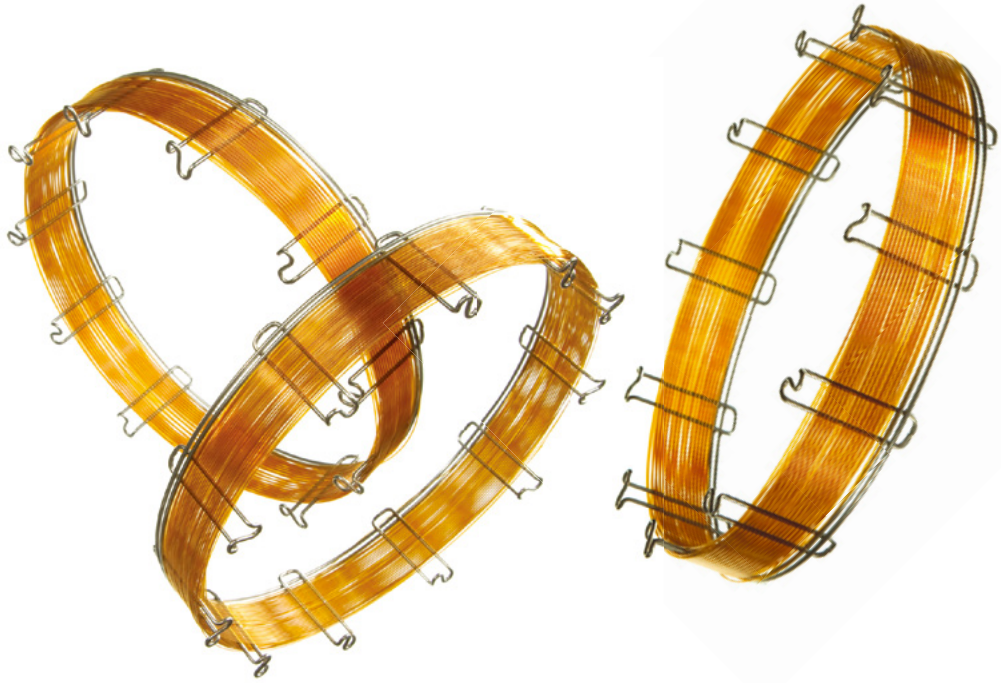
C184-E037E

SHIMADZU
Excellence in Science

Gas Chromatograph Series Columns

GC Columns Guidebook

CoreFocus



Contents

Capillary Columns
Column Selection Guide

Check the structure of the target components

Investigate the structure (functional group), boiling point, nature, stability, and other properties of the target component.

Select the stationary phase

Selecting a stationary phase of chemical properties close to those of the target component helps increase retention force and prevent drops in separation caused by defective peak shape.

Stationary Phase	100% dimethyl polysiloxane	** % diphenyl / ** % dimethyl polysiloxane	** % cyanopropylphenyl / ** % dimethyl polysiloxane	Trifluoropropyl methyl polysiloxane	Polyethylene glycol
Polarity	Non-polar	Low to Medium	Medium	Medium to High	High
Separation Properties	Elution in boiling point order	Aromatic compounds are retained by phenyl group content	Effective for separation of oxygenated compounds, isomers, etc.	Uniquely retains compounds containing halogens	Strong retention of polar compounds
Applications	Gasoline and solvent related	Flavors, environmental related, aromatic compounds, semivolatiles	Pesticides, PCBs, oxygenated compounds	Halogenated compounds, polar compounds, solvents	Polar compounds, solvents, Flavors, FAME
Columns	SH-I-1MS SH-I-1HT SH-1 SH-MetalX-1	SH-I-5MS SH-I-5HT SH-I-17 SH-I-SVOC MS SH-5 SH-5MS SH-20 SH-35 SH-35MS SH-65 SH-MetalX-5	SH-1301 SH-624 SH-1701	SH-200 SH-200MS	SH-Wax SH-PolarWax

Determine the column size

Determine the column size according to the sample amount to inject while referring to the following table.

Inner Diameter	0.18 mm	Has extremely high resolution but its sample load is small. • Samples having a complex mixed system • Suited to split injection
	0.25 mm 0.32 mm	Has high resolution and a moderate sample load • Supports samples having a complex mixed system • Suited to split/splitless injection
	0.53 mm	Has satisfactory resolution and a large sample load • Suited to purity measurement and analysis of trace components • Used in direct injection, on-column injection, and large-volume injection • Can be easily replaced from packed column
Film Thickness	Thick Film	• Good separation of high-concentration components • Suited to purity analysis
	Thin Film	• Fast elution of high boiling point compounds • Suited to the analysis of medium to high boiling point compounds
Length		When twice as long (for fixed-temperature analysis) • The analysis time will be twice • The degree of separation will be 1.4 times

Capillary Columns
Cross-Reference

Shimadzu	Stationary Phase	USP	Similar Phases						Page
			Agilent	Supelco	SGE	Phenomenex	Quadrex	Alltech	
High-Performance Columns									
SH-I-1MS	100% dimethyl polysiloxane	G1, G2, G38	HP-1ms UI, HP-1ms, DB-1ms UI, DB-1ms, Ultra-1, VF-1ms	SPB-1, Equity-1	BP-1	ZB-1, ZB-1ms	007-1	AT-1ms	8
SH-I-5MS	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	HP-5ms UI, HP-5ms, HP-5msSV, DB-5, Ultra-2, CP Sil 8 CB	SPB-5, Equity-5	BP-5ms	ZB-5, ZB-5msi	007-5	AT-5ms	9
SH-I-1HT	100% dimethyl polysiloxane	–	DB-1HT	–	–	ZB-1HTinferno	–	AT-1ht	10
SH-I-5HT	5% diphenyl / 95% dimethyl polysiloxane	–	DB-5HT, VF-5HT	–	HT-5	ZB-5HTinferno	–	–	10
SH-I-5Sil MS	1,4-bis(dimethylsiloxy)phenylene dimethyl polysiloxane	G27, G36	DB-5ms UI, DB-5ms, VF-5ms	SLB-5ms	BPX-5	ZB-5MS, ZB-Semi-Volatiles, ZM-5MS plus	007-5MS	–	11
SH-I-XLB	proprietary phase	–	DB-XLB, VF-Xms	–	–	ZB-MR1, ZB-XLB	–	–	12
SH-I-17	50% diphenyl / 50% dimethyl polysiloxane	G3	HP-17, DB-17, DB-17HT, DB-608	SPB-17	–	ZB-50	–	–	13
SH-I-35Sil MS	proprietary phase	G42	DB-35ms, DB-35ms UI, VF-35ms	–	BPX35, BPX608	ZB-MR2	–	–	13
SH-I-17Sil MS	proprietary phase	G17	DB-17ms, VF-17ms	–	BPX-50	–	–	–	14
SH-I-PAH	proprietary phase	G51	–	–	–	–	–	–	14
SH-I-624Sil MS	proprietary phase	G43	DB-624, VF-624ms, CP-Select 624 CB	–	BP-624	–	–	–	15
SH-I-1301Sil MS	silarylene-based cyano	G43	VF-1301ms	–	–	–	–	–	16
SH-I-SVOC MS	proprietary phase	G27, G36	DB-UI 8270D	–	–	ZB-SemiVolatiles	–	–	16
SH-I-LAO	proprietary phase	–	–	–	–	–	–	–	17
General Purpose Columns									
SH-1	100% dimethyl polysiloxane	G1, G2, G38	HP-1, DB-1, CP Sil 5 CB	SPB-1	BP-1	ZB-1	007-1	AT-1, EC-1	18
SH-1 PONA	100% dimethyl polysiloxane	–	CP-Sil PONA C8, DB-Petro, HP-PONA	Petrocol DH	BP1PONA	–	–	–	18
SH-5	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	HP-5, DB-5, CP Sil 8 CB	SPB-5	BP-5	ZB-5	007-5	AT-5, EC-5	19
SH-5MS	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	HP-5, DB-5, CP Sil 8 CB	SPB-5	BP-5	ZB-5	007-5	AT-5, EC-5	20

Shimadzu	Stationary Phase	USP	Similar Phases						Page
			Agilent	Supelco	SGE	Phenomenex	Quadrex	Alltech	
SH-20	20% diphenyl / 80% dimethyl polysiloxane	G32	–	SPB-20	–	–	007-20	AT-20, EC-20	21
SH-35/ SH-35MS	35% diphenyl / 65% dimethyl polysiloxane	G42	HP-35, DB-35	SPB-35, SPB-608	BPX-35, BPX-608	ZB-35	007-35	AT-35, AT-35ms	22
SH-50	100% methyl phenyl polysiloxane	G3	HP-50+, CP-Sil 24 CB	SPB-50	–	–	007-17	AT-50	23
SH-65	65% diphenyl / 35% dimethyl polysiloxane	–	–	–	–	–	007-65HT	–	23
SH-65TG	65% diphenyl / 35% dimethyl polysiloxane	–	CP-TAP-CB	–	–	–	007-65HT	–	24
SH-1301	6% cyanopropylphenyl / 94% dimethyl polysiloxane	G43	DB-1301, CP-1301, VF-1301ms	–	–	–	007-1301	AT-1301	24
SH-624	6% cyanopropylphenyl / 94% dimethyl polysiloxane	G43	HP-624, DB-624, DB-624 UI, VF-624ms	SPB-624	BP-624	ZB-624	007-624	AT-624	25
SH-1701	14% cyanopropylphenyl / 86% dimethyl polysiloxane	G46	DB-1701P, DB-1701, CP Sil 19 CB, VF-1701ms, VF-1701 Pesticides	SPB-1701	BP-10	ZB-1701, ZB-1701P	007-1701	AT-1701	26
SH-200/ SH-200MS	Trifluoropropylmethyl polysiloxane	G6	DB-210, DB-200, VF-200ms	–	–	–	–	AT-210	27
SH-225	50% cyanopropylmethyl / 50% phenylmethyl polysiloxane	G7, G19	DB-225, CP-Sil 43 CB	SPB-225	BP-225	–	007-225	AT-225	29
SH-440	modifiedpolysiloxane (uniquephase)	–	–	–	–	–	–	–	29
SH-502.2	diphenyl / dimethyl polysiloxane	–	DB-502.2	–	–	–	–	–	29
SH-2330	90% biscyanopropyl / 10% cyanopropylphenyl polysiloxane (Non-bonded)	G5,G8, G48	VF-23ms	SP-2330, SP-2331, SP-2380	BPX-70	–	007-23	AT-Silar90	30
SH-2560	biscyanopropyl / polysiloxane	G5	HP-88, CP-Sil88	SP-2560	–	–	–	–	30
SH-2887	dimethyl polysiloxane	–	DB-2887	Petrocol 2887	–	–	–	–	30
SH-Wax	Polyethylene glycol	G16, G20, G39	DB-Wax	–	BP-20	ZB-Wax	007-CW	AT-WAXms, EC-WAX	31
SH-PolarWax	Polyethylene glycol	G16, G20, G39	HP-INNOWax, CP-Wax 52 CB, VF-WAX MS	Supelcowax-10	–	ZB-Wax Plus	–	AT-WAX, EC-WAX	32
Dedicated Columns									
SH-1614	Ideal for analysis of PBDE	–	–	–	–	–	–	–	33
SH-OPP1/ SH-OPP2	Ideal for analysis of organophosphorus pesticides	–	–	–	–	–	–	–	34
SH-CLP/ SH-CLP II	Ideal for analysis of organochlorine pesticides	–	DB-CLP1 / DB-CLP2	–	–	–	–	–	35

Shimadzu	Stationary Phase	USP	Similar Phases						Page
			Agilent	Supelco	SGE	Phenomenex	Quadrex	Alltech	
SH-VMS	Ideal for analysis of volatile organic pollutants	–	–	–	–	–	–	–	36
SH-Volatil Amin	Ideal for analysis of volatile amines	–	CP-Volamine	–	–	–	–	–	37
SH-PCB	Dedicated to PCBs analysis	–	–	–	–	–	–	–	37
SH-VRX	Ideal for analysis of volatile organic pollutants	–	–	–	–	–	–	–	37
SH-FAME	Ideal for analysis of FAMEs	G16	Select FAME	Omegawax	–	–	–	AT-AquaWax, AT-FAME	38
SH-BAC Plus 1/ SH-BAC Plus 2	Ideal for analysis of alcohol compounds in blood	–	DB-ALC1 / DB-ALC2	–	–	ZB-BAC-1 / ZB-BAC-2	–	–	39
SH-5 Amine/ SH-35 Amine	Ideal for analysis of amines	–	–	–	–	–	–	–	40
SH-PolarD	Ideal for analysis of free acid	G25, G35	HP-FFAP, DB-FFAP, VF-DA, CP-Wax 58 CB, CP-FFAP CB	Nukol	BP-21	ZB-FFAP	–	AT-AquaWax-DA, AT-1000, EC-1000	41
SH-PolarX	Ideal for analysis of amines	–	CAM, CP-Wax 51 for Amines	Carbowax Amine	–	–	–	AT-CAM	42
SH-PolarWAX MS	Ideal for analyses of food, flavor, fragrance, industrial chemical and solvent	–	–	–	–	–	–	AT-WAXms	43
SH-βDEXse	Ideal for the separation of chiral compounds	–	–	–	–	–	–	–	43
SH-βDEXsm	Ideal for the separation of most chiral compounds in essential oils	–	–	–	–	–	–	–	43
SH-βDEXsa	Unique selectivity for esters, lactones, and other fruit flavor components	–	–	–	–	–	–	–	44
SH-Dioxin	Unique selectivity for toxic dioxin and furan congeners allows	–	–	–	–	–	–	–	44
SH-Mineral Oil	Optimized column dimensions for fast mineral oil screening	–	Select Mineral Oil	–	–	–	–	–	44
SH-TCEP	Ideal for aromatics and oxygenates in gasoline	–	CP-TCEP	SPB-TCEP	–	–	–	–	44
SH-Volatiles	Application-specific column for volatile organic compounds	–	–	–	–	–	–	–	45
PLOT Columns									
SH-Alumina BOND/Na_2SO_4	Aluminum oxide with Na_2SO_4 deactivation	–	GS-ALUMINA, CP-Al_2O_3/Na_2SO_4	Alumina sulfate PLOT	–	–	–	AT-Alumina	46
SH-Alumina BOND/KCl	Aluminum oxide with KCl deactivation	–	GS-Alumina KCl, HP-PLOT Al_2O_3 KCl, CP-Al_2O_3/KCl	Alumina chloride PLOT	–	–	–	–	46
SH-Alumina BOND/CFC	proprietary phase	–	–	–	–	–	–	–	47
SH-Alumina BOND/MAPD	proprietary phase	–	Select Al2O3 MAPD	–	–	–	–	–	47

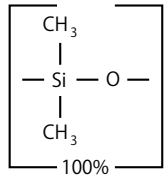
Shimadzu	Stationary Phase	USP	Similar Phases						Page
			Agilent	Supelco	SGE	Phenomenex	Quadrex	Alltech	
SH-Msieve 5A	Molecular Sieve 5A	–	HP-PLOT Molesieve, CP-Molsieve 5A	Mol Sieve 5A PLOT	–	–	PLT-5A	AT-Mole Sieve	48
SH-Q-BOND	100% divinylbenzene porous polymer	–	HP-PLOT Q, CP-PoraPLOT Q, CP-PoraBOND Q	Supel-Q PLOT	–	–	–	AT-Q	49
SH-U-BOND	Divinylbenzene ethylene glycol / dimethylacrylate porous polymer	–	HP-PLOT U, CP-PoraPLOT U, CP-PoraBOND U	–	–	–	–	–	49
SH-QS-BOND	Porous divinylbenzene homopolymer	–	GS-Q	–	–	–	–	–	50
Metal Columns									
SH-MetalX-1	100% dimethyl polysiloxane	G1, G2, G38	HP-1, DB-1, CP-Sil 5 CB	SPB-1	BP-1	ZB-1	007-1	AT-1, EC-1	51
SH-MetalX-1HT SimDist	100% dimethyl polysiloxane	–	CP-SimDist UltiMetal, DB-HT SimDis ProSteel	–	–	ZB-1X SimDist	–	–	51
SH-MetalX-5	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	HP-5, DB-5, CP-Sil 8 CB	SPB-5	BP-5	ZB-5	007-5	EC-5, AT-5	51
SH-MetalX-1701	proprietary phase	G46	DB-1701P, DB-1701, CP-Sil 19 CB, VF-1701ms, VF-1701 Pesticides	Equity-1701	BP-10	ZB-1701, ZB-1701P	007-1701	AT-1701	52
SH-MetalX-WAX	polyethylene glycol	G16, G20, G39	HP-INNOWax, CP-Wax 52 CB, VF-WAX MS	Supelcowax-10	–	ZB-WAXplus	–	AT-WAX	52
SH-MetalX Biodiesel TG	proprietary phase	–	–	MET-Biodiesel	–	–	–	–	52
SH-MetalX-Alumina BOND /Na_2SO_4	proprietary phase	–	CP-Al_2O_3/Na_2SO_4	–	–	–	–	–	53
SH-MetalX-Q-BOND	Nonpolar porous polymer	–	PoraPLOT Q Ultimetal Quadrex PLT-Q	–	–	–	–	–	53
SH-MetalX-Msieve 5A PLOT	proprietary phase	–	–	–	–	–	–	–	53

Capillary Columns
High-Performance Columns

SH-I-1MS

- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- Tested and guaranteed for ultra-low bleed; improved signal-to-noise ratio for better sensitivity and mass spectral integrity.
- General-purpose columns for arson accelerants, essential oils, hydrocarbons, pesticides, PCB congeners (e.g., Aroclor mixes), sulfur compounds, amines, solvent impurities, simulated distillation, oxygenates, gasoline range organics (GRO), refinery gases.
- Equivalent to USP G2 phase.
- Similar phases: HP-1ms UI, HP-1ms, DB-1ms UI, DB-1ms, Ultra-1, VF-1ms, SPB-1, Equity-1

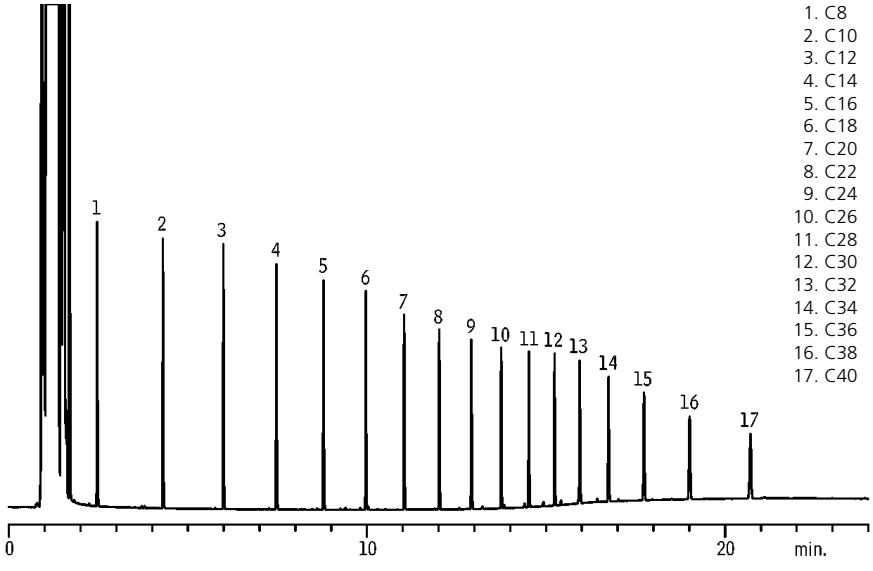
SH-I-1MS Structure



ID	df	Temp. Range	12 m	20 m	25 m	50 m
0.15 mm	0.15 µm	-60 to 330/350 °C	–	227-36001-01	–	–
	2.0 µm	-60 to 330/350 °C	–	227-36002-01	–	–
0.18 mm	0.18 µm	-60 to 330/350 °C	–	221-75921-20	–	–
	0.36 µm	-60 to 330/350 °C	–	227-36003-01	–	–
0.20 mm	0.33 µm	-60 to 330/350 °C	227-36004-03	–	227-36004-01	227-36004-02

ID	df	Temp. Range	15 m	30 m	60 m
0.25 mm	0.25 µm	-60 to 330/350 °C	227-36005-01	221-75923-30	227-36005-02
	0.50 µm	-60 to 330/350 °C	227-36006-01	227-36006-02	221-75924-60
	1.0 µm	-60 to 330/350 °C	227-36007-01	227-36007-02	227-36007-03
0.32 mm	0.25 µm	-60 to 330/350 °C	227-36008-01	221-75926-30	227-36008-02
	0.50 µm	-60 to 330/350 °C	227-36009-01	227-36009-02	227-36009-03
	1.0 µm	-60 to 330/350 °C	–	227-36010-01	221-75928-60
	4.0 µm	-60 to 330/350 °C	–	227-36011-01	–
0.53 mm	0.50 µm	-60 to 330/350 °C	227-36012-01	227-36012-02	–
	1.0 µm	-60 to 330/350 °C	227-36013-01	227-36013-02	–
	1.50 µm	-60 to 330/350 °C	227-36014-01	227-36014-02	227-36014-03

Petroleum Hydrocarbons (TPH)



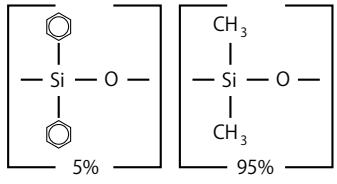
Peaks
1. C8
2. C10
3. C12
4. C14
5. C16
6. C18
7. C20
8. C22
9. C24
10. C26
11. C28
12. C30
13. C32
14. C34
15. C36
16. C38
17. C40

Conditions
Instrument: GC-2010
Column: SH-I-1MS, 20 m, 0.18 mm ID, 0.18 µm (P/N: 221-75921-20)
Sample: Florida TRPH Standard, 500 µg/mL each component in hexane
Inj. Vol.: 0.5 µL, split (split ratio 20:1)
Inj. Temp: 275 °C
Carrier Gas: Hydrogen, constant linear velocity mode, 55 cm/sec.
Oven Temp: 40 °C (hold 1 min) to 330 °C at 20 °C/min (hold 10 min)
Detector: FID, 350 °C

SH-I-5MS

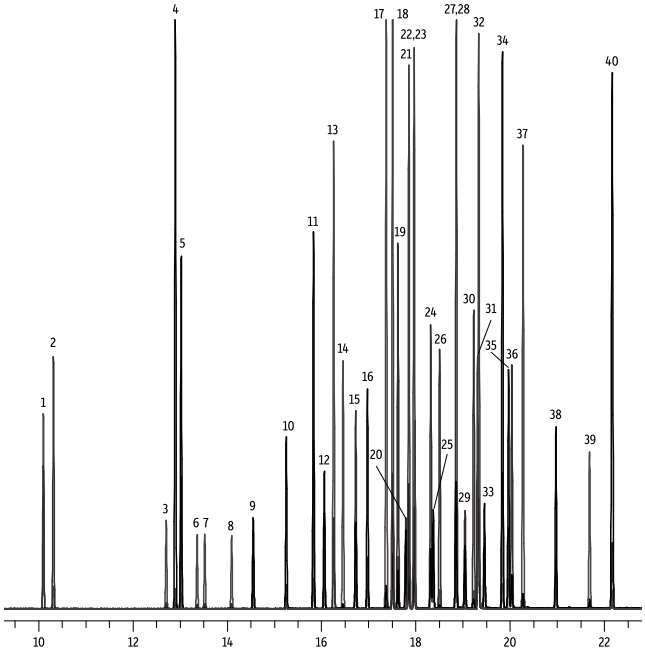
- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- Tested and guaranteed for ultra-low bleed; improved signal-to-noise ratio for better sensitivity and mass spectral integrity.
- General-purpose columns for semi-volatiles, phenols, amines, residual solvents, drugs of abuse, pesticides, PCB congeners (e.g., Aroclor mixes), solvent impurities.
- Equivalent to USP G27 and G36 phases.
- Similar phases: HP-5ms UI, HP-5ms, DB-5, Ultra-2, CP Sil 8 CB, SPB-5, Equity-5

SH-I-5MS Structure



ID	df	Temp. Range	10 m	15 m	20 m	25 m	30 m	50 m	60 m
0.10 mm	0.10 µm	-60 to 330/350 °C	227-36342-01	–	–	–	–	–	–
0.18 mm	0.18 µm	-60 to 330/350 °C	–	–	227-36015-01	–	–	–	–
	0.30 µm	-60 to 330/350 °C	–	–	227-36016-01	–	–	–	–
	0.36 µm	-60 to 330/350 °C	–	–	227-36017-01	–	–	–	–
0.20 mm	0.33 µm	-60 to 330/350 °C	–	–	–	227-36018-01	–	227-36018-02	
0.25 mm	0.25 µm	-60 to 330/350 °C	–	221-75940-15	–	–	221-75940-30	–	227-36019-01
	0.40 µm	-60 to 330/350 °C	–	–	–	–	227-36020-01	–	–
	0.50 µm	-60 to 330/350 °C	–	227-36021-01	–	–	221-75941-30	–	221-75942-60
	1.0 µm	-60 to 330/350 °C	–	227-36022-01	–	–	227-36022-02	–	227-36022-03
0.32 mm	0.25 µm	-60 to 330/350 °C	–	227-36023-01	–	–	221-75943-30	–	227-36023-02
	0.50 µm	-60 to 330/350 °C	–	227-36024-01	–	–	221-75944-30	–	227-36024-02
	1.0 µm	-60 to 330/350 °C	–	227-36025-01	–	–	227-36025-02	–	227-36025-03
0.53 mm	0.25 µm	-60 to 330/350 °C	–	227-36026-01	–	–	227-36026-02	–	–
	0.50 µm	-60 to 330/350 °C	–	227-36027-01	–	–	227-36027-02	–	–
	1.0 µm	-60 to 330/350 °C	–	227-36028-01	–	–	227-36028-02	–	–
	1.50 µm	-60 to 330/350 °C	–	227-36029-01	–	–	227-36029-02	–	–

GC Multiresidue Pesticide



Peaks

1. Chloroneb
2. Pentachlorobenzene
3. alpha-BHC
4. Hexachlorobenzene
5. Pentachloroanisole
6. beta-BHC
7. gamma-BHC (Lindane)
8. delta-BHC
9. Endosulfan ether
10. Heptachlor
11. Pentachlorothioanisole
12. Aldrin
13. 4,4'-Dichlorobenzophenone
14. Fenson
15. Isodrin
16. Heptachlor epoxide (Isomer B)
17. Chlorbenside
18. *trans*-Chlordane
19. 2,4'-DDE
20. Endosulfan I
21. *cis*-Chlordane
22. *trans*-Nonachlor
23. Chlorfenson (Ovex)
24. 4,4'-DDE
25. Dieldrin
26. 2,4'-DDD
27. Endrin
28. Ethylan (Perthane)
29. Endosulfan II
30. 4,4'-DDD
31. 2,4'-DDT
32. *cis*-Nonachlor
33. Endrin aldehyde
34. 4,4'-Methoxychlor olefin
35. Endosulfan sulfate
36. 4,4'-DDT
37. 2,4'-Methoxychlor
38. Endrin ketone
39. Tetradifon
40. Mirex

Conditions

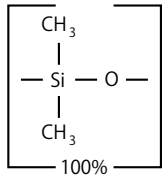
Column: SH-I-5MS, 30 m, 0.25 mm ID, 0.25 µm (P/N: 221-75940-30)
Inj. Vol.: 1 µL split (split ratio 50:1)
Inj. Temp: 250 °C
Oven Temp: 90 °C (hold 1 min) to 330 °C at 8.5 °C/min (hold 5 min)
Carrier Gas: He, constant flow rate 1.4 mL/min
Detector: MS-QP
Transfer Line Temp: 290 °C
Source Temp: 325 °C
Solvent Delay Time: 5 min
Ionization: EI

Capillary Columns
High-Performance Columns

SH-I-1HT

- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- 40% longer lifetime from specially designed fused silica tubing.
- Columns processed for high-temperature applications, such as high molecular weight hydrocarbons.
- Similar phases: DB-1HT, AT-1ht

SH-I-1HT Structure

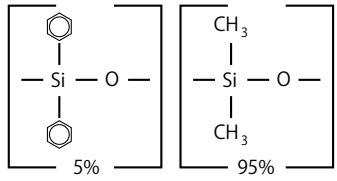


ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	-60 to 400 °C	227-36087-01	227-36087-02
	0.25 µm	-60 to 400 °C	–	227-36088-01
0.32 mm	0.10 µm	-60 to 400 °C	227-36089-01	227-36089-02
	0.25 µm	-60 to 400 °C	–	227-36090-01

SH-I-5HT

- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- 40% longer lifetime from specially designed fused silica tubing.
- Columns processed for high-temperature applications, such as mineral oil.
- Similar phases: DB-5HT, VF-5HT

SH-I-5HT Structure

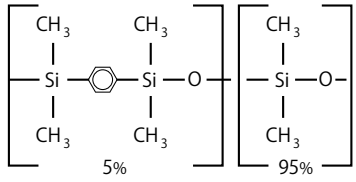


ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	-60 to 400 °C	221-75933-15	227-36091-01
	0.25 µm	-60 to 400 °C	227-36092-01	221-75934-30
0.32 mm	0.10 µm	-60 to 400 °C	227-36093-01	227-36093-02
	0.25 µm	-60 to 400 °C	–	227-36094-01
0.53 mm	0.15 µm	-60 to 380/400 °C	–	227-36095-01

SH-I-5Sil MS

- Low-polarity phase: Crossbond™ silarylene phase 1,4-bis(dimethylsiloxy) phenylene dimethyl polysiloxane
- Engineered to be a low-bleed GCMS column.
- Excellent inertness for active compounds.
- General-purpose columns—ideal for GCMS analysis of semi-volatiles, polycyclic aromatic compounds, chlorinated hydrocarbons, phthalates, phenols, amines, organochlorine pesticides, organophosphorus pesticides, drugs, solvent impurities, and hydrocarbons.
- Similar phases: DB-5ms UI, DB-5ms, VF-5ms, SLB-5ms

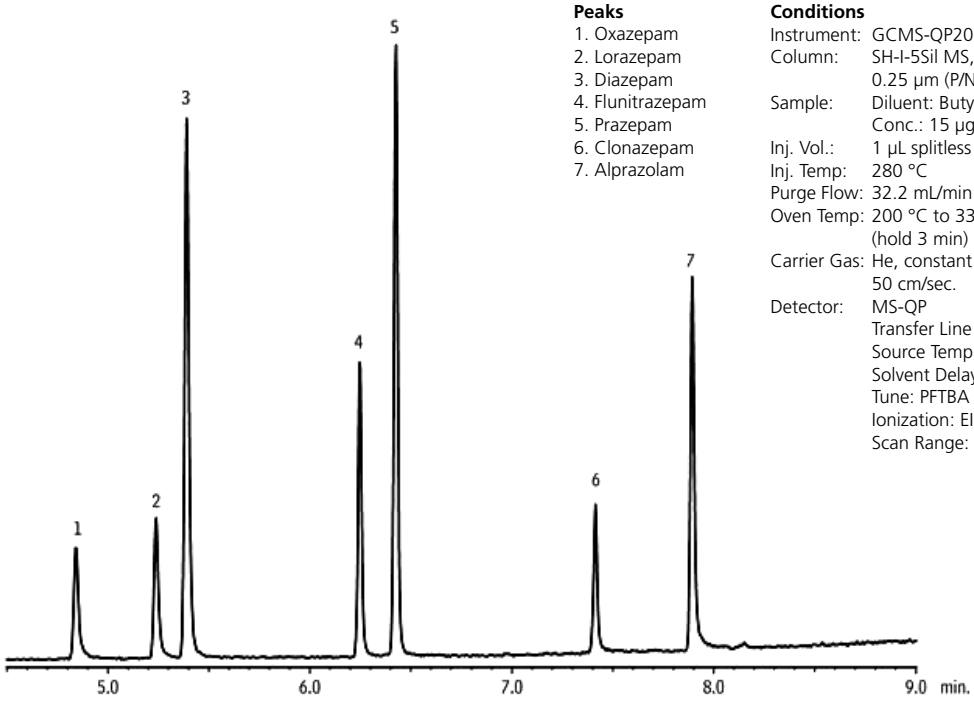
SH-I-5Sil MS Structure



For SH-I-5Sil MS columns with Integrated Guard column, please refer to page 57.

ID	df	Temp. Range	10 m	15 m	20 m	30 m	40 m	60 m
0.10 mm	0.10 µm	-60 to 320/350 °C	227-36317-01	–	–	–	–	–
0.15 mm	0.15 µm	-60 to 320/350 °C	–	–	227-36030-01	–	–	–
	2.0 µm	-60 to 320/350 °C	–	–	227-36031-01	–	–	–
0.18 mm	0.10 µm	-60 to 320/350 °C	–	–	–	–	–	227-36032-01
	0.18 µm	-60 to 320/350 °C	–	–	227-36033-01	–	227-36033-02	–
	0.36 µm	-60 to 320/350 °C	–	–	227-36034-01	–	–	–
0.25 mm	0.10 µm	-60 to 320/350 °C	–	227-36035-01	–	227-36035-02	–	–
	0.25 µm	-60 to 320/350 °C	–	227-36036-01	–	221-75954-30	–	227-36036-02
	0.50 µm	-60 to 320/350 °C	–	227-36037-01	–	227-36037-02	–	–
	1.0 µm	-60 to 320/350 °C	–	227-36038-01	–	221-75956-30	–	227-36038-02
0.32 mm	0.25 µm	-60 to 320/350 °C	–	227-36039-01	–	227-36039-02	–	–
	0.50 µm	-60 to 320/350 °C	–	–	–	227-36040-01	–	–
	1.0 µm	-60 to 320/350 °C	–	–	–	227-36041-01	–	–
0.53 mm	1.50 µm	-60 to 320/350 °C	–	–	–	227-36032-02	–	–

Benzodiazepines



Peaks
1. Oxazepam
2. Lorazepam
3. Diazepam
4. Flunitrazepam
5. Prazepam
6. Clonazepam
7. Alprazolam

Conditions

Instrument: GCMS-QP2010
Column: SH-I-5Sil MS, 30 m, 0.25 mm ID, 0.25 µm (P/N: 221-75954-30)
Sample: Diluent: Butyl chloride
Conc.: 15 µg/mL
Inj. Vol.: 1 µL splitless (hold 1 min)
Inj. Temp: 280 °C
Purge Flow: 32.2 mL/min (20:1 split)
Oven Temp: 200 °C to 330 °C at 15 °C/min (hold 3 min)
Carrier Gas: He, constant linear velocity mode, 50 cm/sec.
Detector: MS-QP
Transfer Line Temp: 280 °C
Source Temp: 200 °C
Solvent Delay Time: 4 min
Tune: PFTBA
Ionization: EI
Scan Range: 50-350

Capillary Columns
High-Performance Columns

SH-I-XLB

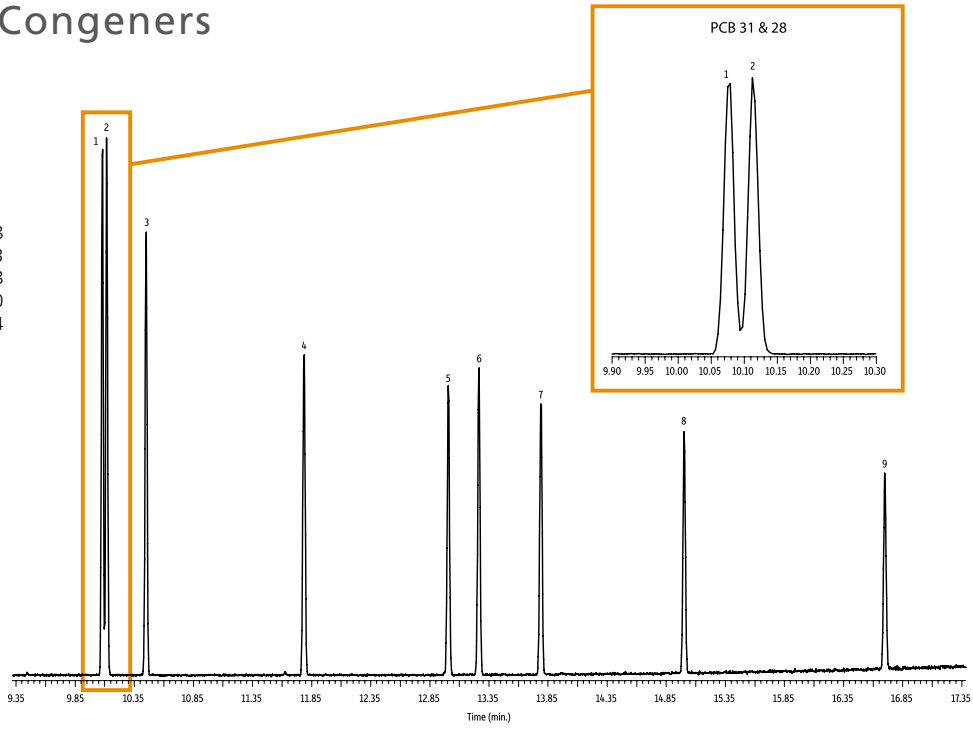
- Low-polarity proprietary phase
- General-purpose columns exhibiting extremely low bleed. Ideal for many GCMS applications, including pesticides, PCB congeners (e.g., Aroclor mixes), PAHs.
- Unique selectivity.
- Similar phases: DB-XLB, VF-Xms

ID	df	Temp. Range	20 m	30 m	60 m
0.18 mm	0.18 µm	30 to 340/360 °C	227-36309-01	–	–
0.25 mm	0.10 µm	30 to 340/360 °C	–	227-36042-01	–
	0.25 µm	30 to 340/360 °C	–	227-36043-01	227-36043-02
	0.50 µm	30 to 340/360 °C	–	227-36044-01	–
	1.0 µm	30 to 340/360 °C	–	227-36045-01	–
0.32 mm	0.25 µm	30 to 340/360 °C	–	227-36046-01	227-36046-02
	0.50 µm	30 to 340/360 °C	–	227-36047-01	–
	1.0 µm	30 to 340/360 °C	–	227-36048-01	–
0.53 mm	0.50 µm	30 to 320/360 °C	–	227-36049-01	–
	1.50 µm	30 to 320/360 °C	–	–	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

EU PCB Congeners

Peaks
1. PCB 31
2. PCB 28
3. PCB 52
4. PCB 101
5. PCB 118
6. PCB 153
7. PCB 138
8. PCB 180
9. PCB 194



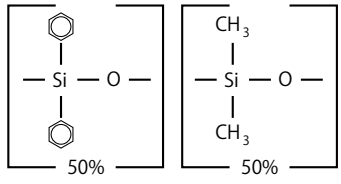
Conditions

Column: SH-I-XLB, 30 m, 0.25 mm ID, 0.25 µm (P/N: 227-36043-01)
Sample: PCB congener standard
Diluent: Dichloromethane
Conc.: 3.5 ppm
Inj. Vol.: 0.5 µL splitless (hold 1.75 min)
Inj. Temp: 300 °C
Purge Flow: 50 mL/min
Oven Temp: 40 °C (hold 2 min) to 240 °C at 30 °C/min (hold 2 min) to 340 °C at 10 °C/min (hold 5 min)
Carrier Gas: He, constant flow rate 1 mL/min
Detector: MS-QP
Transfer Line Temp: 300 °C
Source Temp: 280 °C
Ionization: EI
Scan Range: 45-550

SH-I-17

- Mid-polarity phase: Crossbond™ 50% diphenyl / 50% dimethyl polysiloxane
- General-purpose columns for pesticides, herbicides, rosin acids, phthalate esters, triglycerides, sterols.
- Similar phases: HP-17, DB-17, DB-17HT, DB-608, SPB-17

SH-I-17 Structure

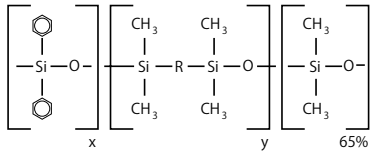


ID	df	Temp. Range	20 m	30 m
0.18 mm	0.18 µm	40 to 280/320 °C	227-36061-01	–
0.25 mm	0.25 µm	40 to 280/320 °C	–	221-75907-30
	0.50 µm	40 to 280/320 °C	–	227-36062-01
	1.0 µm	40 to 280/320 °C	–	227-36063-01
0.32 mm	0.25 µm	40 to 280/320 °C	–	227-36064-01
	0.50 µm	40 to 280/320 °C	–	227-36065-01
	1.0 µm	40 to 280/320 °C	–	227-36066-01
0.53 mm	0.25 µm	40 to 280/320 °C	–	227-36067-01
	0.50 µm	40 to 280/320 °C	–	227-36068-01
	0.83 µm	40 to 280/320 °C	–	–
	1.0 µm	40 to 280/320 °C	–	221-76193-30
	1.50 µm	40 to 280/320 °C	–	227-36070-01

SH-I-35Sil MS

- Mid-polarity: Crossbond™ phase (similar to 35% phenyl methyl polysiloxane)
- Very low-bleed phase for GCMS analysis.
- Special selectivity and excellent inertness for substituted polar compounds, such as drugs, pesticides, herbicides, PCBs, phenols, etc.
- Provides superior separation for cannabinoids.
- Similar phases: DB-35ms, DB-35ms UI, VF-35ms

SH-I-35Sil MS Structure



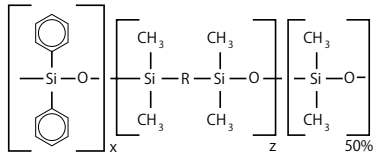
ID	df	Temp. Range	15 m	30 m
0.25 mm	0.25 µm	50 to 340/360 °C	227-36051-01	227-36051-02
	0.50 µm	50 to 340/360 °C	227-36052-01	227-36052-02
	1.0 µm	50 to 340/360 °C	227-36053-01	227-36053-02
0.32 mm	0.25 µm	50 to 340/360 °C	227-36054-01	227-36054-02
	0.50 µm	50 to 340/360 °C	227-36055-01	227-36055-02
	1.0 µm	50 to 340/360 °C	–	227-36056-02
0.53 mm	0.50 µm	50 to 340/360 °C	227-36057-01	227-36057-02
	1.0 µm	50 to 320/340 °C	227-36058-01	227-36058-02
	1.50 µm	50 to 310/330 °C	–	–
	3.0 µm	50 to 280/300 °C	–	227-36060-02

Capillary Columns
High-Performance Columns

SH-I-17Sil MS

- Mid-polarity Crossbond™ phase (similar to 50% phenyl methyl polysiloxane)
- Low bleed for use with sensitive detectors, such as MS.
- Excellent inertness and selectivity for active environmental compounds, such as PAHs.
- Equivalent to USP G3 phase.
- Similar phases: DB-17ms, HP-17, DB-17, VF-17ms, CP-Sil 24 CB

SH-I-17Sil MS Structure

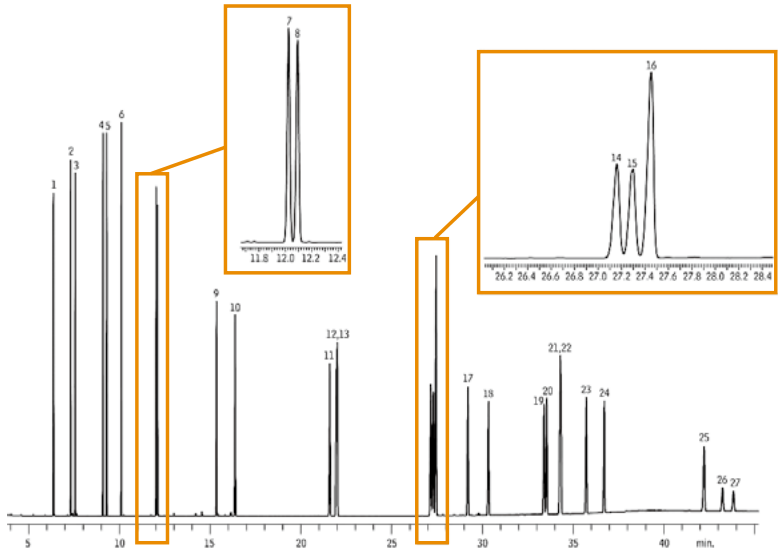


ID	df	Temp. Range	15 m	20 m	30 m	60 m
0.18 mm	0.18 µm	40 to 340/360 °C	–	227-36071-03	–	–
0.25 mm	0.25 µm	40 to 340/360 °C	227-36071-02	–	221-75916-30	227-36071-01
0.32 mm	0.25 µm	40 to 340/360 °C	–	–	227-36072-01	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Polycyclic Aromatic Hydrocarbons (US EPA Method 8100)

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



Conditions

Column: SH-I-17Sil MS, 30 m, 0.25 mm ID, 0.25 µm (P/N: 221-75916-30)
Inj. Vol.: 0.5 µL splitless (hold 1.75 min)
Inj. Temp: 320 °C
Purge Flow: 75 mL/min
Oven Temp: 65 °C (hold 0.5 min) to 220 °C at 15 °C/min to 330 °C at 4 °C/min (hold 15 min)
Carrier Gas: He, constant flow rate 2.0 mL/min
Detector: FID, 320 °C

SH-I-PAH

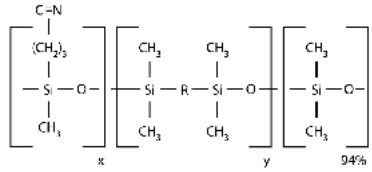
- Mid-polarity proprietary phase
- Ideal for EFSA PAH4 analysis—separates all priority compounds: benz[a]anthracene, chrysene, benzo[b] fluoranthene and benzo[a]pyrene.
- Best resolution of chrysene from interfering PAHs, triphenylene, and cyclopenta[cd]pyrene.
- Complete separation of benzo [b], [k], [j], and [a] fluoranthenes.

ID	df	Temp. Range	30 m	40 m	60 m
0.18 mm	0.07 µm	to 350/360 °C	–	227-36073-01	–
0.25 mm	0.10 µm	to 350/360 °C	227-36074-01	–	227-36074-02

SH-I-624Sil MS

- Mid-polarity Crossbond™ silarylene phase (similar to 6% cyanopropylphenyl / 94% dimethyl polysiloxane)
- Low-bleed, high-thermal stability column—maximum temperatures up to 300–320 °C.
- Inert—excellent peak shape for a wide range of compounds.
- Selective—G43 phase highly selective for volatile organics and residual solvents, great choice for USP<467>.
- Manufactured for column-to-column reproducibility—well-suited for validated methods.
- Similar phases: HP-624, DB-624, VF-624ms, CP-Select 624 CB

SH-I-624Sil MS Structure

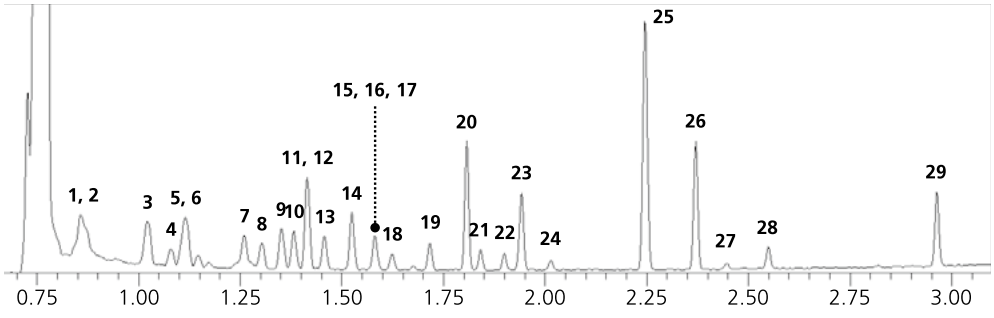


ID	df	Temp. Range	20 m	30 m	60 m	75 m	105 m
0.18 mm	1.0 µm	-20 to 300/320 °C	227-36075-01	–	–	–	–
0.25 mm	1.40 µm	-20 to 300/320 °C	–	221-75962-30	227-36076-01	–	–
0.32 mm	1.80 µm	-20 to 300/320 °C	–	227-36077-01	221-75963-60	–	–
0.53 mm	3.0 µm	-20 to 280/300 °C	–	227-36078-01	227-36078-02	227-36078-03	227-36078-04

Ultra-Fast Analysis of Volatile Organic Compounds in Water

Peaks

1. Vinyl chloride-d3 (ISTD)
2. Vinyl chloride
3. 1,1-dichloroethylene
4. Dichloromethane
5. Methyl-t-butyl ether (MTBE)
6. Trans-1,2-dichloroethylene
7. Cis-1,2-dichloroethylene
8. Trichloromethane
9. 1,1,1-trichloroethane
10. Carbon tetrachloride
11. 1,2-dichloroethane
12. Benzene
13. Fluorobenzene (ISTD)
14. Trichloroethylene
15. 1,4-dioxane-d8 (ISTD)
16. 1,2-dichloropropane
17. 1,4-dioxane
18. Bromodichloromethane
19. Cis-1,3-dichloropropene
20. Toluene
21. Trans-1,3-dichloropropene
22. 1,1,2-trichloroethane
23. Tetrachloroethylene
24. Dibromochloromethane
25. *m*-,*p*-xylene
26. *o*-xylene
27. Bromoform
28. 4-bromofluorobenzene
29. 1,4-dichlorobenzene



Conditions

Instrument: GCMS-TQ8030 + HS-20 Loop
Column: SH-I-624Sil MS, 20 m, 0.18 mm ID, 1.00 µm (P/N: 227-36075-01)
Headspace-Loop: Loop volume: 1 mL
Sample Equilibration: 70 °C for 30 min
Vial pressurization: 0.5 min, 50 kPa, equilibration 0.05 min
Needle Flush: 2 min
Sample Pathway Temp: 200 °C
Transfer Line Temp: 200 °C

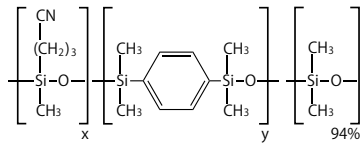
Inj.: Split (split ratio 30:1)
Oven Temp: 70 °C, 40 °C/min to 220 °C (hold 0.5 min)
Carrier Gas: He, constant linear velocity mode, 50 cm/sec
Detector: MS: SIM
MS/MS: MRM
Event (loop) time: 0.15 sec
Source Temp: 200 °C
Interface Temp: 230 °C

Capillary Columns
High-Performance Columns

SH-I-1301Sil MS

- Mid-polarity Crossbond™ silarylene phase (similar to 6% cyanopropylphenyl / 94% dimethyl polysiloxane)
- Highest thermal stability in the industry ensures dependable, accurate MS results and increased uptime.
- Stabilized cyano phase selectivity improves the performance of existing methods. Ideal for solvents, glycols, and other polar compounds.
- Rigorous QC testing ensures inertness and accurate, reliable data for multiple compound classes.
- Similar phase: VF-1301ms

SH-I-1301Sil MS Structure

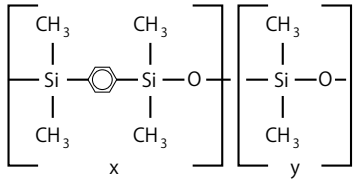


ID	df	Temp. Range	15 m	30 m	60 m
0.25 mm	0.25 µm	-60 to 320 °C	–	227-36079-01	227-36079-02
	1.0 µm	-60 to 320 °C	–	227-36080-01	227-36080-02
0.32 mm	0.25 µm	-60 to 320 °C	–	227-36081-01	–
	1.0 µm	-60 to 320 °C	–	227-36082-01	227-36082-02
	1.50 µm	-60 to 320 °C	–	227-36083-01	227-36083-02
0.53 mm	1.0 µm	-60 to 320 °C	227-36084-01	227-36084-02	–
	1.50 µm	-60 to 320 °C	–	–	–
	3.0 µm	-60 to 280/320 °C	–	227-36086-01	227-36086-02

SH-I-SVOC MS

- Proprietary 5% phenyl-type phase
- Engineered to be a low-bleed GC-MS column.
- SH-I-SVOC MS columns keep your instrument online and analyzing semivolatiles (SVOC) samples instead of offline for time-consuming recalibration or column replacement.
- The best choice for analyzing semivolatiles in environmental samples.
- Similar phase: DB-UI 8270D, ZB-SemiVolatiles

SH-I-SVOC MS Structure



ID	df	Temp. Range	15 m	20 m	30 m
0.15 mm	0.15 µm	to 340/340 °C	–	227-36362-01	–
0.18 mm	0.18 µm	to 340/340 °C	–	227-36362-02	–
	0.36 µm	to 330/340 °C	–	227-36362-03	–
0.25 mm	0.25 µm	to 340/340 °C	227-36362-04	–	227-36362-06
	0.50 µm	to 330/340 °C	–	–	227-36362-08
0.32 mm	0.25 µm	to 340/340 °C	–	–	227-36362-10
	0.50 µm	to 330/340 °C	–	–	227-36362-11

SH-I-LAO

- Specifically applicated for linear alpha olefin (LAO) impurity analysis.
- Unique selectivity enables high resolution of impurities from peaks of interest.
- Engineered to be a low-bleed column.

ID	df	Temp. Range	60 m
0.25 mm	1.4 µm	-20 to 300/320 °C	227-36364-01

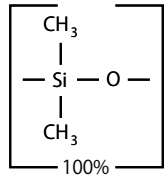
Guard columns for SH-I are also available. Please refer to page 54.

Capillary Columns
General-Purpose Columns

SH-1

- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- General-purpose columns for solvent impurities, PCB congeners (e.g., Aroclor mixes), simulated distillation, arson accelerants, gases, natural gas odorants, sulfur compounds, essential oils, hydrocarbons, semi-volatiles, pesticides, oxygenates.
- Equivalent to USP G1, G2, G38 phases.
- Similar phases: HP-1, DB-1, CP Sil 5 CB, SPB-1

SH-1 Structure



For SH-1 columns with Integrated Guard column, please refer to page 57.

ID	df	Temp. Range	10 m	15 m	20 m	25 m	30 m	60 m	105 m
0.10 mm	0.40 µm	-60 to 330/350 °C	–	–	227-36330-01	–	–	–	–
0.18 mm	0.40 µm	-60 to 330/350 °C	227-36378-01	–	–	–	–	–	–
0.25 mm	0.10 µm	-60 to 330/350 °C	–	221-75718-15	–	–	221-75718-30	227-36096-01	–
	0.25 µm	-60 to 330/350 °C	221-75719-10	227-36354-01	–	221-75719-25	221-75719-30	221-75719-60	–
	0.50 µm	-60 to 330/350 °C	–	–	–	–	227-36097-01	227-36097-02	–
	1.0 µm	-60 to 320/340 °C	–	–	–	–	227-36098-01	227-36098-02	221-75721-05
0.32 mm	0.10 µm	-60 to 330/350 °C	–	–	–	–	227-36099-01	227-36099-02	227-36108-03
	0.25 µm	-60 to 330/350 °C	–	–	–	–	221-75723-30	221-75723-60	–
	0.50 µm	-60 to 330/350 °C	–	–	–	–	221-75724-30	227-36100-01	–
	1.0 µm	-60 to 320/340 °C	–	–	–	–	221-75725-30	221-75725-60	–
	1.50 µm	-60 to 310/330 °C	–	–	–	–	227-36101-01	227-36101-02	–
	3.0 µm	-60 to 280/300 °C	–	–	–	–	227-36102-01	227-36102-02	227-36102-03
	4.0 µm	-60 to 280/300 °C	–	–	–	–	227-36103-01	–	–
	5.0 µm	-60 to 260/280 °C	–	227-36108-04	–	–	221-75728-30	221-75728-60	–
0.53 mm	0.10 µm	-60 to 320/340 °C	–	–	–	–	227-36104-01	–	–
	0.25 µm	-60 to 320/340 °C	–	–	–	–	221-75729-30	227-36105-01	–
	0.50 µm	-60 to 310/330 °C	–	221-75730-15	–	–	221-75730-30	227-36106-01	227-36108-05
	1.0 µm	-60 to 310/330 °C	–	221-75731-15	–	–	221-75731-30	221-75731-60	–
	1.50 µm	-60 to 310/330 °C	–	221-75732-15	–	–	221-75732-30	227-36107-01	–
	3.0 µm	-60 to 270/290 °C	–	–	–	–	221-75733-30	221-75733-60	227-36108-06
	5.0 µm	-60 to 270/290 °C	–	227-36108-07	–	–	221-75734-30	221-75734-60	227-36108-05
	7.0 µm	-60 to 240/260 °C	–	–	–	–	227-36108-01	227-36108-02	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-1 PONA

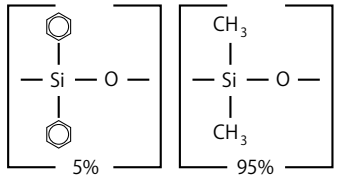
Compatible with ASTM and CGSB for hydrocarbon analysis.

ID	df	Temp. Range	50 m	100 m	150 m
0.20 mm	0.50 µm	-60 to 300/340 °C	227-36368-01	–	–
0.25 mm	0.50 µm	-60 to 300/340 °C	–	221-76196-00	–
1.0 mm	0.25 µm	-60 to 300/340 °C	–	–	227-36361-01

SH-5

- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- General-purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g., Aroclor mixes), essential oils, semi-volatiles.
- Equivalent to USP G27 and G36 phases.
- Similar phases: HP-5, DB-5, CP Sil 8 CB, SPB-5

SH-5 Structure



For SH-5 columns with Integrated Guard column, please refer to page 57.

ID	df	Temp. Range	15 m	25 m	30 m	60 m
0.25 mm	0.10 µm	-60 to 330/350 °C	221-75700-15	–	221-75700-30	227-36109-01
	0.25 µm	-60 to 330/350 °C	227-36313-01	–	221-75701-30	227-36110-01
	0.50 µm	-60 to 330/350 °C	227-36111-02	221-76178-25	221-76178-30	227-36111-01
	1.0 µm	-60 to 320/340 °C	227-36112-02	–	221-75702-30	227-36112-01
0.32 mm	0.10 µm	-60 to 330/350 °C	227-36312-01	–	227-36113-01	–
	0.25 µm	-60 to 330/350 °C	221-75703-15	–	221-75703-30	221-75703-60
	0.50 µm	-60 to 330/350 °C	–	–	221-75704-30	227-36114-01
	1.0 µm	-60 to 320/350 °C	–	–	–	221-75705-60
		-60 to 325/350 °C	–	–	221-75705-30	–
		-60 to 330/350 °C	–	227-36352-01	–	–
	1.50 µm	-60 to 310/330 °C	–	–	221-76181-30	227-36115-01
	3.0 µm	-60 to 280/300 °C	–	–	227-36116-01	227-36116-02
0.53 mm	0.10 µm	-60 to 320/340 °C	227-36117-02	–	227-36117-01	–
	0.25 µm	-60 to 320/340 °C	227-36314-01	–	221-75708-30	227-36118-01
	0.50 µm	-60 to 320/330 °C	227-36119-02	–	221-75709-30	227-36119-01
	1.0 µm	-60 to 320/330 °C	221-75710-15	–	221-75710-30	221-75710-60
	1.50 µm	-60 to 310/330 °C	221-75711-15	–	221-75711-30	227-36120-01
	3.0 µm	-60 to 270/290 °C	–	–	221-75712-30	227-36121-01
	5.0 µm	-60 to 270/290 °C	–	–	221-75713-30	221-75713-60

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

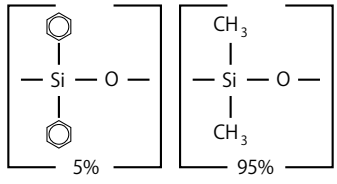
Metal columns are also available. Please refer to page 51.

Capillary Columns
General-Purpose Columns

SH-5MS

- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- Column specifically tested for low-bleed performance.
- General-purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g., Aroclor mixes), essential oils, semi-volatiles.
- Equivalent to USP G27 and G36 phases.
- Similar phases: HP-5, DB-5, CP Sil 8 CB, SPB-5

SH-5MS Structure

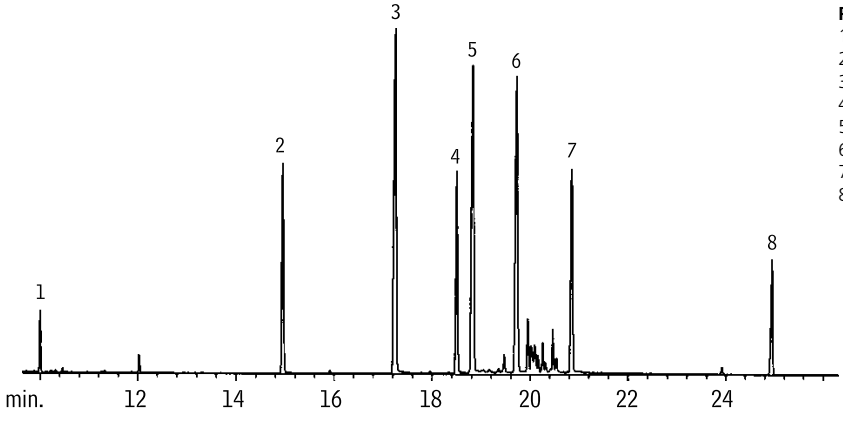


For SH-5MS columns with Integrated Guard column, please refer to page 57.

ID	df	Temp. Range	15 m	30 m	60 m
0.25 mm	0.10 µm	-60 to 330/350 °C	221-75854-15	221-75854-30	227-36122-01
	0.25 µm	-60 to 330/350 °C	221-75855-15	221-75855-30	227-36123-01
	0.50 µm	-60 to 330/350 °C	–	227-36124-01	227-36124-02
	1.0 µm	-60 to 325/350 °C	–	221-75857-30	–
0.32 mm	0.10 µm	-60 to 330/350 °C	–	227-36125-01	227-36125-02
	0.25 µm	-60 to 330/350 °C	–	221-75858-30	221-75858-60
	0.50 µm	-60 to 330/350 °C	–	227-36126-01	227-36126-02
	1.0 µm	-60 to 325/350 °C	–	227-36127-01	–
0.53 mm	0.50 µm	-60 to 320/340 °C	–	221-76191-30	–
	1.0 µm	-60 to 320/340 °C	–	227-36128-01	–
	1.50 µm	-60 to 310/330 °C	–	227-36129-01	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Endocrine Disruptors: Alkyl Phenols



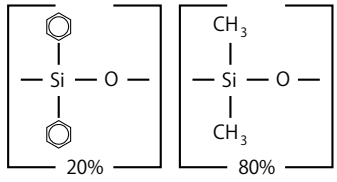
Peaks
1. *tert*-butyl phenol
2. *n*-pentyl phenol
3. *n*-hexyl phenol
4. *n*-heptyl phenol
5. *tert*-octyl phenol
6. *n*-octyl phenol
7. *n*-nonyl phenol
8. bisphenol A

Conditions
Column: SH-5MS, 30 m, 0.25 mm ID, 0.25 µm (P/N: 221-75855-30).
Conc.: 5–10 ng on-column
Inj.: Splitless, purge on at 1 min
Inj. Temp.: 275 °C
Oven Temp: 35 °C (hold 1 min) to 300 °C at 10 °C/min (hold 15 min)
Carrier Gas: He
Det. Temp: 310 °C

SH-20

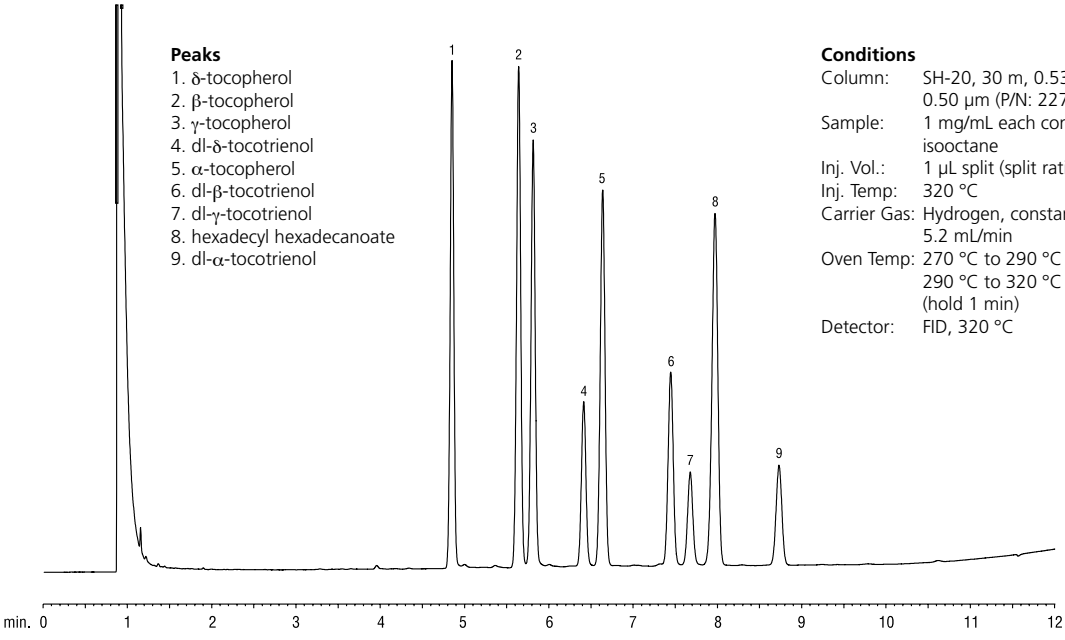
- Mid-polarity phase: Crossbond™ 20% diphenyl / 80% dimethyl polysiloxane
- General-purpose columns for volatile compounds, flavor compounds, alcoholic beverages.
- Equivalent to USP G28 and G32 phases.
- Similar phases: SPB-20, 007-20, AT-20, EC-20

SH-20 Structure



ID	df	Temp. Range	30 m	60 m
0.25 mm	0.10 µm	-20 to 300/320 °C	227-36130-01	–
	0.25 µm	-20 to 300/320 °C	227-36131-01	227-36131-02
	0.50 µm	-20 to 290/310 °C	227-36132-01	–
	1.0 µm	-20 to 280/300 °C	227-36133-01	227-36133-02
0.32 mm	0.25 µm	-20 to 300/320 °C	227-36135-01	–
	0.50 µm	-20 to 290/310 °C	227-36136-01	–
	1.0 µm	-20 to 280/300 °C	227-36137-01	227-36137-02
	1.50 µm	-20 to 270/290 °C	227-36138-01	227-36138-02
	3.0 µm	-20 to 250/270 °C	227-36139-01	227-36139-02
0.53 mm	0.10 µm	-20 to 260/280 °C	–	–
	0.25 µm	-20 to 260/280 °C	–	–
	0.50 µm	-20 to 260/280 °C	227-36142-01	–
	1.0 µm	-20 to 260/280 °C	227-36143-01	–
	1.50 µm	-20 to 250/270 °C	227-36144-01	–
	3.0 µm	-20 to 240/260 °C	227-36145-01	–

Tocopherols and Tocotrienols



Peaks
1. δ-tocopherol
2. β-tocopherol
3. γ-tocopherol
4. dl-δ-tocotrienol
5. α-tocopherol
6. dl-β-tocotrienol
7. dl-γ-tocotrienol
8. hexadecyl hexadecanoate
9. dl-α-tocotrienol

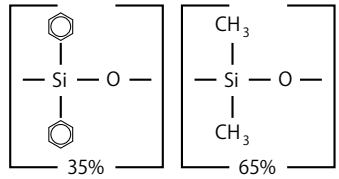
Conditions

Column:	SH-20, 30 m, 0.53 mm ID, 0.50 µm (P/N: 227-36142-01)
Sample:	1 mg/mL each component in isooctane
Inj. Vol.:	1 µL split (split ratio 20:1)
Inj. Temp:	320 °C
Carrier Gas:	Hydrogen, constant flow rate 5.2 mL/min
Oven Temp:	270 °C to 290 °C at 2 °C/min 290 °C to 320 °C at 10 °C/min (hold 1 min)
Detector:	FID, 320 °C

SH-35 / SH-35MS

- Mid-polarity phase: Crossbond™ 35% diphenyl / 65% dimethyl polysiloxane
- General-purpose columns for organochlorine pesticides, PCB congeners (e.g., Aroclor mixes), herbicides, pharmaceuticals, sterols, rosin acids, phthalate esters.
- Equivalent to USP G42 phase.
- Similar phases: HP-35, DB-35, SPB-35, SPB-608

SH-35 / SH-35MS Structure



SH-35

ID	df	Temp. Range	30 m	60 m
0.25 mm	0.10 µm	40 to 320 °C	227-36146-01	227-36146-02
	0.25 µm	40 to 320 °C	227-36147-01	227-36147-02
	0.50 µm	40 to 310 °C	227-36148-01	227-36148-02
	1.0 µm	40 to 290 °C	227-36149-01	227-36149-02
0.32 mm	0.25 µm	40 to 320 °C	227-36151-01	227-36151-02
	0.50 µm	40 to 310 °C	227-36152-01	–
	1.0 µm	40 to 290 °C	227-36153-01	–
	1.50 µm	40 to 270/290 °C	227-36154-01	–
	3.0 µm	40 to 250/270 °C	227-36155-01	227-36155-02
0.53 mm	0.50 µm	40 to 300 °C	227-36158-01	–
	1.0 µm	40 to 290 °C	227-36159-01	227-36159-02
	1.50 µm	40 to 280 °C	227-36160-01	–
	3.0 µm	40 to 240/260 °C	227-36161-01	–

SH-35MS (Low-bleed phase for GCMS analysis)

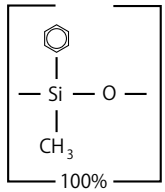
ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	40 to 320 °C	221-75835-30

Download the brochure of GC/GCMS consumables from
http://www.shimadzu.com/an/gc/column_consumable/index.html

SH-50

- Mid-polarity phase: Crossbond™ 100% methyl phenyl polysiloxane
- General-purpose columns for pesticides, herbicides, rosin acids, phthalate esters, sterols.
- Equivalent to USP G3 phase.
- Similar phases: HP-50+, CP-Sil 24 CB, SPB-50

SH-50 Structure

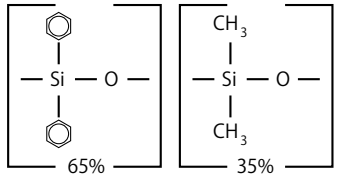


ID	df	Temp. Range	10 m	30 m	60 m
0.25 mm	0.25 µm	40 to 300/320 °C	–	227-36162-01	227-36162-02
	0.50 µm	40 to 290/310 °C	–	227-36163-01	–
	1.0 µm	40 to 280/300 °C	–	227-36164-01	227-36164-02
0.32 mm	0.25 µm	40 to 300/320 °C	–	221-76182-30	227-36165-01
	0.50 µm	40 to 290/310 °C	–	227-36166-01	227-36166-02
	1.0 µm	40 to 280/300 °C	–	227-36167-01	227-36167-02
0.53 mm	0.50 µm	40 to 270/290 °C	–	227-36168-01	227-36168-02
	0.83 µm	40 to 270/290 °C	–	227-36169-01	–
	1.0 µm	40 to 260/280 °C	–	227-36170-01	227-36170-02
	1.50 µm	40 to 250/270 °C	–	227-36171-01	–
	2.50 µm	–	227-36171-03	–	–

SH-65

- Mid-polarity phase: Crossbond™ 65% diphenyl / 35% dimethyl polysiloxane
- General-purpose columns for phenols, fatty acids, triglycerides.
- Equivalent to USP G17 phase.

SH-65 Structure



ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	50 to 300 °C	227-36172-01
	0.50 µm	50 to 280/300 °C	227-36173-01
	1.0 µm	50 to 260/280 °C	227-36174-01
0.32 mm	0.25 µm	50 to 300 °C	227-36175-01
	0.50 µm	50 to 280/300 °C	227-36176-01
	1.0 µm	50 to 260/280 °C	227-36177-01
0.53 mm	1.0 µm	50 to 250/270 °C	227-36178-01

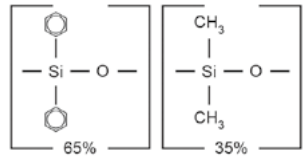
Capillary Columns
General-Purpose Columns

SH-65TG

- Application-specific columns, specially tested for triglycerides.

The SH-65TG phase resolves triglycerides by degree of unsaturation as well as by carbon number.

SH-65TG Structure

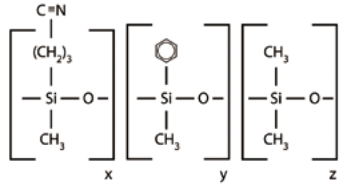


ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	40 to 370 °C	227-36325-01	227-36325-02

SH-1301

- Mid-polarity phase: Crossbond™ 6% cyanopropylphenyl / 94% dimethyl polysiloxane
- General-purpose columns for residual solvents, alcohols, oxygenates, and volatile organic compounds.
- Equivalent to USP G43 phase.
- Similar phases: DB-1301, CP-1301, SPB-1301

SH-1301 Structure



For SH-1301 columns with Integrated Guard column, please refer to page 57.

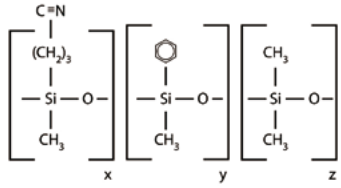
ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	-20 to 280 °C	221-76194-30	221-76194-60
	0.50 µm	-20 to 270 °C	227-36203-01	–
	1.0 µm	-20 to 260 °C	227-36204-01	227-36204-02
	1.40 µm	-20 to 240 °C	–	227-36205-01
0.32 mm	0.25 µm	-20 to 280 °C	227-36206-01	–
	0.50 µm	-20 to 270 °C	227-36207-01	–
	1.0 µm	-20 to 260 °C	227-36208-01	227-36208-02
	1.50 µm	-20 to 250 °C	227-36209-01	227-36209-02
	1.80 µm	-20 to 240 °C	227-36210-01	227-36210-02
0.53 mm	0.25 µm	-20 to 280 °C	227-36211-01	–
	0.50 µm	-20 to 270 °C	227-36212-01	227-36212-02
	1.0 µm	-20 to 260 °C	227-36213-01	227-36213-02
	1.50 µm	-20 to 250 °C	227-36214-01	–
	3.0 µm	-20 to 240 °C	221-75776-30	221-75776-60

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-624

- Mid-polarity phase: Crossbond™ 6% cyanopropylphenyl / 94% dimethyl polysiloxane
- Application-specific columns for volatile organic pollutants. Recommended in U.S. EPA methods for volatile organic pollutants.
- Equivalent to USP G43 phase.
- Similar phases: HP-624, DB-624, DB-624 UI, VF-624ms, SPB-1301

SH-624 Structure



For SH-624 columns with Integrated Guard column, please refer to page 57.

ID	df	Temp. Range	20 m	30 m	40 m	50 m	60 m	75 m	105 m
0.10 mm	0.50 µm	-20 to 240 °C	227-36332-01	–	–	–	–	–	–
0.18 mm	1.0 µm	-20 to 240 °C	227-36259-01	–	227-36259-02	–	–	–	–
0.25 mm	1.40 µm	-20 to 240 °C	–	221-75863-30	–	–	227-36215-01	–	–
0.32 mm	1.80 µm	-20 to 240 °C	–	221-75864-30	–	227-36347-01	221-75864-60	–	–
0.53 mm	3.0 µm	-20 to 240 °C	–	221-75865-30	–	–	221-75865-60	221-75865-75	227-36215-02

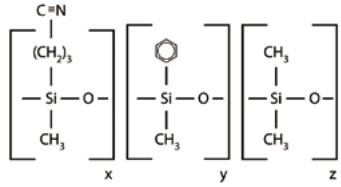
* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Capillary Columns
General-Purpose Columns

SH-1701

- Mid-polarity phase: Crossbond™ 14% cyanopropylphenyl / 86% dimethyl polysiloxane
- General-purpose columns for alcohols, oxygenates, PCB congeners (e.g., Aroclor mixes), pesticides, and fragrance compounds.
- Equivalent to USP G46 phase.
- Similar phases: DB-1701P, DB-1701, CP Sil 19 CB, VF-1701ms, VF-1701 Pesticides, SPB-1701

SH-1701 Structure



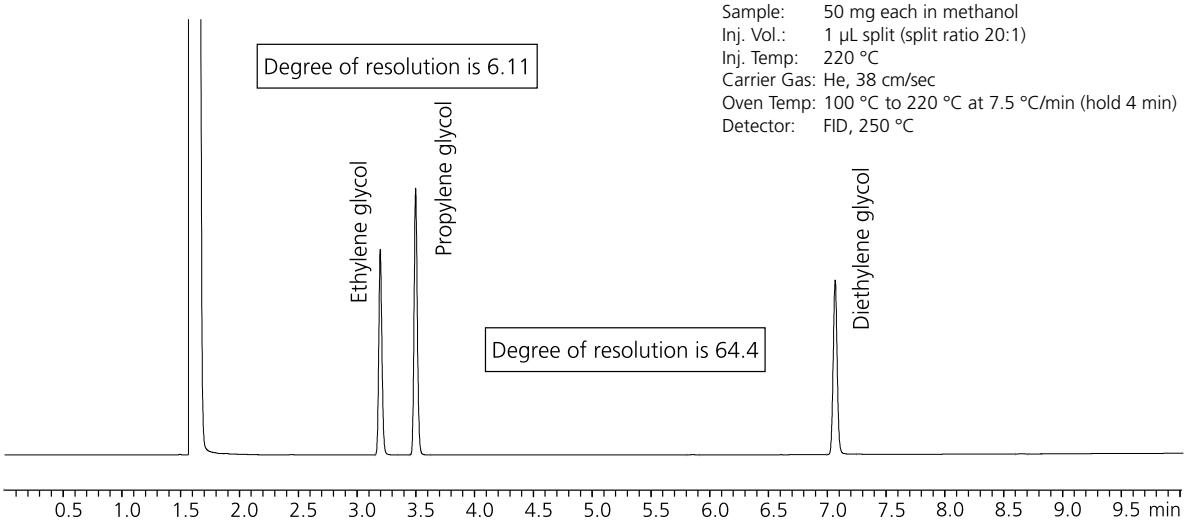
For SH-1701 columns with Integrated Guard column, please refer to page 57.

ID	df	Temp. Range	15 m	30 m	40 m	60 m
0.18 mm	0.20 µm	-20 to 280 °C	–	–	227-36216-03	–
0.25 mm	0.10 µm	-20 to 280 °C	–	227-36216-01	–	227-36216-02
	0.25 µm	-20 to 280 °C	–	221-75777-30	–	227-36217-01
	0.50 µm	-20 to 270/280 °C	–	221-75778-30	–	227-36218-01
	1.0 µm	-20 to 260/280 °C	–	221-75779-30	–	227-36219-01
0.32 mm	0.10 µm	-20 to 280 °C	–	221-76184-30	–	–
	0.25 µm	-20 to 280 °C	221-75780-15	221-75780-30	–	221-75780-60
	0.50 µm	-20 to 270/280 °C	–	221-75781-30	–	227-36221-01
	1.0 µm	-20 to 260/280 °C	–	221-75782-30	–	221-75782-60
	1.50 µm	-20 to 240/260 °C	–	227-36222-01	–	227-36222-02
0.53 mm	0.10 µm	-20 to 270/280 °C	–	227-36223-01	–	–
	0.25 µm	-20 to 270/280 °C	–	227-36224-01	–	–
	0.50 µm	-20 to 260/270 °C	–	227-36225-01	–	–
	1.0 µm	-20 to 250/270 °C	–	221-75785-30	–	227-36226-01
	1.50 µm	-20 to 240/260 °C	–	227-36227-01	–	227-36227-02
	3.0 µm	-20 to 230/250 °C	–	227-36228-01	–	227-36228-02

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Analysis of Ethylene Glycol and Diethylene Glycol in Propylene Glycol

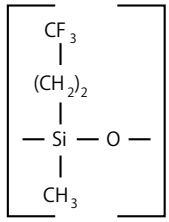
Conditions
Instrument: GC-2010 Plus AF/AOC™-20i
Column: SH-1701, 30 m, 0.32 mm ID, 1.00 µm (P/N: 221-75782-30)
Sample: 50 mg each in methanol
Inj. Vol.: 1 µL split (split ratio 20:1)
Inj. Temp: 220 °C
Carrier Gas: He, 38 cm/sec
Oven Temp: 100 °C to 220 °C at 7.5 °C/min (hold 4 min)
Detector: FID, 250 °C



SH-200 / SH-200MS

- Mid-polarity phase: Crossbond™ trifluoropropyl methyl polysiloxane
- General-purpose columns for solvents, Freon® fluorocarbons, alcohols, ketones, silanes, glycols, and drugs of abuse.
- Equivalent to USP G6 phase.
- Similar phases: DB-210, DB-200, VF-200ms

SH-200 / SH-200MS Structure



SH-200

ID	df	Temp. Range	30 m	60 m	100 m	105 m
0.25 mm	0.10 µm	-20 to 320/340 °C	–	–	–	227-36180-03
	0.25 µm	-20 to 320/340 °C	227-36180-01	227-36180-02	–	–
	0.50 µm	-20 to 310/330 °C	227-36181-01	227-36181-02	–	–
	1.0 µm	-20 to 290/310 °C	221-75800-30	227-36182-01	227-36182-02	–
0.32 mm	0.10 µm	-20 to 320/340 °C	227-36183-01	–	–	–
	0.25 µm	-20 to 320/340 °C	227-36184-01	227-36184-02	–	–
	0.50 µm	-20 to 310/330 °C	227-36185-01	227-36185-02	–	–
	1.0 µm	-20 to 290/310 °C	227-36186-01	227-36186-02	–	–
	1.50 µm	-20 to 280/300 °C	227-36187-01	227-36187-02	–	221-75804-15
0.53 mm	0.10 µm	-20 to 310/330 °C	–	–	–	–
	0.25 µm	-20 to 310/330 °C	227-36189-01	–	–	–
	0.50 µm	-20 to 300/320 °C	227-36190-01	227-36190-02	–	–
	1.0 µm	-20 to 290/310 °C	227-36191-01	227-36191-02	–	–
	1.50 µm	-20 to 280/300 °C	227-36192-01	227-36192-02	–	–
	3.0 µm	-20 to 260/280 °C	227-36193-01	227-36193-02	227-36193-03	–

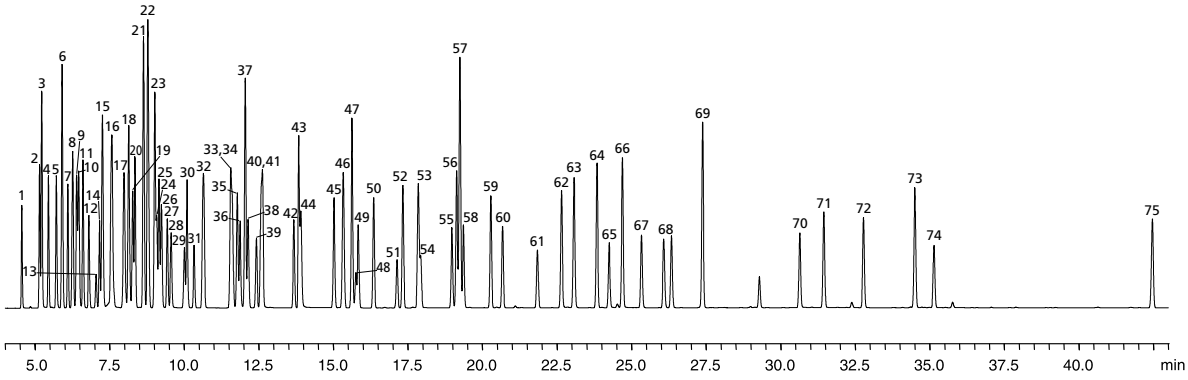
* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-200MS (Low-bleed phase for GCMS analysis)

ID	df	Temp. Range	30 m
0.25 mm	0.10 µm	-20 to 320/340 °C	227-36194-01
	0.25 µm	-20 to 320/340 °C	221-75811-30
	0.50 µm	-20 to 310/330 °C	227-36195-01
	1.0 µm	-20 to 290/310 °C	227-36196-01
0.32 mm	0.25 µm	-20 to 320/340 °C	221-75814-30
	0.50 µm	-20 to 310/330 °C	227-36198-01
	1.0 µm	-20 to 290/310 °C	227-36199-01
0.53 mm	0.50 µm	-20 to 300/320 °C	227-36200-01
	1.0 µm	-20 to 290/310 °C	227-36201-01
	1.50 µm	-20 to 280/300 °C	227-36202-01

Capillary Columns
General-Purpose Columns

Analysis of Organic Solvents



Peaks

1. Methanol
2. Ethanol
3. Acetaldehyde + Ethyl Ether
4. 1,1-Dichloroethylene
5. Isopropanol
6. Dichloromethane + Hexane
7. trans-1,2-Dichloroethylene
8. tert.-Butanol
9. tert.-Butyl Methyl Ether
10. Isopropyl Ether
11. n-Propanol
12. Ethyl Formate
13. Chloroform
14. Methyl Acetate
15. Cyclohexane
16. Tetrachloromethane + sec.-Butanol
17. Isooctane
18. Isobutanol + 1,1,1-Trichloroethane
19. Acetonitrile
20. Acrylonitrile
21. Benzene
22. Tetrahydrofuran + methylcyclohexane
23. Methyl Acrylate + 1,2-Dichloroethane
24. Trichloroethylene
25. n-Butanol
26. Ethyl Acetate
27. 1,2-Dimethoxyethane
28. Ethylene Glycol Monomethyl Ether
29. Ethylenechlorohydrin
30. Methyl Ethyl Ketone
31. Nitromethane
32. Propylene Glycol Monomethyl Ether + Isopropyl Acetate
33. Ethyl Acrylate
34. Isoamyl Alcohol
35. Methyl Methacrylate
36. Ethylene Glycol Monoethyl Ether
37. Toluene
38. 1,4-Dioxane
39. tetrachloroethylene
40. n-Propyl Acetate
41. n-Amyl Alcohol
42. Epichlorohydrin
43. Pyridine
44. Ethylene Glycol Monoisopropyl Ether
45. Isobutyl Acetate
46. Methyl Isobutyl Ketone + Ethylbenzene
47. Chlorobenzene
48. p-Xylene
49. m-Xylene
50. n-Butyl Acetate
51. o-Xylene
52. Methyl Butyl Ketone
53. Cyclohexanol
54. 1,1,2,2-Tetrachloroethane
55. Isoamyl Acetate
56. Butyl Acrylate
57. Ethylene Glycol Monobutyl Ether
58. Anisole + Propylene Glycol Monomethyl Ether Acetate
59. n-Amyl Acetate
60. Ethylene Glycol Monoethyl Ether Acetate
61. N,N-Dimethylformamide
62. Isooctanol
63. Cyclohexanone
64. o-Dichlorobenzene
65. Diethylene Glycol Monoethyl Ether
66. Benzyl Alcohol
67. N,N-Dimethylacetamide
68. Dimethyl Sulfoxide
69. Tetralin
70. Diethylene Glycol Monobutyl Ether
71. 2-Ethylhexyl Acrylate
72. N-Methylpyrrolidone
73. Isophorone
74. 1,3-Dimethyl-2-Imidazolidinone
75. Sulfolane

Conditions

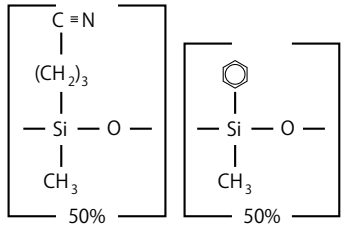
Instrument: GC-2010
Column: SH-200, 60 m, 0.32 mm ID, 1.00 µm (P/N: 227-36186-02)
Injection: Split (split ratio: 50:1)
Inj. Temp: 250 °C
Carrier Gas: He, constant linear velocity mode, 25 cm/sec
Oven Temp: 40 °C (0 min) to 310 °C at 4 °C/min
Detector: FID, 330 °C

For information on connection parts for capillary columns, please refer to page 59.

SH-225

- Polar phase: Crossbond™ 50% cyanopropylmethyl / 50% phenylmethyl polysiloxane
- General-purpose columns for FAMEs, carbohydrates, sterols, flavor compounds.
- Equivalent to USP G7 and G19 phases.
- Similar phases: DB-225, DB-225MS, CP-Sil 43 CB, SPB-225

SH-225 Structure



ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	40 to 220/240 °C	227-36229-01	227-36229-02
	0.50 µm	40 to 220/240 °C	227-36230-01	–
0.32 mm	0.25 µm	40 to 220/240 °C	227-36232-01	–
	0.50 µm	40 to 220/240 °C	227-36233-01	–
	1.0 µm	40 to 200/220 °C	227-36234-01	227-36234-02
0.53 mm	0.25 µm	40 to 200/220 °C	227-36235-01	–
	0.50 µm	40 to 200/220 °C	227-36236-01	–
	1.0 µm	40 to 200/220 °C	227-36237-01	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-440

- General-purpose columns with unique selectivity for pesticides, PAHs, or other semivolatiles. Ideal for low/trace-level analyses.
- Low-bleed, high-resolution columns with unique selectivity.

ID	df	Temp. Range	20 m	30 m
0.18 mm	0.18 µm	20 to 320 °C	227-36340-02	–
0.25 mm	0.25 µm	20 to 320/340 °C	–	227-36340-01
0.32 mm	0.25 µm	20 to 320/340 °C	–	227-36340-03

SH-502.2

- Application-specific columns with unique selectivity for volatile organic pollutants. The SH-502.2 column is cited in U.S. EPA Method 502.2 and in many gasoline range organics (GRO) methods for monitoring underground storage tanks.
- Excellent separation of trihalomethanes; ideal polarity for light hydrocarbons and aromatics.
- Similar phase: DB-502.2

The SH-502.2 column will enable you to quantify all compounds listed in U.S. EPA methods 502.2 or 524.2, whether you use a mass spectrometer or a PID in tandem with an ELCD. The diphenyl/dimethyl polysiloxane based SH-502.2 stationary phase provides low bleed and thermal stability to 270 °C. A 105-meter column can separate the light gases specified in EPA methods without subambient cooling. Narrow bore columns can interface directly in GC/MS systems.

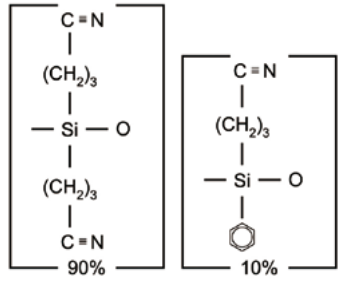
ID	df	Temp. Range	30 m	40 m	60 m	75 m	105 m
0.25 mm	1.40 µm	-20 to 250/270 °C	227-36341-04	–	227-36341-03	–	–
0.32 mm	1.80 µm	-20 to 250/270 °C	227-36341-01	–	–	–	227-36341-02
0.45 mm	2.55 µm	-20 to 250/270 °C	–	–	–	227-36341-05	–
0.53 mm	3.0 µm	-20 to 250/270 °C	–	–	227-36341-06	–	227-36341-07

Capillary Columns
General-Purpose Columns

SH-2330

- Highly polar phase: Crossbond™ 90% biscyanopropyl / 10% cyanopropylphenyl polysiloxane (Non-bonded)
- General-purpose columns for cis/trans FAMEs, dioxin isomers.
- Equivalent to USP G8 and G48 phase.
- Similar phases: DB-23, VF-23ms, SP-2330, SP-2331, SP-2380

SH-2330 Structure



ID	df	Temp. Range	30 m	60 m	105 m
0.25 mm	0.10 µm	0 to 260/275 °C	227-36238-01	227-36238-02	–
	0.20 µm	0 to 260/275 °C	227-36239-01	227-36239-02	227-36239-03
0.32 mm	0.20 µm	0 to 260/275 °C	227-36241-01	227-36241-02	–
0.53 mm	0.20 µm	0 to 260/275 °C	227-36243-01	–	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-2560

- Highly polar phase; biscyanopropyl polysiloxane—not bonded
- Stationary phase selectivity optimized for isomer separation to ensure accurate quantification of critical cis/trans FAMEs.
- Application-specific QC test guarantees consistent, reliable performance for AOAC 996.06 and AOCS Ce 1j-07 methods.
- Excellent sample capacity; no peak distortion means easy, accurate peak integration.
- Similar phases: HP-88, CP Sil 88, SBP-2560

ID	df	Temp. Range	50 m	100 m
0.25 mm	0.20 µm	20 to 250 °C	227-36311-04	227-36311-01

SH-2887

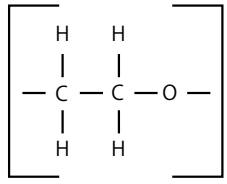
- Nonpolar phase: CrossbondTM 100% dimethyl polysiloxane
- Application-specific column for simulated distillation.
- Guarantee a stable baseline with low bleed and reproducible retention times.
- Similar phase: DB-2887, Petrocol 2887, Petrocol EX2887

ID	df	Temp. Range	10 m
0.53 mm	2.65 µm	-60 to 360 °C	227-36373-01

SH-Wax

- Polar phase: Crossbond™ polyethylene glycol
- Best polyethylene glycol (PEG) phase for alkenols, glycols, and aldehydes.
- Equivalent to USP G14, G15, G16, G20, G39 phases.
- Similar phases: DB-Wax, CP-Wax 52 CB

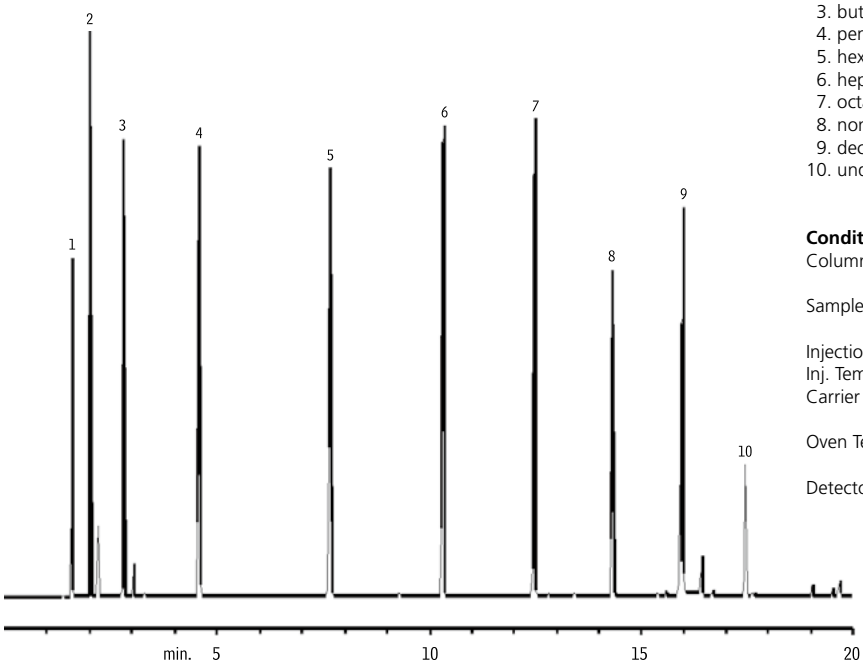
SH-Wax Structure



ID	df	Temp. Range	15 m	20 m	30 m	50 m	60 m
0.10 mm	0.10 µm	20 to 250 °C	–	227-36356-01	–	–	–
0.25 mm	0.10 µm	20 to 250 °C	–	–	221-76186-30	–	–
	0.25 µm	20 to 250 °C	–	–	221-75893-30	221-75893-50	221-75893-60
	0.50 µm	20 to 250 °C	–	–	221-75894-30	–	221-75894-60
0.32 mm	0.25 µm	20 to 250 °C	–	221-75895-20	221-75895-30	–	221-75895-60
	0.50 µm	20 to 250 °C	–	–	221-75896-30	221-75896-50	221-75896-60
	1.0 µm	20 to 240/250 °C	–	–	221-75897-30	–	221-75897-60
0.53 mm	0.25 µm	20 to 250 °C	–	–	227-36244-01	–	–
	0.50 µm	20 to 250 °C	–	–	221-76188-30	–	227-36245-01
	1.0 µm	20 to 240/250 °C	221-75899-15	–	221-75899-30	–	221-75899-60

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Aldehydes



Peaks
1. ethanal
2. propanal
3. butenal
4. pentanal
5. hexanal
6. heptanal
7. octanal
8. nonanal
9. decanal
10. undecanal

Conditions

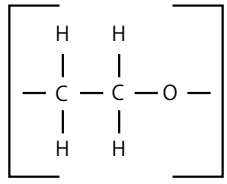
Column:	SH-Wax, 30 m, 0.2 5mm ID, 0.50 µm (P/N: 221-75894-30)
Samples:	C2-C11 aldehydes mixture On-column conc.: 250 ng
Injection:	Split (split ratio: 100:1)
Inj. Temp:	200 °C
Carrier Gas:	Hydrogen, linear velocity 35 cm/sec. set at 40 °C
Oven Temp:	40 °C (hold 5 min) to 200 °C at 10 °C/min
Detector:	FID, 200 °C

Capillary Columns
General-Purpose Columns

SH-PolarWax

- Polar phase: Crossbond™ polyethylene glycol
- Low-bleed PEG column ensures long column lifetimes.
- Rugged enough to withstand repeated water injections.
- Equivalent to USP G14, G15, G16, G20, and G39 phases.
- Similar phases: Innowax, CP-Wax 52 CB, VF-WAX MS, Supelcowax-10

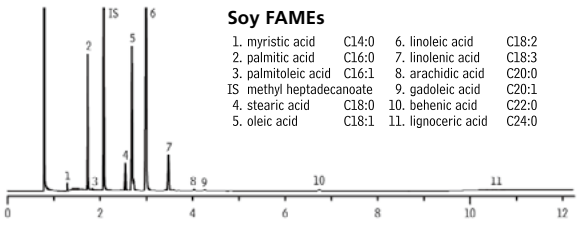
SH-PolarWax Structure



ID	df	Temp. Range	10 m	15 m	20 m	30 m	50 m	60 m
0.10 mm	0.10 µm	40 to 250/260 °C	227-36343-01	–	–	–	–	–
0.18 mm	0.18 µm	40 to 250 °C	–	–	227-36357-01	–	–	–
0.25 mm	0.10 µm	40 to 250/260 °C	–	–	–	227-36246-01	–	227-36246-02
	0.25 µm	40 to 250/260 °C	–	–	–	227-36305-02	227-36247-01	227-36247-02
	0.50 µm	40 to 250/260 °C	–	–	–	227-36248-01	–	227-36248-02
0.32 mm	0.10 µm	40 to 250 °C	–	–	–	227-36249-01	–	–
	0.25 µm	40 to 250/260 °C	–	–	–	221-75972-30	–	227-36250-01
	0.50 µm	40 to 250/260 °C	–	227-36251-02	–	227-36251-01	–	221-75975-60
	1.0 µm	40 to 240/260 °C	–	–	–	227-36252-01	–	227-36252-02
0.53 mm	0.10 µm	40 to 250 °C	–	–	–	227-36253-01	–	–
	0.25 µm	40 to 250/260 °C	–	–	–	227-36254-01	–	227-36254-02
	0.50 µm	40 to 250/260 °C	–	–	–	227-36255-01	–	227-36255-02
	1.0 µm	40 to 240/250 °C	–	–	–	221-75979-30	–	227-36256-01
	1.50 µm	40 to 230/240 °C	–	–	–	227-36257-01	–	227-36257-02
	2.0 µm	40 to 220/230 °C	–	–	–	227-36258-01	–	–

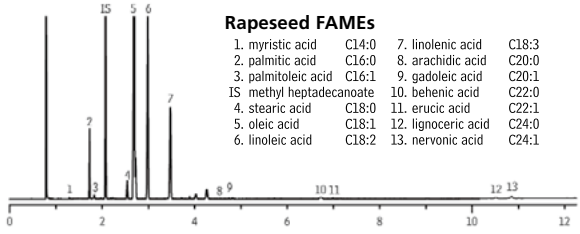
* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

FAMEs in Biodiesel Oils



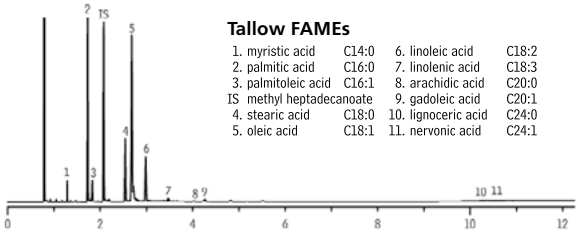
Soy FAMEs

1. myristic acid	C14:0	6. linoleic acid	C18:2
2. palmitic acid	C16:0	7. linolenic acid	C18:3
3. palmitoleic acid	C16:1	8. arachidic acid	C20:0
IS methyl heptadecanoate		9. gadoleic acid	C20:1
4. stearic acid	C18:0	10. behenic acid	C22:0
5. oleic acid	C18:1	11. lignoceric acid	C24:0



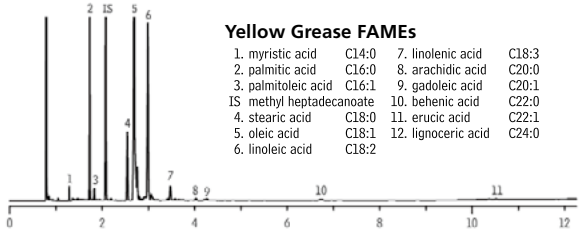
Rapeseed FAMEs

1. myristic acid	C14:0	7. linolenic acid	C18:3
2. palmitic acid	C16:0	8. arachidic acid	C20:0
3. palmitoleic acid	C16:1	9. gadoleic acid	C20:1
IS methyl heptadecanoate		10. behenic acid	C22:0
4. stearic acid	C18:0	11. erucic acid	C22:1
5. oleic acid	C18:1	12. lignoceric acid	C24:0
6. linoleic acid	C18:2	13. nervonic acid	C24:1



Tallow FAMEs

1. myristic acid	C14:0	6. linoleic acid	C18:2
2. palmitic acid	C16:0	7. linolenic acid	C18:3
3. palmitoleic acid	C16:1	8. arachidic acid	C20:0
IS methyl heptadecanoate		9. gadoleic acid	C20:1
4. stearic acid	C18:0	10. lignoceric acid	C24:0
5. oleic acid	C18:1	11. nervonic acid	C24:1



Yellow Grease FAMEs

1. myristic acid	C14:0	7. linolenic acid	C18:3
2. palmitic acid	C16:0	8. arachidic acid	C20:0
3. palmitoleic acid	C16:1	9. gadoleic acid	C20:1
IS methyl heptadecanoate		10. behenic acid	C22:0
4. stearic acid	C18:0	11. erucic acid	C22:1
5. oleic acid	C18:1	12. lignoceric acid	C24:0
6. linoleic acid	C18:2		

Conditions

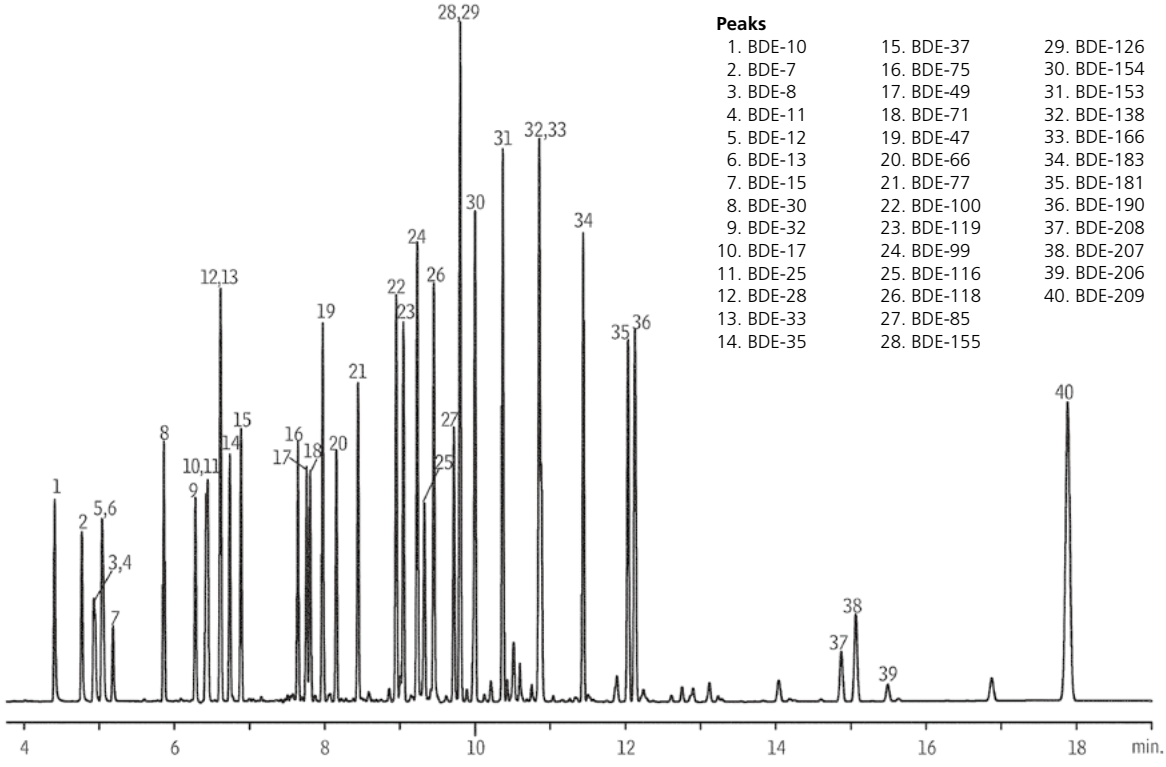
Column: SH-PolarWax, 30 m, 0.32 mm ID, 0.25 µm (P/N: 221-75972-30)
Inj. Vol.: 1 µL split (split ratio 100:1)
Inj. Temp: 250 °C
Carrier Gas: Hydrogen, constant flow rate 3mL/min, linear velocity 60 cm/sec.
Oven Temp: 210 °C (hold 5 min) to 230 °C at 20 °C/min (hold 5 min)
Det.: FID, 250 °C

SH-1614

- 5% diphenyl / 95% dimethyl polysiloxane
- Optimized for PBDE analysis by EPA Method 1614.
- Short column option resolves BDE-209 three times faster, with less thermal breakdown.
- Unique deactivation gives higher BDE-209 response than competitor columns, for greater analytical sensitivity.
- Exceeds EPA Method 1614 resolution criteria for BDE-49 and BDE-71.

ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	-60 to 330/360 °C	227-36265-01	227-36265-02

Brominated Flame Retardants



Peaks

1. BDE-10	15. BDE-37	29. BDE-126
2. BDE-7	16. BDE-75	30. BDE-154
3. BDE-8	17. BDE-49	31. BDE-153
4. BDE-11	18. BDE-71	32. BDE-138
5. BDE-12	19. BDE-47	33. BDE-166
6. BDE-13	20. BDE-66	34. BDE-183
7. BDE-15	21. BDE-77	35. BDE-181
8. BDE-30	22. BDE-100	36. BDE-190
9. BDE-32	23. BDE-119	37. BDE-208
10. BDE-17	24. BDE-99	38. BDE-207
11. BDE-25	25. BDE-116	39. BDE-206
12. BDE-28	26. BDE-118	40. BDE-209
13. BDE-33	27. BDE-85	
14. BDE-35	28. BDE-155	

Conditions

Column: SH-1614, 15 m, 0.25 mm ID, 0.10 µm (P/N: 227-36265-01)
Sample: 100-300 ppb PBDE PAR Solution
500 ppb decabromodiphenyl ether
Inj. Vol.: 1 µL splitless (hold 1 min),
Inj. Temp: 340 °C
Carrier Gas: He, constant flow, linear velocity 60 cm/sec., 120 °C
Oven Temp: 120 °C (hold 1 min) to 275 °C at 15 °C/min to 300 °C at 5 °C/min (hold 5 min)
Detector: µ-ECD, 345 °C

SH-OPP

- Application-specific columns for 53 organophosphorus pesticides (OPP) listed in EPA Method 8141.
- Low bleed—ideal for GC-FPD, GC-NPD, or GC-MS analyses.

ID	df	Temp. Range	30 m
0.32 mm	0.50 µm	-20 to 310/330 °C	227-36377-01

SH-OPP2

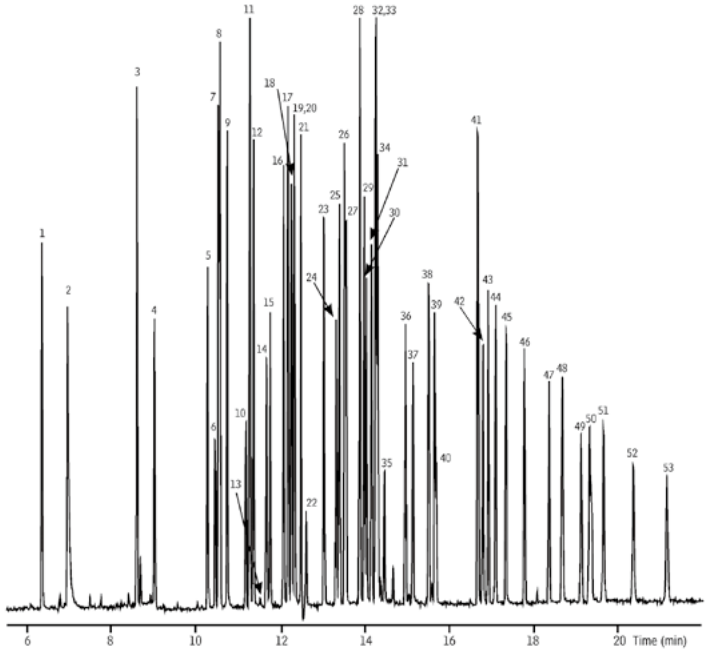
- Dedicated column for organophosphorus pesticides; best column combination for US EPA Method 8141.
- Low bleed - ideal for GC-FPD, GC-NPD, or GCMS analyses.

ID	df	Temp. Range	30 m
0.32 mm	0.32 µm	-20 to 310/330 °C	221-75887-30

Organophosphorus Pesticides (U.S. EPA Method 8141A)

Peaks

1. Dichlorvos
2. Hexamethylphosphoramide
3. Mevinphos
4. Trichlorfon
5. TEPP
6. Demeton-O
7. Tributyl phosphate (SS)
8. Thionazin
9. Ethoprop
10. Naled
11. Sulfotepp
12. Phorate
13. Dicrotophos
14. Monocrotophos
15. Demeton-S
16. Terbufos
17. Dimethoate
18. Diazinon
19. Dioxathion
20. Fonophos
21. Disulfoton
22. Phosphamidon isomer (breakdown product)
23. Dichlorofenthion
24. Phosphamidon
25. Chlorpyrifos methyl
26. Methyl parathion
27. Ronnel
28. Aspon
29. Fenitrothion
30. Malathion
31. Chlorpyrifos
32. Trichloronate
33. Parathion-ethyl
34. Fenthion
35. Merphos
36. Chlorfenvinphos
37. Crotoxyphos
38. Stirofos
39. Prothiofos
40. Merphos oxone (breakdown product)
41. Ethion
42. Fensulfothion
43. Sulprofos
44. Carbophenothion
45. Famphur
46. Triphenyl phosphate (SS)
47. EPN
48. Phosmet
49. Leptophos
50. Tri-o-cresyl phosphate
51. Azinphos-methyl
52. Azinphos-ethyl
53. Coumaphos



Conditions

Columns: SH-OPP2, 30 m, 0.32 mm ID, 0.32 µm (P/N: 221-75887-30)
Inj. Vol.: 1 µL splitless (hold 1 min)
Inj. Temp: 200 °C
Oven Temp: 80 °C (hold 0.5 min) to 280 °C at 12 °C/min (hold 10 min)
Carrier Gas: He
Dead Time: 1.03 min at 80 °C
Detector: FPD, 250 °C
Notes: Constant pressure

SH-CLP / SH-CLP II

- Dedicated columns for organochlorine pesticides and herbicides.
- Low bleed - ideal for high-sensitivity GC-ECD or GCMS analyses.
- Baseline separations in less than 10 minutes.
- Analyze EPA Method 8081B, 8082A, 8151A, 504.1, 515, 508.1, and 552.2 compounds without time-consuming column changes.
- Similar phases: DB-CLP1 / DB-CLP2

SH-CLP

ID	df	Temp. Range	20 m	30 m
0.18 mm	0.18 µm	-60 to 320/340 °C	227-36266-02	–
0.32 mm	0.32 µm	-60 to 320/340 °C	–	227-36266-01
	0.50 µm	-60 to 320/340 °C	–	221-75879-30

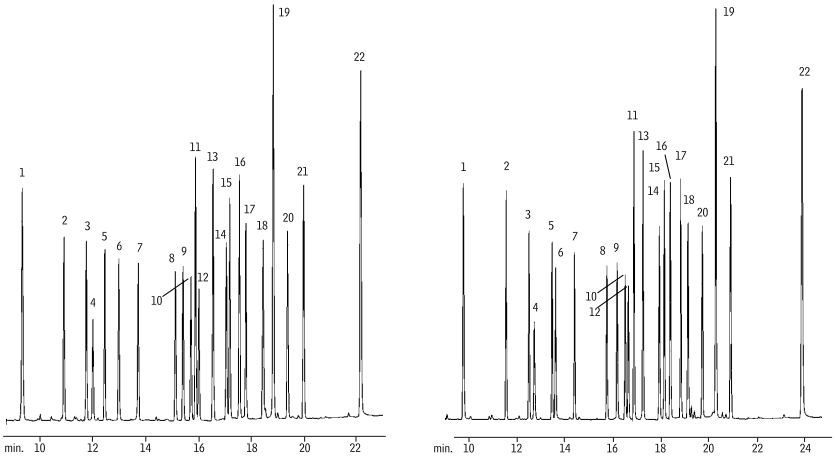
SH-CLP II

ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	-60 to 320/340 °C	227-36267-02
0.32 mm	0.25 µm	-60 to 320/340 °C	227-36267-01
	0.50 µm	-60 to 320/340 °C	227-36267-03

Organochlorine Pesticides (US EPA Method 8081)

Peaks

1. 2,4,5,6-tetrachloro-*m*-xylene
2. α-BHC (α-HCH)
3. γ-BHC (lindane)
4. β-BHC (β-HCH)
5. δ-BHC (δ-HCH)
6. heptachlor
7. aldrin
8. heptachlor epoxide
9. γ-chlordane
10. α-chlordane
11. 4,4'-DDE
12. endosulfan I
13. dieldrin
14. endrin
15. 4,4'-DDD
16. endosulfan II
17. 4,4'-DDT
18. endrin aldehyde
19. methoxychlor
20. endosulfan sulfate
21. endrin ketone
22. decachlorobiphenyl



Conditions

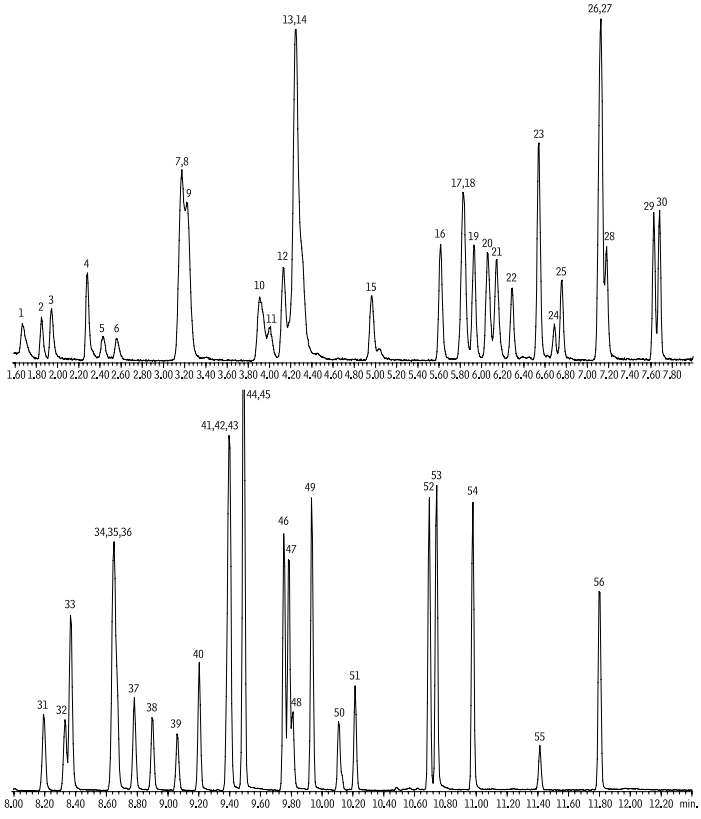
	SH-CLP, 30 m, 0.32 mm ID, 0.50 µm (P/N: 221-75879-30)	SH-CLP II, 30 m, 0.32 mm ID, 0.25 µm (P/N: 227-36267-01)
Column:		
Oven Temp:	120 °C (hold 1 min) to 300 °C (hold 10 min) at 9 °C/min	
Inj.:	Direct	
Inj. Temp:	200 °C	
Detector:	ECD, 300 °C with anode purge	
Dead time:	1.9 min	
Head pressure:	8.7 psi (constant)	
Flow rate:	1.3 mL/min at 120 °C, He	

SH-VMS

- Dedicated columns for analyzing volatile organic pollutants by GCMS including methods TO-15, TMS, and EPA 8260.
- Complete separation of U.S. EPA Method 8260 compounds in less than 10 minutes.

ID	df	Temp. Range	20 m	30 m	40 m	60 m
0.18 mm	1.0 µm	-40 to 240/260 °C	227-36412-01	–	227-36412-02	–
0.25 mm	1.40 µm		–	227-36268-01	–	227-36268-02
0.32 mm	1.80 µm		–	227-36269-01	–	227-36269-02
0.45 mm	2.55 µm		–	–	–	227-36348-01
0.53 mm	3.0 µm		–	227-36353-01	–	–

Volatile Organics (US EPA CLP 04.1)



Conditions

Column: SH-VMS, 30 m, 0.25 mmID, 1.40 µm (P/N: 227-36268-01)
Purge and Trap: Trap: #10 (Tenax®/silica gel/carbon molecular sieve)
Sample Temp: ambient
Purge: 11 min at 40 mL/min
Desorb preheat: 185 °C
Desorb: 0.5 min at 190 °C
Desorb flow rate: 35.0 mL/min
Bake: 8 min at 210 °C
Interface: split injector
Transfer Line Temp: 150 °C
Inj.: Split (split ratio: 35:1)
Inj. Temp: 200 °C
Carrier Gas: He, linear velocity 34 cm/sec., 40 °C, constant flow
Oven Temp: 40 °C (hold 4 min) to 90 °C at 16 °C/min to 220 °C at 32 °C/min (hold 5 min)
Detector: MS
Transfer Line Temp: 150 °C
Scan Range: 35-300 amu.
Ionization: EI

Peaks

1. dichlorodifluoromethane
2. chloromethane
3. vinyl chloride
4. bromomethane
5. chloroethane
6. trichlorofluoromethane
7. 1,1-dichloroethene
8. carbon disulfide
9. 1,1,2-trichloro-1,2,2-trifluoroethane
10. methylene chloride
11. acetone
12. *trans*-1,2-dichloroethene
13. methyl acetate
14. methyl *tert-butyl* ether
15. 1,1-dichloroethane
16. cis-1,2-dichoroethane
17. cyclohexane
18. bromochloromethane (IS)
19. chloroform
20. carbon tetrachloride
21. 1,1,1-trichloroethane
22. 2-butanone
23. benzene
24. 1,2-dichloroethane-d4 (SS)
25. 1,2-dichloroethane
26. methylcyclohexane
27. trichloroethene
28. 1,4-difluorobenzene (IS)
29. 1,2-dichloropropane
30. bromodichloromethane
31. *cis*-1,3-dichloropropene
32. toluene d8 (SS)
33. toluene
34. tetrachloroethane
35. 4-methyl-2-pentanone
36. *trans*-1,3-dichloropropane
37. 1,1,2-trichloroethane
38. dibromochloromethane
39. 1,2-dibromoethane
40. 2-hexanone
41. chlorobenzene d5 (IS)
42. chlorobenzene
43. ethylbenzene
44. *m*-xylene
45. *p*-xylene
46. *o*-xylene
47. styrene
48. bromoform
49. isopropylbenzene
50. 4-bromofluorobenzene (SS)
51. 1,1,2,2-tetrachloroethane
52. 1,3-dichlorobenzene
53. 1,4-dichlorobenzene
54. 1,2-dichlorobenzene
55. 1,2-dibromo-3-chloropropane
56. 1,2,4-trichlorobenzene

SH-Volatil Amin

- Unique selectivity for baseline resolution of all volatile amines.
- Excellent inertness assures accuracy and sensitivity for volatile amines, including free ammonia.
- Highly robust phase withstands repeated water injections, resulting in longer column lifetime.
- High temperature stability (290 °C) ensures elution of amines up to C16 and allows contaminants to be removed by "baking out" the column.
- Similar phase: CP-Volamine

The SH-Volatile Amine column was designed specifically for analyzing volatile amines in difficult matrices, such as water. The unique base deactivation creates an exceptionally inert surface for these sensitive compounds, resulting in highly symmetrical peaks, which allow low detection limits. The stable bonded phase yields a column that is not only retentive and highly selective for these compounds but is also very robust and able to withstand repeated water injections.

ID	df	Temp. Range	30 m	60 m
0.32 mm	5.0 µm	-60 to 270/290 °C	227-36326-01	227-36326-02

SH-PCB

- Unique polymer for PCBs analysis by GC-ECD or GC-MS.
- Good results for other semivolatiles.
- Low polarity; inert to active compounds.

ID	df	Temp. Range	30 m	60 m
0.18 mm	0.18 µm	30 to 320/340 °C	–	227-36310-03
0.25 mm	0.25 µm		227-36310-04	227-36310-01

SH-VRX

- Application-specific columns for volatile organic pollutants.
- Excellent for U.S. EPA Method 8021 compounds.

The SH-VRX stationary phase and optimized column dimensions provide low bleed, excellent resolution, and fast analysis times for volatile compounds.

ID	df	Temp. Range	20 m	25 m	30 m	60 m
0.10 mm	0.50 µm	-40 to 240/260 °C	–	227-36331-01	–	–
0.18 mm	1.0 µm		227-36331-02	–	–	–
0.25 mm	1.40 µm		–	–	227-36355-01	227-36355-02
0.32 mm	1.80 µm		–	–	227-36355-03	–
0.53 mm	3.0 µm		–	–	227-36355-04	–

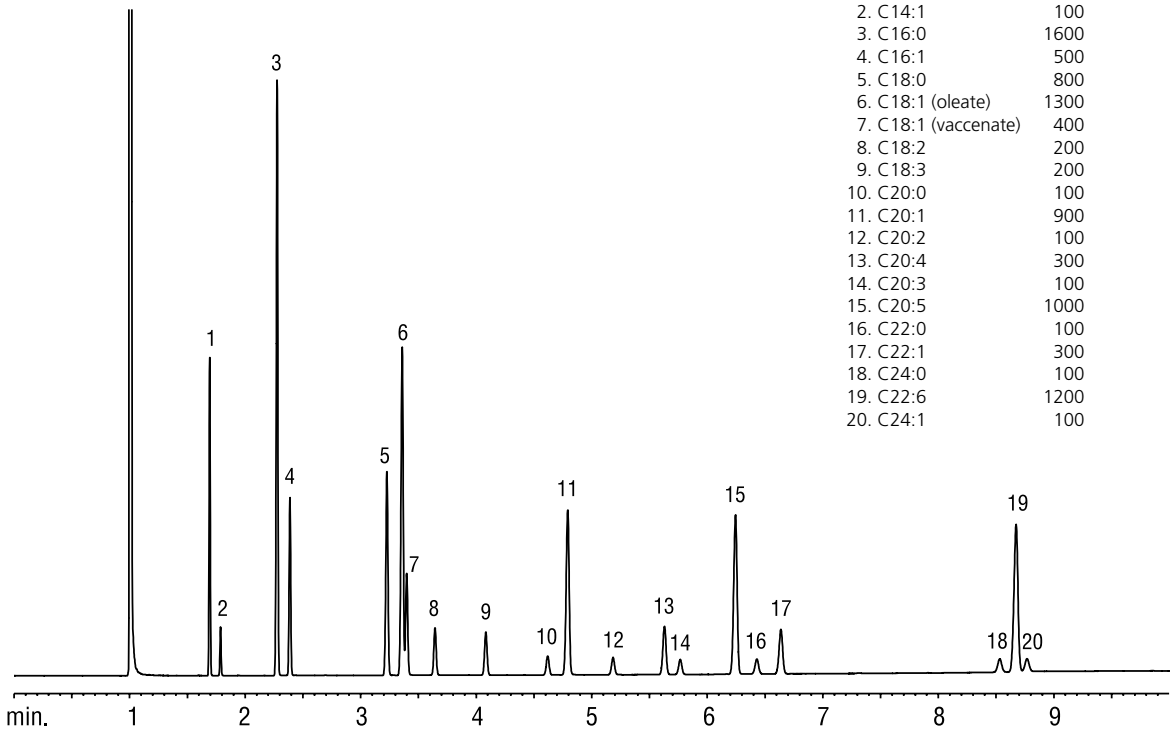
SH-FAME

- Dedicated column for FAMEs, specially tested with a FAME mixture.
- Equivalent to USP G16 phase.
- Similar phases: Select FAME, Omegawax

ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	20 to 240/250 °C	227-36324-01
0.32 mm	0.25 µm	20 to 240/250 °C	227-36270-01

FAMEs (Marine Oil Standard)

Peak List	Conc. (µg/mL)
1. C14:0	600
2. C14:1	100
3. C16:0	1600
4. C16:1	500
5. C18:0	800
6. C18:1 (oleate)	1300
7. C18:1 (vaccenate)	400
8. C18:2	200
9. C18:3	200
10. C20:0	100
11. C20:1	900
12. C20:2	100
13. C20:4	300
14. C20:3	100
15. C20:5	1000
16. C22:0	100
17. C22:1	300
18. C24:0	100
19. C22:6	1200
20. C24:1	100



Conditions

Column: SH-FAME, 30 m, 0.32 mm ID, 0.25 µm (P/N: 227-36270-01)
Inj. Vol.: 1 µL split (split ratio: 100:1)
Conc.: 10,000 µg/mL in isooctane (total FAMEOs)
Inj. Temp: 250 °C
Carrier Gas: Hydrogen, constant flow rate 3 mL/min
Oven Temp: 195 - 240 °C at 5 °C/min (hold 1 min)
Detector Temp: 275 °C

SH-BAC Plus 1 / SH-BAC Plus 2

- Optimized column selectivities guarantee resolution of ethanol, internal standards, and frequently encountered interferences.
- Robust and reproducible column chemistry ensures longer column lifetime and consistent results.

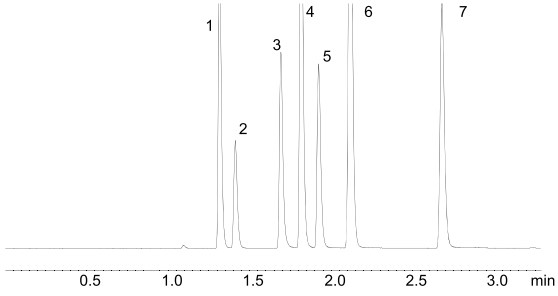
SH-BAC Plus 1

ID	df	Temp. Range	30 m
0.32 mm	1.80 µm	-20 to 240/260 °C	227-36260-01
0.53 mm	3.0 µm	-20 to 240/260 °C	227-36261-01

SH-BAC Plus 2

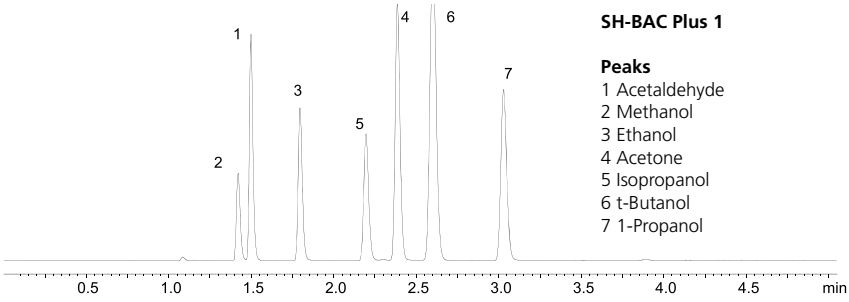
ID	df	Temp. Range	30 m
0.32 mm	0.60 µm	-20 to 240/260 °C	227-36263-01
0.53 mm	1.0 µm	-20 to 240/260 °C	227-36264-01

Analysis of Alcohol Compounds in Blood



SH-BAC Plus 2

Peaks
1 Acetaldehyde
2 Methanol
3 Ethanol
4 Acetone
5 Isopropanol
6 t-Butanol
7 1-Propanol



SH-BAC Plus 1

Peaks
1 Acetaldehyde
2 Methanol
3 Ethanol
4 Acetone
5 Isopropanol
6 t-Butanol
7 1-Propanol

Conditions

Instrument: GC-2010 Plus AF + HS-20
Headspace: Oven Temp.: 85 °C
Vial Warming Time: 15 min
Vial Pressurization Time: 1 min
Injection Time: 0.5 min
Sample Line Temp: 150 °C
Vial Volume: 20 mL
Vial Agitation: Off
Vial Pressurization: 100 kPa
Load Time: 0.5 min
Needle Flash Time: 0.5 min
Transfer Line Temp: 150 °C

Column: SH-BAC Plus 2, 30 m, 0.32 mm ID, 0.60 µm (P/N: 227-36263-01)
SH-BAC Plus 1, 30 m, 0.32 mm ID, 1.80 µm (P/N: 227-36260-01)
Column Temp: 40 °C
Inj.: Split (split ratio: 20:1)
Carrier Gas: He, 100 kPa
Detector: FID, 250 °C
Makeup Gas: He, 30 mL/min
Hydrogen: 40 mL/min
Air: 400 mL/min

SH-5 Amine / SH-35 Amine

- Dedicated columns for amines and other basic compounds, including alkylamines, diamines, triamines, ethanolamines, and nitrogen-containing heterocyclics.

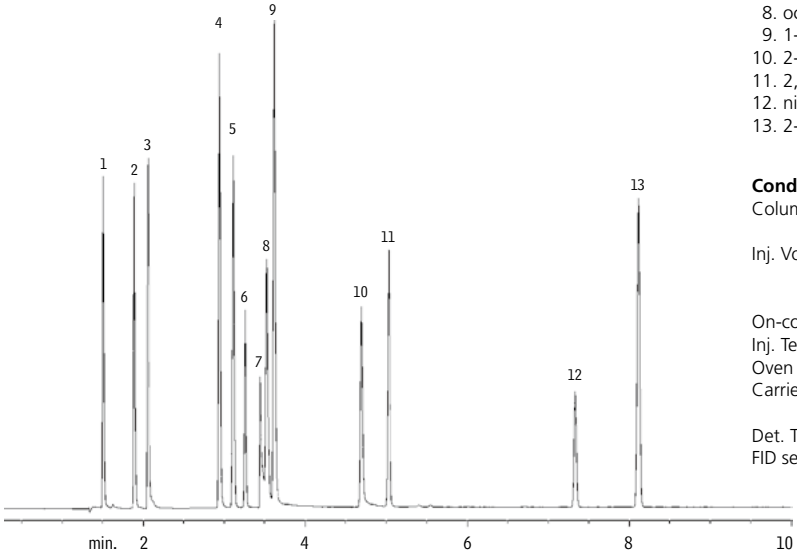
SH-5 Amine (Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane)

ID	df	Temp. Range	15 m	30 m
0.25 mm	0.25 µm	-60 to 315 °C	–	227-36282-01
	0.50 µm	-60 to 300/315 °C	227-36323-01	227-36283-01
	1.0 µm	-60 to 300/315 °C	227-36323-02	227-36284-01
0.32 mm	1.0 µm	-60 to 300/315 °C	227-36332-03	227-36332-02
	1.50 µm	-60 to 290/305 °C	–	227-36285-01
0.53 mm	1.0 µm	-60 to 290/305 °C	–	227-36286-01
	3.0 µm	-60 to 280/295 °C	–	227-36287-01

SH-35 Amine (Mid-polarity phase: Crossbond™ 35% diphenyl / 65% dimethyl polysiloxane)

ID	df	Temp. Range	15 m	30 m
0.25 mm	0.50 µm	0 to 220 °C	–	227-36288-01
	1.0 µm	0 to 220 °C	–	227-36289-01
0.32 mm	1.0 µm	0 to 220 °C	–	227-36290-01
	1.50 µm	0 to 220 °C	–	227-36291-01
0.53 mm	1.0 µm	0 to 220 °C	227-36280-03	227-36292-01
	3.0 µm	0 to 220 °C	–	227-36293-01

Amines & Phenols



Peaks
1. diethylamine
2. pyridine
3. morpholine
4. phenol
5. aniline
6. 2-chlorophenol
7. diethylenetriamine
8. octylamine
9. 1-methyl-2-pyrrolidinone
10. 2-nitrophenol
11. 2,6-dimethylaniline
12. nicotine
13. 2-nitroaniline

Conditions

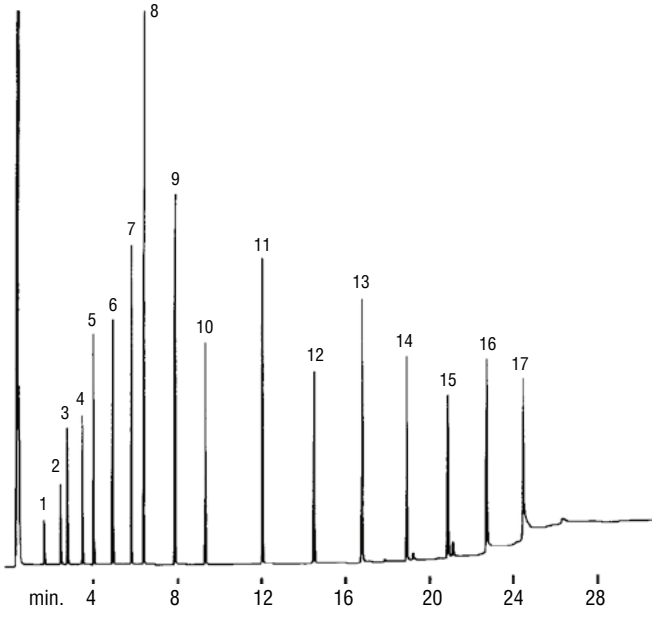
Column:	SH-5 Amine, 30 m, 0.32 mm ID, 1.00 µm (P/N: 227-36290-01)
Inj. Vol.:	1 µL split injection of miscellaneous amines and phenols in water (split ratio: 25:1)
On-column conc.:	22 ng
Inj. Temp:	305 °C
Oven Temp:	120 °C to 220 °C at 10 °C/min
Carrier Gas:	Hydrogen, linear velocity 38cm/sec. set at 120 °C
Det. Temp:	305 °C
FID sensitivity:	6.4 × 10-11 AFS

SH-PolarD

- Polar phase: Crossbond™ acid-deactivated Carbowax™ polyethylene glycol
- Dedicated columns for free (underivatized) acids, some inorganic acids.
- Resistant to oxidative damage.
- Equivalent to USP G25 and G35 phases.
- Similar phases: HP-FFAP, DB-FFAP, VF-DA, CP-Wax 58 CB, CP-FFAP CB, Nukol

ID	df	Temp. Range	15 m	30 m	50 m	60 m
0.25 mm	0.10 µm	40 to 250/260 °C	–	227-36271-01	–	–
	0.25 µm	40 to 250/260 °C	–	221-75981-30	–	227-36272-01
	0.50 µm	40 to 250/260 °C	–	227-36273-01	–	227-36273-02
0.32 mm	0.10 µm	40 to 250/260 °C	–	227-36274-01	–	–
	0.25 µm	40 to 250/260 °C	–	227-36321-02	–	227-36275-01
	0.50 µm	40 to 250/260 °C	–	227-36322-02	–	227-36276-01
	1.0 µm	40 to 240/250 °C	–	227-36277-01	227-36277-03	227-36277-02
0.53 mm	0.25 µm	40 to 250/260 °C	–	227-36278-01	–	227-36278-02
	0.50 µm	40 to 250/260 °C	–	227-36279-01	–	227-36279-02
	1.0 µm	40 to 240/250 °C	227-36280-03	227-36280-01	–	227-36280-02
	1.50 µm	40 to 230/240 °C	–	227-36281-01	–	227-36281-02

Organic Acids (Free Fatty Acids)



Peaks

1. acetic acid
2. propionic acid
3. isobutyric acid
4. *n*-butyric acid
5. isovaleric acid
6. *n*-valeric acid
7. isocaproic acid
8. caproic acid
9. heptanoic acid
10. caprylic acid
11. capric acid
12. lauric acid
13. myristic acid
14. palmitic acid
15. stearic acid
16. arachidic acid
17. behenic acid

Conditions

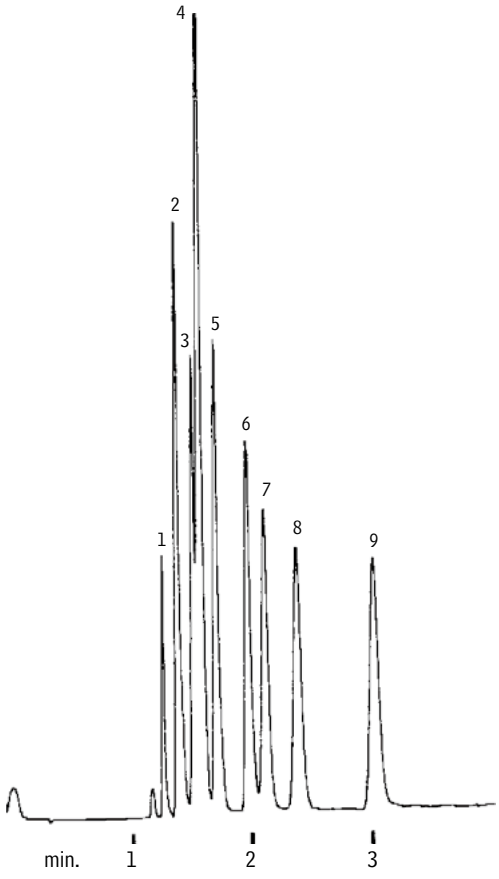
Column:	SH-PolarD, 30 m, 0.53 mm ID, 0.25 µm (P/N: 227-36278-01)
Sample:	free acid standard Conc.: 25 ng/µL.
Inj. Vol.:	0.3 µL direct
Inj. Temp:	280 °C
Oven Temp:	100 °C (hold 2 min) to 280 °C at 8 °C/min, (hold 10 min)
Carrier Gas:	Hydrogen, flow rate 10 cc/min, linear velocity 80 cm/sec.
Detector:	FID, 280 °C

SH-PolarX

- Polar phase: Crossbond™ base-deactivated Carbowax™ polyethylene glycol
- Dedicated columns for underivatized amines and other basic compounds, including alkylamines, diamines, triamines, nitrogen-containing heterocyclics. No need for column priming.
- Similar phases: CAM, CP-Wax 51 for Amines, Carbowax Amine

ID	df	Temp. Range	15 m	30 m	60 m
0.25 mm	0.25 µm	40 to 210/220 °C	227-36359-01	227-36294-01	–
	0.50 µm	40 to 210/220 °C	–	227-36295-01	–
0.32 mm	0.25 µm	40 to 210/220 °C	–	227-36296-01	227-36296-02
	0.50 µm	40 to 210/220 °C	–	227-36297-01	–
	1.0 µm	40 to 210/220 °C	–	227-36298-01	227-36298-02
0.53 mm	0.50 µm	40 to 210/220 °C	–	227-36299-01	–
	1.0 µm	40 to 210/220 °C	–	227-36300-01	227-36300-02

Amines (low MW)



Peaks
1. trimethylamine
2. dimethylamine
3. ethylamine
4. methylamine
5. isopropylamine
6. *n*-propylamine
7. *tert*-butylamine
8. diethylamine
9. *sec*-butylamine

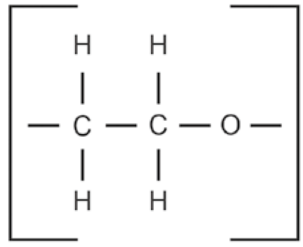
Conditions

Column:	SH-PolarX, 30 m, 0.53 mm ID, 1.00 µm (P/N: 227-36300-01)
Inj. Vol.:	1 µL direct injection of amines in water
Inj. Temp:	250 °C
Carrier Gas:	Hydrogen, flow rate 5 cc/min, linear velocity 40 cm/sec.
Oven temp.:	45 °C
Detector:	FID, 250 °C

SH-PolarWAX MS

- High-polarity, stable polyethylene glycol (PEG) stationary phase.
- Low bleed and rugged enough to withstand repeated temperature cycles without retention time shifting.
- Ideal for food, flavor, fragrance, and industrial chemical and solvent analysis.
- Temperature range: 40 °C to 250/260 °C.
- Equivalent to USP G14, G15, G16, G20, and G39 phases.
- Similar phases: VF-WAXms, TR-WaxMS

SH-PolarWAX MS Structure



The SH-PolarWax MS column ensures reproducible retention times from run to run, even with temperature cycling. When methods require trace analysis, this highly polar, low-bleed stationary phase produces excellent signal-to-noise levels! Ideal for food and flavor analysis (e.g., essential oils), fragrance and allergen analysis, as well as industrial solvent and chemical analysis.

ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	40 to 250/260 °C	227-36322-01
0.32 mm	0.25 µm	40 to 250/260 °C	227-36322-03

SH-βDEXse

- Phase: 2,3-di-O-ethyl-6-O-tert-butyl dimethylsilyl beta cyclodextrin added into 14% cyanopropylphenyl/86% dimethyl polysiloxane
- Excellent the column lifetime by adding β or γ cyclodextrin in stationary phase.
- Ideal for the separation of chiral compounds.
- Provides better resolution for limonene, linalool, linalyl acetate, ethyl-2-methylbutyrate, 2,3-butane diol, and styrene oxides.

ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	40 to 230 °C	227-36365-01

SH-βDEXsm

- Phase: 2,3-Di-O-methyl-6-O-tert-butyl-dimethylsilyl-beta-cyclodextrin, added to 14% cyanopropylphenyl/86% dimethylpolysiloxane
- Excellent the column lifetime by adding β or γ cyclodextrin in stationary phase.
- Ideal for the separation of most chiral compounds in essential oils.

ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	40 to 230 °C	227-36365-02
0.32 mm	0.25 µm	40 to 230 °C	227-36365-03

Capillary Columns
Dedicated Columns

SH-βDEXsa

- Phase: 2,3-Di-acetoxy-6-O-tert-butyl-dimethylsilyl-beta-cyclodextrin, added to 14% cyanopropylphenyl/86% dimethylpolysiloxane
- Excellent the column lifetime by adding β or γ cyclodextrin in stationary phase.
- Unique selectivity for esters, lactones, and other fruit flavor components.

ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	40 to 230 °C	227-36365-04

SH-Dioxin

- Isomer separation for for 2,3,7,8-TCDD and 2,3,7,8-TCDF achieved with one GC column.
- Thermally stable to 340 °C for longer lifetime.
- Unique selectivity for toxic dioxin and furan congeners allows.

ID	df	Temp. Range	10 m	40 m	60 m
0.18 mm	0.18 µm	20 to 320/340 °C	–	227-36374-01	–
0.25 mm	0.25 µm	20 to 320/340 °C	–	–	227-36374-02

SH-Mineral Oil

- Application specific columns meet DIN EN ISO 9377-2:2000 requirements.
- Optimized column dimensions for fast mineral oil screening.
- Surface linked phase guarantees long lifetime, robustness, and stability to 400 °C

ID	df	Temp. Range	30 m
0.32 mm	0.10 µm	-60 to 380/400 °C	227-36379-02
	0.15 µm	-60 to 380/400 °C	227-36379-01

SH-TCEP

- Highly polar phase; 1,2,3-tris [2-cyanoethoxy] propane—not bonded
- General-purpose columns, ideal for aromatics and oxygenates in gasoline.
- Similar phases: CP-TCEP, SPB-TCEP

ID	df	Temp. Range	30 m
0.25 mm	0.40 µm	0 to 135/150 °C	227-36376-01

SH-Volatiles

- Application-specific columns for volatile organic compounds.
- Can be used for alcohols and solvents.
- Low bleed - ideal for GCMS analyses.

ID	df	Temp. Range	30 m	60 m
0.25 mm	1.0 µm	-20 to 270/280 °C	227-36375-01	227-36375-02
0.32 mm	1.50 µm	-20 to 270/280 °C	–	227-36375-03

SH-Alumina BOND

- The reactivity of the aluminum oxide stationary phase is minimized to improve column response for polar unsaturates, such as dienes, and the column's sensitivity (or response) ensures linear and quantitative chromatographic analysis for these compounds.
- Highly selective for C1–C5 hydrocarbons
- Separate all saturated and unsaturated hydrocarbon isomers above ambient temperatures.

SH-Alumina BOND/Na_2SO_4

- Na_2SO_4 deactivation
- Acetylene and propadiene elute after butanes.
- Best separation for butene isomers (impurities in butene streams).
- Methyl acetylene elutes after 1,3-butadiene.
- Cyclopropane (impurity in propylene) elutes well before propylene.
- Similar phases: GS-ALUMINA, CP-Al_2O_3/Na_2SO_4, Alumina sulfate PLOT

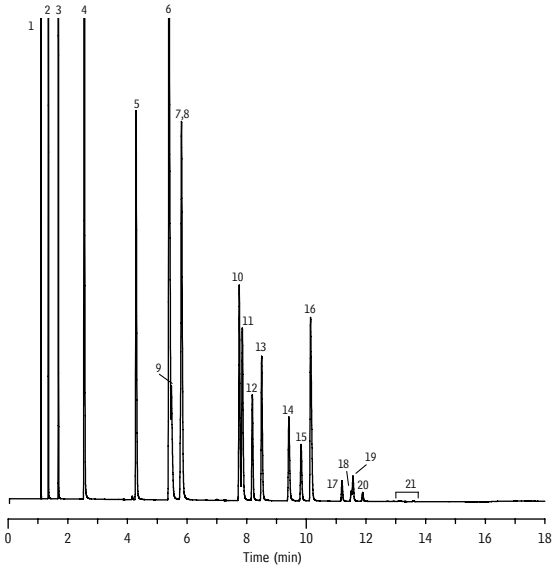
ID	df	Temp. Range	30 m	50 m
0.25 mm	4.0 µm	-60 to 200 °C	227-36328-03	–
0.32 mm	5.0 µm	-60 to 200 °C	227-36328-01	227-36328-02
0.53 mm	10 µm	-60 to 200 °C	227-36316-01	227-36301-01

SH-Alumina BOND/KCl

- KCl deactivation
- Lowest polarity alumina column in Shimadzu PLOT columns.
- Low moisture sensitivity reduces the need for frequent regeneration.
- Acetylene elutes before n-butane.
- Methyl acetylene (impurity in 1,3-butadiene) elutes before 1,3-butadiene.
- Similar phases: GS-Alumina KCl, HP-PLOT Al_2O_3 KCl, CP-Al_2O_3/KCl, Alumina chloride PLOT

ID	df	Temp. Range	30 m	50 m
0.25 mm	4.0 µm	-60 to 200 °C	227-36367-01	–
0.32 mm	5.0 µm	-60 to 200 °C	–	227-36380-01
0.53 mm	10 µm	-60 to 200 °C	–	221-76139-50

Refinery Gas



Peaks

1. methane
2. ethane
3. ethylene
4. propane
5. propylene
6. isobutane
7. *n*-butane
8. propadiene
9. acetylene
10. *trans*-2-butene
11. 1-butene
12. isobutylene
13. *cis*-2-butene
14. isopentane
15. *n*-pentane
16. 1,3-butadiene
17. *trans*-2-pentene
18. 2-methyl-2-butene
19. 1-pentene
20. *cis*-2-pentene
21. hexanes

Conditions

Column:	SH-Alumina BOND/KCl, 50 m, 0.53 mm ID, 10 µm (P/N: 221-76139-50)
Sample:	Refinery gas
Inj. Vol.:	10 µL split (split vent flow 80mL/min)
Inj. Temp:	200 °C
Oven Temp:	45 °C (hold 1 min) to 200 °C at 10 °C/min (hold 3.5 min)
Carrier Gas:	Hydrogen, constant pressure, 8.0 psi, linear velocity 74 cm/sec. at 45 °C
Detector:	FID, 200 °C

SH-Alumina BOND/CFC

- Highly selective for C1–C5 hydrocarbons and separate all saturated and unsaturated hydrocarbon isomers above ambient temperatures.
- Improved inertness for chlorofluorocarbon (CFC) compounds.
- Highly selective alumina-based column, separates most CFCs.

ID	df	Temp. Range	30 m
0.53 mm	10 µm	-60 to 200 °C	227-36369-01

SH-Alumina BOND/MAPD

- Optimized deactivation produces maximum response when analyzing trace levels of acetylene, methyl acetylene, and propadiene.
- Extended temperature range up to 250 °C for fast elution of high molecular weight (HMW) hydrocarbons and accelerated column regeneration following exposure to water.

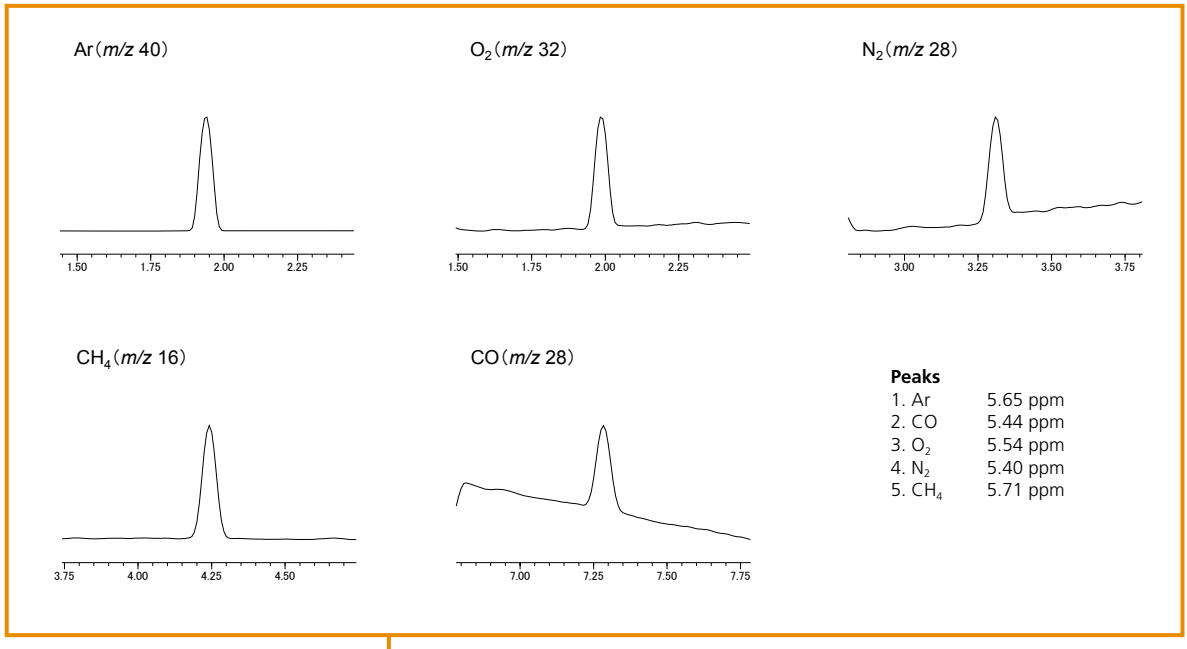
ID	df	Temp. Range	50 m
0.53 mm	10 µm	-60 to 250 °C	227-36358-01

SH-Msieve 5A

- Stationary phase: Molecular sieve 5A
- Easily separate permanent gases at temperatures above ambient.
- Improve accuracy with sharp, symmetrical peaks for argon, oxygen, and carbon monoxide.
- Similar phases: HP-PLOT Molesieve, CP-Molsieve 5A, Mol Sieve 5A PLOT

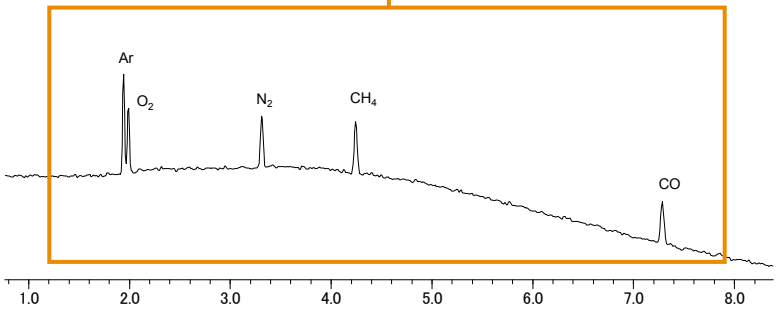
ID	df	Temp. Range	15 m	30 m
0.25 mm	20 µm	-100 to 300 °C	227-36611-01	–
0.32 mm	30 µm	-100 to 300 °C	–	227-36611-02
0.53 mm	50 µm	-100 to 300 °C	–	221-75763-30

Analysis of Inorganic Gas



Peaks

1. Ar	5.65 ppm
2. CO	5.44 ppm
3. O_2	5.54 ppm
4. N_2	5.40 ppm
5. CH_4	5.71 ppm



Conditions

Instrument:	GCMS-QP2010 Ultra
Column:	SH-Msieve 5A, 30 m, 0.32 mm ID, 30 µm (P/N: 227-36611-02)
Sample injection:	Gas sampler (1 mL loop volume) (P/N: 223-57653-91)
Inj. Mode:	Split (split ratio: 50:1)
Inj. Temp:	200 °C
Control Mode:	Pressure (100 kPa)
Carrier Gas:	Helium
Oven Temp:	35 °C (hold 2 min) to 150 °C at 10 °C/min (hold 5 min)
Detector:	MS Interface Temp: 200 °C Ion Source Temp: 200 °C Measurement Mode: Scan (m/z 10 to100) Event Time: 0.5 sec Ionization Method: EI Emission Current:150 µA

SH-Q-BOND

- Non-polar PLOT column incorporating 100% divinylbenzene.
- Excellent for analysis of C1 to C3 hydrocarbons as well as isomers and alkanes up to C12.
- High retention for CO2 simplifies gas analysis; CO2 and methane separated from O2/N2/CO. (Note: O2/N2/CO not separated at ambient temperature.)
- Use for analysis of oxygenated compounds and solvents.
- Similar phases: HP-PLOT Q, CP-PoraPLOT Q, CP-PoraBOND Q, Supel-Q PLOT

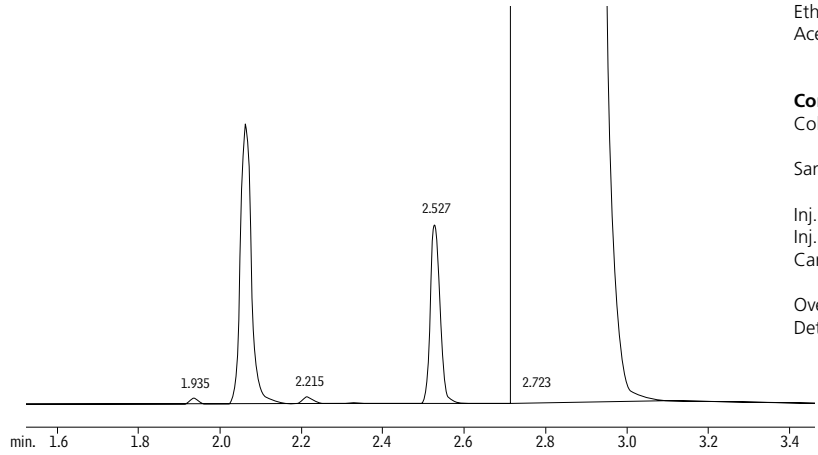
ID	df	Temp. Range	30 m
0.25 mm	8.0 µm	-60 to 280/300 °C	227-36381-01
0.32 mm	10 µm	-60 to 280/300 °C	221-75764-30
0.53 mm	20 µm	-60 to 280/300 °C	221-75765-30

SH-U-BOND

- Polar PLOT column, incorporating divinylbenzene ethylene glycol / dimethylacrylate.
- Highest polarity porous polymer column in Shimadzu PLOT columns.
- Highly inert for the analysis of polar and nonpolar compounds.
- Ideal for trace H2S, COS, and mercaptans in hydrocarbon streams.
- Similar phases: HP-PLOT U, CP-PoraPLOT U, CP-PoraBOND U

ID	df	Temp. Range	15 m	30 m
0.25 mm	8.0 µm	-60 to 190 °C	–	227-36302-03
0.32 mm	10 µm	-60 to 190 °C	–	227-36327-01
0.53 mm	20 µm	-60 to 190 °C	227-36302-02	227-36302-01

Water and Ethanol in Acetone



Peaks	**Ret. Time**
Methane	1.935
Water	2.063
Methanol	2.215
Ethanol	2.527
Acetone	2.723

Conditions

Column:	SH-Q-BOND, 30 m, 0.53 mm ID, 20 µm (P/N: 221-75765-30)
Sample:	0.5% water and ethanol in acetone
Inj. Vol.:	3 µL split (split ratio 11:1)
Inj. Temp:	250 °C
Carrier Gas:	He, constant flow, linear velocity 28.7 cm/sec. @ 200 °C
Oven Temp:	200 °C, isothermal
Detector:	TCD, 260 °C

SH-QS-BOND

- Phase: Porous divinylbenzene homopolymer
- Intermediate polarity porous polymer PLOT column incorporating low 4-vinylpyridine.
- Separates ethane, ethylene, and acetylene to baseline.
- Similar Phases: GS-Q

ID	df	Temp. Range	30 m
0.53 mm	20 µm	-60 to 250 °C	227-36366-01

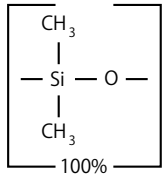
Trap columns for adhering dislodged particles from PLOT columns are also available.
Please refer to page 54.

Capillary Columns
Metal Columns

SH-MetalX-1

- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- General-purpose columns for solvent impurities, PCB congeners (e.g., Aroclor mixes), gases, natural gas odorants, sulfur compounds, essential oils, hydrocarbons, semivolatiles, pesticides, and oxygenates.
- Equivalent to USP G1, G2, G38 phases.
- 4.5" standard coil diameter.
- Similar phases: DB-PS1, UAC-1

SH-MetalX-1 Structure



ID	df	Temp. Range	7.5 m	15 m	30 m
0.25 mm	0.10 µm	-60 to 360/430 °C	–	227-36318-01	–
0.28 mm	0.10 µm	-60 to 360/430 °C	–	221-75734-15	–
	0.25 µm	-60 to 360/430 °C	–	–	227-36318-02
0.53 mm	1.50 µm	-60 to 360/430 °C	227-36363-01	–	–

SH-MetalX-1HT SimDist

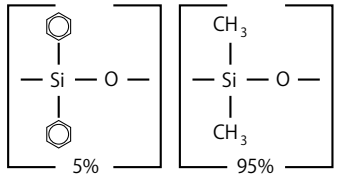
- Nonpolar phase
- Lowest bleed for longest column lifetime.
- Reliably meets all ASTM D2887, D6352, D7169, D7213, and D7500 specifications.
- 100% dimethyl polysiloxane phase allows easy comparisons to historical data.
- Individually tested for guaranteed performance.
- 7" coil diameter.
- Similar phases: DB-HT SimDis ProSteel, CP-SimDist, UltiMetal, ZB-1X SimDist

ID	df	Temp. Range	5 m
0.53 mm	0.10 µm	-60 to 430/450 °C	227-36344-01

SH-MetalX-5

- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- General-purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g., Aroclor mixes), essential oils, and semivolatiles.
- Equivalent to USP G27 and G36 phases.
- 4.5" standard coil diameter.
- Similar phases: DB-PS5, VF-5ht UltiMetal

SH-MetalX-5 Structure



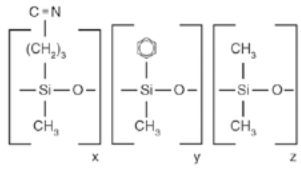
ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	-60 to 430 °C	221-75743-30

Capillary Columns
Metal Columns

SH-MetalX-1701

- Midpolarity Crossbond™ phase
- General-purpose columns for alcohols, oxygenates, PCB congeners (e.g., Aroclor mixes), and pesticides.
- Equivalent to USP G46 phase.
- 4.5" standard coil diameter.
- Similar phase: DB-PS1701

SH-MetalX-1701 Structure

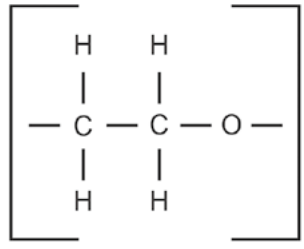


ID	df	Temp. Range	15 m
0.53 mm	1.00 µm	-20 to 260 °C	227-36336-01

SH-MetalX-WAX

- Polar phase; Crossbond™ Carbowax polyethylene glycol—provides oxidation resistance
- General-purpose columns for FAMEs, flavor compounds, essential oils, amines, solvents, xylene isomers, and U.S. EPA Method 603 (acrolein/acrylonitrile).
- Equivalent to USP G14, G15, G16, G20, and G39 phases.
- 4.5" standard coil diameter.

SH-MetalX-WAX Structure



ID	df	Temp. Range	15 m
0.53 mm	1.00 µm	40 to 240/250 °C	227-36337-01

SH-MetalX Biodiesel TG

- Fast analysis times and sharp mono-, di-, and triglyceride peaks.
- Stable at 430 °C for reliable, consistent performance.
- Similar phase: MET-Biodiesel

ID	df	Temp. Range	14 m	15 m
0.32 mm	0.10 µm	-60 to 380/430 °C	–	227-36315-02
0.53 mm	0.16 µm	-60 to 380/430 °C	227-36315-01	–

Download more application data of GC/GCMS from
http://www.shimadzu.com/an/gc-datasheet.html
http://www.shimadzu.com/an/gcms-datasheet.html

SH-MetalX-Alumina BOND / Na_2SO_4

- Can be made in small coil diameters—perfect for tight spaces.
- Similar Phases: CP-Al_2O_3/Na_2SO_4

ID	df	Temp. Range	30 m
0.53 mm	10 µm	-60 to 200 °C	227-36382-01

SH-MetalX-Q-BOND

- Phase: Nonpolar porous polymer
- Can be made in small coil diameters—perfect for tight spaces.
- Similar Phases: PoraPLOT Q Ultimetal , Quadrex PLT-Q

ID	df	Temp. Range	30 m
0.53 mm	20 µm	-60 to 280/300 °C	227-36383-01

SH-MetalX-Msieve 5A PLOT

- Efficient separation of argon/oxygen and other permanent gases, including carbon monoxide.
- Molecular sieves have very high retention, allowing separations of permanent gases at temperatures above ambient.

ID	df	Temp. Range	30 m
0.53 mm	50 µm	-100 to 300°C	227-36384-01

SH-I Guard / Retention Gap Columns

- Extend column lifetime.
- Excellent inertness—obtain lower detection limits for active compounds.
- Sharper chromatographic peaks by utilizing retention gap technology.
- Maximum temperature: 360 °C.

ID	5 m	10 m
0.25 mm	227-36303-01	227-36304-01
0.32 mm	227-36305-01	227-36306-01
0.53 mm	227-36307-01	227-36308-01

SH-Particle Trap (for PLOT columns)

- Includes two Press-Tight® connectors and a 2.5 m column.
- Protects detector and valves; connects between column and detector or valve.
- Eliminates detector spikes and scratches in valve rotors.

* For information about Press-Tight® connectors, please refer to page 52.

Description	P/N
SH-Particle Trap for 0.32 mmID PLOT Columns	227-36800-01
SH-Particle Trap for 0.53 mmID PLOT Columns	227-36800-02

SH-IP Guard Columns

- Tested with a comprehensive test mix to ensure high inertness.
- Useful for a wide range of applications.
- Use with most common solvents.
- Maximum temperature: 360 °C.

Description	ID	5 m	10 m	30 m
SH-IP Guard Column	0.10 mm	227-36321-06	–	–
	0.15 mm	227-36321-07	–	–
	0.25 mm	227-36320-01	227-36321-03	–
	0.32 mm	227-36320-02	227-36321-04	–
	0.53 mm	227-36320-03	227-36321-01	227-36321-05

SH Guard Columns Polar Deactivation

- Polar polyethylene glycol deactivation
- Tested with a comprehensive test mix to ensure high inertness.
- Polyethylene glycol deactivation layer provides optimum wettability for polar compounds.
- Minimize peak splitting when using polar solvents such as methanol or water.
- Compatible with SH-PolarWax, SH-225 and SH-2330 capillary columns.
- Maximum temperature: 280 °C.

Description	ID	5 m	30 m
SH Guard Column Polar Deactivation	0.25 mm	227-36335-01	227-36335-04
	0.32 mm	227-36335-02	–
	0.53 mm	227-36335-03	–

SH Guard Columns Base Deactivated

- Tested with a basic amine test mix.
- Excellent inertness for basic compounds.
- Recommended for use with SH-5 Amine, SH-35 Amine, SH-Volatile Amine, and SH-PolarX capillary columns.
- Batch test chromatogram included.
- Maximum temperature: 315 °C.

Chemists using guard columns in the analyses of basic compounds frequently observe peak tailing and low recovery. This happens because conventionally deactivated tubing surfaces can be adsorptive to basic compounds. Shimadzu offers base-deactivated guard columns, as well as base-deactivated inlet liners, for completely inert sample pathways.

Description	ID	5 m
SH Guard Column Base Deactivated	0.25 mm	227-36334-01
	0.32 mm	227-36334-02
	0.53 mm	227-36334-03

SH-MetalX-Siltek Guard Column

- Tested with a comprehensive test mix, to ensure high inertness.
- Revolutionary deactivation process for superior inertness.
- Analyze active samples accurately; ideal for chlorinated pesticide analysis (reduces endrin breakdown to less than 1%).
- Maximum temperature: 380 °C.

Description	ID	10 m
SH-MetalX-Siltek Guard	0.53 mm	227-36319-01

SH Guard Column Siltek Deactivation

- Revolutionary deactivation process for superior inertness.
- Maximum temperature: 380 °C

Description	ID	5 m
SH Guard Column Siltek Deactivation	0.32 mm	227-36385-01

SH Guard Column NP Deactivation

- Useful as guard columns, transfer lines, or long retention gaps
- Maximum temperature: 325 °C

Description	ID	30 m
SH Guard Column NP Deactivation	0.32 mm	227-36370-01

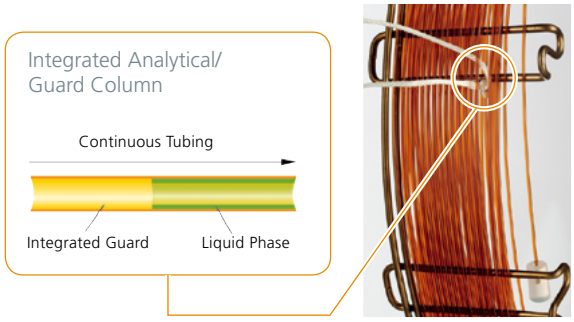
SH Guard Column Hydroguard Deactivation

- Extend analytical column lifetime by preventing degradation from harsh "steam-cleaning" water injections.
- Maximum temperature: 325 °C

Description	ID	5 m	10 m
SH Guard Column Hydroguard Deactivation	0.25 mm	227-36372-01	227-36372-02

Integrated Guard Columns

- No leaks for a more robust method.
- No column connections for easier, faster maintenance.
- No peak distortions due to connector dead volume and thermal capacity.



String indicates where the analytical column begins

Column	ID	df	Length	With 2m Integrated Guard	With 5m Integrated Guard	With 10m Integrated Guard
SH-I-5Sil MS	0.25 mm	0.25 µm	15 m	–	–	227-36386-01
			30 m	–	221-76161-30	221-76162-30
SH-I-1	0.25 mm	0.25 µm	30 m	–	221-75719-31	–
			60 m	–	227-36333-02	–
	0.53 mm	1.0 µm	30 m	–	221-75731-31	–
		1.50 µm	30 m	–	227-36333-01	–
		5.0 µm	30 m	–	221-75734-31	–
SH-5	0.25 mm	0.25 µm	30 m	–	221-76153-05	221-76153-30
		1.0 µm	30 m	–	221-76179-30	–
	0.32 mm	0.25 µm	30 m	–	221-76177-30	–
			60 m	–	221-76177-60	–
		1.0 µm	30 m	–	221-76180-30	–
	0.53 mm	5.0 µm	30 m	–	221-76154-35	–
SH-5MS	0.25 mm	0.10 µm	30 m	–	221-76189-30	–
		0.25 µm	15 m	–	221-75861-15	–
			30 m	–	221-75861-05	221-75861-10
	0.32 mm	0.25 µm	30 m	–	221-76190-30	–
SH-1301	0.53 mm	3.0 µm	30 m	–	221-76164-35	–
SH-624	0.25 mm	1.40 µm	30 m	–	221-76183-30	–
	0.32 mm	1.80 µm	30 m	–	221-76157-35	–
	0.53 mm	3.0 µm	30 m	–	221-76158-30	–
SH-1701	0.25 mm	0.25 µm	30 m	–	221-76185-30	–
SH-1MS	0.25 mm	0.10 µm	15 m	227-36346-01	–	–
SH-PolarWax	0.25 mm	0.25 µm	30 m	–	227-36360-01	–
	0.53 mm	1.0 µm	30 m	–	227-36360-02	–

Capillary Columns
Guard Columns

Columns with pre-connected guard

- Zero-dead-volume design and deactivated metal construction connector ensures optimal peak shapes.
- Since the separation column and guard column are integrated, it is possible to avoid the leakage trouble and save labor caused by manually connecting analytical column and guard column.

Column	ID	df	Length	With 5m Integrated Guard	With 10m Integrated Guard
SH-I-5HT	0.25 mm	0.25 µm	30 m	227-36345-01	–
SH-I-SVOC MS	0.25 mm	0.25 µm	15 m	–	227-36362-05
			30 m	227-36362-07	–
		0.50 µm	30 m	227-36362-09	–

Others

Low-Pressure GC (LPGC) Column Kit

- Pre-connected column by Restrictor column (5 m length of 0.18 mm ID Hydroguard tubing) and SH-5MS with integrated transfer line (15 m, 0.53 mm ID, 1 µm) plus 1 m integrated transfer lines on the outlet end (16 m total length of 0.53 mm ID tubing).
- Easily install LPGC into GC-MS or GC-MS/MS system as simple as a normal column.
- 3 times faster multiresidue pesticides analysis in foods.

Column	ID	df	Length	Low-Pressure GC (LPGC) Column Kit
Restrictor column	0.18 mm	–	5 m	227-36349-01
SH-5MS*	0.53 mm	1.00 µm	16 m	

* Column with integrated transfer line

SH Untreated Fused Silica Tubing

- Flexible polyimide coated fused silica tubing.
- Making the own column or using some kind of gas line.
- Maximum temperature: 350 °C

Description	ID	15 m
SH Untreated Fused Silica Tubing	0.53 mm	227-36371-01

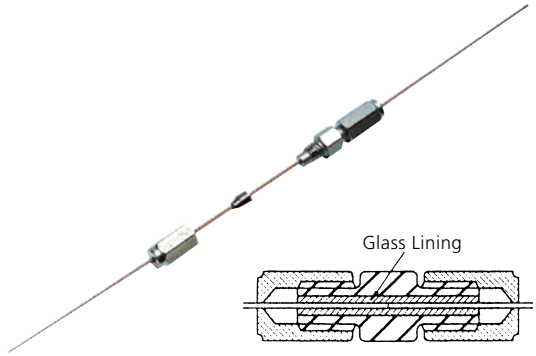
Connection Parts for Capillary Columns
Nuts and Ferrules

Diag. #	Description	Specification	P/N
1	Nut with slit (5 pcs)	Detector side of GC-2010/2010 Plus/2014/2025	221-32705-84
2	Nut without slit (10 pcs)	Injection unit side of GC-2010/2010 Plus/2014/2025	221-16325-81
	Nut without slit (5 pcs)	For GCMS	670-11009
	Graphite Ferrule 0.5 (10 pcs)	For 0.1 - 0.32 mmID columns	221-32126-05
	Graphite Ferrule 0.8 (10 pcs)	For 0.53 mmID columns	221-32126-08
3	Graphite Vespel® Ferrule (10 pcs)	For 0.1 - 0.25 mmID columns	670-15003-03
	Graphite Vespel® Ferrule (10 pcs)	For 0.32 mmID columns	670-15003-04
	Graphite Vespel® Ferrule (10 pcs)	For 0.53 mmID columns	670-15003-07
4	SilTite™ Metal Ferrule (10 pcs)	For 0.1 - 0.25 mmID columns	221-72563-04
	SilTite™ Metal Ferrule (10 pcs)	For 0.32 mmID columns	221-72563-05
	SilTite™ Metal Ferrule (10 pcs)	For 0.53 mmID columns	221-72563-08
	SilTite™ Metal Ferrule (10 pcs)	For 1/32" ID columns	221-75200-04
	SilTite™ Kit (10 pcs ferrules, 2 pcs nuts)	For 0.1 - 0.25 mmID columns	221-75200
	SilTite™ Kit (10 pcs ferrules, 2 pcs nuts)	For 0.32 mmID columns	221-75200-01
	SilTite™ Kit (10 pcs ferrules, 2 pcs nuts)	For 0.53 mmID columns	221-75200-02
	SilTite™ Kit (10 pcs ferrules, 2 pcs nuts)	For 1/32" ID columns	221-75200-03
	SilTite™ Nut (5 pcs)	-	221-75186

Glass-Lined Stainless Steel Joint

This is a compact joint to connect capillary columns. The glass lining minimizes the adsorption of sample components.
To ensure a positive connection, it is necessary to cut the ends of capillary columns properly to match each other.

Description	Applicable Capillary OD (mm)	P/N
Mini-union (with 5 pcs graphite ferrules)	0.4	670-11424-11
	0.5	670-11424-12
	0.8	670-11424-13
Graphite Ferrule (10 pcs)	0.4 - 0.5	670-11424-21
	0.8	670-11424-22



Connection Parts for Capillary Columns
Press-Tight™ Connectors

This connector is used to connect capillary columns easily by inserting the columns into the connector from both ends. When the columns are coated with polyimide resin, the connection will remain tight almost permanently and will be completely free of leakage.
Applicable to 0.35 mm to 0.8 mmOD capillary columns.

Description	P/N
Press-Tight™ Connector (5 pcs)	221-38102-91
Press-Tight™ Connector (5 pcs with 5 g polyimide resin)	221-38102-92

Main use of Press-Tight™ connectors

- Connection of broken capillary columns
  The connectors are unobtrusive.
- On-column sample injection
  Any capillary columns can be used in on-column injection mode by connecting a short wide-bore capillary columns to the inlet of the column.
- Retention gap method
  An about 2 meters long capillary tube with no stationary phase, which is connected to the head of analytical capillary column, prevents peaks from being split.
- Column conditioning
  A short capillary tube, which is connected to the outlet of the column, prevents air (oxygen) from diffusing into the column, thus preventing the deterioration of liquid phase which is kept at a high temperature.
- Stable storing of capillary columns
  Deterioration by air and contamination can be prevented by connecting the both ends with a capillary tube.

Capillary Column Accessory Set

This set contains tools and supplies which are used to ensure high analytical productivity in capillary gas chromatography.

P/N	221-38652-91

The set includes:

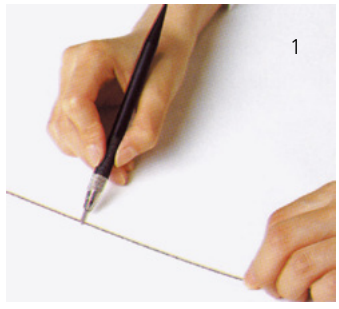
- Graphite ferrules
- Nuts
- Soap film flow meter
- Capillary tube cutter
- Spanner
- Tweezers
- Magnifying lens
- Ruler (stainless steel, 150mm)
- Accessory Box
- Pin vise
- Drill
- Press-Tight® connectors
- Polyimide resin
- Compact vise
- Adapter Socket (MM-C)
- Magnet grips

Capillary Tube Cutters

To cut a fused silica capillary tube, score the desired part with the above cutters, which have a ceramic blade, and snap at the position.

The figure on the right shows an easy-to-use pen type. A spare blade is included.

Diag. #	Description	P/N
1	Capillary Tube Cutter (pen type with 1 pc spare blade)	221-50595-91
	Capillary Tube Ceramic Cutter (3 pcs)	221-75181



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