation process
Stage 3: Coating, bonding and crosslinking
Stage 4: Quality control

Stage 1: Hydrothermal Treatment

Teknokroma starts its manufacturing process with the selection of the best possible fused silica tubing. This tube presents an extremely reduced tolerance of internal diameters and has a polyimide outer coating capable of withstanding the highest temperatures without loss of its flexible mechanical characteristics. Each one of the batches of silica used in the process is conveniently characterized as an essential step to set the Hydrothermal treatment conditions (Fig. 1) that will give rise to a surface containing a high and constant density of silanol groups, which will later be properly deactivated.
This treatment is indispensable, as the different capillary tubing manufactured batches present a very low and irregularly distributed silanol group density due to the high temperature manufacturing process (~2200ºC).

Fig. 1. Verification of Hydrothermal Treatment

1 2-Octanone
2 C-10
3 1-Octanol
4 C-11
5 2,6-Dimethylphenol
6 2,6-Dimethylaniline
7 C-12
8 C-13



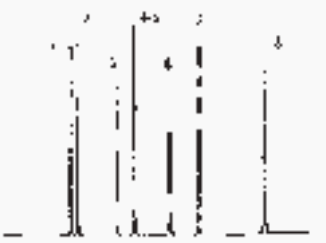
TKG 1095

Stage 2: Deactivation process

The deactivation process, which is different for each type of stationary phase, is carefully controlled (fig. 2), ensuring that the tubing surface has acquired the necessary chemical inertness and surface tension in order to be able to proceed with the second stage of stationary phase deposition. This step also facilitates the introduction of specific functional groups on the tubing wall which are very useful for the later binding of the stationary phase or to give the columns a given end point characteristics.

Fig. 2. Deactivation Stage (Intermediate Test)

1 2-Octanone
2 C-10
3 1-Octanol
4 C-11
5 2,6-Dimethylphenol
6 2,6-Dimethylaniline
7 C-12
8 C-13



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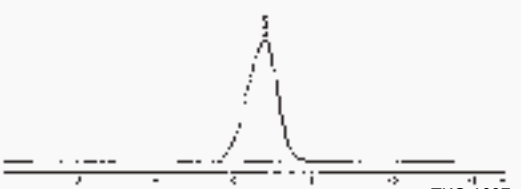
Stage 3: Coating, bonding and crosslinking

Stationary phase selection for optimum wetting of the column is a critical point in regards to column quality. Teknokroma uses extremely pure polymers for its phases, in order to guarantee that our columns will respond to the requirements that our customers expect in terms of efficiency, reproducibility, stability and minimal bleeding.

The polymers used are carefully fractionated to eliminate the low molecular weight components and trace catalyst. This results in a higher thermal stability and lower bleeding. Then, these polymers are tested by means of spectroscopic (FTIR, UV, NMR), chromatographic (GPC) techniques and by differential thermal analysis. Fig. 3 shows the molecular exclusion chromatography of the polymer TRB-5 with its corresponding thermogravimetric curve in Fig. 4.

The crosslinking and bonding of the stationary phase is achieved by avoiding the use of peroxides which are the cause of many of the problems related to residual activity due to phase degradation and thermal instability exhibited in numerous imported columns.

Fig. 3. GPC Chromatogram of TRB-5 polymer



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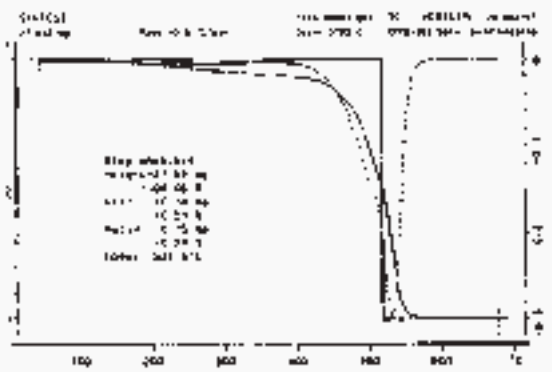
The fact that a given stationary phase is crosslinked and/ or chemically bonded to the capillary tube inner wall allows, if necessary, the recovery or regeneration of an accidentally contaminated column by washing it with the adequate series of solvents.

Fig. 4. DTA Curve of TRB-polymer



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Stage 4. Quality Control

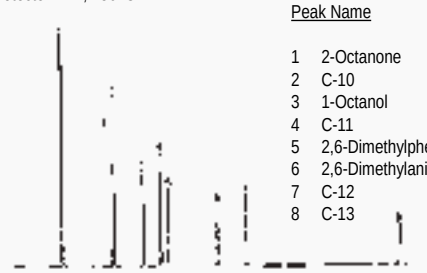
S E L E C T P R O V E N Q U A L I T Y

When you buy a Teknokroma capillary column you receive a product designed and manufactured in our laboratory with the aim to help you solve your analytical problems and which meets all of our quality criteria.
At the same time you obtain from our Technical Department at Teknokroma the assurance that we will be at your side to help you with all the problems and concerns experience in the lab.

Remember that each column is individually tested and the accompanying test data is the proof that the column meets our quality specifications and thus we expect it to meet your demands. Each one of the columns obtained by this process is rigorously controlled by means of a strict Quality Control Test (fig. 5 and 6), which ensures that you will receive a guaranteed quality product.

Fig. 5 Quality Control Test

Column: **TRB-5**, 60m x 0.25 mm ID x 0.25 µm
Carrier gas: He, 25 psi
Oven: 110°C (Isothermal)
Injection: 1µL , split 1:100, 250ºC
1µL , SP-4-7300 test Approx. 5 ng of each compound on column
Detector: FID, 250°C



Peak Name	
1	2-Octanone
2	C-10
3	1-Octanol
4	C-11
5	2,6-Dimethylphenol
6	2,6-Dimethylaniline
7	C-12
8	C-13

TKG 1099

Stationary Phase

The selection of the ideal column for a given analysis may look like a complex problem since we need to be right on the selection of the polarity of the stationary phase as well as column length, internal diameter and film thickness.
The polarity of the stationary phase is chosen depending on the kind of compounds you wish to separate. Non polar phases, such as TRB-1 and TRB-5, separate compounds by their boiling points. Intermediate polarity phases such as TRB-WAX, TRB-1701, combine retention by boiling point with the more selective interaction through hydrogen bridges or dipolar moments, etc., and thus provide a higher selectivity. The principal mechanisms of polar phases such as TR-CN100 (Cyanosilicone with 100% of cyano propyl groups) lie in the dipole-dipole interactions between the functional groups of the stationary phase and those from the substances to be separated. These type of phases retain polar compounds more than non polar ones.

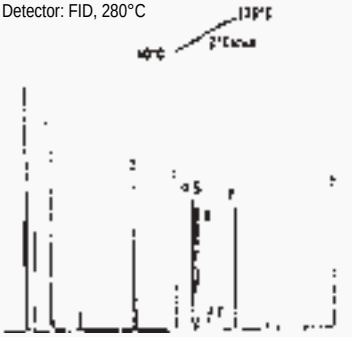
In general, non polar phases are more thermally stable than the polar phases. In other words, the higher the column polarity, the lower its thermal stability. Most of the Teknokroma columns are cross-linked, which results in high thermal stability.
The cross-linking in a stationary phase produces slight changes in the physicochemical characteristics of the phase as well as in its polarity relative to the uncross-linked phase. Thus TEKNOKROMA also offers in its catalog columns with non bonded phases that show the selectivity of the original phase (for instance TR-SE30, TR-SE54, TR-20M, etc.).

Length

The efficiency of a chromatographic column (number of theoretical plates per meter) is a function of its length. The standard length used for most of the separations is 25-30 meters. With this length one can obtain a high efficiency with relative short times of analysis. Columns of 15m are used for rapid control analyses, reaction monitoring, etc. as well as for the chromatography of high molecular weight substances while columns of 50-60 m, 100 m or 150 m are used for very complex samples. Teknokroma exclusively manufactures a 150 m column for detail analyses of

Fig. 6. GROB test

Column: **TRB-5**, 30m x 0.25 mm ID x 0.25 µm
Carrier gas: He, 12 psi
Injection: 1µL, Grob Test, split 1:100, 260ºC
Detector: FID, 280°C



Peak Name	
1	2,3-Butanediol
2	C-10
3	1-Octanol
4	2,6-Dimethylphenol
5	C-11
6	Nonanal
7	2-Ethylhexanoic acid
8	2,6-Dimethylaniline
9	C-10 FAME
10	Dicyclohexylamine
11	C-11 FAME
12	C-12 FAME

TKG 1100

petroleum and essential oil hydrocarbons. As a general rule, we can say that in a constant temperature chromatographic analysis, the number of theoretical plates and analysis time are directly proportional to the column length while resolution is directly proportional to the square root of the theoretical plates. Thus, we need to take into account that when we double column length, its resolution only increases by 40% whereas analysis time doubles.

Internal Diameter

The column internal diameter is inversely proportional to its separation power. The smaller the diameter, the larger the efficiency and thus a higher resolution but at the same time the loading capacity decreases.
For samples containing a large number of substances where you may need a given resolution, it is recommended to use small internal diameter columns (0.20-0.25 mm) and for samples with a high range of concentrations higher internal diameter columns are recommended (0.32-0.53 mm) since these larger diameters allow for the injection of a higher sample amount.

Columns of 0.53 mm ID (semicapillary) have a loading capacity similar to that of packed columns, which they replace in many analyzes, with better resolution, higher chemical inertness and lower analysis time.
The 0.32-0-53 mm ID columns can be used with either the injector for capillary columns or with the packed column injector, due to the high flow-rates at which they can operate.

In the increasingly used GC-MS systems it is recommended to work with small ID columns (0.10mm, 0.15mm, 0.18mm, 0.20 mm and 0.22 mm) so as not to exceed the capacity of the vacuum system. Recently, capillary columns of 0.1 mm ID have appeared on the market. These generate high plate numbers or, in other words, to reduce analysis time without losing resolution. The high efficiency of these columns (7000-10000 plates/meter) allows the resolution of complex samples using shorter column lengths, thus with very short analysis times, with the resulting cost reduction for the laboratory. Evidently, their loading capacity is a limiting factor and in order to obtain the best performance from these columns we need to take into account instrumental factors (injector-detector).

Film Thickness

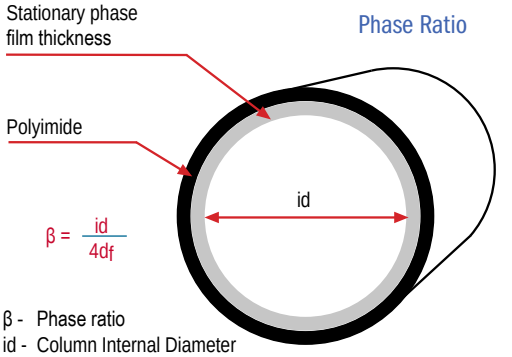
The film thickness of the stationary phase deposited inside the capillary column exerts an influence on the number of effective theoretical plates that can be obtained with the column for a given separation, on its loading capacity, on the bleed level and on the elution temperature of a compound.
A film thickness of 0.25-0.32 µm is the standard thickness allowing for a compromise between loading capacity and resolution; and for the injection of samples with a wide volatility range.

Thick films increase retention of the most volatile components whereas thin films provide faster elution at lower temperatures. As a general rule, thin films (0.1 µm) must be used for compounds with a high molecular weight such as triglycerides, antioxidants, etc., which have elution temperatures over 300°C. Thick films must be used for low boiling substances because thick films increase the interaction between the substances and the stationary phase. Specifically, 3-5 µm films are used to separate solvents, gases, and very volatile substances at room temperature or lower.

When the thickness of the stationary phase increases, thermal stability decreases, and thus the bleed level is higher which will limit the maximum operating temperature of the column.

The β factor defines the relation between the column internal diameter and the stationary phase thickness, thereby helping you to select the most appropriate column for your analysis.

In addition, the β factor allows for the easy exchange of columns since, for a given analysis with the same stationary phase, similar β factors will result in the same or very similar retention times and capacity factors. Of course, this implies taking into account the column loading capacity (phase thickness and internal diameter).



Factor β

β	Column suitable for the separation of:
>400	High molecular weight compounds
100 - 400	All purpose use
<100	Volatile compounds of low molecular weight

Bleed Level

The bleed level of stationary phase from a capillary column is the parameter which will determine the level of sensitivity in a given assay. It is directly related to the amount of stationary phase in the column and thus with the film thickness. It also increases exponentially with temperature (fig.7).

A low bleed level will allow you to work without problems with the whole range of modern high sensitivity detectors and at the same time will result in less contamination. This will also allow the quantification of high boiling point or high molecular weight compounds which are analyzed by means of high temperature gradients.

Teknokroma Capillary Columns

Maximum Efficiency

All manufacturing stages for capillary columns have been optimized in order to be able to offer our customers columns of very high efficiency.

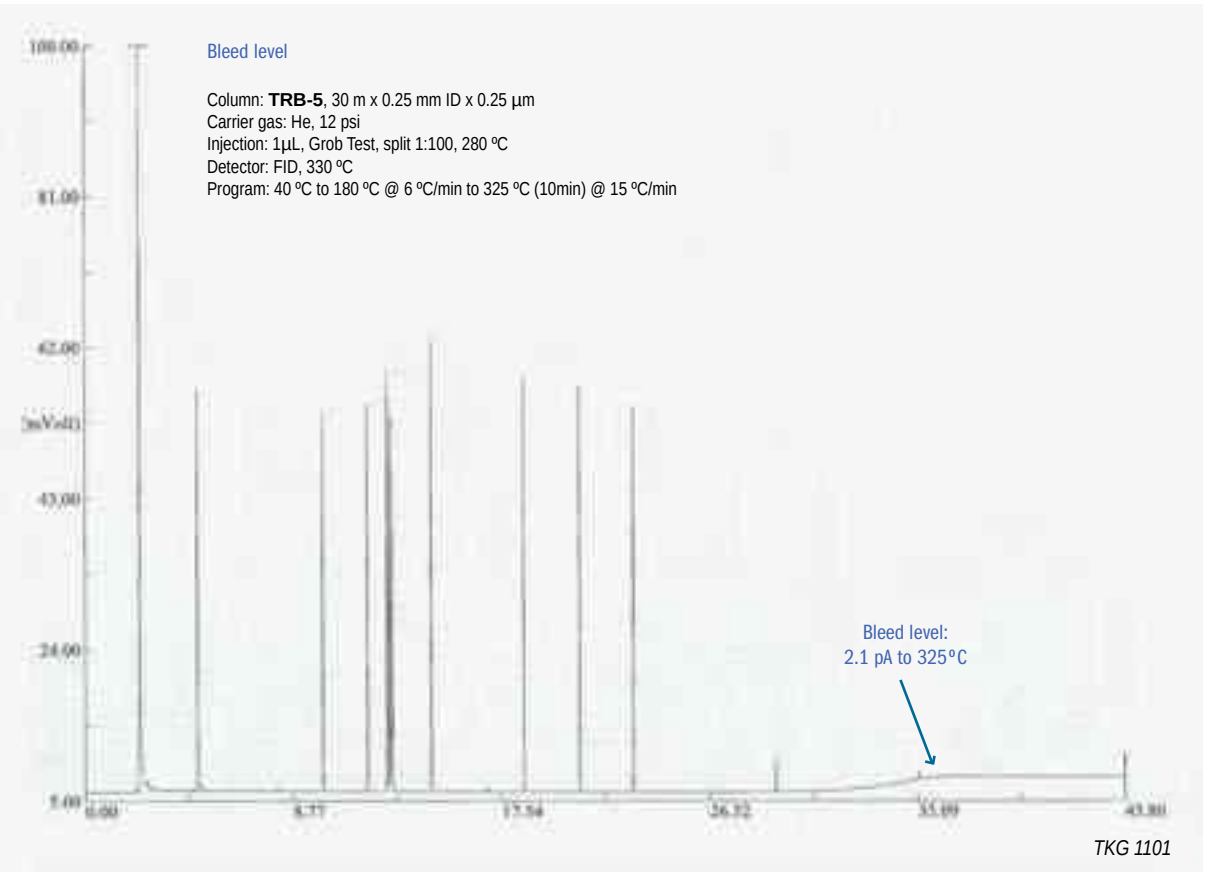
Wide Stationary Phase Selection

Teknokroma incorporates in its catalogue a selection of capillary columns prepared with the stationary phases most commonly used in the field of gas chromatography (Table 1).

Maximum Reproducibility

When you select a Teknokroma column for your analyses you can be assured that each of the steps in the production process has been thoroughly controlled to ensure that there are no deviations from the established quality parameters. All of the steps incorporate the maximum possible automation procedures. This translates into a high reproducibility level with regards to the chromatographic performance of our columns.

Internal diameter (mm)	Theoretical Plates (N/m)
0,10	7.000 - 9.000
0,20	4.700 - 5.500
0,25	3.300 - 4.600
0,32	2.700 - 3.700
0,53	1.400 - 2.200



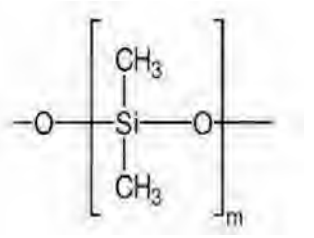
	TEKNOKROMA	PHASE COMPOSITION	USP CODE	AGILENT	PHENOMENEX	RESTEK	SGE	SUPELCO (MERCK)
Ultra Low bleed & Ultra Inertness (MS) Applications	Sapiens-1MS	100% Dimethyl Polysiloxane	G1, G2, G9, G38	DB1-MS UI, HP-1 MS UI, VF-1MS	ZB-1 Plus	Rxi-1MS	SOL-GEL-1MS	SLB-1MS
	Sapiens-5MS	95% Dimethyl - 5% Diphenyl polysiloxane	G27, G36, G41	HP-5 MS UI	ZB-5 Plus	Rxi-5MS		
	Sapiens-X5MS	Silphenylene Phase equivalent to SAPIENS-5MS		DB-5MS UI, VF-5MS	ZB-5 Plus	Rxi-5Sil MS	BPX5	SLB-5MS
	Sapiens-WAX.MS	100% Polyethylene Glycol (PEG)	G14, G15, G16, G20, G39, G47	VF-WAXMS, DB-WAX UI, DB-WAX.MS	ZB-WAX Plus	STABILWAX MS	SolGel-WAX	SupelcoWAX 10
	Sapiens-624MS	Silphenylene phase eq. to 6% Cyanopropylphenyl polysiloxane	G43	DB-624 UI, VF-624MS, VF-1301MS, DB-Select 624 UI, for <467>		Rxi-624SilMS	BPX-Volatile	
	Sapiens-200	35% Trifluropropyl-methylpolysiloxane	G6	DB-200, DB-210		Rtx-200		
Ultra Low bleed (MS) applications	TRB-1MS	100% Dimethyl Polysiloxane	G1, G2, G9, G38	HP-1MS, DB-1MS, CP-Sil 5 CB MS	ZB-1MS	Rtx-1MS	SOLGEL-1MS, BPX-1	Equity-1
	TRB-5MS	95% Dimethyl - 5% Diphenyl Polysiloxane	G27, G36, G41	HP-5MS, PAS-5, VF-5MS, CP-Si 8 CB MS	ZB-5MS i	Rtx-5 MS		Equity-5
	Meta.X5	Silphenylene phase eq. to 5% Phenylpolysiloxane		HP-5TA,DB-5MS, CP-Sil 8 CB Low Bleed/MS VF-5MS	ZB-5MS	Rtx-5Sil MS	BPX5, BP5M	
	Meta.X5 Triazine	Silphenylene phase (proprietary phase)						
	Meta.XLB	Silphenylene phase (proprietary phase)		DB-XLB, VF-XMS	ZB-XLB	Rxi-XLB		MDN 12
Low bleed High Temperature	Sapiens-WAX.HT	100% Polyethylene Glycol	G14, G15, G16, G20, G39, G47				SolGel-WAX	
	TRB-1HT/TKM-1HT	100% Dimethyl Polysiloxane	G1, G2, G9, G38	DB-1HT, Select Mineral Oil	ZB-1HT Inferno, ZB-1XT SimDist	Rxi-1HT, Stx-1HT	BPX1	
	TKM-1HTSimDist	100% Dimethyl Polysiloxane	G1, G2, G9, G38	DB-HT SimDist, CP-SimDist ultimetal	ZB-1HT Inferno, ZB-1XT SimDist	MXT-1HT SimDist	BPX1	HT5
	TRB-5HT/TKM-5HT	95% Dimethyl - 5% Diphenyl Polysiloxane	G27, G36, G41	DB-5HT, VF-5HT	ZB-5HT Inferno	Rxi-5HT, MXT-5HT	HT5	HT5
	TRB-50HT	50% Diphenyl- 50% Dimethyl Polysiloxane	G3, G17	DB-17ht, CP-TAP		Rtx-65TG, MXT-65TG	BPX50	
	TRB-BIODIESEL/TKM	Proprietary Bonded and crosslinked phase		Biodiesel, Select Biodiesel	ZB-Bioethanol	Rtx-Biodiesel		MET-Biodiesel
Low bleed General aplications	TRB-1	100% Dimethyl Polysiloxane	G1, G2, G9, G38	HP-1, HP101, Ultra-1, DB-1, CP-Sil 5 CB	ZB-1	Rtx-1	BP1	SPB-1, Equity-1
	TRB-SULFUR	100% Dimethyl Polysiloxane	G1, G2, G9, G38	CP-Select CB for Sulfur, CP-Sil 5CB for sulfur				SPB-1Sulfur
	TRB-PETROL	100% Dimethyl Polysiloxane	G1, G2, G9, G38	CP-Sil PONA CB, DB-PETRO, HP-1	ZB-DHA-PONA	Rtx-DHA-100	BP1 PONA	Petrocol DH
	TRB-50.2PONA	100% Dimethyl Polysiloxane	G1, G2, G9, G38	HP-PONA, CP-SIL PONA CB, HP-1	ZB-DHA-PONA	Rtx-DHA-50	BP1 PONA	Petrocol DH 50.2
	TRB-2887/ TKM-2887	100% Dimethyl Polysiloxane	G1, G2, G9, G38	DB-2887	ZB-1HT Inferno, ZB-1XT SimDist	Rtx-2887, MXT-2887	BPX1, BP1 PONA	Petrocol-2887 Petrocol-EX2887
	TRB-Petro.150	100% Dimethyl Polysiloxane	G1, G2, G9, G38	DB-1, CP-Sil PONA CB	ZB-DHA-PONA	Rtx-DHA-150	BP1 PONA	Petrocol DH 150
	TRB-5	95% Dimethyl - 5% Diphenylpolysiloxane	G27, G36, G41	HP-5,Ultra-2,DB-5, CP-SIL 8 CB	ZB-5	Rtx-5	BP5	SPB-5, MDN-5
	TRB-STEROL	95% Dimethyl - 5% Diphenylpolysiloxane	G27, G36, G41					SAC-5
	MetAMINE-VOL	Proprietary Bonded and crosslinked phase		CP-Volamine		Rtx-Volatile Amine		

	TEKNOKROMA	PHASE COMPOSITION	USP CODE	AGILENT	PHENOMENEX	RESTEK	SGE	SUPELCO (MERCK)
Low Bleed General applications (FID/ECD)	TRB-5AMINE	95% Dimethyl - 5% Diphenyl Polysiloxane	G27	CP-Sil 8 CB for amines		Rtx-5Amine		PTA-5
	TRB-5.625	95% Dimethyl - 5% Diphenyl Polysiloxane	G27	DB-5.625				PTE-5
	TRB-G27	95% Dimethyl - 5% Diphenyl Polysiloxane	G27			Rtx-G27		G27
	MTI-5	5% Phenyl - 95% Methyl Polysiloxane	G27	HP-5MSi		Rxi-5MS		PTE-5
	TRB-1301	94% Dimethyl -6% Cyanopropyl-Phenyl Polysiloxane	G43	HP-1301, DB-1301, CP-1301	ZB-624	Rtx-1301	BP624	SPB-1301
	TRB-624	94% Dimethyl -6% Cyanopropyl-Phenyl Polysiloxane	G43	HP-624, DB-624, CP-Select 624 CB	ZB-624	Rtx-624, Rtx-1301	BP624	OVI-G43, SPB-624
	TRB-G43	94% Dimethyl -6% Cyanopropyl-Phenyl Polysiloxane	G43	HP-624, DB-624, CP-Select 624 CB, DB-624UI	ZB-624	Rtx-G43	BP624	OVI-G43
	TRB-14	14% Diphenyl - 86% Dimethyl Polysiloxane		CP-Sil 13 CB				
	TRB-20	20% Diphenyl - 80% Dimethyl Polysiloxane	G28, G32			Rtx-20		SPB-20
	TRB-35	35% Diphenyl - 65% Dimethyl Polysiloxane	G42	HP-35,DB-35	ZB-35	Rtx-35		SPB-35
	TRB-1701	14% Cyanopropyl-Phenyl-86% Dimethyl Polysiloxane	G46	HP-1701,PAS-1701, DB-1701, CP-Sil 19 CB	ZB-1701	Rtx-1701	BP10	SPB-1701, Equity 1701
	TRB-225	50% Cyanopropyl-Phenyl-50% Dimethyl Polysiloxane	G7, G19	HP-225, DB-225, CP-Sil 43 CB		Rtx-225	BP225	SPB-225
	TRB-50	50% Diphenyl- 50% Dimethyl Polysiloxane	G3, G17	HP-50+, DB-17, CP-Sil 24 CB, DB-EUPh	ZB-50	Rtx-50, Rxi-17		SPB-50, SPB-2250
	TRB-F50	50% Trifluoropropyl - 50% Methyl Polysiloxane	G6	DB-210,DB-200		Rtx-200		
	TRB-PAG	50% Polyethylene - 50% Polypropylene Glycol	G18					PAG
	SupraWAX-280	100% Polyethylene Glycol	G14, G15, G16, G20, G39, G47	DB-WAX etr			SolGel-WAX	SupelcoWAX-10
	TRB-WAX	100% Polyethylene Glycol	G14, G15, G16, G20, G39, G47	HP-20M,HP-InnoWAX DB-WAX,Carbowax 20M, CP-WAX 52 CB, HP-WAX	ZB-WAX	StabilWAX, Rtx-WAX	BP20	CarboWAX 20M
	TRB-FFAP	Polyethylene Glycol esterified with nitroteraphtalic acid	G25, G35	HP-FFAP,DB-FFAP, CP-WAX 58 FFAP CB	ZB-FFAP	StabilWAX-DA	BP21	Nukol, SPB-1000
	TR-WAX.DB	Treated Polyethylene Glycol for basic compounds		CAM,HP-BasicWAX, CP-WAX 51 CB for amines, CP-WAX for volatile amines		StabilWAX-DB		CarboWAX-Amine
	TRB-WAXOmega	100% Polyethylene Glycol (PEG)				FameWAX		OmegaWAX
	Meta.WAX	100% Polyethylene Glycol (PEG)		HP-WAX,DB-WAX, CP-WAX 57 CB, DB-WAX FF	ZB-WAX	Rtx-WAX	BP20	Nukol
	Meta.WAX 400	100% Polyethylene Glycol (PEG)	G20	CP-Carbowax 400				
	TR-CN100	100% Cyanopropyl Polysiloxane	G5	SelectFAME, CP-Sil 88, HP-88	ZB-FAME, ZB-88	Rt-2330, Rt-2560	BPX-70, BPX-90	SP-2340, SP-2380, SP-2560, SP-2330
	TR-CRESOL	Proprietary Nonbonded phase		CP-Cresol				
	TR-17	Poly (Methyl Phenylsiloxane)	G3	HP-17, DB-17	ZB-50	Rxi-17		SPB-17
	TRB-608	Proprietary Bonded and crosslinked phase		HP-608, DB-608			BP608	SPB-608
	TR-TCEP	1,2,3-tris (2-cyanoethoxy) propane		CP-TCEP		Rt-TCEP		TCEP
	Meta.VOC	Proprietary Bonded and crosslinked phase		DB-502.2, HP-VOC		Rtx-502.2, Rtx-Volatile		VOCOL
	MetaBLOOD 1 & MetaBLOOD 2	Proprietary Bonded and crosslinked phase		DB-ALC1, DB-ALC2	ZB-BAC1, ZB-BAC2	Rtx-BAC1, Rtx-BAC2, Rtx-BAC 1 Plus, Rtx-BAC2 Plus		

Teknokroma Capillary Columns

Line of SAPIENS Capillary Columns

- We are pleased to introduce a superb new generation of capillary columns.
- Columns for today's demanding applications
- Our columns are able to compete with the best columns in the market, with ultra-low bleed and high inertness with respect to active, acid and basic compounds.



Structure of Poly (dimethyl) siloxane

SAPIENS-1MS

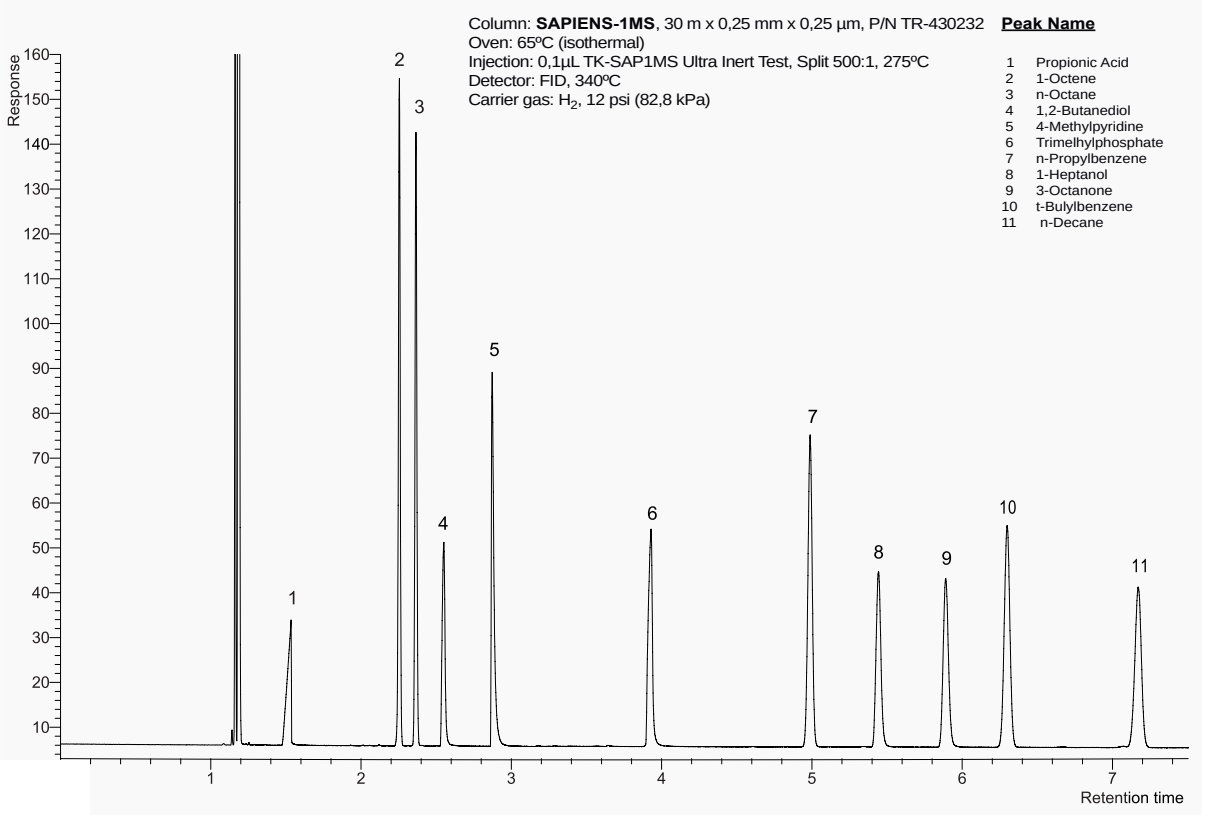
100% Dimethyl polysiloxane, bonded and crosslinked phase, manufactured with MSP technology

- General purpose non polar column
- Ultra low bleed, improved signal-to-noise ratio for GC-MS
- Excellent chemical inertness and thermal stability making it ideal for trace analysis and GC/MS
- Solvent rinsable
- Developed with a new integral technology
- Molecular Stabilization Process incorporated (MSP)
- Highest inertness for polar, acid and basic compounds
- Guaranteed reproducibility between batches
- Perfect for use with Retention Time Locking (RTL) software

SAPIENS-1MS Equivalent Phase

Agilent: DB1-MS UI, HP-1 MS UI, VF-1MS
Restek: Rxi-1MS
Phenomenex: ZB-1Plus
GL Sciences: InertCap 1MS
Sigma-Aldrich: SLB-1MS
SGE: SOL-GEL-1MS
Macherey-Nagel: OPTIMA-1MS Accent

SAPIENS-1MS: Ultra Inert Test, Good peak (TK-SAP1MS). Shape and response for all active compounds

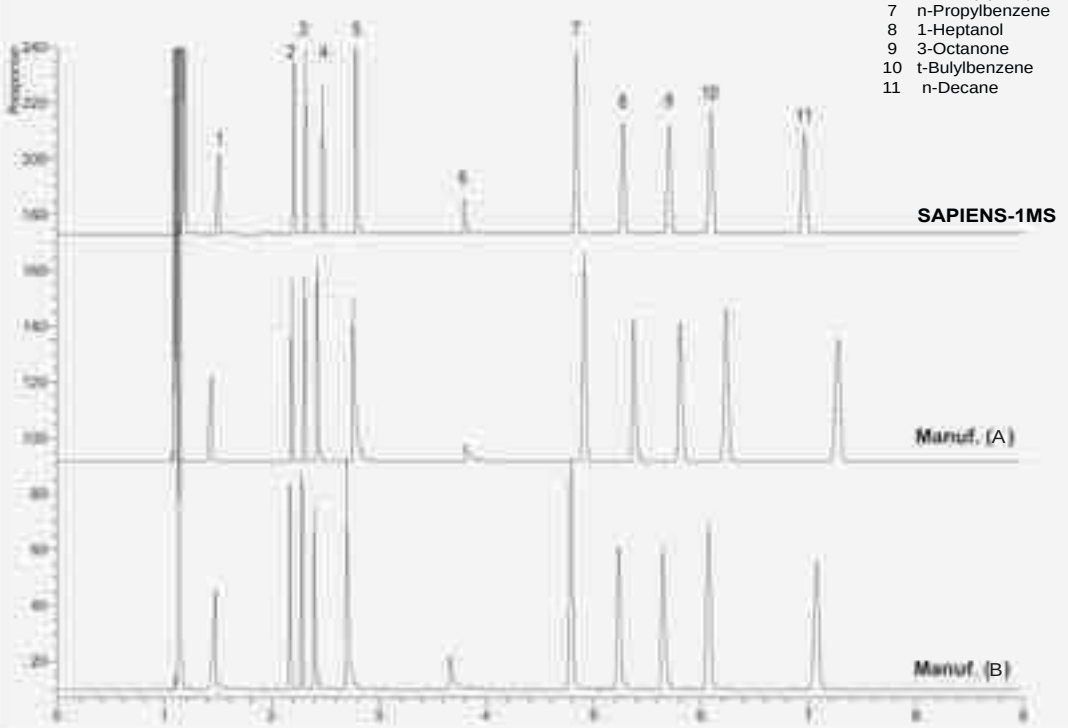


SAPIENS-1MS: Ultra Inert Test (TK-SAP1MS) Performance against major ultra inert column manufacturers

Column: **SAPIENS-1MS**, 30 m x 0,25 mm x 0,25µm TR-430232
Oven: 65ºC (isothermal)
Injection: 0,1µL TK-SAP1MS Ultra Inert Test, Split 500:1, 275ºC
Detector: FID, 340ºC
Carrier gas: H_2,12 psi (82,8 kPa)

Peak Name

1 Propionic Acid
2 1-Octene
3 n-Octane
4 1,2-Butanediol
5 4-Methylpyridine
6 Trimelhylphosphate
7 n-Propylbenzene
8 1-Heptanol
9 3-Octanone
10 t-Bulylbenzene
11 n-Decane

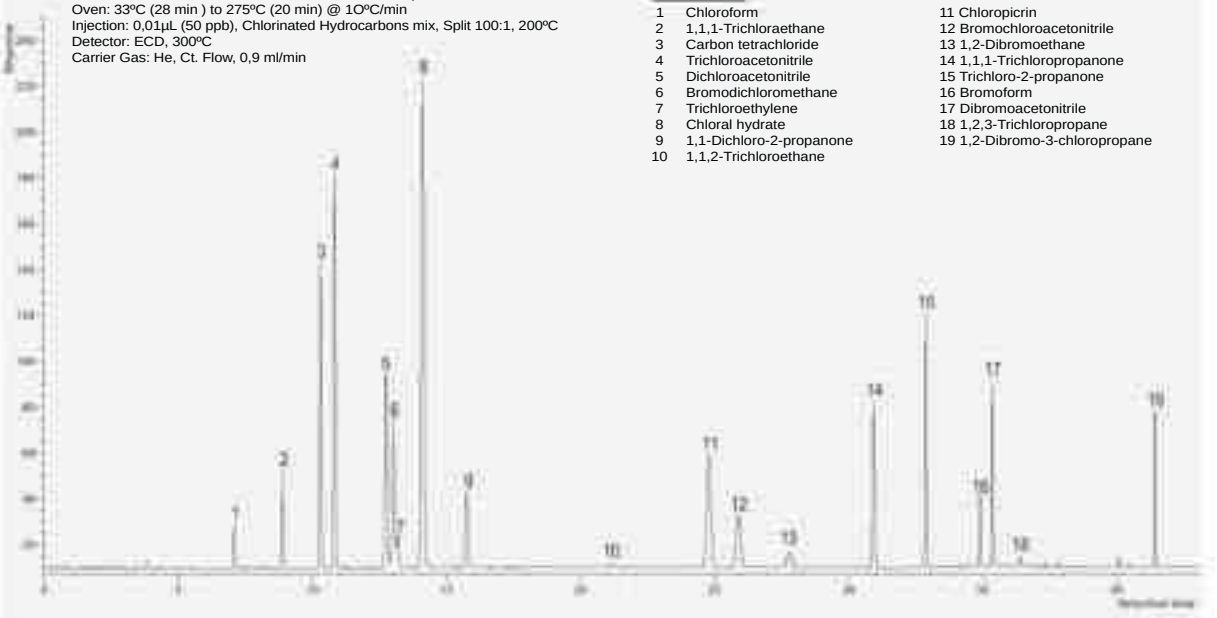


SAPIENS-1MS: Analysis chlorinated solvents and desifection by-products (EPA 551.1)

Column: **SAPIENS-1MS**, 30 m x 0,25 mm x 1,0 µm, P/N TR-431032
Oven: 33ºC (28 min) to 275ºC (20 min) @ 1OºC/min
Injection: 0,01µL (50 ppb), Chlorinated Hydrocarbons mix, Split 100:1, 200ºC
Detector: ECD, 300ºC
Carrier Gas: He, Ct. Flow, 0,9 ml/min

Peak Name

1 Chloroform
2 1,1,1-Trichloraethane
3 Carbon tetrachloride
4 Trichloroacetonitrile
5 Dichloroacetonitrile
6 Bromodichloromethane
7 Trichloroethylene
8 Chloral hydrate
9 1,1-Dichloro-2-propanone
10 1,1,2-Trichloroethane
11 Chloropicrin
12 Bromochloroacetonitrile
13 1,2-Dibromoethane
14 1,1,1-Trichloropropanone
15 Trichloro-2-propanone
16 Bromoform
17 Dibromoacetonitrile
18 1,2,3-Trichloropropane
19 1,2-Dibromo-3-chloropropane



Teknokroma Capillary Columns

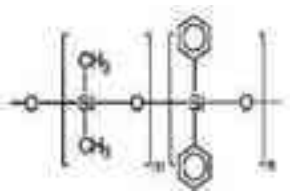
SAPIENS-1MS

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	-60 to 325/350	**TR-430141**
	20	0,10	-60 to 325/350	**TR-430181**
0,18	20	0,18	-60 to 325/350	**TR-430984**
	20	0,36	-60 to 325/350	**TR-433484**
0,20	12	0,33	-60 to 325/350	**TR-4333B9**
	25	0,33	-60 to 325/350	**TR-433329**
0,25	15	0,25	-60 to 325/350	**TR-430212**
	30	0,25	-60 to 325/350	**TR-430232**
	30	0,50	-60 to 325/350	**TR-430532**
	30	1,00	-60 to 325/350	**TR-431032**
	60	0,25	-60 to 325/350	**TR-430262**
0,32	15	0,25	-60 to 325/350	**TR-430213**
	25	0,52	-60 to 325/350	**TR-435223**
	30	0,25	-60 to 325/350	**TR-430233**
	30	1,00	-60 to 325/350	**TR-431033**

SAPIENS-5MS

95% Dimethyl - 5% diphenylpolysiloxane, bonded and crosslinked phase

- Ultra low bleed and high chemical inertness
- Excellent thermal stability
- Selectivity identical to TRB-5
- Minimum peak tailing for active analystes. Specifically tested for chemical inertness towards active compounds
- Ideal for trace analysis by GC/MS. Improves mass spectral integrity and quantitation at low concentrations.

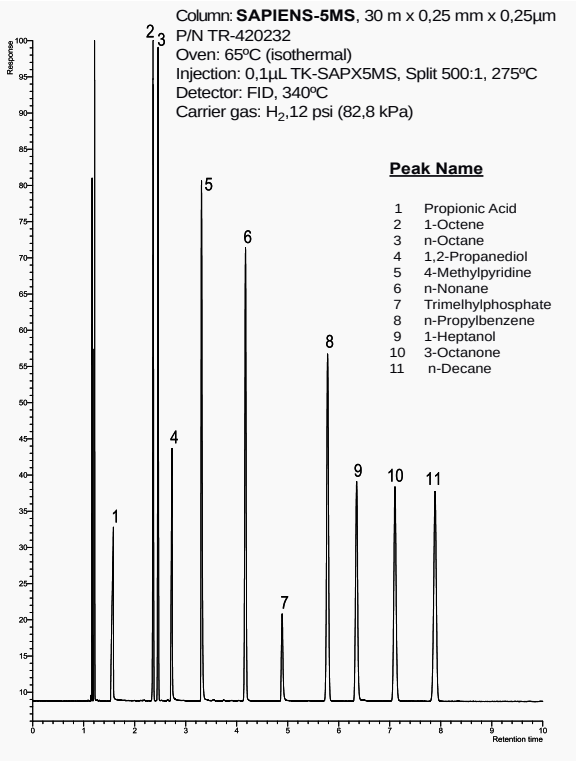


Structure of poly (dimethyl-diphenyl) siloxane

SAPIENS-5MS Equivalent Phase

Agilent: HP-5 MS UI
Restek: Rxi-5MS
Phenomenex: ZB-5Plus
Macherey-Nagel: OPTIMA-5MS

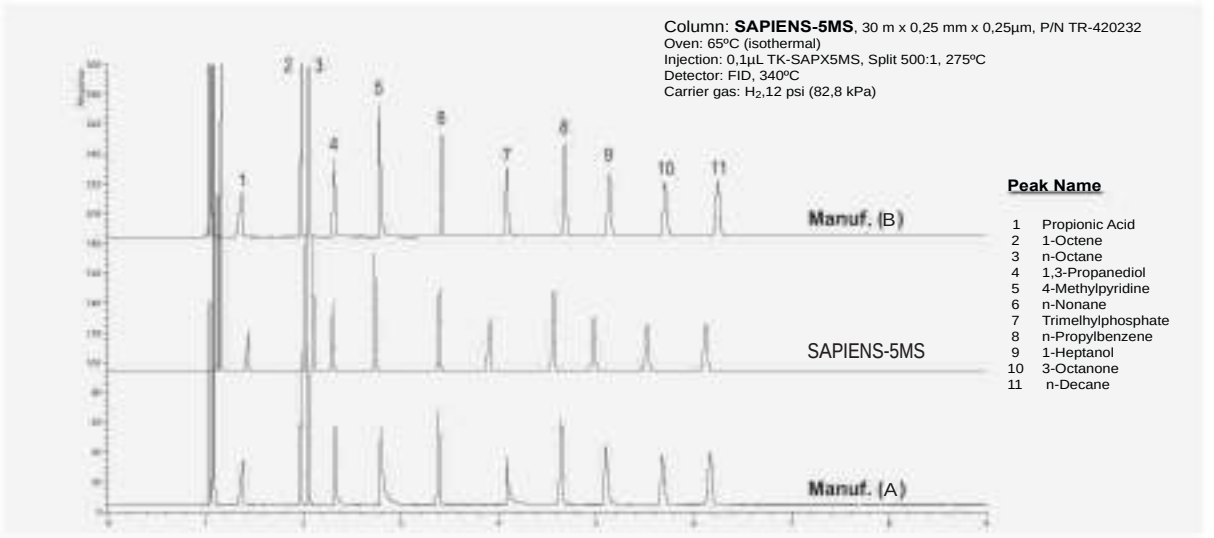
SAPIENS-5MS: Ultra Inert Test (TK-SAPX5MS). Excellent performance for all key compounds



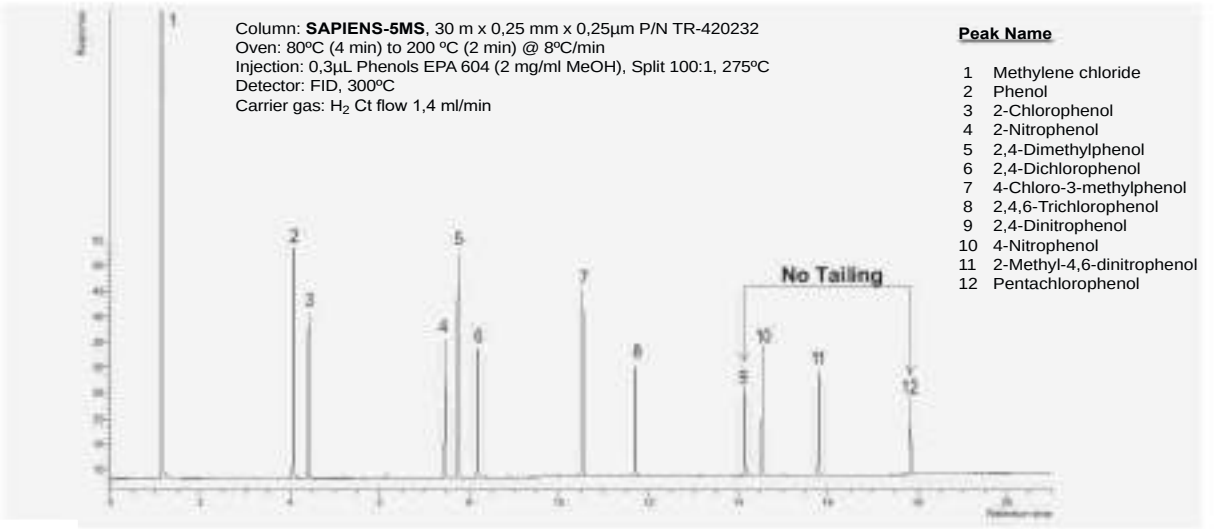
Ultra Inert Test TK-SAPX5MS (composition)

Elution	Compound	Key Control Parameter
1	Propionic Acid	Basicity
2	1-Octene	Polarity
3	n-Octane	Hydrocarbon
4	1,2-Propanediol	Silanol
5	4-Methylpyridine	Acidity
6	n-Nonane	Hydrocarbon
7	Trimelhylphosphate	Acidity
8	n-Propylbenzene	Hydrocarbon
9	1-Heptanol	Silanol
10	3-Octanone	Polarity
11	n-Decane	Hydrocarbon

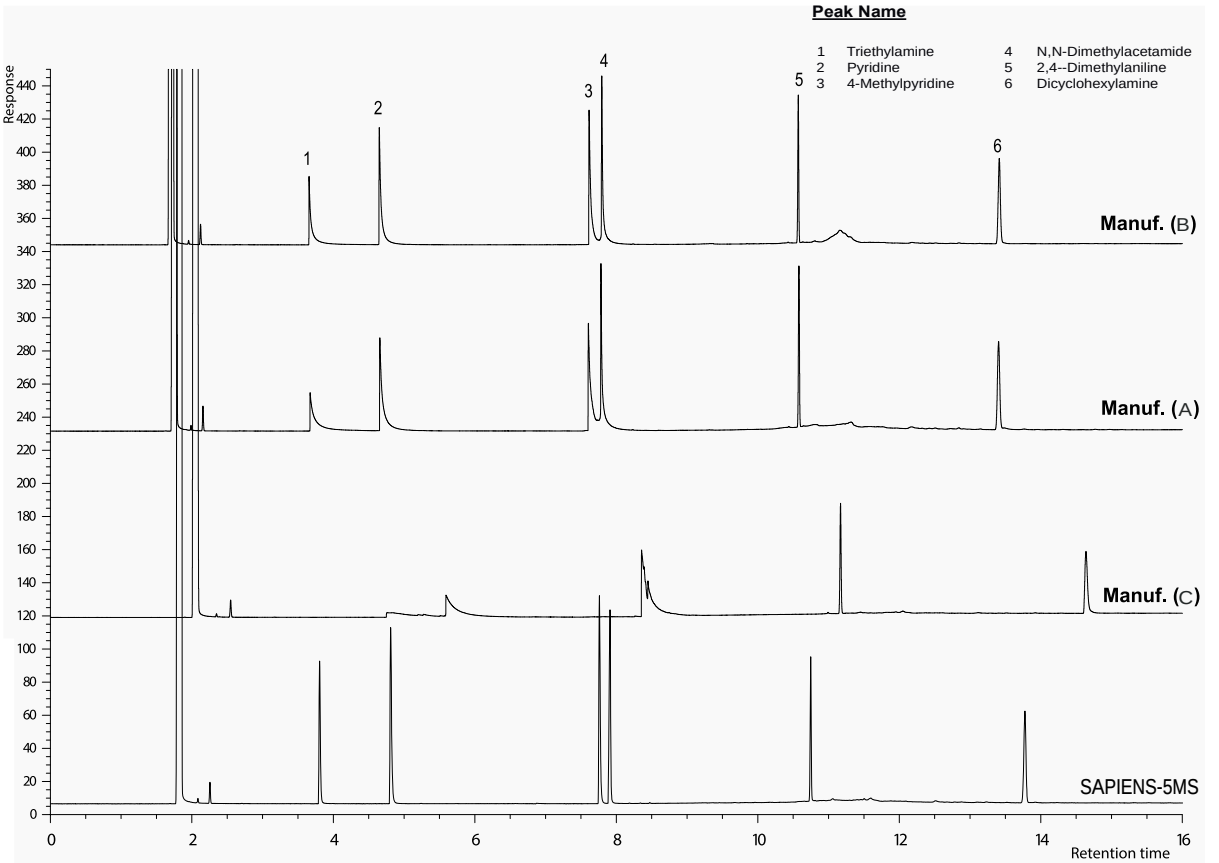
SAPIENS-5MS: Ultra Inert Test (TK-SAPX5MS). Performance against major ultra inert column manufacturers
Excellent performance for all key compounds



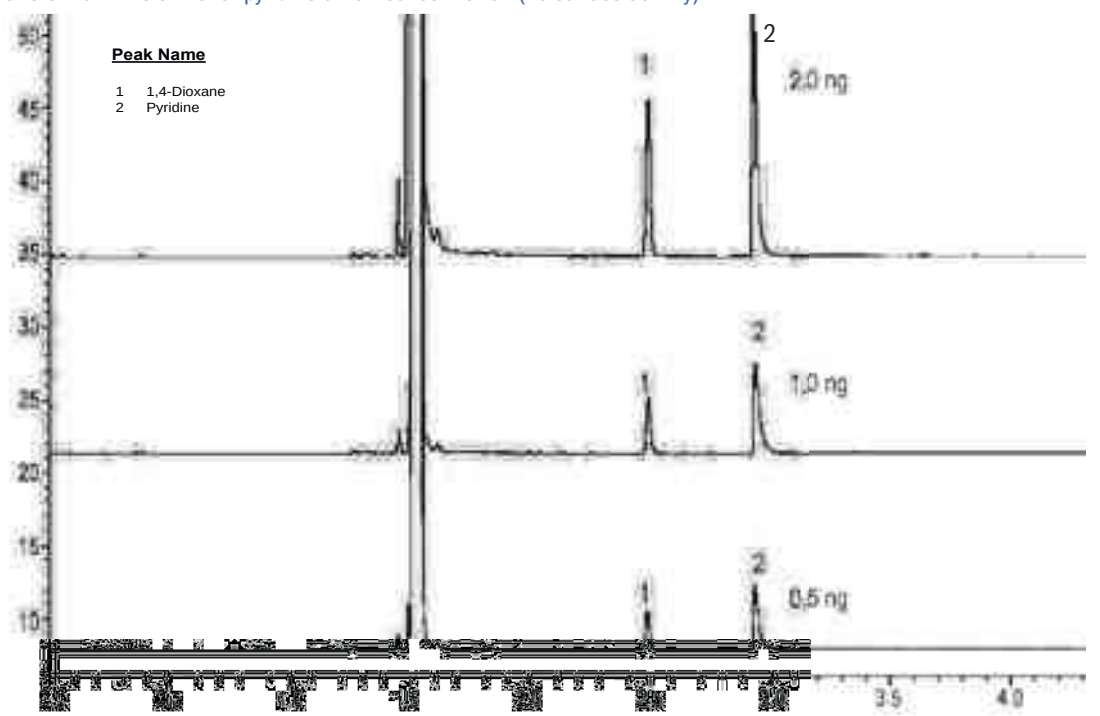
SAPIENS-5MS: Acidity Test - Perfect peak shapes



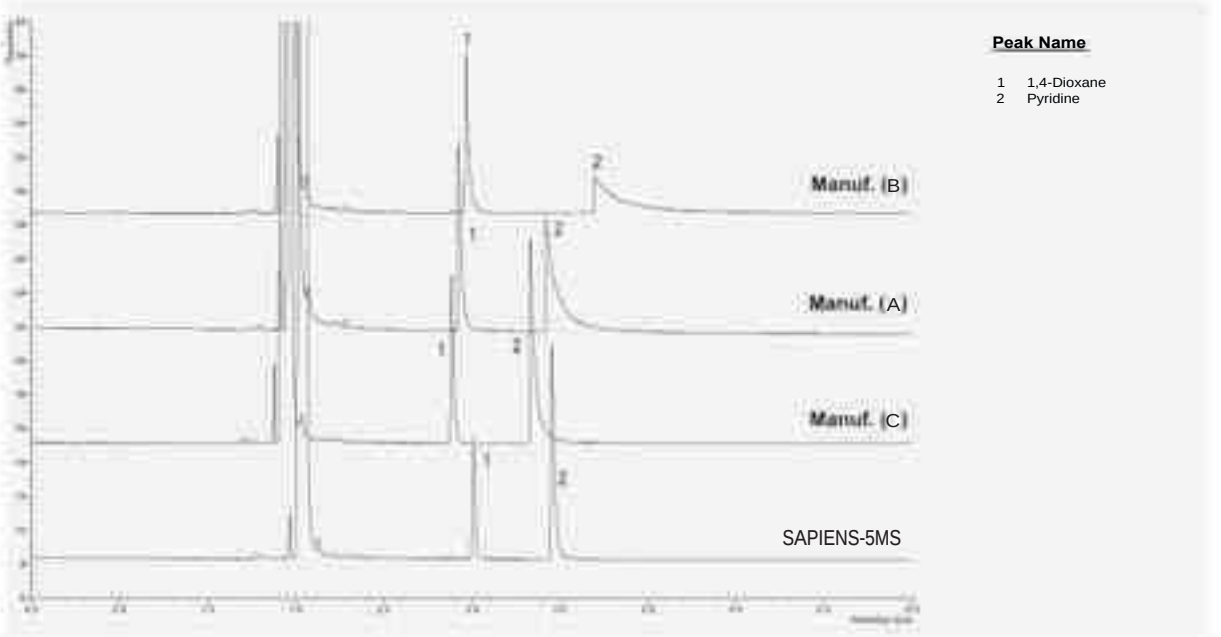
SAPIENS-5MS: Basicity test Performance against major ultra inert column manufacturers



APIENS-5MS: High column inertness for 1,4-dioxane and pyridine
o retention time shifts for pyridine at low concentration (no surface activity)

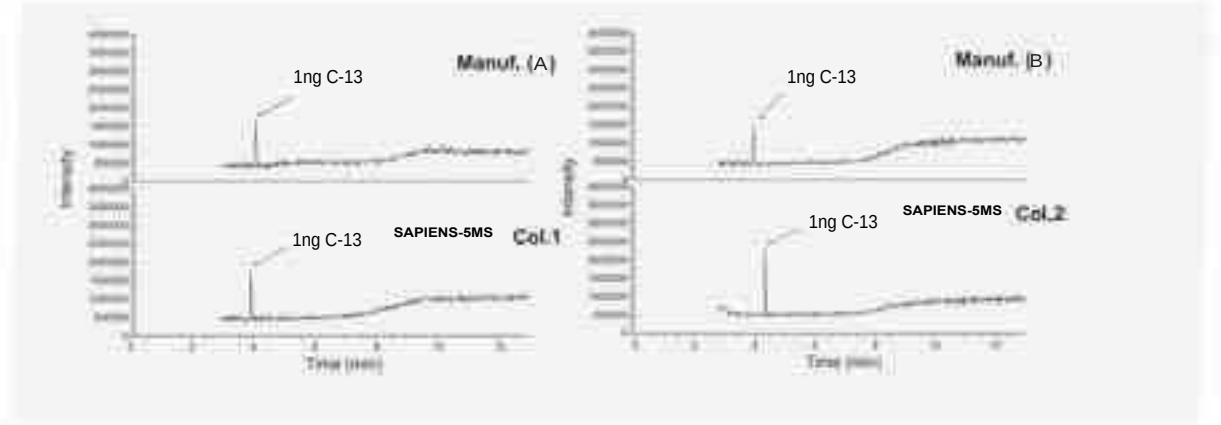


SAPIENS-5MS: 1,4-dioxane and pyridine Performance against major ultra inert column manufacturers



SAPIENS-5MS: Bleed (GC-MS) comparison test

Bleed Curves related to 1 ng of tridecane in MS detector



SAPIENS-5MS

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	-60 to 325/350	**TR-420141**
	20	0,10	-60 to 325/350	**TR-420181**
0,18	20	0,18	-60 to 325/350	**TR-420984**
0,20	12	0,33	-60 to 325/350	**TR-4233B9**
	25	0,33	-60 to 325/350	**TR-423329**
0,25	15	0,25	-60 to 325/350	**TR-420212**
	30	0,25	-60 to 325/350	**TR-420232**
	30	0,50	-60 to 325/350	**TR-420532**
	30	1,00	-60 to 325/350	**TR-421032**
	60	0,25	-60 to 325/350	**TR-420262**
0,32	30	0,25	-60 to 325/350	**TR-420233**
	30	1,00	-60 to 325/350	**TR-421033**

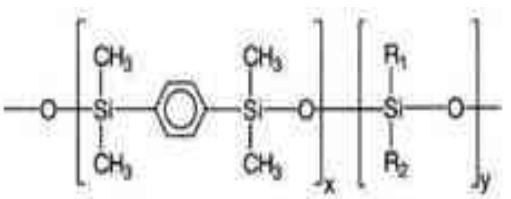
SAPIENS-X5MS

Polysiloxane containing p-silphenylene

- Ideal column for semivolatile compounds.
- selectivity similar to Meta.X5
- New generation of column incorporates arylene groups in the polymer structure to provide improved thermal stability, reduced column bleed and optimal resolution for aromatic compounds.
- Stringent quality control test guarantees total and optimal signal/ noise ratio for the more active compounds such as 2,4-dinitropherol, 4-nitroaniline and pentachlorophenol that normally suffer adsorption problems.

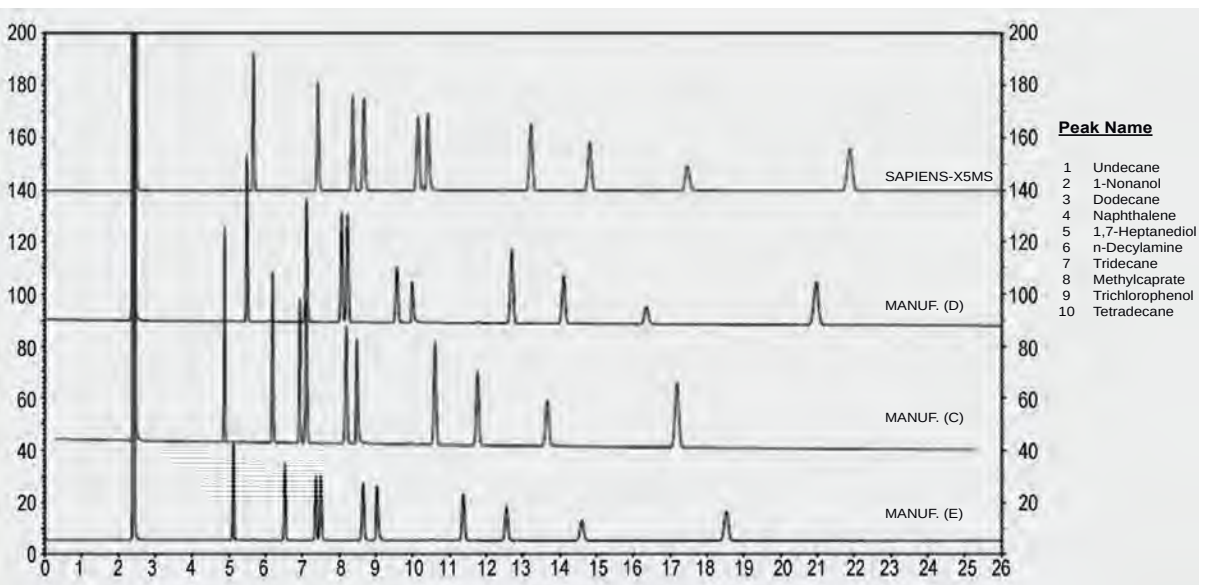
SAPIENS-X5MS Equivalent Phase

Agilent: DB-5MS UI, VF-5MS
Restek: Rxi-5Sil MS
Phenomenex: ZB-5Plus
SGE: BPX5
Sigma-Aldrich: SLB-5MS
Macherey-Nagel: OPTIMA-5MS Accent

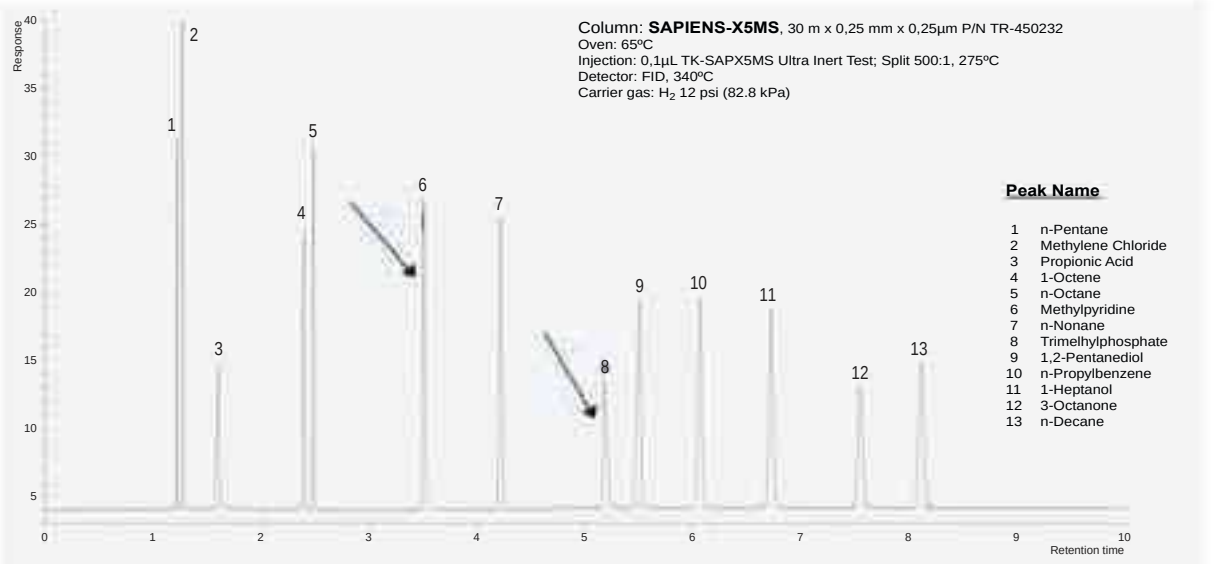


Structure of Polysiloxane containing p-silphenylene

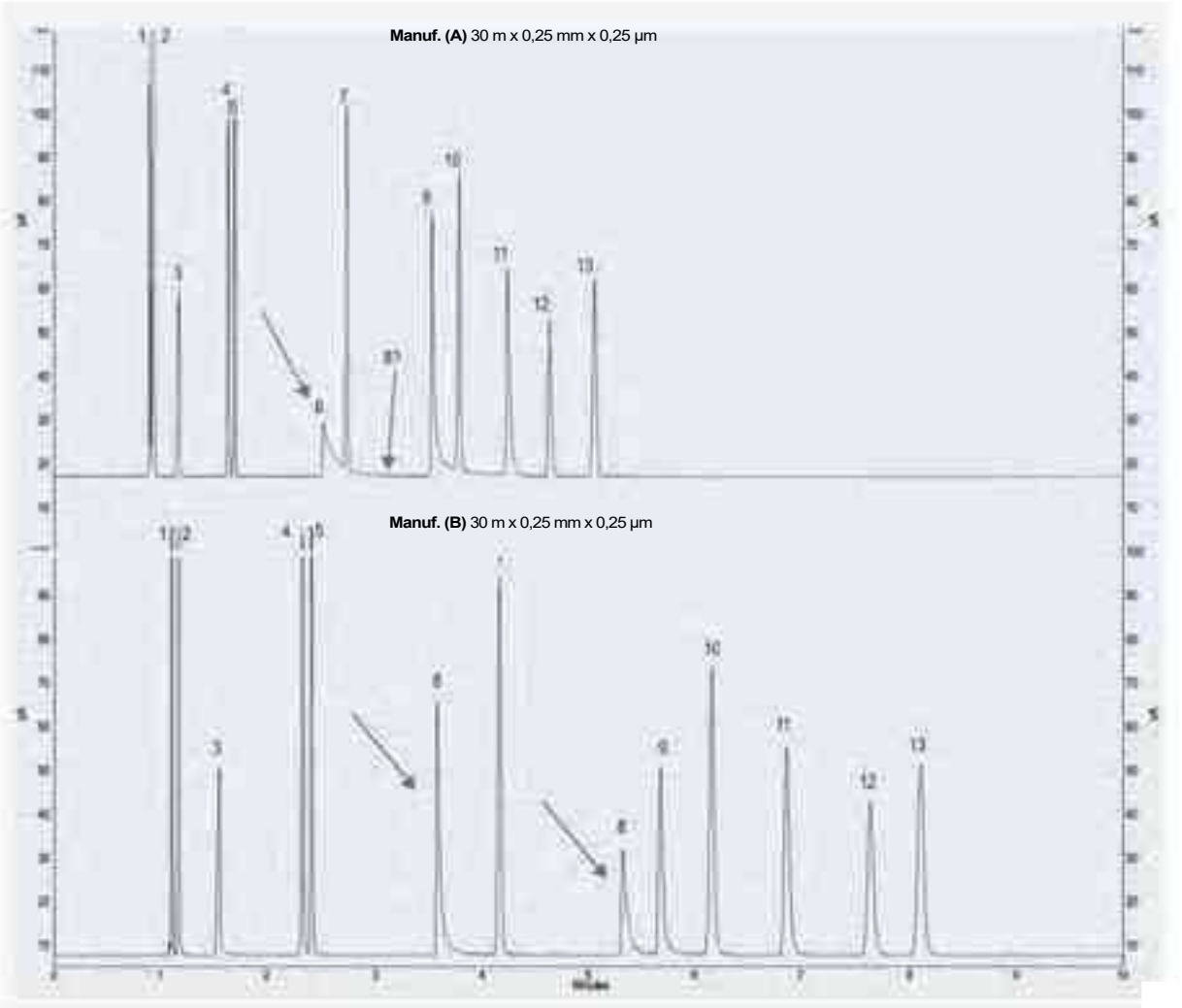
SAPIENS-X5MS: Clasical Inertness Test comparison vs major manufacturers
All columns are good

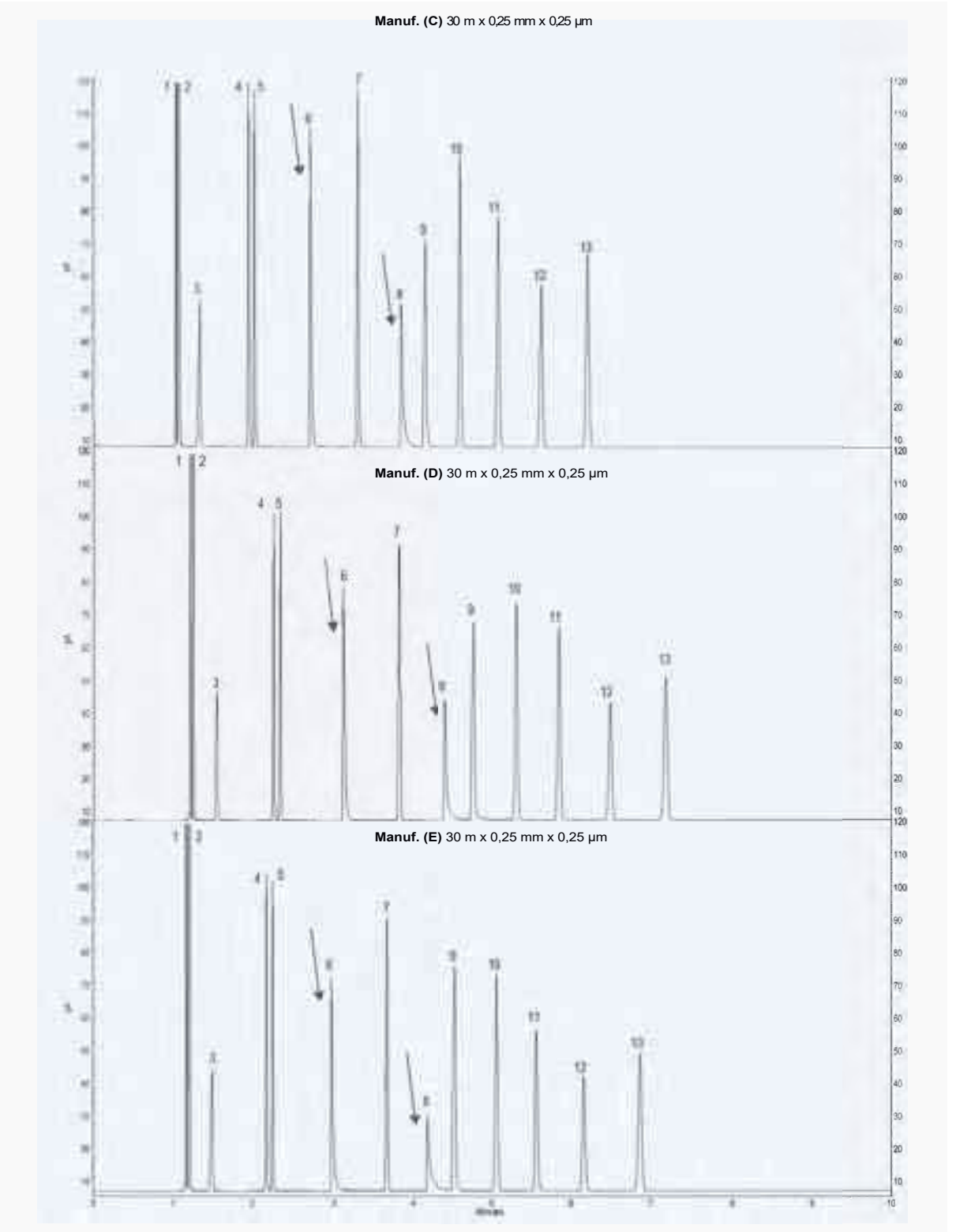


SAPIENS-X5MS: Ultra Inert Test * Performance against major ultra inert column manufacturers
Superior quality and peak shape for all active compounds *(J.Luong et al. J.Sep.Sci. 2007)



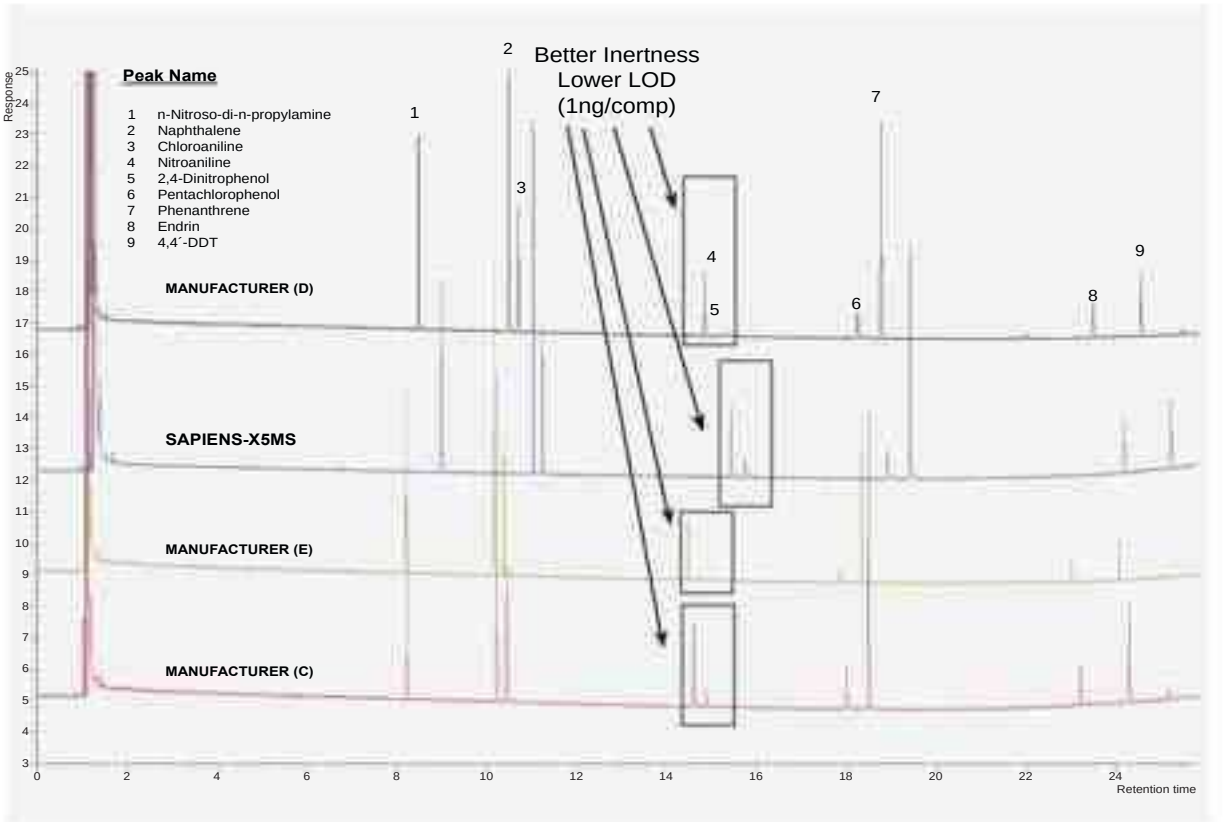
All columns are very good with a classical test but not all are excellent against a more demanding test



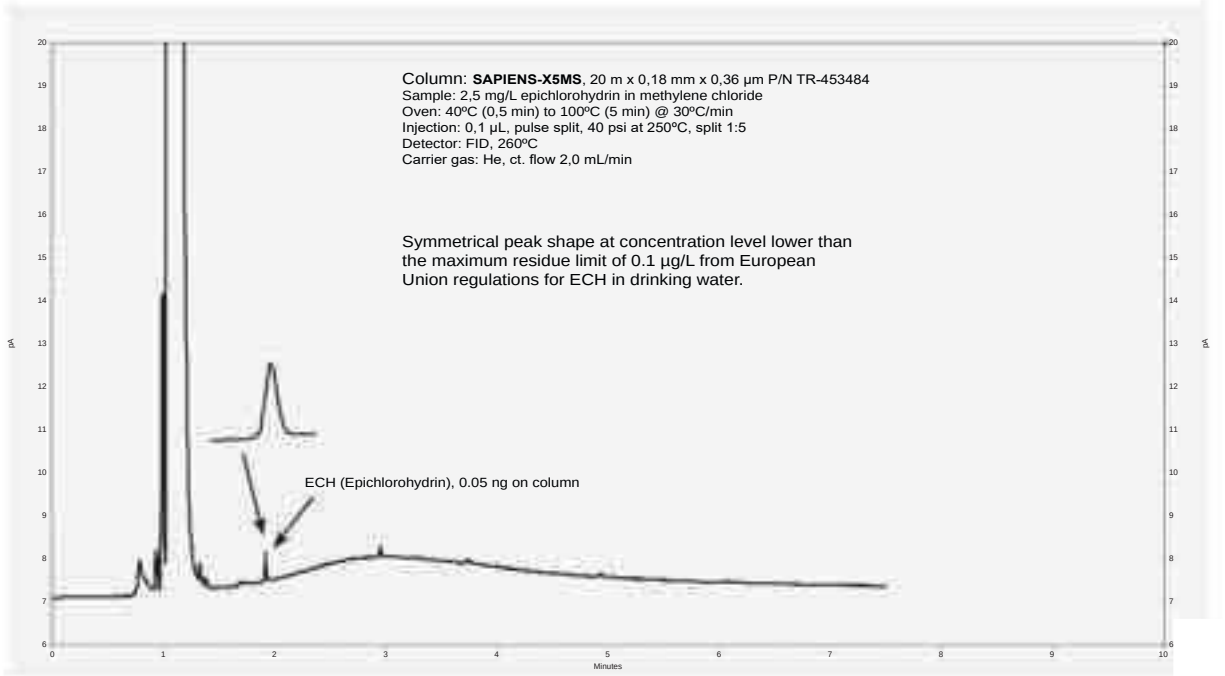


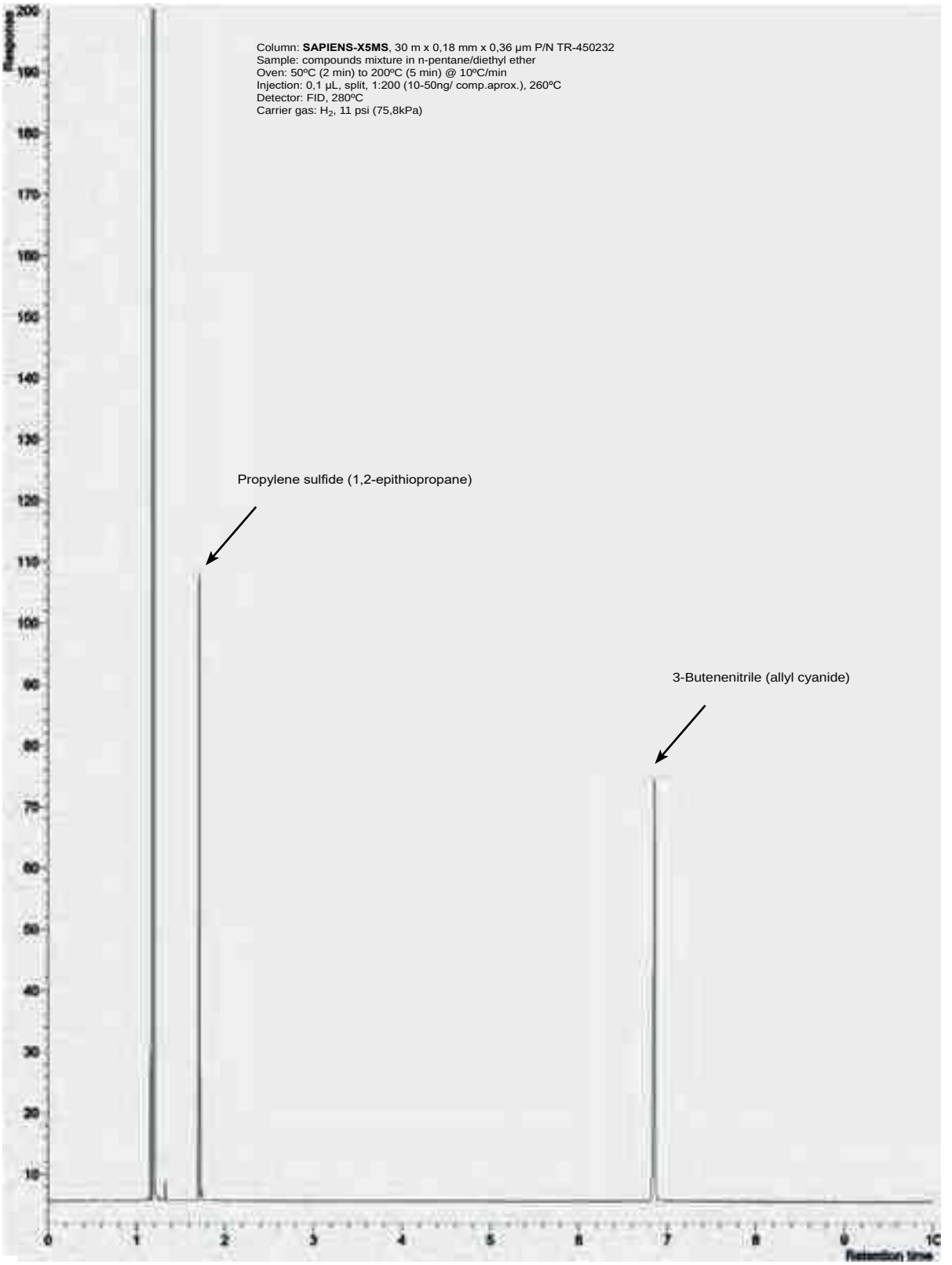
* Columns used for comparsion are from: Agilent, Phenomenex, Supelco, SGE and Restek (listed in random order)

SAPIENS-X5MS: Alinines, Phenols and Pesticides test Performance against major ultra inert column manufacturers
Improved performance for active compounds



SAPIENS-X5MS: Epichlorohydrin GC analysis in drinking water with SAPIENS-X5MS column




Column: **SAPIENS-X5MS**, 30 m x 0,18 mm x 0,36 µm P/N TR-450232
Sample: compounds mixture in n-pentane/diethyl ether
Oven: 50ºC (2 min) to 200ºC (5 min) @ 10ºC/min
Injection: 0,1 µL, split, 1:200 (10-50ng/ comp.aprox.), 260ºC
Detector: FID, 280ºC
Carrier gas: H_2, 11 psi (75,8kPa)
Propylene sulfide (1,2-epithiopropane)
3-Butenenitrile (allyl cyanide)
Response
Retention time

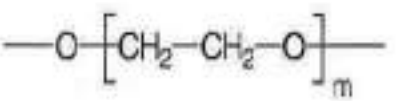
SAPIENS-X5MS

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	-60 to 325/350	**TR-450141**
	20	0,10	-60 to 325/350	**TR-450181**
0,18	20	0,18	-60 to 325/350	**TR-450984**
	20	0,36	-60 to 325/350	**TR-453484**
0,25	15	0,25	-60 to 325/350	**TR-450212**
	15	1,00	-60 to 325/350	**TR-451012**
	25	0,25	-60 to 325/350	**TR-450222**
	30	0,25	-60 to 325/350	**TR-450232**
	30	0,50	-60 to 325/350	**TR-450532**
	30	1,00	-60 to 325/350	**TR-451032**
	50	0,25	-60 to 325/350	**TR-450252**
	60	0,25	-60 to 325/350	**TR-450262**
	60	1,00	-60 to 325/350	**TR-451062**
0,32	15	0,25	-60 to 325/350	**TR-450213**
	30	0,25	-60 to 325/350	**TR-450233**
	30	0,50	-60 to 325/350	**TR-450533**
	30	1,00	-60 to 325/350	**TR-451033**
	60	1,00	-60 to 325/350	**TR-451063**

SAPIENS-WAX.MS

100% polyethylene glycol, bonded and cross-linked phase

- Specifically designed for polar compounds
- Lower bleed for trace analysis
- Solvent rinsable
- Equivalent to USP G14, G15, G16, G20, G39, G47 phases

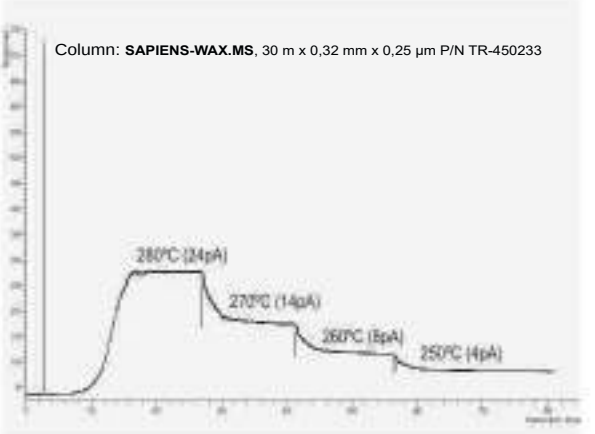


Structure of of Polyethylene glycol

SAPIENS-WAX.MS Equivalent Phase

Agilent: VF-WAXms, DB-WAX UI, DB-WAX.MS
Restek: STABILWAX MS
Phenomenex: ZB-WAX Plus
Supelco: Supelcowax-10
SGE: SOLGEL-WAX
Macherey-Nagel: OPTIMA-WAXplus

SAPIENS-WAX.MS: Bleed vs Temperature



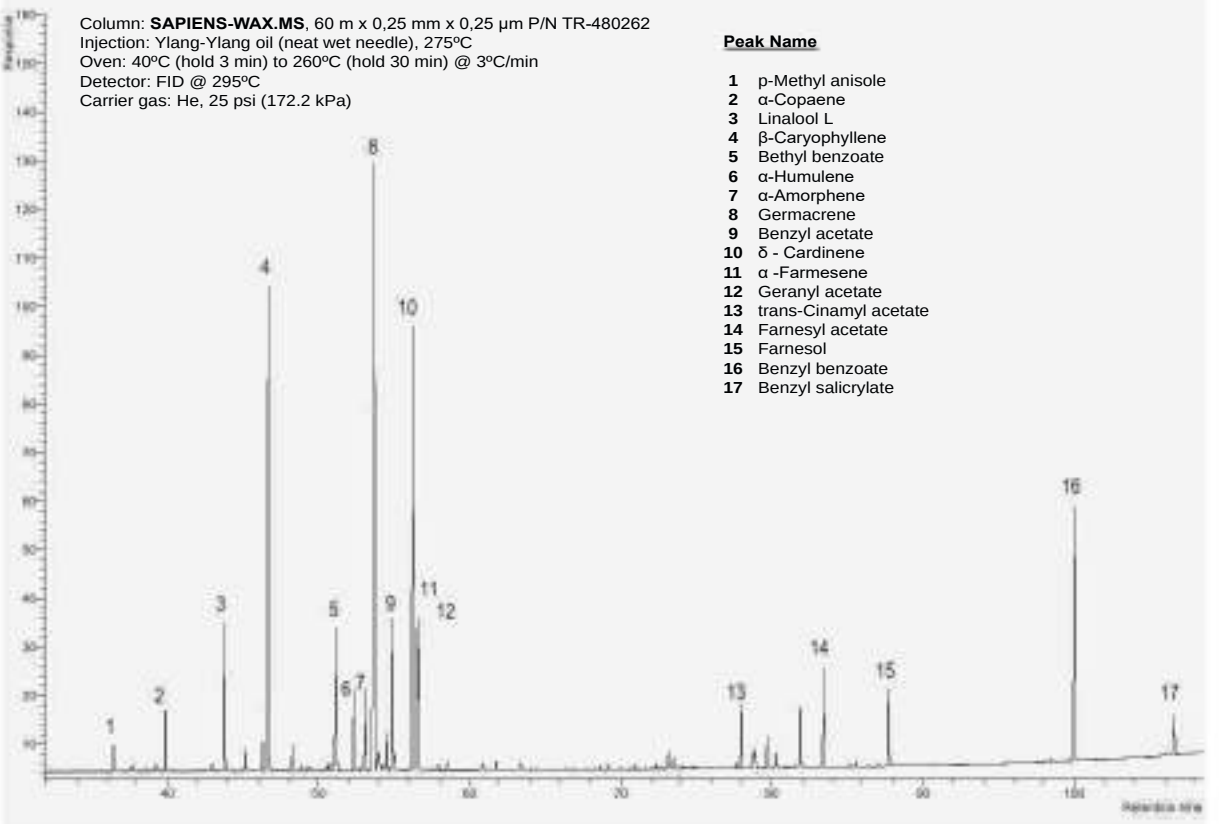
Teknokroma Capillary Columns

SAPIENS-WAX.MS: Ylang-Ylang Oil by GC-FID

Column: **SAPIENS-WAX.MS**, 60 m x 0,25 mm x 0,25 µm P/N TR-480262
Injection: Ylang-Ylang oil (neat wet needle), 275ºC
Oven: 40ºC (hold 3 min) to 260ºC (hold 30 min) @ 3ºC/min
Detector: FID @ 295ºC
Carrier gas: He, 25 psi (172.2 kPa)

Peak Name

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



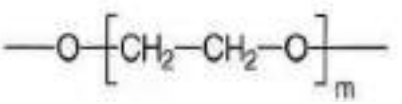
SAPIENS-WAX.MS

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	35 to 280	**TR-480141**
	10	0,20	35 to 280	**TR-482141**
	20	0,10	35 to 280	**TR-480181**
0,25	15	0,25	35 to 280	**TR-480212**
	15	0,50	35 to 280	**TR-480512**
	25	0,20	35 to 280	**TR-482122**
	30	0,25	35 to 280	**TR-480232**
	30	0,50	35 to 280	**TR-480532**
	30	1,00	35 to 280	**TR-481032**
	60	0,25	35 to 280	**TR-480262**
0,32	30	0,25	35 to 280	**TR-480233**
	30	0,50	35 to 280	**TR-480533**
	30	1,00	35 to 280	**TR-481033**
	60	0,25	35 to 280	**TR-480263**
	60	0,50	35 to 280	**TR-480563**
	60	1,00	35 to 280	**TR-481063**

SAPIENS-WAX.HT

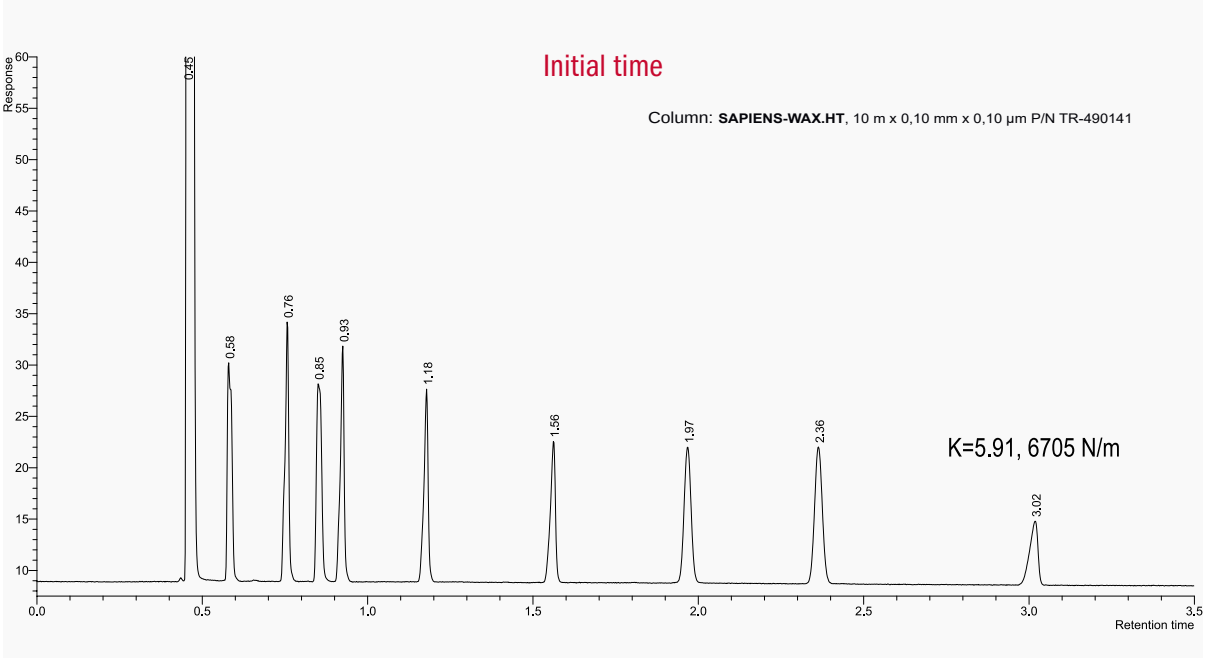
Polyethylene glycol that can withstand up to 300 ºC

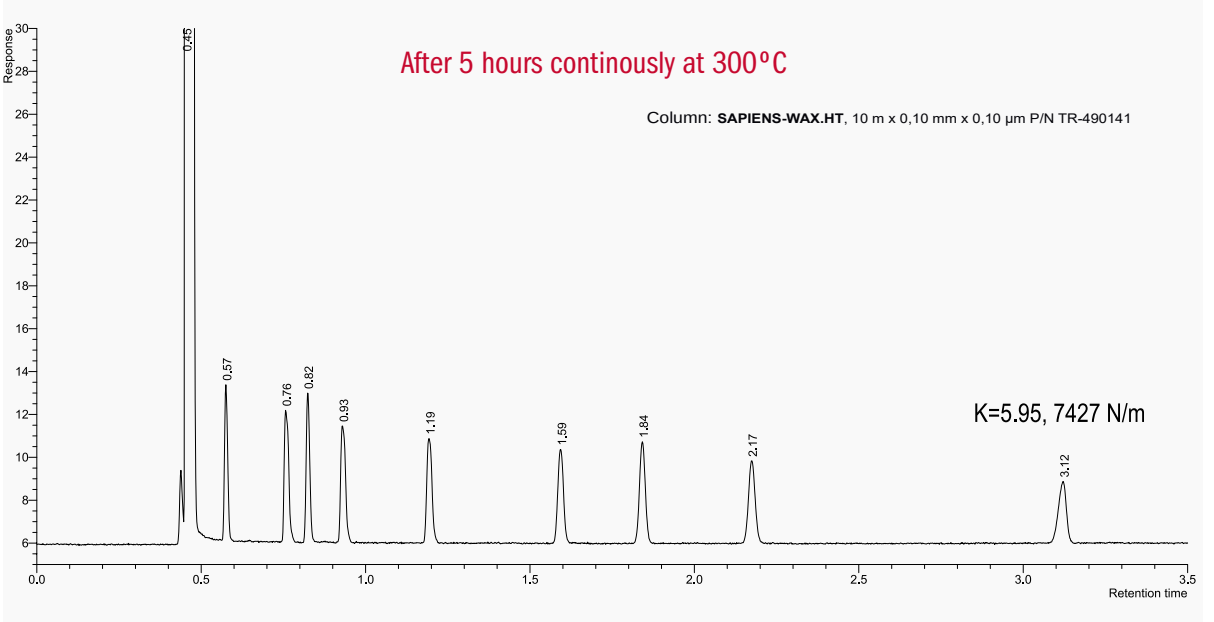
- Specifically designed for Fast GC and GC x GC analysis
- MSP High Performance



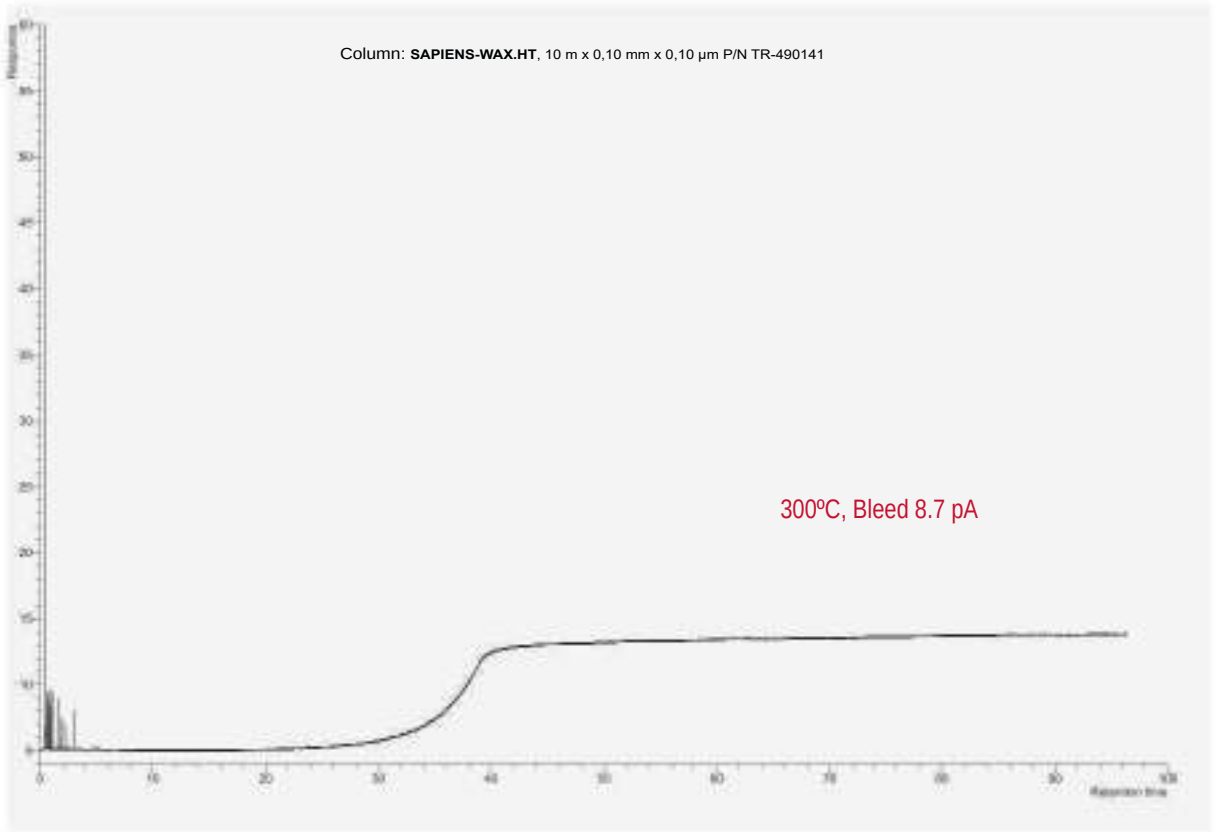
Structure of Polyethylene glycol

SAPIENS-WAX.HT: After 5hrs continuously at 300ºC no degradation of the stationary phase is detected





SAPIENS-WAX.HT: Bleeding at 300ºC



SAPIENS-WAX.HT

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	2	0,10	35 to 300	**TR-4901D1**
	5	0,10	35 to 300	**TR-4901A1**
	10	0,10	35 to 300	**TR-490141**

SAPIENS-624MS

Silphenylene phase equivalent to 94% methyl-6% cyanopropylphenyl, polysiloxane bonded and cross-linked

- Intermediate polarity
- Highly inert, excellent chromatographic performance for acidic, basic and polar compounds
- Low bleed column especially design for superior thermal stability up to 280ºC
- Suitable for environmental analysis of organic volatile compounds and residual solvents in pharmaceutical products
- Meets specifications of USP <467> and PhEur 2.4.24
- Phase equivalent to USP G43

SAPIENS-624MS Equivalent Phase G43

Agilent: DB-624UI, VF-624MS, VF-1301MS, DB-Select 624UI for <467>

Restek: Rxi-624SilMS

SGE: BPX-Volatile

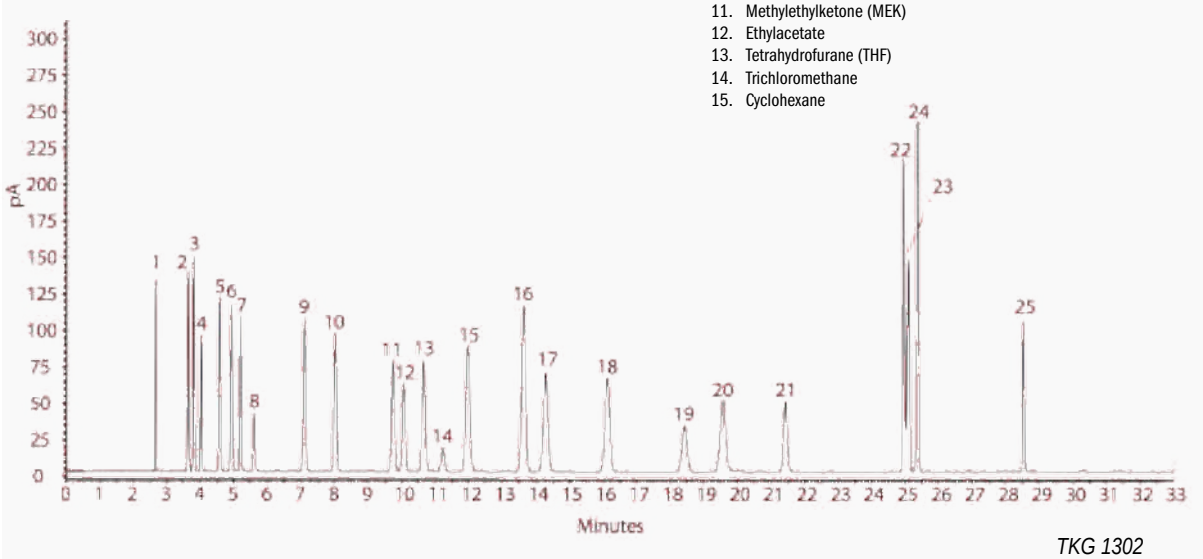
SAPIENS-624MS

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	20	1,00	-20 to 260/280	**TR-591084**
0,20	25	1,12	-20 to 260/280	**TR-591129**
0,25	30	1,40	-20 to 260/280	**TR-591432**
	60	1,40	-20 to 260/280	**TR-591462**
0,32	30	1,80	-20 to 260/280	**TR-591833**
	60	1,80	-20 to 260/280	**TR-591863**
0,53	30	3,00	-20 to 260/280	**TR-593035**
	60	3,00	-20 to 260/280	**TR-593065**
	75	3,00	-20 to 260/280	**TR-593075**
	105	3,00	-20 to 260/280	**TR-5930K5**

SAPIENS-624MS: Residual Solvents

Column: **SAPIENS-624MS**, 30 m x 0,32 mm x 1,8 µm, P/N TR-591833
Sample: 0.1 µl Residual Solvent mix (0,1%)
Injection: 260ºC, Split: 1:50
Detector: FID @ 260ºC
Carrier gas: He, 10 psi
Oven: 35ºC (20 min) to 150ºC (2min) @ 12ºC/min

1. Methanol
2. Pentane
3. Ethanol
4. Diethylether
5. Acetone
6. 2-Propanol
7. Acetonitrile
8. Dichloromethane
9. n-Hexane
10. 1-Propanol
11. Methylethylketone (MEK)
12. Ethylacetate
13. Tetrahydrofurane (THF)
14. Trichloromethane
15. Cyclohexane
16. Benzene
17. 2-Methylpropanol
18. Heptane
19. Trichloroethylene
20. n-Butanol
21. 1,4-Dioxane
22. Methylisobutylketone (MIBK)
23. Pyridine
24. Toluene
25. N,N-Dimethylformamide

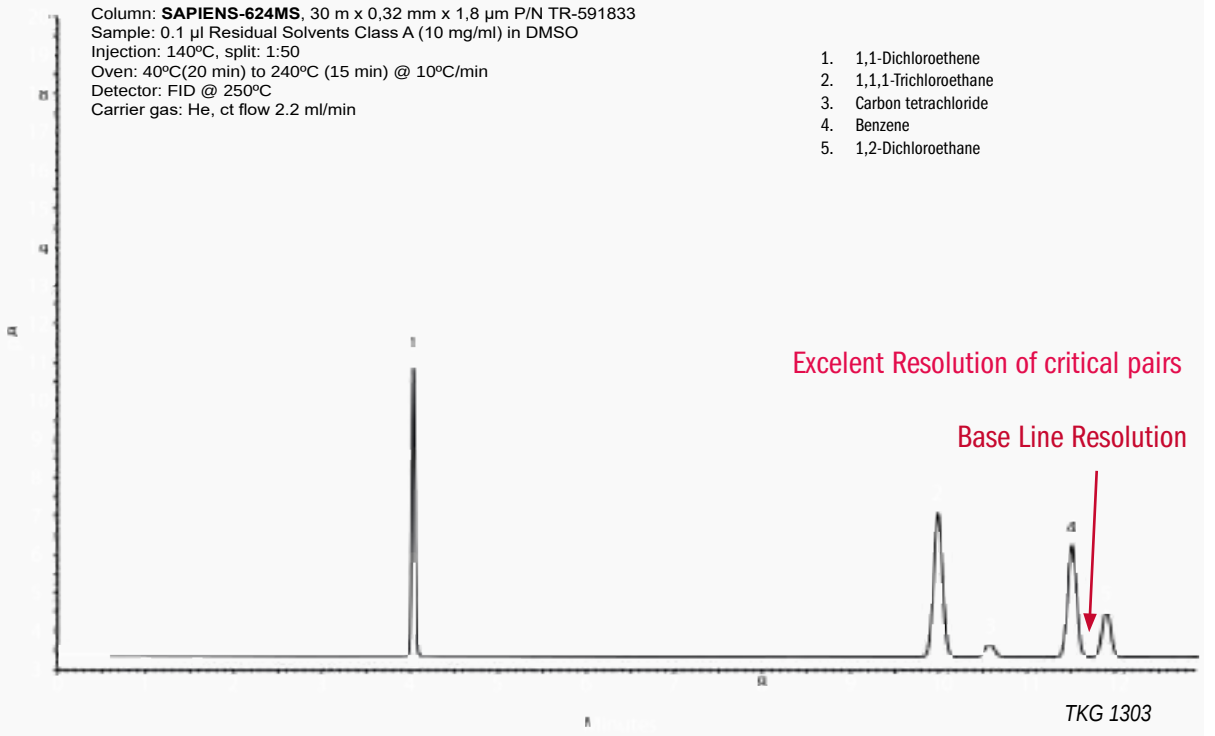


TKG 1302

SAPIENS-624MS: USP <467> Residual Solvents Class 1

Column: **SAPIENS-624MS**, 30 m x 0,32 mm x 1,8 µm P/N TR-591833
Sample: 0.1 µl Residual Solvents Class A (10 mg/ml) in DMSO
Injection: 140ºC, split: 1:50
Oven: 40ºC(20 min) to 240ºC (15 min) @ 10ºC/min
Detector: FID @ 250ºC
Carrier gas: He, ct flow 2.2 ml/min

1. 1,1-Dichloroethene
2. 1,1,1-Trichloroethane
3. Carbon tetrachloride
4. Benzene
5. 1,2-Dichloroethane

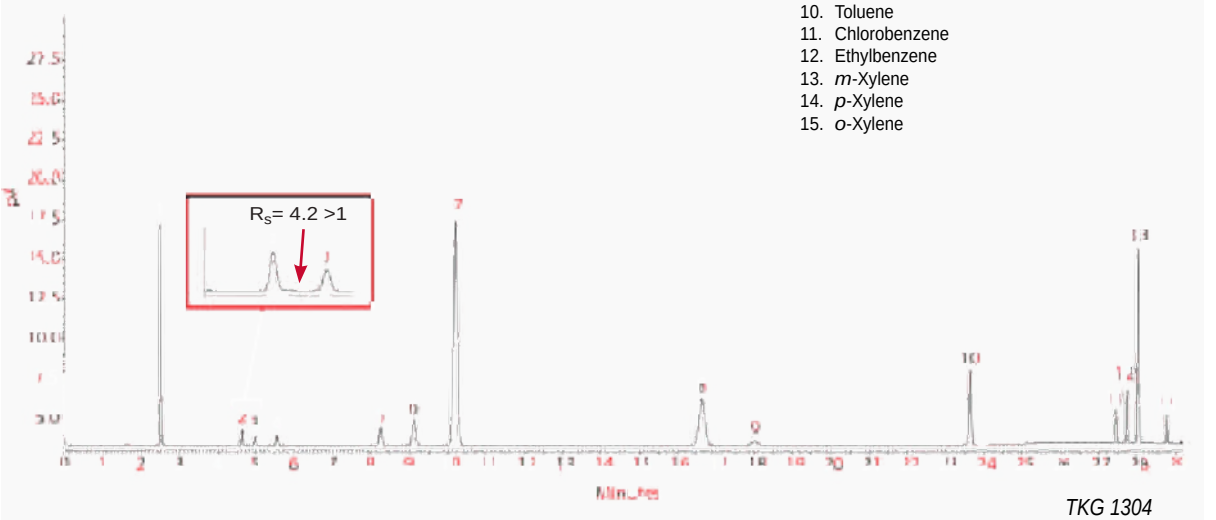


TKG 1303

SAPIENS-624MS: USP <467> Residual Solvents Class 2

Column: **SAPIENS-624MS**, 30 m x 0,32 mm x 1,8 µm P/N TR-591833
Sample: 0.1 µl Residual Solvents Class 2 (0.98-19.4 mg/ml) in DMSO
Injection: 140ºC, split: 1:50
Oven: 40ºC(20 min) to 240ºC (15 min) @ 10ºC/min
Detector: FID @ 250ºC
Carrier gas: He, ct flow 2.2 ml/min

1. Methanol
2. Acetonitrile
3. Dichloromethane
4. trans-1,2-Dichloromethene
5. cis-1,2-Dichloroethene
6. Tetrahydrofuran
7. Cyclohexane
8. Methylcyclohexane
9. 1,4-Dioxane
10. Toluene
11. Chlorobenzene
12. Ethylbenzene
13. *m*-Xylene
14. *p*-Xylene
15. *o*-Xylene



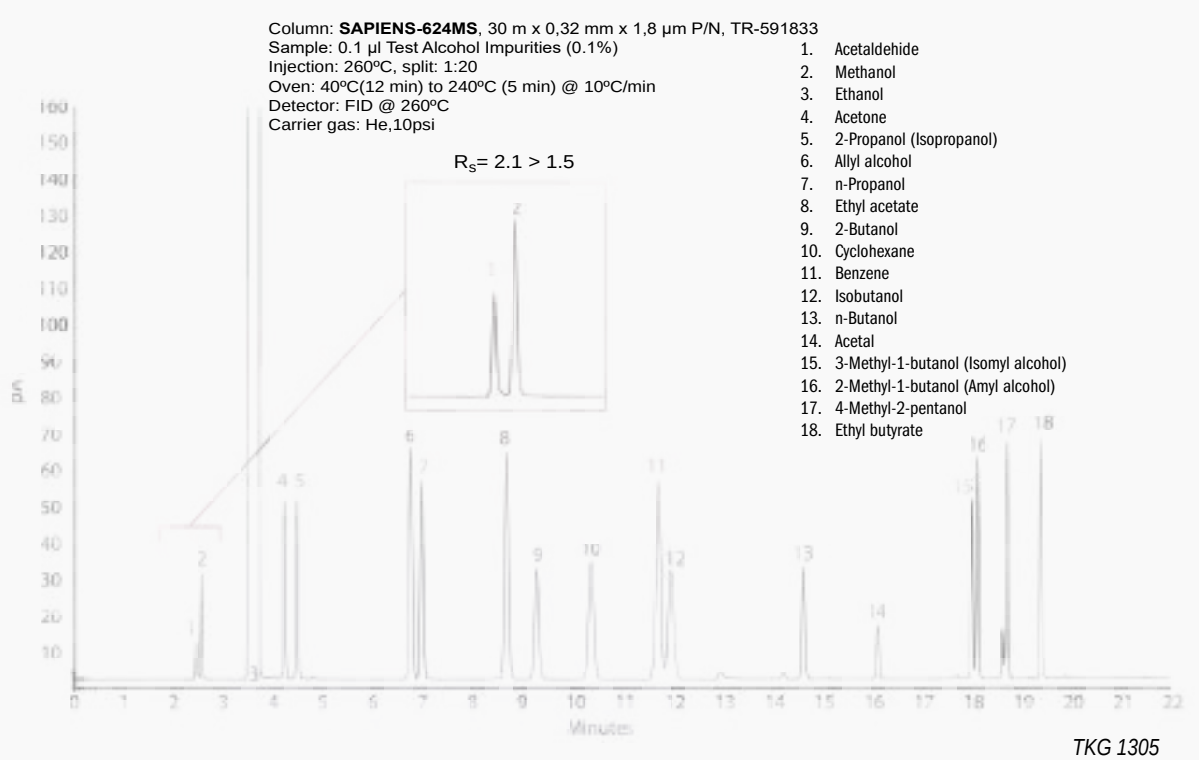
TKG 1304

SAPIENS-624MS: EuPh Ethanol Impurities

Column: **SAPIENS-624MS**, 30 m x 0,32 mm x 1,8 µm P/N, TR-591833
Sample: 0.1 µl Test Alcohol Impurities (0.1%)
Injection: 260ºC, split: 1:20
Oven: 40ºC(12 min) to 240ºC (5 min) @ 10ºC/min
Detector: FID @ 260ºC
Carrier gas: He,10psi

R_s= 2.1 > 1.5

1. Acetaldehide
2. Methanol
3. Ethanol
4. Acetone
5. 2-Propanol (Isopropanol)
6. Allyl alcohol
7. n-Propanol
8. Ethyl acetate
9. 2-Butanol
10. Cyclohexane
11. Benzene
12. Isobutanol
13. n-Butanol
14. Acetal
15. 3-Methyl-1-butanol (Isomyl alcohol)
16. 2-Methyl-1-butanol (Amyl alcohol)
17. 4-Methyl-2-pentanol
18. Ethyl butyrate



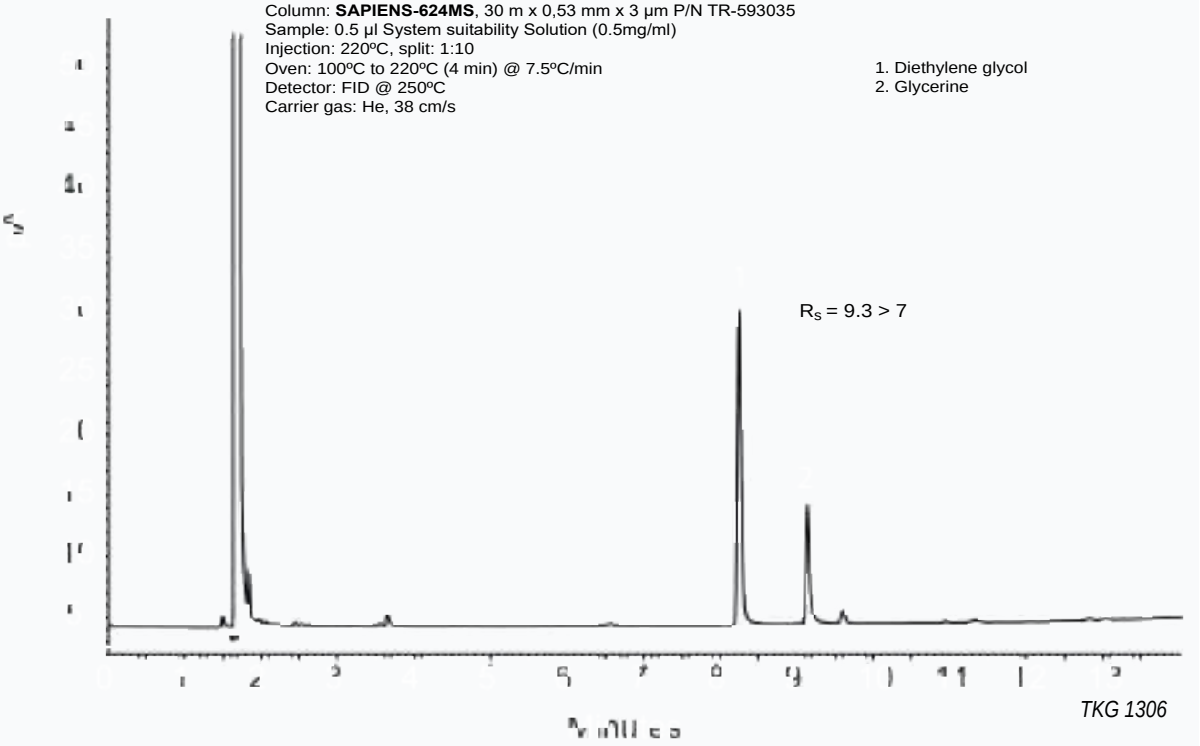
TKG 1305

SAPIENS-624MS: USP Glycerin monograph; Related compounds System Suitability Solution

Column: **SAPIENS-624MS**, 30 m x 0,53 mm x 3 µm P/N TR-593035
Sample: 0.5 µl System suitability Solution (0.5mg/ml)
Injection: 220ºC, split: 1:10
Oven: 100ºC to 220ºC (4 min) @ 7.5ºC/min
Detector: FID @ 250ºC
Carrier gas: He, 38 cm/s

1. Diethylene glycol
2. Glycerine

R_s = 9.3 > 7



TKG 1306

SAPIENS-200

35% Trifluropropyl-methyl polysiloxane, bonded and cross-linked phase

- Intermediate polarity
- Unique selectivity based on the high electron acceptance of fluorine atoms
- Column of choice for the separation of compounds with electron-donor groups such as ketones, esters, nitriles, secondary and tertiary amines, nitro and chlorinated compounds, PAHs, CFCs and silanes
- Low bleed, ideal for NPD, ECD and MS detectors

Structure of Poly (dimethyltrifluoropropylmethyl) siloxane

SAPIENS-200 Equivalent Phase

Agilent: DB-200

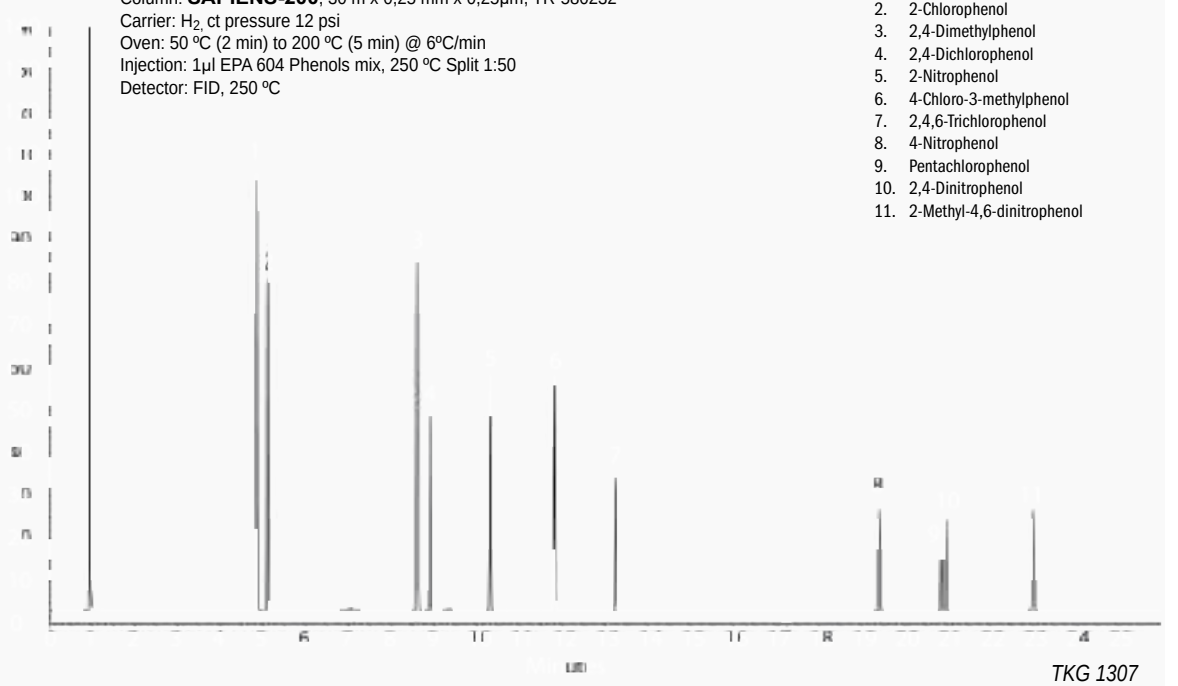
Restek: Rtx-200

SAPIENS-200

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,25	30 to 300/320	**TR-580212**
	30	0,25	30 to 300/320	**TR-580232**
	60	0,25	30 to 300/320	**TR-580262**
	30	0,50	30 to 300/320	**TR-580532**
	60	0,50	30 to 300/320	**TR-580562**
	30	1,00	30 to 280/300	**TR-581032**
	60	1,00	30 to 280/300	**TR-581062**
0,32	30	0,25	30 to 300/320	**TR-580233**
	60	0,25	30 to 300/320	**TR-580263**
	30	0,50	30 to 300/320	**TR-580533**
	60	0,50	30 to 300/320	**TR-580563**
	30	1,00	30 to 280/300	**TR-581033**
	60	1,00	30 to 280/300	**TR-581063**
	30	1,80	30 to 270/300	**TR-581833**
	60	1,80	30 to 270/300	**TR-581863**
0,53	30	0,25	30 to 300/320	**TR-580235**
	60	0,25	30 to 300/320	**TR-580265**
	30	0,50	30 to 300/320	**TR-580535**
	60	0,50	30 to 300/320	**TR-580565**
	30	1,00	30 to 280/300	**TR-581035**
	60	1,00	30 to 280/300	**TR-581065**
	60	3,00	30 to 260/280	**TR-583065**

SAPIENS-200: EPA 604 Phenols

Column: **SAPIENS-200**, 30 m x 0,25 mm x 0,25µm, TR-580232
Carrier: H_2, ct pressure 12 psi
Oven: 50 ºC (2 min) to 200 ºC (5 min) @ 6ºC/min
Injection: 1µl EPA 604 Phenols mix, 250 ºC Split 1:50
Detector: FID, 250 ºC



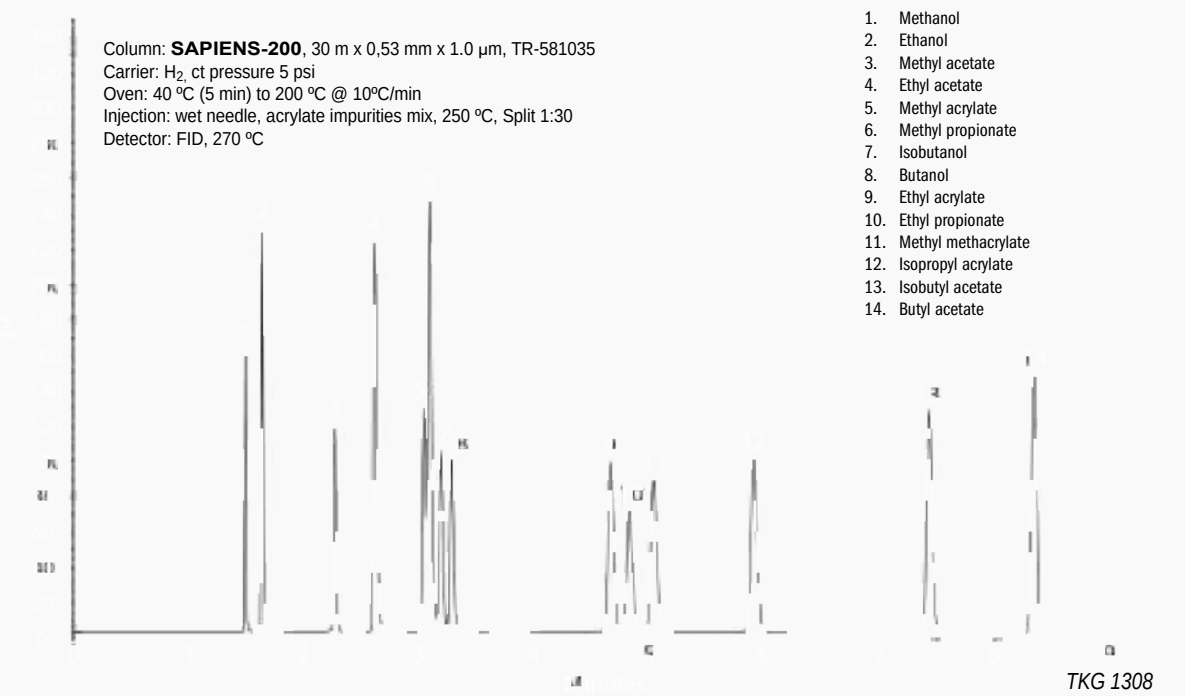
1. Phenol
2. 2-Chlorophenol
3. 2,4-Dimethylphenol
4. 2,4-Dichlorophenol
5. 2-Nitrophenol
6. 4-Chloro-3-methylphenol
7. 2,4,6-Trichlorophenol
8. 4-Nitrophenol
9. Pentachlorophenol
10. 2,4-Dinitrophenol
11. 2-Methyl-4,6-dinitrophenol

TKG 1307

SAPIENS-200: Acrylate Impurities

Column: **SAPIENS-200**, 30 m x 0,53 mm x 1.0 µm, TR-581035
Carrier: H_2, ct pressure 5 psi
Oven: 40 ºC (5 min) to 200 ºC @ 10ºC/min
Injection: wet needle, acrylate impurities mix, 250 ºC, Split 1:30
Detector: FID, 270 ºC

1. Methanol
2. Ethanol
3. Methyl acetate
4. Ethyl acetate
5. Methyl acrylate
6. Methyl propionate
7. Isobutanol
8. Butanol
9. Ethyl acrylate
10. Ethyl propionate
11. Methyl methacrylate
12. Isopropyl acrylate
13. Isobutyl acetate
14. Butyl acetate

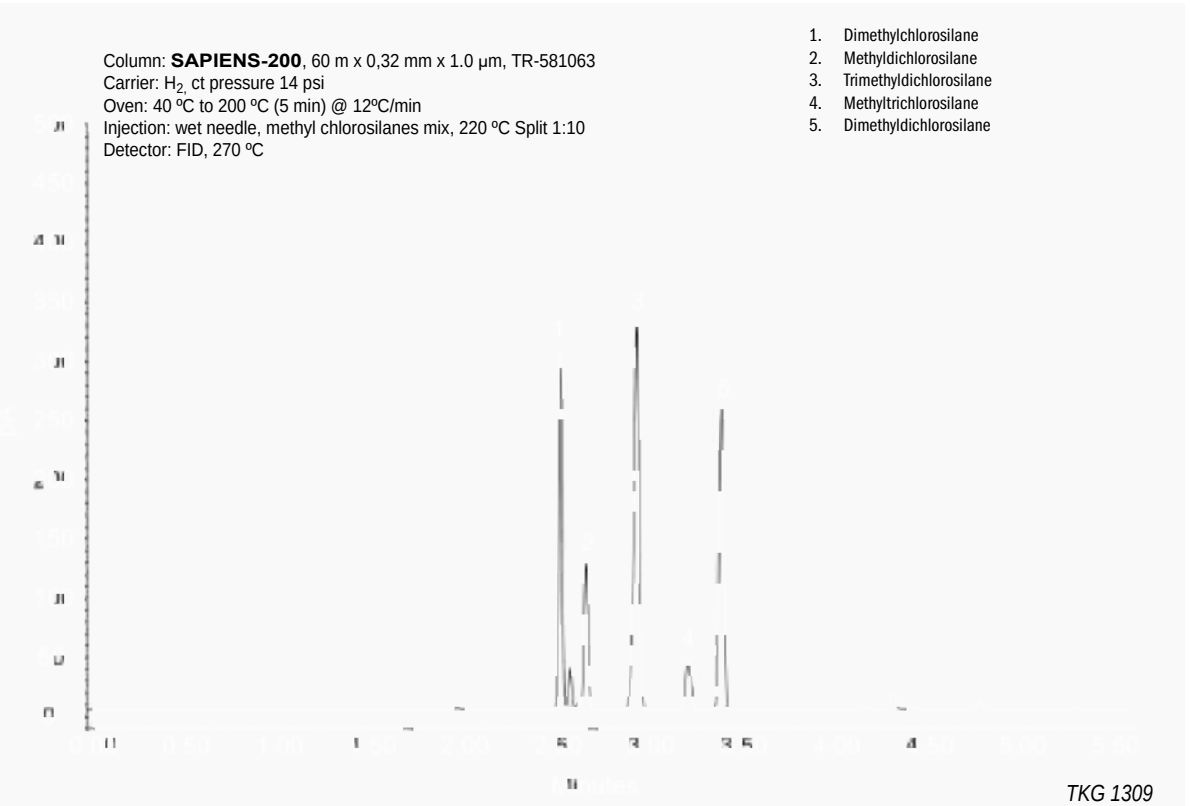


TKG 1308

SAPIENS-200: Methyl Chlorosilanes

Column: **SAPIENS-200**, 60 m x 0,32 mm x 1.0 µm, TR-581063
Carrier: H_2, ct pressure 14 psi
Oven: 40 ºC to 200 ºC (5 min) @ 12ºC/min
Injection: wet needle, methyl chlorosilanes mix, 220 ºC Split 1:10
Detector: FID, 270 ºC

1. Dimethylchlorosilane
2. Methyldichlorosilane
3. Trimethyldichlorosilane
4. Methyltrichlorosilane
5. Dimethyldichlorosilane

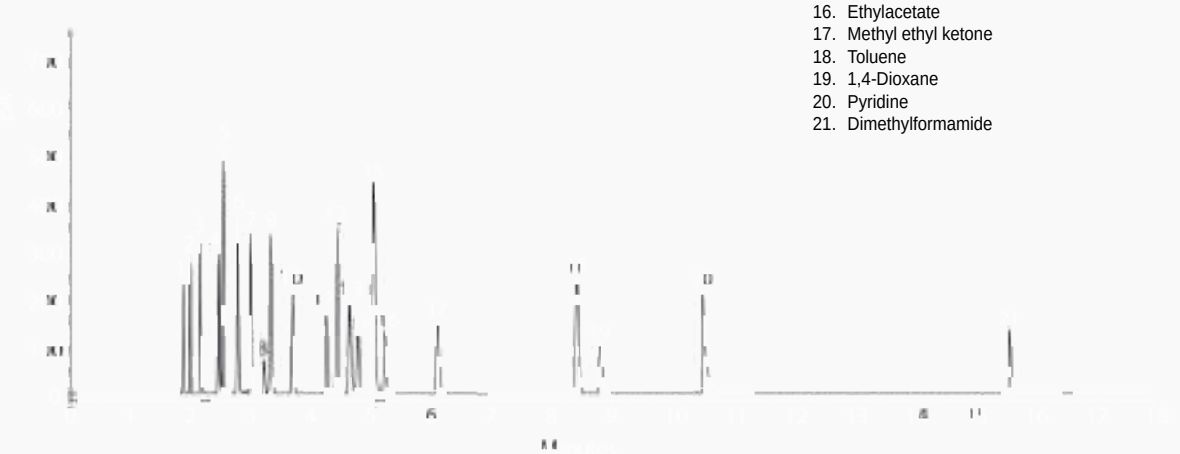


TKG 1309

SAPIENS-200: Solvents

Column: **SAPIENS-200,** 30m x 0.32mm x 1.0um, TR-581033
Injection: solvents mix, wet needle, 250ºC, split 1:50
Carrier gas: He, ct. pressure 10psi (68.9kPa)
Oven program: 40ºC (8min) to 150ºC @ 12ºC/min
Detector: FID, 300ºC

1. Methanol
2. n-Pentane
3. Ethanol
4. Isopropanol
5. Methylene chloride
6. t-Butanol
7. n-Propanol
8. Chloroform
9. Cyclohexane
10. Acetone
11. Acetonitrile
12. Benzene
13. Tetrahydrofuran
14. Trichloroethylene
15. n-Butanol
16. Ethylacetate
17. Methyl ethyl ketone
18. Toluene
19. 1,4-Dioxane
20. Pyridine
21. Dimethylformamide

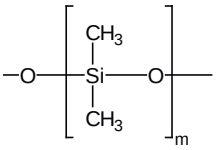


TKG 1310

TRB-1

100% Dimethyl polysiloxane, bonded and crosslinked phase

- 100% Dimethyl polysiloxane
- Non-polar phase
- Column for general use
- High thermal stability
- Ideal column for the analysis of petrochemical products and industrial solvents



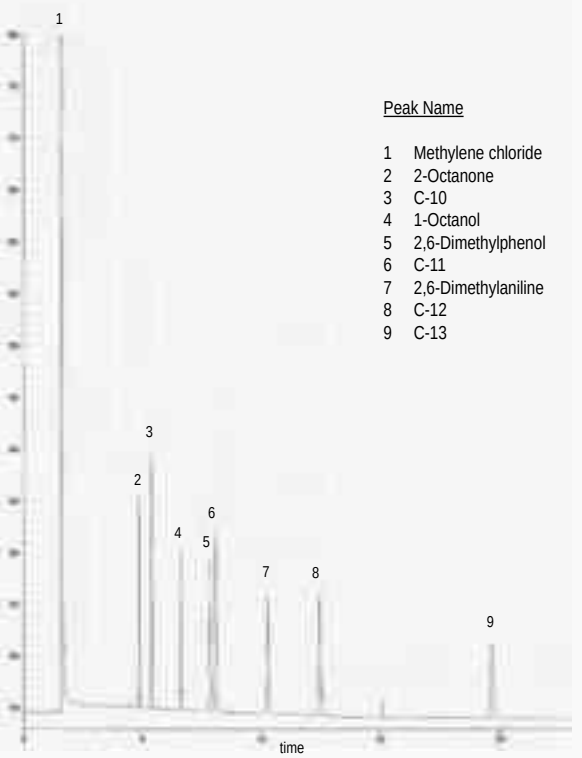
Structure of Poly (dimethyl) siloxane

TRB-1 Equivalent Phase

Agilent: HP-1, HP-101, ULTRA-1, DB-1, CP-SIL 5 CB
Supelco: SPB-1, EQUITY-1
Restek: Rtx-1
SGE: BP-1
Macherey-Nagel: OPTIMA-1

TRB-1: Test

Column: **TRB-1**, 25m x 0.15mm x 1.2µm, P/N TR-111226
Oven: 145ºC (isothermal)
Injection: 1 µL Test SP-4-7300, split 1:100, 280ºC
Carrier gas: H_2, ct pressure 22 psi (151.6 kPa)
Detector: FID, 300ºC



Peak Name

1 Methylene chloride
2 2-Octanone
3 C-10
4 1-Octanol
5 2,6-Dimethylphenol
6 C-11
7 2,6-Dimethylaniline
8 C-12
9 C-13

TKG 1102

TRB-1

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	5	0,12	-60 to 325/350	**TR-1107A1**
	10	0,10	-60 to 325/350	**TR-110141**
	10	0,40	-60 to 320/340	**TR-110441**
	20	0,10	-60 to 325/350	**TR-110181**
	20	0,40	-60 to 320/340	**TR-110481**
	40	0,20	-60 to 325/350	**TR-1121C1**
	40	0,40	-60 to 320/340	**TR-1104C1**

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	10	0,18	-60 to 325/350	**TR-110944**
	10	0,20	-60 to 325/350	**TR-112144**
	10	0,40	-60 to 325/350	**TR-110444**
	20	0,18	-60 to 325/350	**TR-110984**
	20	0,40	-60 to 325/350	**TR-110484**
	40	0,40	-60 to 325/350	**TR-1104C4**

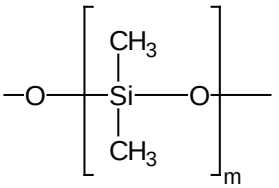
Teknokroma Capillary Columns

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,20	12	0,33	-60 to 325/350	**TR-1133B9**
	15	0,15	-60 to 325/350	**TR-111319**
	15	0,35	-60 to 325/350	**TR-110319**
	15	0,50	-60 to 325/350	**TR-110519**
	25	0,15	-60 to 325/350	**TR-111329**
	25	0,33	-60 to 325/350	**TR-113329**
	25	0,35	-60 to 325/350	**TR-110329**
	25	0,50	-60 to 325/350	**TR-110529**
	30	0,15	-60 to 325/350	**TR-111339**
	30	0,35	-60 to 325/350	**TR-110339**
	30	0,50	-60 to 325/350	**TR-110539**
	50	0,15	-60 to 325/350	**TR-111359**
	50	0,33	-60 to 325/350	**TR-113359**
	50	0,35	-60 to 325/350	**TR-110359**
	60	0,15	-60 to 325/350	**TR-111369**
	60	0,50	-60 to 325/350	**TR-110569**
0,25	15	0,10	-60 to 325/350	**TR-110112**
	15	0,25	-60 to 325/350	**TR-110212**
	15	0,50	-60 to 325/350	**TR-110512**
	15	1,00	-60 to 325/340	**TR-111012**
	25	0,10	-60 to 325/350	**TR-110122**
	25	0,25	-60 to 325/350	**TR-110222**
	25	0,50	-60 to 325/350	**TR-110522**
	25	1,00	-60 to 320/340	**TR-111022**
	30	0,10	-60 to 325/350	**TR-110132**
	30	0,25	-60 to 325/350	**TR-110232**
	30	0,50	-60 to 325/350	**TR-110532**
	30	1,00	-60 to 320/340	**TR-111032**
	50	0,10	-60 to 325/350	**TR-110152**
	50	0,25	-60 to 325/350	**TR-110252**
	50	0,50	-60 to 325/350	**TR-110552**
	50	1,00	-60 to 320/340	**TR-111052**
	60	0,10	-60 to 325/350	**TR-110162**
	60	0,25	-60 to 325/350	**TR-110262**
	60	0,50	-60 to 325/350	**TR-110562**
	60	1,00	-60 to 325/350	**TR-111062**
	100	1,00	-60 to 325/350	**TR-111092**
	105	1,00	-60 to 325/350	**TR-1110K2**
0,32	15	0,10	-60 to 325/350	**TR-110113**
	15	0,25	-60 to 325/350	**TR-110213**
	15	0,50	-60 to 325/350	**TR-110513**
	15	1,00	-60 to 325/350	**TR-111013**
	15	3,00	-60 to 280/300	**TR-113013**
	25	0,10	-60 to 325/350	**TR-110123**
	25	0,25	-60 to 325/350	**TR-110223**
	25	0,50	-60 to 325/350	**TR-110523**
	25	1,00	-60 to 325/350	**TR-111023**
	25	3,00	-60 to 280/300	**TR-113023**
	30	0,10	-60 to 325/350	**TR-110133**
	30	0,25	-60 to 325/350	**TR-110233**
	30	0,50	-60 to 325/350	**TR-110533**
	30	1,00	-60 to 325/350	**TR-111033**
	30	3,00	-60 to 280/300	**TR-113033**
	50	0,10	-60 to 325/350	**TR-110153**
	50	0,25	-60 to 325/350	**TR-110253**
	50	0,50	-60 to 325/350	**TR-110553**
	50	1,00	-60 to 325/350	**TR-111053**
	50	3,00	-60 to 280/300	**TR-113053**
	60	0,10	-60 to 325/350	**TR-110163**
	60	0,25	-60 to 325/350	**TR-110263**
	60	0,50	-60 to 325/350	**TR-110563**
	60	1,00	-60 to 325/350	**TR-111063**
	60	3,00	-60 to 280/300	**TR-113063**
	60	5,00	-60 to 260/280	**TR-115063**
0,53	10	2,65	-60 to 300/310	**TR-112645**
	15	0,10	-60 to 320/340	**TR-110115**
	15	0,50	-60 to 320/340	**TR-110515**
	15	1,50	-60 to 310/330	**TR-111515**
	15	3,00	-60 to 270/290	**TR-113015**
	15	5,00	-60 to 270/290	**TR-115015**
	15	7,00	-60 to 260/280	**TR-117015**
	25	0,10	-60 to 320/340	**TR-110125**
	25	0,50	-60 to 320/340	**TR-110525**
	25	1,50	-60 to 310/330	**TR-111525**
	25	3,00	-60 to 270/290	**TR-113025**
	25	5,00	-60 to 270/290	**TR-115025**
	30	0,10	-60 to 320/340	**TR-110135**
	30	0,50	-60 to 320/340	**TR-110535**
	30	0,88	-60 to 310/330	**TR-110835**
	30	1,50	-60 to 310/330	**TR-111535**
	30	2,65	-60 to 270/290	**TR-112635**
	30	3,00	-60 to 270/290	**TR-113035**
	30	5,00	-60 to 270/290	**TR-115035**
	30	7,00	-60 to 260/280	**TR-117035**
	50	0,10	-60 to 320/340	**TR-110155**
	50	0,50	-60 to 320/340	**TR-110555**
	50	1,50	-60 to 310/330	**TR-111555**
	50	3,00	-60 to 270/290	**TR-113055**
	50	5,00	-60 to 270/290	**TR-115055**
	60	0,10	-60 to 320/340	**TR-110165**
	60	0,50	-60 to 320/340	**TR-110565**
	60	1,50	-60 to 310/330	**TR-111565**
	60	3,00	-60 to 270/290	**TR-113065**
	60	5,00	-60 to 270/290	**TR-115065**
	60	7,00	-60 to 240/260	**TR-117065**
	100	3,00	-60 to 270/290	**TR-113095**
	105	3,00	-60 to 270/290	**TR-1130K5**

TRB-1HT/TKM-1HT

100% Dimethyl polysiloxane, bonded and crosslinked phase.

- Non-polar phase
- Produced specially for high temperature analyses (Max. temp. 400ºC)
- Available in fused silica (TRB-1HT) and metal tubing (TKM-1HT) add "**M**" at the end of the desired P/N
- Uses: analysis of compounds with high boiling point, triglycerides, waxes, etc.



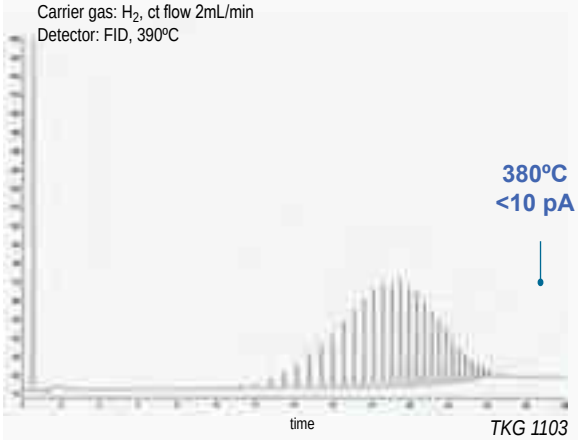
Structure of Poly (dimethyl) siloxane

TRB-1HT Equivalent Phase

Agilent: DB-1HT, Select Mineral Oil
Restek: Stx-1HT, Rxi-1HT
Phenomenex: ZB-1HT Inferno, ZB-XTSimDist
SGE: BPX1

TRB-1HT

Column: Retention Gap (intermediate polarity) 5 m x 0,53 mm (TR-200055) + **TRB-1HT** (TR-610113) 15 m x 0.32 mm x 0.10 µm
Oven: 50ºC (2 min) to 380ºC (5 min) @ 15ºC/min
Injection: 0,3 µL Poliwax 655 (0,1% in CS2), on column (sec. cool 30 s), 280ºC
Carrier gas: H_2, ct flow 2mL/min
Detector: FID, 390ºC



TKG 1103

TRB-1HT

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,10	-60 to 400	**TR-610112**
	30	0,10	-60 to 400	**TR-610132**
0,32	15	0,10	-60 to 400	**TR-610113**
	30	0,10	-60 to 400	**TR-610133**

TKM-1HT SimDist

100% Dimethyl polysiloxane, bonded and crosslinked phase.

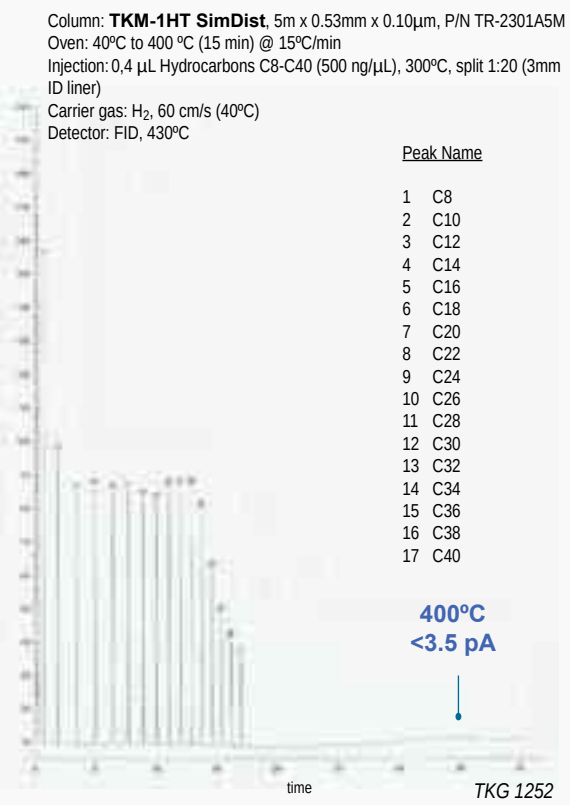
- True methyl silicone polarity
- Unbreakable, specially treated stainless steel
- Maximum temperature 430ºC
- Low bleed at 400ºC (Typical values of 4-6 pA)
- Distillation range C6 to C120

TKM-1HT SimDist Equivalent Phase

Agilent: DB-HT SimDist, CP-SimDist Ultimetal
Restek: MXT-1HT SimDist
Phenomenex: ZB-1HT Inferno, ZB-XTSimDist
SGE: BPX1
SUPELCO: HT5

TKM-1HT SimDist

Column: **TKM-1HT SimDist**, 5m x 0.53mm x 0.10µm, P/N TR-2301A5M
Oven: 40ºC to 400 ºC (15 min) @ 15ºC/min
Injection: 0,4 µL Hydrocarbons C8-C40 (500 ng/µL), 300ºC, split 1:20 (3mm ID liner)
Carrier gas: H_2, 60 cm/s (40ºC)
Detector: FID, 430ºC



TKG 1252

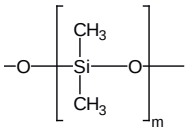
TKM-1HT SimDist

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,53	5	0,10	-60 to 400/430	**TR-2301A5M**
	5	0,15	-60 to 400/430	**TR-2313A5M**

TRB-1MS

100% Dimethyl polysiloxane, bonded and crosslinked phase.

- These columns gives identical selectivity to the TRB-1, fulfil column bleed specifications that make them compatible with analysis of trace components with GC/MS. Therefore, the standard column of 30 m x 0.25 mm x 0.25 µm has a guaranteed maximum bleed of 4 pA at 320 °C
- Great chemical inertness towards active compounds and excellent thermal stability
- Improved signal/noise ratio, which enables greater sensitivity with MS, ECD, NPD, SCD, etc. detectors and provides greater precision in quantitative analysis at trace levels
- Less column bleed means less detectors contamination and faster column conditioning



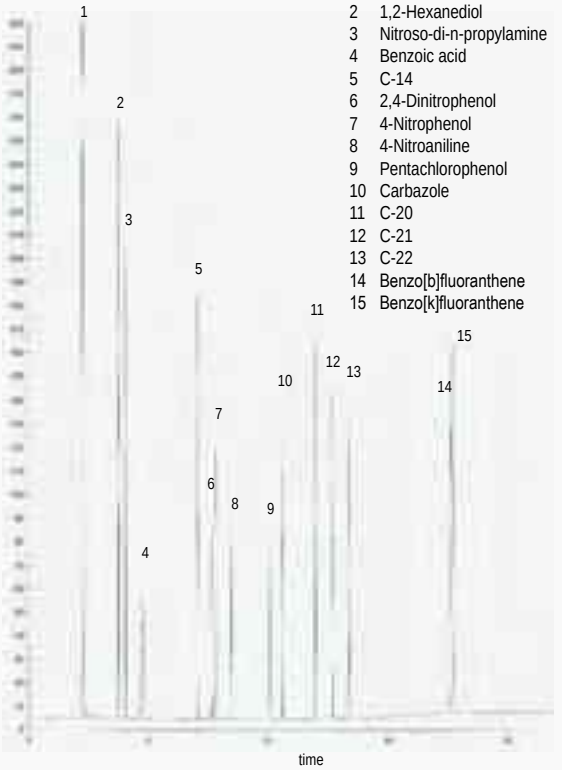
Structure of Poly (dimethyl) siloxane

TRB-1MS: MX5 Test

Column: **TRB-1MS**, 60m x 0.25mm x 0.25µm, P/N TR-510262
Oven: 100ºC to 325 ºC (5 min) @ 6ºC/min
Injection: 1µL Test MX5 (10 to 20 ng/comp. on column), split 1:100, 280ºC
Carrier gas: H_2, ct pressure 25 psi (172 kPa).
Detector: FID, 340 ºC

Peak Name

1 Methylene chloride
2 1,2-Hexanediol
3 Nitroso-di-n-propylamine
4 Benzoic acid
5 C-14
6 2,4-Dinitrophenol
7 4-Nitrophenol
8 4-Nitroaniline
9 Pentachlorophenol
10 Carbazole
11 C-20
12 C-21
13 C-22
14 Benzo[b]fluoranthene
15 Benzo[k]fluoranthene



TKG 1104

TRB-1MS Equivalent Phase

Agilent: HP-1MS, DB-1MS, VF-1MS, CP-SIL 5 CB MS
Restek: Rtx-1MS
Phenomenex: ZB-1MS
Macherey-Nagel: OPTIMA-1MS, OPTIMA-1MS Accent
Supelco: EQUITY-1
SGE: SOLGEL-1MS, BPX-1

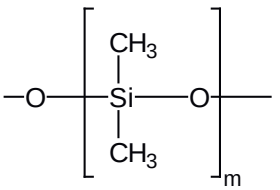
TRB-1MS

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	-60 to 325/350	**TR-510141**
	10	0,40	-60 to 325/350	**TR-510441**
	20	0,10	-60 to 325/350	**TR-510181**
	20	0,40	-60 to 325/350	**TR-510481**
0,18	20	0,18	-60 to 325/350	**TR-510984**
	40	0,18	-60 to 325/350	**TR-5109C4**
0,20	12	0,33	-60 to 325/350	**TR-5133B9**
	15	0,33	-60 to 325/350	**TR-513319**
	25	0,33	-60 to 325/350	**TR-513329**
	30	0,33	-60 to 325/350	**TR-513339**
	50	0,33	-60 to 325/350	**TR-513359**
	60	0,33	-60 to 325/350	**TR-513369**
0,25	15	0,10	-60 to 325/350	**TR-510112**
	15	0,25	-60 to 325/350	**TR-510212**
	15	1,00	-60 to 325/350	**TR-511012**
	30	0,10	-60 to 325/350	**TR-510132**
	30	0,25	-60 to 325/350	**TR-510232**
	30	1,00	-60 to 325/350	**TR-511032**
	60	0,10	-60 to 325/350	**TR-510162**
	60	0,25	-60 to 325/350	**TR-510262**
	60	1,00	-60 to 325/350	**TR-511062**
0,32	15	0,10	-60 to 325/350	**TR-510113**
	15	0,25	-60 to 325/350	**TR-510213**
	15	0,50	-60 to 325/350	**TR-510513**
	15	1,00	-60 to 325/350	**TR-511013**
	60	1,00	-60 to 325/350	**TR-511062**
	30	0,10	-60 to 325/350	**TR-510133**
	30	0,25	-60 to 325/350	**TR-510233**
	30	0,50	-60 to 325/350	**TR-510533**
	30	1,00	-60 to 325/350	**TR-511033**
	60	0,10	-60 to 325/350	**TR-510163**
	60	0,25	-60 to 325/350	**TR-510263**
	60	0,50	-60 to 325/350	**TR-510563**
	60	1,00	-60 to 325/350	**TR-511063**
0,53	15	0,50	-60 to 320/340	**TR-510515**
	15	1,00	-60 to 320/340	**TR-511015**
	15	1,50	-60 to 310/330	**TR-511515**
	30	0,50	-60 to 320/340	**TR-510535**
	30	1,00	-60 to 320/340	**TR-511035**
	30	1,50	-60 to 310/330	**TR-511535**

TRB-SULFUR

100% Dimethyl polysiloxane, bonded and crosslinked phase.

- Column specially designed for the analysis of sulphurous compounds (in natural gas, petrol derivates, wines, beer, etc.)
- Guaranteed thermal stability, with low column bleed



Structure of Poly (dimethyl) siloxane

TRB-SULFUR Equivalent Phase

Agilent: CP-Select CB for Sulfur, CP-Sil 5CB for Sulfur
Supelco: SPB-1 SULFUR

TRB-SULFUR

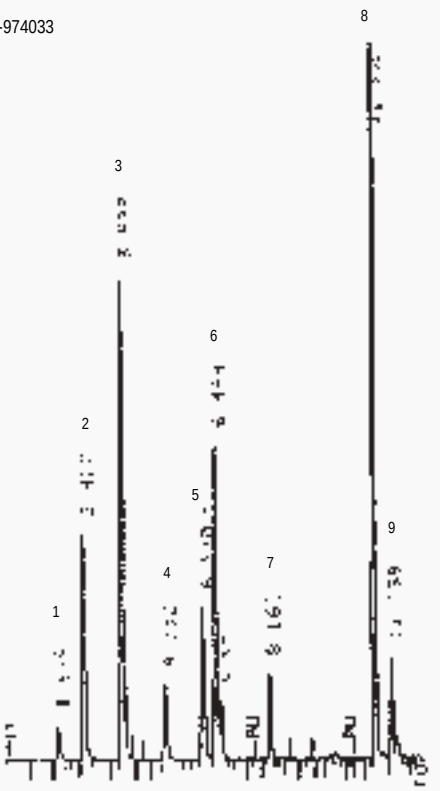
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,32	30	4,00	-60 to 270/290	**TR-974033**

TRB-SULFUR: MERCAPTANS

Column: **TRB-SULFUR** , 30 m x 0.32 mm x 4.0 µm, TR-974033

Peak Name

1 SH2
2 Methyl mercaptan
3 Ethyl mercaptan
4 2-Propylmercaptan
5 Terbutyl mercaptan
6 Methyl ethyl sulfide
7 1-Propylmercaptan
8 2-Butyl mercaptan
9 T.H.T.

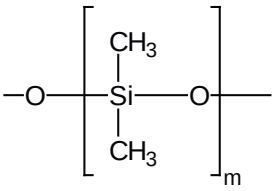


TKG 1105

TRB-PETROL

100% Dimethyl polysiloxane, bonded and crosslinked phase.

- Column for analyzing complex mixtures of hydrocarbons according to the ASTM regulations (American Society for Testing and Materials)
- Sufficient resolution power to undertake PNA, PONA and PIANO analysis



Structure of Poly (dimethyl) siloxane

TRB-PETROL Equivalent Phase

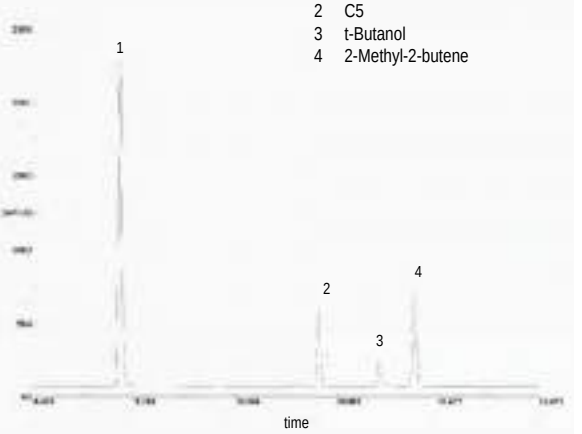
Agilent: DB-Petro,HP-1, CP-Sil PONA CB
Supelco: Petrocol DH
Phenomenex: ZB-DHA-PONA
Restek: Rtx-DHA-100
SGE: BP1 PONA

TRB-PETROL

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	100	0,50	-60 to 300/320	**TR-110592**

TRB-PETROL (PONA column) meets all ASTM specifications

	ASTM D-6730 Specifications
C5 efficiency (total theoretical plates): 618.503	450.000-550.000
K (C5): 0.47	0.45-0.50
t-Butanol skewness: 1.62	>1.00 - < 5.00
Resolution t-Butanol/2-Methylbutene-2: 4.41	3.25-5.25

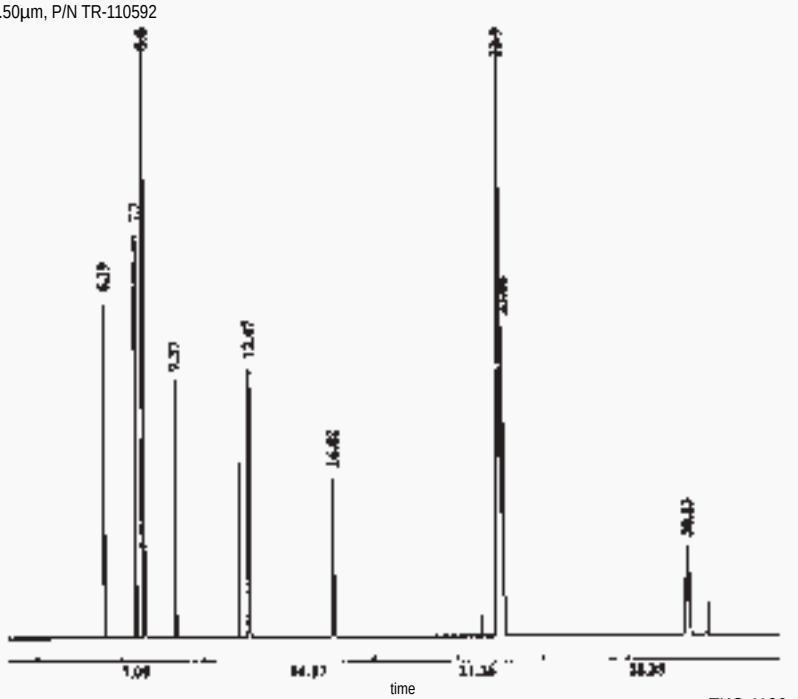


TKG 1254

TRB-PETROL: HYDROCARBONS

Column: **TRB-PETROL**, 100m x 0.25mm x 0.50µm, P/N TR-110592
Oven: 60ºC (isothermal)
Injector: 260ºC
Carrier gas: H_2, 34 psi
Injection: Test for hydrocarbons, split (1:100)
Detector: FID, 260º

tr (min.)	Compound
6.39	n-Hexane
7.70	Benzene
8.03	Cyclohexane
9.37	n-Heptane
12.47	Toluene
16.02	n-Octane
22.93	m-Xylene
23.08	p-Xylene
30.83	n-Nonane

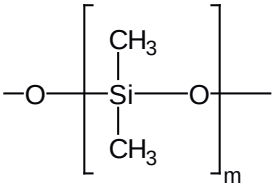


TKG 1106

TRB-50.2PONA

100% Dimethyl polysiloxane, bonded and crosslinked phase.

- Column designed for the complete analysis of PONA hydrocarbons (Paraffins, Olefins, Naphthenes and Aromatics) in petrol-derived products according to the ASTM regulations, method D5134



Structure of Poly (dimethyl) siloxane

TRB-50.2PONA Equivalent Phase

Agilent: HP-PONA, CP-SIL PONA CB, HP-1
Supelco: Petrocol DH 50.2
Restek: Rtx-DHA-50
SGE: BP1 PONA
Phenomenex: ZB-DHA-PONA

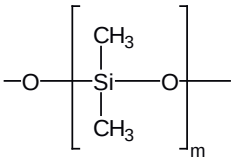
TRB-50.2PONA

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,20	50	0,50	-60 to 320/340	**TR-110559**

TRB-2887 / TKM-2887

100% Dimethyl polysiloxane, bonded and crosslinked phase.

- 100% Dimethylpolysiloxane
- Designed specifically for simulated distillation according to the ASTM method D2887
- Available in fused silica (TRB-2887) and metal Tubing (TKM-2887)



Structure of Poly (dimethyl) siloxane

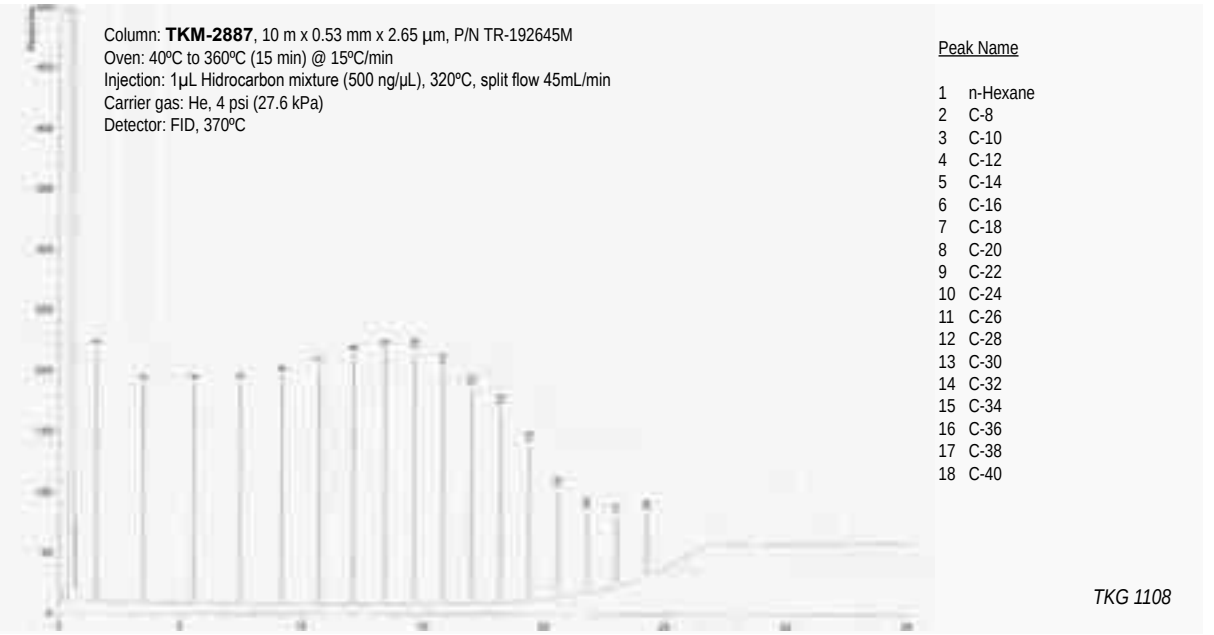
TRB-2887/ TKM-2887 Equivalent Phase

Agilent: DB-2887
Supelco: Petrocol-2887; Petrocol-EX2887
Restek: Rtx-2887, MXT-2887
Phenomenex: ZB-1HT Inferno, ZB-1XT SimDist
SGE: BPX1, BP1 PONA

TRB-2887/ TKM-2887

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,53	10	2,65	-60 to 340/360	**TR-192645**
0,53	10	2,65	-60 to 360/400	**TR-192645M**

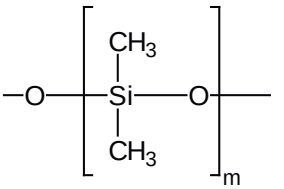
TKM-2887: HYDROCARBONS C6-C40



TRB-Petro.150

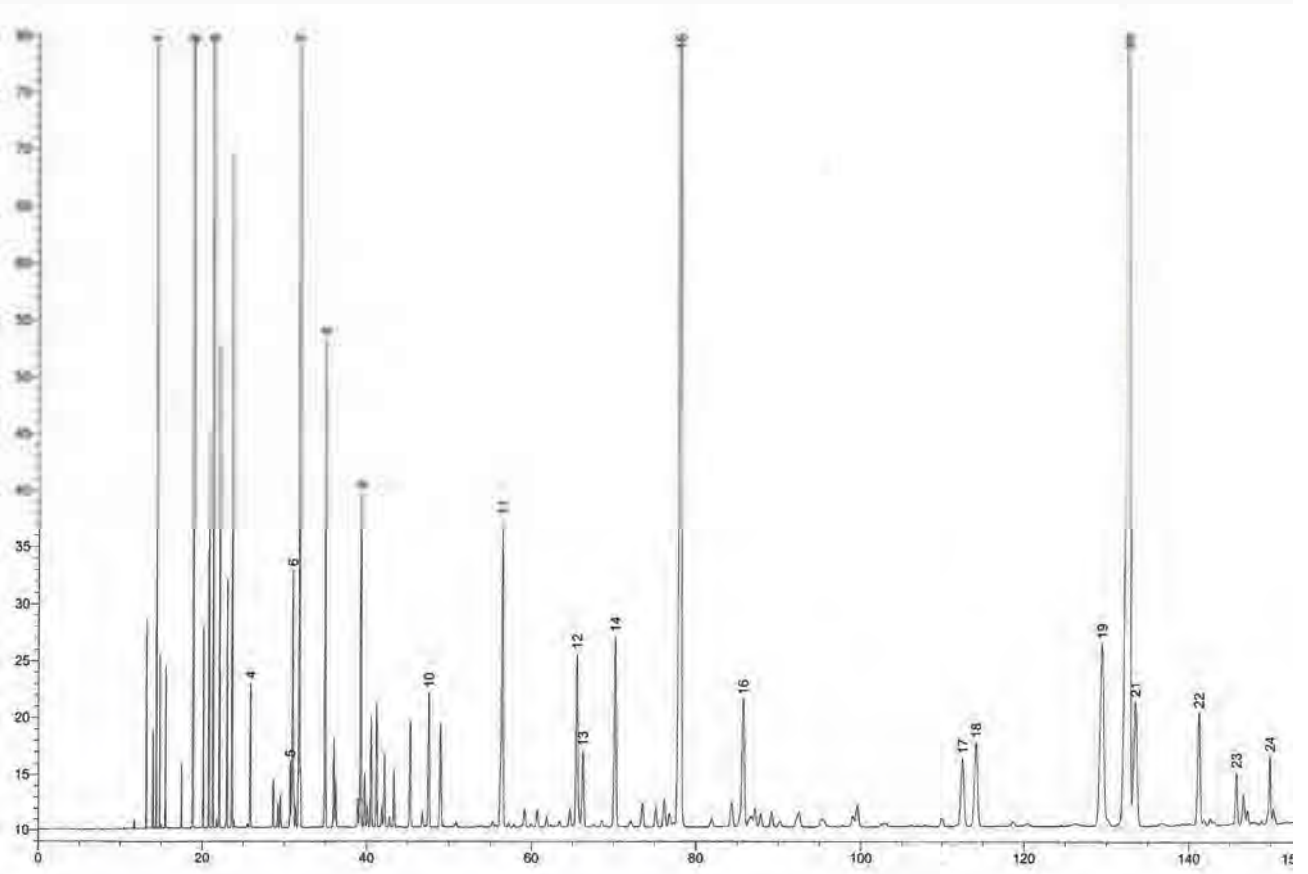
100% Dimethyl polysiloxane, bonded and crosslinked phase.

- Maximum resolution for hydrocarbon analysis



Structure of Poly (dimethyl) siloxane

TRB-PETRO.150



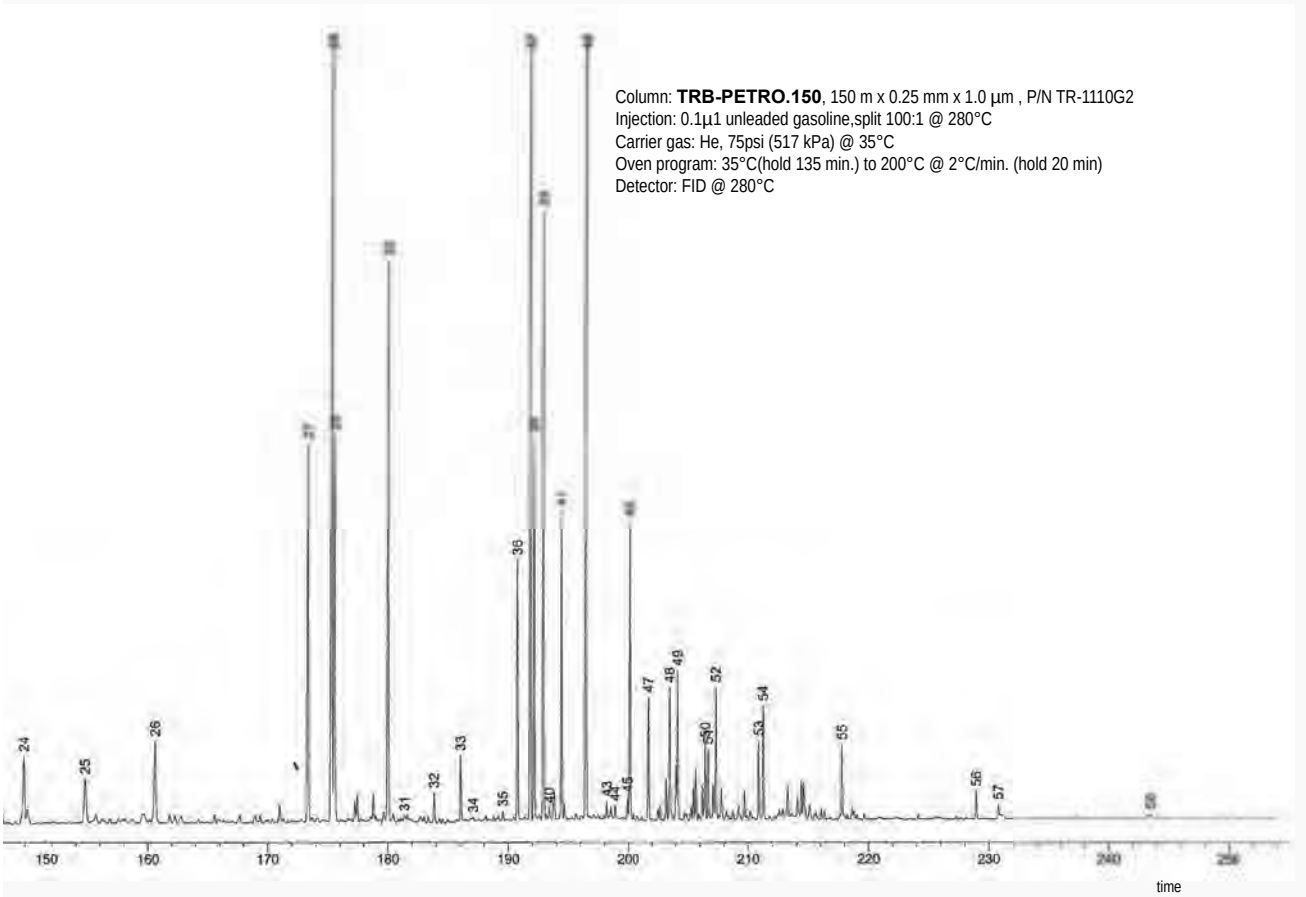
1	n-Butane	11	Benzene	21	2,3,3- Trimethylpentane
2	Isopentane	12	2-Methylhexane	22	2,3-Dimethylhexane
3	n-Pentane	13	2,3-Dimethylpentane	23	2-Methylheptane
4	2,2-Dimethylbutane	14	3-Methylhexane	24	3-Methylheptane
5	Cyclopentane	15	2,2,4- Trimethylpentane	25	2-Methyl-1-heptene
6	2,3-Dimethylbutane	16	n-Heptane	26	n-Octane
7	2-Methylpentane	17	2,5-Dimethylhexane	27	Ethylbenzene
8	3-Methylpentane	18	2,4-Dimethylhexane	28	m-Xylene
9	n-Hexane	19	2,3,4-Trimethylpentane	29	p-Xylene
10	2,4-Dimethylpentane	20	Toluene	30	o-Xylene

TRB-Petro.150 Equivalent Phase

Agilent: DB-1, CP-Sil PONA CB
Supelco: Petrocol DH 150
Restek: Rtx-DHA-150
Phenomenex: ZB-DHA-PONA
SGE: BP1 PONA

TRB-Petro.150

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	**1**50	1,00	-60 to 300/320	**TR-1110G2**



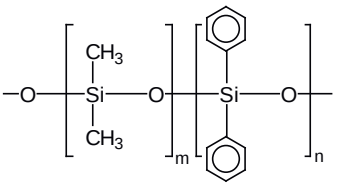
31 1-Nonene
32 n-Nonane
33 Isopropylbenzene
34 3,3,5- Trimethylheptane
35 2,4,5- Trimethylheptane
36 n-Propylbenzene
37 1-Methyl-3-ethylbenzene
38 1-Methyl-4-ethylbenzene
39 1,3,5-Trimethylbenzene
40 3,3,4- Trimethylheptane
41 1-Methyl-2-ethylbenzene
42 1,2,4- Trimethylbenzene
43 Isobuthylbenzene
44 sec-Buthylbenzene
45 n-Decane
46 1,2,3- Trimethylbenzene
47 Indane
48 1,3-Diethylbenzene
49 n-Butylbenzene
50 1,4-Dimethyl-2-ethylbenzene
51 1,3- Dimethyl-4-ethylbenzene
52 1,2-Dimethyl-4-ethylbenzene
53 1,2,4,5- Tetramethylbenzene
54 1,2,3,5-Tetramethylbenzene
55 Naphthalene
56 2-Methylnaphthalene
57 1-Methylnaphthalene
58 Dimethylnaphthalenes

Teknokroma Capillary Columns

TRB-5

95% Dimethyl- 5% diphenyl polysiloxane, bonded and crosslinked phase.

- Most versatile and universal stationary phase in the gas chromatography analysis field
- Characteristic affinity towards compounds with aromatic rings.
- Great thermal stability and chemical inertness for analizing acidic and basic compounds
- Ideal for analysis in the environmental field; dioxines, PCB´s, PCT´s, polyaromatic compounds, phenols, herbicides, organochlorinated and organophosphorus pesticides, aromatic hydrocarbons, solvents, drugs, oils,etc...



Structure of Poly (dimethyldiphenyl) siloxane

TRB-5 Equivalent Phase

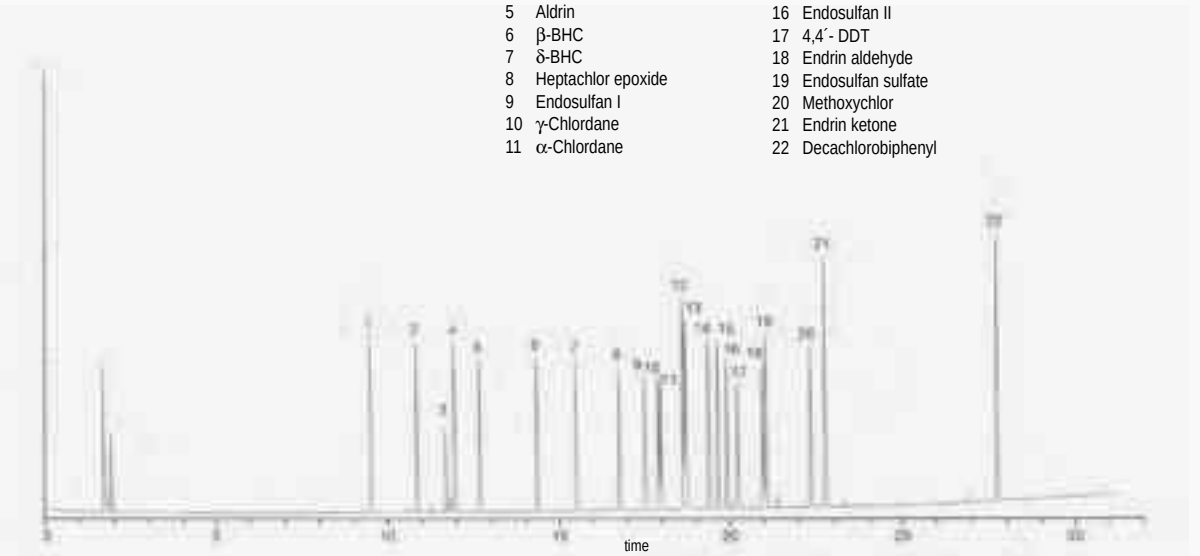
Restek: Rtx-5
Agilent: HP-5, Ultra-2, DB-5, CP-SIL8CB
Supelco: SPB-5, MDN-5
Macherey-Nagel: OPTIMA-5
Phenomenex: ZB-5
SGE: BP5

TRB-5: CHLORINATED PESTICIDES

Column: **TRB-5**, 30 m x 0.25 mm x 0.25 µm, P/N TR-120232
Injection: 1µL chlorinated pesticides mixture, splitless @ 230ºC (25-270 ppb on column)
Oven: 150ºC to 225ºC (10 min.) @ 2ºC/min
Carrier gas: H_2, ct pressure 12 psi (87.7 kPa) 150ºC
Detector: ECD, 310ºC

Peak Name

1	2,4,5,6-Tetrachloro-*m*-xylene	12	4,4´- DDE
2	γ-BHC	13	Dieldrin
3	δ-BHC	14	Endrin
4	Heptachlor	15	4,4´- DDD
5	Aldrin	16	Endosulfan II
6	β-BHC	17	4,4´- DDT
7	δ-BHC	18	Endrin aldehyde
8	Heptachlor epoxide	19	Endosulfan sulfate
9	Endosulfan I	20	Methoxychlor
10	γ-Chlordane	21	Endrin ketone
11	α-Chlordane	22	Decachlorobiphenyl



TKG 1109

TRB-5

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	-60 to 325/350	**TR-120141**
	10	0,17	-60 to 320/350	**TR-121941**
	10	0,33	-60 to 320/350	**TR-123341**
	10	0,40	-60 to 320/350	**TR-120441**
	20	0,10	-60 to 325/350	**TR-120181**
	20	0,40	-60 to 320/350	**TR-120481**
0,18	10	0,18	-60 to 325/350	**TR-120944**
	10	0,40	-60 to 325/350	**TR-120444**
	20	0,18	-60 to 325/350	**TR-120984**
	20	0,40	-60 to 325/350	**TR-120484**
	40	0,18	-60 to 325/350	**TR-1209C4**
0,20	12	0,18	-60 to 325/350	**TR-1233B9**
	15	0,15	-60 to 325/350	**TR-121319**
	15	0,35	-60 to 325/350	**TR-120319**
	15	0,50	-60 to 325/350	**TR-120519**
	25	0,15	-60 to 325/350	**TR-121329**
	25	0,33	-60 to 325/350	**TR-123329**
	25	0,35	-60 to 325/350	**TR-120329**
	25	0,50	-60 to 325/350	**TR-120529**
	30	0,15	-60 to 325/350	**TR-121339**
	30	0,35	-60 to 325/350	**TR-120339**
	30	0,50	-60 to 325/350	**TR-120539**
	50	0,15	-60 to 325/350	**TR-121359**
	50	0,33	-60 to 325/350	**TR-123359**
	50	0,35	-60 to 325/350	**TR-120359**
	50	0,50	-60 to 325/350	**TR-120559**
	60	0,15	-60 to 325/350	**TR-121369**
	60	0,35	-60 to 325/350	**TR-120369**
	60	0,50	-60 to 325/350	**TR-120569**
0,25	15	0,10	-60 to 325/350	**TR-120112**
	15	0,25	-60 to 325/350	**TR-120212**
	15	0,50	-60 to 325/350	**TR-120512**
	15	1,00	-60 to 320/350	**TR-121012**
	25	0,10	-60 to 325/350	**TR-120122**
	25	0,25	-60 to 325/350	**TR-120222**
	25	0,50	-60 to 325/350	**TR-120522**
	25	1,00	-60 to 320/350	**TR-121022**
	30	0,10	-60 to 325/350	**TR-120132**
	30	0,25	-60 to 325/350	**TR-120232**
	30	0,50	-60 to 325/350	**TR-120532**
	30	1,00	-60 to 320/350	**TR-121032**
	50	0,10	-60 to 325/350	**TR-120152**
	50	0,25	-60 to 325/350	**TR-120252**
	50	0,50	-60 to 325/350	**TR-120552**
	50	1,00	-60 to 320/350	**TR-121052**
	60	0,10	-60 to 325/350	**TR-120162**
	60	0,25	-60 to 325/350	**TR-120262**
	60	0,50	-60 to 325/350	**TR-120562**
	60	1,00	-60 to 325/350	**TR-121062**
0,32	15	0,10	-60 to 325/350	**TR-120113**
	15	0,25	-60 to 325/350	**TR-120213**

TRB-5

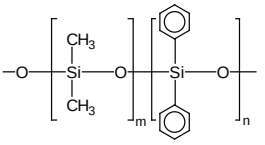
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,32	15	0,50	-60 to 325/350	**TR-120513**
	15	1,00	-60 to 325/350	**TR-121013**
	15	3,00	-60 to 280/350	**TR-123013**
	25	0.10	-60 to 325/350	**TR-120123**
	25	0,25	-60 to 325/350	**TR-120223**
	25	0,50	-60 to 325/350	**TR-120523**
	25	1,00	-60 to 325/350	**TR-121023**
	25	3,00	-60 to 280/350	**TR-123023**
	30	0,10	-60 to 325/350	**TR-120133**
	30	0,25	-60 to 325/350	**TR-120233**
	30	0,50	-60 to 325/350	**TR-120533**
	30	1,00	-60 to 325/350	**TR-121033**
	30	3,00	-60 to 280/350	**TR-123033**
	50	0,10	-60 to 325/350	**TR-120153**
	50	0,25	-60 to 325/350	**TR-120253**
	50	0,50	-60 to 325/350	**TR-120553**
	50	1,00	-60 to 325/350	**TR-121053**
	50	3,00	-60 to 280/350	**TR-123053**
	60	0,10	-60 to 325/350	**TR-120163**
	60	0,25	-60 to 325/350	**TR-120263**
	60	0,50	-60 to 325/350	**TR-120563**
	60	1,00	-60 to 325/350	**TR-121063**
	60	3,00	-60 to 280/350	**TR-123063**
0,53	10	2,65	-60 to 270/290	**TR-122645**
	15	0,10	-60 to 320/340	**TR-120115**
	15	0,50	-60 to 320/340	**TR-120515**
	15	1,50	-60 to 310/330	**TR-121515**
	15	3,00	-60 to 270/290	**TR-123015**
	15	5,00	-60 to 270/290	**TR-125015**
	25	0,10	-60 to 320/340	**TR-120125**
	25	0,50	-60 to 320/340	**TR-120525**
	25	1,50	-60 to 310/330	**TR-121525**
	25	3,00	-60 to 270/290	**TR-123025**
	25	5,00	-60 to 270/290	**TR-125025**
	30	0,10	-60 to 320/340	**TR-120135**
	30	0,50	-60 to 320/340	**TR-120535**
	30	0,88	-60 to 310/330	**TR-120835**
	30	1,50	-60 to 310/330	**TR-121535**
	30	2,65	-60 to 270/290	**TR-122635**
	30	3,00	-60 to 270/290	**TR-123035**
	30	5,00	-60 to 270/290	**TR-125035**
	50	0,10	-60 to 320/340	**TR-120155**
	50	0,50	-60 to 320/340	**TR-120555**
	50	1,50	-60 to 310/330	**TR-121555**
	50	3,00	-60 to 270/290	**TR-123055**
	50	5,00	-60 to 270/290	**TR-125055**
	60	0,10	-60 to 320/340	**TR-120165**
	60	0,50	-60 to 320/340	**TR-120565**
	60	1,50	-60 to 310/330	**TR-121565**
	60	3,00	-60 to 270/290	**TR-123065**
	60	5,00	-60 to 270/290	**TR-125065**

Teknokroma Capillary Columns

TRB-5HT / TKM-5HT

95% Dimethyl- 5% diphenyl polysiloxane, bonded and crosslinked phase.

- Produced specially for analysis at high temperature up to 400ºC
- Available in fused silica (TRB-5HT) and metal tubing (TKM-5HT) add "**M**" at the end of the desired P/N
- Excellent symmetry for compounds with high boiling points
- For analysis of waxes, triglycerides, sterol esters, polyoxyethylenated alcohols, etc.



Structure of Poly (dimethyldiphenyl) siloxane

TRB-5HT Equivalent Phase

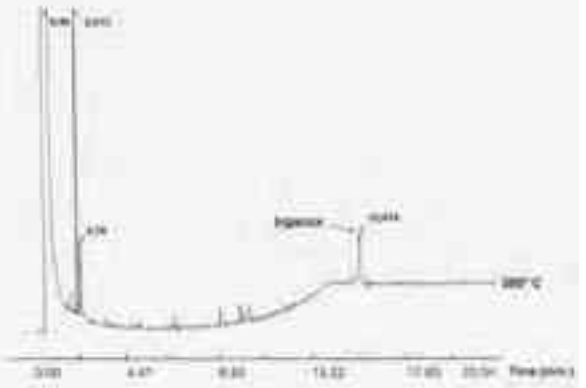
Agilent: DB-5HT, VF-5HT
Phenomenex: ZB-5HT Inferno
Restek: Rxi-5HT, MTX-5HT

TRB-5HT

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,10	-60 to 400	**TR-620112**
	30	0,10	-60 to 400	**TR-620132**
0,32	15	0,10	-60 to 400	**TR-620113**
	30	0,10	-60 to 400	**TR-620133**

TRB-5HT: Irganox ® 1010

Column: **TRB-5HT,** 15m x 0,25 mm x 0,10 µm, P/N TR-620112
Injection: 1µL (Irganox 1010, 12 mg/ml chloroform), split (1:60), 370ºC
Carrier gas: H2, 6psi (41,3 kPa)
Oven: 150°C to 380ºC (10 min) @ 30°C/min
Detector: FID to 390°C

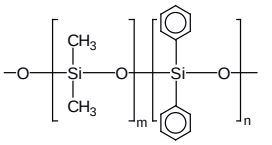


TKG 1110

TRB-STEROL

95% Dimethyl- 5% diphenyl polysiloxane, bonded and crosslinked phase.

- Column specifically designed for the analysis of complex mixtures of sterols, from either animal or plant origin.
- The deactivation layer developed by Teknokroma, guarantees high chemical inertness and low bleeding level.
- Allows analysis of sterols without derivatization.
- Column specifically tested for sterols



Structure of Poly (dimethyldiphenyl) siloxane

TRB-STEROL Equivalent Phase

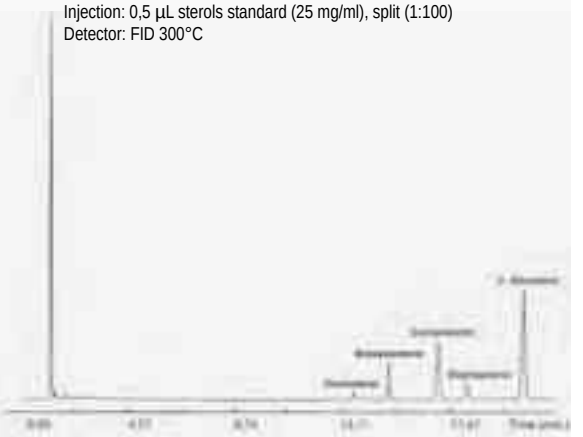
Supelco: SAC-5

TRB-STEROL

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,22	30	0,22	-60 to 325-350	**TR-182238**
	30	0,12	-60 to 325-350	**TR-180738**

TRB-STEROL: Sterols

Column: **TRB-STEROL,** 30m x 0,22 mm x 0,22 µm, P/N TR-182238
Oven: 265ºC
Injector: 280ºC
Carrier gas: H2, 18 psi (124 kPa)
Injection: 0,5 µL sterols standard (25 mg/ml), split (1:100)
Detector: FID 300°C

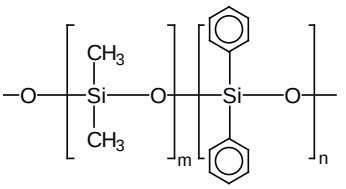


TKG 1111

TRB-5MS

95% Dimethyl- 5% diphenyl polysiloxane, bonded and crosslinked phase.

- Same polarity as TRB-5, but the polymer synthesis, the deactivation process and the bonding and crosslinking procedures have been optimized to obtain minimum bleeding and exceptional chemical inertness. Ideal for MS detectors.
- The bleeding specifications for a column of 30 m x 0,25 mm x 0,25 µm (P/N 520232) indicate that it is lower than 4 pA at 320ºC.
- Column recommended to work with any selective detector



Structure of Poly (dimethyldiphenyl) siloxane

TRB-5MS Equivalent Phase

Restek: Rtx-5ms
Agilent: HP-5MS, CP-Sil8-CB MS, PAS-5
Supelco: Equity-5
Macherey-Nagel: OPTIMA-5ms
Phenomenex: ZB-5MSi

TRB-5MS

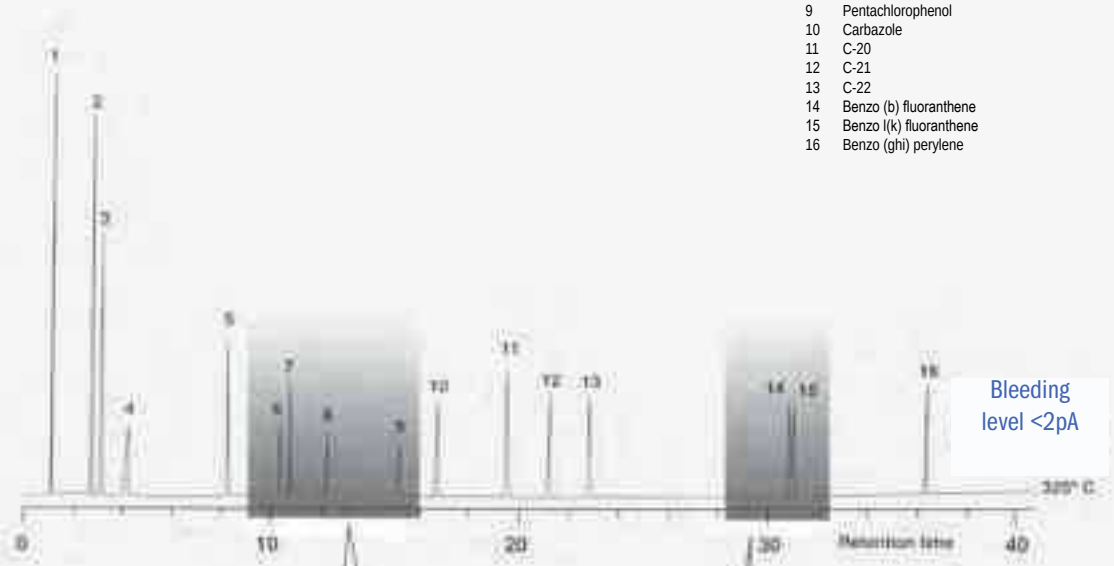
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	-60 to 325-350	**TR-520141**
	10	0,40	-60 to 325-350	**TR-520441**
	20	0,10	-60 to 325-350	**TR-520181**
	20	0,40	-60 to 325-350	**TR-520481**
0,18	20	0,18	-60 to 325-350	**TR-520984**
	40	0,18	-60 to 325-350	**TR-5209C4**
0,20	12	0,33	-60 to 325-350	**TR-5233B9**
	15	0,33	-60 to 325-350	**TR-523319**
	25	0,33	-60 to 325-350	**TR-523329**
	30	0,33	-60 to 325-350	**TR-523339**
	50	0,33	-60 to 325-350	**TR-523359**
	60	0,33	-60 to 325-350	**TR-523369**
0,25	15	0,10	-60 to 325-350	**TR-520112**
	15	0,25	-60 to 325-350	**TR-520212**
	15	1,00	-60 to 325-350	**TR-521012**
	30	0,10	-60 to 325-350	**TR-520132**
	30	0,25	-60 to 325-350	**TR-520232**
	30	1,00	-60 to 325-350	**TR-521032**
	60	0,10	-60 to 325-350	**TR-520162**
	60	0,25	-60 to 325-350	**TR-520262**
	60	1,00	-60 to 325-350	**TR-521062**
0,32	15	0,10	-60 to 325-350	**TR-520113**
	15	0,25	-60 to 325-350	**TR-520213**
	15	0,50	-60 to 325-350	**TR-520513**
	15	1,00	-60 to 325-350	**TR-521013**
	30	0,10	-60 to 325-350	**TR-520133**
	30	0,25	-60 to 325-350	**TR-520233**
	30	0,50	-60 to 325-350	**TR-520533**
	30	1,00	-60 to 325-350	**TR-521033**
	60	0,10	-60 to 325-350	**TR-520163**
	60	0,25	-60 to 325-350	**TR-520263**
	60	0,50	-60 to 325-350	**TR-520563**
	60	1,00	-60 to 325-350	**TR-521063**
0,53	15	0,50	-60 to 320-340	**TR-520515**
	15	1,00	-60 to 320-340	**TR-521015**
	15	1,50	-60 to 310-330	**TR-521515**
	30	0,50	-60 to 320-340	**TR-520535**
	30	1,00	-60 to 320-340	**TR-521035**
	30	1,50	-60 to 310-330	**TR-521535**

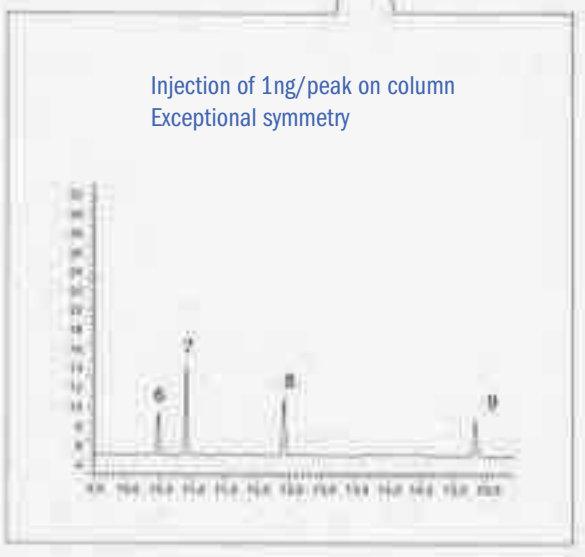
The TRB-5MS column has an excellent resolution and symmetry in all polarity range, for neutral, acid and basic compounds. All these substances that appear in the analysis of semivolatile traces (for example, EPA official methods) can be analyzed in only one column.

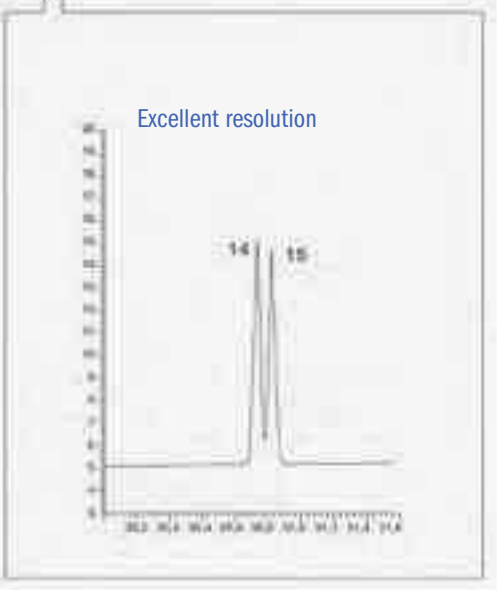
TRB-5MS: Test MX5

Column: **TRB-5MS,** 30 m x 0,25 mm x 0,25 µm, P/N TR-520232
Injection: 1µL, split (1:100), 5 to 10 ng/comp. on column, 280ºC
Carrier gas: H_2, 12 psi (87,7 kPa)
Oven: 100°C to 325ºC (5 min) @ 6°C/min
Detector: FID, 300°C
Sample: Test MX5

Peak Name	
1	Methylene chloride
2	1,2-Hexanediol
3	Nitroso-di-n-propylamine
4	Benzoic acid
5	C-14
6	2,4-Dinitrophenol
7	4-Nitrophenol
8	4-Nitroaniline
9	Pentachlorophenol
10	Carbazole
11	C-20
12	C-21
13	C-22
14	Benzo (b) fluoranthene
15	Benzo l(k) fluoranthene
16	Benzo (ghi) perylene





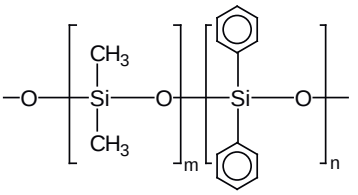


TKG 1112

TRB-5AMINE

95% Dimethyl- 5% diphenyl polysiloxane, bonded and crosslinked phase.

- Column specially designed for the analysis of amines
- Proprietary deactivation that minimizes absorption and tailing of basic compounds, like alkylamines, alcoholamines, basic pharmaceuticals, aromatic amines, etc.
- Selectivity and thermal stability equivalent to the TRB-5 columns



Structure of Poly (dimethyldiphenyl) siloxane

TRB-5AMINE Equivalent Phase

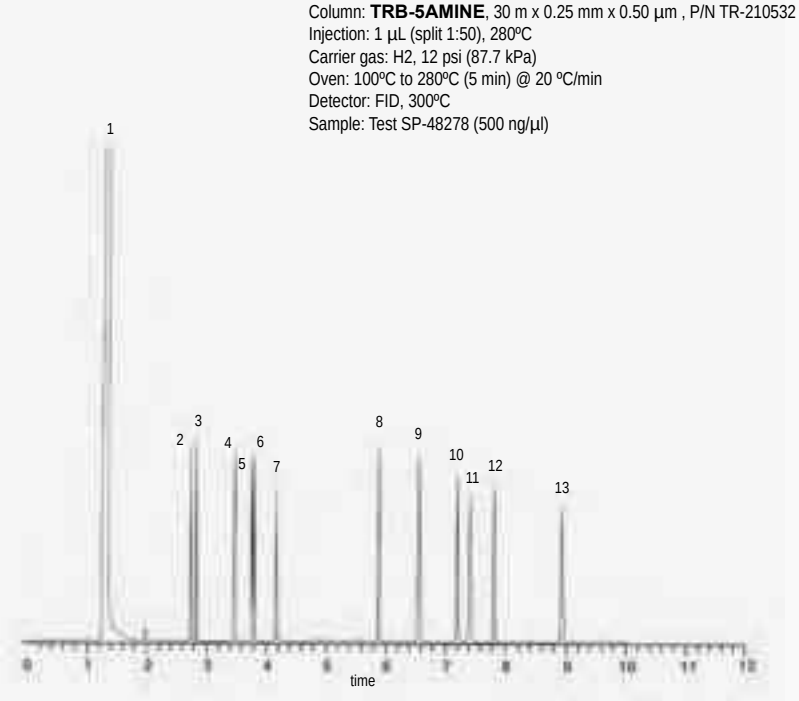
Agilent: CP-Sil 8 CB for Amines
Restek: Rtx-5Amine
Supelco: PTA-5
Macherey-Nagel: OPTIMA-5A

TRB-5AMINE

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,50	-60 to 300/315	**TR-210512**
	15	1,00	-60 to 300/315	**TR-211012**
	30	0,50	-60 to 300/315	**TR-210532**
	30	1,00	-60 to 300/315	**TR-211032**
	60	0,50	-60 to 300/315	**TR-210562**
	60	1,00	-60 to 300/315	**TR-211062**
0,32	15	0,50	-60 to 300/315	**TR-210513**
	15	1,00	-60 to 300/315	**TR-211013**
	15	1,50	-60 to 290/305	**TR-211513**
	30	0,50	-60 to 300/315	**TR-210533**
	30	1,00	-60 to 300/315	**TR-211033**
	30	1,50	-60 to 290/305	**TR-211533**
	60	0,50	-60 to 300/315	**TR-210563**
	60	1,00	-60 to 300/315	**TR-211063**
	60	1,50	-60 to 290/305	**TR-211563**
0,53	15	1,00	-60 to 290/305	**TR-211015**
	15	3,00	-60 to 280/295	**TR-213015**
	30	1,00	-60 to 290/305	**TR-211035**
	30	3,00	-60 to 280/295	**TR-213035**
	60	1,00	-60 to 290/305	**TR-211065**
	60	3,00	-60 to 280/295	**TR-213065**

TRB-5AMINE: Amines Test

Column: **TRB-5AMINE**, 30 m x 0.25 mm x 0.50 µm , P/N TR-210532
Injection: 1 µL (split 1:50), 280ºC
Carrier gas: H2, 12 psi (87.7 kPa)
Oven: 100ºC to 280ºC (5 min) @ 20 ºC/min
Detector: FID, 300ºC
Sample: Test SP-48278 (500 ng/µl)



Peak Name

1 Methyl tert-butyl ether
2 Benzylamine
3 n-Octylamine
4 n-Nonylamine
5 2,4-Dimethylaniline
6 2,6-Dimethylaniline
7 n-Decylamine
8 C-15
9 C-16
10 C-17
11 Tri-n-hexylamine
12 C-18
13 C-20

TKG 1113

Teknokroma Capillary Columns

MetAmine-VOL

- For separation of volatile amines (optimized separation) and alcohols.
- Fully compatible with water samples
- Good peak shape for volatile alcohols

MetAmine-VOL Equivalent Phase

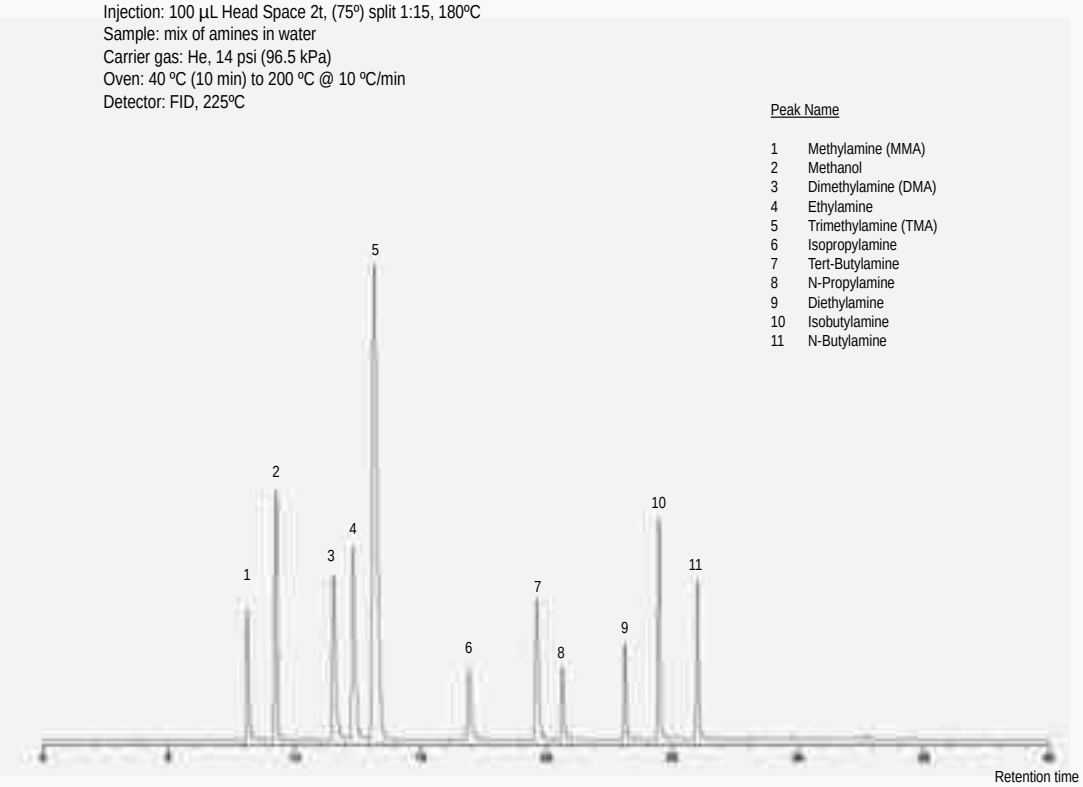
Agilent: CP-Volamine
Restek: Rtx-Volatile Amine

MetAmine-VOL

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,32	15	Optimized	260/280	**TR-635013**
	30	Optimized	260/280	**TR-635033**
	60	Optimized	260/280	**TR-635063**

MetAmine-VOL: Volatile Amines in water

Column: **MetAmine-VOL**, 60 m x 0.32 mm, P/N TR-635063
Injection: 100 µL Head Space 2t, (75º) split 1:15, 180ºC
Sample: mix of amines in water
Carrier gas: He, 14 psi (96.5 kPa)
Oven: 40 ºC (10 min) to 200 ºC @ 10 ºC/min
Detector: FID, 225ºC

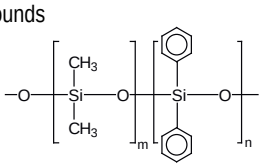


TKG 1256

TRB-5.625

95% Dimethyl- 5% diphenyl polysiloxane, bonded and crosslinked phase.

- Column specially manufactured to fulfil the level of inertness required by the EPA methods for the analysis of semivolatile compounds, designed for methods 625, 1625, 8270 and CLP protocols
- Inertness and minimum absorption of acidic, basic and neutral compounds



Structure of Poly (dimethyldiphenyl) siloxane

TRB-5.625 Equivalent Phase

Supelco: PTE-5
Agilent: DB-5.625

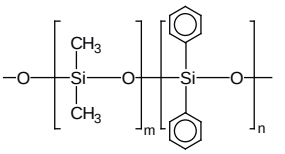
TRB-5.625

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	20	0,18	-60 to 325/350	**TR-260984**
	20	0,36	-60 to 325/350	**TR-263484**
0,20	12	0,33	-60 to 325/350	**TR-2633B9**
	25	0,33	-60 to 325/350	**TR-263329**
	50	0,33	-60 to 325/350	**TR-263359**
0,25	15	0,10	-60 to 325/350	**TR-260112**
	15	0,25	-60 to 325/350	**TR-260212**
	15	0,50	-60 to 325/350	**TR-260512**
	15	1,00	-60 to 325/350	**TR-261012**
	30	0,10	-60 to 325/350	**TR-260132**
	30	0,25	-60 to 325/350	**TR-260232**
	30	0,50	-60 to 325/350	**TR-260532**
	30	1,00	-60 to 325/350	**TR-261032**
	60	0,10	-60 to 325/350	**TR-260162**
	60	0,25	-60 to 325/350	**TR-260262**
0,32	15	0,10	-60 to 325/350	**TR-260113**
	15	0,25	-60 to 325/350	**TR-260213**
	15	0,50	-60 to 325/350	**TR-260513**
	15	1,00	-60 to 325/350	**TR-261013**
	30	0,10	-60 to 325/350	**TR-260133**
	30	0,25	-60 to 325/350	**TR-260233**
	30	0,50	-60 to 325/350	**TR-260533**
	30	1,00	-60 to 325/350	**TR-261033**
	60	0,10	-60 to 325/350	**TR-260163**
0,53	15	1,50	-60 to 320/340	**TR-261515**
	30	0,50	-60 to 320/340	**TR-260535**
	30	1,00	-60 to 310/330	**TR-261035**
	60	0,25	-60 to 325/350	**TR-260265**

TRB-G27

95% Dimethyl- 5% diphenyl polysiloxane, bonded and crosslinked phase.

- Fulfils the specifications of the American Pharmacopea (USP) for the analysis of organic volatile impurities (OVI) in pharmaceutical products (Methods <USP 467>).



Structure of Poly (dimethyldiphenyl) siloxane

TRB-G27 Equivalent Phase

Restek: Rtx-G27
Supelco: G27

TRB-G27

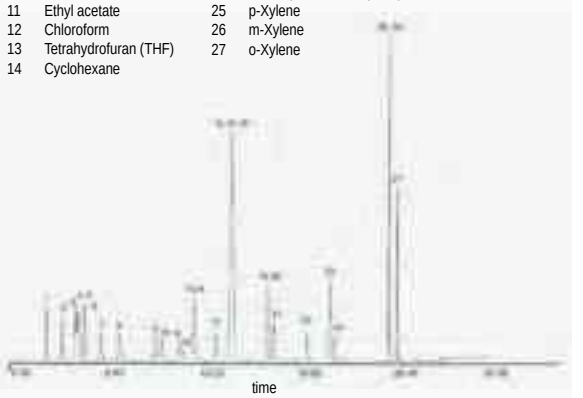
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,53	30	5,00	-60 to 270/290	**TR-175035**

TRB-G27: Residual solvents in pharmaceutical products

Column: **TRB-G27**, 30 m x 0,53 mm x 5,0 µm, P/N TR-175035
Injection: 220ºC, split 1:80, 5 m phenylmethyl deactivated retention gap
Carrier Gas: He, 4.5 psi (31 kPa), 35 cm/s to 35ºC
Oven: 35ºC (10 min) to 100ºC @ 5ºC /min to 240ºC (5 min) @ 25ºC/min
Detector: FID, 250ºC
Sample: 0,02 µL solvent mixture

Peak Name

1	Methanol	15	1,2-Dicholoroethane
2	Ethanol	16	Benzene
3	Acetonitrile	17	Carbon tetrachloride
4	Acetone	18	n-Butanol
5	Isopropanol	19	n-Heptane
6	Ethyl ether	20	Trichloroethylene
7	Methylene chloride	21	1,4-Dioxane
8	n-Propanol	22	Pyridine
9	Methyl ethyl ketone (MEK)	23	Toluene
10	n-Hexane	24	Dimethylformamide (DMF)
11	Ethyl acetate	25	p-Xylene
12	Chloroform	26	m-Xylene
13	Tetrahydrofuran (THF)	27	o-Xylene
14	Cyclohexane		

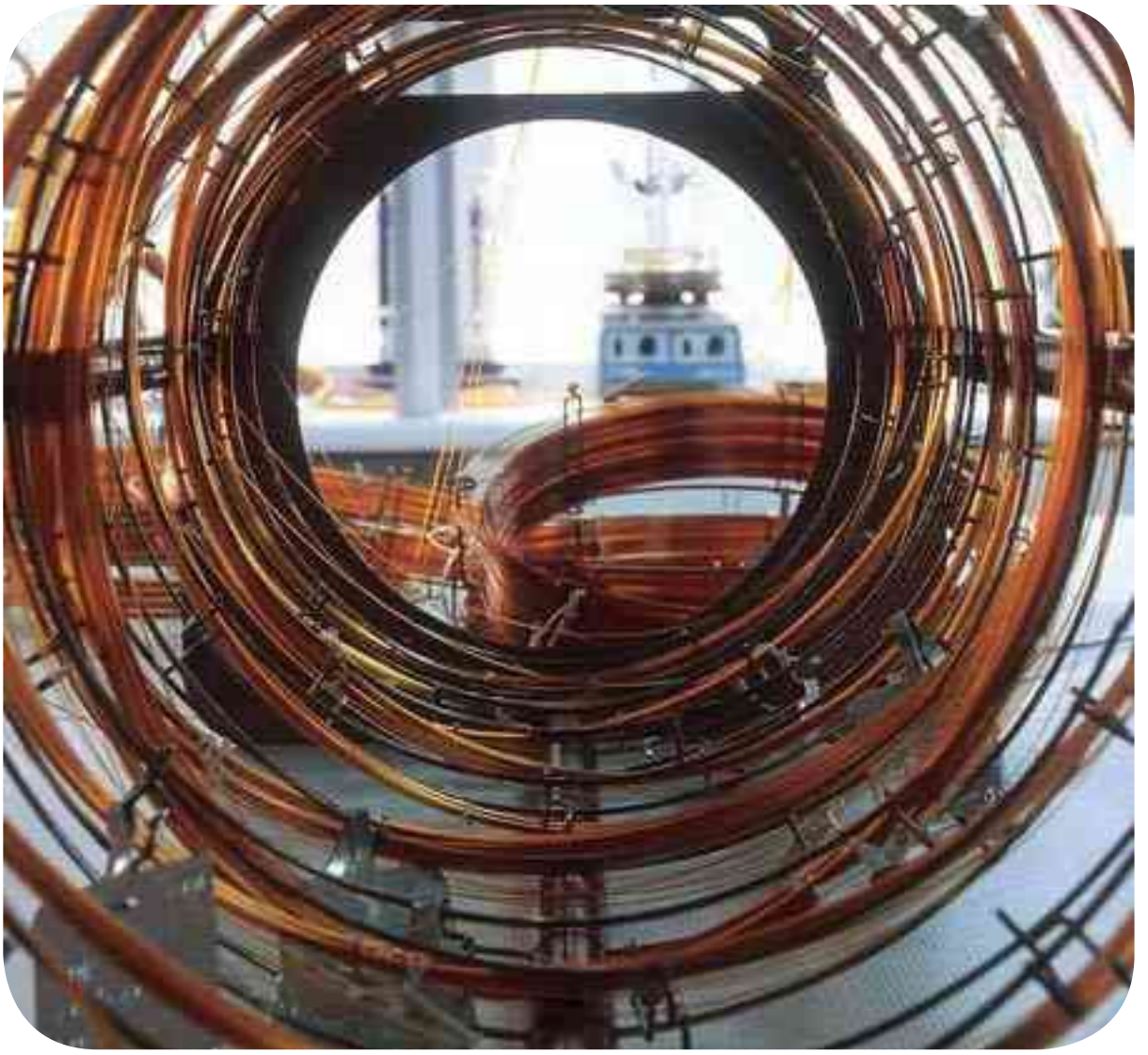


TKG 1114

Teknokroma Capillary Columns

MTI-5

5% Phenyl- 95% methyl polysiloxane, bonded and crosslinked phase.



- Polarity equivalent to Supelco PTE-5 and Agilent HP-5Msi columns
- High inertness and ultra low bleeding
- Column contrasted for analyses of semivolatile contaminant agents (EPA 625, 1625, 8770)
- Maximum thermal stability (360º)

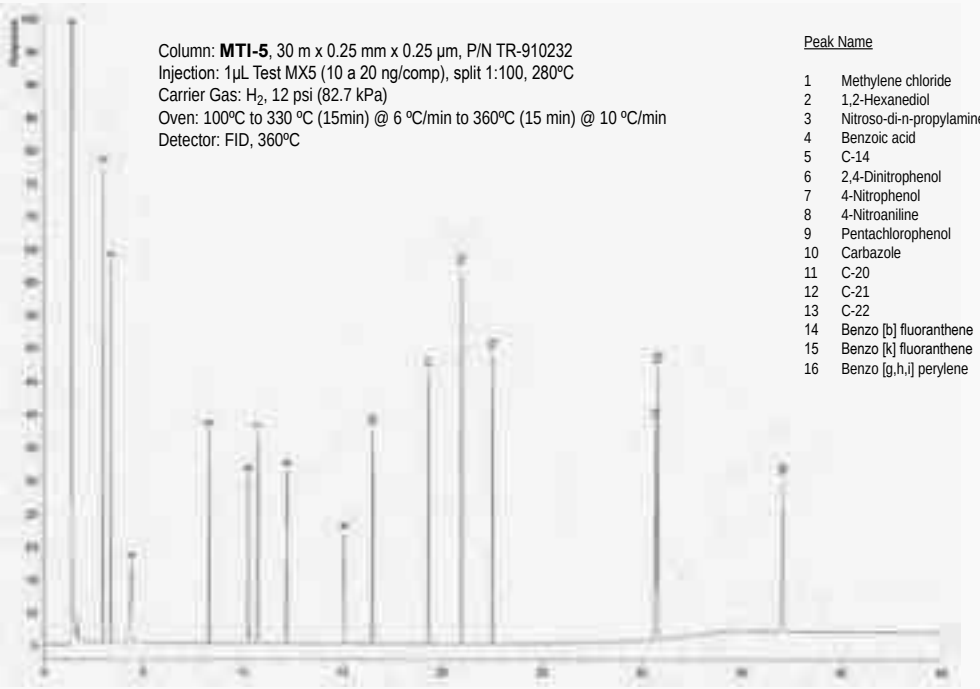
MTI-5 Equivalent Phase

Supelco: PTE-5
Agilent: HP-5Msi

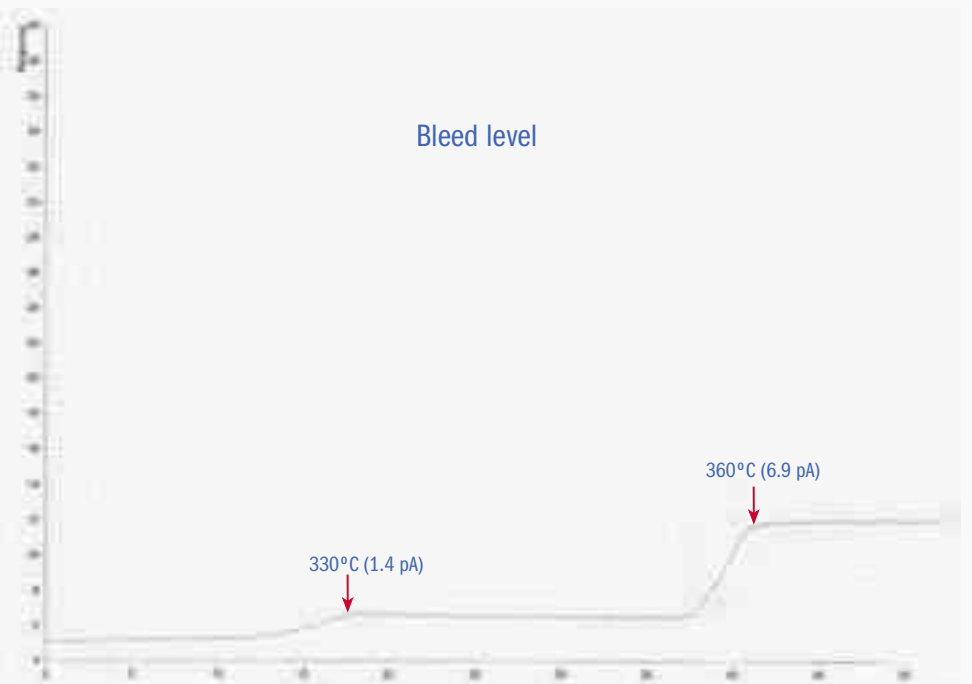
MTI-5

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	30	0,25	-60 to 360	**TR-910232**
0,32	30	0,25	-60 to 360	**TR-910233**
0,53	15	0,50	-60 to 330/360	**TR-910515**

MTI-5: Test



TKG 1207

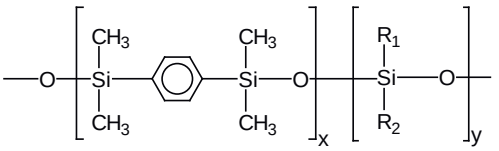


TKG 1208

Meta.X5

Silphenylene phase, selectivity similar to TRB-5, bonded and crosslinked phase.

- Column of choice for the analysis of semivolatile compounds by GC-MS
- Selectivity similar to TRB-5
- New generation of column incorporates arylene groups in the polymer structure, improves thermal stability, reduces bleeding level and provides optimal resolution for aromatic compounds
- Manufacturing procedures guarantees maximal inertness and minimal bleeding level



Structure of Polysiloxane containing p-silphenylene

Meta.X5 Equivalent Phase

Restek: Rtx-5Sil MS
Agilent: DB-5 MS, HP-5TA, CP-SIL8CB Low bleed/MS, VF-5MS
SGE: BPX5, BP5M
Phenomenex: ZB-5MS

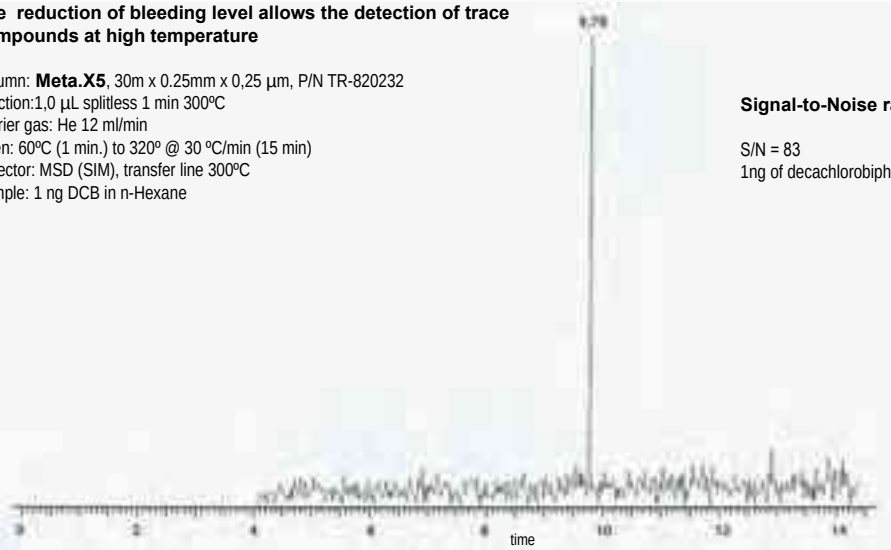
Meta.X5

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	20	0,18	-60 to 325/350	**TR-820984**
	20	0,36	-60 to 325/350	**TR-823484**
	40	0,18	-60 to 325/350	**TR-8209C4**
0,20	12	0,33	-60 to 325/350	**TR-8233B9**
	25	0,33	-60 to 325/350	**TR-823329**
	50	0,33	-60 to 325/350	**TR-823359**
0,25	15	0,10	-60 to 325/350	**TR-820112**
	15	0,25	-60 to 325/350	**TR-820212**
	15	0,50	-60 to 325/350	**TR-820512**
	15	1,00	-60 to 325/350	**TR-821012**
	30	0,10	-60 to 325/350	**TR-820132**
	30	0,25	-60 to 325/350	**TR-820232**
	30	0,50	-60 to 325/350	**TR-820532**
	30	1,00	-60 to 325/350	**TR-821032**
	60	0,10	-60 to 325/350	**TR-820162**
	60	0,25	-60 to 325/350	**TR-820262**
0,32	15	0,10	-60 to 325/350	**TR-820113**
	15	0,25	-60 to 325/350	**TR-820213**
	15	0,50	-60 to 325/350	**TR-820513**
	15	1,00	-60 to 325/350	**TR-821013**
	30	0,10	-60 to 325/350	**TR-820133**
	30	0,25	-60 to 325/350	**TR-820233**
	30	0,50	-60 to 325/350	**TR-820533**
	30	1,00	-60 to 325/350	**TR-821033**
	60	0,10	-60 to 325/350	**TR-820163**
	60	0,25	-60 to 325/350	**TR-820263**
0,53	15	0,50	-60 to 320/340	**TR-820515**
	15	1,00	-60 to 320/340	**TR-821015**
	15	1,50	-60 to 320/340	**TR-821515**
	30	0,50	-60 to 320/340	**TR-820535**
	30	1,00	-60 to 320/340	**TR-821035**
	30	1,50	-60 to 310/330	**TR-821535**

Meta.X5: Signal-to-Noise ratio

The reduction of bleeding level allows the detection of trace compounds at high temperature

Column: **Meta.X5**, 30m x 0.25mm x 0,25 µm, P/N TR-820232
Injection:1,0 µL splitless 1 min 300ºC
Carrier gas: He 12 ml/min
Oven: 60ºC (1 min.) to 320º @ 30 ºC/min (15 min)
Detector: MSD (SIM), transfer line 300ºC
Sample: 1 ng DCB in n-Hexane

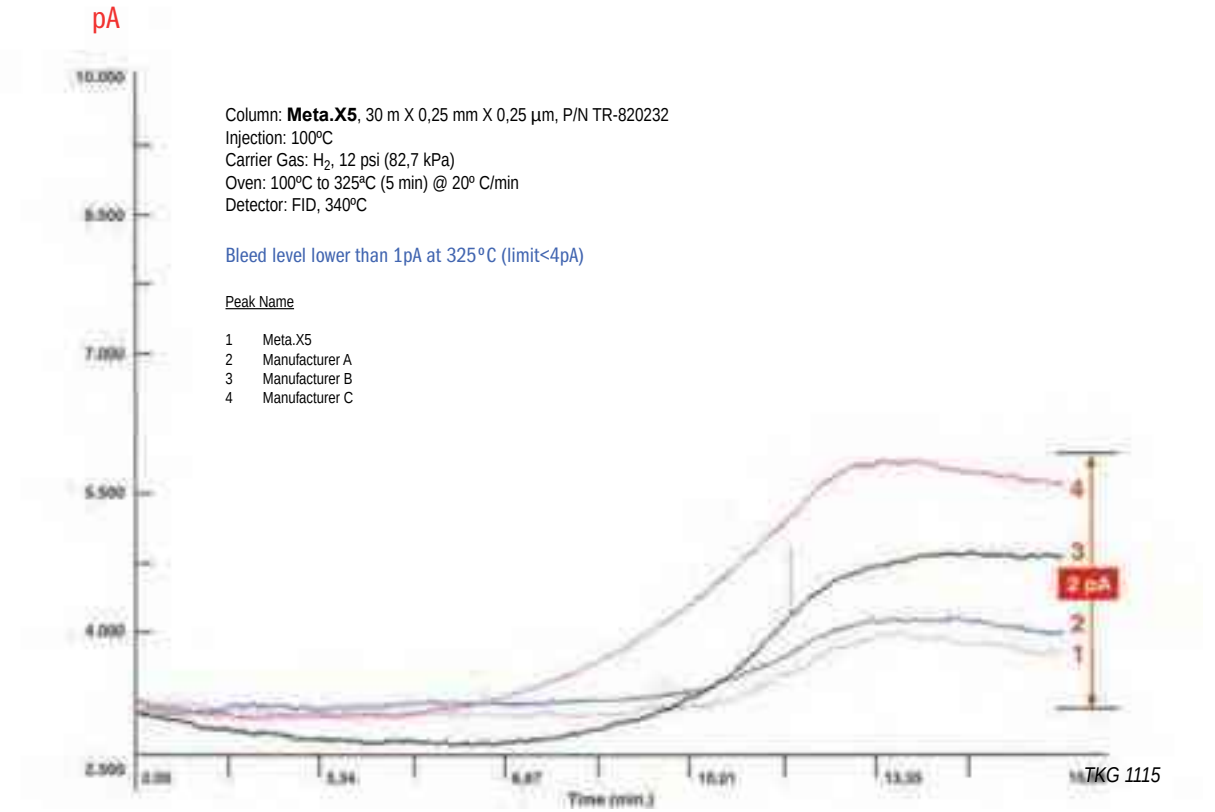


Signal-to-Noise ratio

S/N = 83
1ng of decachlorobiphenyl (DCB)

TKG 1116

Meta.X5: Column Bleed comparison



Column: **Meta.X5**, 30 m X 0,25 mm X 0,25 µm, P/N TR-820232
Injection: 100ºC
Carrier Gas: H_2, 12 psi (82,7 kPa)
Oven: 100ºC to 325ºC (5 min) @ 20º C/min
Detector: FID, 340ºC

Bleed level lower than 1pA at 325°C (limit<4pA)

Peak Name

1 Meta.X5
2 Manufacturer A
3 Manufacturer B
4 Manufacturer C

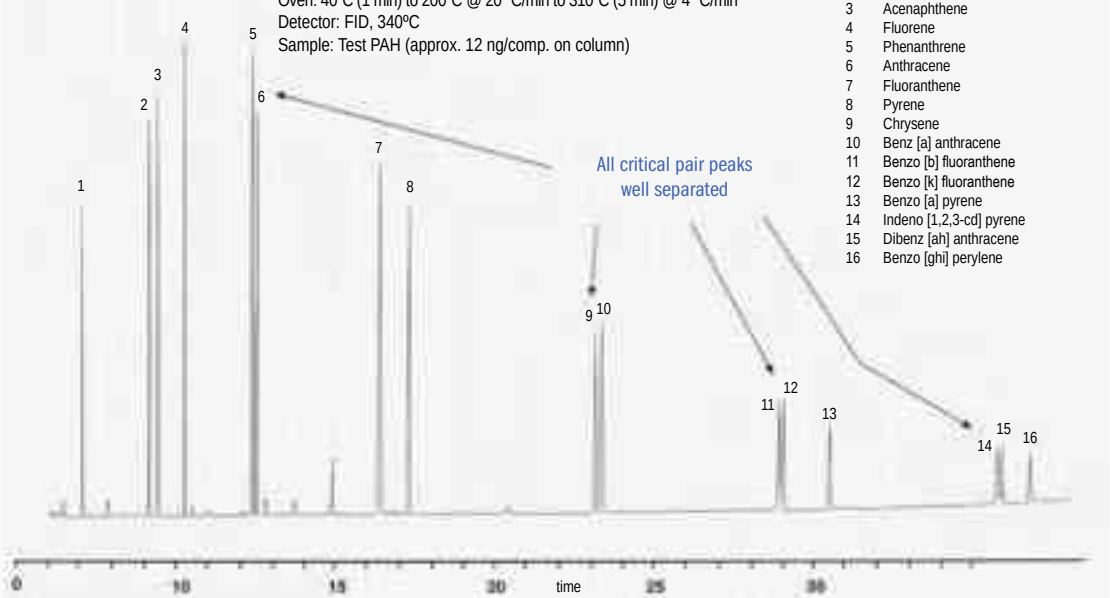
TKG 1115

Meta.X5: Polycyclic aromatic hydrocarbons PAHs Method (EPA Method 610)

Column: **Meta.X5**, 30 m x 0.25 mm x 0,50 µm, P/N TR-820532
Injection:0,3 µL (splitless, 1 min) 300ºC
Carrier gas: H_2, 16 psi (110.2 kPa)
Oven: 40ºC (1 min) to 200ºC @ 20 ºC/min to 310ºC (5 min) @ 4 ºC/min
Detector: FID, 340ºC
Sample: Test PAH (approx. 12 ng/comp. on column)

Peak Name

1 Naphathalene
2 Acenaphthylene
3 Acenaphthene
4 Fluorene
5 Phenanthrene
6 Anthracene
7 Fluoranthene
8 Pyrene
9 Chrysene
10 Benz [a] anthracene
11 Benzo [b] fluoranthene
12 Benzo [k] fluoranthene
13 Benzo [a] pyrene
14 Indeno [1,2,3-cd] pyrene
15 Dibenz [ah] anthracene
16 Benzo [ghi] perylene



TKG 1117

Teknokroma Capillary Columns

Meta.X5 TRIAZINE (proprietary phase)

Silphenylene phase, selectivity similar to TRB-5, bonded and crosslinked.

- New formulation of Meta.X5 stationary phase. Ideal for separation of Triazine herbicides from EPA 609 method.
- Low bleed and excelent inertness for the analysis of traces of herbicides by GC/MS.
- General purpose column for pesticides.

Meta.X5 TRIAZINE

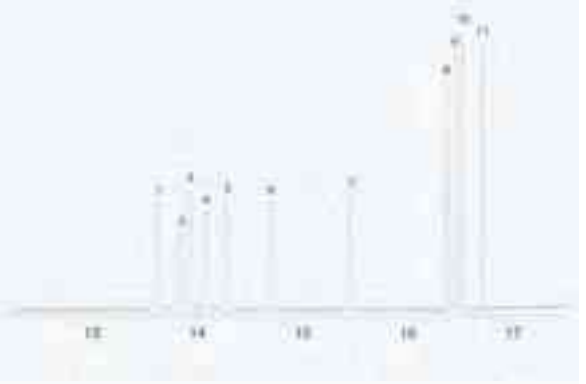
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,30	30	0,25	325/350ºC	**TR-410232**

Meta.X5 TRIAZINE: Triazine Herbicides

Column: **Meta.X5 TRIAZINE**, 30m x 0.25mm x 0,25 µm, P/N TR-410232
Injection: split 1:25, 250 ºC
Carrier gas: He, ct flow 1.0 ml/min
Oven: 80 ºC (0.5 min) to 160 ºC (7 min) @ 30 ºC/min to 195ºC @ 7 ºC/min to 290 ºC (3 min) @ 45 ºC/min
Transfer Line: 290ºC
Ionization mode: EI
Scan range: 50-450 amu
Sample: Triazine herbicides EPA 619 2 ng/compound on column

Peak Name

1 Atraton
2 Simazine
3 Prometon
4 Atrazine
5 Propazine
6 Terbutylazine
7 Secbumeton
8 Simetryn
9 Ametryn
10 Prometryn
11 Terbutryn



TKG 1262

Meta.XLB (proprietary phase)

Silphenylene phase, bonded and crosslinked

- Low polarity phase with Extreme Low Bleed.
- Directly replace for DB-XLB
- General purpose column with extended temperature range (30 to 340/360ºC)
- Ideal column for GC-MS analysis
- Unique selectivity for aromatic compounds (PCBs,PAHs,PBDEs)
- Excellent column for pesticides and herbicides

Meta.XLB Equivalent Phase

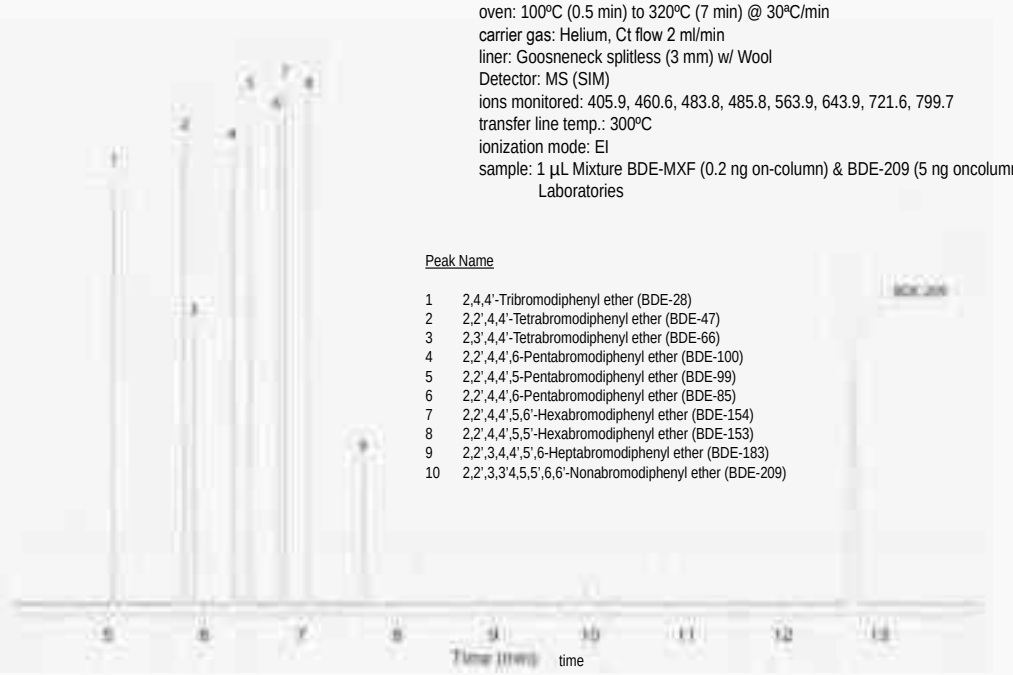
Restek: Rxi-XLB
Agilent: DB-XLB, VF-XMS
Supelco: MDN 12
Phenomenex: ZB-XLB
Macherey-Nagel: OPTIMA XLB

Meta.XLB

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	30 to 340/360ºC	**TR-330141**
0,18	20	0,18	30 to 340/360ºC	**TR-330984**
	30	0,18	30 to 340/360ºC	**TR-330934**
	60	0,18	30 to 340/360ºC	**TR-330964**
0,25	15	0,10	30 to 340/360ºC	**TR-330112**
	15	0,25	30 to 340/360ºC	**TR-330212**
	15	1,00	30 to 340/360ºC	**TR-331012**
	30	0,10	30 to 340/360ºC	**TR-330132**
	30	0,25	30 to 340/360ºC	**TR-330232**
	30	0,50	30 to 340/360ºC	**TR-330532**
	30	1,00	30 to 340/360ºC	**TR-331032**
	60	0,25	30 to 340/360ºC	**TR-330262**
0,32	15	0,25	30 to 340/360ºC	**TR-330213**
	15	1,00	30 to 340/360ºC	**TR-331013**
	30	0,10	30 to 340/360ºC	**TR-330133**
	30	0,25	30 to 340/360ºC	**TR-330233**
	30	0,50	30 to 340/360ºC	**TR-330533**
	30	1,00	30 to 340/360ºC	**TR-331033**
	60	0,25	30 to 340/360ºC	**TR-330263**
0,53	15	1,50	30 to 320/340ºC	**TR-331515**
	30	1,50	30 to 320/340ºC	**TR-331535**

Meta.XLB: Analysis of brominated flame retardants (Polybrominated Diphenyl Ethers, PBDEs)

column: **Meta.XLB**, 15 m x 0.18 mm x 0.072 um, P/N TR-332414
injection: 280ºC, splitless w/ surge: pulse 40 psi @ 0.30 min, 50ml/min @ 0.4 min
oven: 100ºC (0.5 min) to 320ºC (7 min) @ 30ºC/min
carrier gas: Helium, Ct flow 2 ml/min
liner: Goosneneck splitless (3 mm) w/ Wool
Detector: MS (SIM)
ions monitored: 405.9, 460.6, 483.8, 485.8, 563.9, 643.9, 721.6, 799.7
transfer line temp.: 300ºC
ionization mode: EI
sample: 1 µL Mixture BDE-MXF (0.2 ng on-column) & BDE-209 (5 ng oncolumn) from Wellington Laboratories



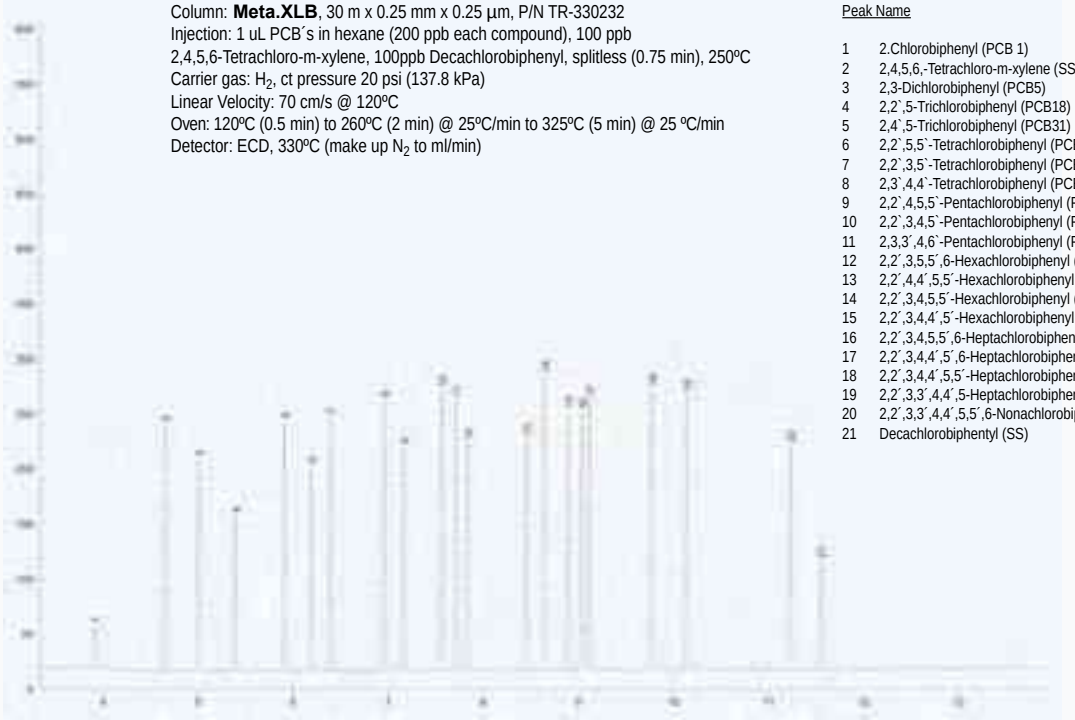
Peak Name

1 2,4,4'-Tribromodiphenyl ether (BDE-28)
2 2,2',4,4'-Tetrabromodiphenyl ether (BDE-47)
3 2,3',4,4'-Tetrabromodiphenyl ether (BDE-66)
4 2,2',4,4',6-Pentabromodiphenyl ether (BDE-100)
5 2,2',4,4',5-Pentabromodiphenyl ether (BDE-99)
6 2,2',4,4',6-Pentabromodiphenyl ether (BDE-85)
7 2,2',4,4',5,6'-Hexabromodiphenyl ether (BDE-154)
8 2,2',4,4',5,5'-Hexabromodiphenyl ether (BDE-153)
9 2,2',3,4,4',5',6-Heptabromodiphenyl ether (BDE-183)
10 2,2',3,3'4,5,5',6,6'-Nonabromodiphenyl ether (BDE-209)

TKG 1272

Meta.XLB: Polychlorinaded biphenyl (PCB)

Column: **Meta.XLB**, 30 m x 0.25 mm x 0.25 µm, P/N TR-330232
Injection: 1 uL PCB´s in hexane (200 ppb each compound), 100 ppb 2,4,5,6-Tetrachloro-m-xylene, 100ppb Decachlorobiphenyl, splitless (0.75 min), 250ºC
Carrier gas: H_2, ct pressure 20 psi (137.8 kPa)
Linear Velocity: 70 cm/s @ 120ºC
Oven: 120ºC (0.5 min) to 260ºC (2 min) @ 25ºC/min to 325ºC (5 min) @ 25 ºC/min
Detector: ECD, 330ºC (make up N_2 to ml/min)



Peak Name

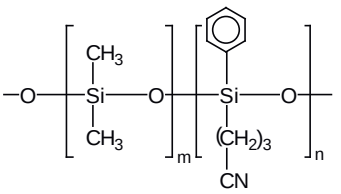
1 2.Chlorobiphenyl (PCB 1)
2 2,4,5,6,-Tetrachloro-m-xylene (SS)
3 2,3-Dichlorobiphenyl (PCB5)
4 2,2`,5-Trichlorobiphenyl (PCB18)
5 2,4`,5-Trichlorobiphenyl (PCB31)
6 2,2`,5,5`-Tetrachlorobiphenyl (PCB52)
7 2,2`,3,5`-Tetrachlorobiphenyl (PCB44)
8 2,3`,4,4`-Tetrachlorobiphenyl (PCB66)
9 2,2`,4,5,5`-Pentachlorobiphenyl (PCB101)
10 2,2`,3,4,5`-Pentachlorobiphenyl (PCB87)
11 2,3,3´,4,6`-Pentachlorobiphenyl (PCB110)
12 2,2´,3,5,5´,6-Hexachlorobiphenyl (PCB151)
13 2,2´,4,4´,5,5´-Hexachlorobiphenyl (PCB153)
14 2,2´,3,4,5,5´-Hexachlorobiphenyl (PCB141)
15 2,2´,3,4,4´,5´-Hexachlorobiphenyl (PCB136)
16 2,2´,3,4,5,5´,6-Heptachlorobiphenyl (PCB187)
17 2,2´,3,4,4´,5´,6-Heptachlorobiphenyl (PCB183)
18 2,2´,3,4,4´,5,5´-Heptachlorobiphenyl (PCB180)
19 2,2´,3,3´,4,4´,5-Heptachlorobiphenyl (PCB170)
20 2,2´,3,3´,4,4´,5,5´,6-Nonachlorobiphenyl (PCB26)
21 Decachlorobiphentyl (SS)

TKG 1265

TRB-1301

94% Dimethyl- 6% cyanopropyl-phenyl polysiloxane, bonded and crosslinked phase.

- Ideal column for analyzing mixtures of acidic and basic compounds with a wide range of polarity
- Intermediate polarity column useful for analyzing pesticides and herbicides



Structure of Poly (dimethylcyanopropylphenyl) siloxane

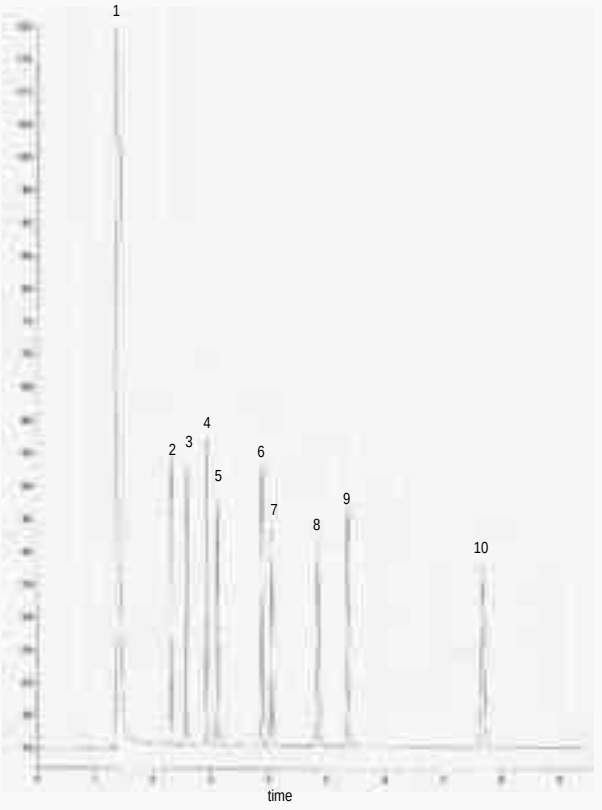
TRB-1301 Equivalent Phase

Agilent: HP-1301, DB-1301, CP-1301
Supelco: SPB-1301,
Restek: Rtx-1301, Rtx-624
SGE: BP624

TRB-1301

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	10	0,40	-20 to 280/300	**TR-640444**
0,25	15	0,25	-20 to 280/300	**TR-640212**
	15	1,00	-20 to 260/280	**TR-641012**
	30	0,25	-20 to 280/300	**TR-640232**
	30	1,00	-20 to 260/280	**TR-641032**
	60	0,25	-20 to 280/300	**TR-640262**
	60	1,00	-20 to 260/280	**TR-641062**
0,32	15	0,25	-20 to 280/300	**TR-640213**
	15	1 00	-20 to 260/280	**TR-641013**
	30	0,25	-20 to 280/300	**TR-640233**
	30	1,00	-20 to 260/280	**TR-641033**
	60	0,25	-20 to 280/300	**TR-640263**
	60	1,00	-20 to 260/280	**TR-641063**
0,53	15	1,00	-20 to 260/280	**TR-641015**
	30	1,00	-20 to 260/280	**TR-641035**
	60	1,00	-20 to 260/280	**TR-641065**

TRB-1301: SP-4-7301 Test



Column: **TRB-1301,** 30 m x 0.25 mm x 1.0 µm, P/N TR-641032
Injection: 0.5 µL standard SP-4-7301 (500 ng/mL), split 1:50, 260 ºC
Carrier gas: H_2, ct pressure 12 psi (82.7 kPa)
Oven: 165ºC
Detector: FID, 280 ºC

Peak Name

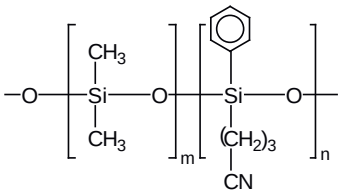
1 Methylene chloride
2 C-10
3 2-Octanone
4 C-11
5 1-Octanol
6 C-12
7 2,6-Dimethylphenol
8 2,6-Dimethylaniline
9 C-13
10 C-14

TKG 1118

TRB-624

94% Dimethyl- 6% cyanopropyl-phenyl polysiloxane, bonded and crosslinked phase.

- Column specially developed for environmental analysis of volatile compounds (Volatile Priority Pollutants)
- Column compatible with EPA methods 501.3, 502.2, 524.2, 601, 602, 8010, 8015, 8020, 8221, 8240 and 8260.
- Excellent inertness.



Structure of Poly (dimethylcyanopropylphenyl) siloxane

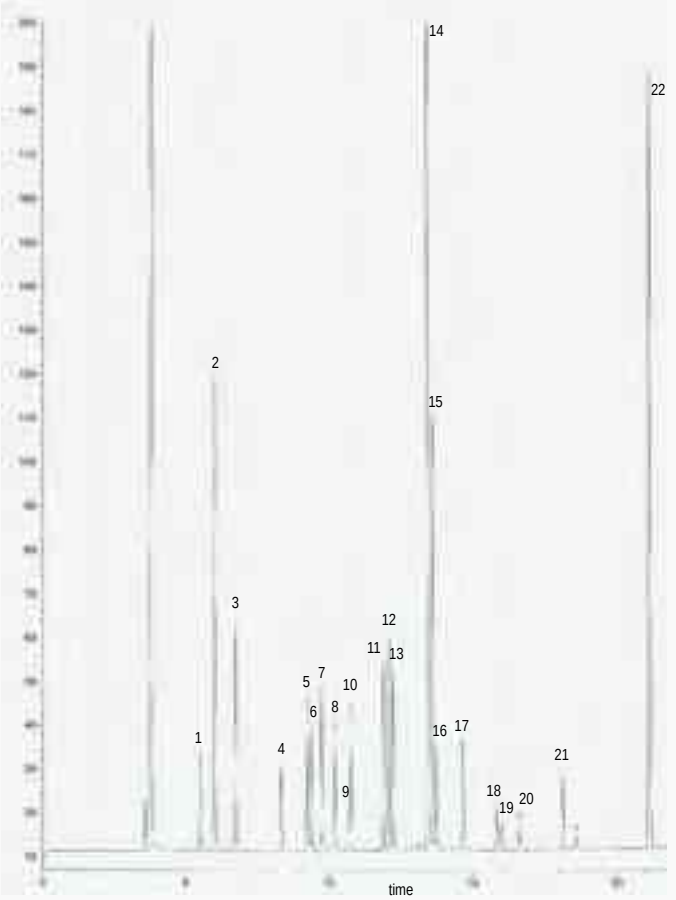
TRB-624 Equivalent Phase

Agilent: HP-624, DB-624, CP- Select 624 CB
Supelco: OVI-G43, SPB-624
Restek: Rtx-1301, Rtx-624
SGE: BP624
Phenomenex: ZB-624

TRB-624

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	20	1,00	-20 to 240/260	**TR-601084**
0,20	25	1,12	-20 to 240/260	**TR-601129**
0,25	30	1,40	-20 to 240/260	**TR-601432**
	60	1,40	-20 to 240/260	**TR-601462**
0,32	30	1,80	-20 to 240/260	**TR-601833**
	60	1,80	-20 to 240/260	**TR-601863**
0,53	30	3,00	-20 to 240/260	**TR-603035**
	60	3,00	-20 to 240/260	**TR-603065**
	75	3,00	-20 to 240/260	**TR-603075**
	105	3,00	-20 to 240/260	**TR-6030K5**

TRB-624: Solvents



Column: **TRB-624**, 60 m x 0.25mm x 1.4 µm, P/N TR-601462
Injection: 1 µL solvents mixture, split 1:100 (20-600 ng/comp), 260 ºC
Carrier gas: H_2, ct pressure 25 psi (172.3 kPa)
Oven: 50 ºC (5min) to 220 ºC @ 6 ºC/min
Detector: FID, 280 ºC

Peak Name

1 Diethylether
2 Acetone
3 Methyl acetate
4 Vinyl acetate
5 MEK
6 Ethyl acetate
7 Tetrahydrofuran
8 Cyclohexane
9 Benzene
10 Isopropyl acetate
11 2-Pentanone
12 3-Pentanone
13 Propyl acetate
14 Pyridine
15 Toluene
16 Isobutyl acetate
17 Butyl acetate
18 Ethyl benzene
19 m-Xylene/p-Xylene
20 o-Xylene
21 Diisobutylketone
22 Nitrobenzene

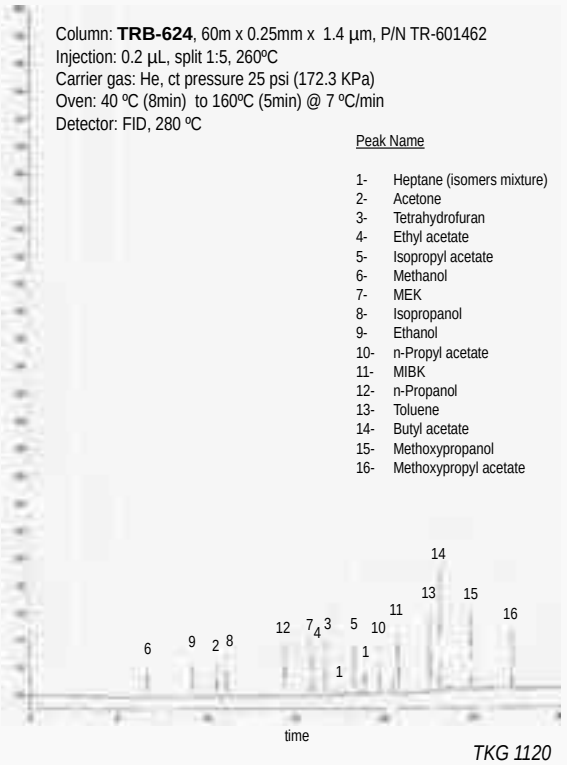
TKG 1119

TRB-624: Solvents

Column: **TRB-624**, 60m x 0.25mm x 1.4 µm, P/N TR-601462
Injection: 0.2 µL, split 1:5, 260ºC
Carrier gas: He, ct pressure 25 psi (172.3 KPa)
Oven: 40 ºC (8min) to 160ºC (5min) @ 7 ºC/min
Detector: FID, 280 ºC

Peak Name

1- Heptane (isomers mixture)
2- Acetone
3- Tetrahydrofuran
4- Ethyl acetate
5- Isopropyl acetate
6- Methanol
7- MEK
8- Isopropanol
9- Ethanol
10- n-Propyl acetate
11- MIBK
12- n-Propanol
13- Toluene
14- Butyl acetate
15- Methoxypropanol
16- Methoxypropyl acetate

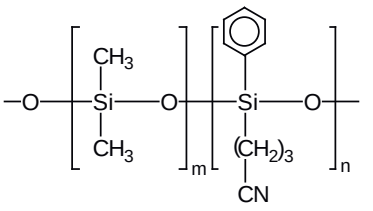


TKG 1120

TRB-G43

94% Dimethyl- 6% cyanopropyl-phenyl polysiloxane, bonded and crosslinked phase.

- USP G43
- Fulfils specifications of the American (USP) and European (EP) pharmacopoeia for the analysis of residual solvents (OVI) in pharmaceutical products, USP method <467> and EP method 2.4.24
- High inertness and low bleed guarenteed.
- Specially tested for complete separation of the five solvents regulated by USP Method 467
- For USP <467>, pharmacopoeia recommends the use of a guard column of 5m (P/N TR-200055) to trap the non-volatile impurities in the sample



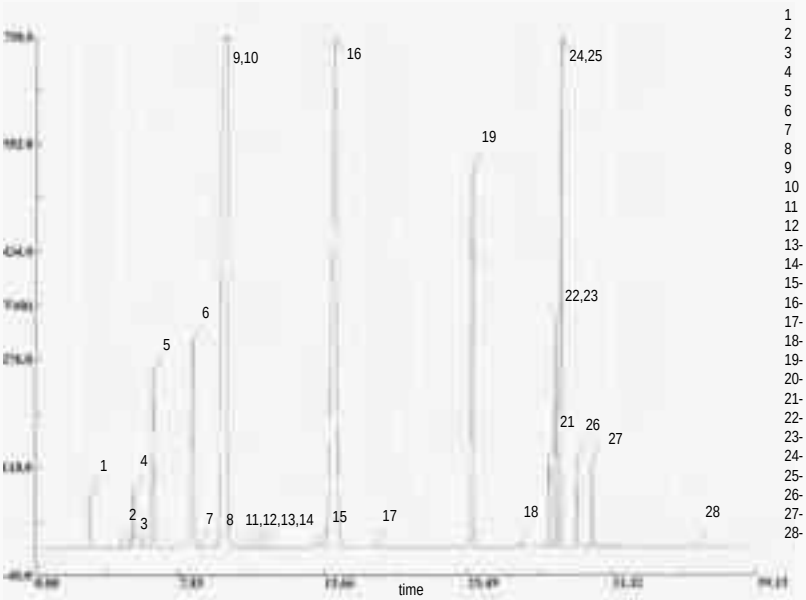
Structure of Poly (dimethylcyanopropylphenyl) siloxane

TRB-G43: Class 1 and Class 2 Residual Solvents

Column: **TRB-G43**, 30 m x 0.53 mm x 3.0 µm, P/N TR-163035
Injection: split 1:2, 250 ºC, 5 m x 0.53 mm intermediate polarity retention gap (TR-200055)
Sample: 0.5 mL headspace 80ºC (2t static head space sampler) 28 Class 1 Mix and Class 2 Mix A, Mix B residual solvents at the regulatory limit concentration
Carrier gas: He, ct pressure 4.8 psi (33.1 kPa), 35 cm/s (40ºC)
Oven: 40 ºC (20 min) to 240 ºC (10 min) @ 10ºC/min
Detector: FID, 250 ºC

Peak Name

1 Methanol
2 1,2-Dichloroethene
3 Acetonitrile
4 Methylene chloride
5 n-Hexane
6 Cis-1,2-Chloroethene
7 Nitromethane
8 Chloroform
9 Cyclohexane
10 1,1,1-Trichloroethane
11 Carbon tetrachloride
12 Benzene
13- 1,2-Dimethoxyethane
14- 1,2-Dichloroethane
15- Trichloroethylene
16- Methylcyclohexane
17- 1,4-Dioxane
18- Pyridine
19- Toluene
20- 2-Hexanone
21- Chlorobenzene
22- Dimethylformamide
23- Ethylbenzene
24- m-Xylene
25- p-Xylene
26- o-Xylene
27- N,N-Dimethylacetamide
28- 1,2,3,4-Tetrahydronaphthalene



TKG 1121

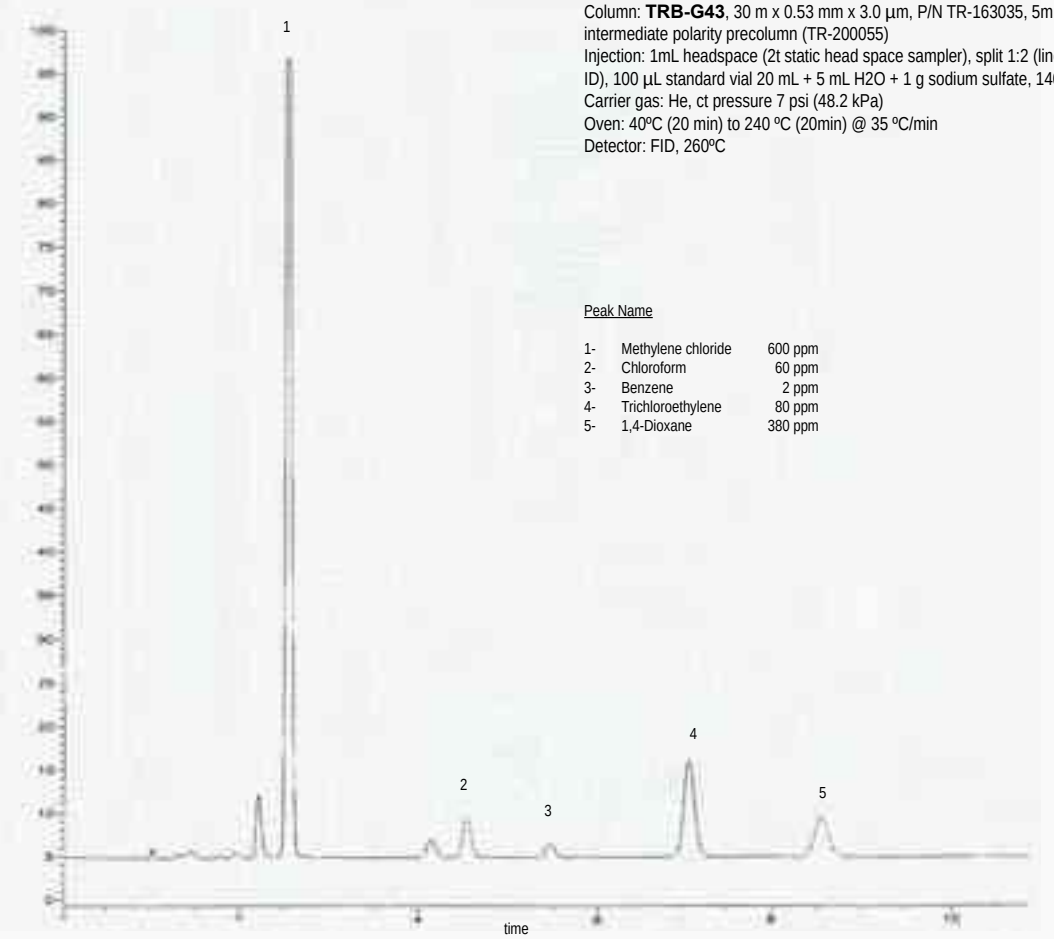
TRB-G43

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,53	30	3,00	-20 to 240/260	**TR-163035**

TRB-G43 Equivalent Phase

Agilent: HP-624, DB-624, CP-Select 624 CB, DB-624 UI
Supelco: OVI-G43
Restek: Rtx-G43
SGE: BP624
Phenomenex: ZB-624
USP Nomenclature: G43

TRB-G43: Solvents



Column: **TRB-G43**, 30 m x 0.53 mm x 3.0 µm, P/N TR-163035, 5m x 0.53mm intermediate polarity precolumn (TR-200055)
Injection: 1mL headspace (2t static head space sampler), split 1:2 (liner 1 mm ID), 100 µL standard vial 20 mL + 5 mL H2O + 1 g sodium sulfate, 140ºC
Carrier gas: He, ct pressure 7 psi (48.2 kPa)
Oven: 40ºC (20 min) to 240 ºC (20min) @ 35 ºC/min
Detector: FID, 260ºC

Peak Name

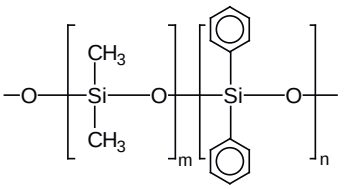
1-	Methylene chloride	600 ppm
2-	Chloroform	60 ppm
3-	Benzene	2 ppm
4-	Trichloroethylene	80 ppm
5-	1,4-Dioxane	380 ppm

TKG 1122

TRB-14

14% Diphenyl - 86% dimethyl polysiloxane, bonded and crosslinked phase.

- Intermediate polarity column with phenyl groups in its structure
- Chemical inertness and low bleed guaranteed
- Confirmation column alongside TRB-1 and TRB-5



Structure of Poly (dimethyldiphenyl) siloxane

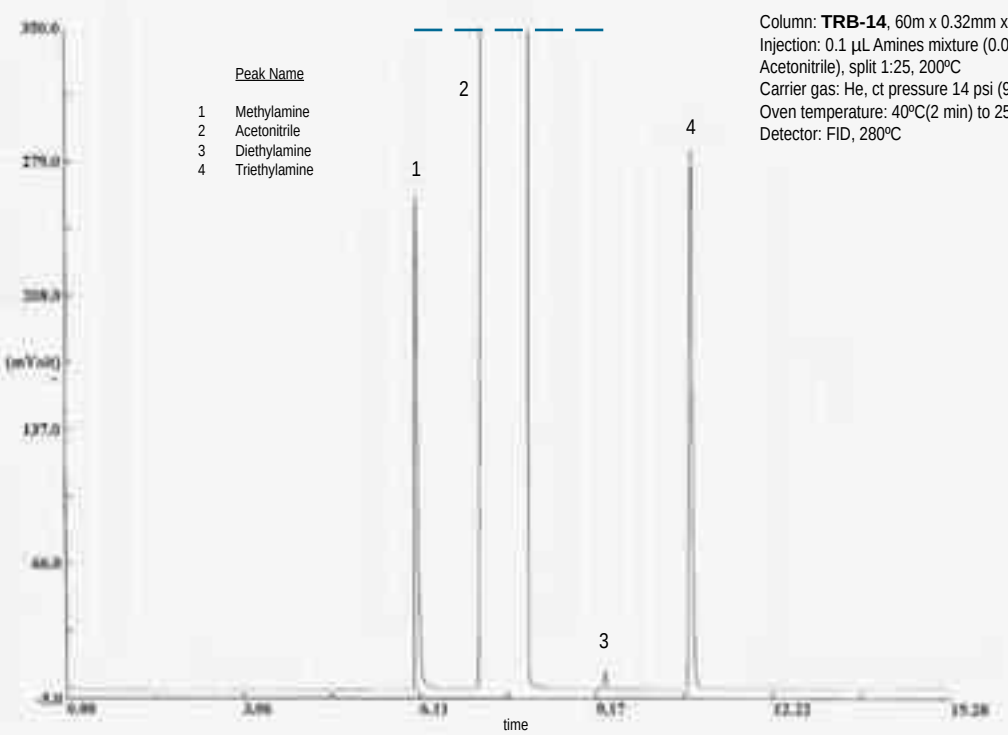
TRB-14 Equivalent Phase

Agilent: CP-SIL 13 CB

TRB-14

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,20	-20 to 300/330	**TR-802112**
	15	0,40	-20 to 300/330	**TR-800412**
	15	1,20	-20 to 300/330	**TR-801212**
	30	0,20	-20 to 300/330	**TR-802132**
	30	0,40	-20 to 300/330	**TR-800432**
	30	1,20	-20 to 300/330	**TR-801232**
	60	0,20	-20 to 300/330	**TR-802162**
	60	0,40	-20 to 300/330	**TR-800462**
	60	1,20	-20 to 300/330	**TR-801262**
0,32	15	0,20	-20 to 300/330	**TR-802113**
	15	0,40	-20 to 300/330	**TR-800413**
	15	1,20	-20 to 300/330	**TR-801213**
	30	0,20	-20 to 300/330	**TR-802133**
	30	0,40	-20 to 300/330	**TR-800433**
	30	1,20	-20 to 300/330	**TR-801233**
	60	0,20	-20 to 300/330	**TR-802163**
	60	0,40	-20 to 300/330	**TR-800463**
	60	1,20	-20 to 300/330	**TR-801263**
0,53	15	1,00	-20 to 300/330	**TR-801015**
	15	2,00	-20 to 300/330	**TR-802015**
	30	1,00	-20 to 300/330	**TR-801035**
	30	2,00	-20 to 300/330	**TR-802035**
	60	1,00	-20 to 300/330	**TR-801065**
	60	2,00	-20 to 300/330	**TR-802065**

TRB-14: Amines



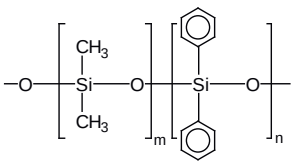
Column: **TRB-14**, 60m x 0.32mm x 1.2 µm, P/N TR-801263
Injection: 0.1 µL Amines mixture (0.02-0.2% in Acetonitrile), split 1:25, 200ºC
Carrier gas: He, ct pressure 14 psi (96.5 kPa)
Oven temperature: 40ºC(2 min) to 250ºC @ 10ºC/min
Detector: FID, 280ºC

TKG 1123

TRB-20

20% Diphenyl - 80% Dimethyl polysilioxane, bonded and crosslinked phase.

- Intermediate polarity column with phenyl groups in its structure
- Excellent confirmation column



Structure of Poly (dimethyldiphenyl) siloxane

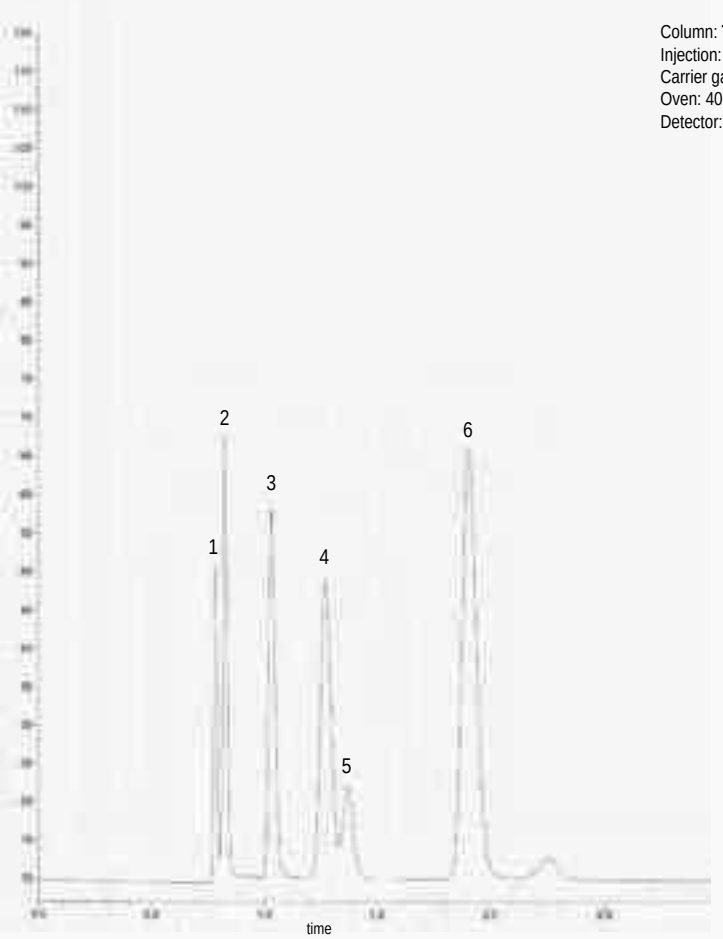
TRB-20 Equivalent Phase

Supelco: SPB-20
Quadrex: 007-502
Restek: Rtx-20

TRB-20

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,25	-20 to 300/320	**TR-200212**
	15	1,00	-20 to 280/300	**TR-201012**
	30	0,25	-20 to 300/320	**TR-200232**
	30	1,00	-20 to 280/300	**TR-201032**
	60	0,25	-20 to 300/320	**TR-200262**
	60	1,00	-20 to 280/300	**TR-201062**
0,32	15	0,25	-20 to 300/320	**TR-200213**
	15	1,00	-20 to 280/300	**TR-201013**
	30	0,25	-20 to 300/320	**TR-200233**
	30	1,00	-20 to 280/300	**TR-201033**
	60	0,25	-20 to 300/320	**TR-200263**
	60	1,00	-20 to 280/300	**TR-201063**
0,53	15	0,50	-20 to 260/280	**TR-200515**
	15	1,00	-20 to 260/280	**TR-201015**
	30	0,50	-20 to 260/280	**TR-200535**
	30	1,00	-20 to 260/280	**TR-201035**
	60	0,50	-20 to 260/280	**TR-200565**
	60	1,00	-20 to 260/280	**TR-201065**

TRB-20: Alcohols in blood



Column: **TRB-20**, 30 m x 0.53 mm x 3.0 µm, P/N TR-203035
Injection: Alcohols in blood, 0.5 µL Head Space, split 5:1, 200 ºC
Carrier gas: He, ct pressure 10 psi (69 kPa)
Oven: 40 ºC (isothermal)
Detector: FID, 200 ºC

Peak Name

1- Methanol
2- Acetaldehyde
3- Ethanol
4- Isopropanol
5- Acetone
6- n-Propanol

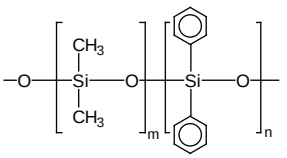
TKG 1124

Teknokroma Capillary Columns

TRB-35

35% Diphenyl - 65% Dimethyl polysilioxane, bonded and crosslinked phase.

- Intermediate polarity column with phenyl groups in its structure
- Excellent confirmation column



Structure of Poly (dimethyldiphenyl) siloxane

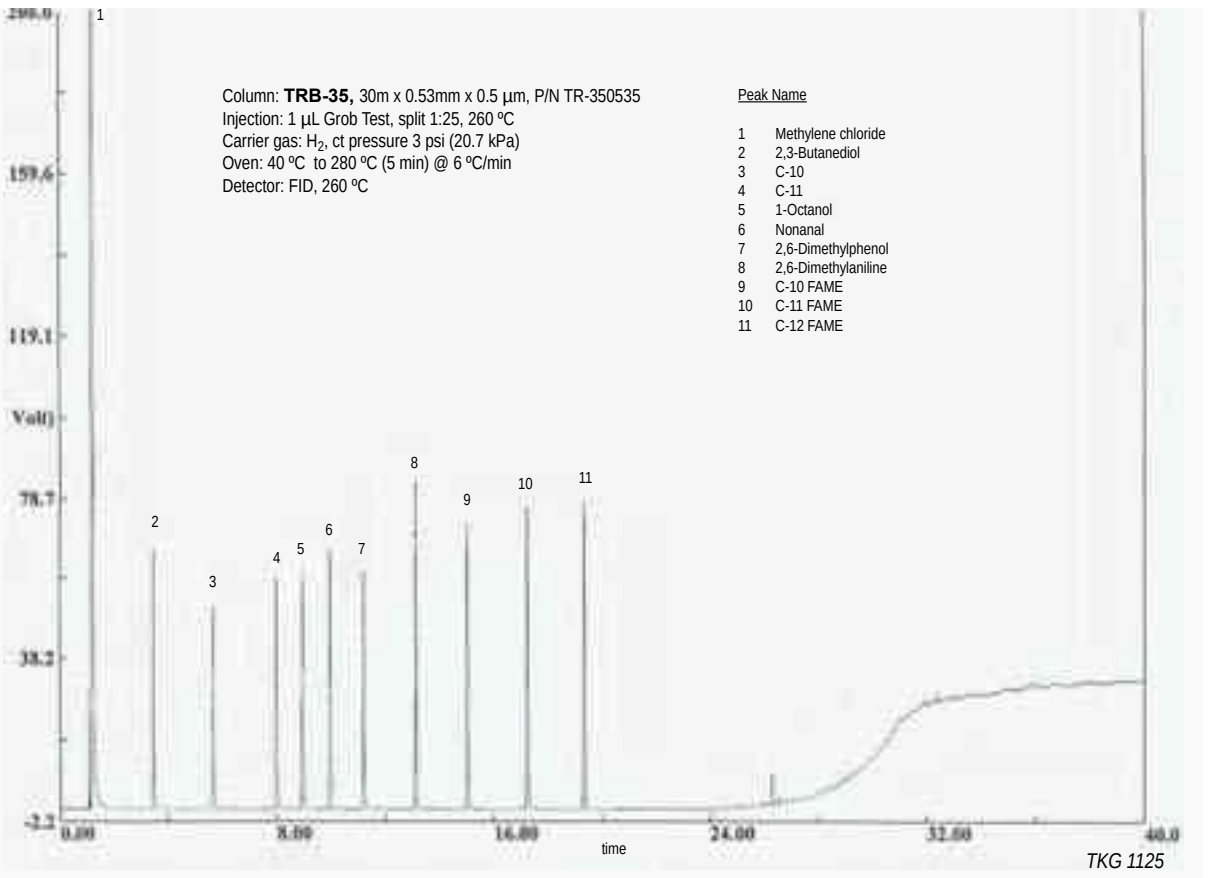
TRB-35 Equivalent Phase

Agilent: HP-35, DB-35
Supelco: SPB-35
Restek: Rtx-35
Quadrex: 007-11
Phenomenex: ZB-35

TRB-35

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,15	-20 to 300/320	**TR-351312**
	15	0,25	-20 to 300/320	**TR-350212**
	30	0,15	-20 to 300/320	**TR-351332**
	30	0,25	-20 to 300/320	**TR-350232**
	60	0,15	-20 to 300/320	**TR-351362**
	60	0,25	-20 to 300/320	**TR-350262**
0,32	15	0,15	-20 to 300/320	**TR-351313**
	15	0,25	-20 to 300/320	**TR-350213**
	15	0,50	-20 to 290/310	**TR-350513**
	30	0,15	-20 to 300/320	**TR-351333**
	30	0,25	-20 to 300/320	**TR-350233**
	30	0,50	-20 to 290/310	**TR-350533**
	60	0,15	-20 to 300/320	**TR-351363**
	60	0,25	-20 to 300/320	**TR-350263**
	60	0,50	-20 to 290/310	**TR-350563**
0,53	15	0,50	-20 to 260/280	**TR-350515**
	15	1,00	-20 to 260/280	**TR-351015**
	30	0,50	-20 to 260/280	**TR-350535**
	30	1,00	-20 to 260/280	**TR-351035**
	60	0,50	-20 to 260/280	**TR-350565**
	60	1,00	-20 to 260/280	**TR-351065**

TRB-35: Grob Test

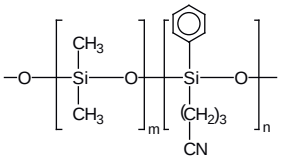


TKG 1125

TRB-1701

14% Cyanopropy phenyl - 86% dimethyl polysiloxane, bonded and crosslinked phase.

- Intermediate polarity column of wide use
- Historically used in the analysis of pesticides.

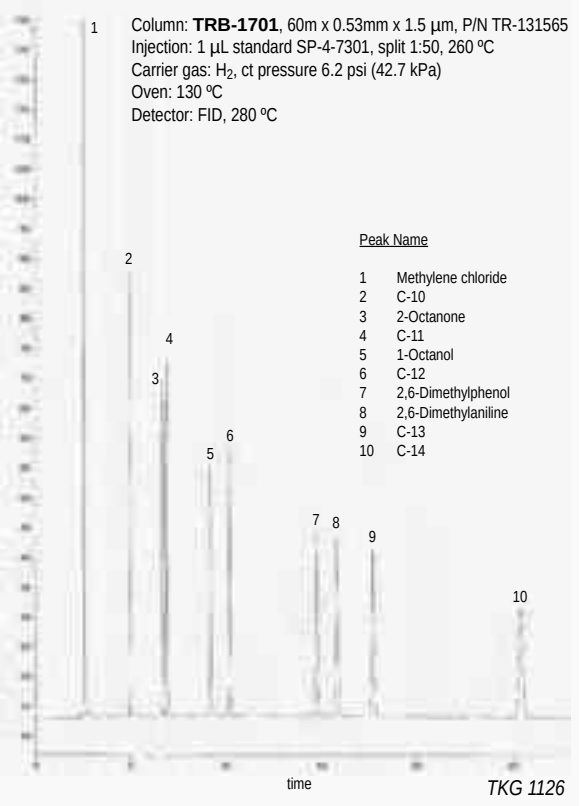


Structure of Poly (dimethylcyanopropylphenyl) siloxane

TRB-1701 Equivalent Phase

Agilent: HP-1701, PAS-1701, DB-1701, CP-SIL 19 CB
Supelco: SPB-1701, Equity 1701
Restek: Rtx-1701
SGE: BP10
Quadrex: 007-1701

TRB-1701: SP-4-7301 Test



TRB-1701

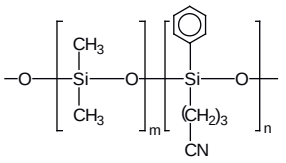
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	20	0,10	-20 to 280/280	**TR-130181**
	20	0,40	-20 to 280/280	**TR-130481**
0,18	10	0,40	-20 to 280/280	**TR-130444**
	20	0,18	-20 to 280/280	**TR-130984**
0,20	15	0,20	-20 to 280/280	**TR-132119**
	30	0,20	-20 to 280/280	**TR-132139**
	60	0,20	-20 to 280/280	**TR-132169**
0,25	15	0,25	-20 to 280/280	**TR-130212**
	15	0,50	-20 to 270/280	**TR-130512**
	15	1,00	-20 to 260/280	**TR-131012**
	30	0,10	-20 to 280/280	**TR-130132**
	30	0,25	-20 to 280/280	**TR-130232**
	30	0,50	-20 to 270/280	**TR-130532**
	30	1,00	-20 to 260/280	**TR-131032**
	60	0,10	-20 to 280/280	**TR-130162**
	60	0,25	-20 to 280/280	**TR-130262**
	60	0,50	-20 to 270/280	**TR-130562**
	60	1,00	-20 to 260/280	**TR-131062**
0,32	15	0,10	-20 to 280/280	**TR-130113**
	15	0,25	-20 to 280/280	**TR-130213**
	15	0,50	-20 to 270/280	**TR-130513**
	15	1,00	-20 to 260/280	**TR-131013**
	30	0,10	-20 to 280/280	**TR-130133**
	30	0,25	-20 to 280/280	**TR-130233**
	30	0,50	-20 to 270/280	**TR-130533**
	30	1,00	-20 to 260/280	**TR-131033**
	60	0,10	20 to 280/280	**TR-130163**
	60	0,25	-20 to 280/280	**TR-130263**
	60	0,50	-20 to 270/280	**TR-130563**
	60	1,00	-20 to 260/280	**TR-131063**
0,53	15	0,10	-20 to 270/280	**TR-130115**
	15	0,50	-20 to 260/270	**TR-130515**
	15	1,00	-20 to 250/270	**TR-131015**
	15	1,50	-20 to 240/260	**TR-131515**
	30	0,10	-20 to 270/280	**TR-130135**
	30	0,50	-20 to 260/270	**TR-130535**
	30	1,00	-20 to 250/270	**TR-131035**
	30	1,50	-20 to 240/260	**TR-131535**
	60	0,10	-20 to 270/280	**TR-130165**
	60	0,50	-20 to 260/270	**TR-130565**
	60	1,00	-20 to 250/270	**TR-131065**
	60	1,50	-20 to 240/260	**TR-131565**

Teknokroma Capillary Columns

TRB-225

50% Cyanopropyl phenyl - 50% dimethyl polysiloxane, bonded and crosslinked phase.

- Medium/high polarity column
- Excellent for separating cis-trans isomers of FAMES and sugar derivatives.



Structure of Poly (dimethylcyanopropylphenyl) siloxane

TRB-225 Equivalent Phase

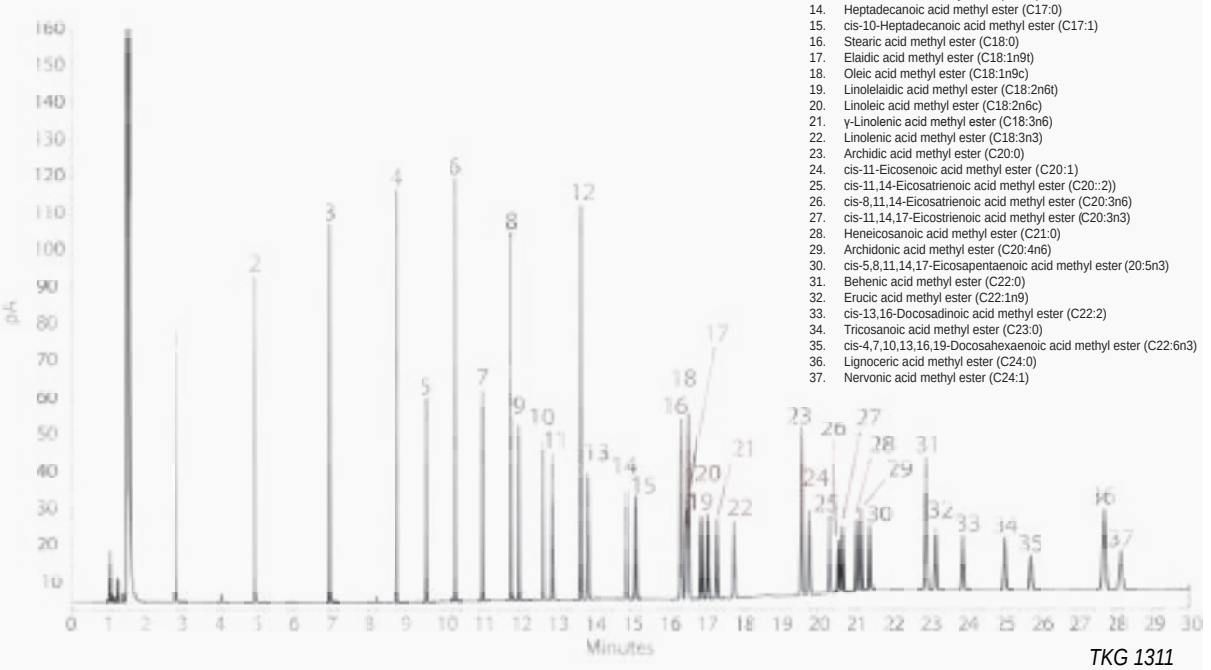
Agilent: HP-225, DB-225, CP-SIL 43 CB
Restek: Rtx-225
SGE: BP225
Quadrex: 007-225
Supelco: SPB-225

TRB-225

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	20	0,10	40 to 220/240	**TR-250181**
0,18	20	0,18	40 to 220/240	**TR-252184**
0,20	15	0,20	40 to 220/240	**TR-252119**
	30	0,20	40 to 220/240	**TR-252139**
0,25	15	0,15	40 to 220/240	**TR-251312**
	15	0,25	40 to 220/240	**TR-250212**
	30	0,15	40 to 220/240	**TR-251332**
	30	0,25	40 to 220/240	**TR-250232**
0,32	15	0,15	40 to 220/240	**TR-251313**
	15	0,25	40 to 220/240	**TR-250213**
	30	0,15	40 to 220/240	**TR-251333**
	30	0,25	40 to 220/240	**TR-250233**
0,53	15	1,00	40 to 200/220	**TR-251015**
	30	1,00	40 to 200/220	**TR-251035**

TRB-225: Food Industry FAME Mix

Column: **TRB-225,** 30 m x 0.25 mm x 0.25 µm, P/N TR-250232
Injection: 0,7 µL Food Industry FAME MIX (RS-35077) (30 mg/mL), split 1:50, 260 ºC
Carrier gas: H_2, ct pressure, 12 psi
Oven: 35 ºC (1 min) to 195 ºC @ 16 ºC/min to 205ºC @ 1.9 ºC/min to 230 ºC (15 min) @ 5.1 ºC/min
Detector: FID, 260 ºC



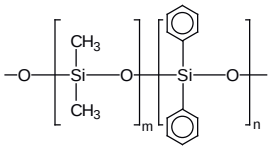
1. Butyric acid methyl ester (C4:0)
2. Caproic acid methyl ester (C6:0)
3. Caprylic acid methyl ester (C8:0)
4. Capric acid methyl ester (C10:0)
5. Undecanoic acid methyl ester (C11:0)
6. Lauric acid methyl ester (C12:0)
7. Tridecanoic acid methyl ester (C13:0)
8. Myristic acid methyl ester (C14:0)
9. Myristoleic acid methyl ester (C14:1)
10. Pentadecanoic acid methyl ester (C15:0)
11. cis-10-Pentadeccenoic acid methyl ester (C15:1)
12. Palmitic acid methyl ester (C16:0)
13. Palmitoleic acid methyl ester (C16:1)
14. Heptadecanoic acid methyl ester (C17:0)
15. cis-10-Heptadecanoic acid methyl ester (C17:1)
16. Stearic acid methyl ester (C18:0)
17. Elaidic acid methyl ester (C18:1n9t)
18. Oleic acid methyl ester (C18:1n9c)
19. Linolelaidic acid methyl ester (C18:2n6t)
20. Linoleic acid methyl ester (C18:2n6c)
21. γ-Linolenic acid methyl ester (C18:3n6)
22. Linolenic acid methyl ester (C18:3n3)
23. Archidic acid methyl ester (C20:0)
24. cis-11-Eicosenoic acid methyl ester (C20:1)
25. cis-11,14-Eicosatrienoic acid methyl ester (C20::2))
26. cis-8,11,14-Eicosatrienoic acid methyl ester (C20:3n6)
27. cis-11,14,17-Eicostrienoic acid methyl ester (C20:3n3)
28. Heneicosanoic acid methyl ester (C21:0)
29. Archidonic acid methyl ester (C20:4n6)
30. cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester (20:5n3)
31. Behenic acid methyl ester (C22:0)
32. Erucic acid methyl ester (C22:1n9)
33. cis-13,16-Docosadinoic acid methyl ester (C22:2)
34. Tricosanoic acid methyl ester (C23:0)
35. cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester (C22:6n3)
36. Lignoceric acid methyl ester (C24:0)
37. Nervonic acid methyl ester (C24:1)

TKG 1311

TRB-50

50% Diphenyl- 50% dimethyl polysiloxane, bonded and crosslinked phase.

- Medium polarity column
- Excellent confirmation column for TRB-5 analyses



Structure of Poly (dimethyldiphenyl) siloxane

TRB-50 Equivalent Phase

Agilent: HP-50+, DB-17, CP-SIL 24 CB, DB-EuPh
Supelco: SPB-50, SPB-2250
Restek: Rtx-50, Rxi-17
Quadrex: 007-17
Phenomenex: ZB-50

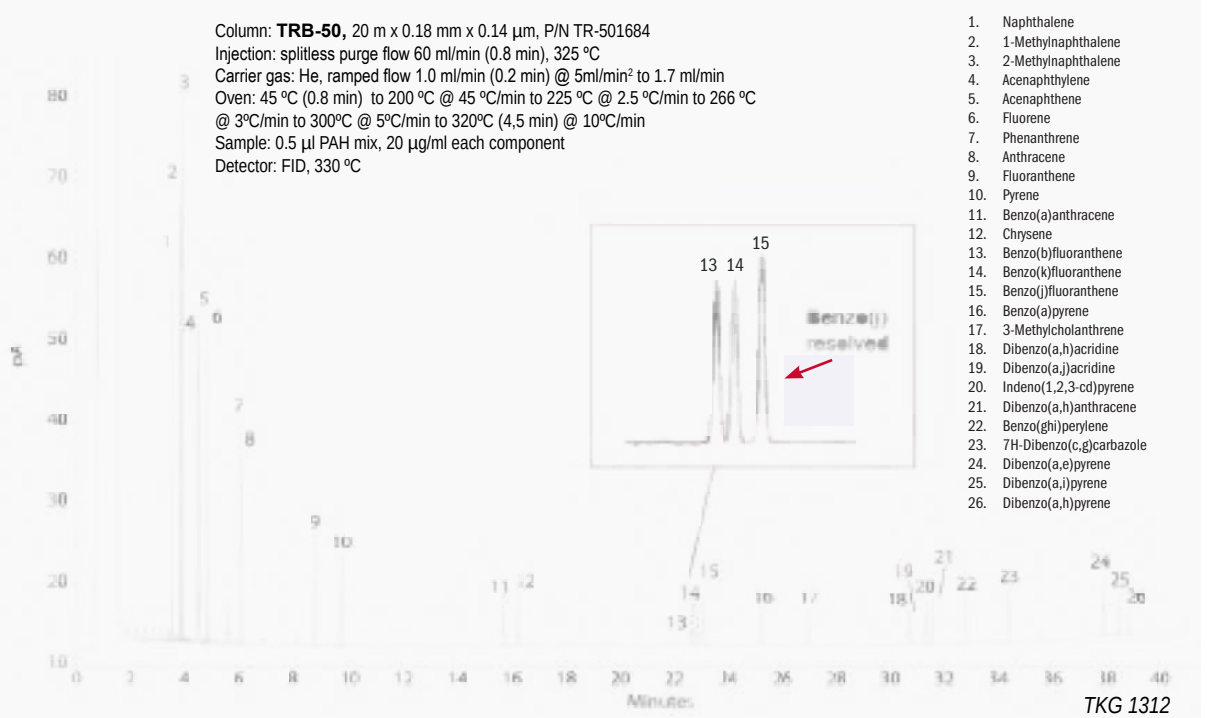
TRB-50

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	40 to 280/300	**TR-500141**
	10	0,20	40 to 280/300	**TR-502141**
	20	0,10	40 to 280/300	**TR-500181**

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	20	0,18	40 to 280/300	**TR-500984**
	20	0,30	40 to 280/300	**TR-502984**
0,25	15	0,15	40 to 280/300	**TR-501312**
	15	0,25	40 to 280/300	**TR-500212**
	15	0,50	40 to 280/300	**TR-500512**
	30	0,15	40 to 280/300	**TR-501332**
	30	0,25	40 to 280/300	**TR-500232**
	30	0,50	40 to 280/300	**TR-500532**
	60	0,15	40 to 280/300	**TR-501362**
	60	0,25	40 to 280/300	**TR-500262**
	60	0,50	40 to 280/300	**TR-500562**
0,32	15	0,15	40 to 280/300	**TR-501313**
	15	0,25	40 to 280/300	**TR-500213**
	15	0,50	40 to 280/300	**TR-500513**
	30	0,15	40 to 280/300	**TR-501333**
	30	0,25	40 to 280/300	**TR-500233**
	30	0,50	40 to 280/300	**TR-500533**
	60	0,15	40 to 280/300	**TR-501363**
	60	0,25	40 to 280/300	**TR-500263**
	60	0,50	40 to 280/300	**TR-500563**
0,53	15	0,50	40 to 260/280	**TR-500515**
	15	1,00	40 to 260/280	**TR-501015**
	30	0,50	40 to 260/280	**TR-500535**
	30	1,00	40 to 260/280	**TR-501035**
	60	0,50	40 to 260/280	**TR-500565**
	60	1,00	40 to 260/280	**TR-501065**

TRB-50: Polynuclear Aromatic Hydrocarbons (PAHs) Analysis

Column: **TRB-50,** 20 m x 0.18 mm x 0.14 µm, P/N TR-501684
Injection: splitless purge flow 60 ml/min (0.8 min), 325 ºC
Carrier gas: He, ramped flow 1.0 ml/min (0.2 min) @ 5ml/min² to 1.7 ml/min
Oven: 45 ºC (0.8 min) to 200 ºC @ 45 ºC/min to 225 ºC @ 2.5 ºC/min to 266 ºC @ 3ºC/min to 300ºC @ 5ºC/min to 320ºC (4,5 min) @ 10ºC/min
Sample: 0.5 µl PAH mix, 20 µg/ml each component
Detector: FID, 330 ºC



1. Naphthalene
2. 1-Methylnaphthalene
3. 2-Methylnaphthalene
4. Acenaphthylene
5. Acenaphthene
6. Fluorene
7. Phenanthrene
8. Anthracene
9. Fluoranthene
10. Pyrene
11. Benzo(a)anthracene
12. Chrysene
13. Benzo(b)fluoranthene
14. Benzo(k)fluoranthene
15. Benzo(j)fluoranthene
16. Benzo(a)pyrene
17. 3-Methylcholanthrene
18. Dibenzo(a,h)acridine
19. Dibenzo(a,j)acridine
20. Indeno(1,2,3-cd)pyrene
21. Dibenzo(a,h)anthracene
22. Benzo(ghi)perylene
23. 7H-Dibenzo(c,g)carbazole
24. Dibenzo(a,e)pyrene
25. Dibenzo(a,i)pyrene
26. Dibenzo(a,h)pyrene

TKG 1312

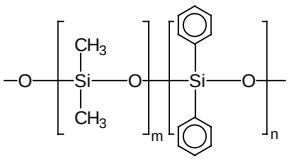
TRB-50HT

50% Diphenyl- 50% dimethylpolysiloxane, bonded and crosslinked phase.

- Medium polarity column with high thermal stability
- Best column for triglycerides analysis

TRB-50HT Equivalent Phase

Agilent: DB-17ht, CP-TAP CB
Restek: Rtx-65TG, MXT-65TG
Quadrex: 007-65HT
SGE: BPX50



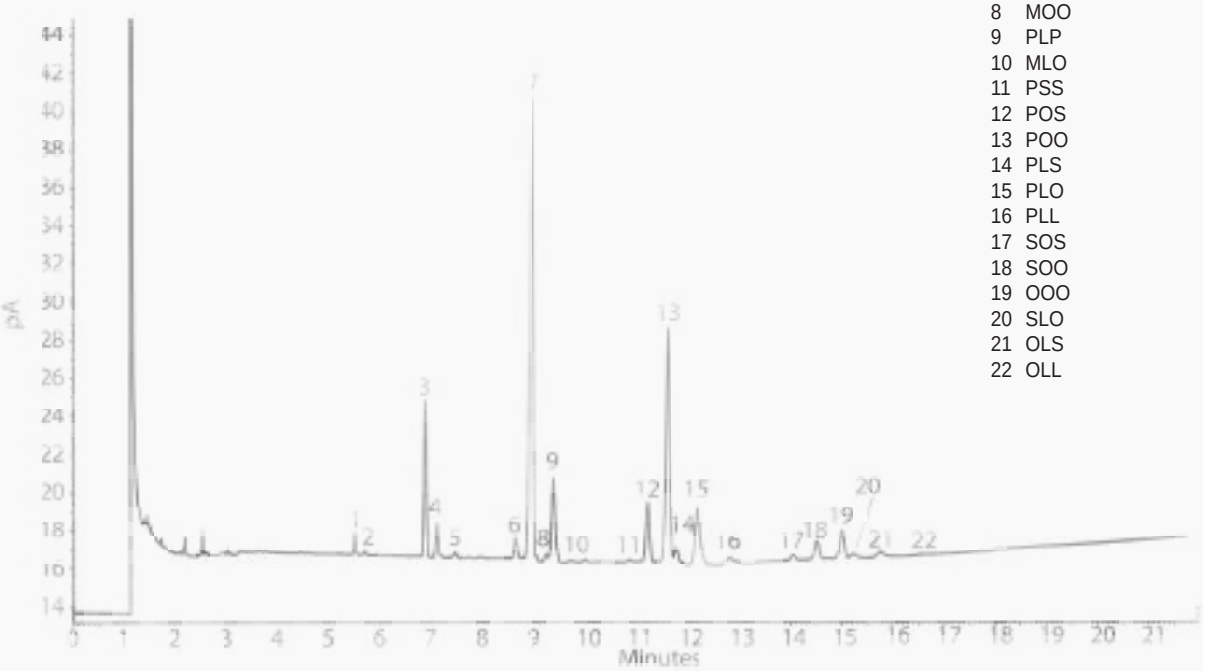
Structure of
Poly (dimethyldiphenyl) siloxane

TRB-50HT

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,10	50 to 370	**TR-530112**
	15	0,15	50 to 370	**TR-531312**
	30	0,10	50 to 370	**TR-530132**
	30	0,15	50 to 370	**TR-531332**

TRB-50HT: Palm oil

Column: **TRB-50HT,** 30 m x 0.25 mm x 0.1 µm, P/N TR-530132
Injection: 1 µl Palm oil, 10 mg/ml in Isooctane, split 1:50, 360 ºC
Liner: Single taper w/wool 4 mm ID
Carrier gas: H_2, ct pressure, 17 psi
Oven: 350 ºC (1 min) to 360 ºC @ 0.5 ºC/min
Detector: FID, 370 ºC

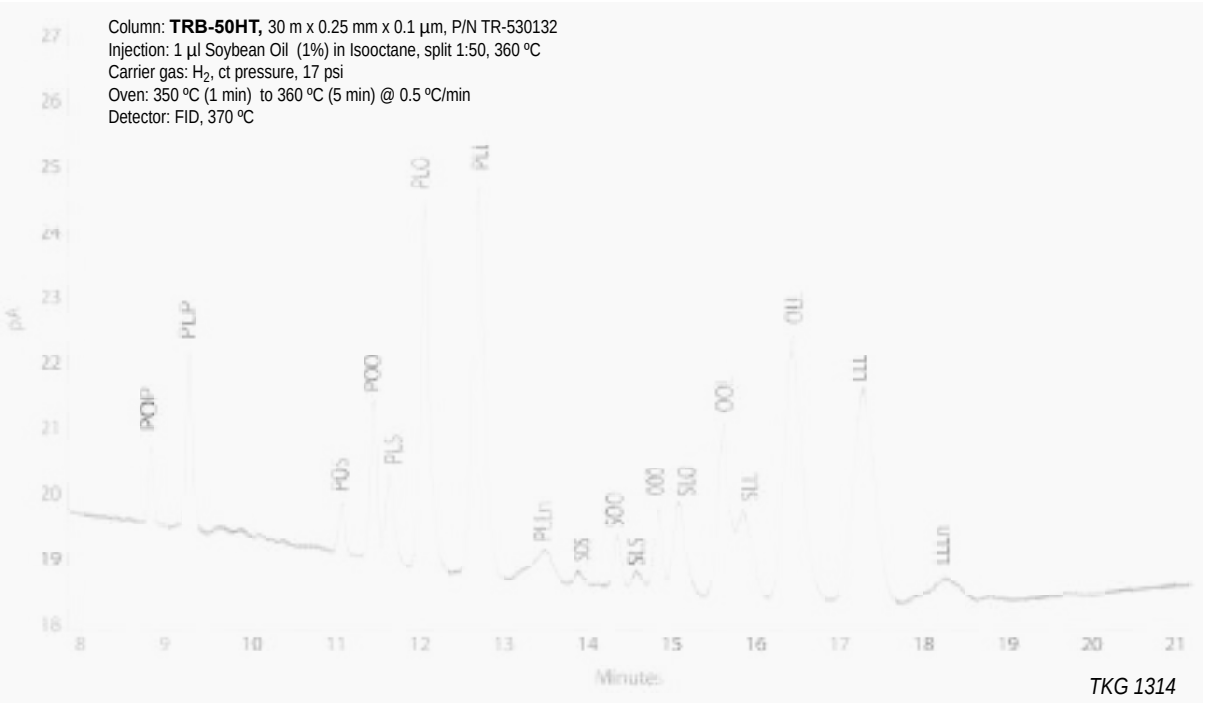


Peak	Name
1	MPP
2	MOM
3	PPP
4	MOP
5	MLP
6	PPS
7	POP
8	MOO
9	PLP
10	MLO
11	PSS
12	POS
13	POO
14	PLS
15	PLO
16	PLL
17	SOS
18	SOO
19	OOO
20	SLO
21	OLS
22	OLL

TKG 1313

TRB-50HT: Soybean Oil

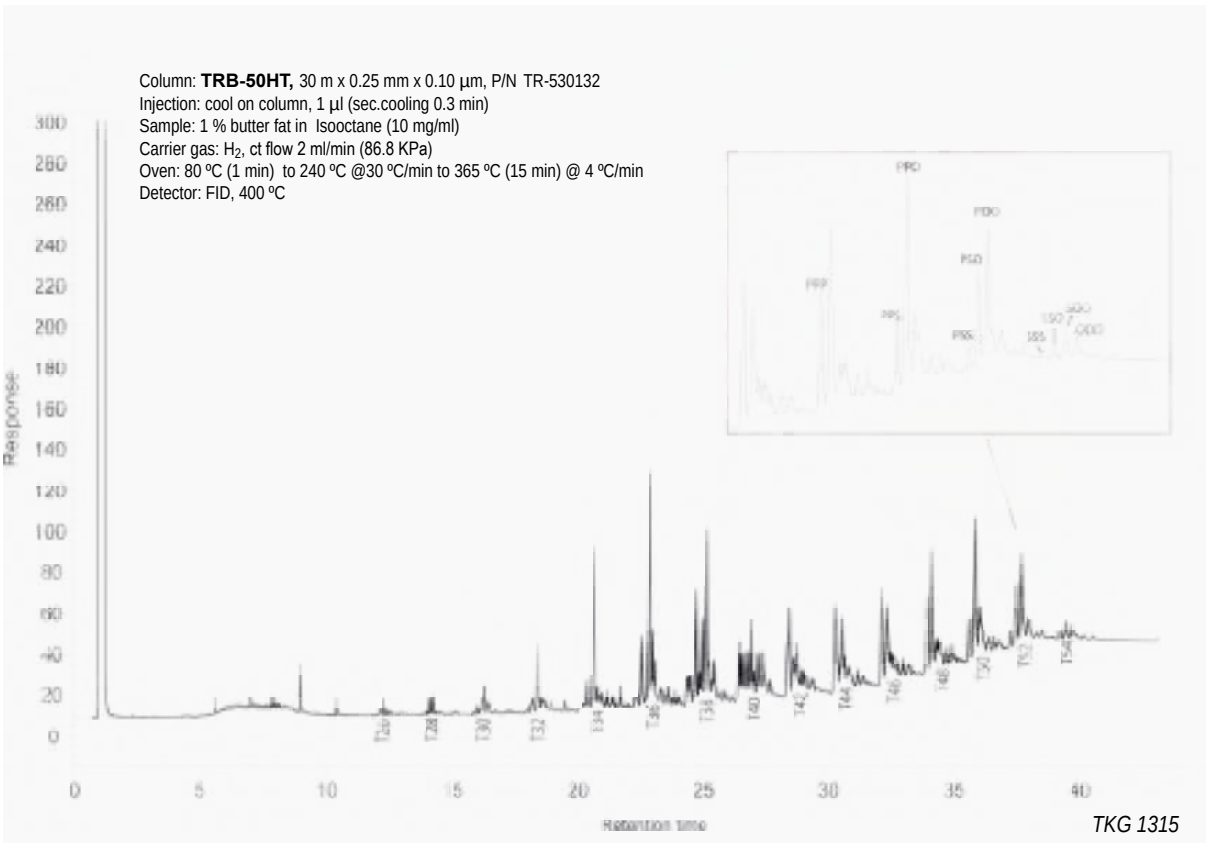
Column: **TRB-50HT,** 30 m x 0.25 mm x 0.1 µm, P/N TR-530132
Injection: 1 µl Soybean Oil (1%) in Isooctane, split 1:50, 360 ºC
Carrier gas: H_2, ct pressure, 17 psi
Oven: 350 ºC (1 min) to 360 ºC (5 min) @ 0.5 ºC/min
Detector: FID, 370 ºC



TKG 1314

TRB-50HT: Butter Triglycerides

Column: **TRB-50HT,** 30 m x 0.25 mm x 0.10 µm, P/N TR-530132
Injection: cool on column, 1 µl (sec.cooling 0.3 min)
Sample: 1 % butter fat in Isooctane (10 mg/ml)
Carrier gas: H_2, ct flow 2 ml/min (86.8 KPa)
Oven: 80 ºC (1 min) to 240 ºC @30 ºC/min to 365 ºC (15 min) @ 4 ºC/min
Detector: FID, 400 ºC



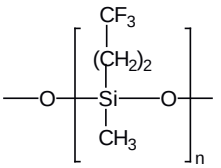
TKG 1315

Teknokroma Capillary Columns

TRB-F50

50% Trifluoropropyl- 50% Methyl polysiloxane, bonded and crosslinked phase.

- High polarity column
- Column designed for the EPA 609 and 8140 methods



Structure of Poly (methyltrifluoropropyl) siloxane

TRB-F50 Equivalent Phase

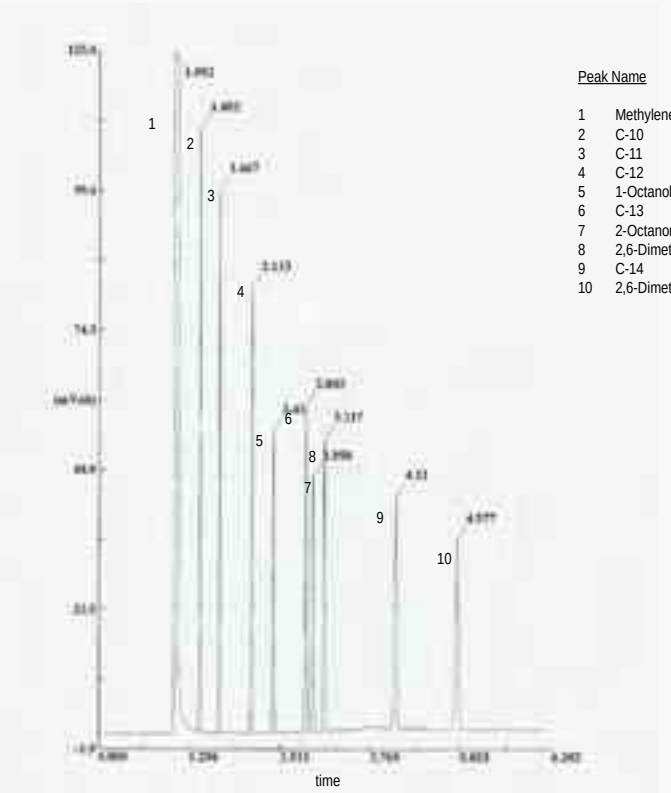
Agilent: DB-210, DB-200
Restek: Rtx-200
Quadrex: 007-210

TRB-F50

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	20	0,20	45 to 240/260	**TR-572184**
0,25	15	0,15	45 to 240/260	**TR-571312**
	15	0,25	45 to 240/260	**TR-570212**
	15	0,50	45 to 240/260	**TR-570512**
	30	0,15	45 to 240/260	**TR-571332**
	30	0,25	45 to 240/260	**TR-570232**
	30	0,50	45 to 240/260	**TR-570532**
0,32	15	0,15	45 to 240/260	**TR-571313**
	15	0,25	45 to 240/260	**TR-570213**
	15	0,50	45 to 240/260	**TR-570513**
	30	0,15	45 to 240/260	**TR-571333**
	30	0,25	45 to 240/260	**TR-570233**
	30	0,50	45 to 240/260	**TR-570533**
0,53	15	1,00	45 to 220/240	**TR-571015**
	30	1,00	45 to 220/240	**TR-571035**

TRB-F50: SP-4-7301 Test

Column: **TRB-F50**, 30 m x 0.32 mm x 0.5 µm, P/N TR-570533
Injection: 1 µL standard SP-4-7301 (500 ng/mL comp), split 1:50, 260 ºC
Carrier gas: H_2, ct pressure, 7psi (48.2 kPa)
Oven: 100 ºC
Detector: FID, 280ºC



Peak Name

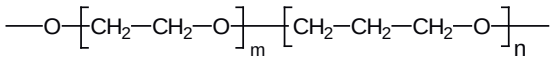
1	Methylene chloride
2	C-10
3	C-11
4	C-12
5	1-Octanol
6	C-13
7	2-Octanone
8	2,6-Dimethylphenol
9	C-14
10	2,6-Dimethylaniline

TKG 1129

TRB-PAG

50% Polyethylene - 50% polypropylene glycol, bonded and crosslinked phase.

- Phase polarity slightly lower than TRB-WAX due to the introduction of propylene oxide groups
- Polarity similar to UCON phase



Structure of Poly (ethylenepropylene) glycol

TRB-PAG Equivalent Phase

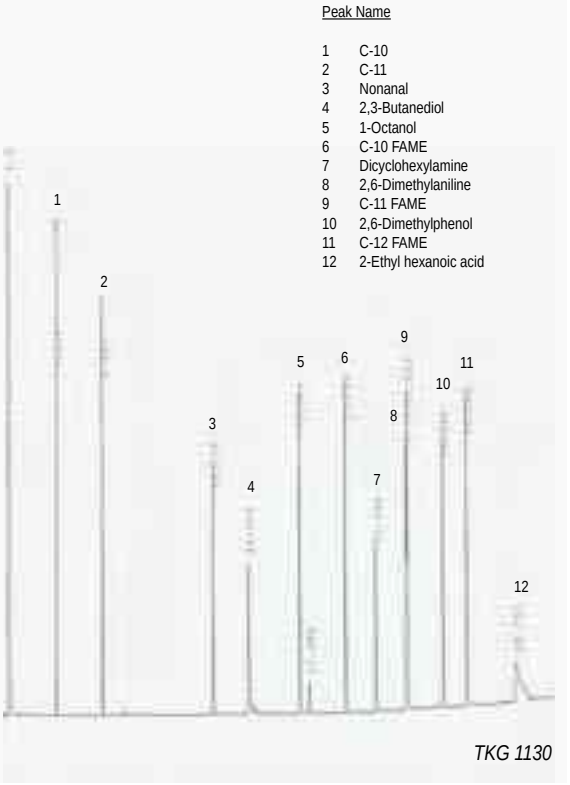
Supelco: PAG

TRB-PAG

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,25	30 to 220/230	**TR-550212**
	30	0,25	30 to 220/230	**TR-550232**
	60	0,25	30 to 220/230	**TR-550262**
0,32	15	0,25	30 to 220/230	**TR-550213**
	30	0,25	30 to 220/230	**TR-550233**
	60	0,25	30 to 220/230	**TR-550263**
0,53	15	0,50	30 to 220/230	**TR-550515**
	30	0,50	30 to 220/230	**TR-550535**
	60	0,50	30 to 220/230	**TR-550565**

TRB-PAG: Grob Test

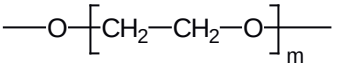
Column: **TRB-PAG**, 30 m x 0.25 mm x 0.25 µm, P/N TR-550232
Injection: 1 µL Test Grob, split 1:25, 260 ºC
Carrier gas: H_2, ct pressure 11 psi (75.8 kPa)
Oven: 40 ºC to 230 ºC (5 min) @ 6 ºC/min
Detector: FID, 260 ºC



SupraWAX-280

Column totally equivalent to the Supelcowax™-10. Based in the popular phase Carbowax 20M.

- 100 % Poliethylene glycol (PEG), bonded and cross-linked phase
- Column of high polarity
- Phase practically equivalent to the USP G16 phase
- Wide range of operating temperatures and high thermal stability (35ºC-280ºC)
- Compatible with water and methanol injections, providing that these solvents must be completely vaporized when they enter into the column.
- Reproducibility among columns guaranteed
- Column used for the analysis of methyl esters of fatty acids (FAMEs) solvents, fragrances, alcohols and aromatic compounds in the alimentary and flavor and fragrance industry.



Structure of Polyethylene glycol

SupraWAX-280 Equivalent Phase

Agilent: DB-WAX etr
Supelco: Supelcowax™ 10
SGE: SolGel-WAX

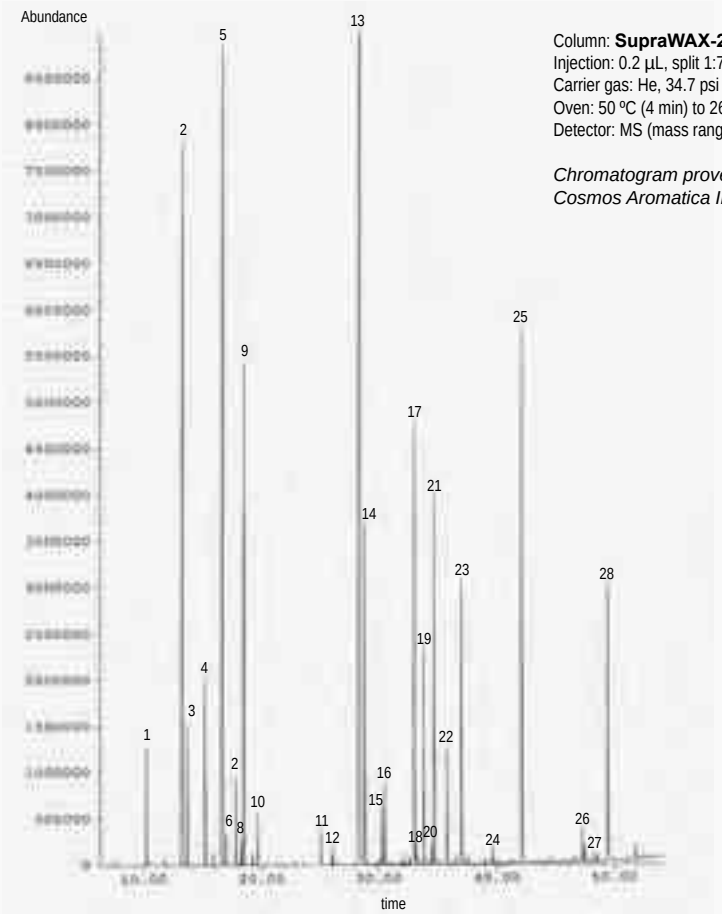
Teknokroma Capillary Columns

SupraWAX-280

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	35 to 280	**TR-830141**
	15	0,10	35 to 280	**TR-830111**
	20	0,10	35 to 280	**TR-830181**
	20	0,20	35 to 280	**TR-832181**
	15	0,20	35 to 280	**TR-832111**
0,18	10	0,18	35 to 280	**TR-830944**
	20	0,18	35 to 280	**TR-830984**
	20	0,30	35 to 280	**TR-832984**
	40	0,30	35 to 280	**TR-8329C4**
0,20	30	0,20	35 to 280	**TR-832139**
	60	0,20	35 to 280	**TR-832169**
	60	0,40	35 to 280	**TR-830469**
0,25	15	0,25	35 to 280	**TR-830212**
	15	0,50	35 to 280	**TR-830512**
	30	0,25	35 to 280	**TR-830232**
	30	0,50	35 to 280	**TR-830532**

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
	60	0,25	35 to 280	**TR-830262**
	60	0,50	35 to 280	**TR-830562**
0,32	15	0,25	35 to 280	**TR-830213**
	15	0,50	35 to 280	**TR-830513**
	30	0,25	35 to 280	**TR-830233**
	30	0,50	35 to 280	**TR-830533**
	30	1,00	35 to 280	**TR-831033**
	60	0,25	35 to 280	**TR-830263**
	60	0,50	35 to 280	**TR-830563**
	60	1,00	35 to 280	**TR-831063**
0,53	15	0.50	35 to 280	**TR-830515**
	15	1,00	35 to 280	**TR-831015**
	30	0.50	35 to 280	**TR-830535**
	30	1,00	35 to 280	**TR-831035**
	30	2,00	35 to 280	**TR-832035**
	60	1,00	35 to 280	**TR-831065**
	60	2,00	35 to 280	**TR-832065**

SupraWAX-280: Essential Oil of Flower of Orange Tree (Neroli)



Column: **SupraWAX-280**, 60 m x 0.20 mm x 0.20 µm, P/N TR-832169
Injection: 0.2 µL, split 1:75, 260 ºC
Carrier gas: He, 34.7 psi
Oven: 50 ºC (4 min) to 265 ºC (10 min) @ 4 ºC/min
Detector: MS (mass range 29-350 m/z) 280 ºC

Chromatogram proveded by Antonio González from Cosmos Aromatica Internacional

Peak Name

1. α-Pynene
2. β-Pynene
3. Sabynene
4. β-Myrcene
5. Limonene
6. β-Phellandrene
7. Cis-b-ocymene
8. γ-Terpynene
9. Trans-b-ocymene
10. α-Terpynolene
11. Cis-linalool oxide
12. Trans-linalool oxide
13. Linalool
14. Linalyl acetate
15. Terpinen-4-ol
16. Trans-caryophyllene
17. α-Terpyneol
18. α-Terpenyl
19. Neryl acetate
20. Cyclogermacrene
21. Geranyl acetate
22. Cis-geranyol
23. Trans-geranyol
24. Phenyl acetonitrile
25. Nerolydol
26. Methylanthranilate
27. Trans, trans-farnesyl acetate
28. Trans, trans-farnesol

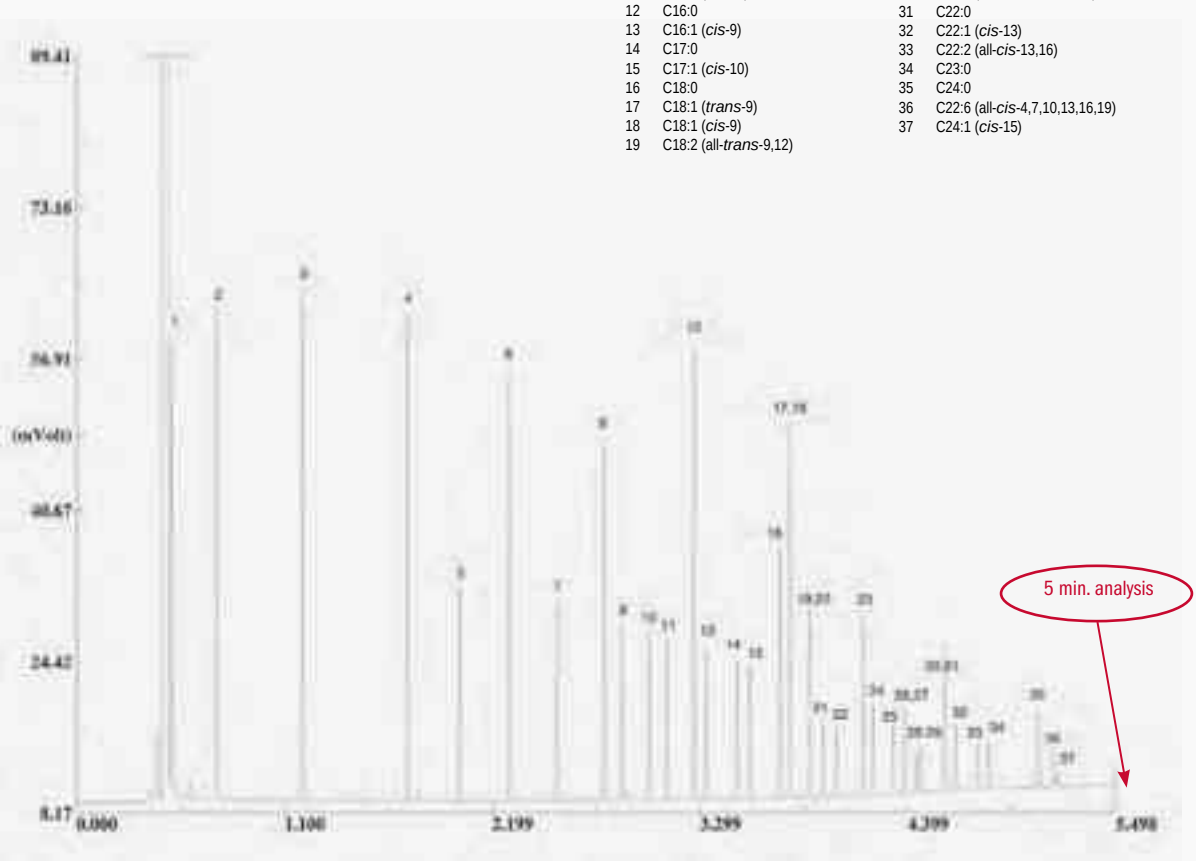
TKG 1202

SupraWAX-280: Food Industry FAME mix (37 compounds)

Column: **SupraWAX-280**, 15 m x 0.10 mm x 0.10 µm, P/N TR-830111
Injection: 0.3 µL Food Industy FAME Mix 10 mg/ml in methylene chloride
280ºC, split 200:1, precission liner
Carrier gas: H_2, 45 psi (310.05 kPa)
Oven: 100 ºC (0.5 min) to 280 ºC (2 min) @ 50 ºC/min
Detector: FID, 280 ºC

Peak Name

1	C4:0	20	C18:2 (all-*cis*-9,12)
2	C6:0	21	C18:3 (all-*cis*-6,9,12)
3	C8:0	22	C18:3 (all-*cis*-9,12,15)
4	C10:0	23	C20:0
5	C11:0	24	C20:1 (*cis*-11)
6	C12:0	25	C20:2 (all-*cis*-11,14)
7	C13:0	26	C20:3 (all-*cis*-8,11,14)
8	C14:0	27	C21:0
9	C14:1 (*cis*-9)	28	C20:3 (all-*cis*-11,14,17)
10	C15:0	29	C20:4 (all-*cis*-5,8,11,14)
11	C15:1 (*cis*-10)	30	C20:5 (all-*cis*-5,8,11,14,17)
12	C16:0	31	C22:0
13	C16:1 (*cis*-9)	32	C22:1 (*cis*-13)
14	C17:0	33	C22:2 (all-*cis*-13,16)
15	C17:1 (*cis*-10)	34	C23:0
16	C18:0	35	C24:0
17	C18:1 (*trans*-9)	36	C22:6 (all-*cis*-4,7,10,13,16,19)
18	C18:1 (*cis*-9)	37	C24:1 (*cis*-15)
19	C18:2 (all-*trans*-9,12)		



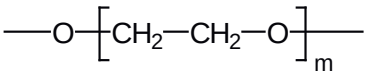
TKG 1247

Teknokroma Capillary Columns

TRB-WAX

100% polyethylene glycol, bonded and cross-linked phase.

- High polarity column
- Ideal for separating alcohols, aldehydes, ketones and aromatic isomers (BTX)

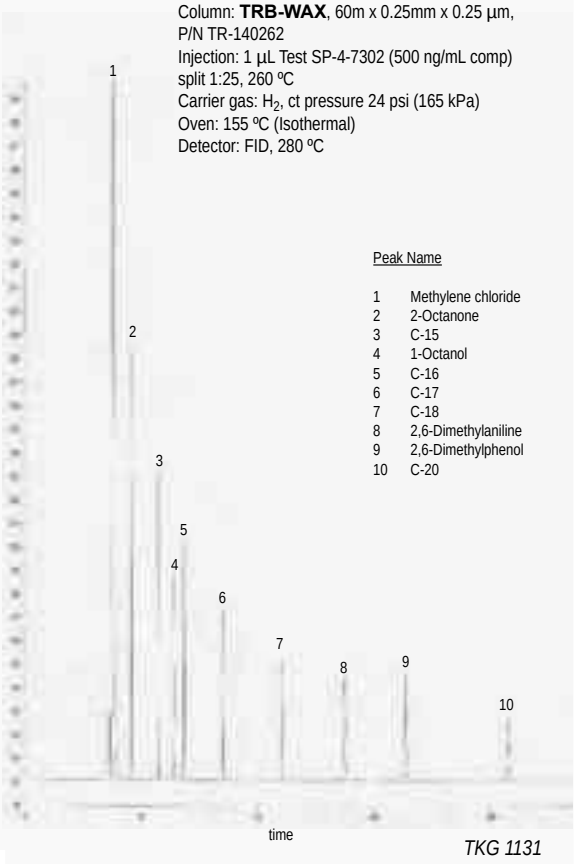


Structure of Polyethylene glycol

TRB-WAX Equivalent Phase

Agilent: HP-INNOWAX, DB-WAX, CP-WAX 52 CB, HP-20M, HP-WAX
Supelco: Carbowax 20M
Restek: STABILWAX, Rtx-WAX
SGE: BP20
Phenomenex: ZB-WAX

TRB-WAX: SP-4-7302 Test

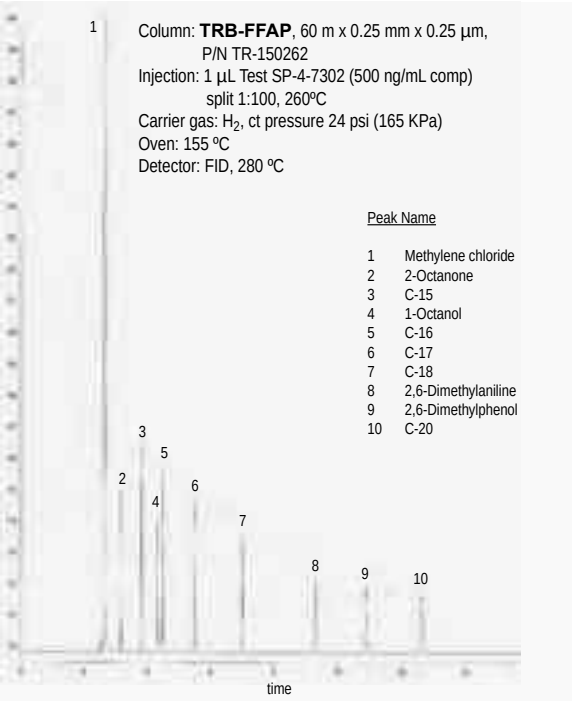


TKG 1131

TRB-WAX

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	40 to 260/270	**TR-140141**
	10	0,20	40 to 260/270	**TR-142141**
	20	0,10	40 to 260/270	**TR-140181**
	20	0,20	40 to 260/270	**TR-142181**
0,20	15	0,20	40 to 260/270	**TR-142119**
	15	0,40	40 to 260/270	**TR-140419**
	30	0,20	40 to 260/270	**TR-142139**
	30	0,40	40 to 260/270	**TR-140439**
	60	0,20	40 to 260/270	**TR-142169**
	60	0,40	40 to 260/270	**TR-140469**
0,25	15	0,10	40 to 260/270	**TR-140112**
	15	0,25	40 to 260/270	**TR-140212**
	15	0,50	40 to 260/270	**TR-140512**
	30	0,10	40 to 260/270	**TR-140132**
	30	0,25	40 to 260/270	**TR-140232**
	30	0,50	40 to 260/270	**TR-140532**
	30	1,00	40 to 260/270	**TR-141032**
	60	0,10	40 to 260/270	**TR-140162**
	60	0,25	40 to 260/270	**TR-140262**
	60	0,50	40 to 260/270	**TR-140562**
0,32	15	0,10	40 to 260/270	**TR-140113**
	15	0,25	40 to 260/270	**TR-140213**
	15	0,50	40 to 260/270	**TR-140513**
	30	0,10	40 to 260/270	**TR-140133**
	30	0,25	40 to 260/270	**TR-140233**
	30	0,50	40 to 260/270	**TR-140533**
	50	1,20	40 to 230/240	**TR-141253**
	60	0,10	40 to 260/270	**TR-140163**
	60	0,25	40 to 260/270	**TR-140263**
	60	0,50	40 to 260/270	**TR-140563**
	60	1,00	40 to 230/240	**TR-141063**
	60	1,20	40 to 230/240	**TR-141263**
	100	1,00	40 to 230/240	**TR-141093**
0,53	10	1,00	40 to 240/250	**TR-141045**
	15	1,00	40 to 240/250	**TR-141015**
	30	1,00	40 to 240/250	**TR-141035**
	30	1,33	40 to 240/250	**TR-141735**
	30	2,00	40 to 240/250	**TR-142035**
	60	1,00	40 to 240/250	**TR-141065**
	60	2,00	40 to 240/250	**TR-142065**

TRB-FFAP: SP-4-7302 Test

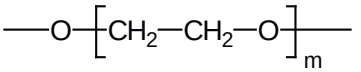


TKG 1132

TRB-FFAP

Polyethylene glycol esterified with nitroteraphthalic acid, bonded and crosslinked phase.

- Ideal for analysis of free acids (without derivatization), phenols and glycols
- Thermal stability up to (250ºC)



Structure of Polyethylene glycol

TRB-FFAP Equivalent Phase

Agilent: HP-FFAP, DB-FFAP, CP-WAX 58 FFAP CB
Supelco: NUKOL, SPB-1000
Restek: STABILWAX-DA
SGE: BP21
Quadrex: 007-FFAP
Phenomenex: ZB-FFAP

TRB-FFAP

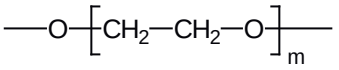
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	40 to 240/250	**TR-150141**
	10	0,20	40 to 240/250	**TR-152141**
	15	0,10	40 to 240/250	**TR-150111**
	20	0,10	40 to 240/250	**TR-150181**
0,20	15	0,30	40 to 240/250	**TR-152119**
	30	0,30	40 to 240/250	**TR-152139**
	60	0,30	40 to 240/250	**TR-152169**
0,25	15	0,25	40 to 240/250	**TR-150212**
	30	0,25	40 to 240/250	**TR-150232**
	60	0,25	40 to 240/250	**TR-150262**
0,32	15	0,25	40 to 240/250	**TR-150213**
	15	0,50	40 to 240/250	**TR-150513**
	30	0,25	40 to 240/250	**TR-150233**
	30	0,50	40 to 240/250	**TR-150533**
	60	0,25	40 to 240/250	**TR-150263**
	60	0,50	40 to 240/250	**TR-150563**
0,53	15	0,50	40 to 240/250	**TR-150515**
	15	1,00	40 to 230/240	**TR-151015**
	30	0,50	40 to 240/250	**TR-150535**
	30	1,00	40 to 230/240	**TR-151035**
	60	0,50	40 to 240/250	**TR-150565**
	60	1,00	40 to 230/240	**TR-151065**

Teknokroma Capillary Columns

TR-WAX.DB

100% Polyethylene glycol, nonbonded phase.

- Basic deactivated Polyethylene glycol (PEG)
- Excellent for analysing basic nonderivatized compounds
- Ideal for separating amines and nitrosamines



Structure of Polyethylene glycol

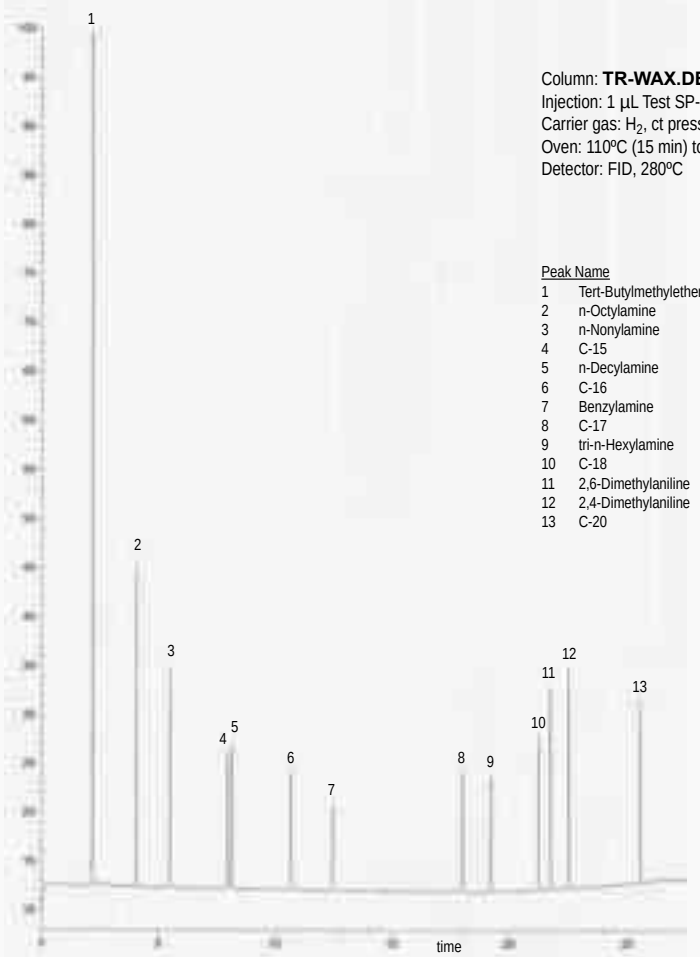
TR-WAX.DB Equivalent Phase

Agilent: CAM, HP-BasicWax, CP-WAX 51 CB for Amines CP-WAX for Volatile Amines
Supelco: Carbowax-Amine
Restek: Stabilwax-DB

TR-WAX.DB

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	15	0,20	60 to 210/220	**TR-932112**
	15	0,25	60 to 210/220	**TR-930212**
	30	0,20	60 to 210/220	**TR-932132**
	30	0,25	60 to 210/220	**TR-930232**
	30	0,50	60 to 210/220	**TR-930532**
	60	0,20	60 to 210/220	**TR-932162**
0,32	15	0,25	60 to 210/220	**TR-930213**
	30	0,25	60 to 210/220	**TR-930233**
	30	0,50	60 to 210/220	**TR-930533**
	30	1,00	60 to 210/220	**TR-931033**
	60	1,00	60 to 210/220	**TR-931063**
0,53	15	1,00	60 to 210/220	**TR-931015**
	30	0,50	60 to 210/220	**TR-930535**
	30	1,00	60 to 210/220	**TR-931035**
	30	1,50	60 to 210/220	**TR-931535**
	60	1,00	60 to 210/220	**TR-931065**

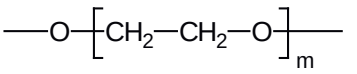
TR-WAX.DB: SP-4-8278 Test



Column: **TR-WAX.DB**, 60m x 0.25mm x 0.20 µm P/N TR-932162
Injection: 1 µL Test SP-4-8278 (500 ng/mL comp), split 1:50, 260ºC
Carrier gas: H_2, ct pressure 24 psi (168 kPa)
Oven: 110ºC (15 min) to 200ºC (10 min) @ 8ºC/min
Detector: FID, 280ºC

Peak	Name
1	Tert-Butylmethylether
2	n-Octylamine
3	n-Nonylamine
4	C-15
5	n-Decylamine
6	C-16
7	Benzylamine
8	C-17
9	tri-n-Hexylamine
10	C-18
11	2,6-Dimethylaniline
12	2,4-Dimethylaniline
13	C-20

TKG 1133



Structure of Polyethylene glycol

TRB-WAXOmega Equivalent Phase

Supelco: Omegawax
Restek: Famewax

TRB-WAXOmega

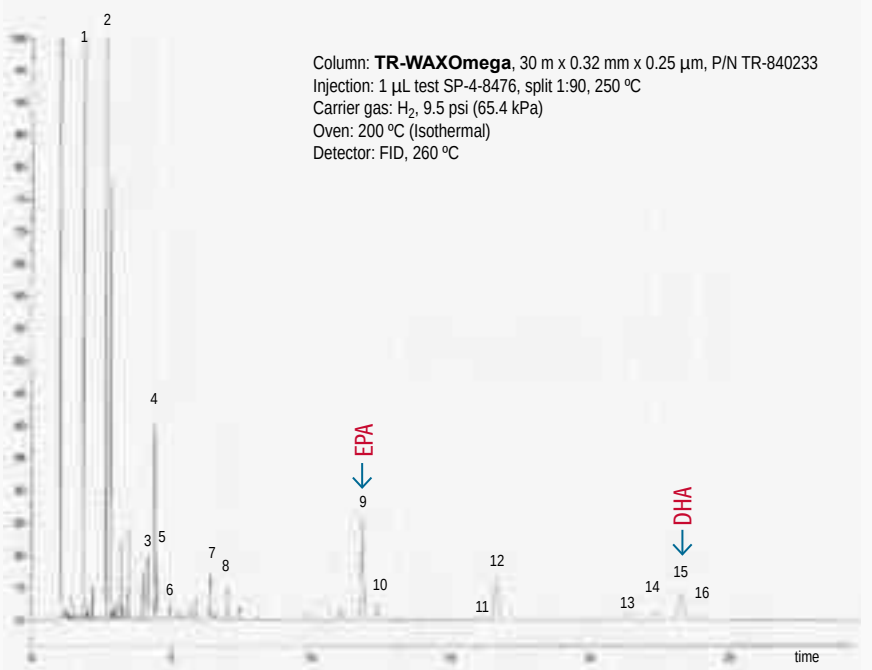
100% Polyethylene glycol, bonded and crosslinked phase.

- High polarity column
- Specially designed for the analysis of Omega-3 and Omega-6 fatty acids methyl esters

TRB-WAXOmega

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	30	0,25	40 to 260/270	**TR-840232**
0,32	30	0,25	40 to 260/270	**TR-840233**
0,53	30	0,50	40 to 260/270	**TR-840535**

TRB-WAXOmega: SP-4-8476 Test



Column: **TR-WAXOmega**, 30 m x 0.32 mm x 0.25 µm, P/N TR-840233
Injection: 1 µL test SP-4-8476, split 1:90, 250 ºC
Carrier gas: H_2, 9.5 psi (65.4 kPa)
Oven: 200 ºC (Isothermal)
Detector: FID, 260 ºC

Peak Name	
1	C14:0
2	C16:0
3	C18:0
4	C18:1n9
5	C18:1n7
6	C18:2n6
7	C18:4n3
8	C20:0
9	C20:5n3 (EPA)
10	C22:0
11	C21:5n3
12	C23:0
13	C22:5n3
14	C24:0
15	C22:6n3 (DHA)
16	C24:1n9

TKG 1134

Teknokroma Capillary Columns

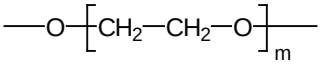
Meta.WAX

100% Polyethylene glycol, bonded and cross-linked phase.

- High polarity column
- Minimum operating temperature 20º C
- Designed for analyzing volatiles in alcoholic beverages
- Excellent symmetry for aldehyde and glycol peaks

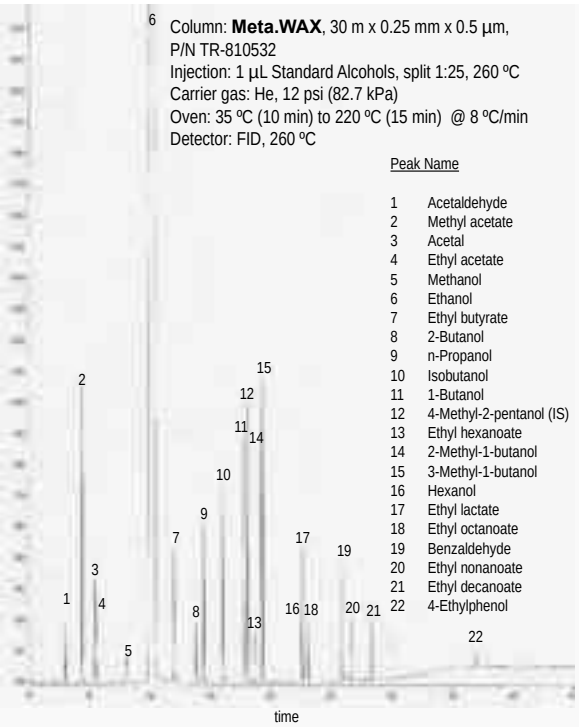
Meta.WAX Equivalent Phase

Agilent: HP-WAX, DB-WAX, CP-WAX 57 CB, DB-WAX FF
Restek: Rtx-WAX
Phenomenex: ZB-WAX
SGE: BP20
Supelco: Nukol



Structure of Polyethylene glycol

Meta.WAX: Alcohols



TKG 1135

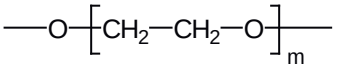
Meta.WAX

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,10	10	0,10	20 to 240/250	**TR-810141**
	10	0,20	20 to 240/250	**TR-812141**
	20	0,10	20 to 240/250	**TR-810181**
	20	0,20	20 to 240/250	**TR-812181**
0,18	10	0,18	20 to 240/250	**TR-810944**
	20	0,18	20 to 240/250	**TR-810984**
	20	0,30	20 to 240/250	**TR-812984**
	40	0,18	20 to 240/250	**TR-8109C4**
	40	0,30	20 to 240/250	**TR-8129C4**
0,25	15	0,10	20 to 240/250	**TR-810112**
	15	0,25	20 to 240/250	**TR-810212**
	15	0,50	20 to 240/250	**TR-810512**
	30	0,10	20 to 240/250	**TR-810132**
	30	0,25	20 to 240/250	**TR-810232**
	30	0,50	20 to 240/250	**TR-810532**
	60	0,20	20 to 240/250	**TR-812162**
	60	0,25	20 to 240/250	**TR-810262**
0,32	15	0,25	20 to 240/250	**TR-810213**
	15	0,50	20 to 240/250	**TR-810513**
	15	1,00	20 to 230/240	**TR-811013**
	30	0,25	20 to 240/250	**TR-810233**
	30	0,50	20 to 240/250	**TR-810533**
	30	1,00	20 to 230/240	**TR-811033**
	60	0,25	20 to 240/250	**TR-810263**
	60	0,50	20 to 240/250	**TR-810563**
	60	0,64	20 to 240/250	**TR-816463**
	60	1,00	20 to 230/240	**TR-811063**
0,53	15	1,00	20 to 230/240	**TR-811215**
	30	1,00	20 to 230/240	**TR-811235**

Meta. WAX 400

100% Polyethylene glycol (PEG), nonbonded phase.

- Column designed for the analysis of volatiles in alcoholic beverages and solvents
- Maximum resolution of amylic alcohols
- High number of plates even at very low temperature (<20ºC)



Structure of Polyethylene glycol

Meta.WAX 400 Equivalent Phase

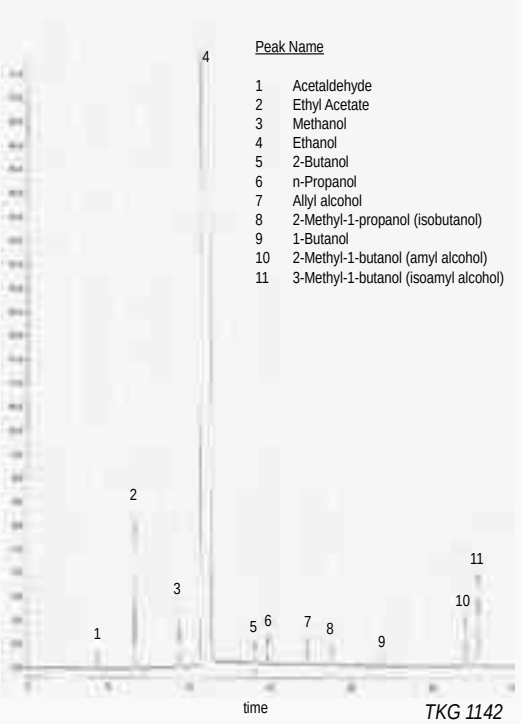
Agilent: CP-Carbowax 400

Meta.WAX 400

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,32	50	0,20	0 to 60/80	**TR-402153**

Meta.WAX 400: Alcohols

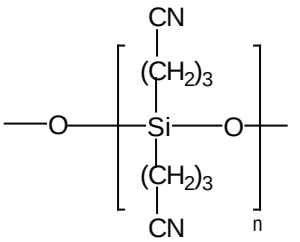
Column: **Meta.WAX 400**, 50 m x 0.32 mm x 0.20 µm, P/N TR-402153
Injection: 1 µL standard (split 1:50), 175 ºC
Carrier gas: He, 11 psi (75.8 kPa)
Oven: 30 ºC (5 min) to 60 ºC (10 min) @ 4 ºC/min
Detector: FID, 175 ºC



TR-CN100

100% Cyanopropyl polysiloxane, nonbonded phase

- Column of maximum polarity
- Designed for separating fatty acids methyl esters (FAME)
- High selectivity towards cis-trans isomers of FAME



Structure of Poly (biscyanopropyl) siloxane

TR-CN100 Equivalent Phase

Agilent: CP-SIL 88, HP-88, Select FAME
Supelco: SP-2340, SP-2380, SP-2560, SP-2330
Restek: Rt-2330, Rt-2560
Phenomenex: ZB-FAME, ZB-88
SGE: BPX70, BPX90

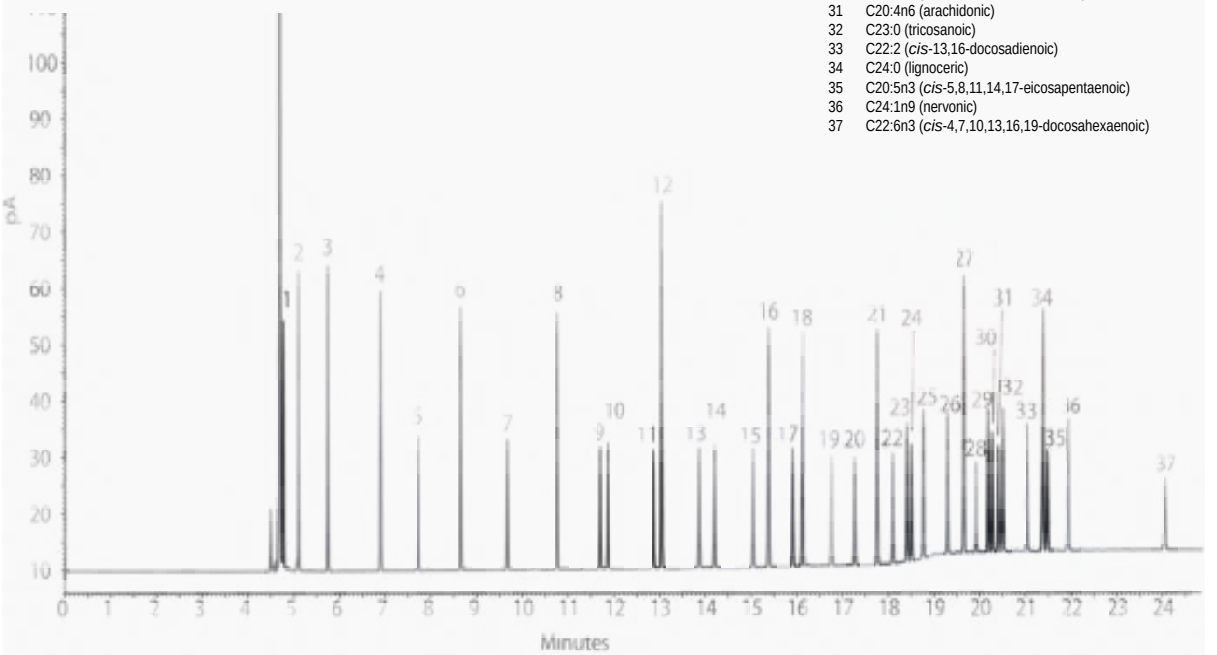
TR-CN100

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	75	0,14	40 to 240/250	**TR-881674**
0,25	15	0,20	40 to 240/250	**TR-882112**
	30	0,20	40 to 240/250	**TR-882132**
	60	0,20	40 to 240/250	**TR-882162**
	100	0,20	40 to 240/250	**TR-882192**
	200	0,20	40 to 240/250	**TR-8821P2**
0,32	15	0,20	40 to 240/250	**TR-882113**
	30	0,20	40 to 240/250	**TR-882133**
	60	0,20	40 to 240/250	**TR-882163**
0,53	15	0,20	40 to 225/250	**TR-882115**
	30	0,20	40 to 225/250	**TR-882135**
	60	0,20	40 to 225/250	**TR-882165**

TR-CN100: SEPARATION OF METHYL ESTERS (FAMES) FAST TEST

Column: **TR-CN100**, 100 m x 0.25 mm x 0.20 µm, P/N TR-882192
Injection: 0.7µL 37 FAMES (RS-35077) (30 mg/mL), split 1:100, 260 ºC
Carrier gas: H_2, ct pressure 42 psi (2,4 ml/min)
Oven: 140 ºC (5 min) to 180 ºC @ 8 ºC/min to 210 ºC @ 4ºC/min to 240 ºC (10 min) @ 20º C/min
Detector: FID, 260 ºC
Liner: 4 mm ID, Single taper w/wool

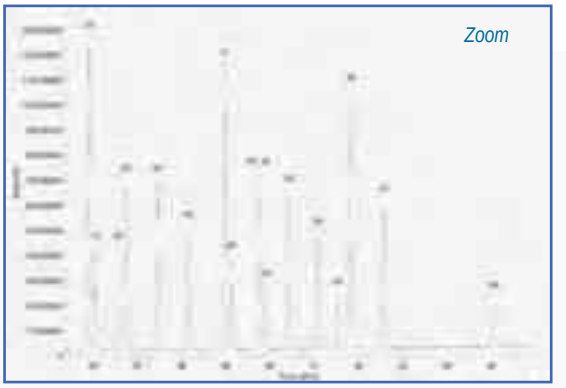
Peak	Name
1	C4:0 (butyric)
2	C6:0 (caproic)
3	C8:0 (caprylic)
4	C10:0 (capric)
5	C11:0 (undecanoic)
6	C12:0 (lauric)
7	C13:0 (tridecanoic)
8	C14:0 (myristic)
9	C14:1 (myristoleic)
10	C15:0 (pentadecanoic)
11	C15:1 (*cis*-10-pentadecanoic)
12	C16:0 (palmitic)
13	C16:1 (palmitoleic)
14	C17:0 (heptadecanoic)
15	C17:1 (*cis*-10-heptadecenoic)
16	C18:0 (stearic)
17	C18:1n9t (elaidic)
18	C18:1n9c (oleic)
19	C18:2n6t (linolelaidic)
20	C18:2n6c (linoleic)
21	C20:0 (arachidic)
22	C18:3n6 (γ-linolenic)
23	C20:1n9 (cis-11-eicosenoic)
24	C18:3n3 (g-linolenic)
25	C21:0 (heneicosanoic)
26	C20:2 (*cis*-11,14-eicosadienoic)
27	C22:0 (behenic)
28	C20:3n6 (*cis*-8,11,14-eicosatrienoic)
29	C22:1n9 (erucic)
30	C20:3n3 (*cis*-11,14,17-eicosatrienoic)
31	C20:4n6 (arachidonic)
32	C23:0 (tricosanoic)
33	C22:2 (*cis*-13,16-docosadienoic)
34	C24:0 (lignoceric)
35	C20:5n3 (*cis*-5,8,11,14,17-eicosapentaenoic)
36	C24:1n9 (nervonic)
37	C22:6n3 (*cis*-4,7,10,13,16,19-docosahexaenoic)

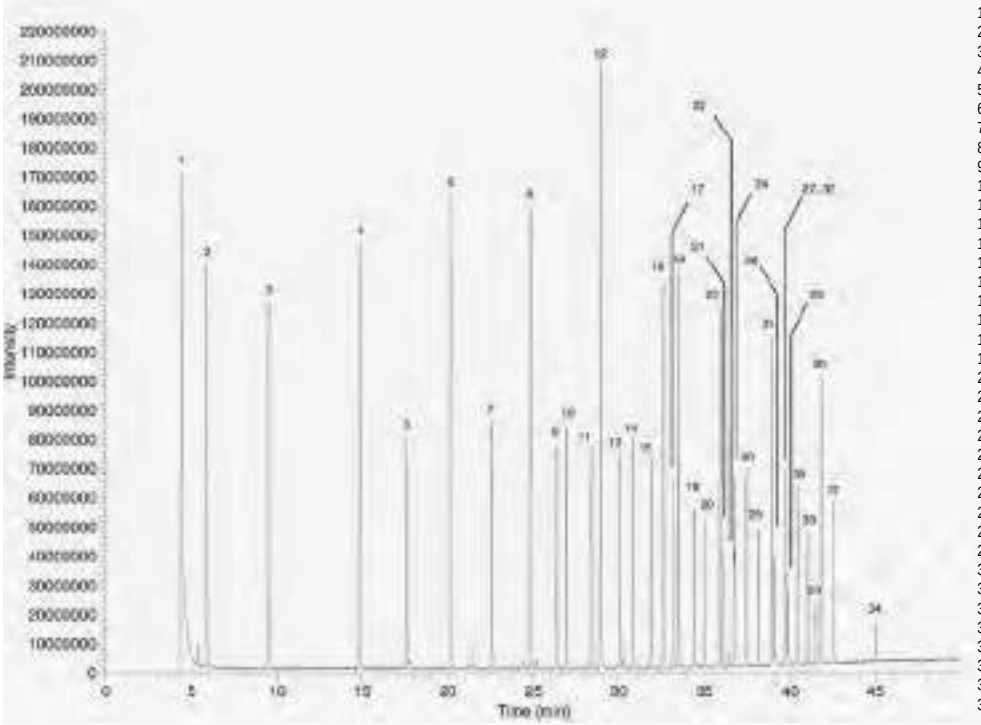


TKG 1316

TR-CN100: Food Industry FAME Mix - 60 m column (MSD)

Column: **TR-CN100**, 60 m x 0.25 mm x 0.20 µm, P/N: TR-882162
Inyection: 280ºC, split 50:1
Carrier gas: He, ct pressure 24 psi (165,6 kPa)
Oven: 90 ºC (7 min) to 240 ºC (3 min) @ 4 ºC/min
Detector: MS
Transfer line: 230 ºC
Ionization mode: EI
Scan range: 40-450 amu
Sample: 0.5µL Food Industry FAME Mix 10 mg/ml in methylene chloride





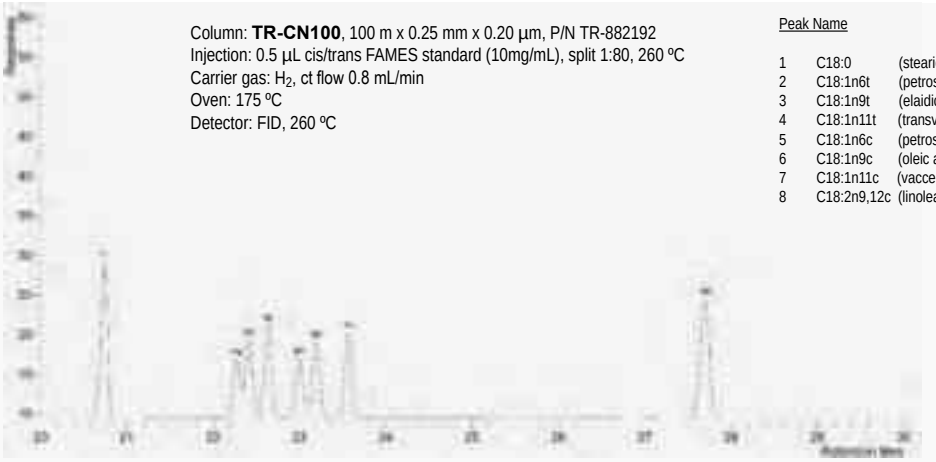
Peak Name

1. C4:0
2. C6:0
3. C8:0
4. C10:0
5. C11:0
6. C12:0
7. C13:0
8. C14:0
9. C14:1(*cis*-9)
10. C15:0
11. C15:1(*cis*-10)
12. C16:0
13. C16:1(*cis*-9)
14. C17:0
15. C17:1(*cis*-10)
16. C18:0
17. C18:1(*trans*-9)
18. C18:1(*cis*-9)
19. C18:2(all-*trans*-9,12)
20. C18:2(all-*cis*-9,12)
21. C18:3(all-*cis*-6,9,12)
22. C18:3(all-*cis*-9,12,15)
23. C20:0
24. C20:1(cis-11)
25. C20:2(all-*cis*-11,14)
26. C20:3(all-*cis*-8,11,14)
27. C20:3(all-*cis*-11,14,17)
28. C20:4(all-*cis*-5,8,11,14)
29. C20:5(all-*cis*-5,8,11,14,17)
30. C21:0
31. C22:0
32. C22:1(*cis*-13)
33. C22:2(all-*cis*-13,16)
34. C22:6 (all-*cis*-4,7,10,13,16,19)
35. C23:0
36. C24:0
37. C24:1(cis-15)

TKG 1251

TR-CN100: MAXIMUM SEPARATION OF CIS-TRANS FAME

Column: **TR-CN100**, 100 m x 0.25 mm x 0.20 µm, P/N TR-882192
Injection: 0.5 µL cis/trans FAMES standard (10mg/mL), split 1:80, 260 ºC
Carrier gas: H_2, ct flow 0.8 mL/min
Oven: 175 ºC
Detector: FID, 260 ºC



Peak Name

1	C18:0	(stearic acid methyl ester)
2	C18:1n6t	(petroselaidic acid methyl ester)
3	C18:1n9t	(elaidic acid methyl ester)
4	C18:1n11t	(transvaccenoic acid methyl ester)
5	C18:1n6c	(petroselinoic acid methyl ester)
6	C18:1n9c	(oleic acid methyl ester)
7	C18:1n11c	(vaccenoic acid methyl ester)
8	C18:2n9,12c	(linoleaic acid methyl ester)

TKG 1255

TR-CRESOL

Proprietary nonbonded phase.

- Column specially designed for the analysis of phenolic compounds (phenols, cresylic acids)
- Derivatization of phenolic compounds is not required to obtain suitable resolution
- Resolves m-cresol/p-cresol and 2,4-xylenol/2,5-xylenol pairs, which are not separated with other columns used for this analysis such as TRB-5 and TRB-WAX

TR-CRESOL Equivalent Phase

Agilent: CP-CRESOL

TR-CRESOL

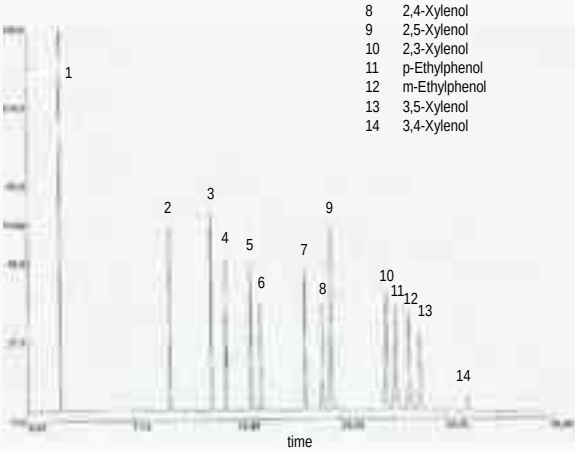
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	30	0,20	130	**TR-702132**
	60	0,20	130	**TR-702162**

TR-CRESOL: Cresols

Column: **TR-CRESOL**, 60 m x 0.25 mm x 0.20 µm, P/N TR-702162
Injection: 1 µL standard Cresols (5000 ng/mL comp), split 1:25, 150ºC
Carrier gas: H_2, ct pressure 24 psi (165 kPa)
Oven: 130 ºC
Detector: FID, 150 ºC

Peak Name

1 Methylene chloride
2 Phenol
3 o-Cresol
4 2,6-Xylenol
5 p-Cresol
6 m-Cresol
7 o-Ethylphenol
8 2,4-Xylenol
9 2,5-Xylenol
10 2,3-Xylenol
11 p-Ethylphenol
12 m-Ethylphenol
13 3,5-Xylenol
14 3,4-Xylenol

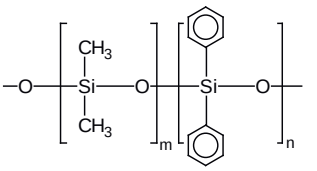


TKG 1137

TR-17

Poly (methylphenylsiloxane)

- Not bonded phase
- Recommended by pharmacopoeia for determining the impurities of sodium saccharin (o-p-Toluenesulfonamides)



Structure of Poly (dimethyldiphenyl) siloxane

TR-17 Equivalent Phase

Agilent: HP-17, DB-17
Restek: Rtx-17

TR-17

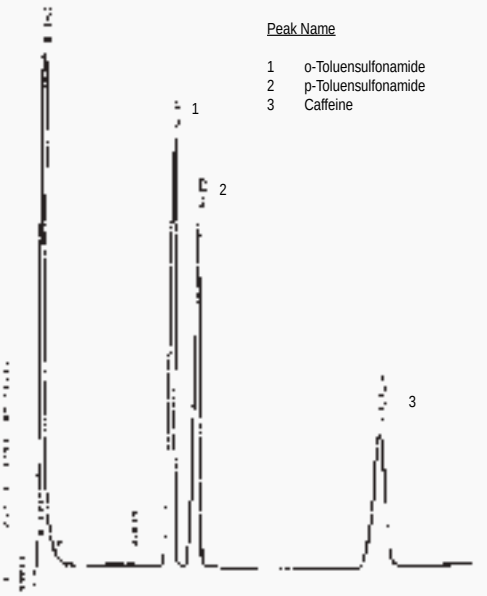
Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,53	10	2,00	40 to 220/240	**TR-712045**

TR-17: Impurities of sodium saccharin

Column: **TR-17,** 10 m x 0,53 mm x 2.0 µm, P/N TR-712045
Injector: 260 ºC
Carrier gas: He, 6.5 psi
Injection: 1ml standard, split 1:4
Oven: 180 ºC
Detector: FID, 280 ºC

Peak Name

1 o-Toluensulfonamide
2 p-Toluensulfonamide
3 Caffeine



TKG 1138

Meta.VOC

Proprietary bonded and crosslinked phase.

- Developed for the analysis of volatile organic compounds (VOC)
- Intermediate polarity column

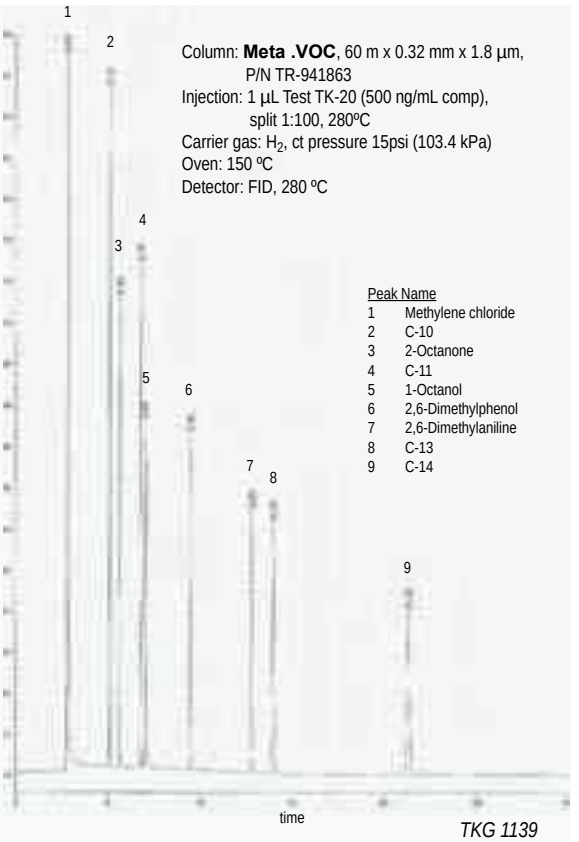
Meta.VOC Equivalent Phase

Agilent: DB-502.2, HP-VOC
Supelco: VOCOL
Restek: Rtx-502.2, Rtx-Volatile

Meta.VOC

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	20	1,00	-20 to 240/250	**TR-941084**
0,20	10	1,20	-20 to 240/250	**TR-941249**
0,25	30	1,50	-20 to 240/250	**TR-941532**
	60	1,50	-20 to 240/250	**TR-941562**
0,32	60	1,80	-20 to 240/250	**TR-941863**
	60	3,00	-20 to 230/240	**TR-943063**
0,53	30	3,00	-20 to 230/240	**TR-943035**
	60	3,00	-20 to 230/240	**TR-943065**
	105	3,00	-20 to 230/240	**TR-9430K5**

Meta.VOC: TK-20 Test



Column: **Meta .VOC**, 60 m x 0.32 mm x 1.8 µm, P/N TR-941863
Injection: 1 µL Test TK-20 (500 ng/mL comp), split 1:100, 280ºC
Carrier gas: H_2, ct pressure 15psi (103.4 kPa)
Oven: 150 ºC
Detector: FID, 280 ºC

Peak Name
1 Methylene chloride
2 C-10
3 2-Octanone
4 C-11
5 1-Octanol
6 2,6-Dimethylphenol
7 2,6-Dimethylaniline
8 C-13
9 C-14

TKG 1139

TRB-608

Proprietary bonded and crosslinked phase.

- Specifically designed for analysing chlorinated pesticides and PCBs
- Suitable for EPA 508, 608 and 8080 methods.

TRB-608 Equivalent Phase

Agilent: HP-608, DB-608
Supelco: SPB-608
SGE: BP608

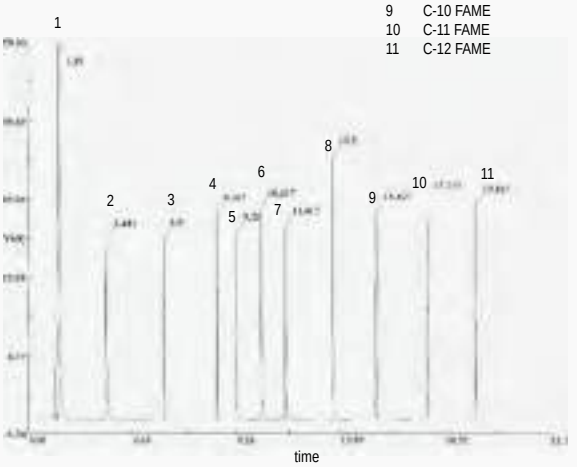
TRB-608

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,18	20	0,18	-20 to 300/310	**TR-360984**
0,25	30	0,25	-20 to 300/310	**TR-360232**
0,53	15	0,50	-20 to 290/300	**TR-360515**
	30	0,50	-20 to 290/300	**TR-360535**

TRB 608: Grob Test

Column: **TRB-608**, 30 m x 0.25 mm x 0.25 µm, P/N TR-360232
Injection: 1 µL Grob test, split 1:100, 280 ºC
Carrier gas: H_2, ct pressure, 11 psi (75.8 kPa)
Oven: 40 ºC to 300 ºC (5 min) @ 6 ºC/min
Detector: FID, 340 ºC

Peak Name
1 Methylene chloride
2 2,3-Butanediol
3 C-10
4 C-11
5 1-Octanol
6 Nonanal
7 2,6-Dimethylphenol
8 2,6-Dimethylaniline
9 C-10 FAME
10 C-11 FAME
11 C-12 FAME



TKG 1140

TR-TCEP

1, 2, 3-Tris (2-cyanoethoxy) propane, nonbonded phase

- High polarity column
- Column for the analysis of alcohols in gasoline
- Separation of the aliphatic hydrocarbons up to C12 in aromatics

TR-TCEP Equivalent Phase

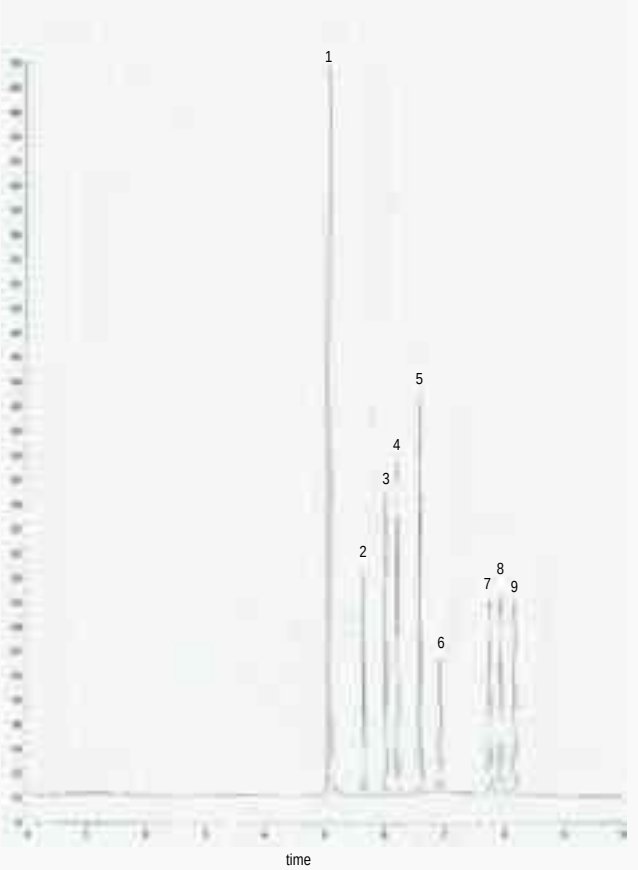
Agilent: CP-TCEP
Supelco: TCEP
Restek: Rt-TCEP

TR-TCEP

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,25	30	0,40	0 to 135	**TR-960432**
	60	0,40	0 to 135	**TR-960462**

TR-TCEP: TR-TCEP Test

Column: **TR-TCEP**, 60 m x 0.25 mm x 0.40 µm, P/N TR-960462
Injection: 1 µL standard (20 ng/mL comp.), split 1:50, 170 ºC
Carrier gas: H_2, ct pressure 24 psi (165 kPa)
Oven: 110 ºC
Detector: FID, 170 ºC



Peak Name

1 Isooctane
2 C-11
3 C-12
4 Benzene
5 C-13
6 Toluene
7 Ethylbenzene
8 p-Xylene
9 Cumene

TKG 1141

MetaBLOOD 1 & MetaBLOOD 2

Proprietary bonded and crosslinked phases

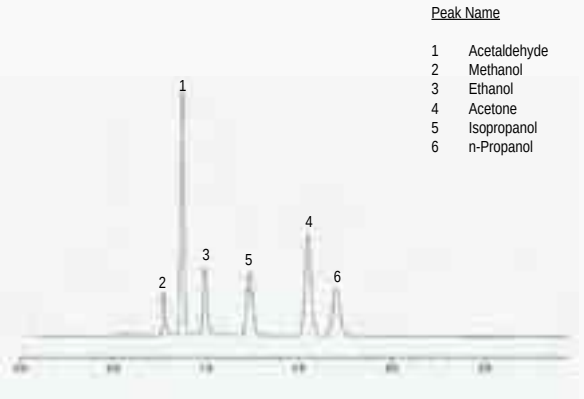
- For analysis of volatile compounds in biological fluids such as blood.
- Extremely low analysis time
- Used as analytical column and confirmation column.
- MetaBLOOD 1 and MetaBLOOD 2 have different elution order for some compounds

MetaBLOOD 1 and MetaBLOOD 2 Equivalent Phases

Agilent: DB-ALC1, DB-ALC2
Restek: Rtx-BAC1, Rtx-BAC2, Rtx-BAC 1 Plus, Rtx-BAC 2 Plus
Phenomenex: ZB-BAC1, ZB-BAC2

MetaBLOOD 1: Alcohols in Blood

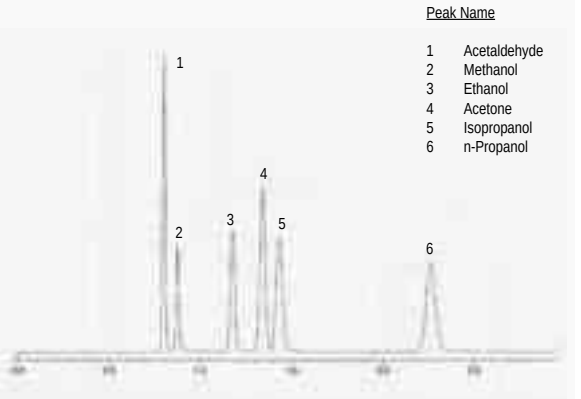
Column: **MetaBLOOD 1**, 30 m x 0.53 mm x 3.0 µm, P/N TR-853035
Injection: 1 mL Head Space 2t, blood alcohols mix, split 1:10, 250 ºC
Carrier gas: He, 80 cm/s (40 ºC)
Oven: 40 ºC (Isothermal)
Detector: FID, 260 ºC



TKG 1198

MetaBLOOD 2: Alcohols in Blood

Column: **MetaBLOOD 2**, 30 m x 0.53 mm x 2.0 µm, P/N TR-862035
Injection: 1 mL Head Space 2t, blood alcohols mix, 250 ºC
Carrier gas: He, 80 cm/s (40 ºC)
Oven: 40 ºC (Isothermal)
Detector: FID, 260 ºC



TKG 1200

MetaBLOOD 1

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,32	30	1.80	-20 to 240/260	**TR-851833**
0,53	30	3.00	-20 to 240/260	**TR-853035**

MetaBLOOD 2

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,32	30	1.20	-20 to 240/260	**TR-861233**
0,53	30	2.00	-20 to 240/260	**TR-862035**

Teknokroma Capillary Columns

TRB-BIODIESEL / TKM-BIODIESEL

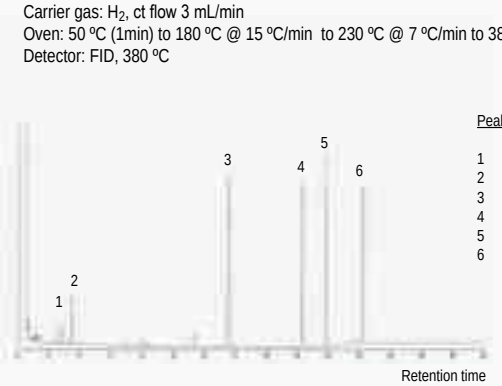
- Glycerin and Mono-Di-Triglycerides analysis tested under EN14105/ASTM D6584 methods
- Chemical inertness guaranteed for a good responce for glycerin analysis
- Low column bleed at high temperatures
- Available in fused Silica and metal tubing

TRB-BIODIESEL / TKM-BIODIESEL

Internal Diam.(mm)	Length (m)	Film Thickness (µm)	Temp limits (°C)	Part. N°. (P/N)
0,32 (Fused Silica)	10 + 2 m x 0.53 mm retention gap attached using SS connector	0.10	400	**TR-G780143**
0,32 (Metal)	10 + 2 m x 0.53 mm retention gap attached using SS connector	0.10	400	**TR-G780143M**

Analysis of Glycerin and Glycerides (EN14105/ASTM D6584)
Low Bleed at 370ºC

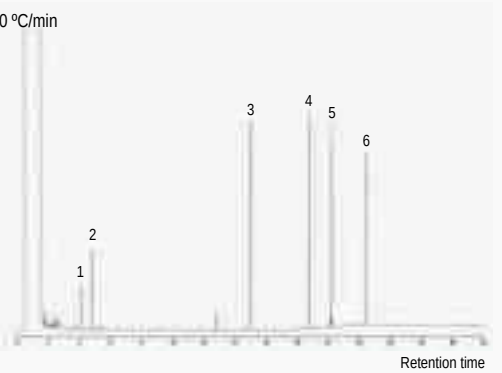
Biodiesel standard, cool on column
Carrier gas: H_2, ct flow 3 mL/min
Oven: 50 ºC (1min) to 180 ºC @ 15 ºC/min to 230 ºC @ 7 ºC/min to 380 ºC (5 min) @ 30 ºC/min
Detector: FID, 380 ºC



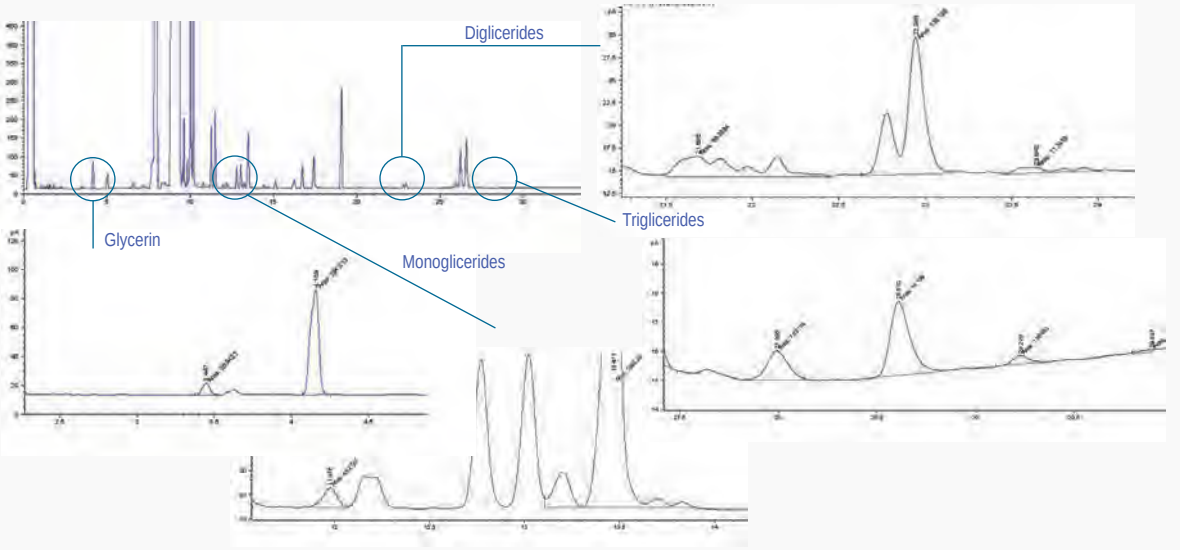
Peak Name

1 Glycerin
2 Buthanetriol (IS1)
3 Monoolein
4 Tricaprin (IS2)
5 Diolein
6 Triolein

Retention Gap (Fused Silica 2 m x 0.53 mmID) + Fused Silica Column
(10 m x 0.32 mm ID x 0.1 µm)



Retention Gap (Metal, 2 m x 0.53 mmID) + Metal Column
(10 m x 0.28 mm ID x 0.1 µm)



Chromatogram obtained from the analysis of Rapesseed oil. Provided by Mercedes H. Muñoz from ACCIONA

Also for Biodiesel analysis

Methanol analysis (EN-14110)
FAMEs and Linolenic acid methyl ester analysis (EN-14103)

TRB-1, 30 m x 0.32 mm x 3.0 µm, TR-113033
SupraWAX-280, 30 m x 0.32 mm x 0.25 µm, TR-830233

Teknokroma Microbore Columns (0.10 mm ID)

- MINIMUM BLEED LEVEL (approximately 10 times less bleed than a conventional column of 0.25 mm ID).
- HIGH ANALYTICAL SPEED (the analysis are approximately 3 times faster than a conventional column of 0.25 mm ID).

0.10 mm internal diameter columns can be connected to a conventional chromatograph fitted with a SPLIT/SPLITLESS injector. Due to its great efficiency (~7,000-10,000 plates/m) and its reduced diameter, the analysis can be undertaken with greater speed compared to standard capillary columns, without loss of peak resolving power. Ideal for complex mixtures, with a large number of components. The standard length is 10 metres (Fig. 8 and Fig. 9).

Fig. 8. TRB-1: Lemon oil in a conventional column

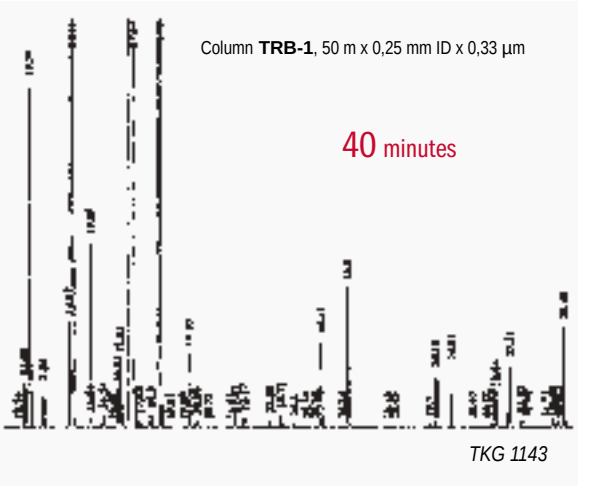
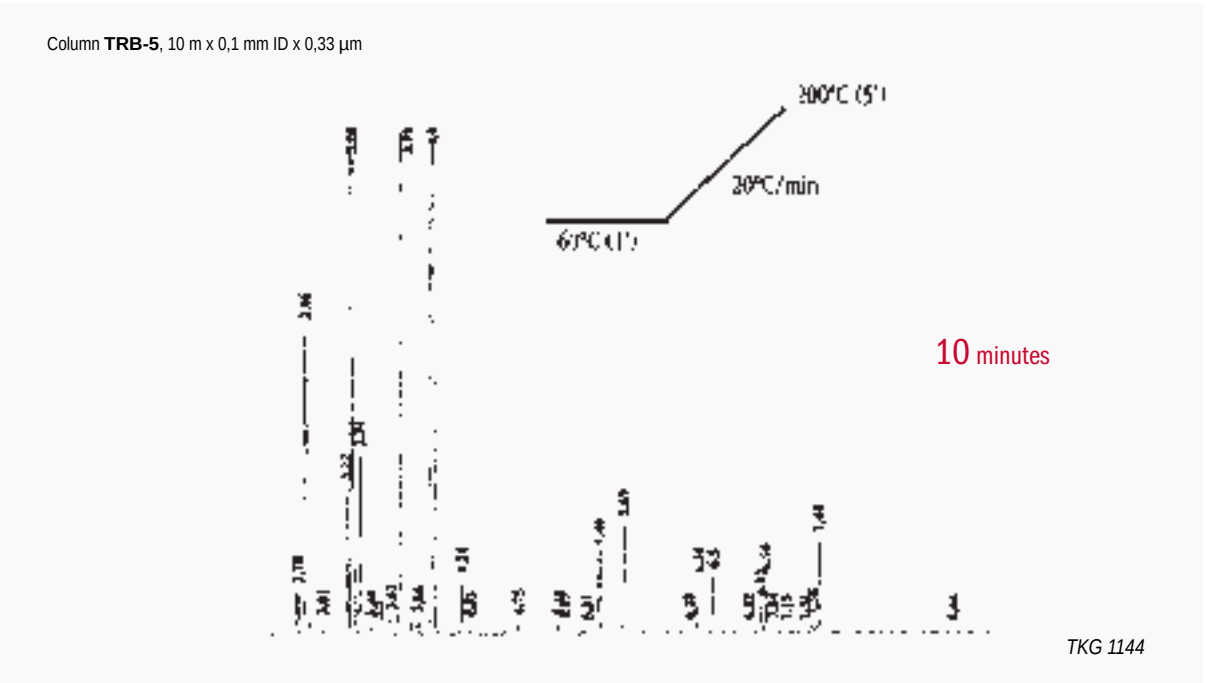


Fig. 9. TRB5: Lemon oil in a 0,10 mm ID column



Teknokroma Microbore Columns (0.10 mm ID)

Limiting factors

1. Working Pressure (Gas Flow)

With microbore columns the working pressures are higher so that more precautions should be taken regarding gas leaks at the injector and connections.
At optimum pressure the carrier gas flow is low (H2~0.2cc/min, He ~0.1cc/min), which is good for working with mass detectors, since it does not exceed its emptying capacity. Not optimizing these parameters may cause losses in peak resolution.

2. Sample Capacity

Narrow bore columns have a very limited sample capacity, approximately 10 times less than that of 0.25 mm ID.

3. Injector

The columns of 0.10 mm ID are compatible with the injection techniques in Split-splitless. It is not recommended to work with direct or on-column injection.
The glass liners, with internal diameters of 2-4 mm, are not the most suitable since, due to their large dead volume, and the fact that one is working with small gas carrying flows, it is difficult for there to be a correct sweep in the injection zone. This transforms into an enlarging of peaks, with the subsequent loss of resolution (especially for liners of 4 mm). It is highly recommended to work with liners of 0.75-1 mm diameter.

Working with this type of small volume liner, along with the microbore columns, means that one must be extremely careful with the purity of the samples that are injected. The samples must be clean and the non-volatile residues must be minimised in order to avoid contaminations that cause absorption of analytes, decompositions, the appearance of ghost peaks, etc.

4. Detector

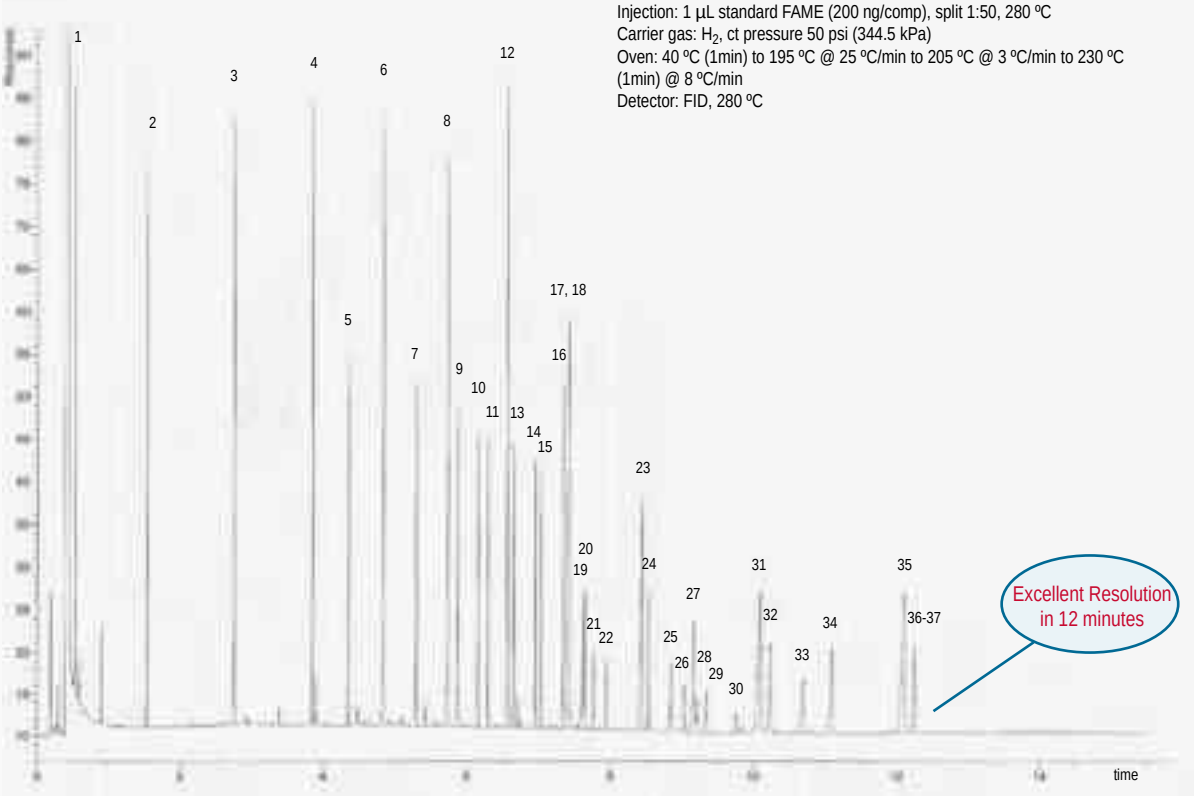
The gas flows of the detector must be optimised for working with the microbore columns. It is possible that in some detectors the auxiliary gas flow(make up) will have to be increased in order to minimise its dead volume and enable the correct sweep of the compounds that leave the column at very low flow levels.
Since the peaks elute very fast and are very narrow (the peak widths are generally less than 1 s) it is necessary to work at very high speeds on the electrometer and with fast integration so that the quantification of the peaks is correct.
The small volume of these columns means that the stationary phase quantity deposited in them is very small compared to a conventional column. This, along with the low flow levels with which it works, causes the bleed level (proportional to the quantity of the phase and flow) to be minimal, even at high temperatures, thus favouring the signal/noise ratio and contributing to the detectors not getting contaminated.

Teknokroma Microbore Columns of 0.10 mm ID

Phase	Length (m)	(df µm)	P/N
TRB-1	5	0.12	**TR-1107A1**
	10	0.10	**TR-110141**
	10	0.40	**TR-110441**
	20	0.10	**TR-110181**
	20	0.40	**TR-110481**
	40	0.20	**TR-1121C1**
	40	0.40	**TR-1104C1**
TRB-1MS	10	0.10	**TR-510141**
	10	0.40	**TR-510441**
	20	0.10	**TR-510181**
	20	0.40	**TR-510481**
TRB-5	10	0.10	**TR-120141**
	10	0.17	**TR-121941**
	10	0.33	**TR-123341**
	10	0.40	**TR-120441**
	20	0.10	**TR-120181**
	20	0.40	**TR-120481**
TRB-5MS	10	0.10	**TR-520141**
	10	0.40	**TR-520441**
	20	0.10	**TR-520181**
	20	0.40	**TR-520481**
TRB-50	10	0.10	**TR-500141**
	10	0.20	**TR-502141**
	20	0.10	**TR-500181**
TRB-225	20	0.10	**TR-250181**
TRB-1701	20	0.10	**TR-130181**
	20	0.40	**TR-130481**
Meta.WAX	10	0.10	**TR-810141**
	10	0.20	**TR-812141**
	20	0.10	**TR-810181**
	20	0.20	**TR-812181**
TRB-WAX	10	0,10	**TR-140141**
	10	0,20	**TR-142141**
	20	0,10	**TR-140181**
	20	0,20	**TR-142181**
SupraWAX-280	10	0.10	**TR-830141**
	15	0.10	**TR-830111**
	20	0.10	**TR-830181**
	20	0.20	**TR-832181**
	15	0.20	**TR-832111**
TRB-FFAP	10	0,10	**TR-150141**
	10	0,20	**TR-152141**
	15	0,10	**TR-150111**
	20	0,10	**TR-150181**

Teknokroma Microbore Columns (0.10 mm ID)

TRB-WAX: 37 FAME mix



Column: **TRB-WAX**, 10 m x 0.10 mm x 0.10 µm, P/N TR-140141
Injection: 1 µL standard FAME (200 ng/comp), split 1:50, 280 ºC
Carrier gas: H_2, ct pressure 50 psi (344.5 kPa)
Oven: 40 ºC (1min) to 195 ºC @ 25 ºC/min to 205 ºC @ 3 ºC/min to 230 ºC (1min) @ 8 ºC/min
Detector: FID, 280 ºC

Peak Name

1 Butyric acid methyl ester (C4:0)
2 Caproic acid methyl ester (C6:0)
3 Caprylic acid methyl ester (C8:0)
4 Capric acid methyl ester (C10:0)
5 Undecanoic acid methyl ester (C11:0)
6 Lauric acid methyl ester (C12:0)
7 Tridecanoic acid methyl ester (C13:0)
8 Myristic acid methyl ester (C14:0)
9 Myristoleic acid methyl ester (C14:1)
10 Pentadecanoic acid methyl ester (C15:0)
11 *cis*-10-Pentadecenoic acid methyl ester (C15:1)
12 Palmitic acid methyl ester (C16:0)
13 Palmitoleic acid methyl ester (C16:1)
14 Heptadecanoic acid methyl ester (C17:0)
15 *cis*-10-Heptadecenoic acid methyl ester (C17:1)
16 Stearic acid methyl ester (C18:0)
17 Oleic acid methyl ester (C18:1n9c)
18 Elaidic acid methyl ester (C18:1n9t)
19 Linoleic acid methyl ester (C18:2n6c)
20 Linolelaidic acid methyl ester (C18:2n6t)
21 γ-Linolenic acid methyl ester (C18:3n6)
22 Linolenic acid methyl ester (C18:3n3)
23 Arachidic acid methyl ester (C20:0)
24 *cis*-11-Eicosenoic acid methyl ester (C20:1)
25 *cis*-11,14-Eicosadienoic acid methyl ester (C20:2)
26 *cis*-8,11,14-Eicosatrienoic acid methyl ester (C20:3n6)
27 Heneicosanoic acid methyl ester (C21:0)
28 *cis*-11,14,17-Eicosatrienoic acid methyl ester (C20:3n3)
29 Arachidonic acid methyl ester (C20:4n6)
30 *cis*-5,8,11,14,17-Eicosapentaenoic acid methyl ester (C20:5n3)
31 Behenic acid methyl ester (C22:0)
32 Erucic acid methyl ester (C22:1n9)
33 *cis*-13,16-Docosadienoic acid methyl ester (C22:2)
34 Tricosanoic acid methyl ester (C23:0)
35 Lignoceric acid methyl ester (C24:0)
36 *cis*-4,7,10,13,16,19-Docosahexaenoic acid methyl ester (C22:6n3)
37 Nervonic acid methyl ester (C24:1)

TKG 1145

Custom Capillary Columns

Teknokroma also provides you with the possibility of working with nonbonded and bonded custom capillary columns, which are still described today in official methods, or which appear in the scientific bibliography. We can supply you with these columns in the size and phase thickness that you require for a similar price as our standard Teknokroma columns. As an example:

TR-101 - 100% polydimethylsiloxane phase (silicone fluid).
TR-SE-30 - 100% polydimethylsiloxane phase.
TR-SE-52 - 5% phenyl-95% dimethylpolysiloxane phase.
TR-SE-54 - 5% phenyl-1% vinyl-94% dimethylpolysiloxane phase.
TR-20M - 100% polyethylene glycol (Carbowax 20M) phase.

We can also supply you with columns for inverse gas chromatography, used for the characterisation of polymers. Teknokroma can coat your polymer in our fused silica column.

For other phases not included in this list contact our technical department

Stainless steel Teknokroma columns (TKM)

- Chemical inertness comparable to that of fused silica
- Ideal for chromatographs in industrial control processes
- Practically unbreakable
- Enables the hightest analysis temperatures

Teknokroma can supply you stainless steel columns with a 0.53 mm internal diameter and an external diameter similar to that of fused silica semi-capillary columns, compatible with standard ferrules of 0.8 mm ID.
These columns are available with our most popular stationary phases.

To order a metallic column:
"simply add the M at the end of the corresponding reference to the column in the catalog."

For instance: TRB-2887 of 10 m x 0.53 mm x 2.65 µm
P/N TR-192645

With stainless steel tube, 10 m x 0.53 mm x 2.65 µm (TKM-2887)
P/N TR-192645M

Columns for the Agilent GC 6850 5-inch column cage

For columns that have to be placed in the oven of the 6850 chromatograph, the column must be rolled up in a 5 inch cage.

To order a column in a 5 inch cage:
you just need to add a 5 to the end of the catalog number of the corresponding column.

For instance: TRB-5, 30m x 0.25 mm x 0.25µm
P/N TR-120232

With 5 inch cage, TRB-5, 30m x 0.25 mm x 0.25µm
P/N TR-1202325

Guard Columns (Retention Gap)

AQUASAFE

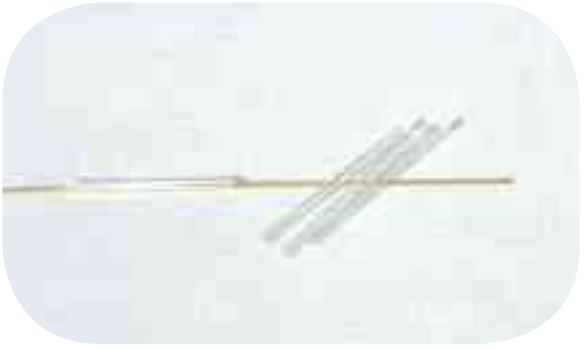
Proprietary deactivation suitable for water direct aqueous injections.

Internal Diam.(mm)	Length (m)	Part. N°. (P/N)
0,25	3 unit x 1	**TR-310012**
	1 unit x 5	**TR-310052**
	1 unit x 10	**TR-310042**
	1 unit x 20	**TR-310082**
0,32	3 unit x 1	**TR-310013**
	1 unit x 5	**TR-310053**
	1 unit x 10	**TR-310043**
	1 unit x 20	**TR-310083**
0,53	3 unit x 1	**TR-310015**
	1 unit x 5	**TR-310055**
	1 unit x 10	**TR-310045**
	1 unit x 20	**TR-310085**

BASE-DEACTIVATED

Proprietary deactivation suitable for the analysis of amines and other basic compounds

Internal Diam.(mm)	Length (m)	Part. N°. (P/N)
0,25	3 unit x 1	**TR-320012**
	1 unit x 5	**TR-320052**
	1 unit x 10	**TR-320042**
	1 unit x 20	**TR-320082**
0,32	3 unit x 1	**TR-320013**
	1 unit x 5	**TR-320053**
	1 unit x 10	**TR-320043**
	1 unit x 20	**TR-320083**
0,53	3 unit x 1	**TR-320015**
	1 unit x 5	**TR-320055**
	1 unit x 10	**TR-320045**
	1 unit x 20	**TR-320085**



UNIVERSAL PRESS FIT CONNECTORS

Deactivated Universal	Description
TR-330001	Universal Press Fit 12pk
TR-330002	Universal Press Fit Angled Y/ 1 unit
TR-330032	Universal Press Fit Angled Y/ 3 units

INTEGRATED GUARD COLUMNS

Some of the most popular Teknokroma capillary columns can be built with an integrated guard column. Built-in guard column is a connection-free solution that protects and preserves the integrity of your column.

Teknokroma also offers the option to build your column with both guard and after column.

to order a column with an integrated guard column use the below formula:

TR-G[P/N Column]-[meters precolumn]-[meters post column]

for instance: Meta XLB 30 m x 0.25 mm x 0.25 µm **P/N TR-330232**
with pre and poscolumn:
Meta XLB 30 m x 0.25 mm x 0.25 µm + 5 meters pre column + 1 meter post column **P/N TR-G330232-5-1**

USP Capillary Column Equivalents

USP CODE	General Description	Teknokroma Recommended Capillary Equivalent
G1	Dimethylpolysiloxane oil	TRB-1, TRB-1ms
G2	Dimethylpolysiloxane gum	TRB-1, TRB-1ms
G3	50% phenyl-50%methylpolysiloxane	TRB-50
G5	3-cyanopropylsiloxane	TR-CN100
G6	Poly(ethylenepropylene)glycol	TRB-F50
G8	90%-3-cyanopropyl-10% phenylmethylsiloxane	TR-CN100
G9	Methylvinylpolysiloxane	TRB-1, TRB-1ms
G14	Polyethylene glycol (MW = 951-1050)	TRB-WAX
G15	Polyethylene glycol (MW = 3000-3070)	TRB-WAX
G16	Polyethylene glycol (MW = 15000)	TRB-WAX
G19	25% phenyl-25%cyanopropylmethylsiloxane	TRB-225
G20	Polyethylene glycol (MW = 400-420)	Meta.WAX 400
G25	Polyethylene glycol TPA	TRB-FFAP
G27	5% phenyl-95%methylpolysiloxane	TRB-5, TRB-5ms, Meta.X5
G28	25% phenyl-75%-dimethylpolysiloxane	TRB-20
G32	20% phenylmethyl-80%-dimethylpolysiloxane	TRB-20
G35	Polyethylene glycol with Nitroterephthalic acid	TRB-FFAP
G36	1%vinyl-5% phenylmethylpolysiloxane	TRB-5, TRB-5ms, Meta.X5
G39	Polyethylene glycol (MW=1500)	TRB-WAX
G42	35% diphenyl-65% dimethylpolysiloxane	TRB-35
G43	6%cyanopropylphenyl-94% dimethylpolysiloxane	TRB-624, TRB-1301, TR-G43
G46	14%cyanopropylphenyl-86% dimethylpolysiloxane	TRB-1701

Drinking Water Test Methods

EPA Method	Application	Recommended Teknokroma Capillary Column		Part Number
501.3	Trihalomethanes by GC/MS and SIM	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	75m x 0.53mm x 3.0 µm	TR-603075
		TRB-624	105m x 0.53mm x 3.0 µm	TR-6030K5
		TRB-624	30m x 0.25mm x 1.0 µm	TR-601032
502.2	Volatile halogenated Organics in Water by Purge & Trap GC/PID/ELCD	TRB-624	30m x 0.25mm x 3.0 µm	TR-603035
503.1	Volatile Aromatics & Unsaturated Organics by Purge & Trap GC	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	30m x 0.25mm x 1.4 µm	TR-601432
504.1	1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (123TCP) by GC/MS	TRB-1	30m x 0.32mm x 0.25 µm	TR-110233
		TRB-624	30m x 0.32mm x 3.0 µm	TR-603035
		TRB-624	30m x 0.25mm x 1.4 µm	TR-601432
505	Organohalide Pesticides & Aroclors by GC/ECD	TRB-1	30m x 0.32mm x 1.0 µm	TR-111033
		TRB-50	30m x 0.32mm x 0.5 µm	TR-500533
		TRB-50	30m x 0.25mm x 0.25 µm	TR-500232
507	Nitrogen & Phosphorous containing Pesticides in Water by GC/NPD	TRB-5	30m x 0.25mm x 0.25 µm	TR-120232
		TRB-5ms	30m x 0.25mm x 0.25 µm	TR-520232
		TRB-1701	30m x 0.25mm x 0.25 µm	TR-130232
508	Chlorinated Pesticides in Water by GC/MS	TRB-5	30m x 0.25mm x 0.25 µm	TR-120232
		TRB-5ms	30m x 0.25mm x 0.25 µm	TR-520232
		TRB-1701	30m x 0.25mm x 0.25 µm	TR-130232
513	2,3,7,8-Tetrachlorodibenzo-p-dioxin by GC/MS	TRB-5ms	60m x 0.25mm x 0.10 µm	TR-520162
515.2	Determination of chlorinated acids in water using liquid-solid extraction & GC/ECD	TRB-1	30m x 0.32mm x 0.25 µm	TR-110233
		TRB-5	30m x 0.32mm x 0.25 µm	TR-120233
		TRB-1701	30m x 0.32mm x 0.25 µm	TR-130233
		TRB-5ms	30m x 0.32mm x 0.25 µm	TR-520233
524.2	Measurement of purgeable organic compounds in water by Purge & Trap capillary column GC/MS	TRB-624	30m x 0.25mm x 1.4 µm	TR-601432
		TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	75m x 0.53mm x 3.0 µm	TR-603075
		TRB-624	60m x 0.32mm x 1.8 µm	TR-601863
525	Organic compounds in drinking water by liquid-solid extraction and capillary column GC/MS	TRB-5	30m x 0.32mm x 0.25 µm	TR-120233
		TRB-5ms	30m x 0.25mm x 0.25 µm	TR-520232

EPA Solid Waste Test Methods

EPA Method	Application	Recommended Teknokroma Capillary Column		Part Number
8010	Halogenated volatile organics	TRB-624	75m x 0.53mm x 3.0 µm	TR-603075
		TRB-624	30m x 0.25mm x 1.4 µm	TR-601432
8015	Non- Halogenated volatile organics	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	30m x 0.25mm x 1.4 µm	TR-601432
8020/8021	Aromatic volatile organic	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	30m x 0.25mm x 1.4 µm	TR-601432
8030/8031	Acrolein, acrylonitrile, acetonitrile	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	30m x 0.25mm x 1.4 µm	TR-601432
8040/8041	Phenols	TRB-5	30m x 0.53mm x 1.5 µm	TR-121535
		TRB-5ms	30m x 0.25mm x 0.25 µm	TR-520232
8060/8061	Phthalate esters	TRB-1	15m x 0.53mm x 1.5 µm	TR-111515
		TRB-1ms	30m x 0.25mm x 0.4 µm	TR-510432
8080	Organochlorine pesticides and PCBs	TRB-5	30m x 0.53mm x 1.5 µm	TR-121535
		TRB-5ms	30m x 0.25mm x 0.5 µm	TR-520532
8081/8082	Organochlorine pesticides and PCBs as Arochlor	TRB-5	30m x 0.53mm x 1.5 µm	TR-121535
		TRB-1701	30m x 0.53mm x 1.0 µm	TR-131035
8090/8091	Nitroaromatics and cyclics ketones	TRB-5	30m x 0.53mm x 1.5 µm	TR-121535
		TRB-5ms	30m x 0.25mm x 0.5 µm	TR-520532
8100	Polynuclear aromatic hydrocarbons	TRB-5	30m x 0.32mm x 0.25 µm	TR-120233
		TRB-5ms	30m x 0.32mm x 0.25 µm	TR-520233
8120/8121	Chlorinated hydrocarbons	TRB-1	30m x 0.32mm x 1.0 µm	TR-111033
		TRB-1ms	30m x 0.32mm x 1.0 µm	TR-511033
8140	Organophosphorus pesticides	TRB-1	30m x 0.32mm x 1.5 µm	TR-111535
		TRB-1701	30m x 0.53mm x 1.0 µm	TR-131035
		TRB-1	30m x 0.25mm x 0.25 µm	TR-110232
8141	Organophosphorus pesticides	TRB-5	15m x 0.53mm x 1.5 µm	TR-121515
		TRB-5ms	15m x 0.25mm x 0,25 µm	TR-520212
8150/8151	Chlorinated herbicides	TRB-5	25m x 0.53mm x 1.0 µm	TR-121025
		TRB-1701	30m x 0.53mm x 1.0 µm	TR-131035
		TRB-5ms	15m x 0.25mm x 0,25 µm	TR-520232
8240	GC/MS for volatile organics	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	75m x 0.53mm x 3.0 µm	TR-603075
		TRB-624	105m x 0.53mm x 3.0 µm	TR-6030K5
		TRB-624	30m x 0.25mm x 1.0 µm	TR-601032
8250	GC/MS for semi-volatile organics	TRB-5ms	30m x 0.25mm x 0,50mm	TR-520532

EPA Solid Waste Test Methods

EPA Method	Application	Recommended Teknokroma Capillary Column		Part Number
8260	GC/MS method for volatile organics capillary techniques	TRB-624	30m x 0.53mm x 3,0 µm	TR-603035
		TRB-624	75m x 0.53mm x 3,0 µm	TR-603075
		TRB-624	105m x 0.53mm x 3,0 µm	TR-6030K5
		TRB-624	30m x 0.25mm x 1,0 µm	TR-601032
8270	GC/MS method for semi-volatile organics capillary techniques	TRB-5	30m x 0.25mm x 1,0 µm	TR-121032
		TRB-5ms	30m x 0.25mm x 1,0 µm	TR-521032
8280	Analysis of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans	TRB-5	30m x 0.25mm x 0,25 µm	TR-120232
		TRB-5ms	60m x 0.25mm x 0,25 µm	TR-520162

EPA Waste Water Test Methods

EPA Method	Application	Recommended Teknokroma Capillary Column		Part Number
601	Purgeable halocarbons	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	75m x 0.53mm x 3,0 µm	TR-603075
		TRB-624	105m x 0.53mm x 3,0 µm	TR-6030K5
		TRB-624	30m x 0.25mm x 1,0 µm	TR-601032
602	Purgeable aromatics	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	105m x 0.53mm x 3.0 µm	TR-6030K5
		TRB-624	30m x 0.25mm x 1.0 µm	TR-601032
603	Acrolein and acrylonitrile	TRB-624	30m x 0.53mm x 3.0 µm	TR-603035
		TRB-624	30m x 0.25mm x 1.0 µm	TR-601032
604/605	Phenols and benzidines	TRB-5ms	30m x 0.53mm x 1.4 µm	TR-521435
		TRB-5ms	30m x 0.25mm x 0.25 µm	TR-520232
606	Phthalate esters	TRB-5	15m x 0.53mm x 1.5 µm	TR-121515
		TRB-5ms	30m x 0.25mm x 0.25 µm	TR-520232
		TRB-5	15m x 0.53mm x 1.5 µm	TR-121515
		TRB-5ms	30m x 0.25mm x 0.25 µm	TR-520232
607	Nitrosamines	TRB-5	30m x 0.53mm x 1.5 µm	TR-121535
		TRB-5ms	30m x 0.25mm x 0.50 µm	TR-520532
608	Organochlorine pesticides and PCBs	TRB-5	50m x 0.53mm x 1.0 µm	TR-121055
		TRB-5ms	50m x 0.25mm x 0.12 µm	TR-520752
609	Nitroaromatics and isophorone	TRB-5	30m x 0.53mm x 1.5 µm	TR-121535
		TRB-5ms	30m x 0.25mm x 0.5 µm	TR-520532

EPA Waste Water Test Methods

EPA Method	Application	Recommended Teknokroma Capillary Column		Part Number
610	Polycyclic Aromatic Hydrocarbons	TRB-5	30m x 0.32mm x 0.25 µm	TR-120233
		TRB-5ms	30m x 0.32mm x 0.10 µm	TR-520133
611	Haloethers	TRB-5	15m x 0.53mm x 1.5 mm	TR-121515
		TRB-5ms	30m x 0.25mm x 0.50 mm	TR-520532
612	Chlorinated hydrocarbons	TRB-5	30m x 0.32mm x 1.0 mm	TR-121033
		TRB-5ms	30m x 0.25mm x 1.0 mm	TR-521032
613	2,3,7,8-tetrachlorodibenzo-p-dioxin	TRB-5ms	60m x 0.25mm x 0.10 mm	TR-520162
615	Chlorinated herbicides	TRB-1701	30m x 0.53mm x 1.0 mm	TR-131035
		TRB-1701	30m x 0.25mm x 0.25 mm	TR-130232
619	Triazine herbicides	TRB-50	30m x 0.53mm x 1.0 mm	TR-501035
		TRB-50	30m x 0.25mm x 0.50 mm	TR-500532
624	Purgeables	TRB-624	30m x 0.53mm x 3.0 mm	TR-603035
		TRB-624	75m x 0.53mm x 3.0 mm	TR-603075
		TRB-624	105m x 0.53mm x 3.0 mm	TR-6030K5
		TRB-624	30m x 0.25mm x 1.4 mm	TR-601432
625	Base/neutrals and acids	TRB-5ms	30m x 0.32mm x 0.25 mm	TR-520233
		TRB-1ms	30m x 0.25mm x 0.25 mm	TR-510232
680	Pesticides and PCBs in water and soil/ sediment	TRB-5	30m x 0.32mm x 0.25 mm	TR-120233
		TRB-5ms	30m x 0.32mm x 0.25 mm	TR-520233
1624	Volatile organic compounds by isotope dilution GC/MS	TRB-624	30m x 0.53mm x 3.0 mm	TR-603035
		TRB-624	30m x 0.25mm x 1.4 mm	TR-601432
1625	Semivolatile organic compounds by isotope dilution	TRB-5	30m x 0.25mm x 0.25 mm	TR-120232
		TRB-5ms	30m x 0.25mm x 0.25 mm	TR-520232
1653	Chlorinated phenols in waste water by in-situ MS acylation and GC low bleed/MS	TRB-5	30m x 0.32mm x 0.25 mm	TR-120233
		TRB-5ms	30m x 0.32mm x 0.25 mm	TR-520233

ASTM Methods

Method	Teknokroma P/N	Teknokroma Phase Recommendation	Sample
D1983	TR-882162	**TR-CN100** 60 m x 0.25 mm x 0.2 µm	FAME analysis
D2245	TR-882162	**TR-CN100** 60 m x 0.25 mm x 0.2 µm	Oils and oil acids in solvent-reducible paints
D2267	TR-960462	**TR-TCEP** 60 m x 0.25 mm x 0.40 µm	Aromatics in light naphthas and aviation gasolines
D2306	TR-140262	**TRB-WAX** 60 m x 0.25 mm x 0.25 µm	C8 aromatic hydrocarbons
D2360	TR-140263	**TRB-WAX** 60 m x 0.32 mm x 0.25 µm	Trace impurities in monocyclic aromatic hydrocarbons and total aromatic determination
D2426	TR-111535	**TRB-1** 30 m x 0.53 mm x 1.5 µm	Butadiene dimer and styrene in butadiene concentrates
D2456	TR-141035	**TRB-WAX** 30 m x 0.53 mm x 1.0 µm	Polyhydric alcohols in alkyd resins
D2505	TR-115035	**TRB-1** 30 m x 0.53 mm x 5 µm	Ethylene, other hydrocarbons, and carbon dioxide in dioxide in high-purity ethylene
D2597		30% SE-30 on Chromosorb PAW 80/100 - Molecular Sieve 13X 45/60	Analysis of demethanozed hydrocarbon liquid mixtures containing nitrogen and carbon dioxide
D2580	TR-820423 TR-151035	**Meta.X5** 25 m x 0.32 mm x 0.4 µm **TRB-FFAP** 30 m x 0.53 mm x 1.0 µm	Phenols in water
D2600	TR-960462 TR-141223	**TR-TCEP** 60 m x 0.25 mm x 0.4 µm **TRB-WAX** 25 m x 0.32 mm x 1.2 µm	Aromatic traces in light saturated hydrocarbons
D2743	TR-882162	**TR-CN100** 60 m x 0.25 mm x 0.2 µm	Oil and oil acids
D2800	TR-882162	**TR-CN100** 60 m x 0.25 mm x 0.2 µm	FAME analysis
D2804	TR-141035 TR-571015	**TRB-WAX** 30 m x 0.53 mm x 1.0 µm **TRB-F50** 15 m x 0.53 mm x 1.0 µm	Purity of methyl ethyl ketone
D2887	TR-112645	**TRB-1** 10 m x 0.53 mm x 2.65 µm	Boiling range distribution of petroleum
Extended	TR-1108A5	**TRB-1** 5 m x 0.53 mm x 0.88 µm	
D2908	TR-601833 TR-603035 TR-140533 TR-141035	**TRB-624** 30 m x 0.32 mm x 1.8 µm **TRB-624** 30 m x 0.53 mm x 3.0 µm **TRB-WAX** 30 m x 0.32 mm x 0.5 µm **TRB-WAX** 30 m x 0.53 mm x 1.0 µm	Volatile organics in water
D2998	TR-111033	**TRB-1** 30 m x 0.32 mm x 1.0 µm	Polyhydric alcohols in alkyd resins
D2999	TR-111535	**TRB-1** 30 m x 0.53 mm x 1.5 µm	Monopentaerythritol in commercial pentaerythritol
D3009	TR-140533 TR-141035	**TRB-WAX** 30 m x 0.32 mm x 0.5 µm **TRB-WAX** 30 m x 0.53 mm x 1.0 µm	Composition of turpentine
D3054	TR-110553	**TRB-1** 50 m x 0.32 mm x 0.5 µm	Impurities in cyclohexane
D3086	TR-120752	**TRB-5** 50 m x 0.25 mm x 0.12 µm	Organochlorine pesticides in water
D3168	TR-111033 TR-111535	**TRB-1** 30 m x 0.32 mm x 1.0 µm **TRB-1** 30 m x 0.53 mm x 1.5 µm	Polymers in emulsion paints
D3257		25% bis-(2-cyanoethyl)formamide on Chromosorb PAW	Aromatics in mineral spirits
D3271	TR-141035	**TRB-WAX** 30 m x 0.53 mm x 1.0 µm	Solvent analysis in paints
D3304	TR-120752	**TRB-5** 50 m x 0.25 mm x 0.12 µm	PCBs in environmental materials
D3328	TR-113033 TR-113035	**TRB-1** 30 m x 0.32 mm x 3.0 µm **TRB-1** 30 m x 0.53 mm x 3.0 µm	Comparison of waterborne petroleum oils
D3329	TR-141065	**TRB-WAX** 60 m x 0.53 mm x 1.0 µm	Purity of methyl isobutyl ketonespirits
D3432	TR-111033 TR-111535	**TRB-1** 30 m x 0.32 mm x 1.0 µm **TRB-1** 30 m x 0.53 mm x 1,5 µm	Toluene diisocyanates in urethane prepolymers
D3447	TR-115055	**TRB-1** 50 m x 0.53 mm x 5.0 µm	Purity of trichlorotrifluoroethane (CFC-113)
D3452	TR-111535	**TRB-1** 30 m x 0.53 mm x 1,5 µm	Identification of rubber
D3457	TR-882162	**TR-CN100** 60 m x 0.25 mm x 0.2 µm	FAME analysis
D3465	TR-115223 TR-111535	**TRB-1** 25 m x 0.32 mm x 0.52 µm **TRB-1** 30 m x 0.53 mm x 1.5 µm	Purity of monomeric plasticizers
D3524	TR-110845	**TRB-1** 10 m x 0.53 mm x 0.88 µm 10% OV-101 on Chromosorb WAW 80/100	Diesel fuel diluent used in diesel engine oil
D3525		10% Dexel 300 on Chromosorb WAW 80/100	Gasoline diluent in used gasoline engine oils
D3534	TR-120252	**TRB-5** 50 m x 0.25 mm x 0.25 µm	PCBs in water
D3606	TR-510112 TR-960462	**TRB-1ms** 15 m x 0.25 mm x 0.1 µm **TR-TCEP** 60 m x 0.25 mm x 0.4 µm	Benzene and toluene in gasoline
D3687	TR-140533 TR-141035	**TRB-WAX** 30 m x 0.32 mm x 0.5 µm **TRB-WAX** 30 m x 0.53 mm x 1.0 µm	Volatile organic compounds
D3710	TR-1150J5	**TRB-1** 7.5 m x 0.53 mm x 5.0 µm	Boiling range distribution of gasoline and gasoline fractions
D3725	TR-151035	**TRB-FFAP** 30 m x 0.53 mm x 1.0 µm	Fatty acids in drying oils
D3760	TR-140263 TR-110563	**TRB-WAX** 60m x 0.32 mm x 0.25 µm **TRB-1 60** m x 0.32 mm x 0.5 µm	Analysis of isopropylbenzene (cumene)

Method	Teknokroma P/N	Teknokroma Phase Recommendation	Sample
D3797	TR-140563	**TRB-WAX** 60 m x 0.32 mm x 0.5 µm	Analysis of o-Xylene
D3798	TR-140563	**TRB-WAX** 60m x 0.32 mm x 0.5 µm	Analysis of p-Xylene
	TR-140263	**TRB-WAX** 60 m x 0.32 mm x 0.25 µm	
D3876	TR-111033	**TRB-1** 30 m x 0.32 mm x 1.0 µm	Methoxyl and hydroxypropyl substitution in cellulose ether products
	TR-111535	**TRB-1** 30 m x 0.53 mm x 1.5 µm	
D3962	TR-151035	**TRB-FFAP** 30 m x 0.53 mm x 1.0 µm	Impurities in styrene
D4059	TR-120252	**TRB-5** 50 m x 0.25 mm x 0.25 µm	PCBs in insulating liquids
D4275	TR-113033	**TRB-1** 30 m x 0.32 mm x 3.0 µm	Butylated hydroxy toluene in ethylene and ethylenevinylacetate polymers
	TR-113035	**TRB-1** 30 m x 0.53 mm x 3.0 µm	
D4367		10% SE-30 on Chromosorb WAW 80/100 25% TCEP on Chromosorb PAW 80/100	Benzene in hydrocarbon solvents
D4415	TR-150233	**TRB-FFAP** 30 m x 0.32 mm x 0.25 µm	Determination of dimer and acrylic acid
D4420	TR-510112	**TRB-1ms** 15 m x 0.25 mm x 0.1 µm	Aromatics in gasoline
	TR-960462	**TR-TCEP** 60 m x 0.25 mm x 0.4 µm	
D4492	TR-140263	**TRB-WAX** 60 m x 0.32 mm x 0.25 µm	Analysis of benzene
D4534	TR-960462	**TR-TCEP** 60 m x 0.25 mm x 0.4 µm	Benzene content of cyclic products
D4735	TR-151035	**TRB-FFAP** 30 m x 0.53 mm x 1.0 µm	Trace thiophene in refined benzene
D4768	TR-151035	**TRB-FFAP** 30 m x 0.53 mm x 1.0 µm	Phenol and cresol inhibitors in insulating oils
D4815	TR-113035 + TCEP precolumn	**TRB-1** 30 m x 0.53 mm x 5.0 µm + 3 **TCEP precolumn** (56cm)	MTBE, ETBE, TAME, DIPE, tert-amyl alcohol, C1-C4 alcohols in gasoline
D4864	TR-121515	**TRB-5** 15 m x 0.53 mm x 1.5 µm	Traces of methanol in propylene
D5008	TR-115045	**TRB-1** 10 m x 0.53 mm x 5.0 µm	Ethyl methyl pentanol content and purity of 2-ethylhexanol
	TR-140233	**TRB-WAX** 30 m x 0.32 mm x 0.25 µm	
D5060	TR-140563	**TRB-WAX** 60m x 0.32 mm x 0.5 µm	Impurities in high-purity ethylbenzene
D5134	TR-110559	**TRB-50.2PONA** 50 m x 0.20 mm x 0.5 µm	Impurities in high-purity ethylbenzene
D5135	TR-140563	**TRB-WAX** 60m x 0.32 mm x 0.5 µm	Styrene analysis
D5307		10% UCW-982 on Chromosorb PAW 80/100 3% OV-1 on Chromosorb WHP 80/100 10% SE-30 on Chromosorb PAW 80/100	Boiling range distribution of crude oil-simulated distillation of crude oil through 538ºC
D5310	TR-120232	**TRB-5** 30 m x 0.25 mm x 0.25 µm	Tar acid composition
	TR-252129	**TRB-225** 25 m x 0.20 mm x 0.20 µm	
D5399	TR-113045	**TRB-1** 10 m x 0.53 mm x 3.0 µm	Boiling point distribution of hydrocarbon solvents
D5441	TR-110592	**TRB-1** 100m x 0.25 mm x 0.5 µm	Analysis of MTBE
	TR-110559	**TRB-50.2PONA** 50 m x 0.20 mm x 0.5 µm	
D5442	TR-110232	**TRB-1** 30 m x 0.25 mm x 0.25 µm	Analysis of petroleum waxes
	TR-120232	**TRB-5** 15 m x 0.25 mm x 0.25 µm	
D5480	TR-115065	**TRB-1** 60 m x 0.53 mm x 5.0 µm	Engine oil volatility by GC
D5501	TR-110592	**TRB-1** 100m x 0.25 mm x 0.5 µm	Ethanol content of denatured fuel ethanol
D5504	TR-974033	**TRB-SULFUR** 30 m x 0.32 mm x 4.0 µm	Sulfur compounds in natural gas and gaseous fuels by GC and SCD
D5580	TR-115035 + TCEP precolumn	**TRB-1** 30 m x 0.53 mm x 5.0 µm + **TCEP** precolumn (56cm)	Aromatics in gasoline
D5599	TR-111062	**TRB-1** 60m x 0.25 mm x 1.0 µm	Oxygenates in gasoline by GC and oxygen selective flame ionization detector
D5623	TR-114033	**TRB-1** 30m x 0.32 mm x 4.0 µm	Sulfur compounds in light petroleum liquids by GC and sulfur selective detection
D5713	TR-110559	**TRB-50.2PONA** 50 m x 0.20 mm x 0.5 µm	Analysis of high-purity benzene for cyclohexane feedstock by capillary GC
D5769	TR-111062	**TRB-1** 60m x 0.25 mm x 1.0 µm	Determination of benzene, toluene and total aromatics in finished gasoline by GC/MS
	TR-115063	**TRB-1** 60 m x 0.32 mm x 5.0 um	
D5917	TR-140263	**TRB-WAX** 60m x 0.32 mm x 0.25 µm	Trace impurities in monocyclic aromatic hydrocarbons by GC and external calibration
D6144	TR-111062	**TRB-1** 60m x 0.25 mm x 1.0 µm	alpha-Methylstyrene by capillary GC
D6159	TR-115035	**TRB-1** 30 m x 0.53 mm x 5.0 µm	Hydrocarbon impurities in ethylene
E0202	TR-812122	**Meta.WAX** 25 m x 0.25 mm x 0.2 µm	Analysis of glycols
E1100	TR-810535	**Meta.WAX** 30 m x 0.53 mm x 0.50 µm	Analysis of denaturated ethanol

NIOSH Regulatory Methods

Method	Method Name	Teknokroma Phase Recommendation	Teknokroma P/N
1000	Allyl chloride	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1001	Methyl chloride	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1002	Chloroprene	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1003	Halogenated hydrocarbons	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1004	sym-Dichloroethyl ether	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1005	Methylene chloride	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1006	Trichlorofluoromethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1007	Vinyl chloride	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1008	Ethylene dibromide	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1009	Vinyl bromide	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1010	Epichlorohydrin	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1011	Ethyl bromide	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1012	Dibromodifluoromethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1013	1,2-Dichloropropane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1014	Methyl iodide	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1015	Vinylidine chloride	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1016	1,1,1,2-Tetrachloro-2,2-difluoroethane and 1,1,2,2-Tetrachloro-1,2-difluoroethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1017	Bromotrifluoromethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1018	Dichlorodifluoromethane and 1,2-Dichlorotetrafluoroethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1019	1,1,2,2-Tetrachloroethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1020	1,1,2-Trichloro-1,2,2-trifluoroethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1022	Trichloroethylene	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
1300	Ketones 1	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
1301	Ketones 2	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
1400	Alcohols 1	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
1401	Alcohols 2	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
1402	Alcohols 3	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
1403	Alcohols 4	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1450	Esters 1	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
1500	Hydrocarbons, BP 36-126ºC	**TRB-1** 30 m x 0.25 mm ID x 0.25 µm	TR-110232
1501	Hydrocarbons, aromatic	**Meta.X5** 30 m x 0.25 mm ID x 0.25 µm	TR-820232
1550	Naphthas	**TRB-1** 60 m x 0.25 mm ID x 0.25 µm	TR-110262
1551	Turpentine	**TRB-1** 60 m x 0.25 mm ID x 0.25 µm	TR-110262
1602	Dioxane	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1603	Acetic acid	**TRB-FFAP** 15 m x 0.25 mm ID x 0.25 µm	TR-150212
1604	Acrylonitrile	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1606	Acetonitrile	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1608	Glycidol	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1609	Tetrahydrofuran	**TRB-1** 15 m x 0.25 mm ID x 0.25 µm	TR-110212
1610	Ethyl ether	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1611	Methylal	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1612	Propylene oxide	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1613	Pyridine	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1614	Ethylene oxide	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
1615	Methyl-tert-butyl ether	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2000	Methanol	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2001	Cresol, all isomers	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830232
2002	Amines, aromatic	**Meta.X5** 30 m x 0.25 mm ID x 1.0 µm	TR-821032
2003	1,1,2,2-Tetrabromoethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
2004	Dimethylacetamide and dimethylformamide	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2005	Nitrobenzenes	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2007	Aminoethanol compounds	**TRB-1** 15 m x 0.25 mm ID x 1.0 µm	TR-111012
2500	2-Butanone	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2501	Acrolein	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2503	Acrolein	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
2504	Tetraethyl pyrophosphate	**TRB-1** 15 m x 0.25 mm ID x 0.25 µm	TR-110212

NIOSH Regulatory Methods

Method	Method Name	Teknokroma Phase Recommendation	Teknokroma P/N
2505	Furfuryl alcohol	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2506	Acetone cyanohydrin	**TRB-1** 15 m x 0.25 mm ID x 1.0 µm	TR-111012
2507	Nitroglycerine and ethylene glycol dinitrate	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2508	Isophorone	**TRB-1** 15 m x 0.25 mm ID x 0.25 µm	TR-110212
2510	1-Octanethiol	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
2513	Ethylene chlorohydrin	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2515	Diazomethane	**TRB-1** 15 m x 0.32 mm ID x 0.25 µm	TR-110213
2516	Dichlorofluoromethane	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
2517	Pentachloroethane	**Meta.X5** 30 m x 0.25 mm ID x 0.5 µm	TR-820532
2518	Hexachloro-1,3-cyclopentadiene	**TRB-624** 30 m x 0.25 mm ID x 1.4 µm	TR-601432
2519	Ethyl chloride	**TRB-624** 30 m x 0.25 mm ID x 1.8 µm	TR-601833
2520	Methyl bromide	**TRB-624** 30 m x 0.25 mm ID x 1.8 µm	TR-601833
2521	Methylcyclohexanone	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
2522	Nitrosamines	**Meta.X5** 30 m x 0.25 mm ID x 0.5 µm	TR-820532
2523	1,3-Cyclopentadiene	**TRB-1** 15 m x 0.32 mm ID x 1.0 µm	TR-111013
2524	Dimethylsulfate	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2525	1-Butanethiol	**TRB-1** 15 m x 0.32 mm ID x 1.0 µm	TR-111013
2526	Nitroethane	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2527	Nitromethane	**Meta.X5** 30 m x 0.25 mm ID x 0.25 µm	TR-820232
2528	2-Nitropropane	**Meta.X5** 30 m x 0.25 mm ID x 0.25 µm	TR-820232
2529	Furural	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
2530	Biphenyl	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
2531	Gluteraldehyde	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
2533	Tetraethyl lead (as Pb)	**TRB-1** 15 m x 0.25 mm ID x 0.25 µm	TR-110212
2534	Tetramethyl lead (as Pb)	**TRB-1** 15 m x 0.25 mm ID x 0.25 µm	TR-110212
2536	Valeraldehyde	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2537	Methylmethacrylate	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
2538	Acetaldehyde	**TRB-1301** 15 m x 0.32 mm ID x 1.0 µm	TR-601013
2539	Aldehydes, Screening	**TRB-1** 30 m x 0.32 mm ID x 0.25 µm	TR-110232
2541	Formaldehyde	**TRB-1701** 30 m x 0.25 mm ID x 0.25 µm	TR-130232
3502	Phenol	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
3700	Benzene	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
3702	Ethylene oxide	**SupraWAX-280** 30 m x 0.32 mm ID x 0.5 µm	TR-830533
4000	Toluene	**TRB-5** 30 m x 0.25 mm ID x 0.25 µm	TR-120232
5012	EPN, malathion, and parathion	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
5014	Chlorinated terphenyl (60% chlorine)	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
5017	Dibutyl phosphate	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
5019	Azelaic acid	**TRB-1** 15 m x 0.32 mm ID x 0.25 µm	TR-110213
5020	Dibutyl phthalate and Di (2-ethylhexyl) phthalate	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
5021	o-Terphenyl	**TRB-1** 30 m x 0.25 mm ID x 0.25 µm	TR-110232
5025	Chlorinated diphenyl ether	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
5029	4,4-Dimethylenedianiline	**TRB-5** 15 m x 0.25 mm ID x 0.25 µm	TR-120212
5500	Ethylene glycol	**SupraWAX-280** 15 m x 0.32 mm ID x 0.5 µm	TR-830513
5502	Aldrin and lindane	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
5503	Polychlorobiphenyls	**Meta.X5** 30 m x 0.25 mm ID x 0.25 µm	TR-820232
5506	Polynuclear aromatic hydrocarbons	**Meta.X5** 30 m x 0.25 mm ID x 0.25 µm	TR-820232
5509	Benzidine and 3,3-dichlorobenzidine	**TRB-5** 15 m x 0.53 mm ID x 1.5 µm	TR-121515
5510	Chlordane	**Meta.X5** 15 m x 0.25 mm ID x 0.25 µm	TR-820212
5514	Demeton	**TRB-5** 15 m x 0.25 mm ID x 0.25 µm	TR-120212
5515	Polynuclear aromatic hydrocarbons (in the presence of isocyanates)	**Meta.X5** 30 m x 0.25 mm ID x 0.25 µm	TR-820232
5516	2,4- and 2,6-Toluenediamine	**TRB-5** 30 m x 0.25 mm ID x 0.25 µm	TR-120232
5517	Polychlorobenzenes	**TRB-1** 15 m x 0.25 mm ID x 0.25 µm	TR-110212
5518	Naphthylamines	**Meta.X5** 30 m x 0.25 mm ID x 0.25 µm	TR-820232
5519	Endrin	**Meta.X5** 30 m x 0.25 mm ID x 0.25 µm	TR-820232