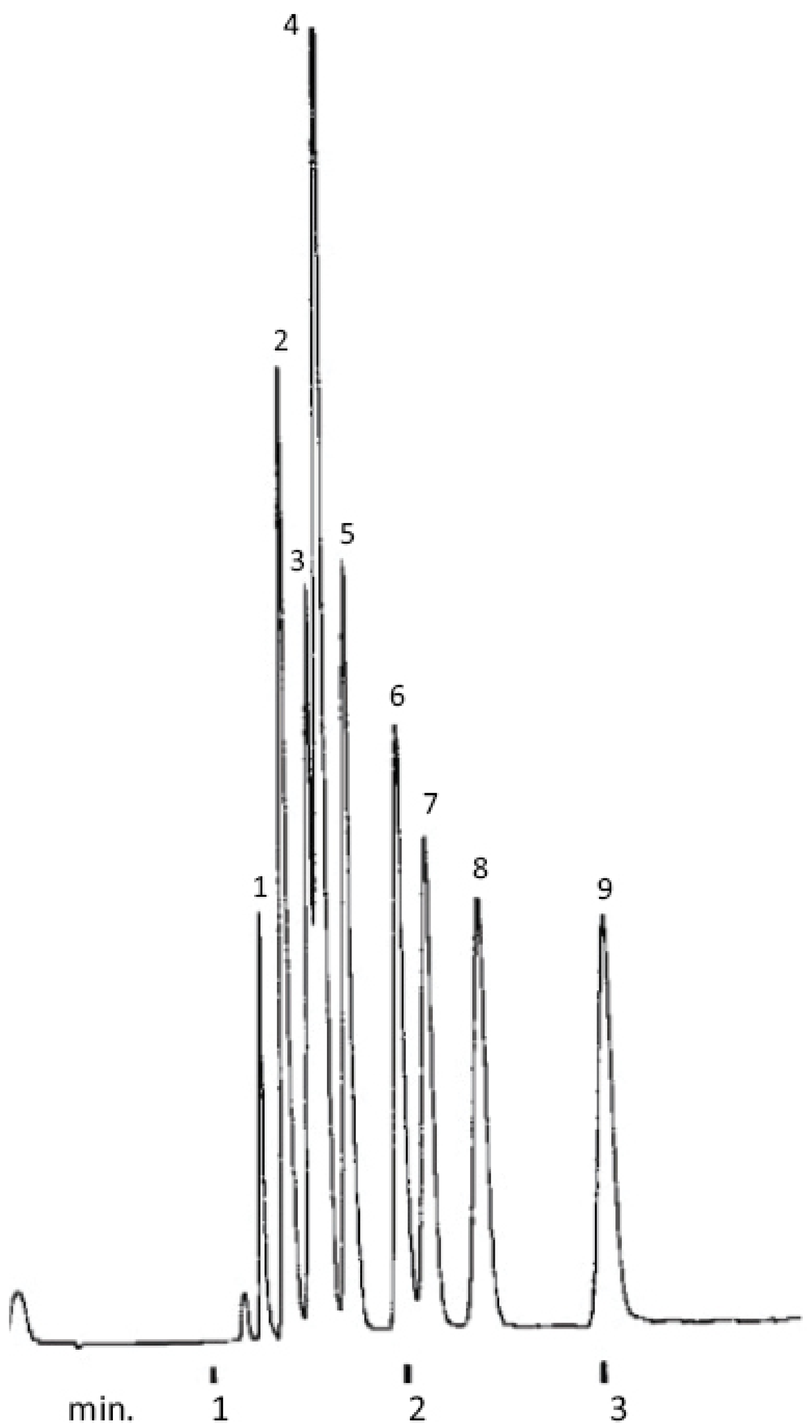
SH-PolarX

- 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	30 m	60 m
0.25 mm	0.25 µm	40 to 210/220 °C	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	–
	1.00 µm	40 to 210/220 °C	227-36298-01	–
0.53 mm	0.50 µm	40 to 210/220 °C	227-36299-01	–
	1.00 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-Silica BOND

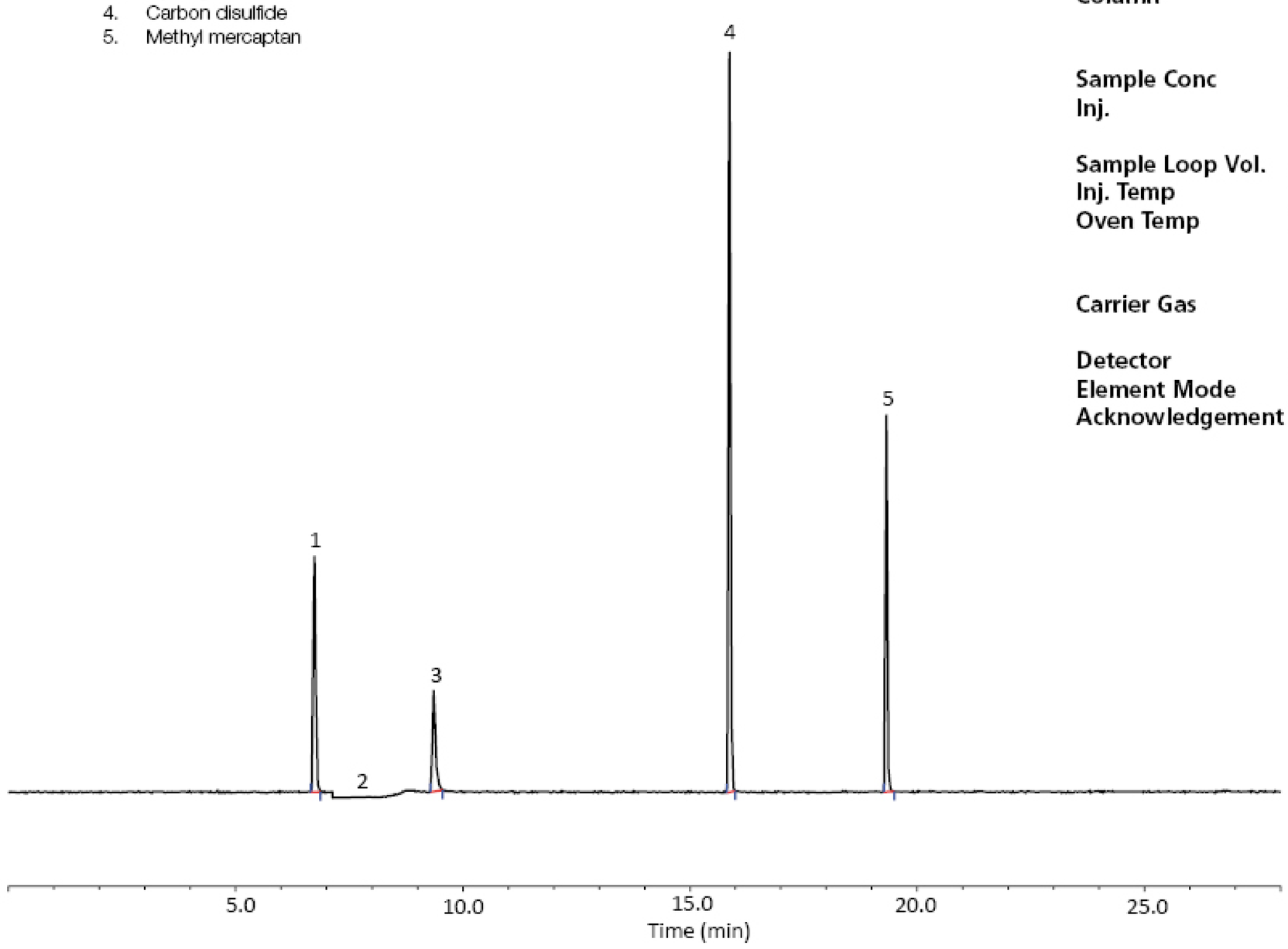
- Bonded silica stationary phase minimizes impact of water, resulting in reproducible retention times for water-containing samples.
- Versatile column ideal for analysis of light hydrocarbons, sulfur gases, halocarbons, and carbon dioxide.
- Individually QC tested with sensitive C4 probes to ensure consistent selectivity.
- Proprietary manufacturing process practically eliminates particle release, reducing downtime due to obstructed FID jets.
- Similar phases: GS-GASPRO, CP-SilicaPLOT

ID	Temp. Range	30 m
0.32 mm	-80 to 260 °C	227-36620-02

Sulfur Compounds in Propane

Peaks

1. Carbonyl sulfide
2. Propane
3. Hydrogen sulfide
4. Carbon disulfide
5. Methyl mercaptan



Conditions

Column	:	SH-Silica BOND, 30 m, 0.32 mm ID (P/N: 227-36620-02)
Sample Conc	:	6 ppm in 100% propane
Inj.	:	Sample valve, split (split flow: 40 mL/min)
Sample Loop Vol.	:	250 µL
Inj. Temp	:	250 °C
Oven Temp	:	35 °C (hold 8 min) to 200 °C at 10 °C/min (hold 5 min)
Carrier Gas	:	He, constant flow rate 2 mL/min
Detector	:	PFPD, 250 °C
Element Mode	:	sulfur
Acknowledgement	:	Chromatogram courtesy of Brix and Joeri Vercammen (Global Analyser Solutions, Belgium)

Trap columns for adhering dislodged particles from PLOT columns are also available.
Please refer to page C-45.

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-Al2O3/Na2SO4, Alumina sulfate PLOT

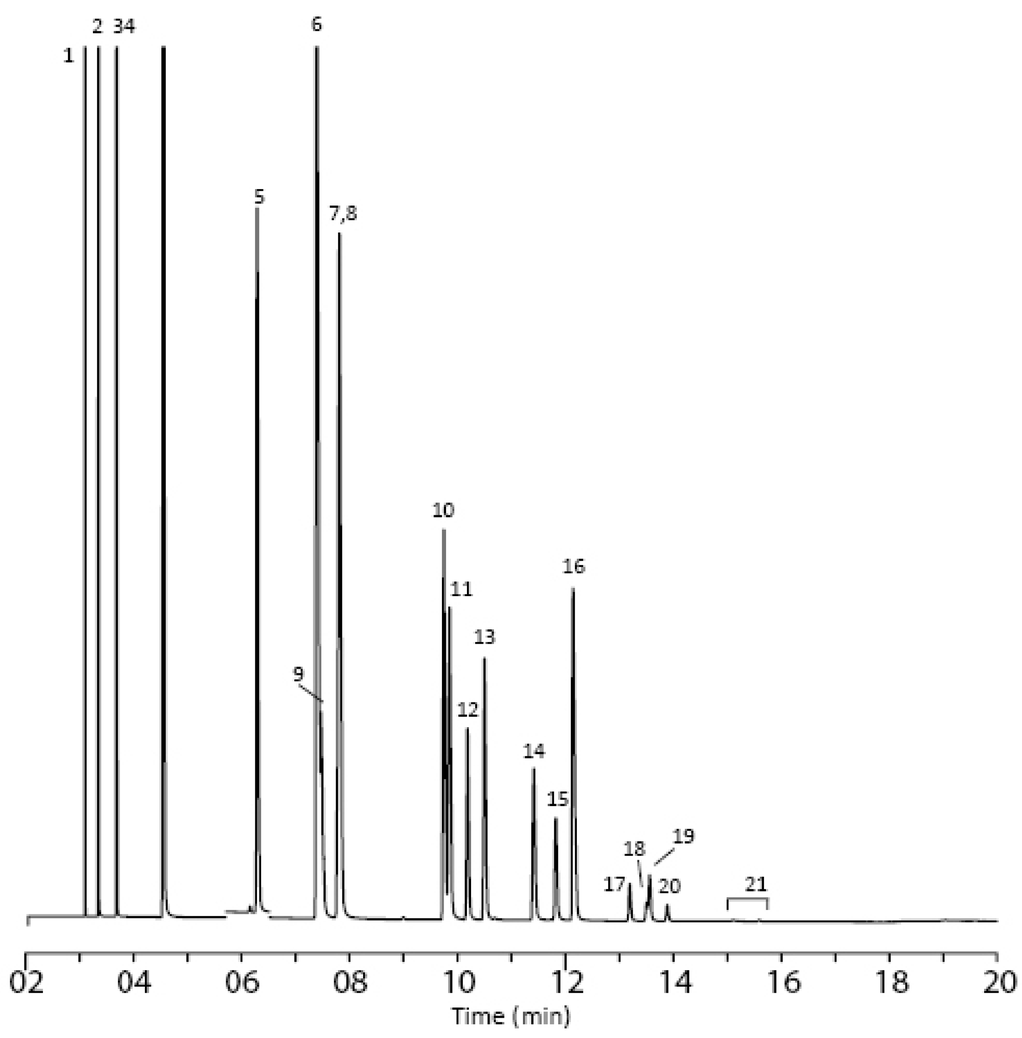
ID	df	Temp. Range	30 m
0.32 mm	5 µm	to 200 °C	227-36328-01
0.53 mm	10 µm	to 200 °C	227-36316-01
ID	**df**	**Temp. Range**	**50 m**
0.53 mm	10 µm	to 200 °C	227-36301-01

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 Al2O3 KCl, CP-Al2O3/KCl, Alumina chloride PLOT

ID	df	Temp. Range	50 m
0.53 mm	10 µm	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

Capillary Columns

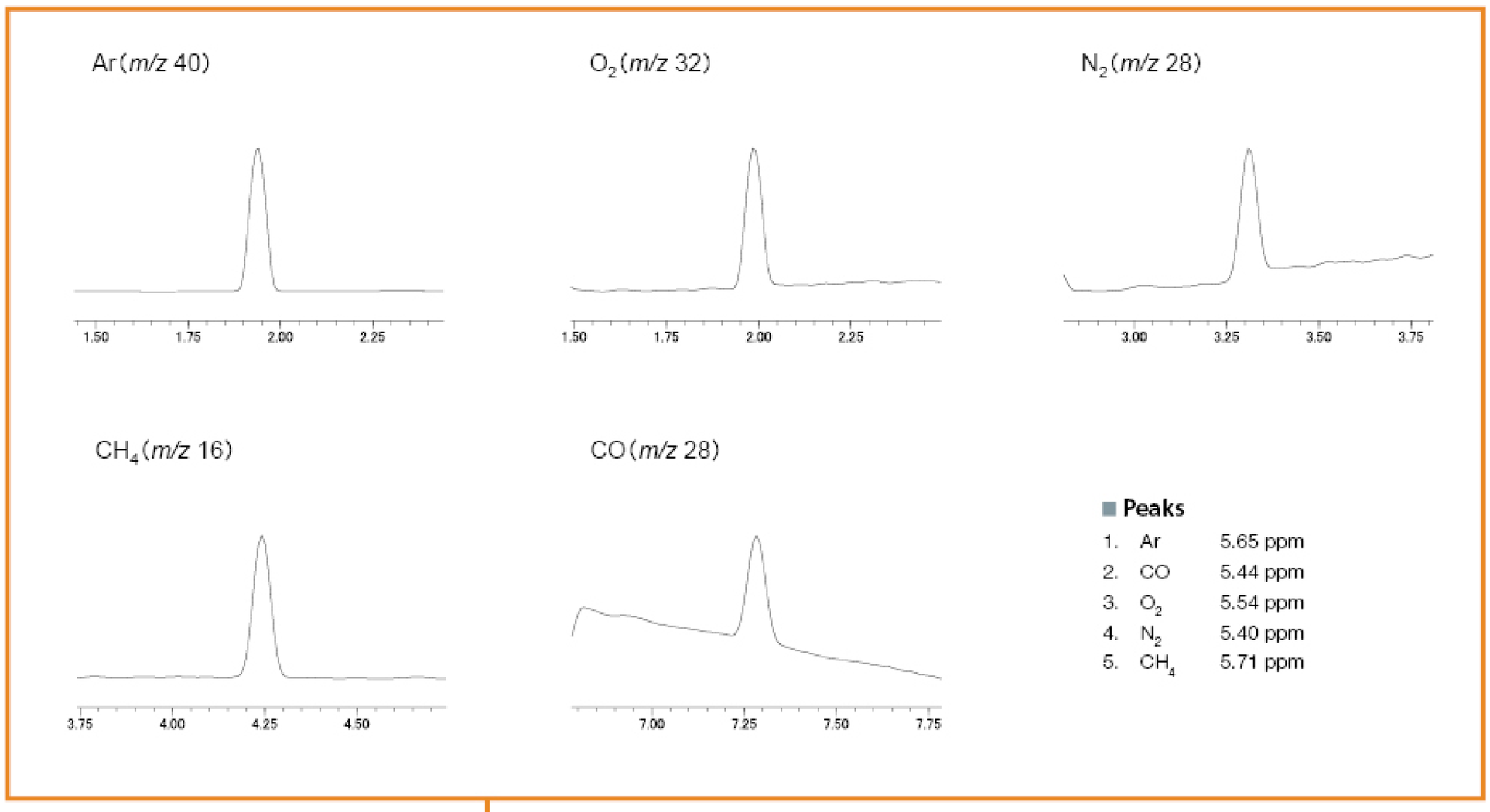
PLOT Columns

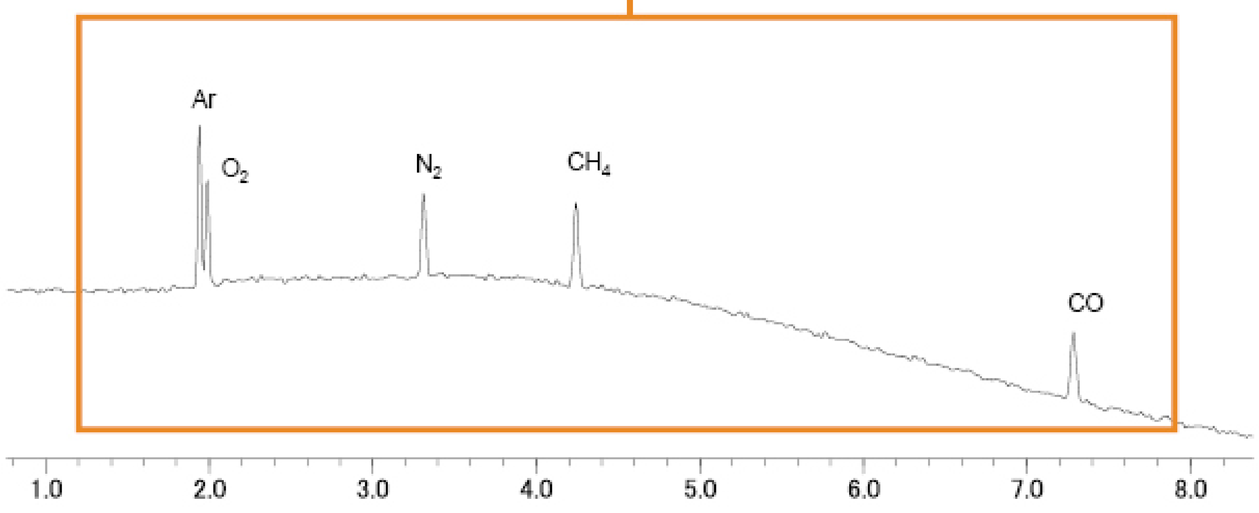
SH-Msieve 5A

- 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, Molsieve 5A PLOT

ID	df	Temp. Range	30 m
0.32 mm	30 µm	to 300 °C	227-36611-02
0.53 mm	50 µm	to 300 °C	221-75763-30

Analysis of Inorganic Gas





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 PLOT

- 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

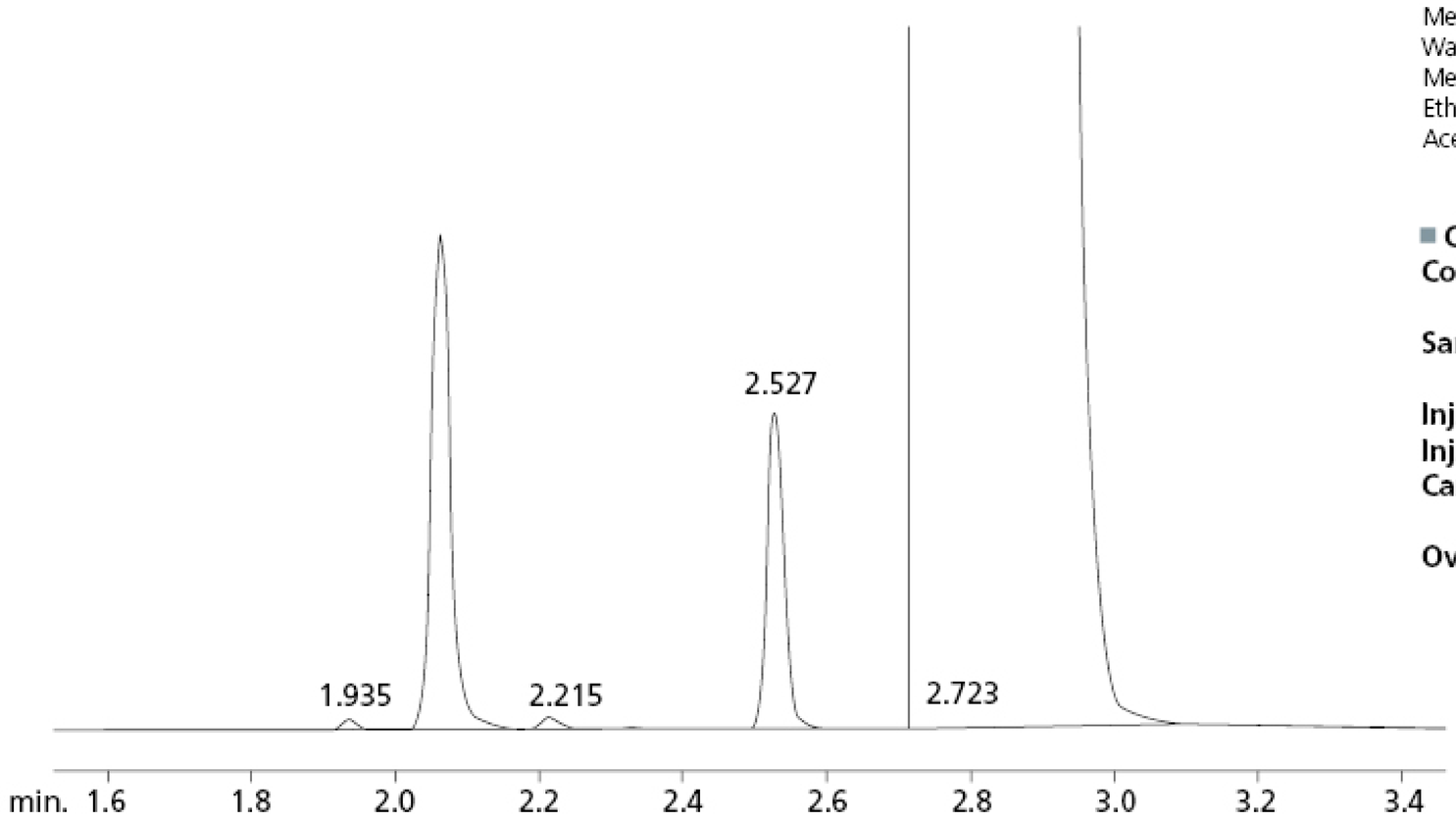
ID	df	Temp. Range	30 m
0.32 mm	10 µm	to 280/300 °C	221-75764-30
0.53 mm	20 µm	to 280/300 °C	221-75765-30

SH-U-BOND PLOT

- 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	30 m
0.32 mm	10 µm	to 190 °C	227-36327-01
0.53 mm	20 µm	to 190 °C	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

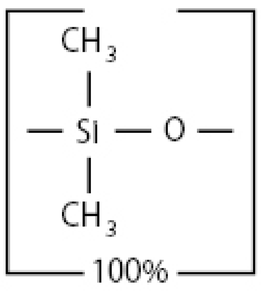
Conditions

Column : SH-Q-BOND PLOT, 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

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

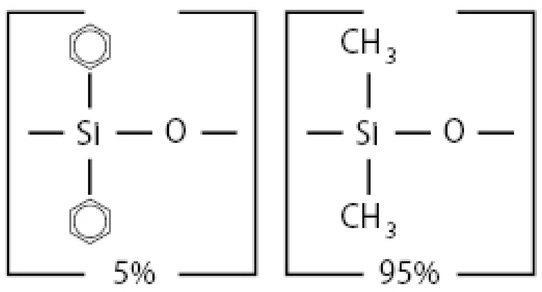


ID	df	Temp. Range	15 m
0.10 mm	0.25 µm	-60 to 430 °C	227-36318-01
0.28 mm	0.10 µm	-60 to 430 °C	221-75734-15

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 phase
- 4.5" standard coil diameter.
- Similar phases: DB-PS5, VF-5ht UltiMeta

SH-MetalX-5 Structure



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

SH-MetalX-1701 (Siltek-treated stainless steel)

- 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(s): DB-PS1701

ID	df	Temp. Range	15 m
0.53 mm	1.00 µm	-20 to 260 °C	227-36334-01

SH-MetalX-WAX (Siltek-treated stainless steel)

- 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.
- Similar Phase(s): DB-PSWAX, UAC-CW

ID	df	Temp. Range	15 m
0.53 mm	1.00 µm	40 to 240/250 °C	227-36335-01

SH-MetalX Biodiesel TG Column (Siltek-treated stainless steel)

- Fast analysis times and sharp mono-, di-, and triglyceride peaks
- Stable at 430 °C for reliable, consistent performance

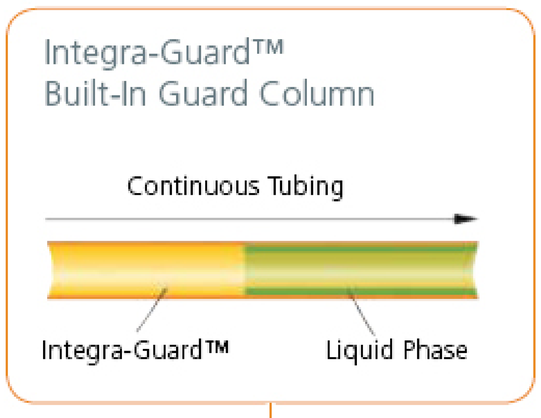
ID	df	Temp. Range	14 m
0.53 mm	0.16 µm	-60 to 430 °C	227-36315-01

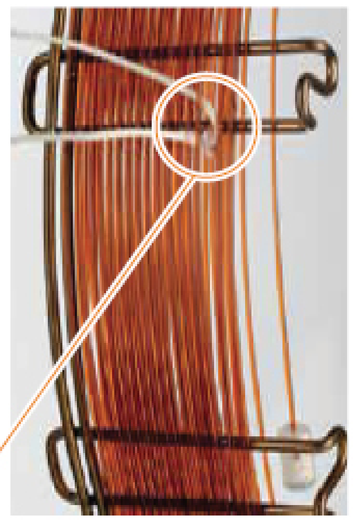
Capillary Columns

Guard Columns

Integra-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 5 m Integra-Guard™	With 10 m Integra-Guard™
SH-I-5Sil MS	0.25 mm	0.25 µm	30 m	221-76161-30	221-76162-30
SH-1	0.25 mm	0.25 µm	30 m	221-75719-31	–
	0.53 mm	1.00 µm	30 m	221-75731-31	–
	0.53 mm	1.50 µm	30 m	227-36333-01	–
	0.53 mm	5.00 µm	30 m	221-75734-31	–
SH-5	0.25 mm	0.25 µm	30 m	221-76153-05	221-76153-30
	0.25 mm	1.00 µm	30 m	221-76179-30	–
	0.32 mm	0.25 µm	30 m	221-76177-30	–
	0.32 mm	0.25 µm	60 m	221-76177-60	–
	0.32 mm	1.00 µm	30 m	221-76180-30	–
	0.53 mm	5.00 µm	30 m	221-76154-35	–
SH-5MS	0.25 mm	0.10 µm	30 m	221-76189-30	–
	0.25 mm	0.25 µm	15 m	221-75861-15	–
	0.25 mm	0.25 µm	30 m	221-75861-05	221-75861-10
	0.32 mm	0.25 µm	30 m	221-76190-30	–
SH-1301	0.53 mm	3.00 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	3.00 µm	30 m	221-76158-30	–
SH-1701	0.25 mm	0.25 µm	30 m	221-76185-30	–

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 IP Guard Column

- Tested with a comprehensive test mix to ensure high inertness.
- Useful for a wide range of applications.
- Use with most common solvents.
- Maximum temperature: 325 °C.

ID	OD	5 m	10 m
0.25 mm	0.37 mm	227-36320-01	227-36321-03
0.32 mm	0.45 mm	227-36320-02	227-36321-04
0.53 mm	0.69 mm	227-36320-03	227-36321-01

SH-MetalX-Siltek Guard Column

- Useful for a wide range of applications.
- Compatible with most common solvents.
- Specially tested with a Florida TRPH test mix.
- Guard column for most non-polar to intermediate polarity MetalX GC capillary columns.
- Maximum temperature: 325 °C.

ID	10 m
0.53 mm	227-36319-01

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.

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

Capillary Columns

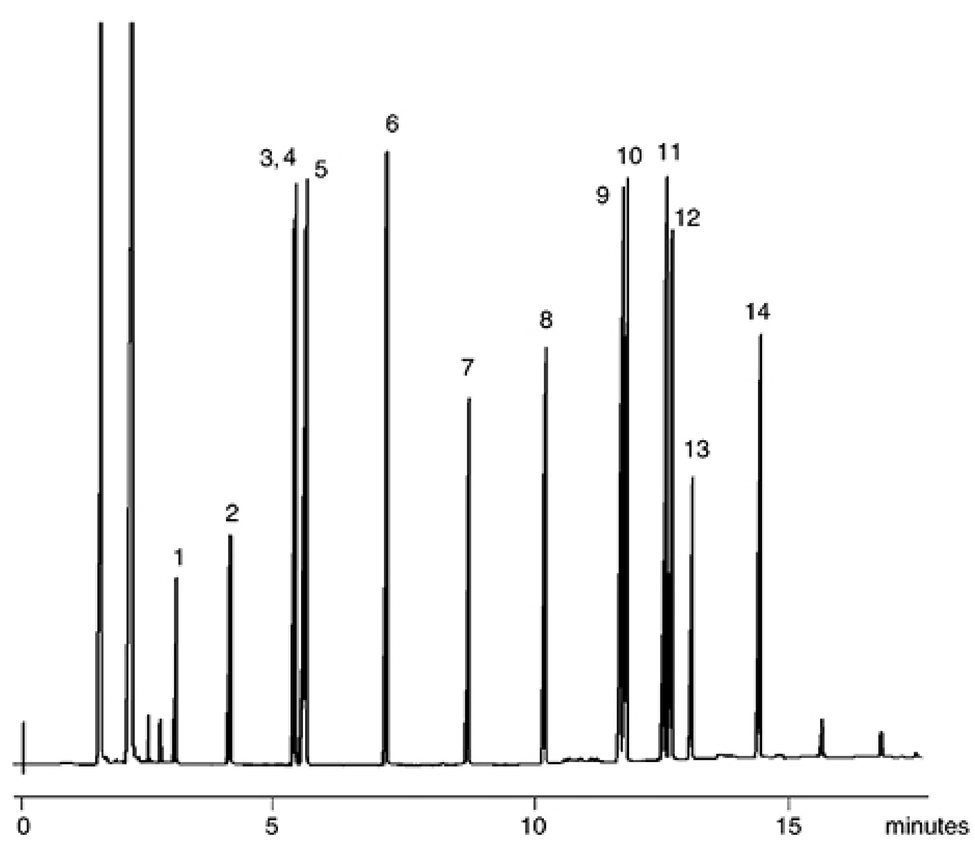
General purpose

- **CBP-1: 100% Dimethyl Polysiloxane;**
  Classic Crosslinked Dimethyl Polysiloxane Technology

- Excellent general purpose non-polar GC column
- Suitable for all routine analyses
- 320 – 340 °C upper temperature limit – dependent on film thickness

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.22	0.25	25	-60 to 320/340	221-28635-25
0.22	0.25	50	-60 to 320/340	221-28635-50
0.10	0.1	12	-60 to 320/340	221-28651-12
0.32	0.5	25	-60 to 320/340	221-28639-25
0.32	0.5	50	-60 to 320/340	221-28639-50
0.53	1.0	12	-60 to 320/340	221-28647-12
0.53	1.0	25	-60 to 320/340	221-28647-25
0.53	5.0	12	-60 to 320/340	221-28648-12
0.53	5.0	25	-60 to 320/340	221-28648-25
0.53	5.0	50	-60 to 320/340	221-28648-50

Analysis of Dimethyl Esters of Dicarboxylic Acids on CBP-1



Column : CBP1-M25-025 (M = 0.22 mm ID)
Shimadzu P/N : 221-28635-25

Components

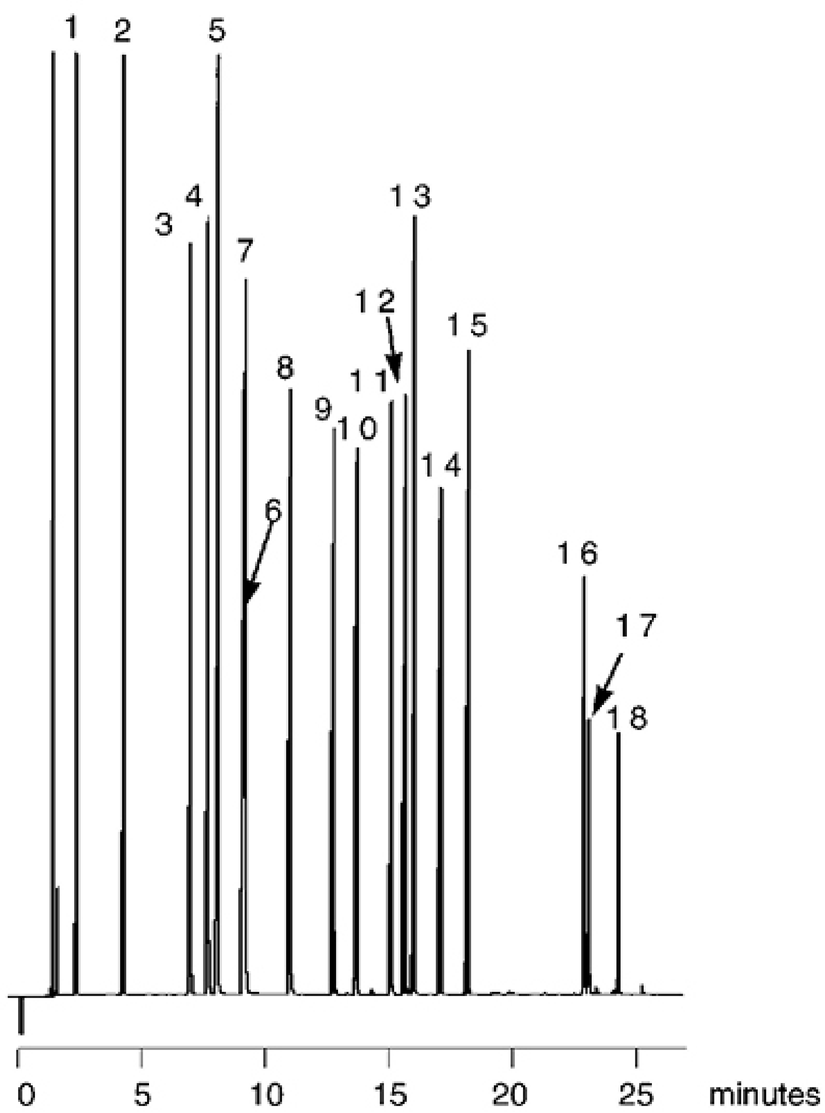
1. Dimethyl Oxalate
2. Dimethyl Malonate
3. Dimethyl Fumarate
4. Dimethyl Succinate
5. Dimethyl Maleate
6. Dimethyl Glutarate
7. Dimethyl Adipate
8. Dimethyl Pimelate
9. Dimethyl Suberate
10. Dimethyl Phthalate
11. Dimethyl Terephthalate
12. Dimethyl iso-Phthalate
13. Dimethyl Azelate
14. Dimethyl Sebacate

CBP-5: 5% phenyl / 95% Dimethyl Polysiloxane

- Ideal general purpose non-polar column
- Excellent inertness
- Good thermal stability

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.22	0.25	25	-60 to 320/340	221-28636-25
0.22	0.25	50	-60 to 320/340	221-28636-50
0.32	0.5	25	-60 to 320/340	221-28641-25
0.32	0.5	50	-60 to 280/340	221-28641-50

Analysis of Substituted Aromatics on CBP-5



Column : CBP5-M25-025
Shimadzu P/N : 221-28636-25

Components

1. Benzene
2. Toluene
3. Chlorobenzene
4. Ethylbenzene
5. m, p-Xylene
6. o-Xylene
7. Styrene
8. iso Propylbenzene
9. n-Propylbenzene
10. 1,3,5-Trimethylbenzene
11. 1,2,4-Trimethylbenzene
12. m-Dichlorobenzene
13. ec-Butylbenzene, p-Dichlorobenzene
14. o-Dichlorobenzene
15. Butyl-benzene
16. 1,2,4 - Trichlorobenzene
17. Napthalene
18. Hexachlorobutadine

Capillary Columns

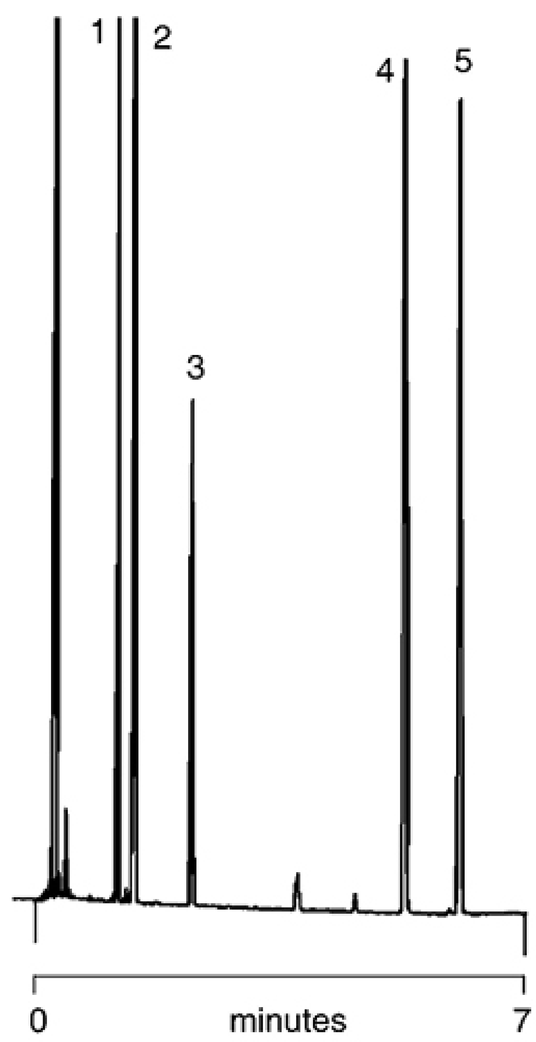
General purpose

CBP-10: 14% Cyanopropylphenyl Polysiloxane

- Used for organochlorine pesticides analysis
- Bonded and crossed-linked
- Able to be solvent rinsed

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.1	0.1	12	-20 to 280/300	221-28652-12
0.22	0.25	25	-20 to 280/300	221-28637-25
0.22	0.25	50	-20 to 280/300	221-28637-50
0.32	0.50	25	-20 to 280/300	221-28643-25
0.32	0.50	50	-20 to 280/300	221-28643-50
0.53	1.0	12	-20 to 260/280	221-28649-12
0.53	1.0	25	-20 to 260/280	221-28649-25

Analysis of Haloethers on CBP-10



Column : CBP10-W12-100
Shimadzu P/N : 221-28649-12

Components

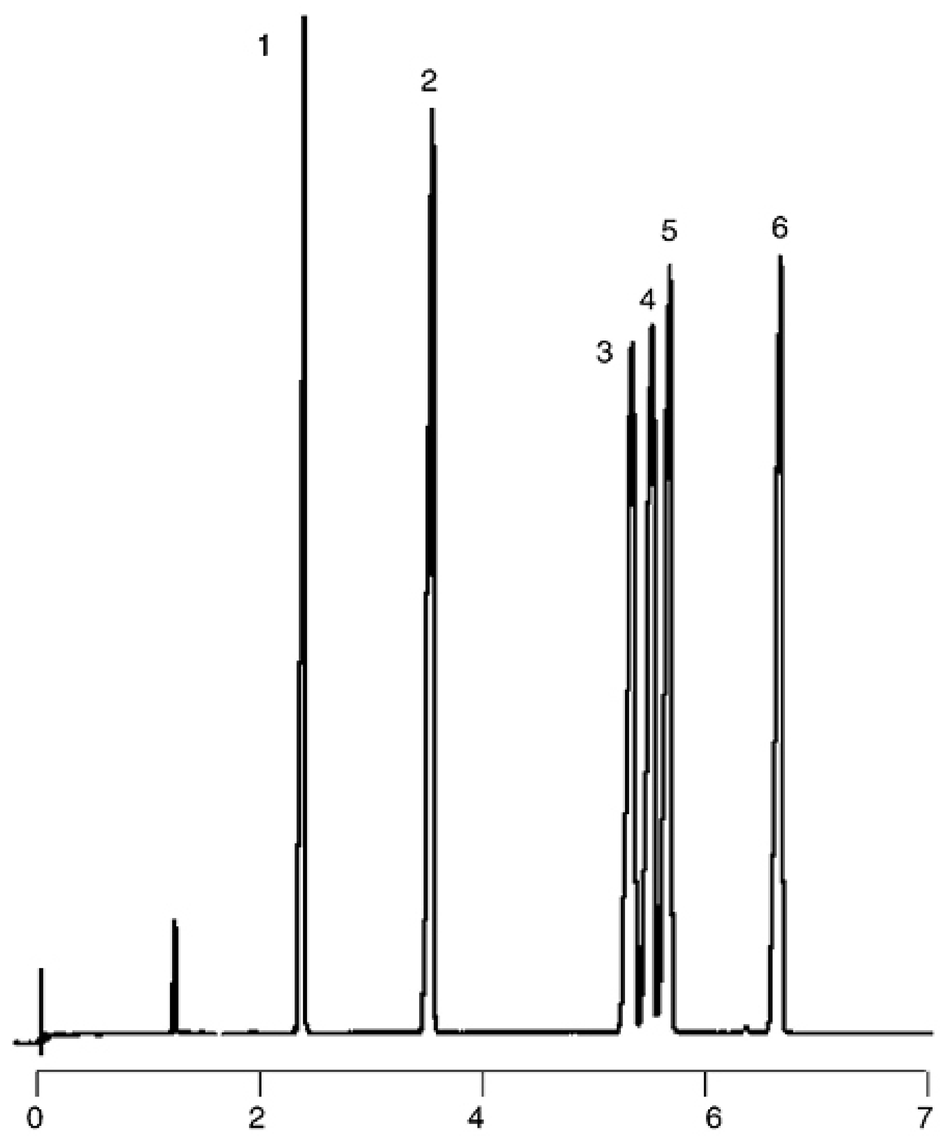
1. Bis (2-chloroethyl) ether
2. Bis (2-chloroisopropyl) ether
3. Bis (2-chloroethoxy) methane
4. 4-Chlorophenyl ether
5. 4-Bromophenyl ether

CBP-20: Bonded Polyethylene Glycol (Wax)

- Industry standard wax column
- Low bleed
- Polar phase suitable for hydrogen bonding analytes

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.22	0.25	25	20 to 260/280	221-28638-25
0.22	0.25	50	20 to 260/280	221-28638-50
0.32	0.5	25	20 to 260/280	221-28645-25
0.32	0.5	50	20 to 260/280	221-28645-50
0.53	1.0	12	20 to 260/280	221-28650-12
0.53	1.0	25	20 to 260/280	221-28650-25

Analysis of Aromatic Pollutants in Water on CBP-20



Column : CBP20-W25-100
Shimadzu P/N : 221-28650-25

Components

1. Benzene
2. Toluene
3. Ethylbenzene
4. p-Xylene
5. m-Xylene
6. o-Xylene

Capillary Columns

General purpose

CBP1-PONA

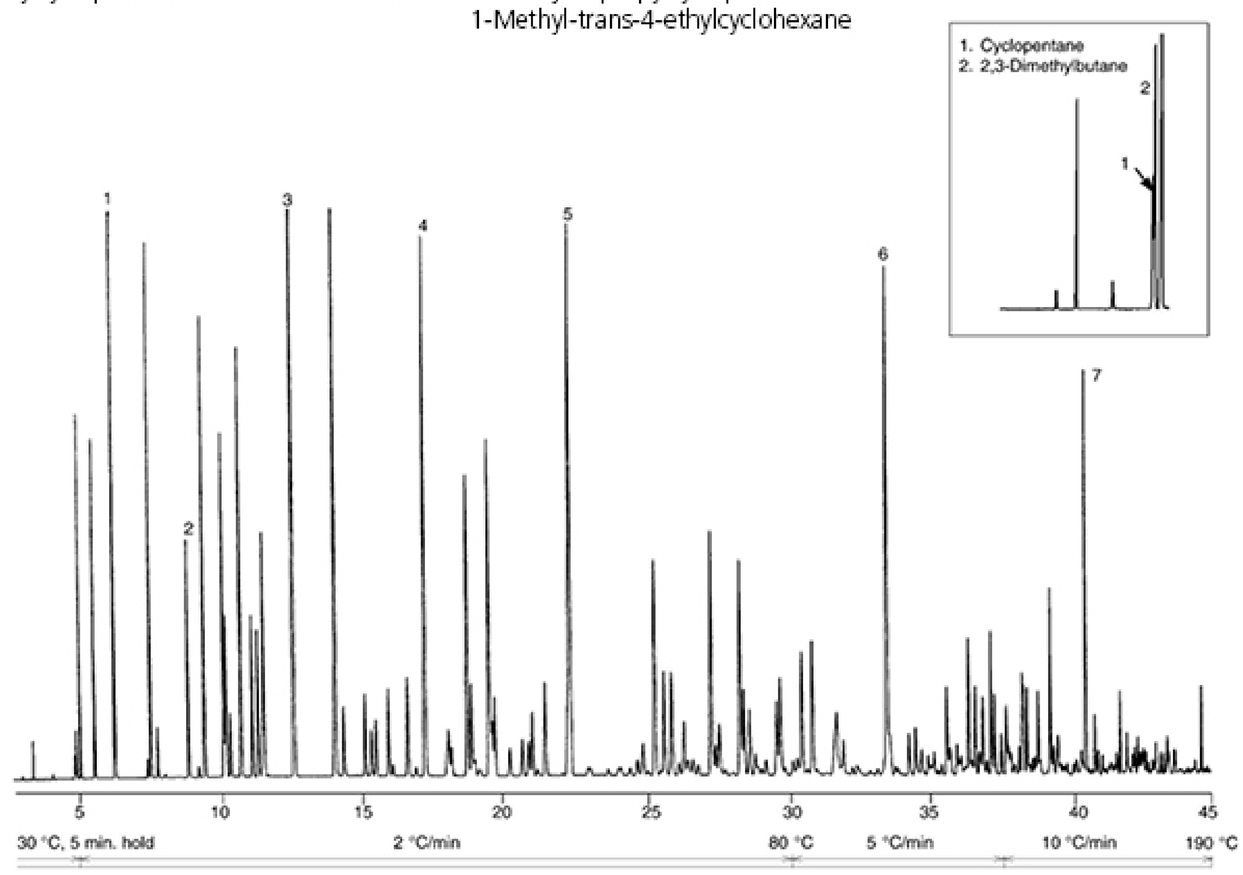
- Designed for the analysis of petroleum products
- Non-polar phase for PONA analysis
- Detailed hydrocarbon analysis according to ASTM (DHA-method)

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.15	0.50	50	-60 to 320/340	221-44082-50

Analysis of Gasline Range Hydrocarbons on CBP1-PONA

Components

	TIME	COMPOUND
	4.85	Toluene
	5.00	Ethylbenzene
	5.25	p-Xylene
	5.74	m-Xylene
1	6.45	o-Xylene
	7.46	2,2-Dimethylpentane
	7.60	Methylcyclopentane
	7.91	2,4-Dimethylpentane
	8.18	2,2,3-Trimethylbutane
2	8.99	Benzene
	9.35	3,3-Dimethylpentane
	9.55	Cyclohexane
	10.23	2-Methylhexane
	10.32	2,3-Dimethylpentane
	10.47	1,1-Dimethylcyclohexane
	10.83	3-Methylhexane
	11.23	1-trans-3-Dimethylcyclopentane
	11.43	1-cis-3-Dimethylcyclopentane
	11.55	3-Ethylpentane
	11.63	1-trans-2-Dimethylcyclopentane
	11.78	2,2,4-Trimethylpentane
3	12.73	n-Heptane
	14.23	Methylcyclohexane
	14.53	2,2-Dimethylhexane
	15.27	Ethylcyclopentane
	15.49	2,5-Dimethylhexane
	15.65	2,4-Dimethylhexane
	16.09	1-trans-2-cis-4-Trimethylcyclopentane
	16.24	2,3,4-Trimethylpentane
	16.78	1-trans-2-cis-3-Trimethylcyclopentane
	17.05	2,3,3-Trimethylpentane
4	17.39	Toluene
	18.27	2,3-Dimethylhexane
	18.43	2-Methyl-3-ethylpentane
	18.84	2-Methylheptane
	19.69	1-Methyl-2-ethylcyclopentane
	18.98	4-Methylheptane
	19.23	1-cis-2-cis-4-trans-Trimethylcyclopentane
	19.50	3-Methylheptane
	19.77	1-trans-4-Dimethylcyclohexane
	20.73	1-Methyl-cis-2-ethylcyclopentane
	20.86	1-Methyl-trans-3-ethylcyclopentane
	21.08	1-Methyl-cis-3-ethylcyclohexane
	21.27	1-Ethy-1-methycyclopentane
	21.53	1-trans-2-Dimethylcyclohexane
5	22.43	n-Octane
	23.05	iso-Propylcyclopentane
	24.14	2.2.5-Trimethylhexane
	24.19	2,2,4-Trimethylhexane
	24,53	2,4,4-Trimethylhexane
	24.79	2,3,5-Trimethylhexane
	25.16	2,4-Dimethylheptane
	25.41	n-Propylcyclopentane
	25.73	1-cis-2-Dimethylcyclohexane
	26.00	1,1,3-Trimethylcyclohexane
	26.25	2,5-Dimethylheptane
	26.44	3,3-Dimethylheptane
	26.58	3,5-Dimethylheptane
	26.77	4,4-Dimethylheptane
	26.94	2,3,3-Trimethylhexane
	27.43	Ethylbenzene
	27.57	1-cis-3-cis-5-Trimethylpentane
	27.69	1,1,4-Trimethylcyclohexane
	27.88	2,3,4-Trimethylhexane
	28.15	3,3,4-Trimethylhexane
	28.42	m-Xylene
	28.54	p-Xylene
	28.74	2,3-Dimethylheptane
	28.84	1-cis-2-trans-4-trans-Trimethylcyclohexane
	28.95	1-cis-2-trans-4-cis-Trimethylcyclohexane
	29.16	3,4-Dimethylheptane
	29.31	3-Methylethylhexane
	29.68	4-Methyloctane
	29.81	2-Methyloctane
	30.56	3-Methyloctane
	30.93	o-Xylene
	31.75	1-Methyl-2-propylcyclopentane and 1-Methyl-trans-4-ethylcyclohexane
	31.98	1-Methyl-cis-4-ethylcyclohexane
	32.46	3,3-Diethylpentane
	32.89	2,2,6-Trimethylheptane
	33.17	1,1,2-Trimethycyclohexane
6	33.52	n-Nonane
	34.26	iso-Propylbenzene
	34.48	tert-Butylcyclopentane
	34.68	tert-Butylbenzene
	35.57	sec-Butylcyclopentane
	36.33	3-Methylnonane
	36.56	n-Propylbenzene
	36.83	n-Propylcyclohexane
	37.12	m-Ethyltoluene
	37.24	p-Ethyltoluene
	37.64	1,3,5-Trimethylbenzene
	38.20	2-Methylnonane
	38.36	o-Ethyltoluene
	38.75	3,6-Dimethyloctane
	38.75	1,2,4-Trimethylbenzene
7	40.32	n-Decane
	40.63	1,2,3-Trimethylbenzene
	41.57	4-Methyldecane
	41.94	sec-Butylbenzene
	42.45	n-Butylbenzene
	44.54	n-Undecane



Column : CBP1-PONA
Shimadzu P/N : 221-44082-50
Detector : FID

GC Packed Columns

The Shimadzu a wide selection of packed columns that fits in most GC instruments in the market.

Some of the more commonly used columns below:

ShinCarbon ST Columns (packed & micropacked)

- Rapid separations of permanent gas/light hydrocarbon mixtures.
- Separate permanent gases, including carbon monoxide and carbon dioxide, without cryogenic cooling.
- Excellent compatibility with most GC detectors—minimal bleed, minimal baseline rise.
- Preconditioned, less than 30 minutes to stabilize.
- Maximum temperature of 280 °C/300 °C.

Molecular Sieve Columns

- Molecular sieve packed columns easily separate permanent gases at above-ambient temperatures. In addition, our molecular sieves are pre-activated and ready to use.

Micropacked GC Columns

- Higher capacity than PLOT columns.
- Increased efficiency over traditional packed columns.
- Made from inert, flexible SilcoSmooth tubing.
- Wide range of packings available.

Rt-XLSulfur Columns (packed & micropacked)

- Optimized columns for low ppbv sulfur analyses.
- Eliminate the need for PTFE tubing.
- Column and end fittings are Sulfinert treated for maximum inertness.
- Maximum temperature of 290 °C.

Porous Polymer Columns (packed)

- Available in both glass and stainless steel tubing.

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

ShinCarbon ST Columns

Analyzing the permanent gases oxygen, nitrogen, methane, carbon monoxide, and carbon dioxide has been virtually impossible for a single gas chromatography (GC) or gas-solid chromatography (GSC) column, without sub-ambient temperatures.

ShinCarbon ST material, a high surface area carbon molecular sieve (~1500 m2/g), is the ideal medium for separating gases and highly volatile compounds by GSC. A 2 m x 1 mm ID micropacked column containing ShinCarbon ST separates the permanent gases in 10 minutes, without cryogenic cooling (Figure 1).

ShinCarbon ST columns can also separate light hydrocarbon / permanent gas mixtures. Figure 2 shows an analysis of permanent gases plus acetylene, ethylene, and ethane, completed in less than 20 minutes. Natural gas components (70% methane) also are cleanly separated (Figure 3). Other potential applications for ShinCarbon ST include analyses of sulfur dioxide and Freon® fluorocarbons (Figure 4).*

** For analysis of other low molecular height sulfur compound, we recommand Rt-X2 Sulfur micropacked and packed columns or SH-Rtx-1 Capillary columns.*

Figure 1 Separate permanent gases in 10 minutes, without cryogenic cooling.

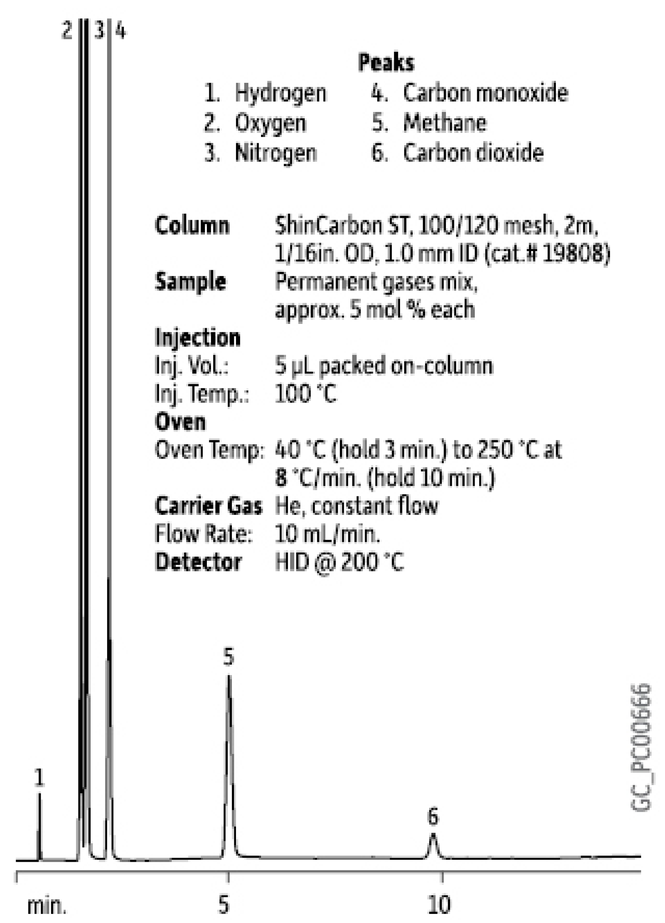


Figure 2 Rapidly analyze light hydrocarbon/permanent gas mixtures.

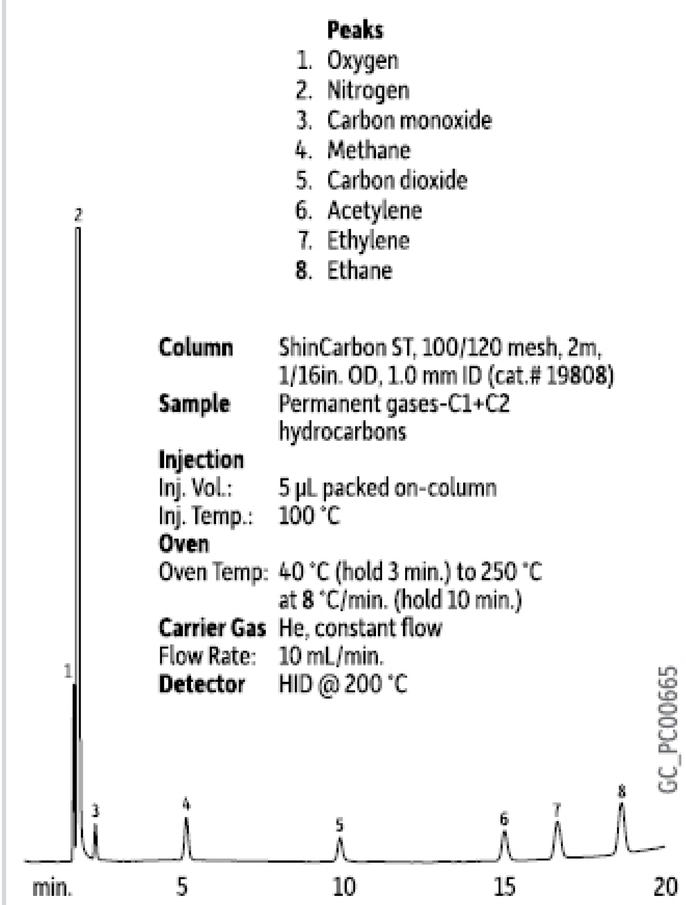
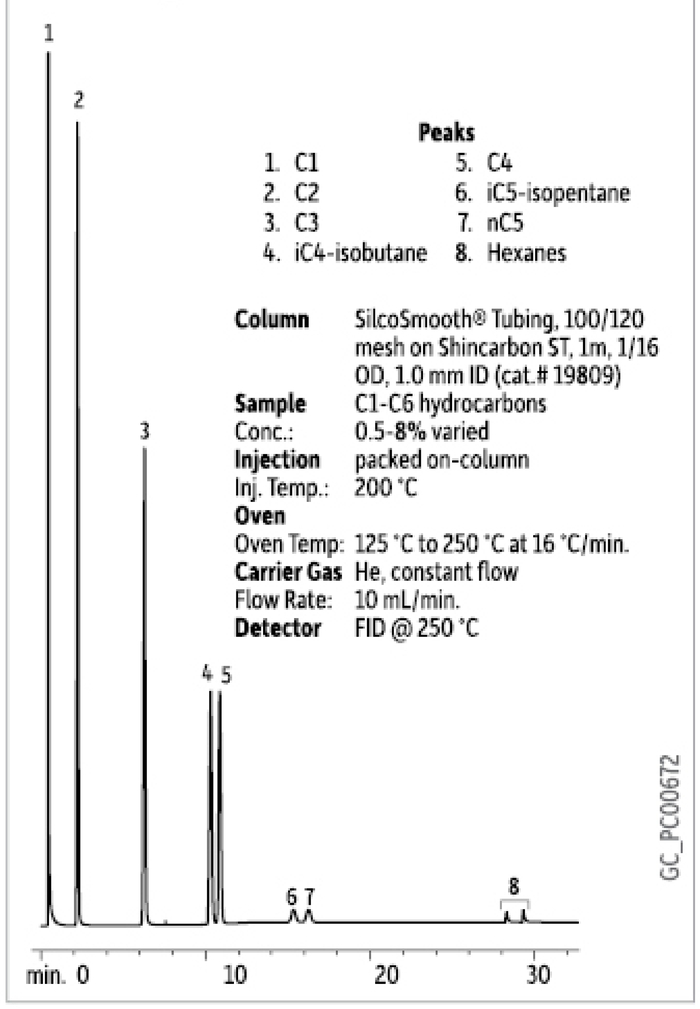


Figure 3 Separate components in natural gas.



ShinCarbon ST Columns (micropacked)

(SilcoSmooth® Stainless Steel)**

OD	ID / mm	Mesh	Length / m
1/16"	1.0	80/100 100/120	1.0
			2.0
			3.0

*** Does not include column nuts and ferrules. Optimal installation kits can be ordered separately.*

ShinCarbon ST Columns (packed)

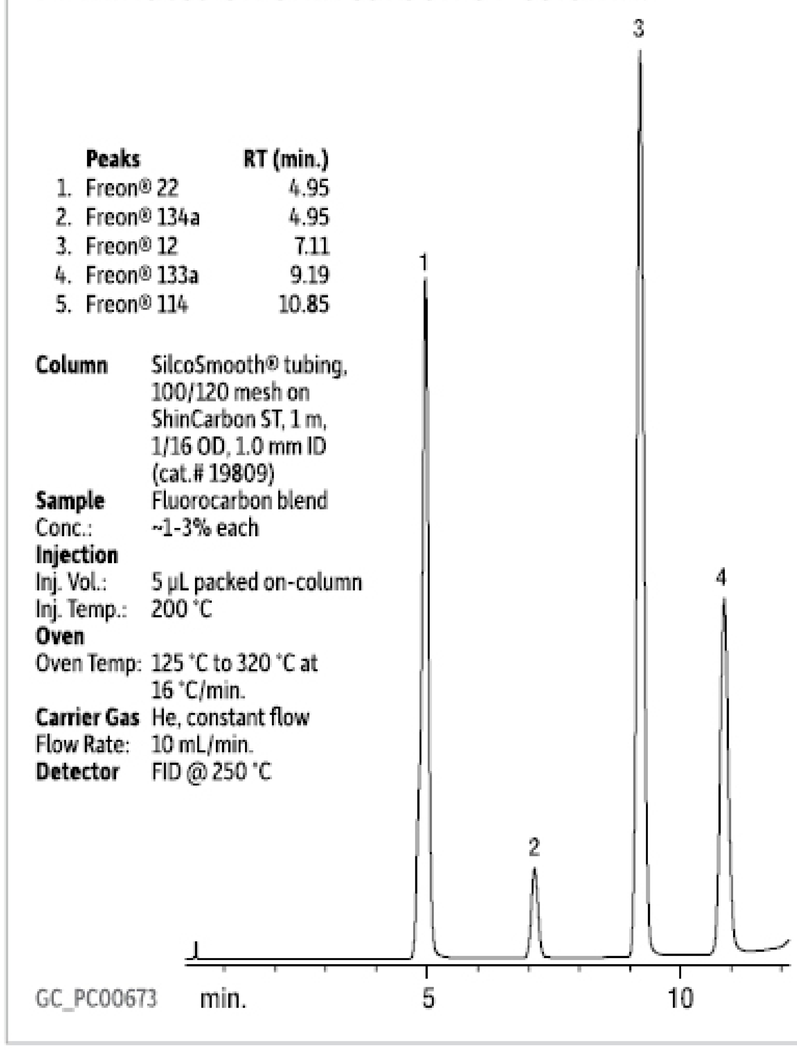
(SilcoSmooth® Stainless Steel)*

OD	ID / mm	Mesh	Length / m
1/8"	2.1	80/100 or 100/120	2.0

** Please indicate instrument configuration when ordering.*

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

Figure 4 Fluorocarbon analysis completed in 11 minutes on ShinCarbon ST column.

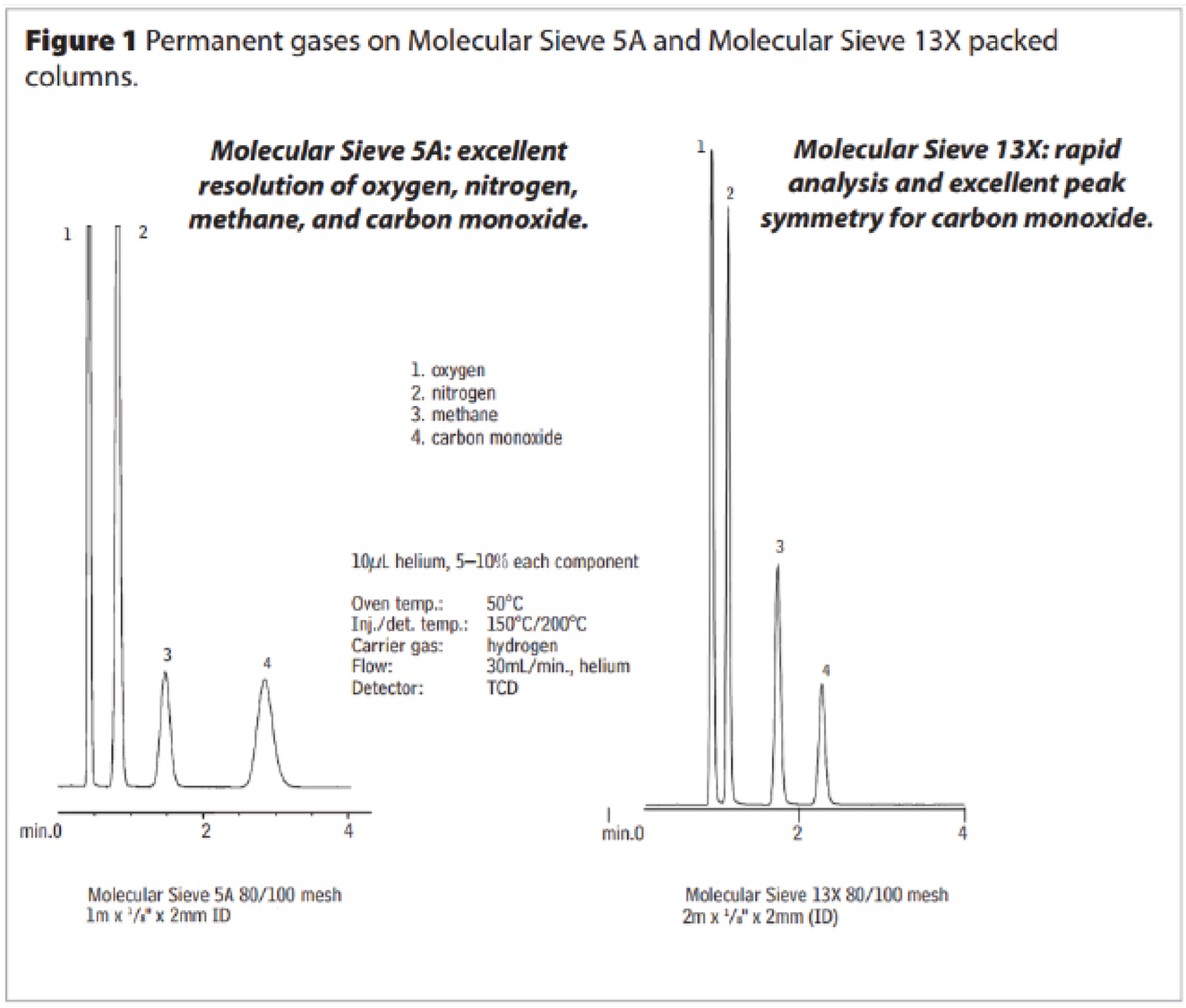


Molecular Sieve 5A / 13X

Molecular sieve packed columns easily separate permanent gases at above-ambient temperatures. The two most common molecular sieves used are 5A and 13X.

Molecular sieve 5A and 13X packings differ in pore size and composition, causing differences in retention and selectivity for many gases. The 5A packing provides greater retention, which improves the separation of argon, oxygen, and nitrogen, and is a better choice for analyzing the trace impurities in inert gases typically used in the semiconductor industry. The 13X packing often is preferred for analysis of carbon monoxide, particularly at trace concentrations, because lower retention results in sharper chromatographic peaks and improved detection limits.

Figure 1 Permanent gases on Molecular Sieve 5A and Molecular Sieve 13X packed columns.



Molecular Sieve Packed Columns

Molesieve	OD	ID / mm	Mesh	Length / m
Molesieve 5A Molesieve 13X	1/8″	2.1	60/80 80/100	1.0
				2.0
				3.0

Molecular Sieve Micropacked Columns

Molesieve	OD	ID / mm	Mesh	Length / m
Molesieve 5A Molesieve 13X	1/16″	1.0	80/100	1.0
				2.0

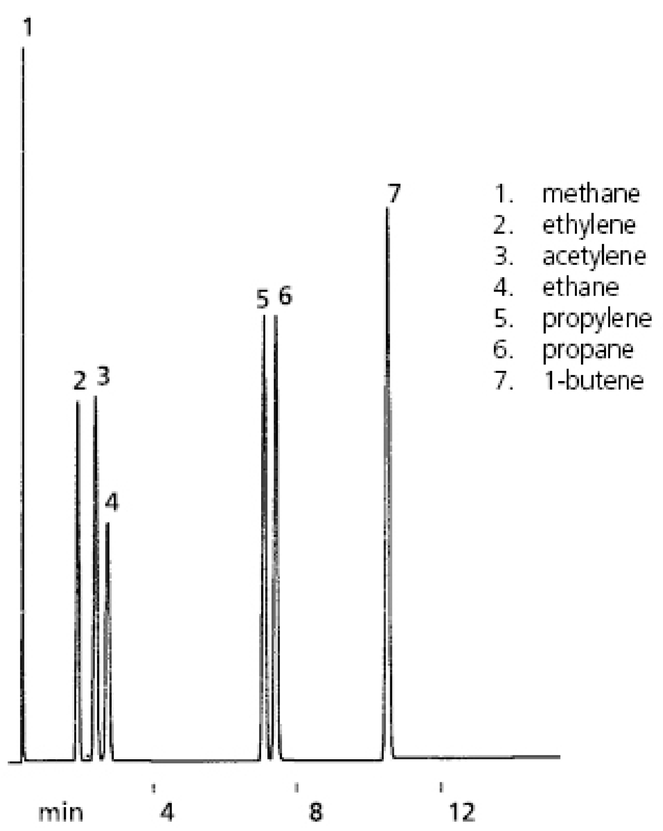
Molecular Sieve 5A and 13X are available in both stainless steel and glass column.

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

Micropacked GC Columns

Micropacked columns are highly efficient and provide good sample capacity, resulting in a powerful tool for solving many difficult application problems. The unsurpassed inertness of SilcoSmooth tubing is based on Siltek deactivation, which allows the column to be flexed and coiled without any fear of chipping or cracking the inert surface.

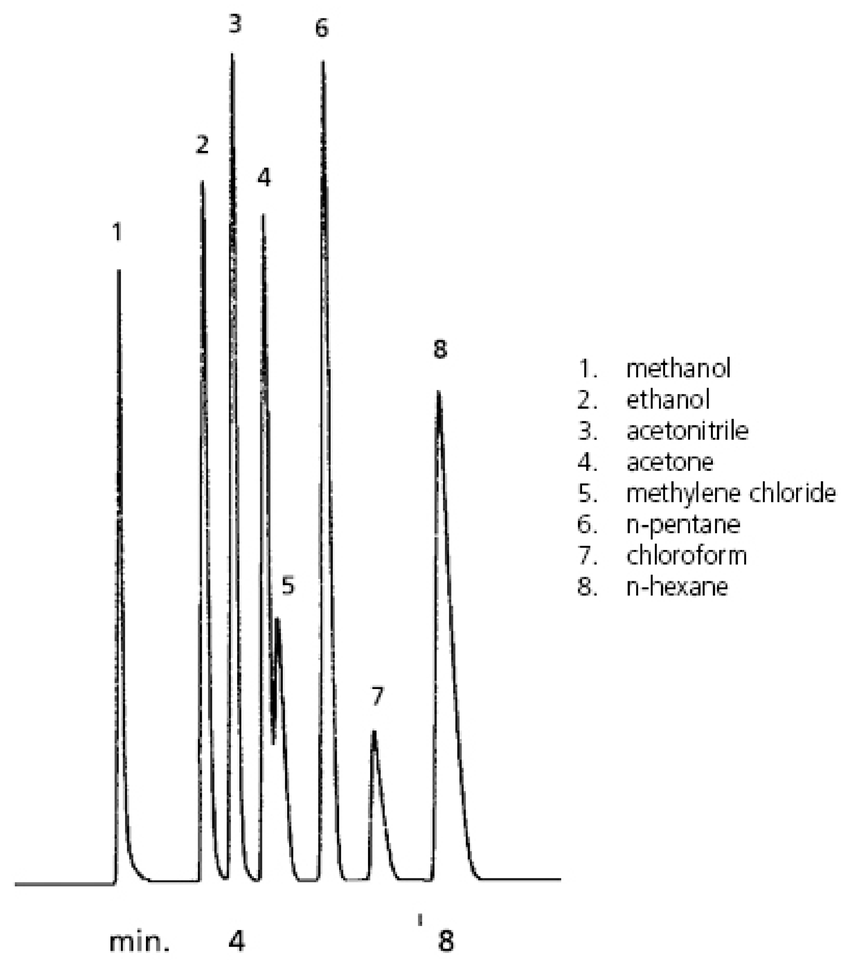
Hydrocarbon Gases
HayeSep® S
(micropacked)



2m, 0.75mm ID HayeSep S micropacked column
500µL split injection of a light hydrocarbon gas mixture

Oven temp.	:	40°C (hold 3 min.) to 150°C @ 15°C/min. (hold 5 min.)
Inj. & det. temp.	:	220 °C
Carrier gas	:	helium
Flow	:	20mL/min. set @ 40 °C
FID sensitivity	:	32 x 10-11 AFS
Split ratio:	:	10:1

Solvents
HayeSep® Q



2m, 1mm ID HayeSep® Q
1µL direct injection of a neat solvent mixture

Oven temp.	:	80°C to 180°C @ 16°C/min. (hold 5 min.)
Inj. & det. temp.	:	200 °C
Carrier gas	:	helium
Flow	:	20mL/min. set @ 40 °C
FID sensitivity	:	512 x 10-11 AFS

Types of micropacked columns available:

Mesh	Packing material
80/100	HayeSep Q
	Molesieve 5A
	Molesieve 13X
	ShinCarbon ST
100/120	HayeSep Q
	HayeSep R
	HayeSep N
	Rt-XLSulfur Micropacked Column
20% TCEP on 80/100 Chromosorb PAW	

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

Rt-XLSulfur Columns (Packed and Micropacked)

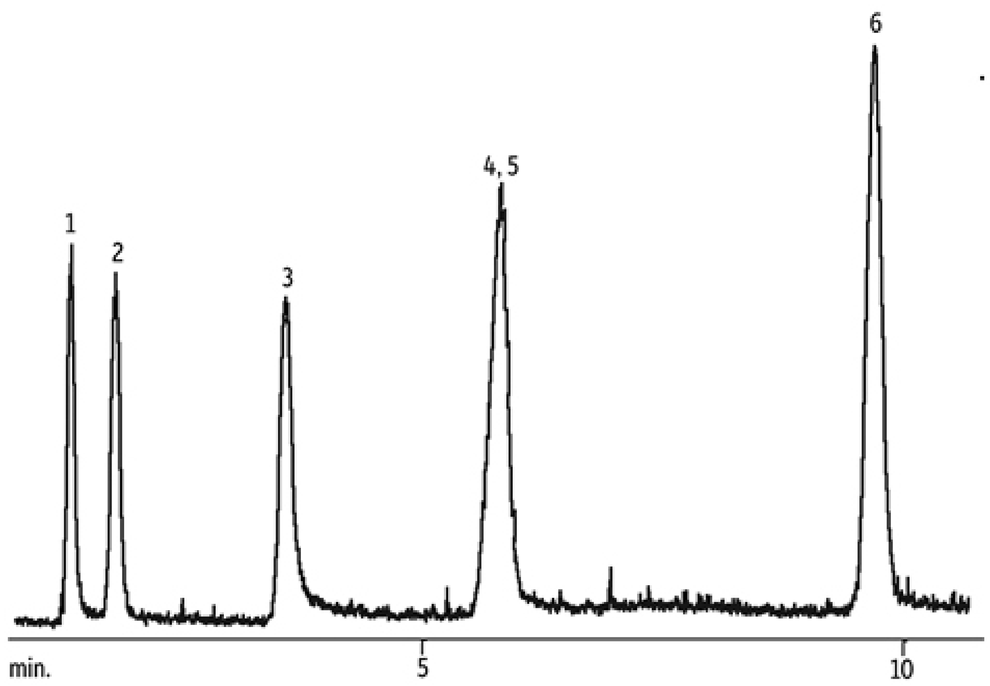
Rt-XLSulfur packed and micropacked columns are designed for ppb-level sulfur analysis. Every component of the sample pathway is treated to provide the highest degree of inertness for reactive, low-level sulfur compounds. The porous polymer phase features a unique surface modification, which results in excellent peak symmetry and thermal stability to 300 °C.

The high performance and reproducibility of the Rt-XLSulfur column enables resolution and quantitation of COS, H_2S, SO^2, CH_3SH, $(CH_3)_2S_2$ at low ppb concentrations. These sulfur compounds typically are found in pulp mill byproducts, natural gas, and petroleum products.

Features:

- Optimized columns for low pbbv sulfur analyses.
- Eliminate the need for PTFE tubing.
- Column and end-fittings are Sulfinert® treated for maximum inertness.

Figure 1 The Rt-XLSulfur column analyzes 50 ppb levels of sulfur compounds, providing low bleed and good symmetry.



Peaks

1. Hydrogen sulfide
2. Carbonyl sulfide
3. Methyl mercaptan
4. Ethyl mercaptan
5. Dimethyl sulfide
6. Dimethyl disulfide

Conditions

Column	: Rt-XLSulfur, 1 m, 0.75 mm ID
Sample conc.	: 1 mL of 50ppbv each sulfur compound
Injection	: sample valve
Oven Temp.	: 60 °C to 230 °C at 15 °C/min.
Carrier Gas	: He, constant flow
Flow Rate:	: 9 mL/min.
Detector	: SCD

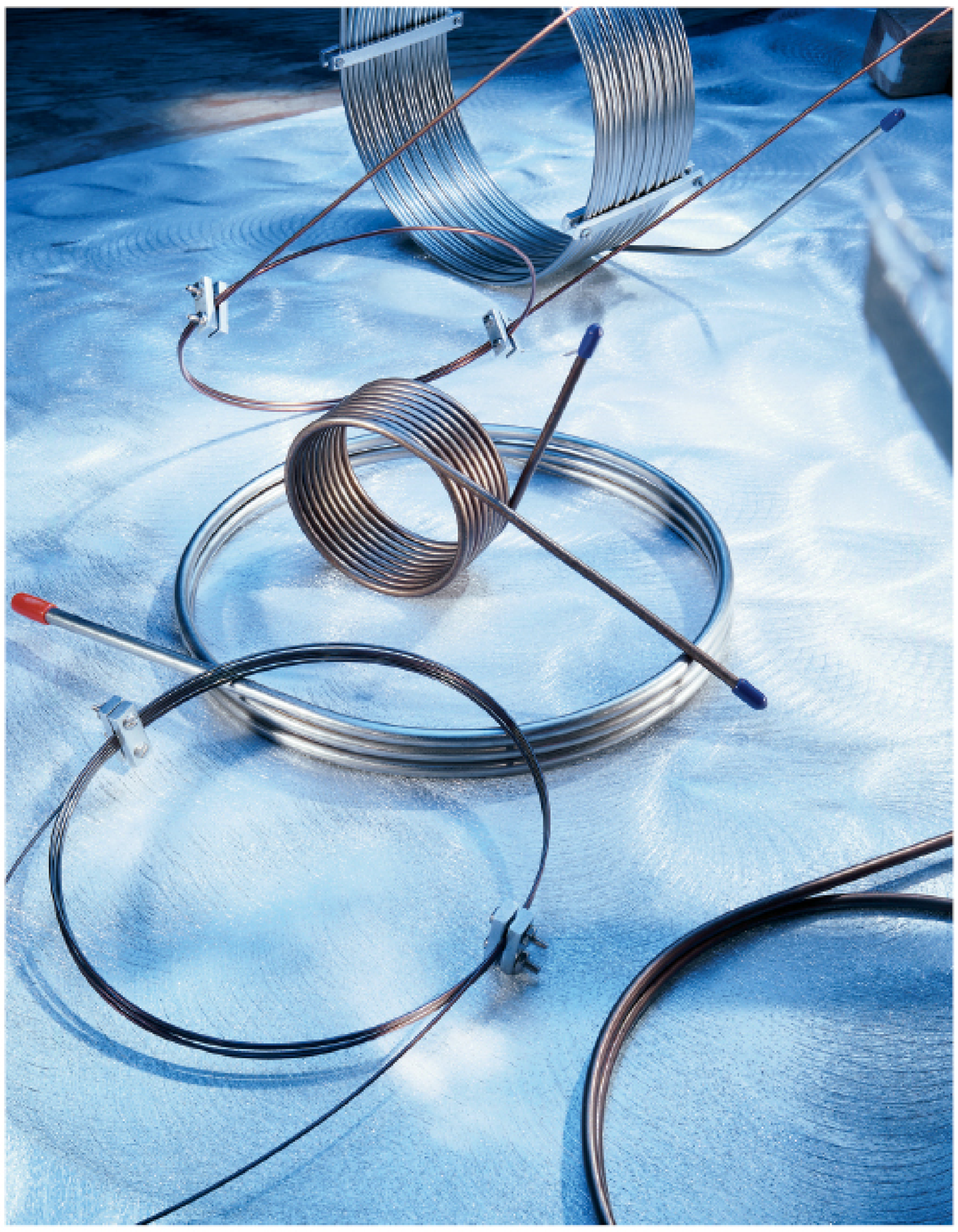
Column	OD	ID / mm	Length / m
Rt-XLSulfur Columns (packed)	1/8″	2.0	1.0
			2.0
	1/16″	3.2	1.0
			2.0
Rt-XLSulfur Columns (micropacked)	1/16″	1.0	1.0
			2.0
	0.95mm	0.75mm	1.0
			2.0

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

Porous Polymer Columns (Packed)

- **Types of packing material available:**

- Activated Charcoal
- HayeSep A
- HayeSep C
- HayeSep D
- HayeSep N
- HayeSep Q
- HayeSep T
- Porapak Q
- Porapak QS
- Porapak R
- Porapak N
- Porapak T
- Shimalite Q
- Silica Gel



Available in both glass and stainless steel tubing.

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

SAMPLE INTRODUCTION – Syringes

Shimadzu Diamond syringes are the result of technological advancements in materials, design, and engineering. Designed to meet the ever increasing levels of sensitivity required by today's analyses, Shimadzu Diamond syringes give you a new level of accuracy and precision.

LONGER LIFE

Shimadzu Diamond syringes have a longer life. The improved solvent resistance and maximized operational temperature range along with the smoothest available internal glass surface ensure you receive the longest lifetime from your Shimadzu syringe.

SUPERIOR PERFORMANCE AND ROBUSTNESS

Shimadzu Diamond syringes have superior performance and robustness with unsurpassed levels of operational strength and durability. Potential for contamination is significantly reduced by the near-zero syringe dead volume and minimized adhesive in the flow path.

REDUCED CARRYOVER

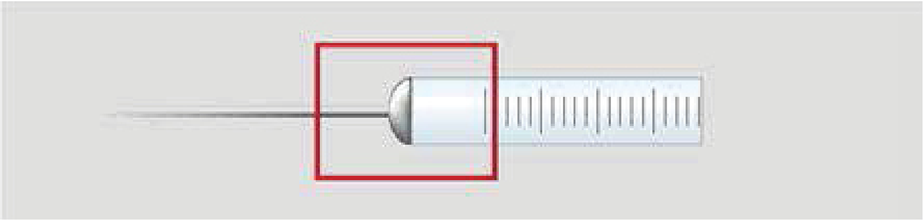
Engineering enhancements have eliminated areas where fluid can become trapped and potentially cause carryover, improving accuracy, precision and analysis results.

Syringe

Syringe Selection Guide
If a syringe is being used by hand, a manual syringe should be selected. If a syringe is installed in an AOC autosampler, then choose the appropriate syringe and volume to suit your instrument and application.

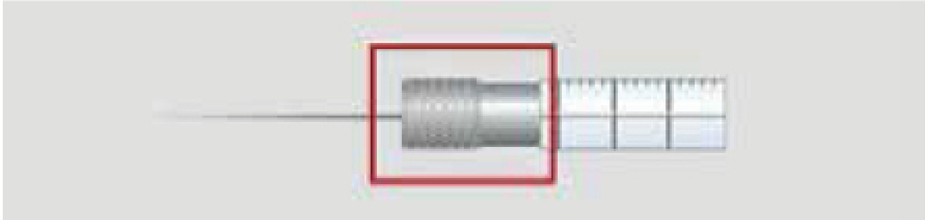
Syringe Style

Fixed Needle



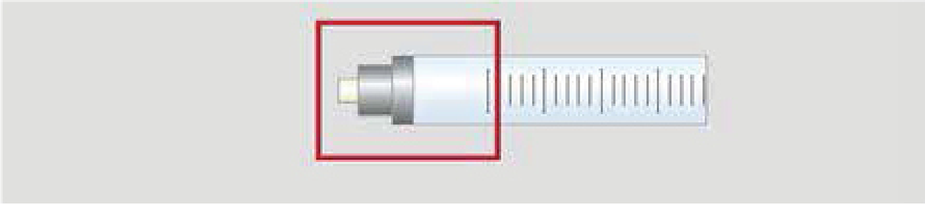
- Better option for experienced users or for applications requiring trace sample levels
- Recommended for use with an autosampler because the probability of needle bending is minimal
- Minimal sample carryover

Removable Needle



- Better option for inexperienced users
- Reduce cost if used in precipitation of salts or in situations in which it may bend easily (such as thick septum) Available for many methods by changing needles

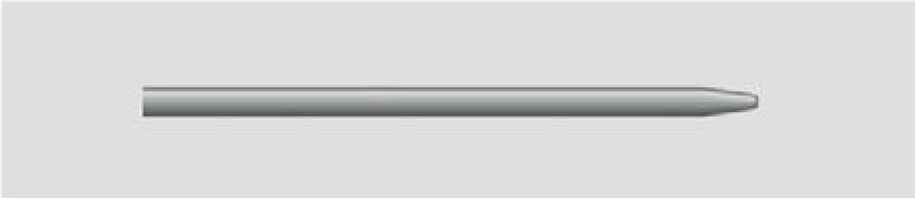
Gas Tight



- For Luer Lock needles and fittings
- Specifically designed to install and secure Luer Lock needles easily

Needle Tip Style

Cone: Autosampler

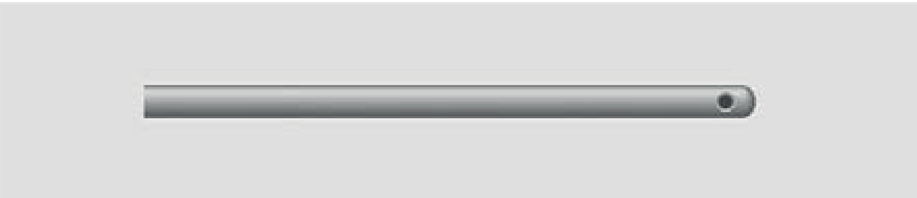


The cone-shaped needle tip is specially developed to withstand multi- injection demands and improve septum lifetime when used with an autosampler. The cone design effectively "parts" the septum during piercing instead of cutting it, as would a bevel needle.

Bevel: Manual Injection

The standard general-purpose needle tip style supplied with many syringes is a 20 ° bevel tip. It is the preferred option for manual injection when piercing the septum in exactly the same place is difficult. The bevel tip is designe d for optimum septum penetration and prevention of septum coring.

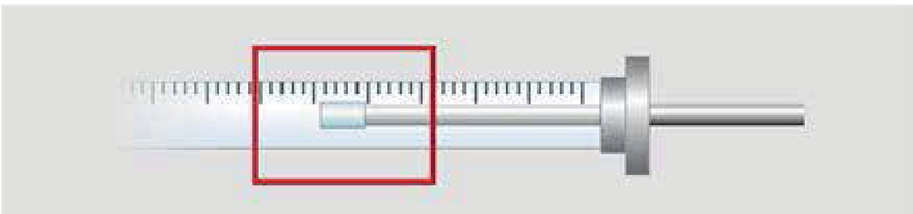
Side Hole Dome



Samples are filled and dispensed through the side hole , eliminating septum plugging of the needle. Ideal for large-volume gas injections. The solid domed tip minimizes septum damage.

Plunger Style

PTFE Tipped Plunger



- PTFE Tip enables gastight analysis
- Suitable for both liquid and gas samples
- Ideal for analysis of highly viscous liquid because it reduces the possibility of the plunger sticking due to micro particles (samples should have no effects with PTFE)
- Plunger is replaceable

Manual Autosampler or Instrument Syringes

If a syringe is being used by hand, a manual syringe should be selected. If a syringe is installed in an AOC autosampler then choose the appropriate syringe and volume to suit your instrument and application.

Shimadzu autosampler syringes are specifically designed to meet instrument dimensional specifications, have an accuracy of better than ± 1 % and are designed for precise, worry-free overnight sampling.

Needle Tip Styles

Cone: GC Autosampler

The cone shaped needle tip is specially developed to withstand multi injection demands and improve septum lifetime when used with the AOC autosampler. The cone design effectively "parts" the septum during piercing instead of cutting it, as would a bevel needle.

LC: HPLC

These needles are used for LC and HPLC valve injection and have a 90 ° square tip with rounded and polished edges. This eliminates damage to the valve's rotor seal and stator face. This needle tip style is a good choice for general liquid dispensing.

Bevel: Manual GC

The standard general purpose needle tip style supplied with many Shimadzu syringes is a 20 ° bevel tip. It is the preferred option for manual injection where piercing the septum in exactly the same place is difficult. The bevel tip is designed for optimum septum penetration and prevention of septum coring.

Side Hole Dome:

Samples are filled and dispensed through the side hole eliminating septum plugging of the needle. Ideal for large volume gas injection. The solid domed tip minimizes septum damage.

Dome:

This style needle is recommended for use with predrilled septa. The tip is rounded and polished to help septum penetration.

Valves

OPEN ⟷ CLOSED

The push-button valve attaches directly to any luer lock 1 mL – 100 mL Shimadzu syringe.

OPEN ⟷ CLOSED

The push-button valve attaches to any luer lock 5 mL – 100 mL Shimadzu syringe.

Syringe for AOC-20i/20s and AOC-20i Plus / 20s Plus

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	Needle ID (mm)	P/N	Replacement Plunger P/N	Replacement Needle P/N
5 µL	–	42	23	0.63	Cone	0.11	221-75173	–	–
10 µL	√	42	23	0.63	Cone	0.11	221-74469	–	–
10 µL	–	42	23	0.63	Cone	0.11	221-34618	–	–
10 µL	√	42	23	0.63	Cone	0.11	221-75174	221-75174-02	221-75174-01
50 µL	–	42	23	0.63	Cone	0.11	221-45243	–	–
250 µL	√	42	23	0.63	Cone	0.11	221-45244	221-45244-01	–

Description	P/N	Syringe Volume
Syringe for OCI	221-37282-02	10 µL

Syringe for AOC-5000 Plus

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle ID (mm)	Needle Tip	P/N
10 µL	–	50	26	0.47	0.11	Cone	221-75175
10 µL	–	50	23	0.63	0.11	Cone	221-75175-01
10 µL	–	80	26	0.47	0.11	Cone	221-75176
10 µL	–	80	23	0.63	0.11	Cone	221-75176-01
10 µL	√	50	26	0.47	0.11	Cone	221-75175-02
10 µL	√	50	23	0.63	0.11	Cone	221-75175-03
25 µL	√	50	23	0.63	0.24	Cone	221-75177
1 mL	√	50	26	0.47	0.15	Side Hole Dome	221-75178
1 mL	√	50	23	0.63	0.15	Side Hole Dome	221-75178-01
2.5 mL	√	50	26	0.47	0.15	Side Hole Dome	221-75179
2.5 mL	√	50	23	0.63	0.15	Side Hole Dome	221-75179-01

Xtra Life Micro Syringe for AOC-30i / AOC-20s

Fixed needle syringe with super flexible titanium alloy plunger. They are resistant to bending and sliding friction for extended lifetime, even with water soluble samples. Plunger and barrel are machined for an exact fit, so they are not interchangeable with another syringe if either part is damaged.

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle ID (mm)	Needle Tip	P/N
5 µL	0.1 µL	43	23	0.64	0.15	Cone	227-35401-01
10 µL	0.2 µL	43	23	0.64	0.15	Cone	227-35400-01

Syringe for AOC-6000

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	P/N
1 µL	-	57	23	0.63	Cone	225-19744-01
5 µL	-	57	26	0.47	Cone	225-19744-02
5 µL	-	57	23	0.63	Cone	227-37166-01
5 µL	-	85	23	0.63	Cone	227-37160-01
10 µL	-	57	26	0.47	Cone	225-19744-03
10 µL	√	57	26	0.47	Cone	225-19744-04
10 µL	-	57	23	0.63	Cone	227-37167-01
10 µL	-	85	23	0.63	Cone	227-37161-01
25 µL	√	57	26	0.47	Cone	225-19744-05
50 µL	√	57	26	0.47	Cone	225-19744-06
100 µL	√	57	26	0.47	Cone	225-19744-07
250 µL	√	57	26	0.47	Cone	225-19744-08
500 µL	√	57	26	0.47	Cone	225-19744-09
1 mL	√	57	23	0.63	Side Hole Dome	225-19744-10
2.5 mL	√	65	23	0.63	Side Hole Dome	225-19744-11

Gastight Syringe for AOC-6000

Syringe Volume	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	P/N
10 µL	85	23	0.63	Cone	227-37162-01
10 µL	57	23	0.63	Cone	227-37168-01
25 µL	85	23	0.63	Cone	227-37163-01
50 µL	85	23	0.63	Cone	227-37164-01
100 µL	57	23	0.63 (ID 0.11)	Cone	227-37169-01
100 µL	85	23	0.63	Cone	227-37165-01
250 µL	57	23	0.63	Cone	227-37170-01

Manual Syringe

Shimadzu manual syringes are available from 5µL to 500µL, and can be widely used in your laboratory work.

Fixed Needle Style

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle ID (mm)	Needle Tip	P/N	Replacement Plunger	
								P/N	Qty
5 µL	–	50	26	0.47	0.11	Bevel	221-75170	–	–
10 µL	–	50	26	0.47	0.11	Bevel	670-12552-01	–	–
10 µL	√	80	26	0.47	0.11	Bevel	221-75170-01	221-75170-02	2
25 µL	–	80	25	0.5	0.2	Bevel	670-12510-31	–	–
25 µL	√	50	25	0.5	0.2	Bevel	221-75171	221-75171-01	1
50 µL	–	50	25	0.5	0.2	Bevel	670-12510-36	–	–
50 µL	√	50	25	0.5	0.2	Bevel	221-75172	221-75172-03	1
100 µL	–	50	25	0.5	0.2	Bevel	670-12510-18	–	–
100 µL	√	50	25	0.5	0.2	Bevel	221-75172-01	221-75172-04	1
250 µL	–	50	25	0.5	0.2	Bevel	670-12510-19	–	–
250 µL	√	50	25	0.5	0.2	Bevel	221-75172-02	221-75172-05	1
500 µL	–	50	25	0.5	0.2	Bevel	670-12510-20	–	–
10 µL	–	51	22	0.028"	0.17	LC	670-12554-01	–	–
25 µL	–	51	22	0.028"	0.37	LC	670-12554-02	–	–
50 µL	–	51	22	0.028"	0.37	LC	670-12554-03	–	–
100 µL	–	51	22	0.028"	0.37	LC	670-12554-04	–	–
250 µL	–	51	22	0.028"	0.37	LC	670-12554-05	–	–
500 µL	–	51	22	0.028"	0.37	LC	670-12554-06	–	–

Removable Needle Style

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	P/N	Replacement Plunger P/N	Replacement Needle P/N
10 µL	√	50	26	0.47	Bevel	670-12553-21	670-12553-33	670-12510-95
25 µL	–	50	25	0.5	Bevel	670-12510-74	–	670-12510-96
50 µL	–	50	25	0.5	Bevel	670-12510-75	–	
100 µL	–	50	25	0.5	Bevel	670-12510-76	–	
250 µL	–	50	25	0.5	Bevel	670-12510-77	–	
500 µL	–	50	25	0.5	Bevel	670-12510-78	–	

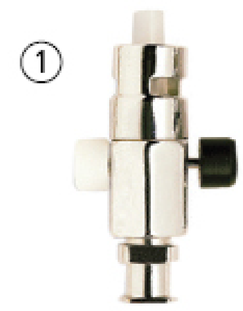
Syringe for Gas Analysis

Luer Lock Needle Style

Syringe Volume	PTFE Tipped Plunger	P/N	Replacement Plunger P/N
1 mL	√	221-54778-01	221-54778-11
5 mL	√	221-54778-02	221-54778-12
10 mL	√	221-54778-03	221-54778-13
25 mL	√	221-54778-04	221-54778-14
50 mL	√	221-54778-05	221-54778-15
100 mL	√	221-54778-06	221-54778-16

Luer Lock Needle

Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	Qty	P/N
50	23	0.63	Bevel	5	221-54778-51
50	19	1.07	Bevel	5	221-54778-52
50	14	2.1	Bevel	5	221-54778-54



OPEN ⟷ CLOSED

Syringe Valve

Diag. #	Syringe Volume	Description	Qty	P/N
①	5 mL to 2 L	Push Button Valve for Luer Lock Needle	1	221-54778-49
②	50 µL to 2 L	Push Button Valve for Luer Lock Needle and Tip Syringe	1	221-54778-50

OPEN ⟷ CLOSED

Removable Needle Style

Gastight syringes with a capacity of milliliter quantity level. The needle is 30mm long and is of a screw-in type, which ensures an easy exchange.

Description	Syringe Volume	P/N	Replacement Needle P/N
MS-GAN025	0.25 mL	670-12504-28	670-12504-85 (5 pcs)
MS-GAN050	0.5 mL	670-12504-29	
MS-GAN100	1 mL	670-12504-30	
MS-GAN250	2.5 mL	670-12504-31	
MS-GAN500	5 mL	670-12504-32	
MS-GANX00	10 mL	670-12504-33	

PIN Style Microsyringe

Plunger-in-needle style. The plunger goes into the needle tip to eliminate dead volume. Ideal for highly precise analysis of micro-volume samples.

Description	P/N	Syringe Volume
0.5BR-7	670-12510-71	0.5 µL
1BR-7	670-12510-72	1 µL
5BR-7	670-12510-73	5 µL

Microsyringe with Plunger Guide

This type of microsyringe has an extended barrel (120 mm long) to prevent the plunger from bending.

Description	P/N	Syringe Volume	Replacement Needle P/N	Qty
10R-GP	670-12510-80	10 µL	670-12510-95	5
5R-GPS	670-12510-86	5 µL	670-12510-94	5

Elastic Plunger Style Microsyringe

These syringes use a titanium alloy plunger, which is highly flexible and corrosion resistant. The high flexibility of the plunger ensures stable injection of samples as small as 5 µL. The needle is 0.41 mm in tip diameter, which is suitable for on-column injection into a capillary column.

Description	P/N	Syringe Volume	Replacement Needle P/N
MS-E05-CS	670-12580-21	5 µL	Fixed Needle
MS-E10-CS	670-12580-22	10 µL	
MS-NE05-CS	670-12580-25	5 µL	670-12580-31 (5 pcs)
MS-NE10-CS	670-12580-26	10 µL	

Microsyringe with Guide Bar

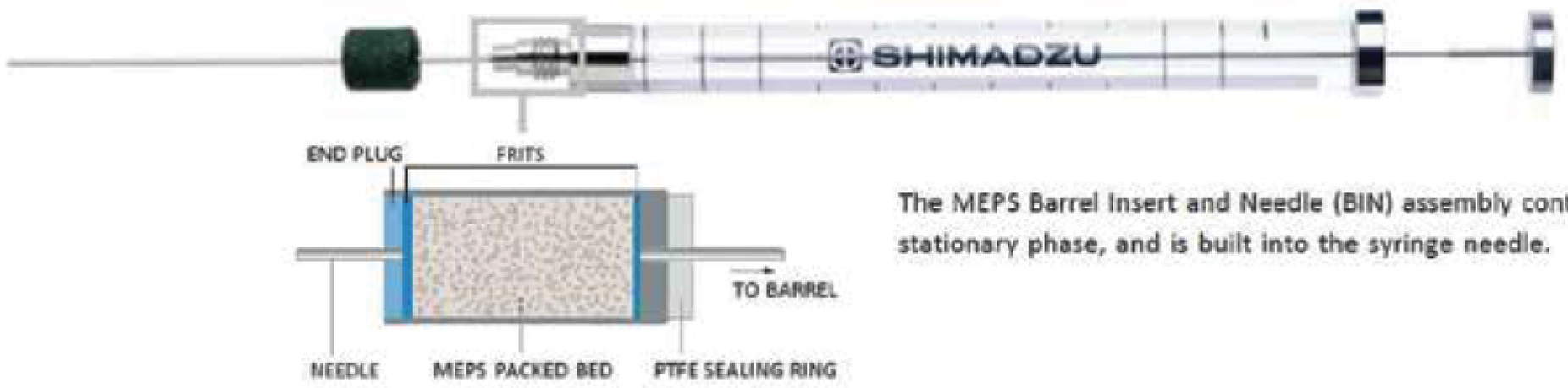
A guide bar is installed parallel to the plunger, which prevents the plunger from bending. A stopper is also provided to allow a preset amount of sample to be injected accurately without reading the scale in each run.

Description	P/N	Syringe Volume	Replacement Needle P/N
MS-G10	670-12504-25	10 µL	Fixed Needle
MS-NG10	670-12504-22	10 µL	670-12504-86 (5 pcs)

Micro Solid Phase Extraction Syringe MEPS™

MEPS™ is Micro Extraction by Packed Sorbent and is used for sample preparation and handling. MEPS is the miniaturization of conventional SPE packed bed devices from milliliter bed volumes to microliter volumes. The MEPS approach to sample preparation is suitable for reversed phases, normal phases, mixed mode or ion exchange chemistries. MEPS is available in a variety of common SPE phases.

Meps Barrel Insert And Needle



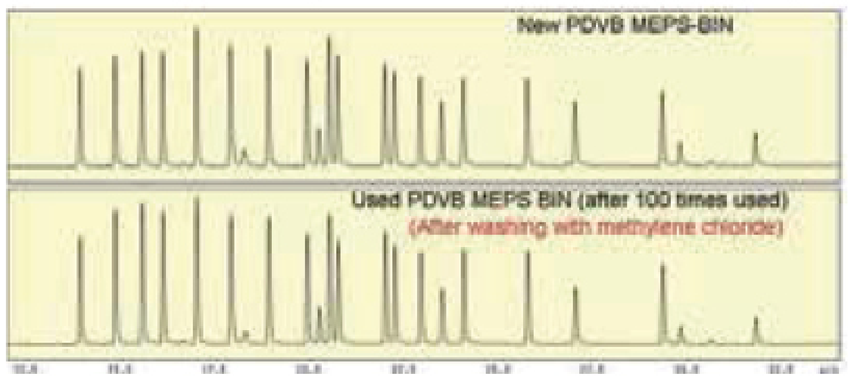
The MEPS Barrel Insert and Needle (BIN) assembly contains the stationary phase, and is built into the syringe needle.

SAMPLE SIZE AND SENSITIVITY
Sample volumes may be as little as 10 µL, or by taking multiple aliquots of 100 µL or 250 µL, samples of 1 mL or larger may be concentrated.

AUTOMATION
Extract samples and make injections on-line using a single device, reducing sample processing times and the need for operator intervention.

SORBENT LIFE
BIN life is dependent on the specific matrix being analyzed. For example, C18 analysis of whole plasma samples is conservatively 25-100 samples before the BIN needs to be changed. BIN life of cleaner samples is significantly longer.

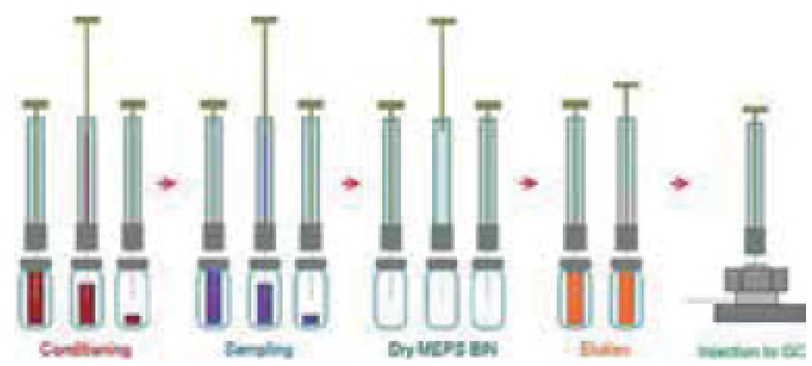
Chromatogram of 22 pesticides standard solution (40 ng/mL)



CARRYOVER
The small quantity of phase in the MEPS BIN is easily and effectively washed between samples to reduce the possibility of carryover. This washing process is not practical with off-line SPE devices. With automated MEPS, washing occurs while the previous sample is running.

FLEXIBLE AND EASY TO USE
The dimensions of the sorbent bed ensure performance remains identical to conventional SPE devices when used for extraction of similar samples. The AOC-MEPS system was developed to incorporate MEPS into a process automation workflow, combining sample preparation and analysis in a single platform.

AOC-MEPS System



When automated by an AOC-MEPS system, the injection volume is much larger compared to the commonly used GC injection volumes of 1 - 2 µL. With AOC-MEPS, the typical injections are 50 to 200 µL of elution solvent.
A large volume injection technique that removes the solvent volume from inside the injector unit while condensing the target compounds should be employed.

MEPS™ Syringe for AOC-20i/20s and AOC-20i Plus/ AOC-20s Plus

Syringe Volume	PTFE Tipped Plunger	P/N	Replacement Plunger	
			P/N	Qty
100 µL	√	221-74830-01	221-74830-10	1

Base	P/N	Qty
C18	221-74830-03	5
Silica	221-74830-04	5
C8 + SCX	221-74830-05	5
C2	221-74830-06	5
C8	221-74830-07	5
PDVB	221-74830-02	5
SDVB	221-74830-11	5
HDVB	221-74830-12	5
Development Kit	221-74830-08	1 each of C18, C8, Silica, C8+SCX, C2

MEPS™ Syringes for AOC-5000 Plus

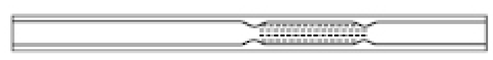
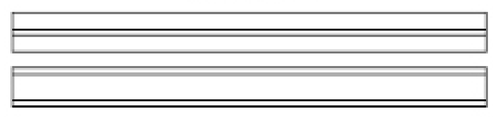
Syringe Volume	PTFE Tipped Plunger	P/N	Replacement Plunger	
			P/N	Qty
100 µL	√	221-75202-01	221-75202-03	1
250 µL	√	221-75202-02	221-75202-04	1

Phase	Qty	P/N for 100 µL syringe	P/N for 250 µL syringe
C18	5	221-75198-01	221-75199-01
Silica	5	221-75198-02	221-75199-02
C8 + SCX	5	221-75198-03	221-75199-03
C2	5	221-75198-04	221-75199-04
C8	5	221-75198-05	221-75199-05
Development Kit	1 each of C18, C8, Silica, C8+SCX, C2	221-75198-06	221-75199-06

GC Glass Insert

The GC inlet functions as the interface between the syringe and the GC capillary column, where the sample is introduced, vaporized, mixed with carrier gas and transferred to the column. Shimadzu instruments offer several types of inlets - split, splitless, programmable temperature vaporization (PTV) and on-column.

The glass insert prevents the sample contacting the metal walls of the injector block. Glass insert geometry and packing materials enable the glass insert to achieve greater heated surface area; this additional surface area can often improve sample vaporization. Conversely, choosing the wrong glass insert geometry can significantly decrease the reproducibility and quality of analysis.

Injection Technique	Sample Types	Glass insert Geometry	Function
Splitless	Trace Level Analyses/ Active Compounds	Taper	A bottom taper focuses sample onto the head of the column and minimizes sample contact with metal parts of the inlet. The addition of quartz wool to your glass insert promotes mixing of analytes, aids the vaporization of liquid samples, and works as a trap to collect non-volatile residue in the sample (i.e. protects capillary column from 'dirty' samples).
Split	General Purpose/ Concentrated Samples/ Dirty Samples	FocusLiner™ 	Ensures quartz wool remains in the correct position in the liner. Excellent reproducibility results from the wiping of the sample from the syringe needle and the prevention of droplet formation. Minimizes high molecular weight discrimination.
Splitless	Trace Level Analyses/ Dirty Samples/ Wide Boiling Point Range	Taper FocusLiner™	Bottom taper focuses sample onto the head of the column and minimizes contact with metal parts of the inlet. Excellent reproducibility results from the wiping of the sample from the syringe needle and the prevention of droplet formation. Minimizes high molecular weight discrimination.
Direct	Trace Level Analyses/ Active Compounds	Direct Taper	Direct glass inserts facilitate maximum transfer of sample by connecting directly to the GC column and inhibiting sample degradation due to hot metal components inside inlet.
Split/Splitless	General Purpose/ Concentrated Samples/ Dirty Samples (only if quartz wool is present)/ Gaseous Samples (also purge & trap, headspace)	Straight 	Straight glass inserts facilitate higher split flows. Narrow bore straight glass inserts facilitate fast GC work. Small injection volumes of less than 0.5 µL are best used with a narrow bore. Narrow bore straight glass inserts improve focussing of gaseous samples (purge, trap & headspace).

Glass Insert Deactivation

Every batch of glass inserts are tested for inertness using the EPA 8081B method. This standard method ensures that each batch of glass inserts has less than 3 % Endrin breakdown from a 1 ppm injection.

Glass Insert for Capillary Column Analysis

Glass insert is very important to prevent the column from being contaminated by sample components. Please choose an appropriate insert according to your system model, injection port and injection method, and exchange it regularly to avoid poor reproducibility and peak shape caused by the crossover of residual samples, etc.

S: Standard; O: Option

		P/N	Specification	Nexis GC-2030	GC-2010 Plus GC-2010 GC-2025	GC-2014	GC-17A ver. 1-3 GC-1700 GC-18A	GC-14A GC-14B	GC-8A
			Injection Unit →	SPL-2030	SPL-2010 Plus SPL-2010 SPL-2025	SPL-2014	SPL-17	SPL-14	SPL-G9
Injection Port Side	Split/Splitless Injection Method: For Split	221-41444	(ID 3.5mm; OD 5mm; Length 95mm)	O	O	S	S		
		221-41444-01	(ID 3.5mm; OD 5mm; Length 95mm)	O	S		O		
		221-37574-01	(99mm)					S	
		221-25822-03	(87mm)						S
		227-35007-01	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool, 5pcs)	S	O	O	O		
	For Splitless	221-48335-01	(ID 3.5mm; OD 5mm; Length 95mm)		S	S	O		
		221-41544	(95mm)		O	O	S		
		221-75192	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, 5pcs)		O	O			
		221-32544	(99mm)					S	
		221-25944-03	(87mm)						S
		227-35008-01	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool*2, 5pcs)	S	O	O	O		
	For Split and Splitless	221-75187	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool, 5pcs)	O	O	O			
		221-75188	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, needle onto wool, 5pcs)	O	O	O			
		221-75189	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, needle into wool, 5pcs)	O	O	O			
		221-75190	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, Straight Through, 5pcs)	O	O	O			
		221-75191	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, needle into wool, 5pcs)	O	O	O			
		221-75193	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool, 5pcs)	O	O				
		221-75194	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, 5pcs)	O	O				
		221-41444-05	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, 5pcs)			O			
		221-41544-05	(ID 2.6mm; OD 5mm; Length 95mm, Deactivated, 5pcs)			O			
		221-75195	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool, 5pcs)			O			
			Injection Unit →	WBI-2030	WBI-2010 Plus WBI-2010	WBI-2014	WBI-17		
	Direct Injection Method (WBI)	221-41599	(95mm)	O	O	O	S		
		221-48335-01	(ID 3.5mm; OD 5mm; Length 95mm)	S	S (WBI-2010)	S	O		
		221-75197	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool*2, 5pcs)		O	O			
		221-41599-05	(ID 2.6mm; OD 5mm; Length 95mm, Deactivated, for 0.53mmID column, 5pcs)			O			
		P/N	Specification	Nexis GC-2030	GC-2010 Plus GC-2010 GC-2025	GC-2014	GC-17A ver. 1-3 GC-1700 GC-18A	GC-14A GC-14B	GC-8A
			Injection Unit →	SPL-2030	SPL-2010 Plus	SPL-2014	SPL-17	SPL-14	SPL-G9
	For SPME	221-75196*	(ID 0.75mm; OD 5mm; Length 95mm, Deactivated, 5pcs)	O	O	O			
	For HS 10	221-76863-73	(ID 1.2mm; OD 5mm, Length 95mm, Deactivated, 5pcs)	S	S	S			
	WBC Attachment	221-38107 *1	(139mm)			S		S	
		221-39148	(86 mm)						S

*1 Required if the WBC Attachment is used for a packed column injection in GC-2014, Insert for GC-14 septum purge unit is P/N: 221-38151-04
*2 Wool is 25mm from the top of insert.
* Can be used for AOC-6000 SPME