Features of Shimadzu vials and septa

- 1st hydrolytic class glass
- Vials are packaged in a cleanroom
- Contamination-free septa production

Screw vials, 100/pack

Part number	226-54110-11	226-54110-01	226-54220-11	226-54220-01	226-54305-01
Type	Clear, screw vial	Clear, screw vial	Clear, screw vial	Clear, screw vial	Clear, screw vial with integrated 0.2mL micro-insert, top bonded
Write on spot	√	X	√	X	√
Min. Vol / uL	200	200	200	200	25
Max. Vol / mL	1.5	1.5	1.5	1.5	0.2
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 9, wide opening	ND 9, wide opening	ND 8, small opening	ND 8, small opening	ND 9, wide opening

Part number	226-54301-01	226-54111-11	226-54111-01	226-54221-11	226-54222-01
Type	Clear, microliter screw vial	Amber, screw vial	Amber, screw vial	Amber, screw vial	Amber, screw vial
Write on spot	X	√	X	√	X
Min. Vol / uL	30	200	200	200	200
Max. Vol / mL	1.5	1.5	1.5	1.5	1.5
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 9, wide opening	ND 9, wide opening	ND 9, wide opening	ND 8, small opening	ND 8, small opening

Part number	226-54307-01	226-54312-01	226-54313-01	226-54308-01	226-54309-01
Type	Clear, 0.9mL LabTotal Recovery vial	Clear, 0.9mL Microliter screw vial	Clear, 1.0mL Total Microliter screw vial	Amber, screw vial with integrated 0.2mL micro-insert, base bonded	Clear, screw vial with integrated 0.2mL micro-insert, base bonded
Write on spot	X	√	X	X	X
Min. Vol / uL	25	25	25	30	30
Max. Vol / mL	1.1	1.1	1.3	0.3	0.3
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 9, wide opening	NP 9, wide opening	NP 9, wide opening	ND 9, wide opening	ND 9, wide opening

ND9 screw plastic micro-vials, 100/pack

Plastic vials offer low binding for proteins and peptides and are the best choice for Ion Chromatography. Specially made for customers concerned about broken glass.

Part number	226-54310-01	226-54311-01	226-54302-01	226-54303-01	226-54304-01
Type	1.5ml PP screw clear vial, slightly concave shaped bottom	1.5ml PP screw amber vial, slightly concave shaped bottom	PP micro-vial, transparent	TPX micro-vial, crystal clear	PP micro-vial, amber
Write on spot	x	x	X	X	X
Min. Vol / uL	200	200	30	30	30
Max. Vol / mL	1.5	1.5	0.25	0.25	0.25
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 9, wide opening	ND 9, wide opening	ND 9, wide opening	ND 9, wide opening	ND 9, wide opening

Caps/Septa for 1.5mL screw vials, 100/pack

Temperature limit for PTFE/Rubber septa: -40°C up to 110°C
Temperature limit for PTFE/Silicone septa: -60°C up to 200°C
Temperature limit for PTFE/Silicone/PTFE septa: -60°C up to 200°C

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Size	Picture
226-54112-01	Blue PP, centre hole	PTFE/Rubber	1.0 mm	45° shore A	ND 9	
226-54113-01	Blue PP, centre hole	PTFE/Silicone, ultra-clean	1.0 mm	55° shore A	ND 9	
226-84131-01	Blue PP, centre hole	PTFE/Silicone *	1.3 mm	45° shore A	ND 9	
226-54114-01	Blue PP, centre hole	PTFE/Silicone/PTFE	1.0 mm	45° shore A	ND 9	
226-84129-01	Blue PP, centre hole	PTFE/Silicone, Slit	1.0 mm	55° shore A	ND 9	
226-54113-02	Blue PP, centre hole	PTFE/Silicone, Slit *	1.3 mm	45° shore A	ND 9	
226-84130-01	Blue PP, centre hole	PTFE/Silicone, pre-cut (Y)	1.0 mm	55° shore A	ND 9	
226-84128-01	Gold Magnetic, centre hole	PTFE/Silicone, ultra-clean	1.0 mm	55° shore A	ND 9	
226-84132-01	Blue PP, closed top	PTFE/Silicone, ultra-clean	1.0 mm	55° shore A	ND 9	
226-84220-01	Black PP, centre hole	PTFE/Silicone, ultra-clean	1.3 mm	45° shore A	ND 8	
226-84221-01	Black PP, centre hole	PTFE/Silicone, ultra-clean	1.3 mm	55° shore A	ND 8	
226-54221-01	Black PP, closed top	PTFE/Silicone, ultra-clean	1.3 mm	45° shore A	ND 8	
226-54221-02	Black PP, closed top	–	–	–	ND 8	
226-54221-03	–	PTFE/Silicone	1.3 mm	45° shore A	ND 8	

* UltraBond seal, cap & septa form an inseparable unit, so that septa cannot fall out.

1.5mL screw vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Septa material	Cap/Septa part number
226-54110-31	Clear with write on spot	226-54110-11	PTFE/Silicone, ultra-clean	226-54113-01
226-54110-41	Clear	226-54110-01	PTFE/Silicone, ultra-clean	226-54113-01
226-54110-51	Clear	226-54110-01	PTFE/Rubber	226-54112-01
226-54111-41	Amber with write on spot	226-54111-11	PTFE/Silicone, ultra-clean	226-54113-01
226-54111-31	Amber	226-54111-01	PTFE/Silicone, ultra-clean	226-54113-01
226-54111-51	Amber	226-54111-01	PTFE/Rubber	226-54112-01

Micro-insert for 1.5mL screw vials, 100/pack

Part number	Min. sample vol	Max. sample vol	Usage	Assembled plastic spring	Type	Picture
226-84201-11	30 uL	250 uL	ND9 wide opening vials	√	Conical	
226-84202-11	25 uL	150 uL	ND8 small opening vials	√	Conical	
226-84203-11	40 uL	350 uL	ND9 wide opening vials	X	Flat bottom	
226-84204-11	40 uL	260 uL	ND8 small opening vials	X	Flat bottom	

1.5 mL amber screw vial kit

1.5 mL clear screw vial kit

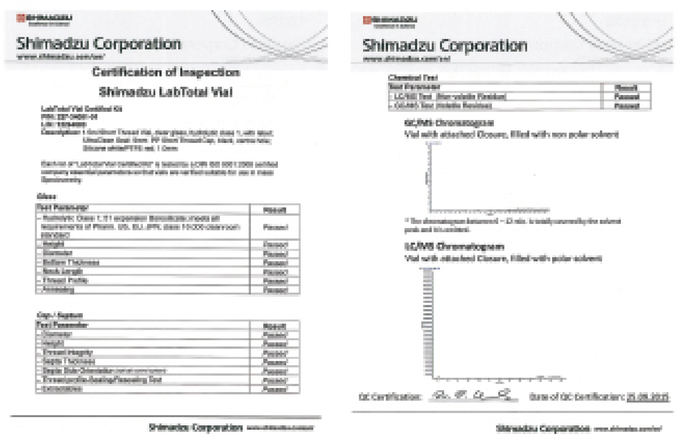
Shimadzu LabTotal Vial MS Certified Kit

- Reduces the Adsorption of Basic Compounds on the Surface of the Glass Vial.
  – This improves quantitative accuracy in the analysis of trace basic compounds.
- Quality certificate proving suitability to LCMS / GCMS
  – This product can be used as a vial for high-sensitivity analysis in GCMS and LCMS
- Wide Mouth with Preset Cap and Septum Improves Ease of Use
  – This shortens the time needed for sample preparation and reduces human error.

Part number	Description
227-34001-01	LabTotal Vial Certified Kit for LCMS, 100/pk
227-34001-02	Blue PP cap, Silicone white/PTFE red for LabTtotal vial LCMS, 50/pk
226-84340-01	Black PP cap, Silicone white/PTFE red for LabTotal vial LCMS, 100/pk
227-34002-01	LabTotal Vial Certified Kit for GCMS, 100/pk

Mass Spec Quality Certificate Provided

This confirms that there was an absence of elution components from the vial in random inspections using LC/MS and GC/MS. Therefore, this product can be used with confidence, with no concern for ghost peaks originating from the vial.



Shimadzu LabTotal Recovery Vial kit

- Shimadzu LabTotal Recovery vials offers maximum recovery for GC and HPLC/UHPLC with a residual volume <1uL for valuable samples
- Minimun working volume 25uL up to 1.6mL (Maximum possible volume) for reproducible results
- Can be used as a concentration vial, because the solid glass bottom offers excellent heat transfer and vial-stability.
- Compactible with universal autosampler
- Available in Deactivated, HPLC/GC and Mass Spec certified kits

Kit part number	Vial	Vial part number	Septa material	Cap/Septa part number	Kit Type
226-54307-31	0.9mL Recovery vial	226-54307-01	Silicone beige/PTFE white*	226-84131-01	-
226-55001-71					Deactivated
226-55001-81					HPLC/GC certified
226-55001-91					MS certified
226-54308-31			Silicone beige/PTFE white pre-slit*	226-54113-02	-
226-55002-71					Deactivated
226-55002-81					HPLC/GC certified
226-55002-91					MS certified

*UltraBond seal, cap & septa form an inseparable unit, so that septa cannot fall out.

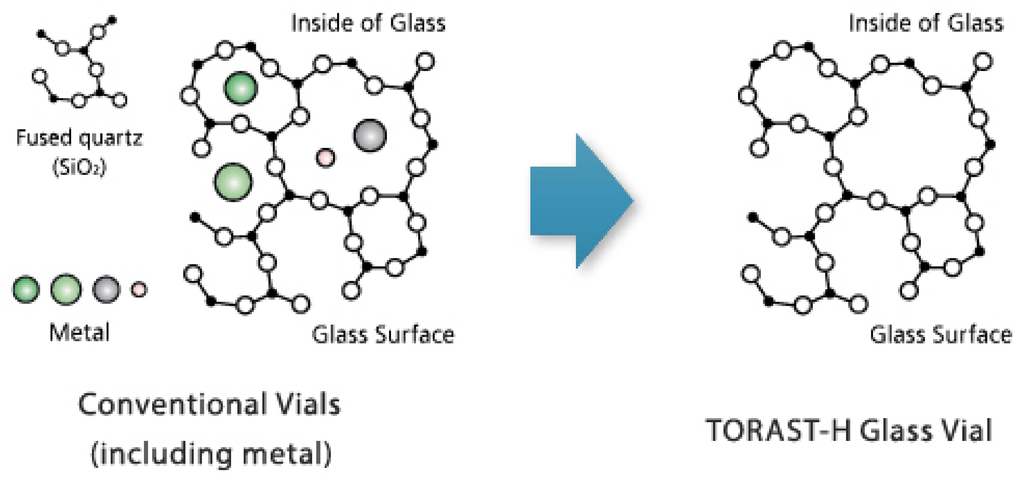
TORAST-H Glass Vial

Features

- Low adsorption vessels treated specially
- Minimized adsorption of bases, acids and neutrals
- Superior quality control

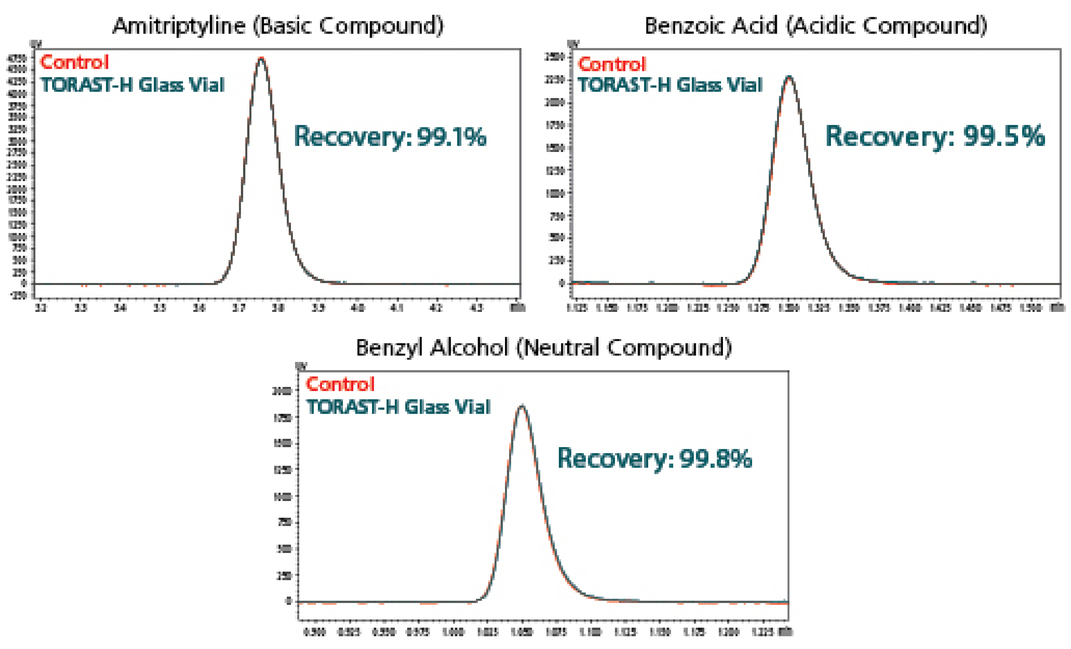
TORAST -H Glass Technology eliminates the risk of adsorption to the glass surface of the vials

Glass, the material of vials, contains metal oxides. Oxides of metals have a high ionizing tendency to be Si-O-M (metal silanolate), which may cause ionic adsorption with basic compounds in the sample. TORAST-H Glass Technology uses special processing to remove metals from the glass and suppress adsorption of basic compounds.



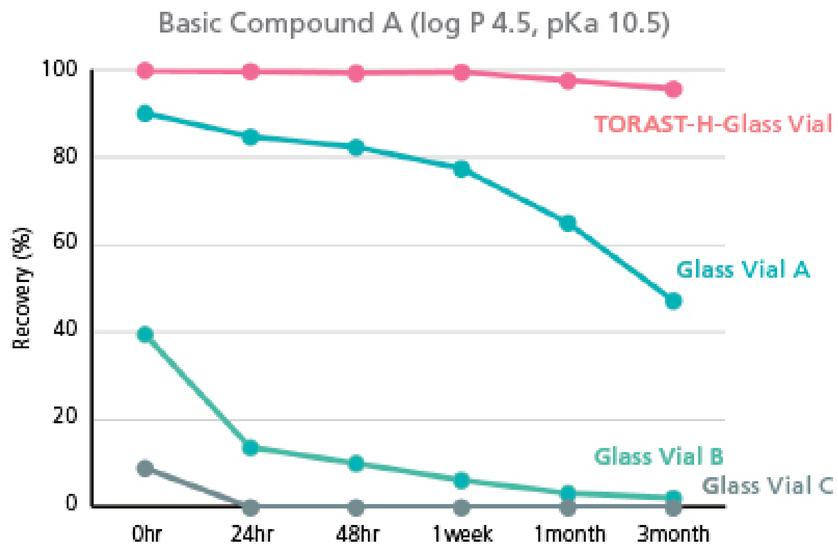
Minimized adsorption of bases, acids & neutrals

In general, giving a positive charge to the glass surface suppresses the adsorption of the basic compounds, but conversely, it causes the adsorption of the acidic compounds. TORAST-H Glass Vials minimize adsorption of both types of compounds.



Low adsorption for long-term storage

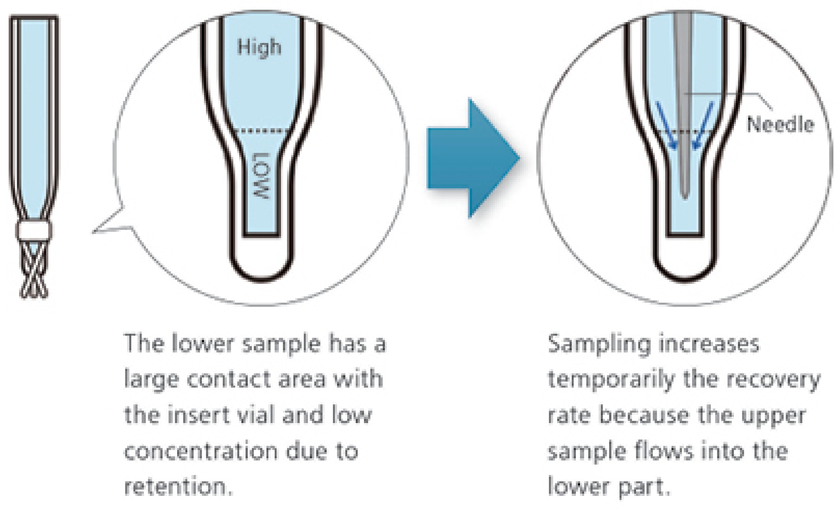
When a sample is stored in a general vial for a long time, the sample may adsorb into the surface of the vial, causing the reproducibility to be poor. The TORAST-H Glass Vial contains low adsorption characteristics that makes it excellent for long term sample storage.



Adsorption test for long-term storage

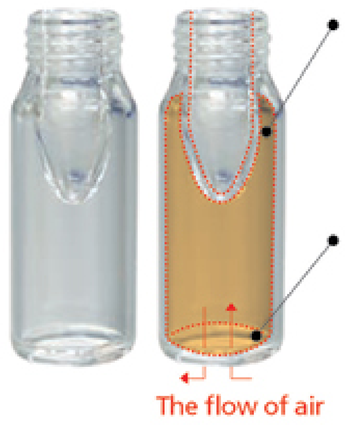
Small-Volume Vials

Insert vials (small capacity) may produce concentration gradients at the top and bottom due to sample adsorption, causing variation over time.



The lower sample has a large contact area with the insert vial and low concentration due to retention.

Sampling increases temporarily the recovery rate because the upper sample flows into the lower part.

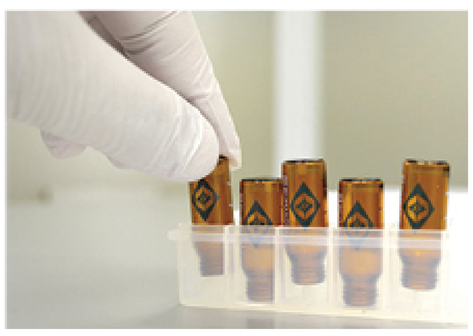


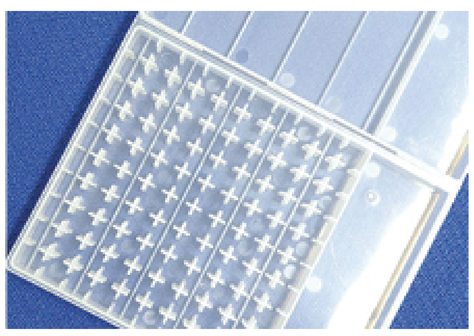
Sample volume : 10 ~ 150 µL

Small-volume vials have a large contact area; therefore, the rate of loss due to adsorption is greater than with a standard vial. TORAST-H Glass Vials shows dramatically less adsorption compared to other small-volume glass vials.

Medical Grade Packaging Materials

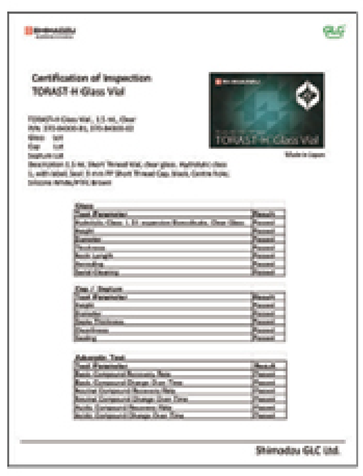
Reduce the adhesion of organic substances from the packaging and the formation of organic layers.

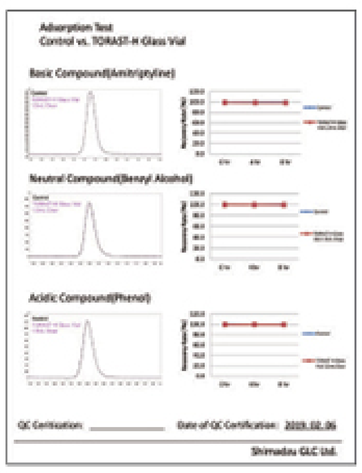




Superior Quality Control

- Hydrolytic Class 1; 51 expansion Borosilicate
- Comes with quality certificates for lot management.
- Shape inspection of vials, septa and caps.
- Low adsorption performance testing for basic, acidic and neutral compounds.





Product Information

P/N	Color	Volume	Cap	Septa	Qty
370-04300-01	Clear Glass	1.5 mL	Screw, Black	PTFE/Silicone	100
370-04300-02				Preslit PTFE/Silicone	
370-04300-03	Amber Glass			PTFE/Silicone	
370-04300-04				Preslit PTFE/Silicone	
370-04301-01	Clear Glass	150 µL		PTFE/Silicone	
370-04301-02				Preslit PTFE/Silicone	
370-04301-03	Amber Glass			PTFE/Silicone	
370-04301-04				Preslit PTFE/Silicone	

* Avoid sunlight and store at room temperature.

TORAST-H Bio Vial

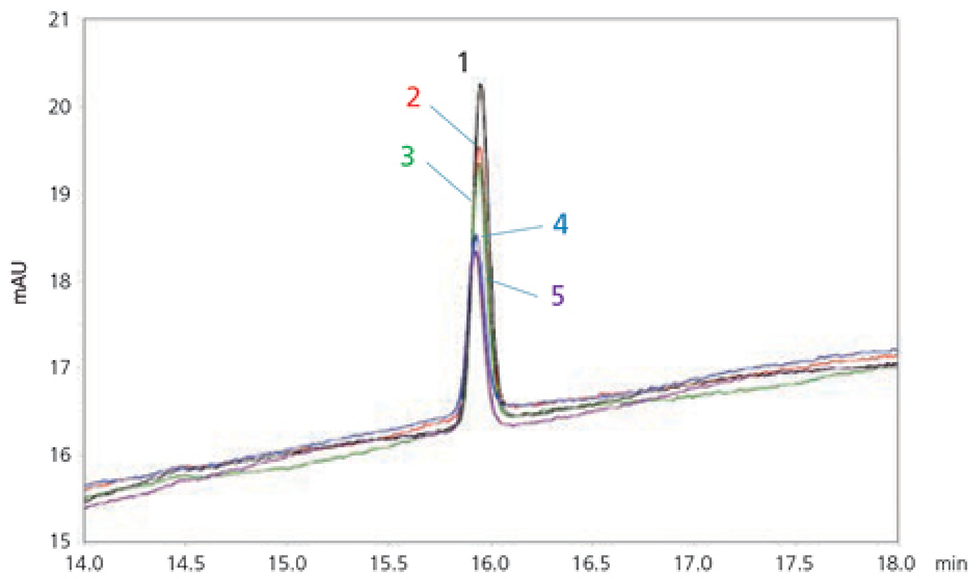
Features

- Prevents the adsorption of organic compounds
- Reduces the adsorptive loss of the precious sample
- Ideal for peptide and basic compounds analysis

Reduces the adsorption of peptides

The peptide used as a medium molecule pharmaceutical product is likely to be adsorbed on the polypropylene resin by the hydrophobic interaction. The TORAST-H Bio Vial prevents the adsorption of organic compounds.

No.	Vial Type	Sample Vol. (µL)	Recovery (%)
1	TORAST-H Bio Vial	200	100
2	Glass Vial by Company A	1500	81.1
3	Glass Vial by Company B	1500	78
4	PP Vial by Company B	200	52.1
5	PP Vial by Company C	200	53.3



Adsorption test on Ghrelin with various type of vials

Product Information

Name	P/N	Volume (µL)	Material	Qty./Unit
TORAST-H Bio Vial with cap	370-04350-00	300	Polypropylene	100

TORAST-H 96well 500 RU

Features

- Low adsorption polypropylene 96-well plate
- Prevents the adsorption of organic compounds
- Reduces the adsorption loss of the precious sample
- Ideal for peptide and basic compounds analysis

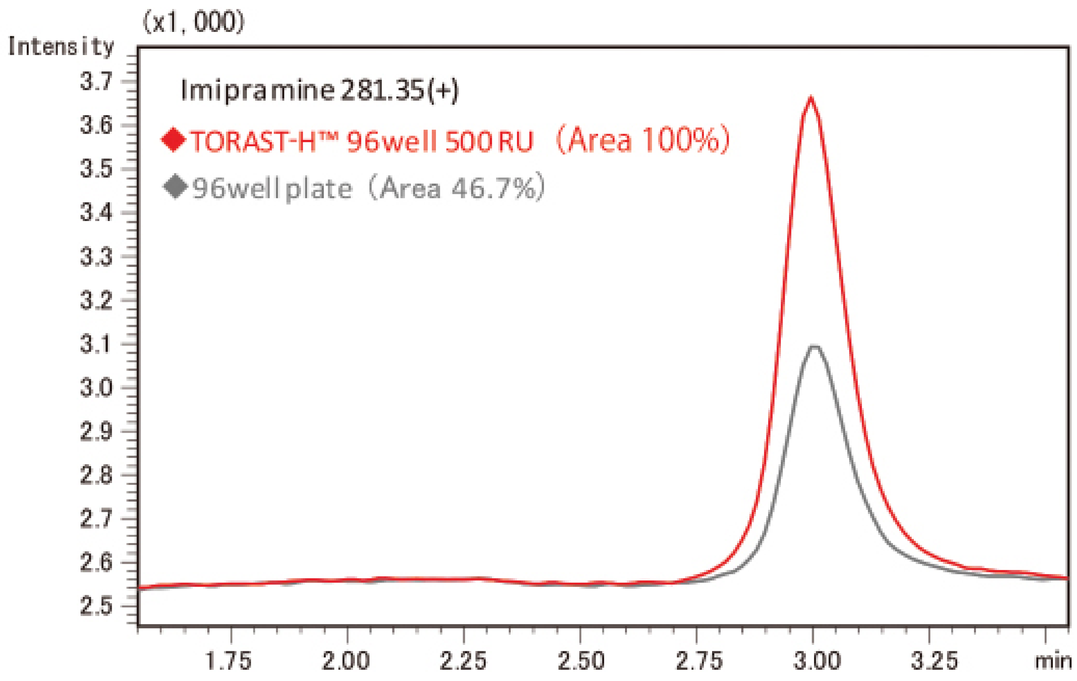
Adsorption Test of Imipramine

Imipramine is used in the treatment of depression and is a hydrophilic and basic compound. (logP: 4.28, pKa: 9.2).

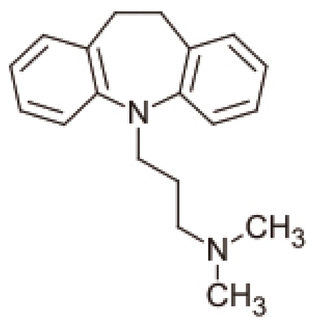
The chromatogram below shows a comparison of the Imipramine peak area with non-coated polypropylene 96-well plate compared to TORAST-H™ 96- well plates.

Non-coated polypropylene 96-well plate show hydrophobic adsorption within the well.

TORAST-H 96well 500 RU plates significantly improved the peak area by preventing the adsorption within the wells. This result indicates that TORAST-H 96well 500 RU well plate is effective in preventing adsorption.



Sample : Imipramine (1 ng/mL)
Instruments : Nexera-i, LCMS-2020
Mobile Phase : 10 mM Ammoniom Acetate in Water : MeCN =40:60_Isocratic flow
Flow Rate : 0.2 mL/min

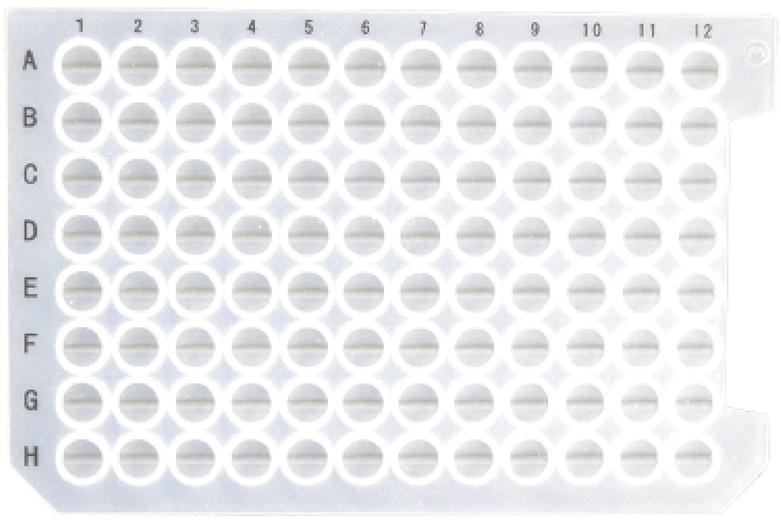


Imipramine Molecular Weight : 280.4

Product Information

Name	P/N	Volume (µL)	Material	Qty./Unit
TORAST-H 96well 500 RU	370-04100-01	500	Polypropylene	10
TORAST 96well Silicon Mat	370-04020-01	-	Silicon	50

TORAST-H 96 well 500 RU



TORAST-H 96 well Silicon Mat

1.5mL crimp vials, 100/pack

Part number	226-54120-11	226-54120-01	226-54306-01	226-54121-11	226-54121-01
Type	Clear, crimp vial	Clear, crimp vial	Clear, crimp vial with integrated 0.2mL micro-insert, top bonded	Amber, crimp vial	Amber, crimp vial
Write on spot	√	X	√	√	X
Min. Vol / uL	200	200	25	200	200
Max. Vol / mL	1.5	1.5	0.21	1.5	1.5
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 11	ND 11	ND 11	ND 11	ND 11

Caps/Septa for 1.5mL crimp vials, 100/pack

Temperature limit for PTFE/Rubber septa: -40°C up to 110°C
Temperature limit for PTFE/Silicone septa: -60°C up to 200°C
Temperature limit for PTFE/Silicone/PTFE septa: -60°C up to 200°C

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Picture
226-54123-01	Silver Aluminum	PTFE/Silicone, ultra-Clean	1.3 mm	45° shore A	
226-54124-01	Silver Aluminum	PTFE/rubber	1.0 mm	45° shore A	
226-84125-01	Blue Aluminum	PTFE/rubber	1.0 mm	45° shore A	
226-84126-01	Red Aluminum	PTFE/rubber	1.0 mm	45° shore A	
226-54127-01	Green Aluminum	PTFE/rubber	1.0 mm	45° shore A	
226-54128-01	Gold magnetic	Silicone/PTFE	1.3 mm	45° shore A	
226-54129-01	Gold magnetic	PTFE/ Silicone/PTFE	1.0 mm	45° shore A	
226-54125-01	–	Silicone/PTFE	1.5 mm	55° shore A	
226-54129-02	–	PTFE/ Silicone/PTFE	1.0 mm	45° shore A	
226-54128-02	–	Silicone/PTFE	1.3 mm	45° shore A	

1.5mL crimp vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Septa material	Cap/Septa part number
226-54120-51	Clear with write on spot	226-54120-11	PTFE/Silicone, ultra-Clean	226-54123-01
226-54120-31	Clear	226-54120-01	PTFE/Silicone, ultra-Clean	226-54123-01
226-54120-61	Clear	226-54120-01	PTFE/rubber	226-54124-01
226-54121-51	Amber with write on spot	226-54121-11	PTFE/Silicone, ultra-Clean	226-54123-01
226-54121-31	Amber	226-54121-01	PTFE/Silicone, ultra-Clean	226-54123-01
226-54121-41	Amber	226-54121-01	PTFE/rubber	226-54124-01

Micro-insert for 1.5mL crimp vials, 100/pack

Part number	Min. sample vol	Max. sample vol	Usage	Assembled plastic spring	Type	Picture
226-84201-11	30 uL	250 ul	ND9 & ND11 vials	√	Conical	
226-84203-11	40 uL	350 uL	ND9 & ND11 vials	X	Flat bottom	

Crimper/Decapper for 1.5mL crimp vials

Part number	Description
226-84001-00	11mm Crimper
226-84011-00	11mm Decapper

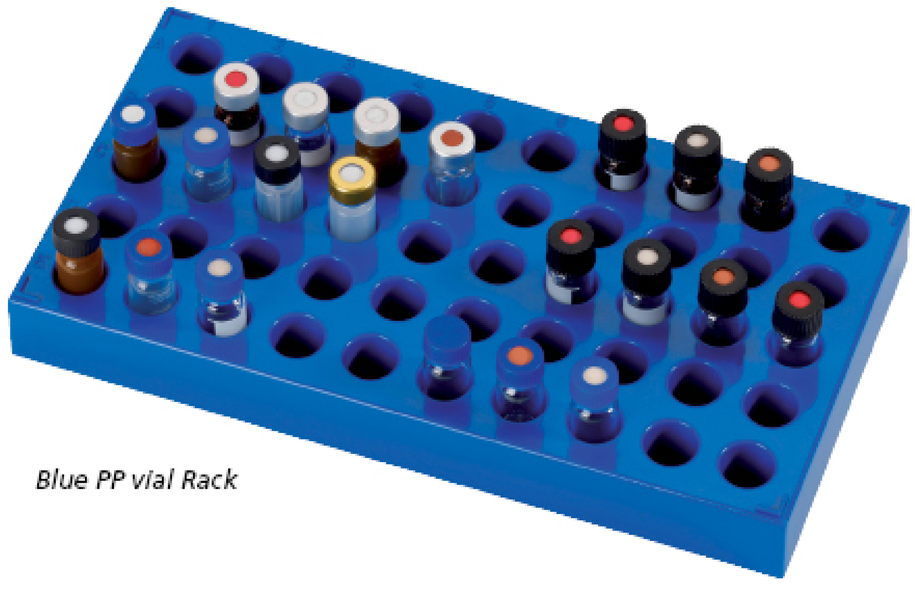
Vial racks for 1.5mL vials

Part number	Type	Dimension	Cavities
226-84902-10	Acrylic	173 x 95 x 20 mm	50
226-84903-10	Blue PP	200 x 105 x 17 mm	50

Shell vials, 100/pack

Part number	226-84203-01	226-84204-01
Min. Vol / uL	100	100
Max. Vol / mL	1.0	1.0
Dimension	40 x 8.2mm	40 x 8.2mm

11mm crimper & decapper



Blue PP vial Rack

4mL screw vials, 100/pack

Part number	226-84410-01	226-84410-21	226-84411-01	226-84411-21
Type	Clear, screw	Clear, screw	Amber, screw	Amber, screw
Write on spot	√	X	√	X
Min. Vol / uL	800	800	800	800
Max. Vol / mL	4.1	4.1	4.1	4.1
Dimension	45 x 14.7mm	45 x 14.7mm	45 x 14.7mm	45 x 14.7mm
Size	ND 13	ND 13	ND 13	ND 13

Caps/Septa for 4mL vials, 100/pack

Temperature limit for Silicone/PTFE septa: -60°C up to 200°C

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Picture
226-84413-01	Black PP closed top	Silicone/PTFE	1.5 mm	55° shore A	
226-84413-02	Black PP open top	Silicone/PTFE	1.5 mm	55° shore A	
226-84415-01	White PP open top	-	-	-	
226-84414-01	-	Silicone/PTFE	1.5 mm	55° shore A	

4mL screw vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Cap / Septa	Cap/Septa part number
226-84410-31	Clear with write on spot	226-84410-01	Closed top, Silicone/PTFE	226-84413-01
226-84410-41	Clear	226-84410-21	Closed top, Silicone/PTFE	226-84413-01
226-84412-31	Clear	226-84410-21	Open top, Silicone/PTFE	226-84413-02
226-84411-31	Amber with write on spot	226-84411-01	Closed top, Silicone/PTFE	226-84413-01
226-84411-41	Amber	226-84411-21	Closed top, Silicone/PTFE	226-84413-01

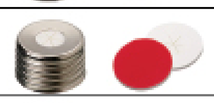
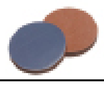
10mL and 20mL Headspace screw vials, 100/pack

Part number	226-84521-01	226-84521-21	226-84510-01	226-84510-21
Volume / mL	10	10	20	20
Type	Round bottom	Round bottom	Round bottom	Round bottom
Dimension	46 x 22.5mm	46 x 22.5mm	75.5 x 22.5mm	75.5 x 22.5mm
For use on instrument	CTC Combi PAL (Varian, Gerstel, Atas, Shimadzu), Agilent, PerkinElmer*			

For TurboMatrix™ 16, 40 and 110, produced after 01.09.2006

Caps/septa for 10mL and 20mL screw vials

Temperature limit for PTFE/Silicone septa: -60°C up to 200°C
Temperature limit for Butyl/PTFE septa: -40°C up to 120°C

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Picture
226-84513-01	Magnetic Screw	Silicone/PTFE	1.3 mm	45° shore A	
226-84514-01	Magnetic Screw	Silicone/PTFE	1.5 mm	55° shore A	
226-84519-01	Magnetic Screw	Silicone/PTFE	1.3 mm	45° shore A	
226-84524-01	Magnetic Screw	Silicone/PTFE, Pre-cut(*)	1.5 mm	55° shore A	
226-84516-01	Magnetic Screw	Butyl/PTFE	1.6 mm	55° shore A	
226-84515-01	-	Silicone/PTFE	1.3 mm	45° shore A	
226-84517-01	-	Butyl/PTFE	1.6 mm	55° shore A	
226-84518-01	-	Silicone/PTFE	1.5 mm	55° shore A	

20mL screw vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Cap / Septa	Cap/Septa part number
226-84510-31	Clear	226-84510-01	Magnetic Screw, Silicone/ PTFE	226-84513-01

10mL and 20mL Headspace crimp vials, 100/pack

Part number	226-84520-00	226-84521-00	226-84520-01	226-84520-21
Volume / mL	10	10	20	20
Type	Round bottom	Round bottom	Round bottom	Round bottom
Dimension	46 x 22.5mm	46 x 22.5mm	75.5 x 22.5mm	75.5 x 22.5mm
For use on instrument	Carlo Erba, CTC PAL (Varian, Gerstel, Atas, Shimadzu), Fisons, Varian, Thermo Scientific		CTC PAL (Varian, Gerstel, Atas, Shimadzu), Thermo Scientific TriPlus HS **	

** not suitable for Thermo Scientific HS250/HS500

10mL and 20mL Headspace crimp vials, 100/pack

Part number	226-84522-01	226-84520-02	226-84523-01
Volume / mL	20	20	20
Type	Flat bottom	Round bottom	Round bottom
Dimension	75.5 x 22.5mm	75.5 x 23mm	75.5 x 23mm
For use on instrument	Agilent, Carlo Erba, DANI, Fisons	PerkinElmer, Tekmar	

Caps/septa for 10mL and 20mL crimp vials

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Temperature limit	Picture
226-84523-11	Gold magnetic	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	-60°C up to 200°C	
226-84524-11	Aluminum pressure release	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	-60°C up to 200°C	
226-84525-11	Aluminum silver	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	-60°C up to 200°C	
226-84531-11	Aluminum silver	Butyl/PTFE	3.0 mm	50° shore A	-40°C up to 120°C	
226-84526-11	Aluminum pressure release	Butyl/PTFE	3.0 mm	50° shore A	-40°C up to 120°C	
226-84540-11	Aluminum silver	Silicone/PTFE (HT quality)	3.2 mm	45° shore A	-60°C up to 200°C	
226-84530-11	Aluminum silver 5mm centre hole	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	Up to 300°C	
226-84541-11	Magnetic Bimetal	Silicone/PTFE	3.0 mm	55° shore A	-60°C up to 200°C	
226-84527-11	-	Silicone/PTFE, ultra-clean	3.1 mm	45° shore A	Up to 250°C	
226-84528-11	-	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	Up to 300°C	
226-84529-11	Aluminum silver	-	-	-	-	

20mL crimp vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Cap / Septa	Cap/Septa part number
226-84520-31	Clear	226-84520-01	Gold magnetic, Silicone/ PTFE, ultra-clean	226-84523-11
226-84521-31	Clear	226-84520-01	Aluminum pressure release, Silicone/PTFE, ultra-clean	226-84524-11

Headspace Wash Kit

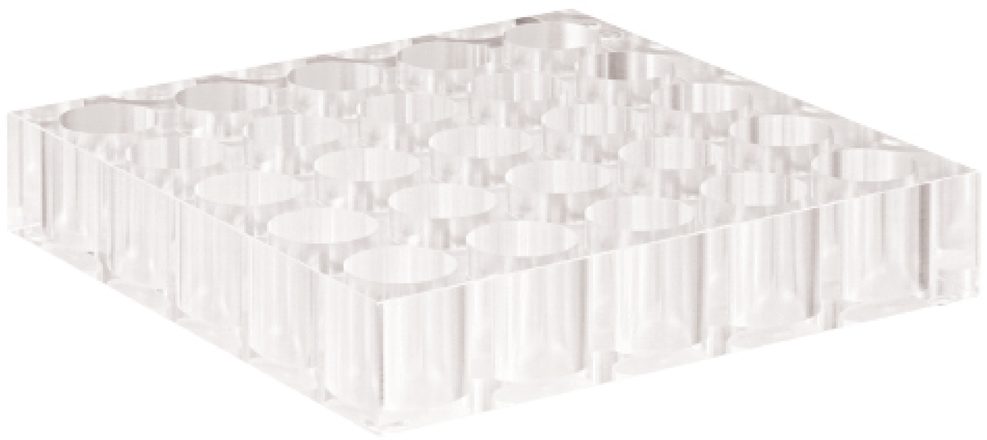
Part number	Vial type	Cap Type	Septa Material	Pack size
226-84600-00	10mL crimp vial	PE Snap Cap	Silicone/PTFE, Y-slitted	25

Vial rack for 10mL and 20mL vials

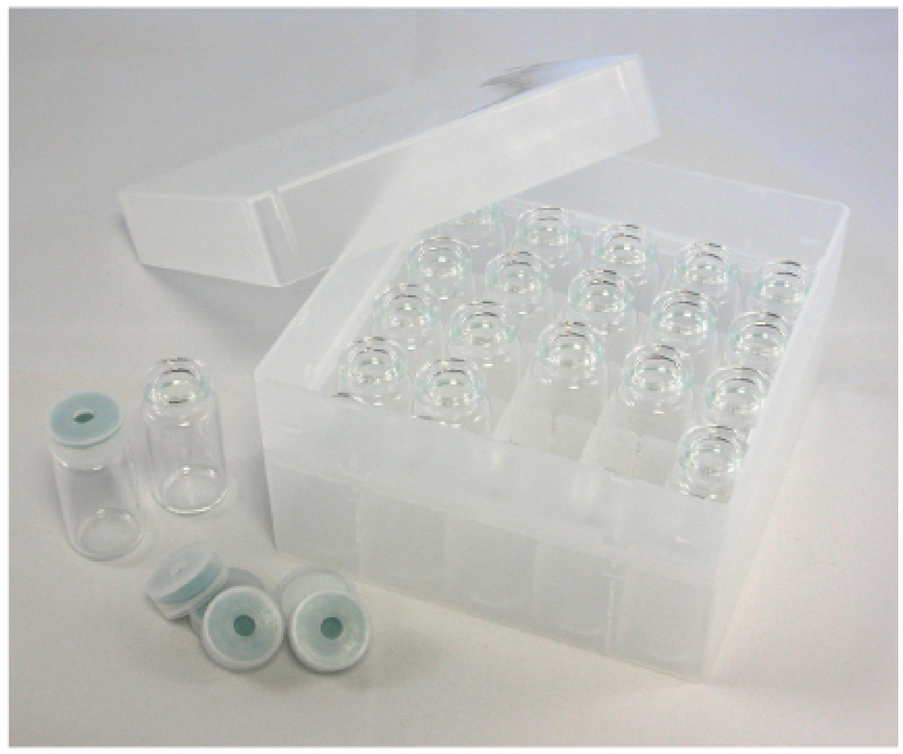
Part number	Type	Dimension	Cavities
226-84901-10	Acrylic	160 x 160 x 30mm	25

Crimper/Decapper for 10mL and 20mL crimp vials

Part number	Description
226-84002-00	20mm Crimper
226-84012-00	20mm Decapper



Acrylic vial rack



Headspace wash kit

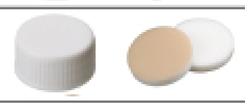
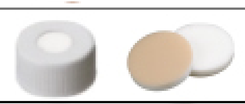
EPA vials

Shimadzu EPA vials are manufactured from 1st hydrolytic class glass, meeting EPA requirement. The flat bottomed EPA screw vials are available in 20 mL, 30 mL, 40 mL and 60 mL sizes in either clear or amber for light sensitive samples. Both injection and solid storage caps pre-assembled with septa are available for these vials. We recommend Ultrabond seals caps where the cap and septa form an inseparable unit, avoiding the issue of septa falling out or pushing into the vial. EPA vials and caps are sold separately in 100 per pack. Convenience vial kits with vials and pre-assembled caps are also available.

EPA screw vials, 100/pack

Part number	Volume	Vial	Size
226-84531-01	20 mL	Clear	ND 24
226-84532-01	20 mL	Amber	ND 24
226-84537-01	30 mL	Clear	ND 24
226-84537-21	30 mL	Amber	ND 24
226-84538-01	40 mL	Clear	ND 24
226-84538-21	40 mL	Amber	ND 24
226-84539-01	60 mL	Clear	ND 24
226-84539-21	60 mL	Amber	ND 24

Caps/septa for EPA screw vials, 100/pack

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Picture
226-84533-11	White PP, centre hole	Silicone/PTFE (EPA-Quality)	3.2 mm	45° shore A	
226-84534-11	White PP, closed top	Silicone/PTFE (EPA-Quality)	3.2 mm	45° shore A	
226-84535-11	White PP, centre hole	Silicone/PTFE (EPA-Quality) *	3.2 mm	45° shore A	
226-84537-11	White PP, closed top	Butyl/PTFE	2.5 mm	55° shore A	
226-84538-11	White PP, centre hole	Butyl/PTFE	2.5 mm	55° shore A	
226-84536-11	-	Silicone/PTFE (EPA-Quality)	3.2 mm	45° shore A	

* UltraBond seal, cap & septa form an inseparable unit, so that septa cannot fall out.

EPA screw vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Septa material	Cap/Septa part number
226-84531-31	20 mL clear	226-84531-01	Centre hole, Silicone/PTFE (EPA-Quality)	226-84533-11
226-84532-31	20 mL clear	226-84531-01	Closed top, Silicone/PTFE (EPA-Quality)	226-84534-11
226-84533-31	20 mL clear	226-84531-01	Centre hole, Silicone/PTFE (EPA-Quality) *	226-84535-11
266-84537-31	30 mL clear	226-84537-01	Centre hole, Silicone/PTFE (EPA-Quality) *	226-84535-11
226-84538-31	40 mL clear	226-84538-01	Centre hole, Silicone/PTFE (EPA-Quality)	226-84533-11

* UltraBond seal, cap & septa form an inseparable unit, so that septa cannot fall out.

Storage screw vials and caps, 100/pack

Part number	Volume	Vial	Size	Cap/Septa part number	Cap Material	Septa Material
226-54220-01	1.5 mL	Clear	ND 8	226-54221-01	PP Black closed top	Silicone/PTFE
226-54222-01	1.5 mL	Amber	ND 8	226-54221-01	PP Black closed top	Silicone/PTFE
226-84410-21	4 mL	Clear	ND 13	226-84413-01	PP Black closed top	Silicone/PTFE
226-84411-21	4 mL	Amber	ND 13	226-84413-01	PP Black closed top	Silicone/PTFE
226-84416-01	8 mL	Clear	ND 15	226-84416-02	PP Black closed top	Silicone/PTFE
226-84416-21	8 mL	Amber	ND 15	226-84416-02	PP Black closed top	Silicone/PTFE
226-84417-01	12 mL	Clear	ND 15	226-84416-02	PP Black closed top	Silicone/PTFE
226-84417-21	12 mL	Amber	ND 15	226-84416-02	PP Black closed top	Silicone/PTFE
226-84418-01	16 mL	Clear	ND 18	226-84418-02	PP Black closed top	Silicone/PTFE

40mL TOC Vial Certified Kits, 72/pack

Part number	Description	Remarks
226-50580-00	40mL TOC Vial Certified Kit, incl. cap and 0.068" Silicon/PTFE septa	Comes with certificate certified <10ppb Carbon, meets USP Method 643
226-50581-00	40mL TOC Vial Certified Kit, incl. cap and 0.125" Silicon/PTFE septa	
226-50582-00	40mL TOC Vial Certified Kit, incl. cap and 0.125" Silicon/PTFE septa,with dust covers	Each vial has an individual dust cover

40mL TOC Vial Kits Separate Components

Part number	Description	Consist of
226-50585-00	40mL TOC clear vial, 144/pack	-
226-50586-00	PP Cap, centre hole, with 0.125" Silicon/PTFE septa, for 40mL vial, 72/pack	226-50587-00 & 226-50588-00
226-50587-00	PP cap, centre hole, for 40mL vials, 72/pack	-
226-50588-00	Septa only, 0.125" Silicon/PTFE, for 40mL vial, 72/pack	-
226-50589-00	PP Caps, with welded 0.068" Silicon/PTFE septa, for 40mL vial, 72/pack	-

Dedicated Pretreatment Vials for CLAM-2000

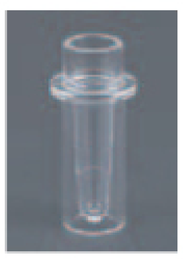
CLAM-2000 is compatible with dedicated disposable pretreatment vials from Shimadzu. Filtration and Collection vials are used as a pair.

Part number	Description		
241-16531-41	Vial set	Set of 100	* Sold as a set
241-16531-42	Vial set	Set of 500	* Sold as a set

Dedicated
Filtration Vial

Dedicated
Collection Vial

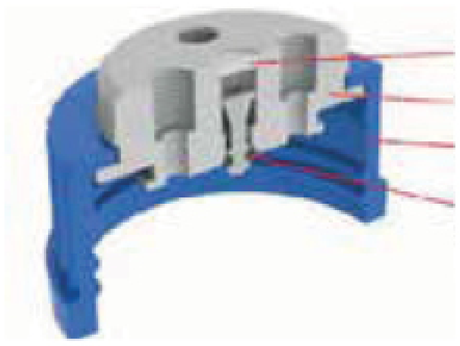
Specifications of Applicable Sample and Reagent Vials

Sample Containers	13 mm body diameter × 75 mm tall Examples: BD brand Vacutainer blood collection tubes Terumo brand Venoject II blood collection tubes Nipro brand Neotube blood collection tubes, etc.	
	2 mL cup P/N 038-00180 Sample Cup, 1270016HIT	
	X Micro-volume cup P/N 241-94045-01 Sample Cup, Micro	
Reagent Vials	2 mL vial P/N 038-00083-01 Vial, 2.0mL Glass Shell Vial	
	6 mL vial P/N 038-00199-04 Vial, SCREW NO.2-C	
	12 mL vial P/N 038-00199-06 Vial, SCREW NO.4-C	

Solvent Safety Caps Kit

Features

- Minimize release of solvent odors
- One-way emission control valve allows air to enter the reservoir as solvent is removed
- Valve opens at a low 0.07psi to minimize back pressure

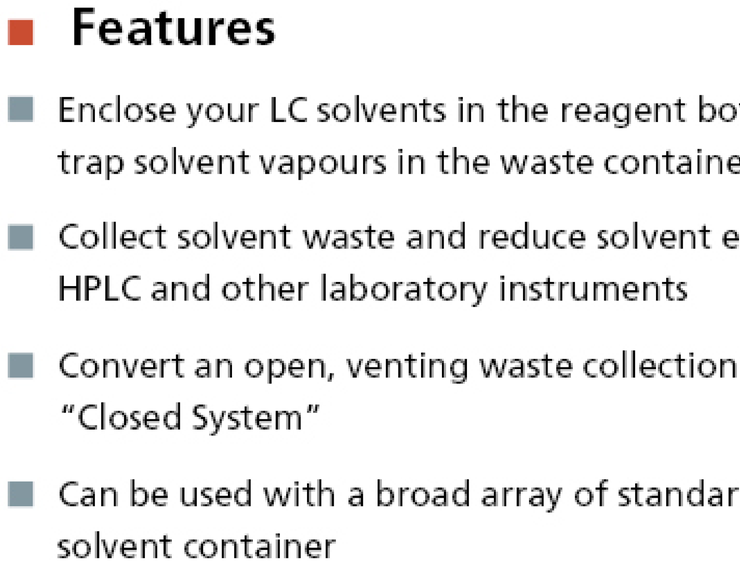


Part number		Description	Consists of	
①	226-50318-00	4 Ports bottle cap, 1 pc	-	
②	226-50319-00	2 Ports Bottle Cap, 1 pc	-	
③	226-50315-01	Plug, ¼-28, Virgin PTFE, 1pc	-	
④	226-50316-01	Tubing Connection, 1/8" OD tubing, Blue Polypropylene fitting, Yellow Tefzel ferrule, 1pc	-	
⑤	226-50318-01	4 Ports Bottle Caps Kit	226-50315-00	Plug, ¼-28, Virgin PTFE, 2 pcs
			226-50316-00	Tubing Connection, 1/8" OD tubing, Blue Polypropylene fitting, Yellow Tefzel ferrule, 4 pcs
			226-50318-00	Safety Bottle Cap, 1pc
⑥	226-50319-01	2 Ports Bottle Caps Kit	226-50315-01	Plug, ¼-28, Virgin PTFE, 1 pc s
			226-50316-02	Tubing Connection, 1/8" OD tubing, Blue Polypropylene fitting, Yellow Tefzel ferrule, 2 pcs
			226-50319-00	Safety 2 Ports Bottle Cap, 1pc

LC/LCMS Solvent Waste Kit

Features

- Enclose your LC solvents in the reagent bottles and trap solvent vapours in the waste container
- Collect solvent waste and reduce solvent emissions from HPLC and other laboratory instruments
- Convert an open, venting waste collection point to a "Closed System"
- Can be used with a broad array of standard laboratory solvent container
- Designed for ease of use and adaptability



A colour marker label at the top of the indicator tube, marked "EXPOSED," shows the colour at which the indicator has been fully exposed. When the colour approximates this label, the filter should be changed. If the indicator changes to a light yellow colour, it designates a prolonged exposure to solvent and should be replaced immediately.

Part number		Description	Consists of
①	226-50330-00	LC Solvent Waste Kit	GL45 safety cap manifold, exhaust filter, colour indicator, basic tubing connections and one DIN45, 6 litre, HDPE Jerrycan.
②	226-50350-00	LCMS Ion Source Waste Kit	PTFE GL45/DIN45 cap with (2) barbs for 1/2" ID tubing and one DIN45, 6 litre, HDPE Jerrycan.
③	226-50336-00	Activated Carbon exhaust filter for organic solvents	
③	226-50337-00	COLOR INDICATOR for activated carbon vapor filters	
④	226-50338-00	Exhaust Filter Adapter to 1/8" NPT port, 1pc	
⑤	226-50342-00	Bottle Thread Adapter, S40 (Merck) female to GL45 male, polypropylene, 1pc	

Carbon exhaust filter
with color indicator

Vacuum Filtration System

47 mm, Glass Filtration Set

- Unique filtration adaptor design can connect with GL45 storage bottle.
- Can filtrate and store solution directly in GL45 storage bottle without the need of being transferred from the -filtering flask.

Application: Purification of organic, corrosive liquid such as solvent (mobile phase) for HPLC analysis.

PTFE Coated Chemical Resistant Vacuum Pump

- No air pollution, maintenance free
  Rocker 300C vacuum pumps are driven by diaphragm, without the need of lubricant, regular oil changes and maintenance with no oil pollution.
- Good chemical resistance
  The diaphragm chamber of Rocker 300C is coated with PTFE and the SS # 316 valve plate can offer good resistance to a wide range of corrosive gases
- Thermal protection device
  Every motor of Rocker series pumps has a built-in thermal protection device to shut of the pump automatically when overheated and then resume working when the temperature cools down.
- International safety certification
  CE certification

Application: Vacuum filtration, Solid-Phase Extraction (SPE), Solvent purification

Part number	Item
226-82000-00	47mm Glass Filtration Set
226-82000-01	PTFE Coated Chemical Resistant Vacuum Pump
226-82000-31	47mm Glass Filtration set with pump

Glass Filtration Set

Filter funnel	Borosilicate glass
Funnel support base	Borosilicate glass
Membrane support	Sintered glass
Clamp	Anodized aluminum
Filtration Adaptor	PP (Autoclavable)
Storage Bottle	Borosilicate glass
Funnel capacity	300 mL
Flask capacity	1000 mL
Filter diameter	47 mm
Effective filtration area	9.6 cm²
Hose barb	5/16 inch (8 mm)

Vacuum Pump

Voltage	220V/50Hz
Max. power	60 W
Max. current	0.3 A
Max. vacuum	- 630 mmHg
Max. flow rate	20 l/min
Dimension (LxWxH)	28.5x13.5x20.4 cm

Solvent bottle and cap kit

- **Solvent bottle kit includes:**
- 1 cap, GL45 thread, with three ports
- Safety-coated glass bottle 1L
- Polypropylene male Luer plug

Part number	Description	Pack size
226-88585-31	Solvent bottles with caps and accessories	5
226-88583-01	Cap with accessories	4
226-88585-02	Solvent bottle 1L	5

Membrane and Syringe Filters, 100/pack

Type	Material	Pore Size / um	Diameter				
			4mm*	13mm	25mm	33mm	47mm*
Syringe filter	Nylon	0.22	226-82104-22	226-82113-22	226-52125-22	226-82133-22	
		0.45	226-82104-45	226-82113-45	226-52125-45	226-82133-45	
	Hydrophobic PTFE	0.22	226-82204-22	226-82213-22	226-52225-22	226-82233-22	
		0.45	226-82204-45	226-82213-45	226-52225-45	226-82233-45	
	Hydrophilic PTFE	0.22	226-82604-22	226-82613-22	226-82625-22	226-82633-22	
		0.45	226-82604-45	226-82613-45	226-82625-45	226-82633-45	
	CA	0.22	226-82504-22	226-82513-22	226-82525-22	226-82533-22	
		0.45	226-82504-45	226-82513-45	226-82525-45	226-82533-45	
	PES	0.22	226-82404-22	226-82413-22	226-82425-22	226-82433-22	
		0.45	226-82404-45	226-82413-45	226-82425-45	226-82433-45	
	PVDF	0.22	226-82304-22	226-82313-22	226-82325-22	226-82333-22	
		0.45	226-82304-45	226-82313-45	226-82325-45	226-82333-45	
	MCE	0.22	226-82704-22	226-82713-22	226-82725-22	226-82733-22	
		0.45	226-82704-45	226-82713-45	226-82725-45	226-82733-45	
Membrane filter	Nylon	0.22		226-52113-22	226-82125-22		226-82147-22
		0.45		226-52113-45	226-82125-45		226-52147-45
	Hydrophobic PTFE	0.22		226-52213-22	226-82225-22		226-82247-22
		0.45		226-52213-45	226-82225-45		226-52247-45
	PES	0.22		226-52413-22	226-52425-22		226-52447-22
		0.45		226-52413-45	226-52425-45		226-52447-45
	PVDF	0.22		226-52313-22	226-52325-22		226-52347-22
		0.45		226-52313-45	226-52325-45		226-52347-45

* 200/pack

CoreFocus
SHIMADZU

GC Columns and Consumables

GC Columns

The Shimadzu offers a wide range of GC columns:

Fused silica capillary

Suitable for general purpose through to specific GC and GC/MS application.

- SH-I
- SH-PolarWax, SH-FAME

PLOT – Fused silica and metal

Ideal for efficient, reproducible analyses of permanent gases, solvents, and hydrocarbons

- SH-Alumina BOND/NaSO4, Alumina BOND/KCl
- SH-Msieve 5A
- SH-Q-BOND, SH-U-BOND
- SH-Silica

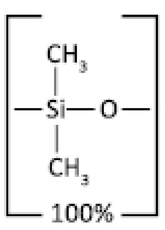
MXT – Metal capillary

Ideal for High-Temperature GC Analysis. General-purpose column for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g., Aroclor mixes), essential oils, and semi-volatiles.

Shimadzu GC columns undergo rigorous testing to ensure they provide you with the best separation possible. Every GC column is tested at the maximum operating temperature for the column, and specific tests are undertaken based on the application the column is targeted for. This means you can be confident of a reliable separation, column after column.

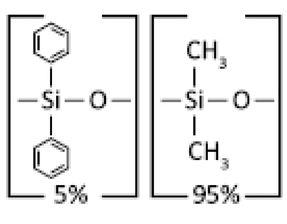
Structures, polarities, properties, and uses for Shimadzu capillary column phases, in order of increasing polarity

SH-I-1Ms, SH-1HT,
SH-I-1
Dimethyl polysiloxane



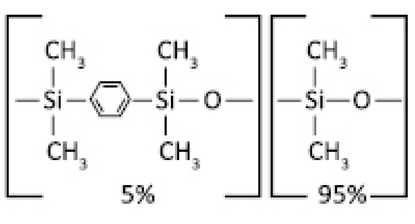
Similar to: (100%-methyl)-polysiloxane Polarity: nonpolar
Uses: solvents, petroleum products, pharmaceutical samples, waxes

SH-I-5Ms, SH-I-5HT,
SH-5, SH-5MS
Diphenyl dimethyl polysiloxane



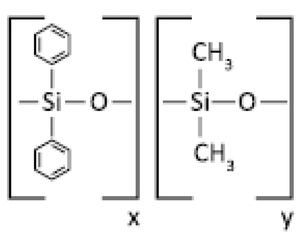
Similar to: (5%-phenyl)-methylpolysiloxane Polarity: slightly polar
Uses: flavors, environmental, aromatic hydrocarbons

SH-I-5Sil MS
1,4-bis(dimethylsiloxy)phenylene dimethyl polysiloxane



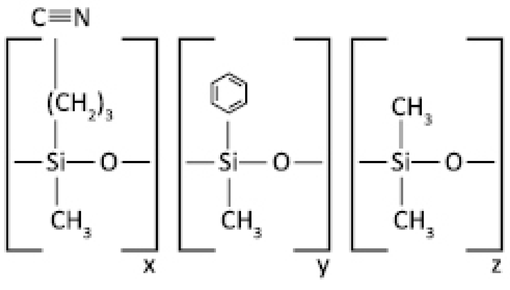
Similar to: (5%-phenyl)-methylpolysiloxane Polarity: slightly polar
Uses: flavors, environmental, pesticides, PCBs, aromatic hydrocarbons

SH-20, SH-25
Diphenyl dimethyl polysiloxane



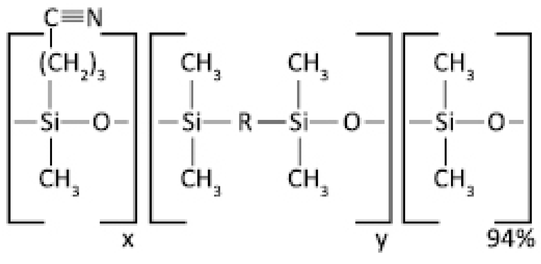
Similar to: (20%-phenyl)-methylpolysiloxane Polarity: slightly polar
Uses: volatile compounds, alcohols

SH-1301, SH-624
Cyanopropylmethyl phenylmethl polysiloxane



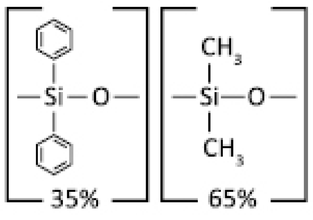
Similar to: (6%-cyanopropylphenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: volatile compounds, insecticides

SH-I-624Sil MS



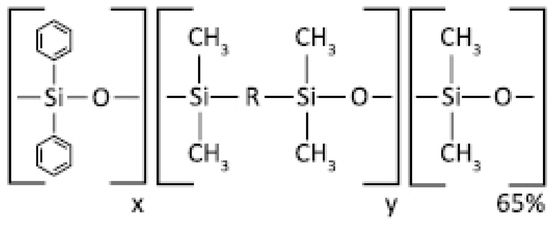
Similar to: (6%-cyanopropylphenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: volatile compounds, insecticides, residue solvents in pharmaceutical products

SH-35
Diphenyl dimethyl polysiloxane



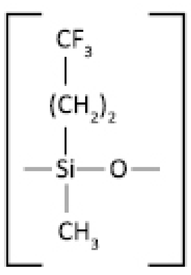
Similar to: (35%-phenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: pesticides, PCBs, amines, nitrogen-containing herbicides

SH-I-35Sil MS



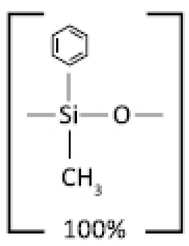
Similar to: (35%-phenyl)-methylpolysiloxane Polarity: intermediately polar
Uses: pesticides, PCBs, amines, nitrogen-containing herbicides

SH-200
Trifluoropropylmethyl polysiloxane



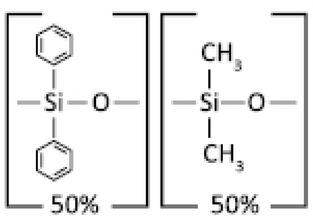
Similar to: (trifluoropropyl)-methylpolysiloxane
Polarity: selective for lone pair electrons Uses: environmental, solvents, Freon® gases, drugs, ketones, alcohols

SH-50
Phenyl methyl polysiloxane



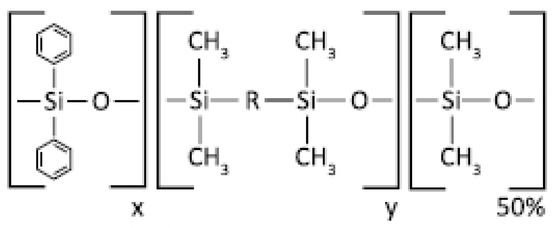
Similar to: (50%-phenyl)-methylpolysiloxane Polarity: intermediately polar
Uses: FAMEs, carbohydrates

SH-I-17
Diphenyl dimethyl polysiloxane



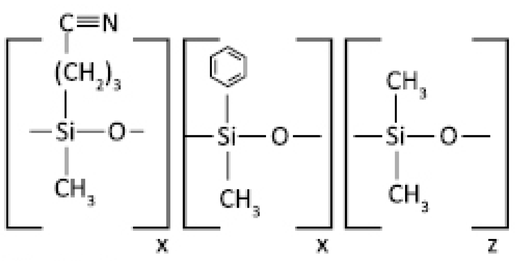
Similar to: (50%-phenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: triglycerides, phthalate esters, steroids, phenols

SH-I-17Sil MS



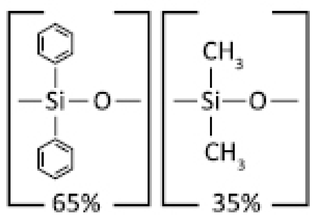
Similar to: (50%-phenyl)-methylpolysiloxane Polarity: intermediately polar
Uses: triglycerides, phthalate esters, steroids, phenols

SH-1701



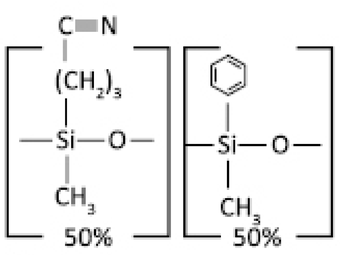
Similar to:
(14%-cyanopropylphenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: pesticides, PCBs, alcohols, oxygenates

SH-65
Diphenyl dimethyl polysiloxane



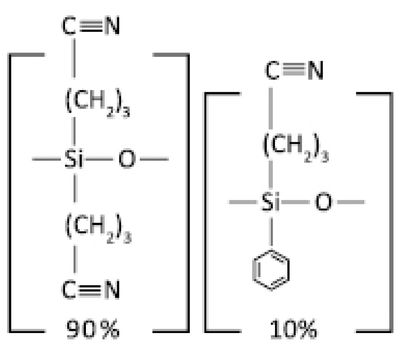
Similar to: (65%-phenyl)-methylpolysiloxane Polarity: intermediately polar
Uses: triglycerides, rosin acids, free fatty acids

SH-225
Cyanopropylmethyl phenylmethyl polysiloxane



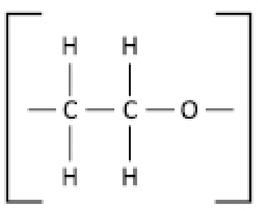
Similar to:
(50%-cyanopropylmethyl)-methylphenylpolysiloxane
Polarity: polar
Uses: FAMEs, carbohydrates

SH-2330
Biscyanopropyl cyanopropylphenyl polysiloxane



Similar to: (95%-cyanopropyl)-phenyl polysiloxane Polarity: polar
Uses: cis/trans FAMEs, dioxin isomers, rosin acids

SH-PolarWax, SH-Wax
Polyethylene glycol



Polarity: polar
Uses: FAMEs, flavors, acids, amines, solvents, xylene isomers

**Structures, polarities, and properties also apply to metal MXT® stationary phases.

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	C-6
SH-I-1HT	100% dimethyl polysiloxane	–	DB-1HT	–	–	ZB-1HT Inferno		AT-1ht	C-8
SH-I-5MS	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	HP-5ms UI, HP-5ms, DB-5, Ultra-2, CP Sil 8 CB	SPB-5, Equity-5	BP-5	ZB-5, ZB-5MSi	007-5	AT-5ms	C-7
SH-I-5HT	5% diphenyl / 95% dimethyl polysiloxane	–	DB-5HT, VF-5HT	–	HT-5	ZB-5HT Inferno	–	–	C-8
SH-I-5Sil MS	1,4-bis(dimethylsiloxy)phenylene dimethyl polysiloxane	–	DB-5ms UI, DB-5ms, VF-5ms	SLB-5ms	BPX-5	ZB-5MS, ZB-Semi-Volatiles	007-5MS	–	C-9
SH-I-XLB	Unique phase	–	DB-XLB, VF-Xms	–	–	ZB-MR1, ZB-XLB	–	–	C-10
SH-I-17	50% diphenyl / 50% dimethyl polysiloxane	G3	HP-17, DB-17, DB-17HT, DB-608	SPB-17	–	ZB-50	–	–	C-11
SH-I-35Sil MS	Similar to 35% phenyl methyl polysiloxane	–	DB-35ms, DB-35ms UI, VF-35ms	–	BPX-35	ZB-MR2	–	–	C-11
SH-I-17Sil MS	Similar to 50% phenyl methyl polysiloxane	G3, G17	DB-17ms, VF-17ms,	–	BPX-50	–	–	–	C-12
SH-I-PAH	Ideal for EFSA PAH4 analysis	–	–	–	–	–	–	–	C-12
SH-I-624Sil MS	Similar to 6% cyanopropylphenyl / 94% dimethyl polysiloxane	G43	HP-624, DB-624, VF-624ms, CP-Select	–	BP-624	–	–	–	C-13
SH-I-1301Sil MS	Similar to 6% cyanopropylphenyl / 94% dimethyl polysiloxane	–	VF-1301ms	–	–	–	–	–	C-14
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	C-15
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	C-16
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	C-17
SH-20	20% diphenyl / 80% dimethyl polysiloxane	G28, G32	–	SPB-20	–	–	007-20	AT-20, EC-20	C-18
SH-25	25% diphenyl / 75% dimethyl polysiloxane	–	–	–	–	–	–	–	C-18
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	C-19
SH-50	100% methyl phenyl polysiloxane	G3	HP-50+, CP-Sil 24 CB	SPB-50	BPX-50	–	007-17	AT-50	C-20
SH-65	65% diphenyl / 35% dimethyl polysiloxane	–	–	–	–	–	007-65HT	–	C-20
SH-1301	6% cyanopropylphenyl / 94% dimethyl polysiloxane	G43	DB-1301, CP-1301	SPB-1301	BP-624	ZB-624	007-1301	AT-1301	C-21
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	C-21
SH-1701	14% cyanopropylphenyl / 86% dimethyl polysiloxane	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	C-22

Shimadzu	Stationary Phase	USP	Similar Phases						Page
			Agilent	Supelco	SGE	Phenomenex	Quadrex	Alltech	
SH-200 / SH-200MS	Trifluoropropylmethyl polysiloxane	G6	DB-210, DB-200, VF-200ms	–	–	–	–	AT-210	C-23
SH-225	50% cyanopropylmethyl / 50% phenylmethyl polysiloxane	G7, G19	DB-225, DB-225MS, CP-Sil 43 CB	SPB-225	BP-225	–	007-225	AT-225	C-25
SH-2330	90% biscyanopropyl / 10% cyanopropylphenyl polysiloxane (Non-bonded)	G8, G48	DB-23, VF-23ms	SP-2330, SP-2331, SP-2380	BPX-70	–	007-23	AT-Silar90	C-25
SH-2560	Biscyanopropyl polysiloxane	–	HP-88, CP-Sil 88	SP-2560	–	–	–	–	C-26
SH-Wax	Polyethylene glycol	G14, G15, G16, G20, G39	DB-Wax, CP-Wax 52 CB	–	BP-20	ZB-Wax	007-CW	AT-WAXms, EC-WAX	C-27
SH-PolarWax	Polyethylene glycol	G14, G15, G16, G20, G39	HP-INNOWax, CP-Wax 52 CB, VF-WAX MS	Supelcowax-10	–	ZB-Wax Plus	–	AT-WAX	C-28
Dedicated Columns									
SH-1614	Ideal for analysis of PBDE	–	–	–	–	–	–	–	C-29
SH-OPP2	Ideal for analysis of organophosphorus pesticides	–	–	–	–	–	–	–	C-30
SH-CLP / SH-CLP II	Ideal for analysis of organochlorine pesticides	–	DB-CLP1 / DB-CLP2	–	–	ZB-CLP1 ZB-CLP2	–	–	C-31
SH-VMS	Ideal for analysis of volatile organic pollutants	–	–	–	–	–	–	–	C-32
SH-VRX		–	DB-VRX	–	–	–	–	–	C-33
SH-PCB	Ideal for analysis of PCB congeners	–	–	–	–	–	–	–	C-33
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	–	–	C-34
SH-FAME	Ideal for analysis of FAMEs	G16	Select FAME	Omegawax	–	–	–	AT-AquaWax, AT-FAME	C-35
SH-Volatil Amin	Ideal for analysis of volatile amines	–	–	–	–	–	–	–	C-35
SH-5 Amine / SH-35 Amine	Ideal for analysis of amines	–	–	–	–	–	–	–	C-36
SH-PolarD	Ideal for analysis of free acid	G25, G35	HP-FFAP, DB-FFAP, VF-DA, CP-Wax 58 FFAP CB	SPB-1000, Nukol	BP-21	ZB-FFAP	007-FFAP	AT-AquaWax-DA, AT-1000, EC-1000	C-37
SH-PolarX	Ideal for analysis of amines	–	CAM, CP-Wax 51 for Amines	Carbowax Amine	–	–	–	AT-CAM	C-38
PLOT Columns									
SH-Silica BOND	Bonded silica	–	GS-GasPRO, CP-SilicaPLOT	–	–	–	–	–	C-39
SH-Alumina BOND / Na2SO4	Aluminum oxide with Na2SO4 deactivation	–	GS-Alumina, CP-Al2O3/ Na2SO4	Alumina sulfate PLOT	–	–	–	AT-Alumina	C-40
SH-Alumina BOND / KCl	Aluminum oxide with KCl deactivation	–	GS-Alumina KCl, HP-PLOT Al2O3 KCl, CP-Al2O3/KCl	Alumina chloride PLOT	–	–	PLT-AL2O3	–	C-40
SH-Msieve 5A	Molecular Sieve 5A	–	HP-PLOT Molesieve, CP-Molsieve 5A	Mol Sieve 5A PLOT	–	–	PLT-5A	AT-Mole Sieve	C-41
SH-Q-BOND	100% divinylbenzene porous polymer	–	HP-PLOT Q, CP-PoraPLOT Q, CP-PoraBOND Q	Supel-Q PLOT	–	–	PLT-Q	AT-Q	C-42
SH-U-BOND	Divinylbenzene ethylene glycol / dimethylacrylate porous polymer	–	HP-PLOT U, CP-PoraPLOT U, CP-PoraBOND U	–	–	–	–	–	C-42
Metal Columns									
SH-MetalX-1	100% dimethyl polysiloxane	G1, G2, G38	DB-PS1	–	–	–	UAC-1	–	C-43
SH-MetalX-5	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	DB-PS5, VF-5ht UltiMetal	–	–	–	UAC-5	–	C-43
SH-MetalX-1701	Similar to (14%-cyanopropylphenyl)-methylpolysiloxane	G46	DB-PS1701	–	–	–	–	–	C-43
SH-MetalX-WAX	Carbowax polyethylene glycol	G14, G15, G16, G20, G39	DB-PSWAX	–	–	–	UAC-CW	–	C-43
SH-MetalX Biodiesel TG	Propietary phase	–	Bioiesel, Select Biodiesel	MET-Biodiesel	–	ZB-Bioethanol	–	–	C-43

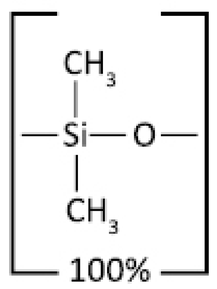
Capillary Columns

High-Performance Columns

SH-I-1MS

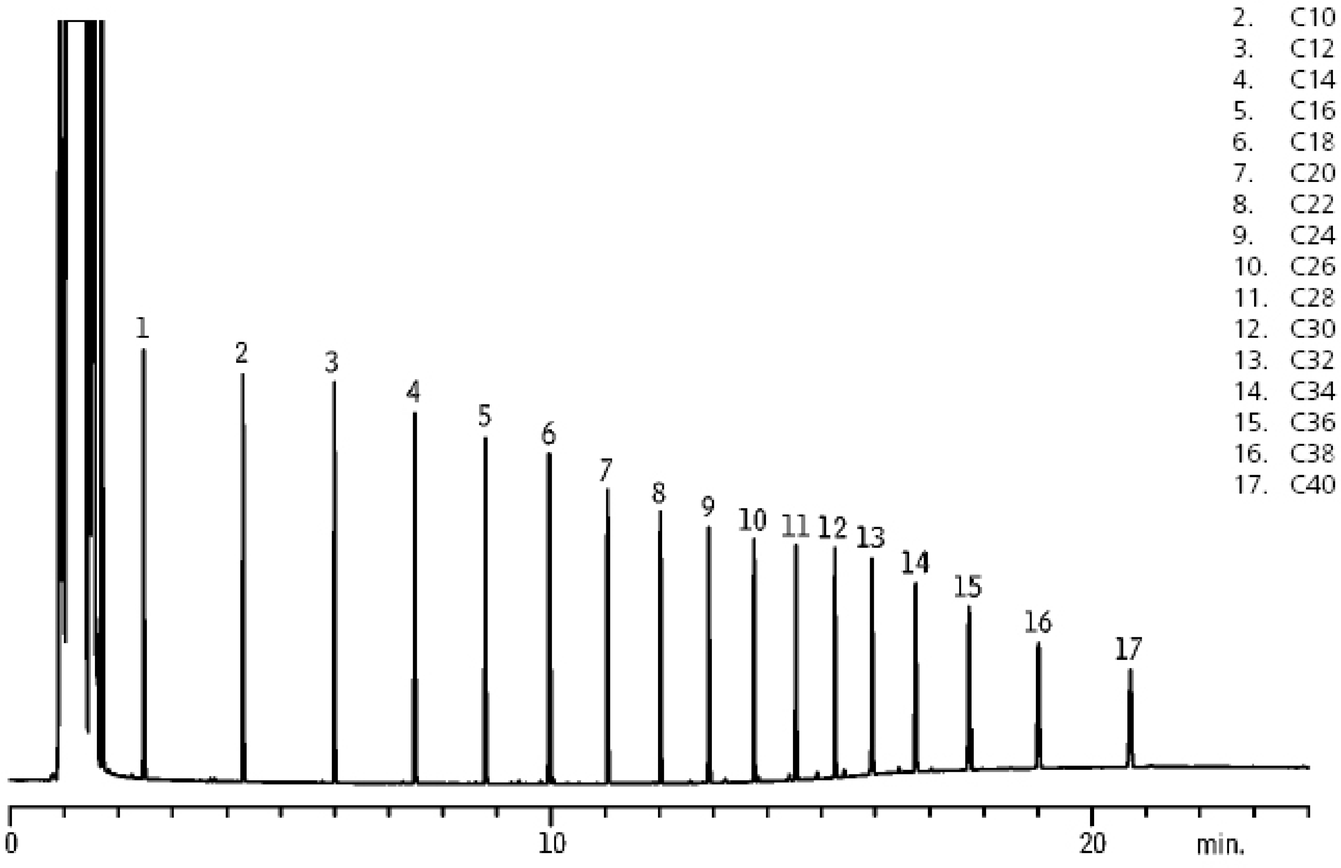
- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- Tested and guaranteed for ultra-low bleed; improved signal-to-noise ratio for better sensitivity and mass spectral integrity.
- General-purpose columns for arson accelerants, essential oils, hydrocarbons, pesticides, PCB congeners (e.g., Aroclor 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	20 m	25 m	50 m
0.15 mm	0.15 µm	-60 to 330/350 °C	227-36001-01	–	–
	2.00 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	–	227-36004-01	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
	1.00 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
	1.00 µm	-60 to 330/350 °C	–	227-36010-01	221-75928-60
	4.00 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	–
	1.00 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

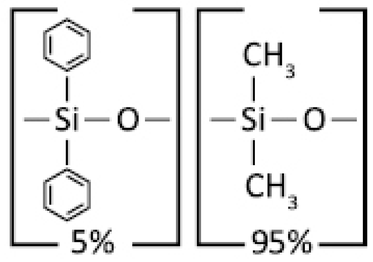
Capillary Columns

High-Performance Columns

SH-I-5MS

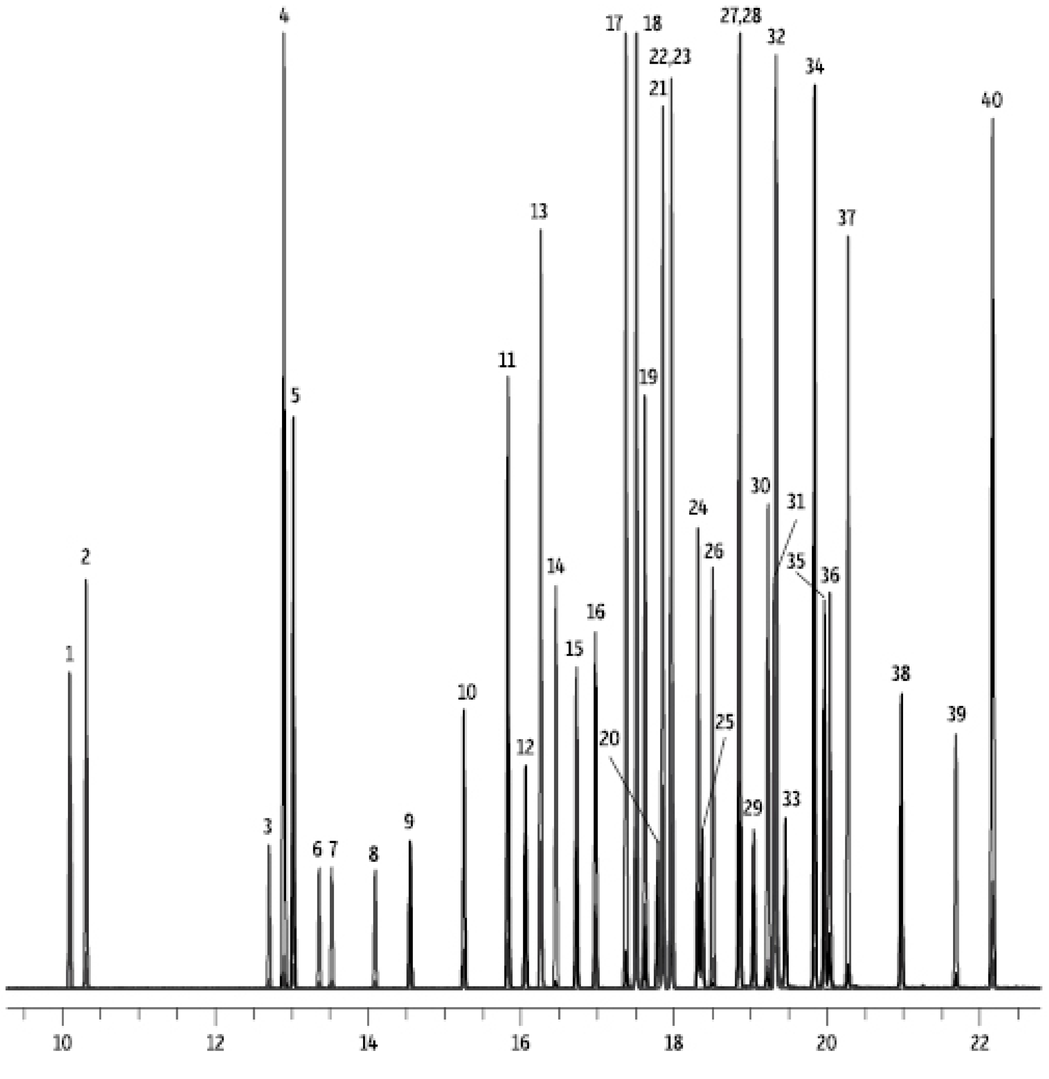
- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- Tested and guaranteed for ultra-low bleed; improved signal-to-noise ratio for better sensitivity and mass spectral integrity.
- General-purpose columns for semi-volatiles, phenols, amines, residual solvents, drugs of abuse, pesticides, 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	20 m	25 m	50 m
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
ID	**df**	**Temp. Range**	**15 m**	**30 m**	**60 m**
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
	1.00 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
	1.00 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	–
	1.00 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

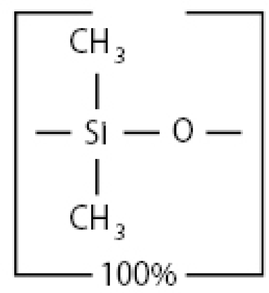
Conditions

Column : SH-I-5MS, 30 m, 0.25 mm ID, 0.25 um (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

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

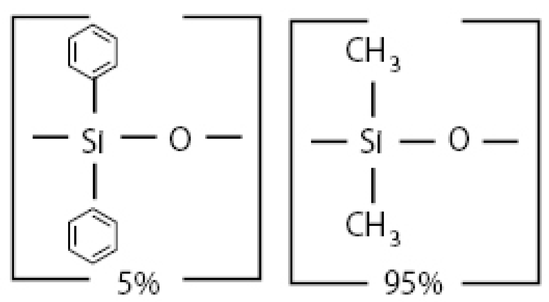


ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	-60 to 400 °C	227-36087-01	227-36087-02
	0.25 µm	-60 to 400 °C	–	227-36088-01
0.32 mm	0.10 µm	-60 to 400 °C	227-36089-01	227-36089-02
	0.25 µm	-60 to 400 °C	–	227-36090-01

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

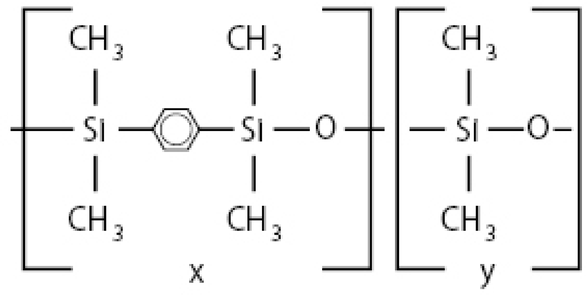
Capillary Columns

High-Performance Columns

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

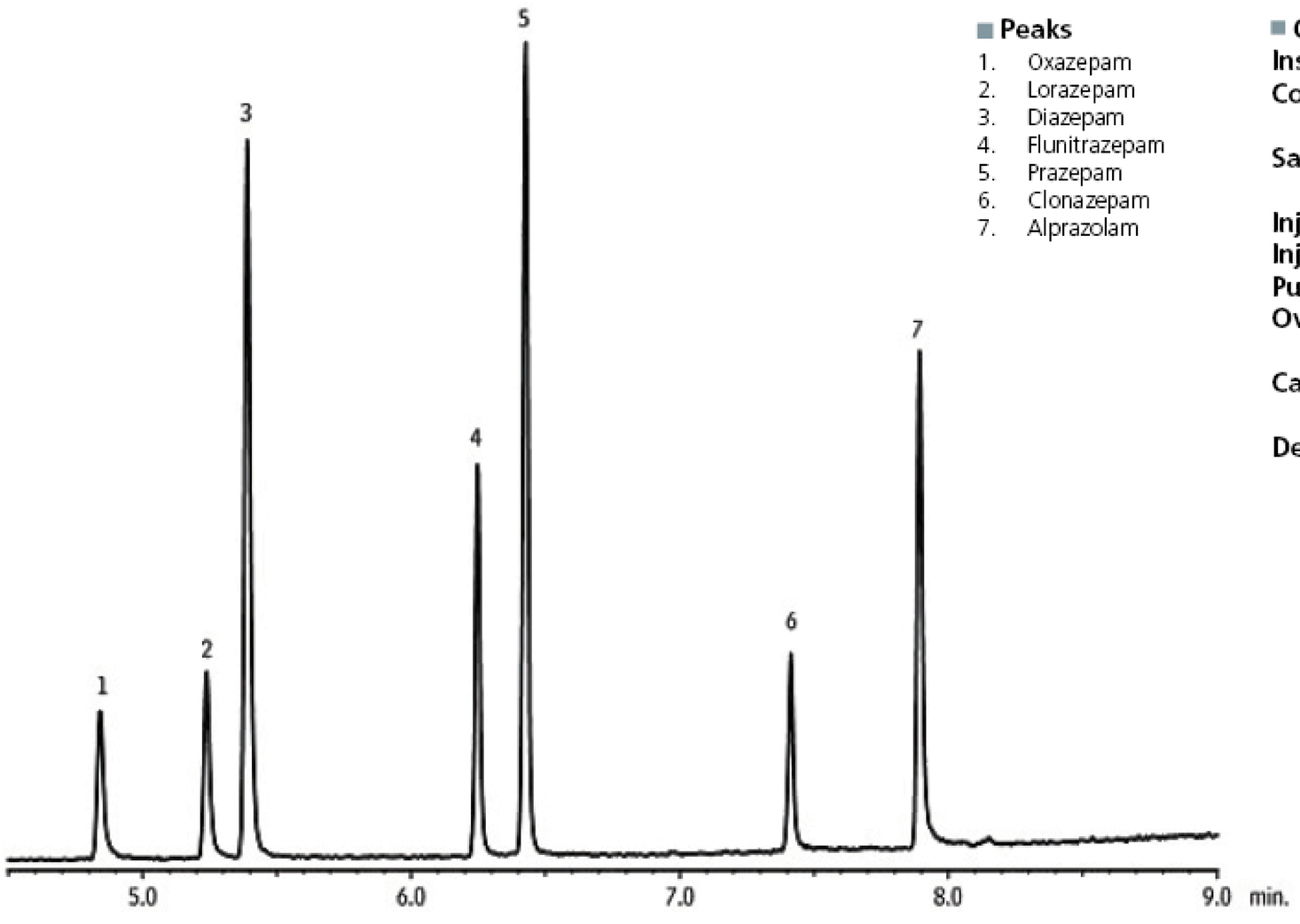
SH-I-5Sil MS Structure



For SH-I-5Sil MS columns with Integra-Guard™ column, please refer to page C-44.

ID	df	Temp. Range	10 m	20 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	–	–
	2.00 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	–	–
ID	**df**	**Temp. Range**		**15 m**	**30 m**	**60 m**
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	–
	1.00 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	–
	1.00 µm	-60 to 320/350 °C	–	–	227-36041-01	–
0.53 mm	1.50 µm	-60 to 320/330 °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

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

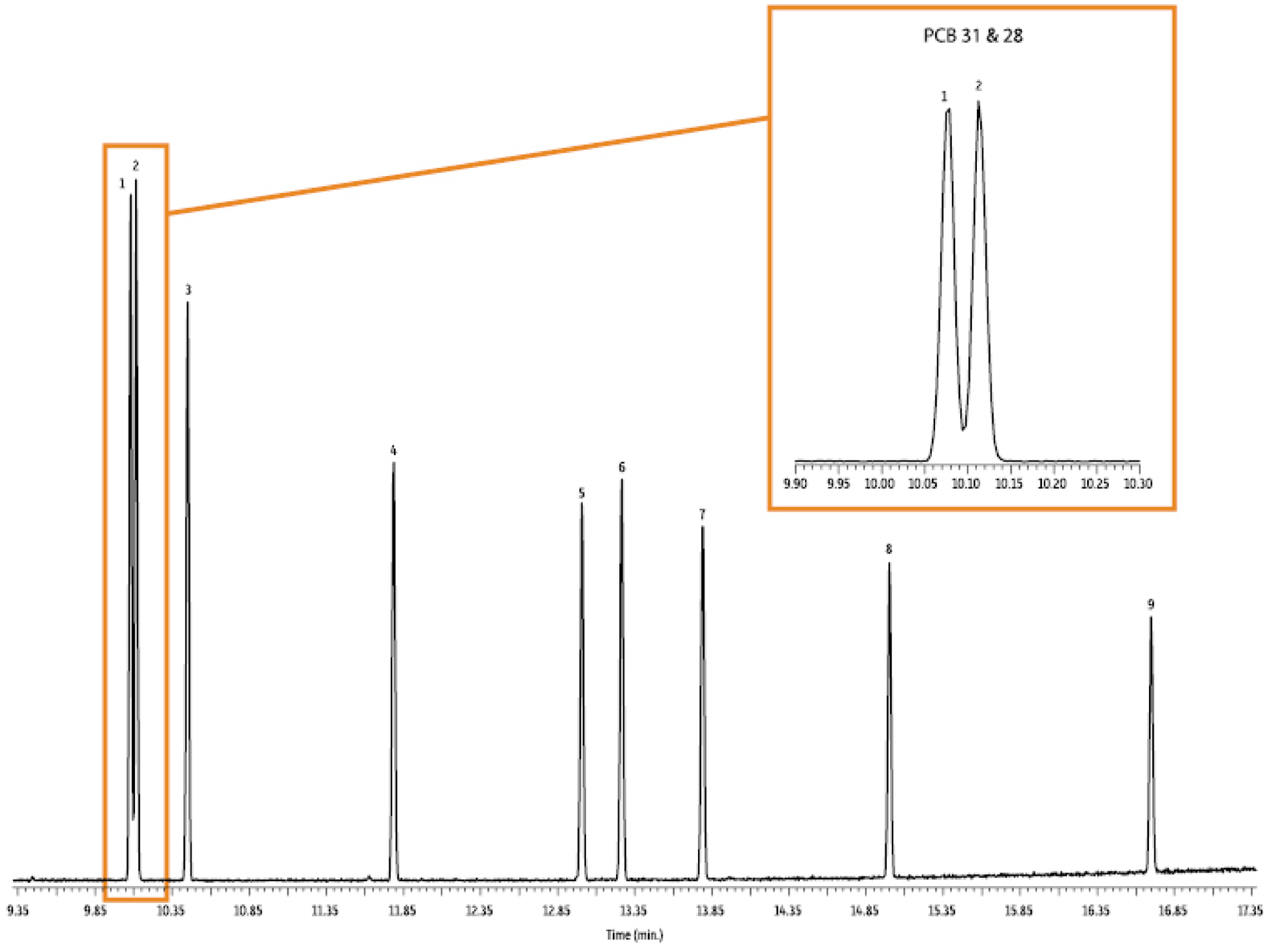
ID	df	Temp. Range	20 m	30 m	60 m
0.18 mm	0.18 µm	30 to 340/360 °C	227-36309-01	–	–
0.25 mm	0.10 µm	30 to 340/360 °C	–	227-36042-01	–
	0.25 µm	30 to 340/360 °C	–	227-36043-01	227-36043-02
	0.50 µm	30 to 340/360 °C	–	227-36044-01	–
	1.00 µm	30 to 340/360 °C	–	227-36045-01	–
0.32 mm	0.25 µm	30 to 340/360 °C	–	227-36046-01	227-36046-02
	0.50 µm	30 to 340/360 °C	–	227-36047-01	–
	1.00 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	–	227-36050-01	–

* 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

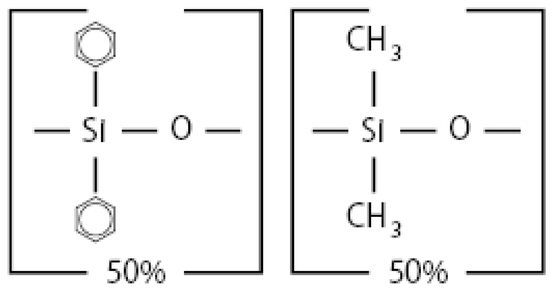
Capillary Columns

High-Performance Columns

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

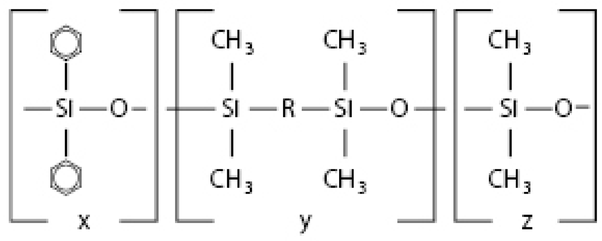


ID	df	Temp. Range	20 m	30 m
0.18 mm	0.18 µm	40 to 280/320 °C	227-36061-01	–
0.25 mm	0.25 µm	40 to 280/320 °C	–	221-75907-30
	0.50 µm	40 to 280/320 °C	–	227-36062-01
	1.00 µm	40 to 280/320 °C	–	227-36063-01
0.32 mm	0.25 µm	40 to 280/320 °C	–	227-36064-01
	0.50 µm	40 to 280/320 °C	–	227-36065-01
	1.00 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	–	227-36069-01
	1.00 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

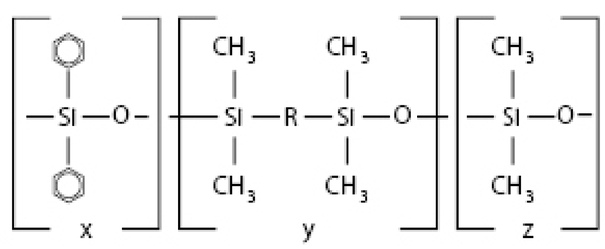


ID	df	Temp. Range	15 m	30 m
0.25 mm	0.25 µm	50 to 340/360 °C	227-36051-01	227-36051-02
	0.50 µm	50 to 340/360 °C	227-36052-01	227-36052-02
	1.00 µm	50 to 320/340 °C	227-36053-01	227-36053-02
0.32 mm	0.25 µm	50 to 340/360 °C	227-36054-01	227-36054-02
	0.50 µm	50 to 340/360 °C	227-36055-01	227-36055-02
	1.00 µm	50 to 320/340 °C	227-36056-01	227-36056-02
0.53 mm	0.50 µm	50 to 340/360 °C	227-36057-01	227-36057-02
	1.00 µm	50 to 325/340 °C	227-36058-01	227-36058-02
	1.50 µm	50 to 310/330 °C	227-36059-01	227-36059-02
	3.00 µm	50 to 280/300 °C	227-36060-01	227-36060-02

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	30 m	60 m
0.25 mm	0.25 µm	40 to 340/360 °C	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.

SH-I-PAH

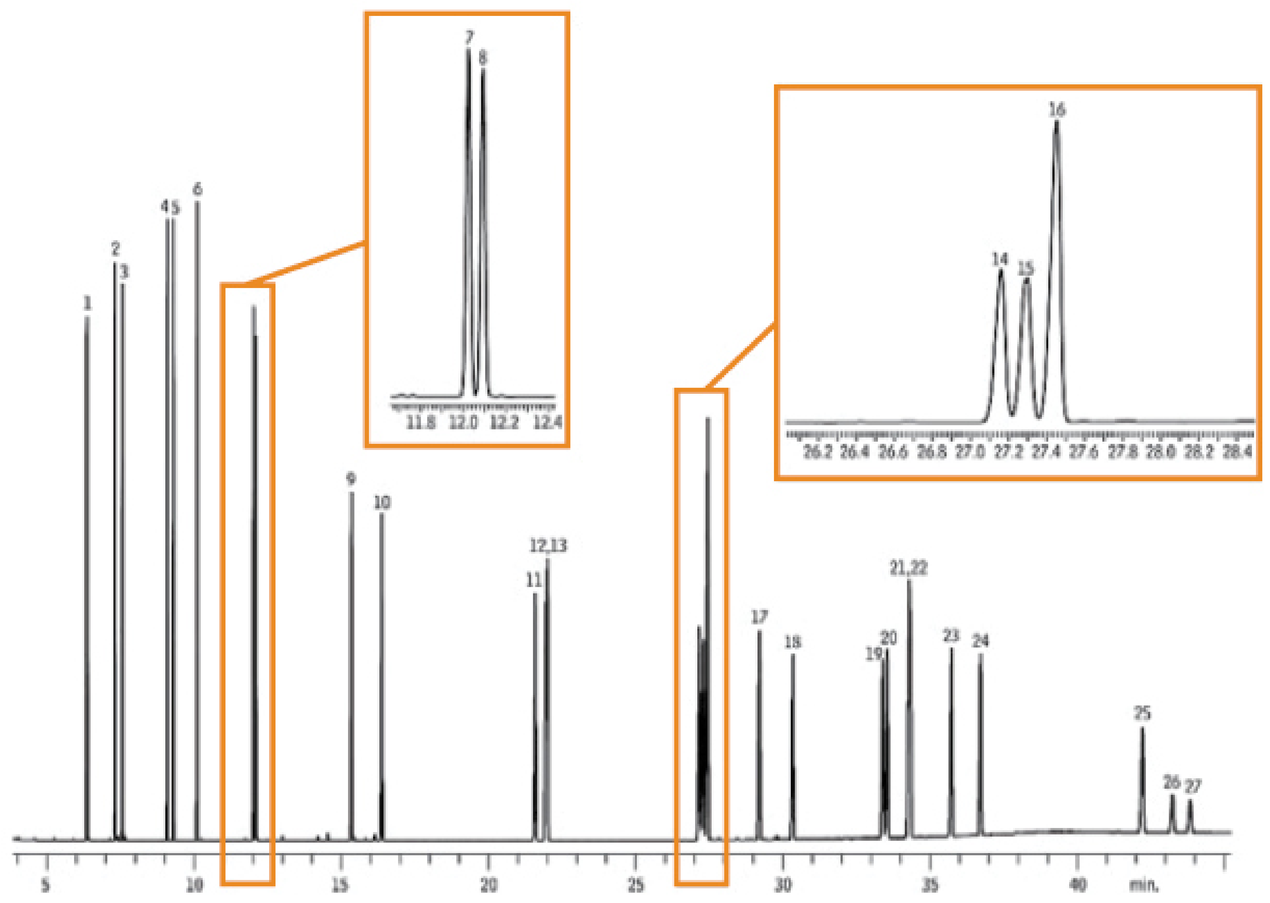
- Mid-polarity proprietary phase
- Ideal for EFSA PAH4 analysis—separates all priority compounds: benz[a]anthracene, chrysene, benzo[b]fluoranthene and benzo[a] pyrene.
- Best resolution of chrysene from interfering PAHs, triphenylene, and cyclopenta[cd]pyrene.
- Complete separation of benzo [b], [k],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

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

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]fl uoranthene
15. Benzo[k]fl uoranthene
16. Benzo(j)fl uoranthene
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 um (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

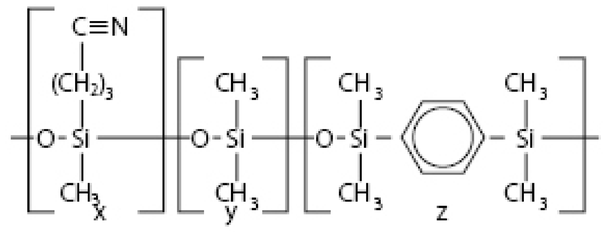
Capillary Columns

High-Performance Columns

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

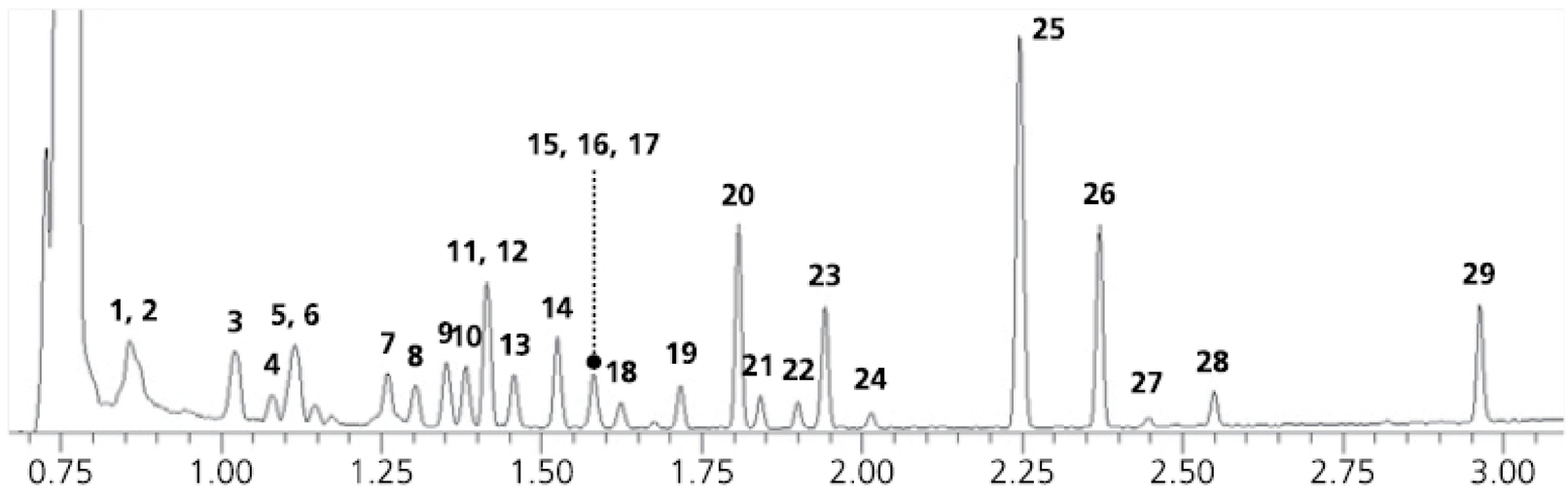


ID	df	Temp. Range	20 m	30 m	60 m	75 m	105 m
0.18 mm	1.00 µm	-20 to 300/320 °C	227-36075-01	–	–	–	–
0.25 mm	1.40 µm	-20 to 300/320 °C	–	221-75962-30	227-36076-01	–	–
0.32 mm	1.80 µm	-20 to 300/320 °C	–	227-36077-01	221-75963-60	–	–
0.53 mm	3.00 µm	-20 to 280/300 °C	–	227-36078-01	227-36078-02	227-36078-03	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-bromofl uorobenzene
29. 1,4-dichlorobenzene



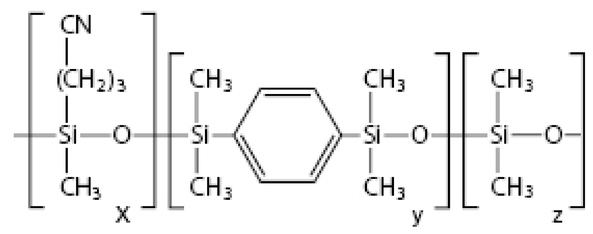
Conditions

Instrument	: GCMS-TQ8030 + HS-20 Loop	**Inj.**	: Split (split ratio 30:1)
Column	: SH-I-624Sil MS, 20 m, 0.18 mm ID, 1.00 µm (P/N: 227-36075-01)	**Oven Temp**	: 70 °C, 40 °C/min to 220 °C (hold 0.5 min)
		Carrier Gas	: He, constant linear velocity mode, 50 cm/sec
Headspace-Loop	: Loop volume: 1 mL	**Detector**	: MS: SIM
Sample Equilibration	: 70 °C for 30 min		MS/MS: MRM
Vial pressurization	: 0.5 min, 50 kPa, equilibration 0.05 min		Event (loop) time: 0.15 sec
Needle Flush	: 2 min		Source Temp: 200 °C
Sample Pathway Temp	: 200 °C		Interface Temp: 230 °C
Transfer Line Temp	: 200 °C		

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
	1.00 µm	-60 to 320 °C	–	227-36080-01	227-36080-02
0.32 mm	0.25 µm	-60 to 320 °C	–	227-36081-01	–
	1.00 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	1.00 µm	-60 to 320 °C	227-36084-01	227-36084-02	–
	1.50 µm	-60 to 320 °C	–	227-36085-01	–
	3.00 µm	-60 to 320 °C	–	227-36086-01	227-36086-02

Guard columns for SH are also available. Please refer to page C-44.

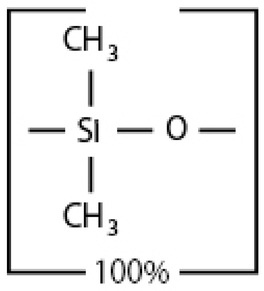
Capillary Columns

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 Integra-Guard™ column, please refer to page C-44.

ID	df	Temp. Range	10 m	15 m	25 m	30 m	60 m	105 m
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	–	221-75719-25	221-75719-30	221-75719-60	–
	0.50 µm	-60 to 330/350 °C	–	–	–	227-36097-01	227-36097-02	–
	1.00 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	–
	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	–
	1.00 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	–
	3.00 µm	-60 to 280/300 °C	–	–	–	227-36102-01	227-36102-02	–
	4.00 µm	-60 to 280/300 °C	–	–	–	227-36103-01	–	–
	5.00 µm	-60 to 260/280 °C	–	–	–	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	–
	1.00 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	–
	3.00 µm	-60 to 270/290 °C	–	–	–	221-75733-30	221-75733-60	–
	5.00 µm	-60 to 270/290 °C	–	–	–	221-75734-30	221-75734-60	–
	7.00 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-PONA

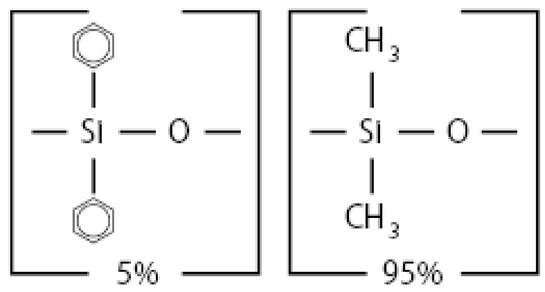
Compatible with ASTM and CGSB for hydrocarbon analysis.

ID	df	Temp. Range	100 m
0.25 mm	0.50 µm	-60 to 300/340 °C	221-76196-00

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 Integra-Guard™ column, please refer to page C-44.

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	–	221-76178-25	221-76178-30	227-36111-01
	1.00 µm	-60 to 320/340 °C	–	–	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
	1.00 µm	-60 to 320/340 °C	–	–	221-75705-30	221-75705-60
	1.50 µm	-60 to 310/330 °C	–	–	221-76181-30	227-36115-01
	3.00 µm	-60 to 280/300 °C	–	–	227-36116-01	227-36116-02
0.53 mm	0.10 µm	-60 to 320/340°C	–	–	227-36117-01	–
	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	–	–	221-75709-30	227-36119-01
	1.00 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
	3.00 µm	-60 to 270/290 °C	–	–	221-75712-30	227-36121-01
	5.00 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 C-43.

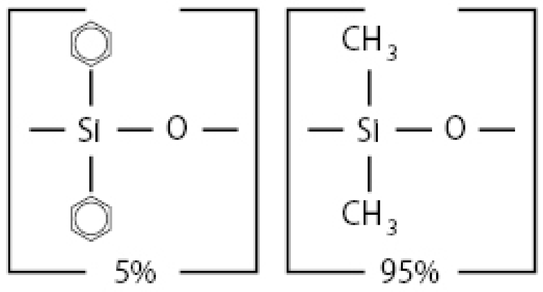
Capillary Columns

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

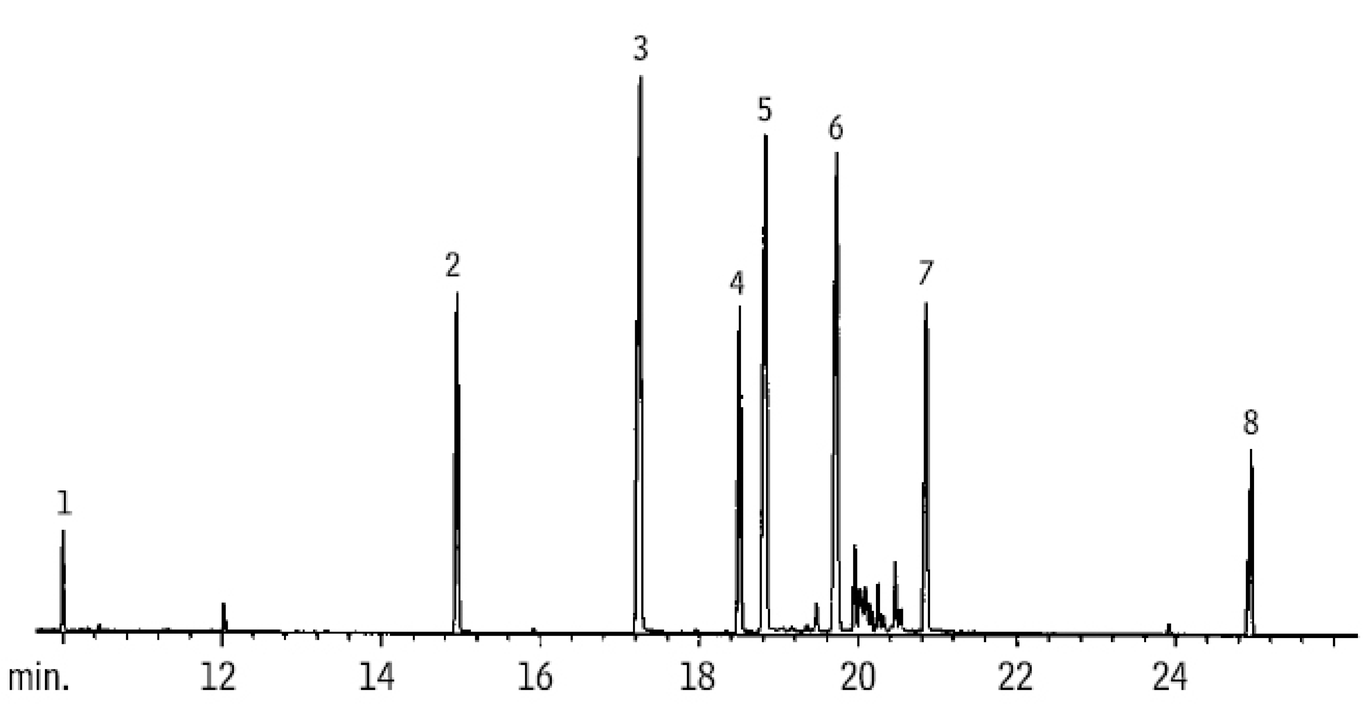


For SH-I-5MS columns with Integra-Guard™ column, please refer to page C-44.

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
	1.00 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
	1.00 µm	-60 to 325/350 °C	–	227-36127-01	–
0.53 mm	0.50 µm	-60 to 320/340 °C	–	221-76191-30	–
	1.00 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

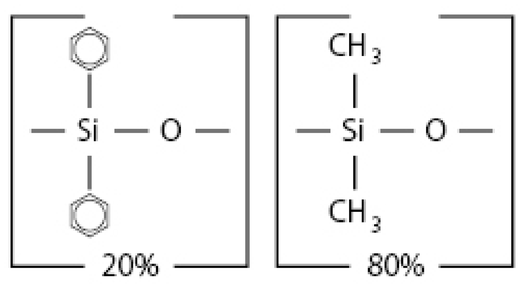
Column : SH-5MS, 30 m, 0.25 mm ID, 0.25 µm (P/N: 221-75855-30).
Conc. : 5–10 ng on-column
Inj. : Splitless, purge on at 1 min
Inj. Temp : 275 °C
Purge Flow : 32.2 mL/min (20:1 split)
Oven Temp : 35 °C (hold 1 min) to 300 °C at 10 °C/min (hold 15 min)
Carrier Gas : He
Det. Temp : 310 °C

GC Columns

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

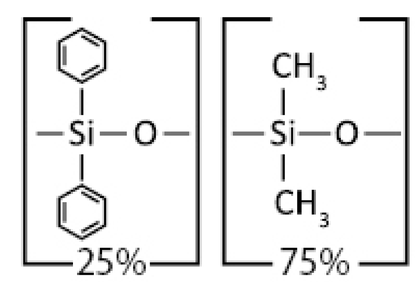


ID	df	Temp. Range	30 m	60 m
0.25 mm	0.10 µm	-20 to 300/320 °C	227-36130-01	227-36130-02
	0.25 µm	-20 to 300/320 °C	227-36131-01	227-36131-02
	0.50 µm	-20 to 290/310 °C	227-36132-01	227-36132-02
	1.00 µm	-20 to 280/300 °C	227-36133-01	227-36133-02
0.32 mm	0.10 µm	-20 to 300/320 °C	227-36134-01	227-36134-02
	0.25 µm	-20 to 300/320 °C	227-36135-01	227-36135-02
	0.50 µm	-20 to 290/310 °C	227-36136-01	227-36136-02
	1.00 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
	3.00 µm	-20 to 250/270 °C	227-36139-01	227-36139-02
0.53 mm	0.10 µm	-20 to 260/280 °C	227-36140-01	227-36140-02
	0.25 µm	-20 to 260/280 °C	–	227-36141-01
	0.50 µm	-20 to 260/280 °C	227-36142-01	–
	1.00 µm	-20 to 260/280 °C	227-36143-01	227-36143-02
	1.50 µm	-20 to 250/270 °C	227-36144-01	–
	3.00 µm	-20 to 240/260 °C	227-36145-01	227-36145-02

SH-25

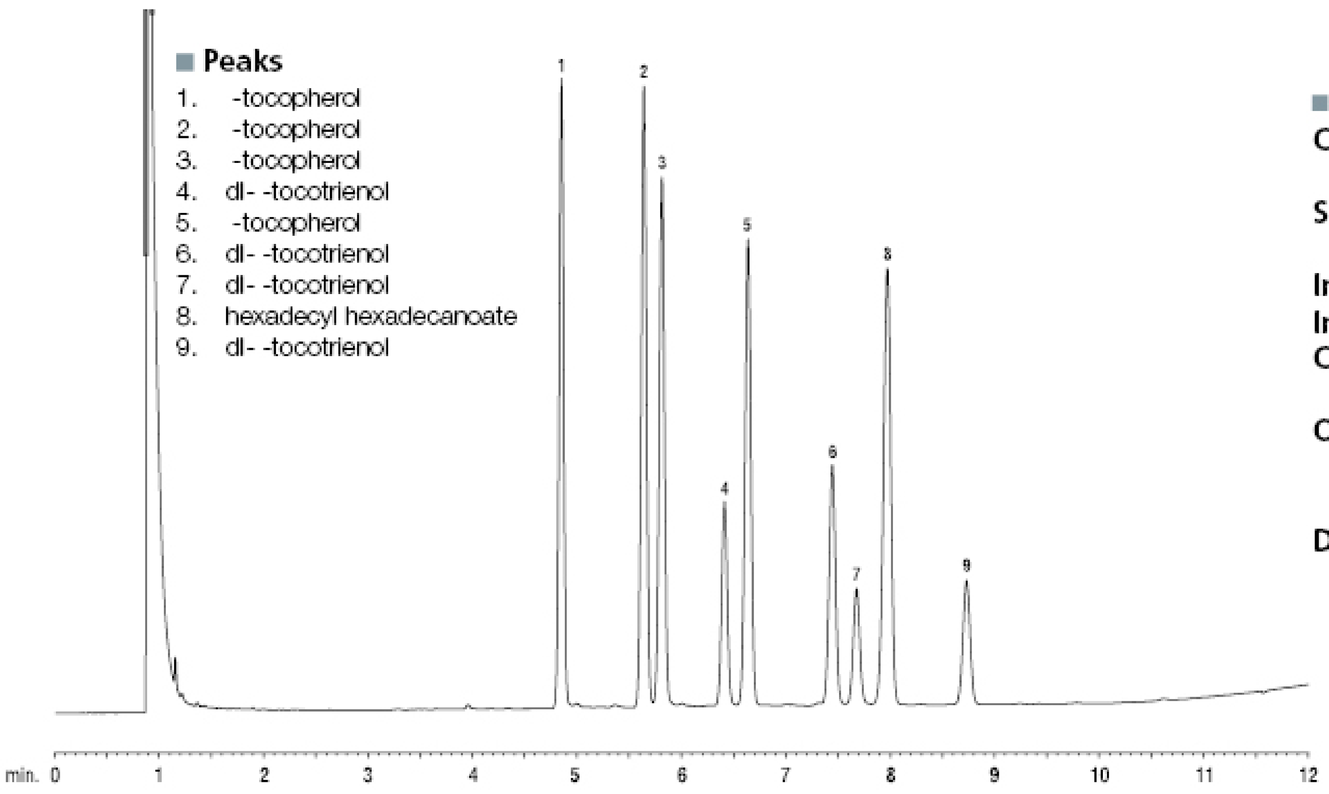
- Mid-polarity phase: Crossbond™ 25% diphenyl / 75% dimethyl polysiloxane
- General-purpose columns for volatile compounds, flavor compounds, alcoholic beverages.

SH-25 Structure



ID	df	Temp. Range	60 m
0.32 mm	1.49 µm	-20 to 250/270 °C	227-36329-01

Tocopherols and Tocotrienols



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

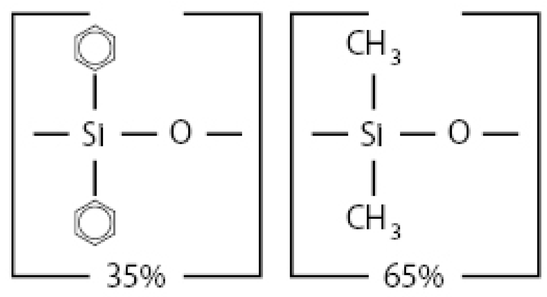
Capillary Columns

General-Purpose Columns

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



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
	1.00 µm	40 to 290 °C	227-36149-01	227-36149-02
0.32 mm	0.10 µm	40 to 320 °C	227-36150-01	227-36150-02
	0.25 µm	40 to 320 °C	227-36151-01	227-36151-02
	0.50 µm	40 to 310 °C	227-36152-01	227-36152-02
	1.00 µm	40 to 290 °C	227-36153-01	227-36153-02
	1.50 µm	40 to 270/290 °C	227-36154-01	–
	3.00 µm	40 to 250/270 °C	227-36155-01	227-36155-02
0.53 mm	0.10 µm	40 to 260/280 °C	–	227-36156-01
	0.25 µm	40 to 260/280 °C	–	227-36157-01
	0.50 µm	40 to 300 °C	227-36158-01	227-36158-02
	1.00 µm	40 to 290 °C	227-36159-01	227-36159-02
	1.50 µm	40 to 280 °C	227-36160-01	227-36160-02
	3.00 µm	40 to 240/260 °C	227-36161-01	227-36161-02

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

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

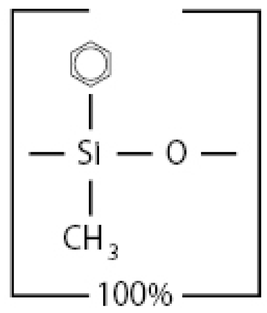
Download the brochure of GC/GCMS consumables from
http://www.shimadzu.com/an/gc/column_consumable/index.html

GC Columns

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

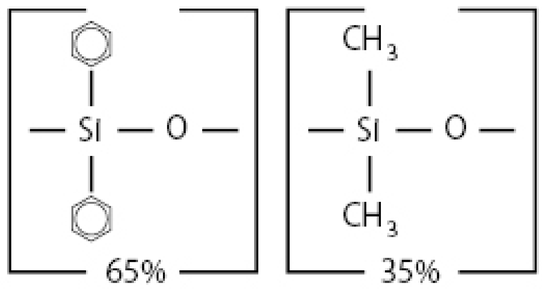


ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	40 to 300/320 °C	227-36162-01	227-36162-02
	0.50 µm	40 to 290/310 °C	227-36163-01	227-36163-02
	1.00 µm	40 to 280/300 °C	227-36164-01	227-36164-02
0.32 mm	0.25 µm	40 to 300/320 °C	221-76182-30	227-36165-01
	0.50 µm	40 to 290/310 °C	227-36166-01	227-36166-02
	1.00 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	–
	1.00 µm	40 to 260/280 °C	227-36170-01	227-36170-02
	1.50 µm	40 to 250/270 °C	227-36171-01	227-36171-02

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 / SH-65TG 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
	1.00 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
	1.00 µm	50 to 260/280 °C	227-36177-01
0.53 mm	1.00 µm	50 to 250/270 °C	227-36178-01

SH-65TG

- High-polarity phase; Crossbond diphenyl dimethyl polysiloxane
- Application-specific columns, specially tested for triglycerides.
- Stable to 370 °C.

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

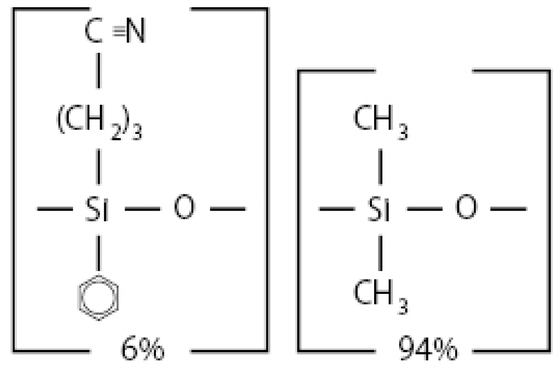
Capillary Columns

General-Purpose Columns

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 Integra-Guard™ column, please refer to page C-44.

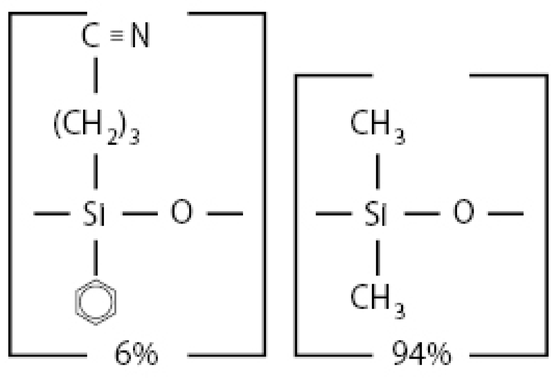
ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	-20 to 280 °C	221-76194-30	221-76194-60
	0.50 µm	-20 to 270 °C	227-36203-01	–
	1.00 µm	-20 to 260 °C	227-36204-01	227-36204-02
	1.40 µm	-20 to 240 °C	–	227-36205-01
0.32 mm	0.25 µm	-20 to 280 °C	227-36206-01	227-36206-02
	0.50 µm	-20 to 270 °C	227-36207-01	227-36207-02
	1.00 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
	1.00 µm	-20 to 260 °C	227-36213-01	227-36213-02
	1.50 µm	-20 to 250 °C	227-36214-01	–

* 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-624

SH-624 Structure



For SH-624 columns with Integra-Guard™ column, please refer to page C-44.

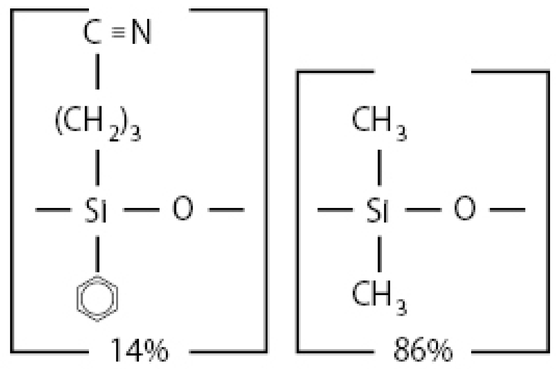
ID	df	Temp. Range	20 m	30 m	60 m	75 m
0.10 mm	0.50 µm	-20 to 240 °C	227-36332-01	–	–	–
0.18 mm	1.00 µm	-20 to 240 °C	227-36259-01	–	–	–
0.25 mm	1.40 µm	-20 to 240 °C	–	221-75863-30	227-36215-01	–
0.32 mm	1.80 µm	-20 to 240 °C	–	221-75864-30	221-75864-60	–
0.53 mm	3.00 µm	-20 to 240 °C	–	221-75865-30	221-75865-60	221-75865-75

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

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, Equity-1701

■ SH-1701 Structure

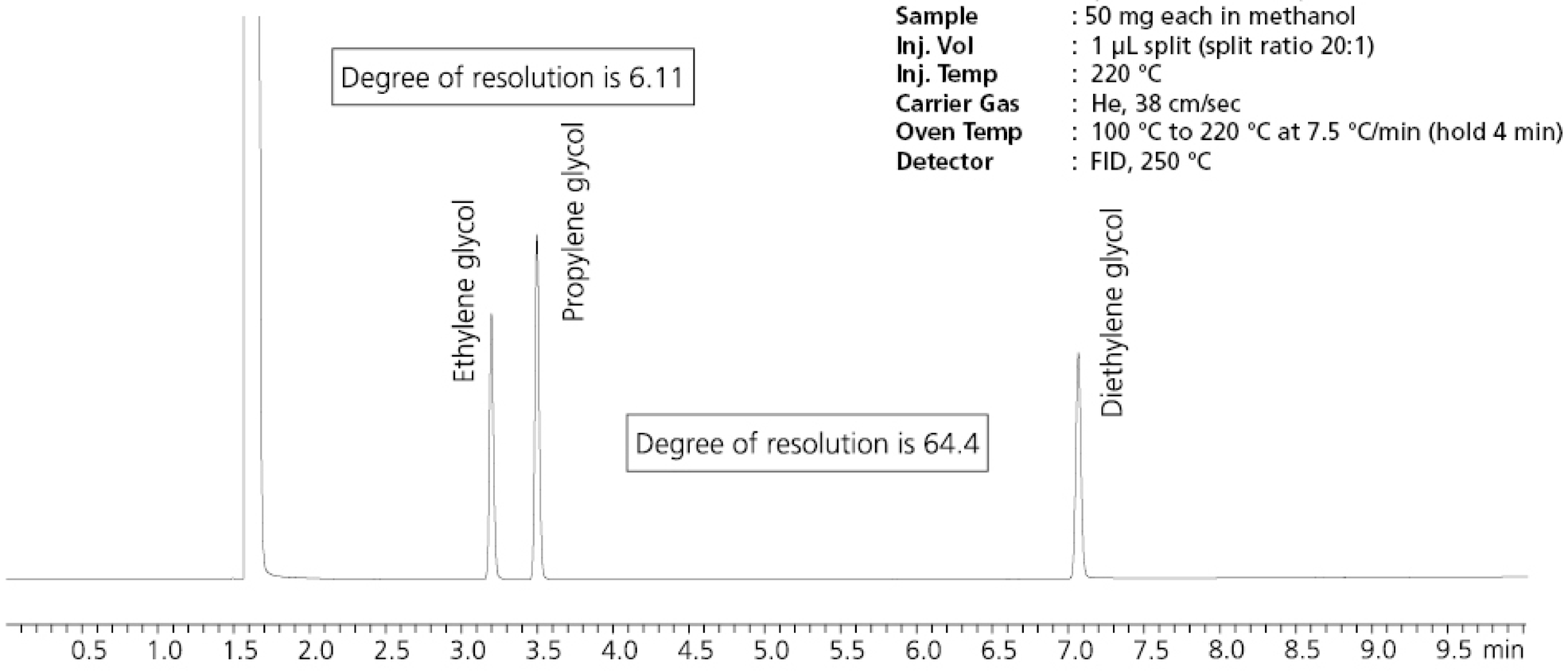


For SH-1701 columns with Intega-Guard™ column, please refer to page C-44.

ID	df	Temp. Range	15 m	30 m	60 m
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
	1.00 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	227-36220-01
	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
	1.00 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	227-36223-02
	0.25 µm	-20 to 270/280 °C	–	227-36224-01	–
	0.50 µm	-20 to 260/270 °C	–	227-36225-01	–
	1.00 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
	3.00 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

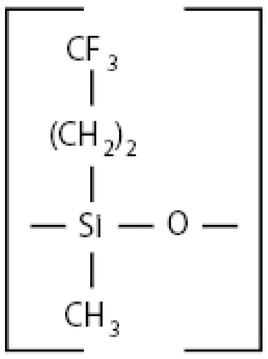
Capillary Columns

General-Purpose Columns

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

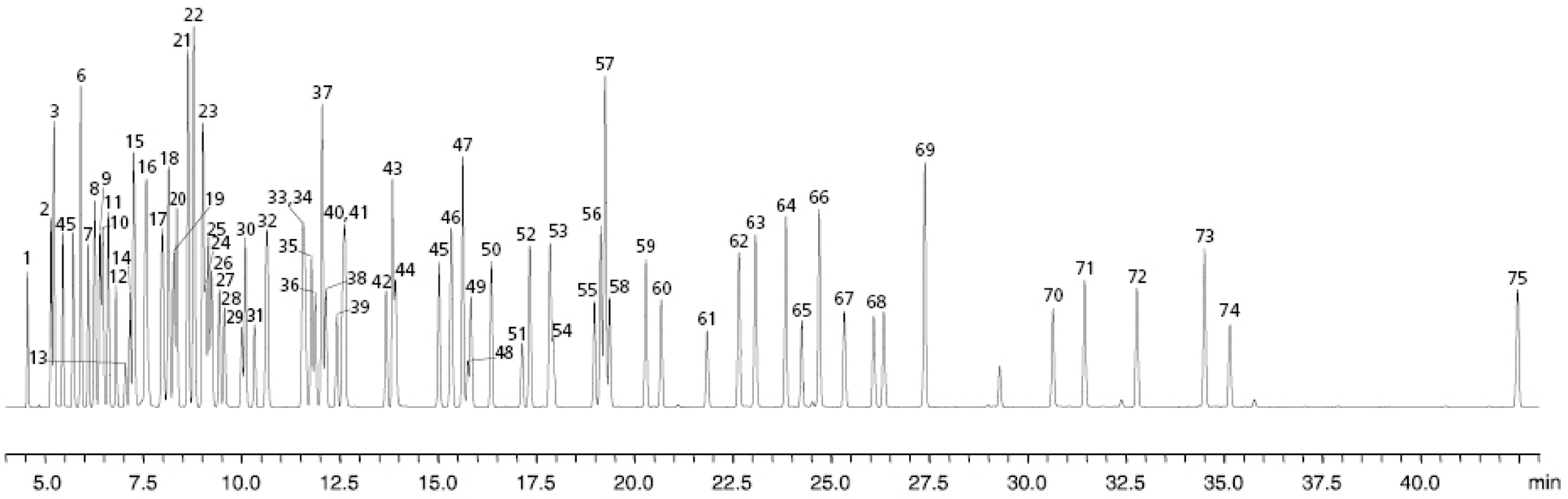
ID	df	Temp. Range	30 m	60 m	105 m
0.25 mm	0.10 µm	-20 to 320/340 °C	227-36179-01	227-36179-02	–
	0.25 µm	-20 to 320/340 °C	227-36180-01	227-36180-02	–
	0.50 µm	-20 to 310/330 °C	227-36181-01	227-36181-02	–
	1.00 µm	-20 to 290/310 °C	221-75800-30	227-36182-01	–
0.32 mm	0.10 µm	-20 to 320/340 °C	227-36183-01	227-36183-02	–
	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	–
	1.00 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	227-36188-01	227-36188-02	–
	0.25 µm	-20 to 310/330 °C	227-36189-01	227-36189-02	–
	0.50 µm	-20 to 300/320 °C	227-36190-01	227-36190-02	–
	1.00 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	–
	3.00 µm	-20 to 260/380 °C	227-36193-01	227-36193-02	–

* 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
	1.00 µm	-20 to 290/310 °C	227-36196-01
0.32 mm	0.10 µm	-20 to 320/340 °C	227-36197-01
	0.25 µm	-20 to 320/340 °C	221-75814-30
	0.50 µm	-20 to 310/330 °C	227-36198-01
	1.00 µm	-20 to 290/310 °C	227-36199-01
0.53 mm	0.50 µm	-20 to 300/320 °C	227-36200-01
	1.00 µm	-20 to 290/310 °C	227-36201-01
	1.50 µm	-20 to 280/300 °C	227-36202-01

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

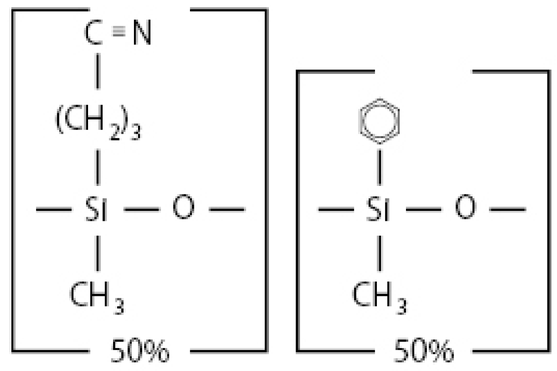
Capillary Columns

General-Purpose Columns

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



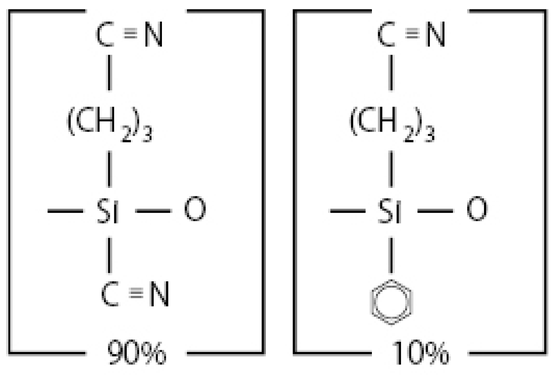
ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	40 to 220/240 °C	227-36229-01	227-36229-02
	0.50 µm	40 to 220/240 °C	227-36230-01	–
0.32 mm	0.10 µm	40 to 220/240 °C	227-36231-01	–
	0.25 µm	40 to 220/240 °C	227-36232-01	–
	0.50 µm	40 to 220/240 °C	227-36233-01	–
	1.00 µm	40 to 200/220 °C	227-36234-01	227-36234-02
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	–
	1.00 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-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
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
0.32 mm	0.10 µm	0 to 260/275 °C	227-36240-01	227-36240-02
	0.20 µm	0 to 260/275 °C	227-36241-01	227-36241-02
0.53 mm	0.10 µm	0 to 260/275 °C	–	227-36242-01
	0.20 µm	0 to 260/275 °C	227-36243-01	227-36243-02

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

Capillary Columns

General-Purpose Columns

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 Phase(s): HP-88, CP-Sil 88, SP-2560, BPX-90, MEGA-10

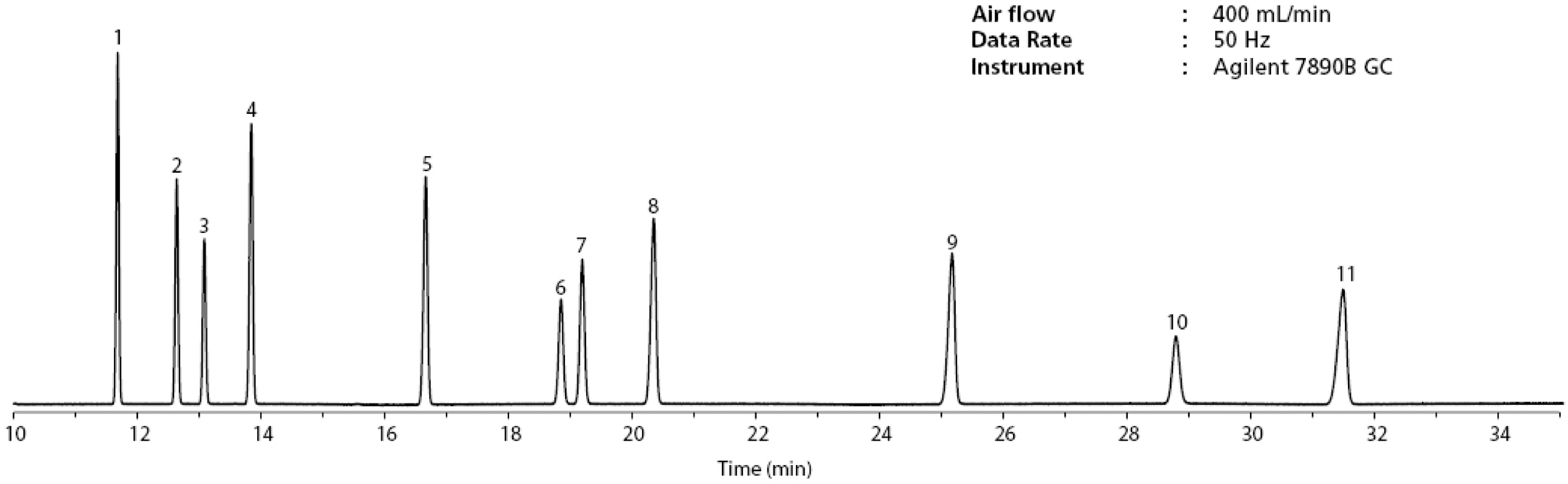
ID	df	Temp. Range	100 m
0.25 mm	0.20 µm	20 to 250 °C	227-36311-01

Unsaturated FAMES QC Test Mix on SH-2560

Peaks	tR (min)	Conc. (µg/mL)	Structural Nomenclature
1. Methyl octadecanoate	11.68	1.1	C18:0
2. Methyl elaidate	12.64	0.8	C18:1 (t9)
3. Methyl oleate	13.09	0.6	C18:1 (c9)
4. Methyl nonadecanoate	13.84	1.1	C19:0
5. Methyl eicosanoate	16.66	1.1	C20:0
6. Methyl eicosenoate	18.85	0.6	C20:1 (c11)
7. Methyl linolenate	19.20	0.8	C18:3 (c9,c12,c15)
8. Methyl heneicosanoate	20.35	1.1	C21:0
9. Methyl docosanoate	25.17	1.1	C22:0
10. Methyl eicosatrienoate	28.79	0.6	C20:3 (c11,c14,c17)
11. Methyl tricosanoate	31.49	1.1	C23:0

Conditions

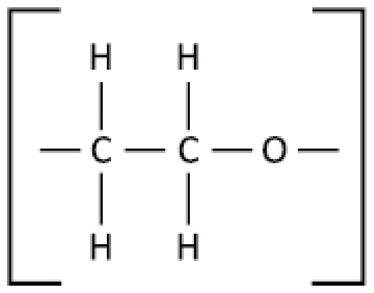
Column	:	SH-2560, 2560, 100 m, 0.25mm ID, 0.20 µm (227-36311-01)
Sample	:	Unsaturated FAMES QC test mix
Diluent	:	Hexane
Injection	:	1 µL split (split ratio 200:1)
Liner	:	Premium 4 mm Precision liner w/wool (cat.# 23305.1)
Inj. Temp	:	250 °C
Oven Temp	:	180 °C (hold 40 min)
Carrier Gas	:	H_2, constant flow
Flow Rate	:	2.5 mL/min
Detector	:	FID, 275 °C
Make-up Gas Type	:	N_2
Hydrogen flow	:	40 mL/min
Air flow	:	400 mL/min
Data Rate	:	50 Hz
Instrument	:	Agilent 7890B GC



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

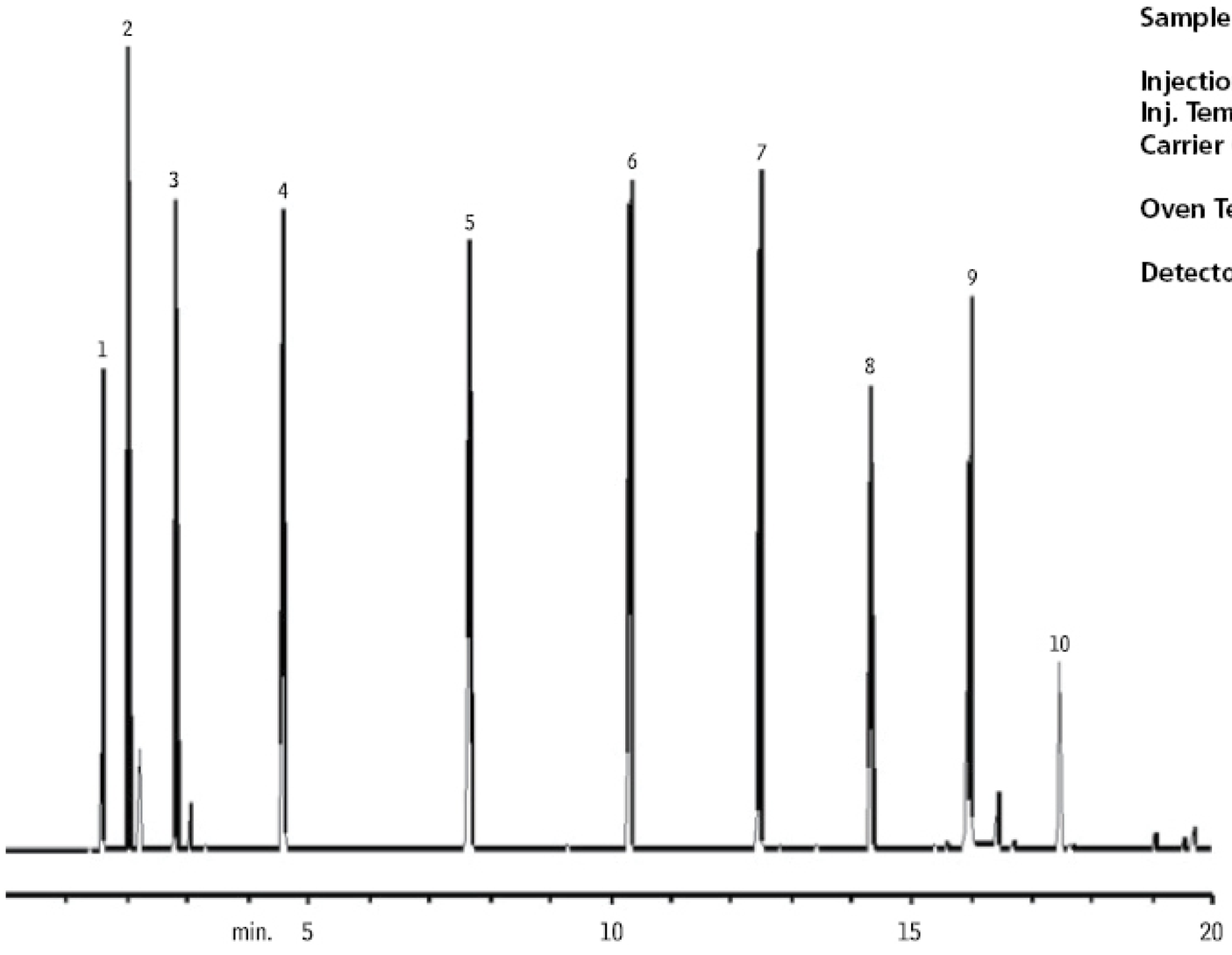
SH-Wax Structure



ID	df	Temp. Range	15 m	20 m	30 m	50 m	60 m
0.25 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
	1.00 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
	1.00 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, 0.25mm ID, 0.50 µm (P/N: 221-75894-30)
Sample : 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

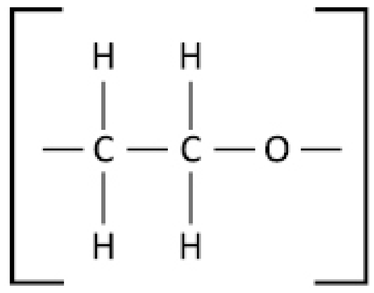
Capillary Columns

General-Purpose Columns

SH-PolarWax / SH-PolarWax MS

- 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 / SH-PolarWax MS Structure



SH-PolarWax

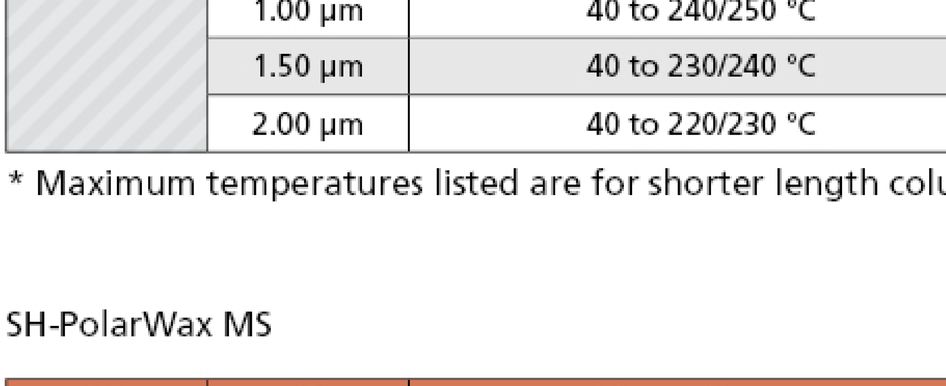
ID	df	Temp. Range	30 m	50 m	60 m
0.25 mm	0.10 µm	40 to 250/260 °C	227-36246-01	–	227-36246-02
	0.25 µm	40 to 250/260 °C	227-36305-02	227-36247-01	227-36247-02
	0.50 µm	40 to 250/260 °C	227-36248-01	–	227-36248-02
0.32 mm	0.10 µm	40 to 250/260 °C	227-36249-01	–	227-36249-02
	0.25 µm	40 to 250/260 °C	221-75972-30	–	227-36250-01
	0.50 µm	40 to 250/260 °C	227-36251-01	–	221-75975-60
	1.00 µm	40 to 240/250 °C	227-36252-01	–	227-36252-02
0.53 mm	0.10 µm	40 to 250/260 °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
	1.00 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
	2.00 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.

SH-PolarWax MS

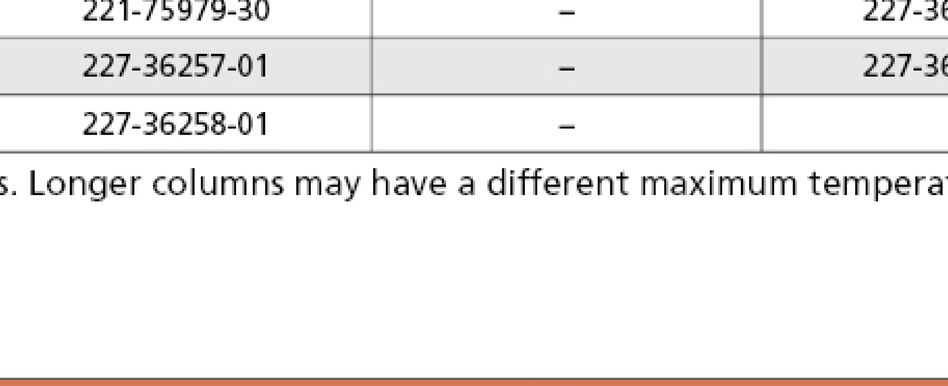
ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	40 to 250/260 °C	227-36322-01
0.32 mm	0.25 µm	40 to 250/260 °C	227-36322-03

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

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)
Detector : FID, 250 °C

Capillary Columns

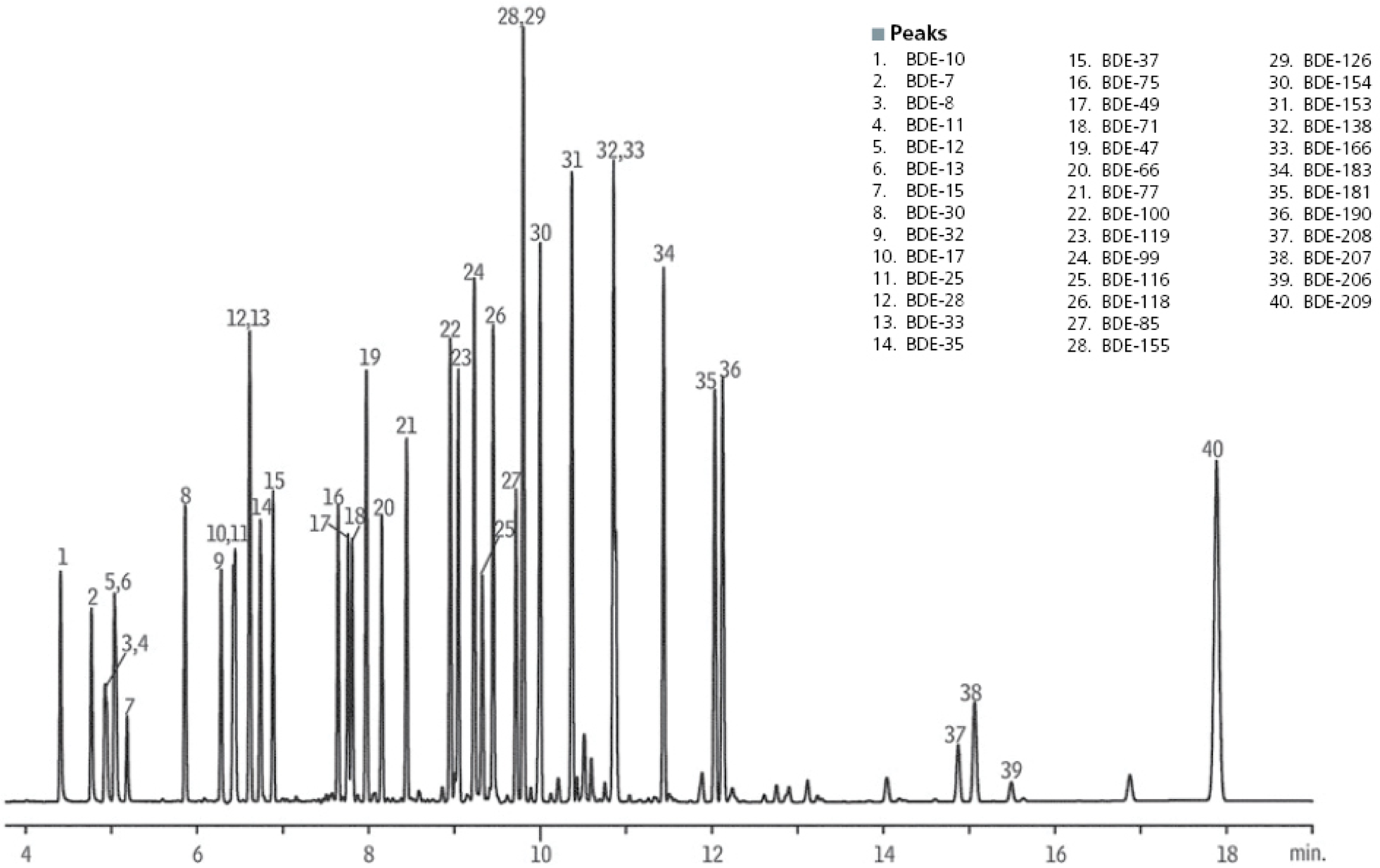
Dedicated Columns

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

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

Capillary Columns
Dedicated Columns

SH-OPP2

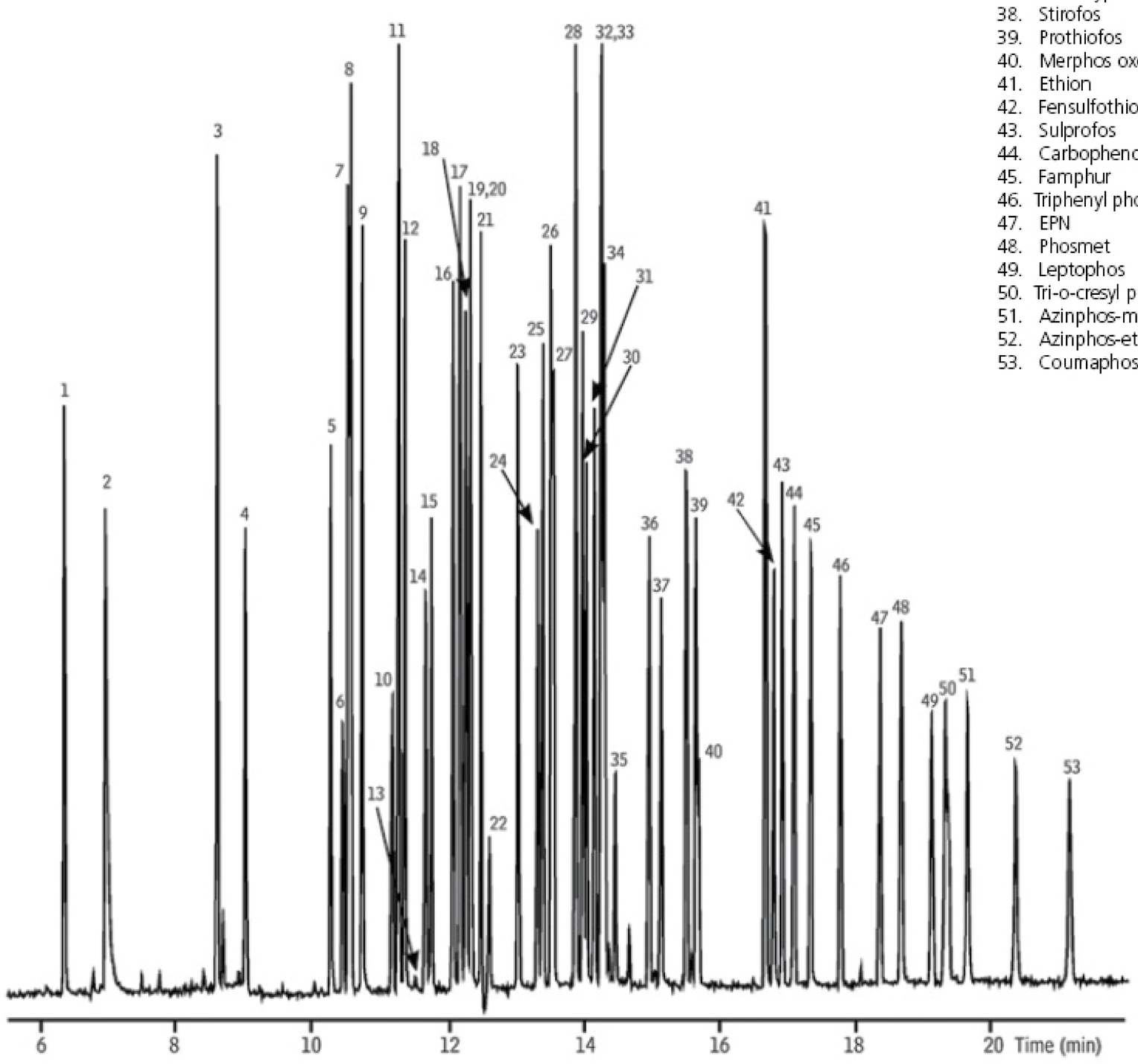
- Dedicated column for organophosphorus pesticides; best column combination for US EPA Method 8141.
- Low bleed - ideal for GC-FPD, GC-NPD, or GCMS analyses.

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

Column	:	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

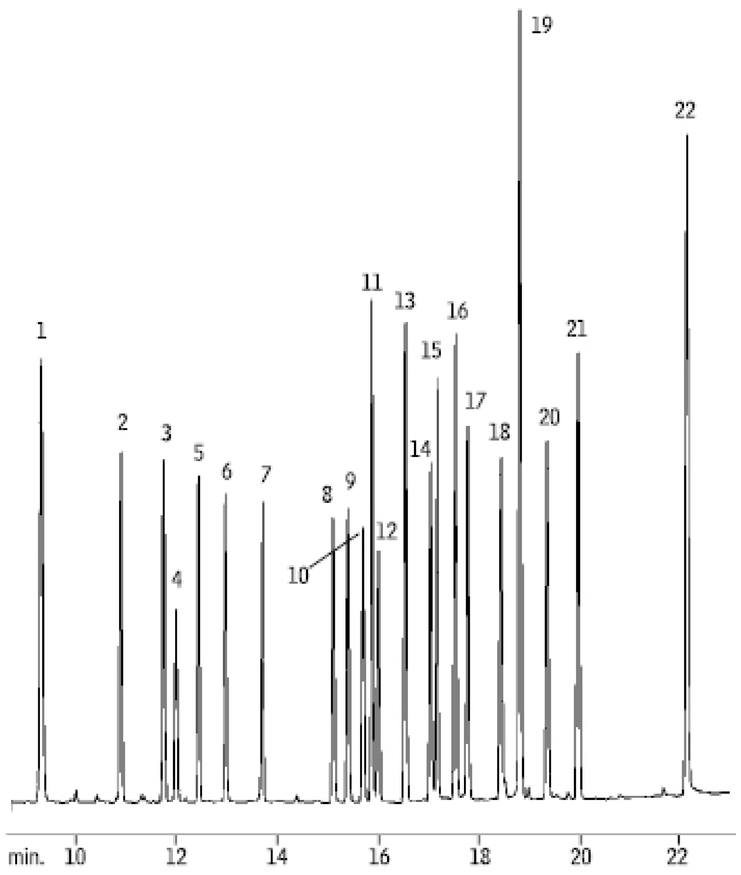
SH-CLP

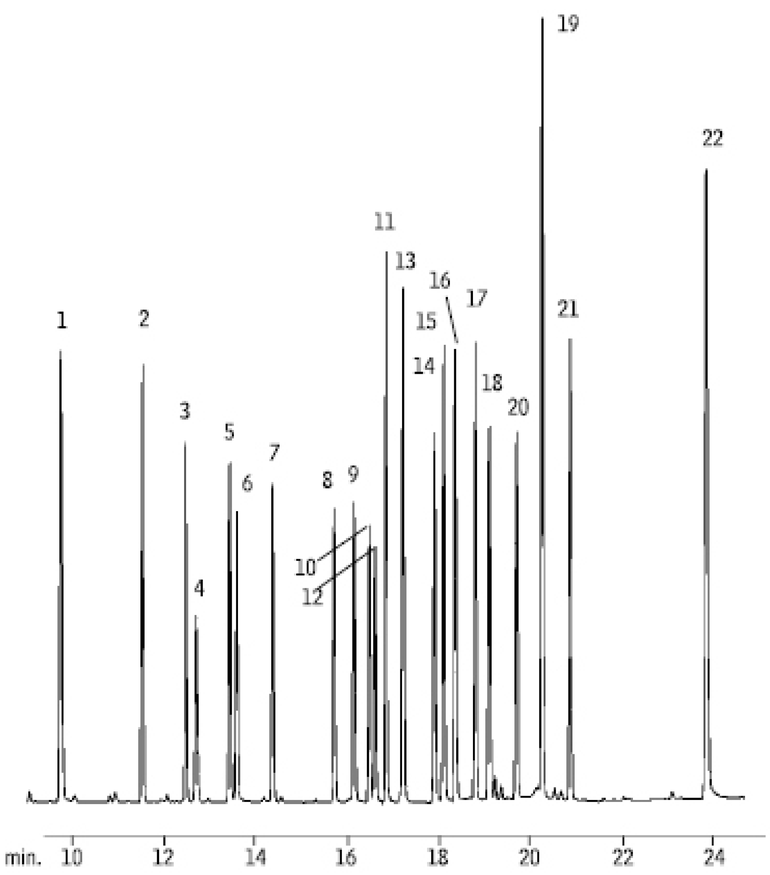
ID	df	Temp. Range	30 m
0.32 mm	0.32 µm	-20 to 320/340 °C	227-36266-01
	0.50 µm	-20 to 320/340 °C	221-75879-30

SH-CLP II

ID	df	Temp. Range	30 m
0.32 mm	0.25 µm	-20 to 320/340 °C	227-36267-01

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

Column	:	SH-CLP, 30 m, 0.32 mm ID, 0.50 µm (P/N: 221-75879-30)
		SH-CLP2, 30 m, 0.32 mm ID, 0.25 µm (P/N: 227-36267-01)
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

Capillary Columns

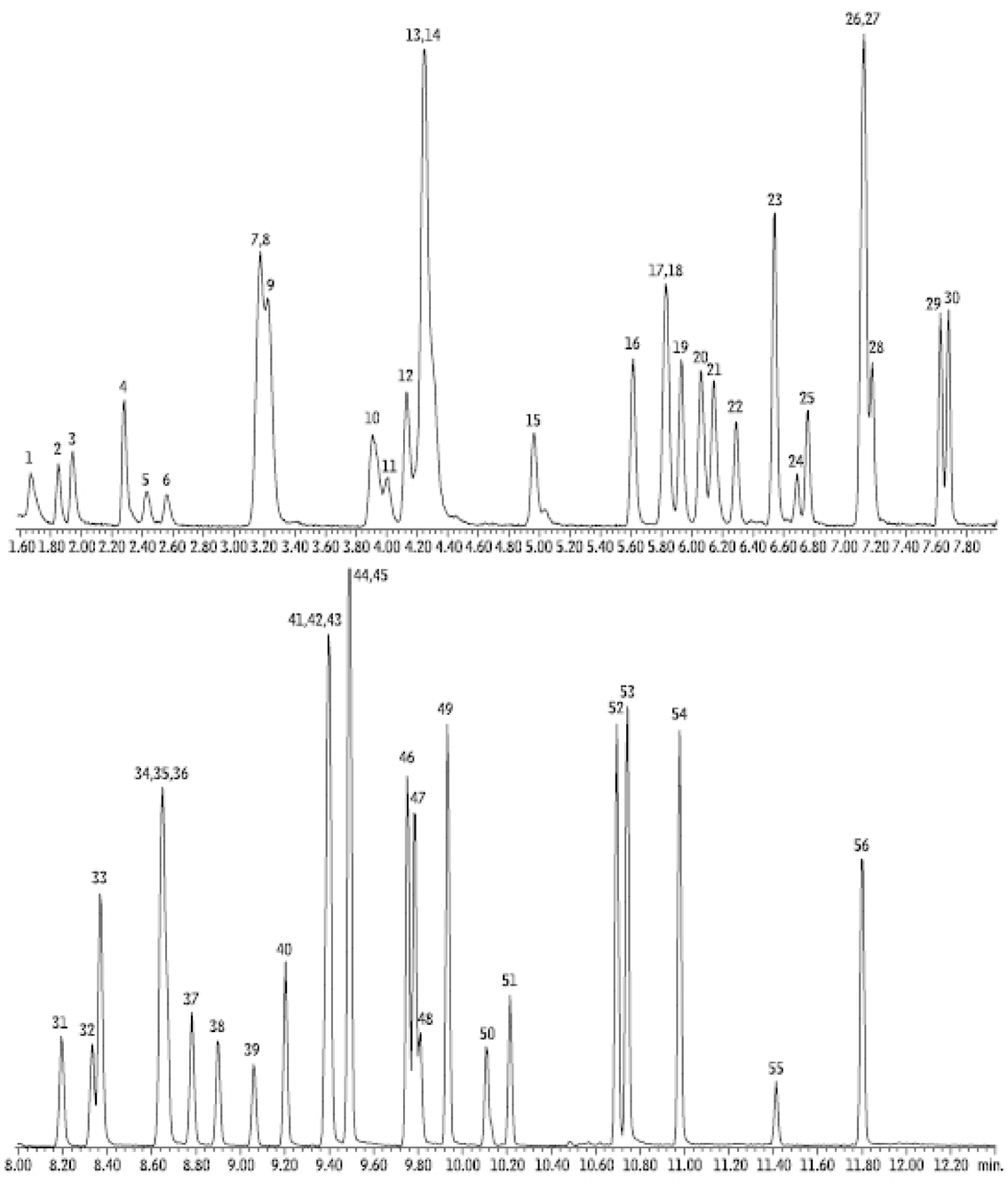
Dedicated Columns

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	60 m
0.18 mm	1.00 µm	-40 to 240/260 °C	227-36412-01	–	–
0.25 mm	1.40 µm	-40 to 240/260 °C	–	227-36268-01	227-36268-02
0.32 mm	1.80 µm	-40 to 240/260 °C	–	227-36269-01	227-36269-02

Volatile Organics (US EPA CLP 04.1)



Peaks

1. dichlorodifluoromethane
2. chloromethane
3. vinyl chloride
4. bromomethane
5. chloroethane
6. trichlorofl uoromethane
7. 1,1-dichloroethene
8. carbon disulfi de
9. 1,1,2-trichloro-1,2,2-trifl uoroethane
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-difl uorobenzene (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-bromofl uorobenzene (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

Conditions

Column : SH-VMS, 30 m, 0.25 mmID, 1.40 µm
(P/N: 227-36268-01)

Purge and Trap : Trap: #10 (Tenax$_R$/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

Capillary Columns

Dedicated Columns

SH-VRX

- Proprietary Crossbond phase
- Application-specific columns for volatile organic pollutants.
- Excellent for U.S. EPA Method 8021 compounds.
- Stable to 260 °C.
- Similar Phase(s): DB-VRX

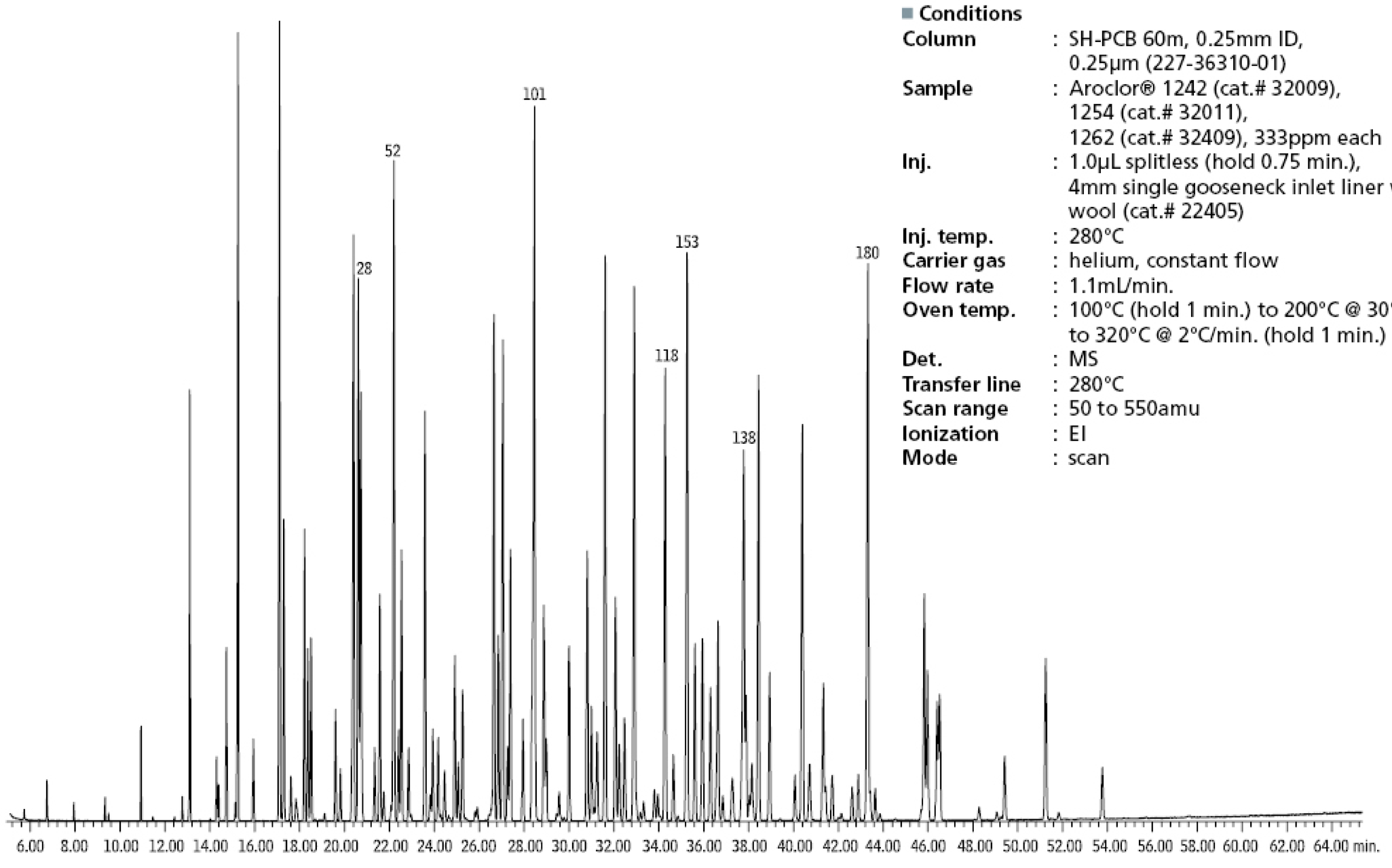
ID	df	Temp. Range	25 m
0.10 mm	0.50 µm	-40 to 240/260 °C	227-36331-01

SH-PCB

- Proprietary Crossbond phase
- Unique polymer for PCBs analysis by GC-ECD or GC-MS.
- Good results for other semi-volatiles.
- Low polarity; inert to active compounds.
- Stable to 340 °C.

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

Aroclor PCBs



Conditions

Column	:	SH-PCB 60m, 0.25mm ID, 0.25µm (227-36310-01)
Sample	:	Aroclor® 1242 (cat.# 32009), 1254 (cat.# 32011), 1262 (cat.# 32409), 333ppm each
Inj.	:	1.0µL splitless (hold 0.75 min.), 4mm single gooseneck inlet liner w/ wool (cat.# 22405)
Inj. temp.	:	280°C
Carrier gas	:	helium, constant flow
Flow rate	:	1.1mL/min.
Oven temp.	:	100°C (hold 1 min.) to 200°C @ 30°C/min., to 320°C @ 2°C/min. (hold 1 min.)
Det.	:	MS
Transfer line	:	280°C
Scan range	:	50 to 550amu
Ionization	:	EI
Mode	:	scan

Capillary Columns

Dedicated Columns

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.

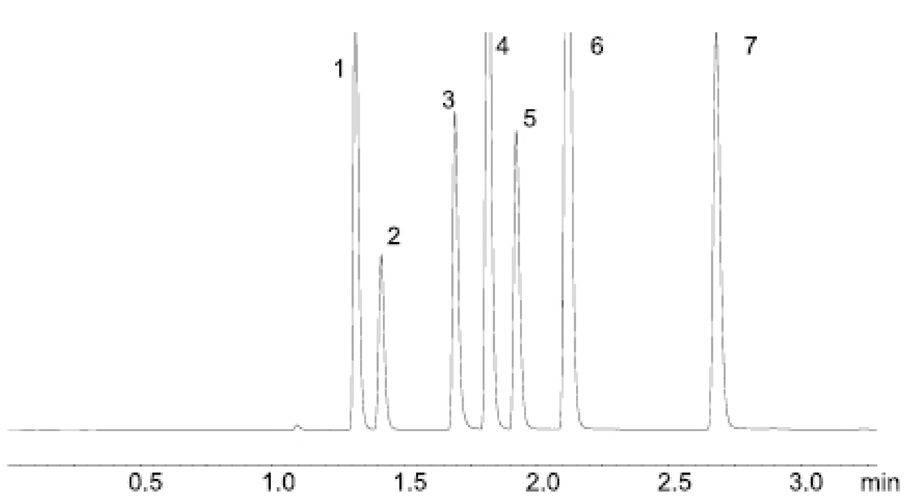
SH-BAC Plus 1

ID	df	Temp. Range	30 m
0.32 mm	1.80 µm	-20 to 240/260 °C	227-36260-01
0.53 mm	3.00 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	1.00 µm	-20 to 240/260 °C	227-36264-01

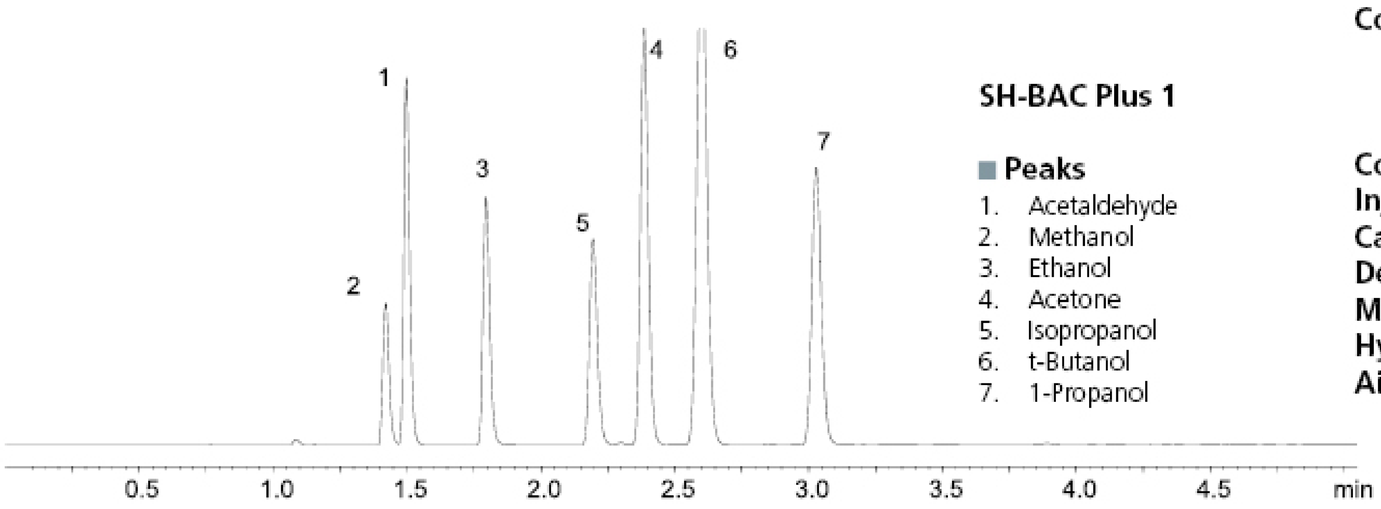
Analysis of Alcohol Compounds in Blood



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

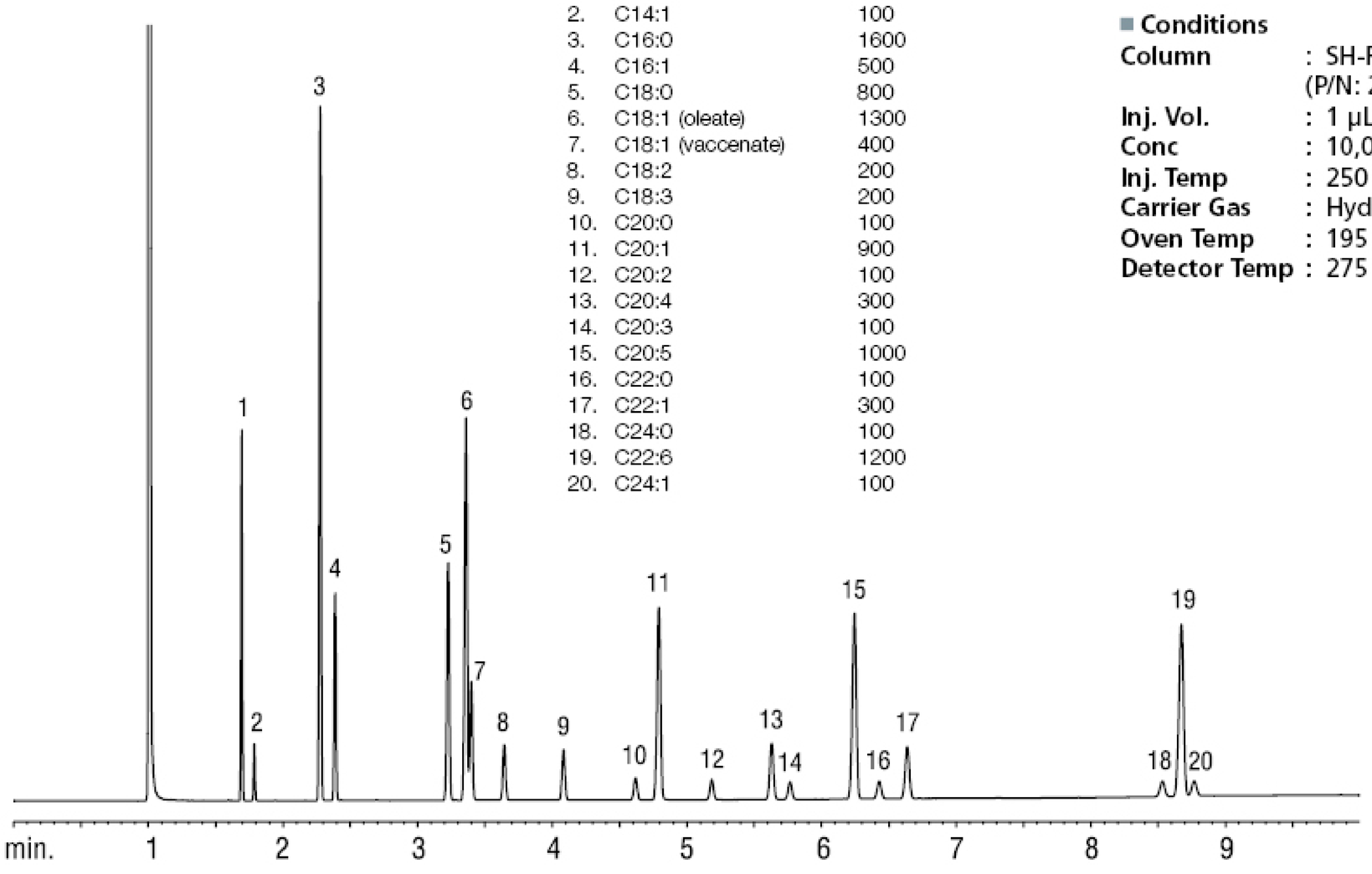
Instrument : GC-2010 Plus AF + HS-20
Headspace : Oven Temp.: 85 °C
Vial Warming Time: 15 min
Vial Pressurization Time: 1 min
Injection Time: 0.5 min
Sample Line Temp: 150 °C
Vial Volume: 20 mL
Vial Agitation: Off
Vial Pressurization: 100 kPa
Load Time: 0.5 min
Needle Flash Time: 0.5 min
Transfer Line 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-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 320/340 °C	227-36324-01
0.32 mm	0.25 µm	20 to 320/340 °C	227-36270-01

FAMEs (Marine Oil Standard)



Peaks		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-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(s): CP-Volamine

ID	Temp. Range	30 m	60 m
0.32 mm	40 to 370 °C	227-36326-01	227-36326-02

SH-5 Amine / SH-35 Amine

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

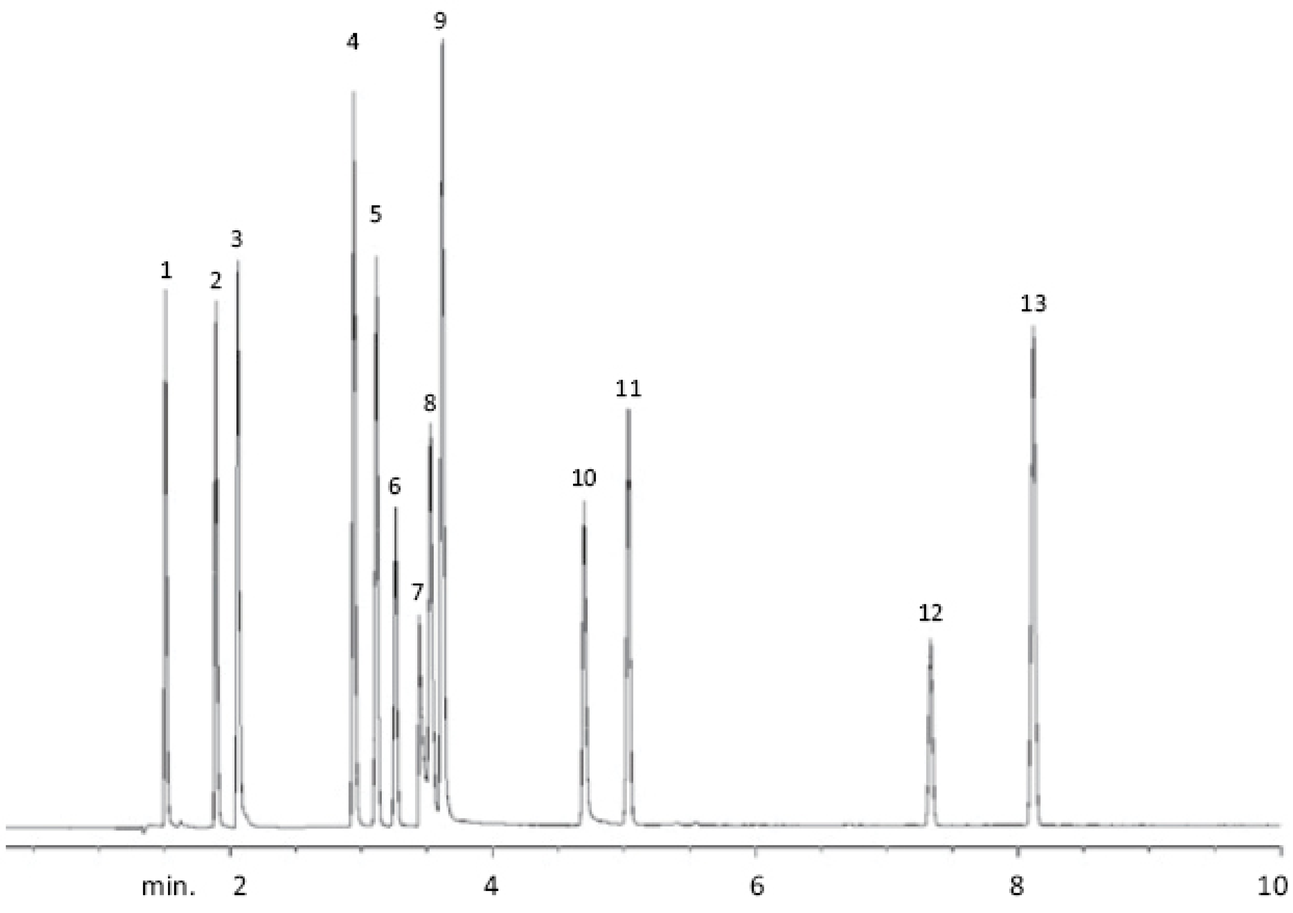
SH-5 Amine (Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane)

ID	df	Temp. Range	15 m	30 m
0.25 mm	0.25 µm	-60 to 300/315 °C	-	227-36282-01
	0.50 µm	-60 to 300/315 °C	227-36323-01	227-36283-01
	1.00 µm	-60 to 300/315 °C	227-36323-02	227-36284-01
0.32 mm	1.00 µm	-60 to 300/315 °C	-	227-36332-02
	1.50 µm	-60 to 290/305 °C	-	227-36285-01
0.53 mm	1.00 µm	-60 to 290/305 °C	-	227-36286-01
	3.00 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	30 m
0.25 mm	0.50 µm	0 to 220 °C	227-36288-01
	1.00 µm	0 to 220 °C	227-36289-01
0.32 mm	1.00 µm	0 to 220 °C	227-36290-01
	1.50 µm	0 to 220 °C	227-36291-01
0.53 mm	1.00 µm	0 to 220 °C	227-36292-01
	3.00 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
Detector Temp	:	305 °C
FID sensitivity	:	6.4×10^{-11} AFS

Capillary Columns

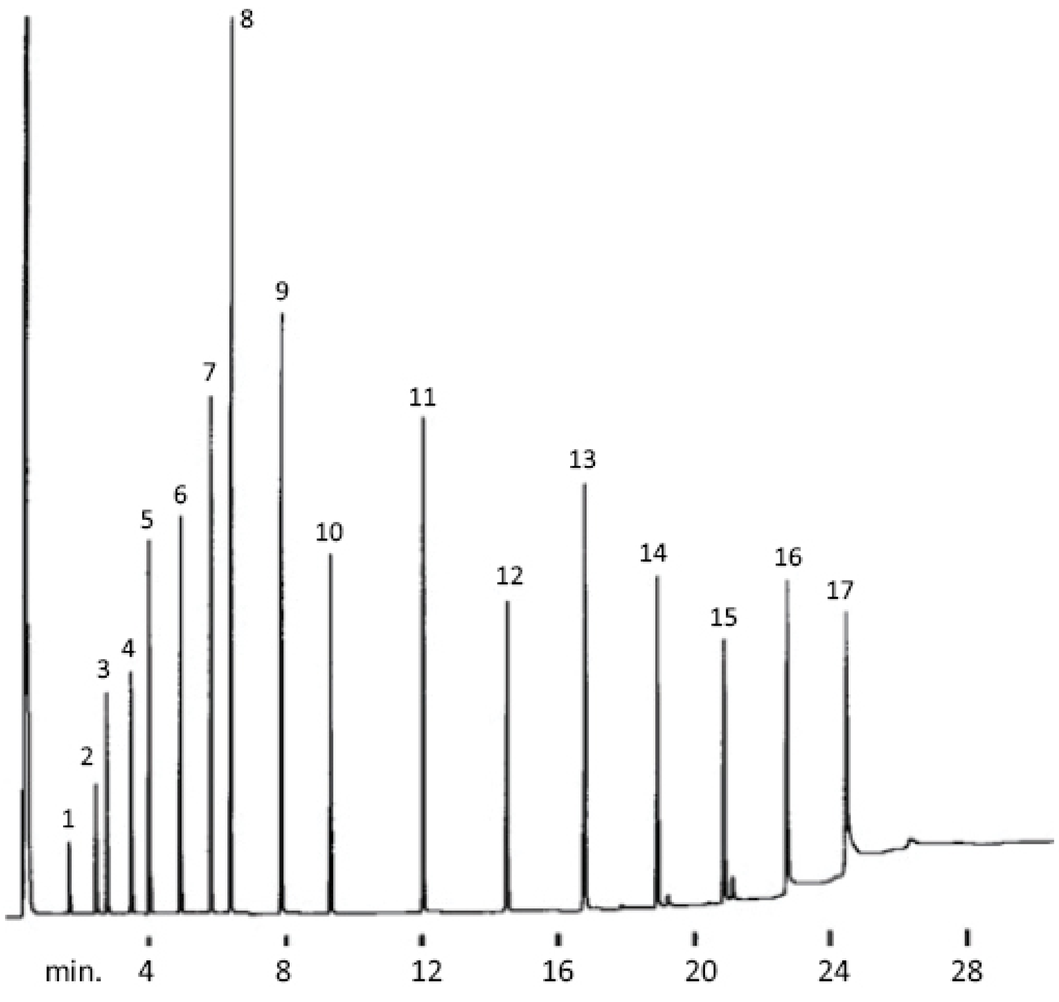
Dedicated Columns

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	30 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
	1.00 µm	40 to 240/250 °C	227-36277-01	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
	1.00 µm	40 to 240/250 °C	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

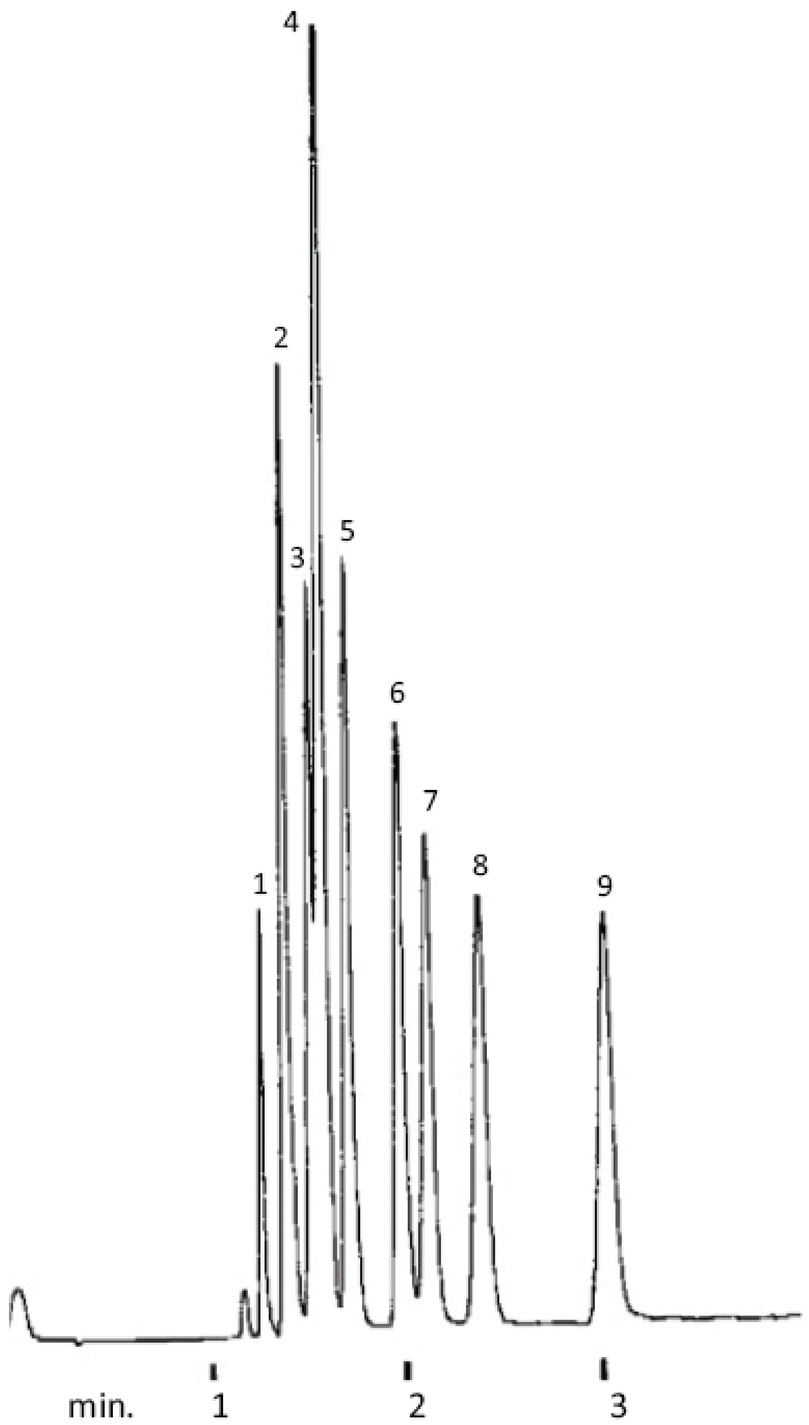
GC Columns

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

Capillary Columns

PLOT Columns

SH-Silica BOND

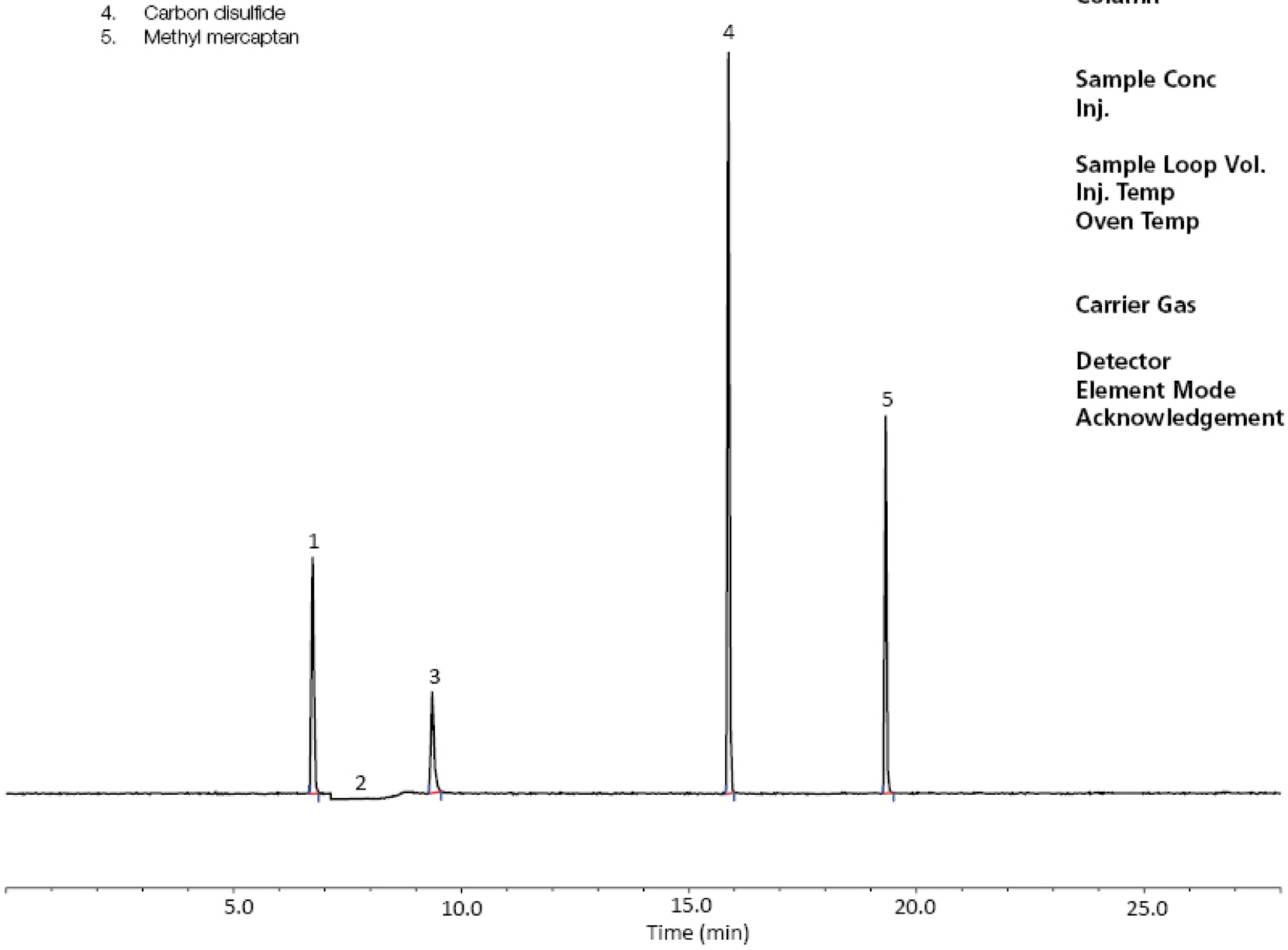
- Bonded silica stationary phase minimizes impact of water, resulting in reproducible retention times for water-containing samples.
- Versatile column ideal for analysis of light hydrocarbons, sulfur gases, halocarbons, and carbon dioxide.
- Individually QC tested with sensitive C4 probes to ensure consistent 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.

GC Columns

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

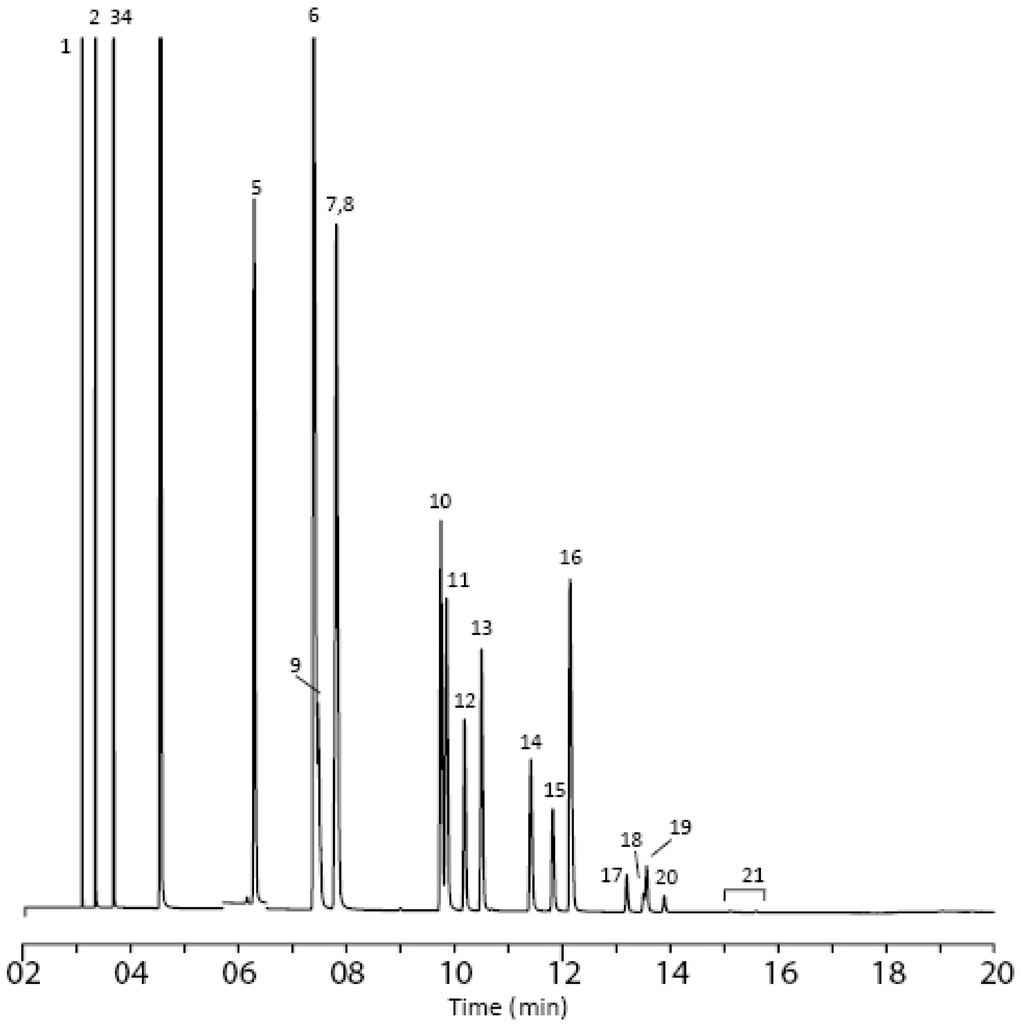
ID	df	Temp. Range	30 m
0.32 mm	5 µm	to 200 °C	227-36328-01
0.53 mm	10 µm	to 200 °C	227-36316-01
ID	**df**	**Temp. Range**	**50 m**
0.53 mm	10 µm	to 200 °C	227-36301-01

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

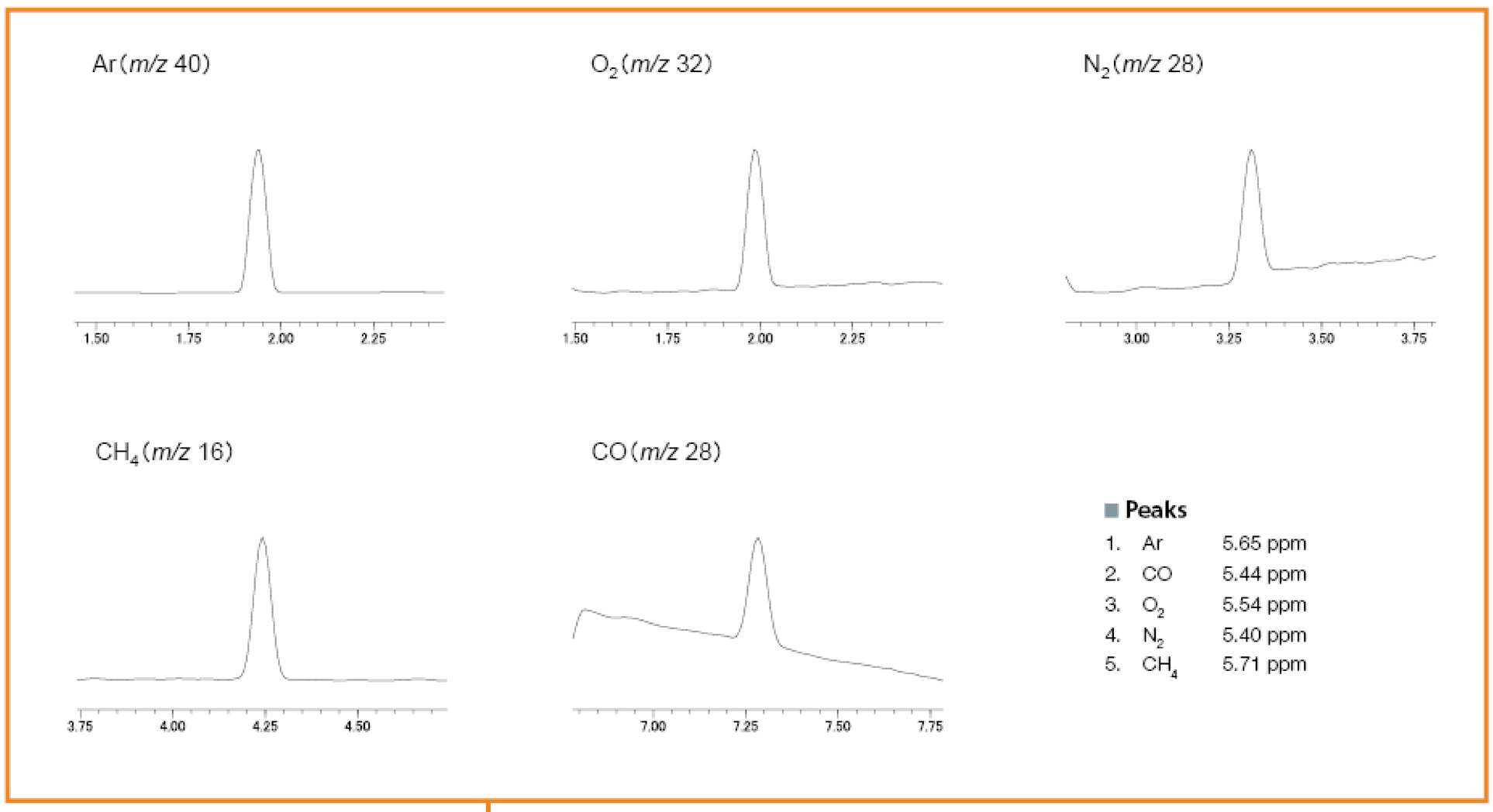
PLOT Columns

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

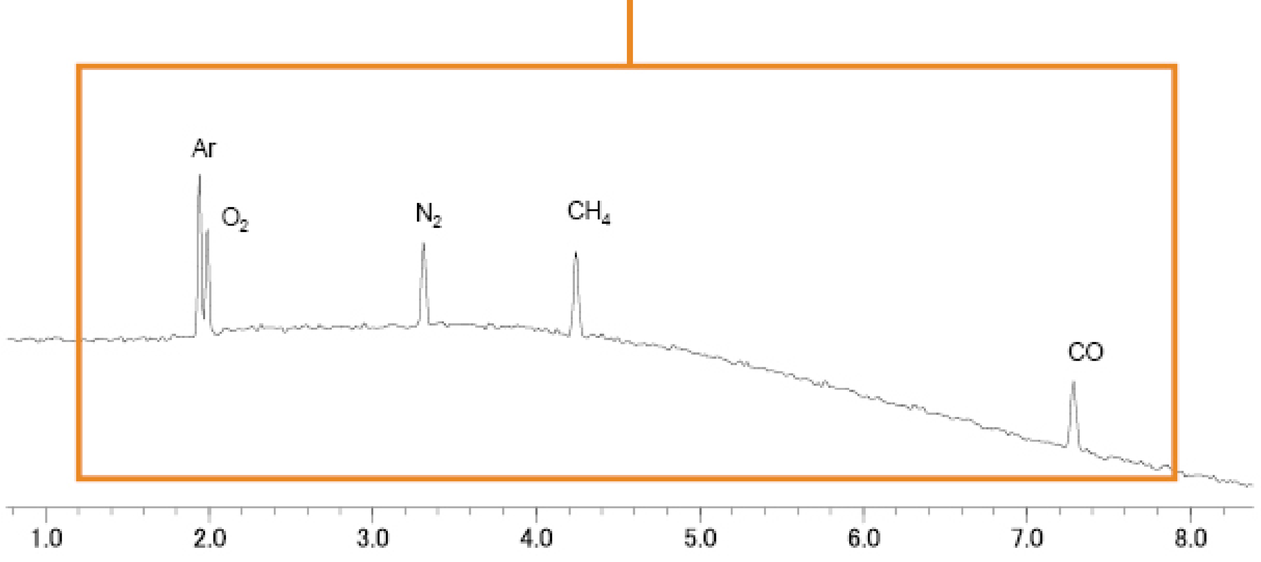
ID	df	Temp. Range	30 m
0.32 mm	30 µm	to 300 °C	227-36611-02
0.53 mm	50 µm	to 300 °C	221-75763-30

Analysis of Inorganic Gas



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 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

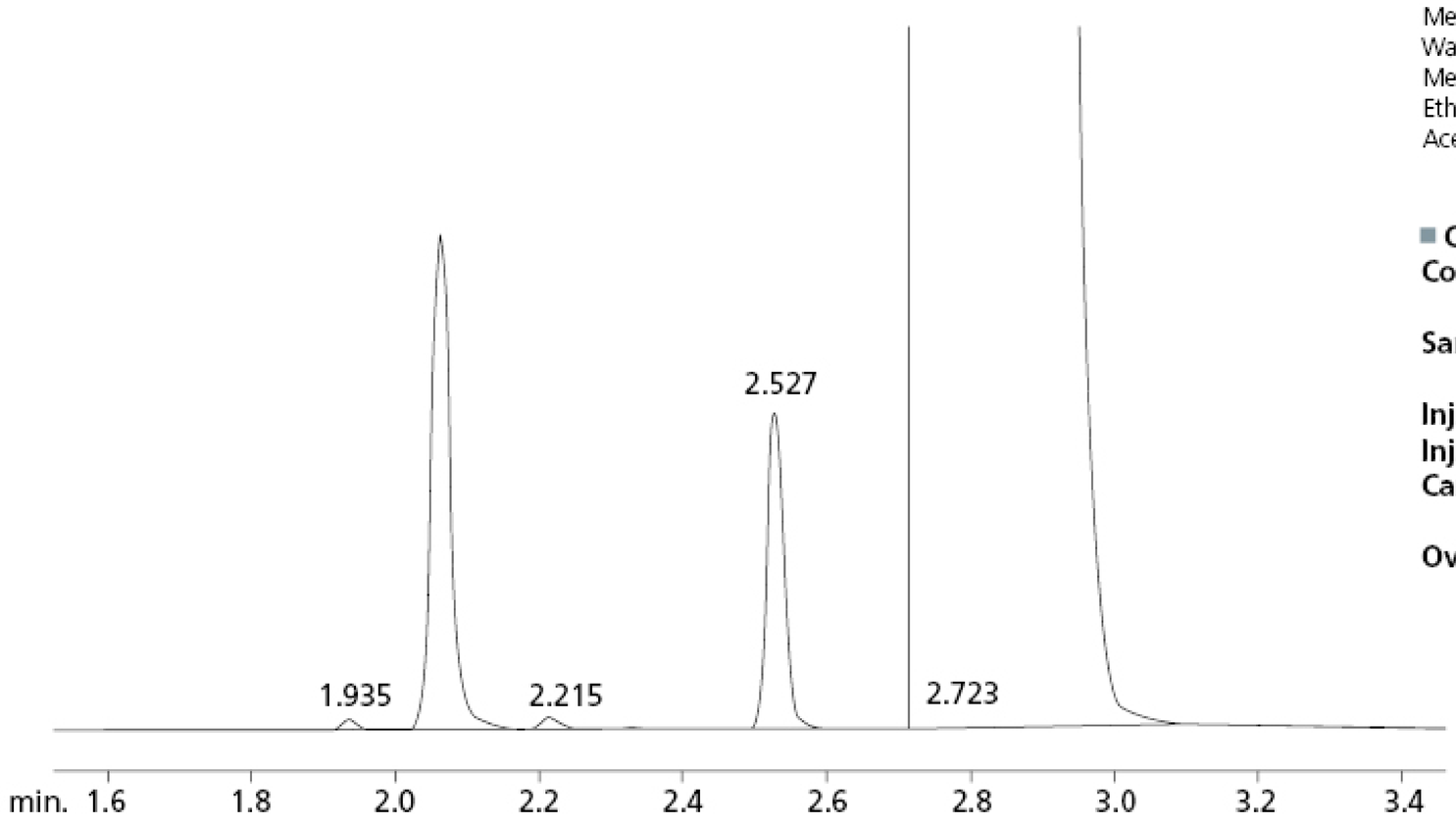
ID	df	Temp. Range	30 m
0.32 mm	10 µm	to 280/300 °C	221-75764-30
0.53 mm	20 µm	to 280/300 °C	221-75765-30

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

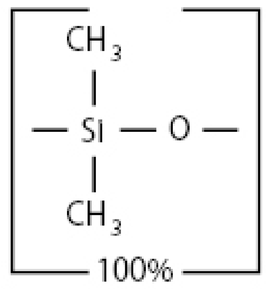
Capillary Columns

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

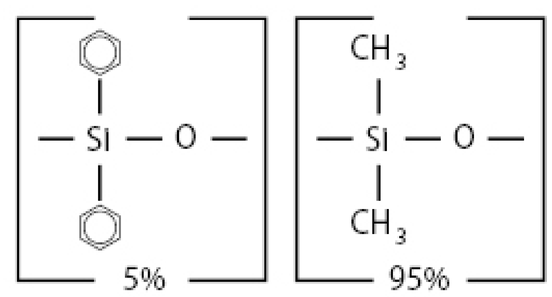


ID	df	Temp. Range	15 m
0.10 mm	0.25 µm	-60 to 430 °C	227-36318-01
0.28 mm	0.10 µm	-60 to 430 °C	221-75734-15

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

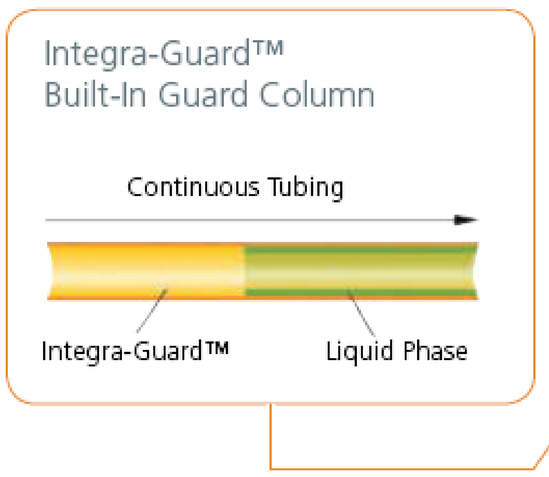
ID	df	Temp. Range	14 m
0.53 mm	0.16 µm	-60 to 430 °C	227-36315-01

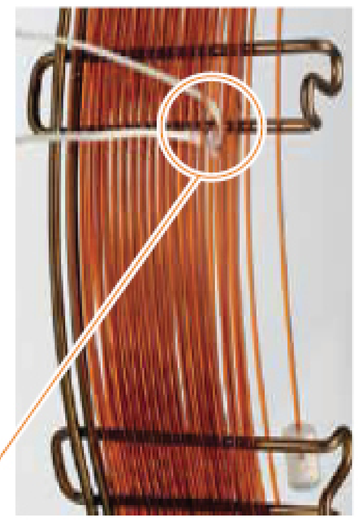
Capillary Columns

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

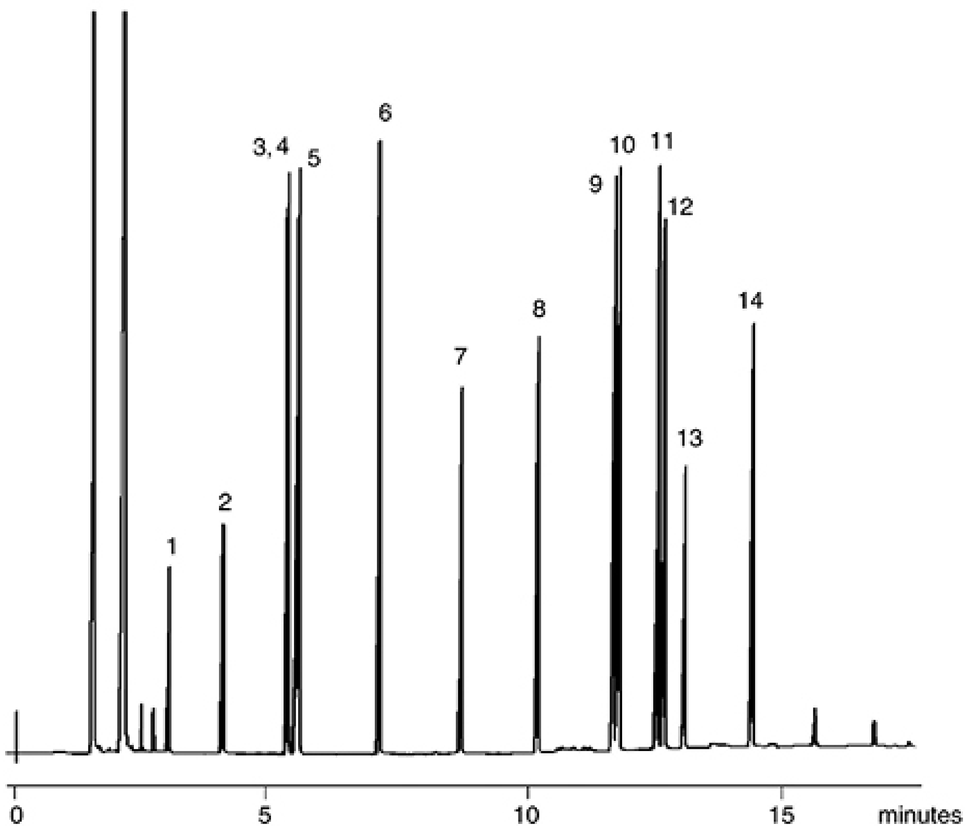
General purpose

- **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

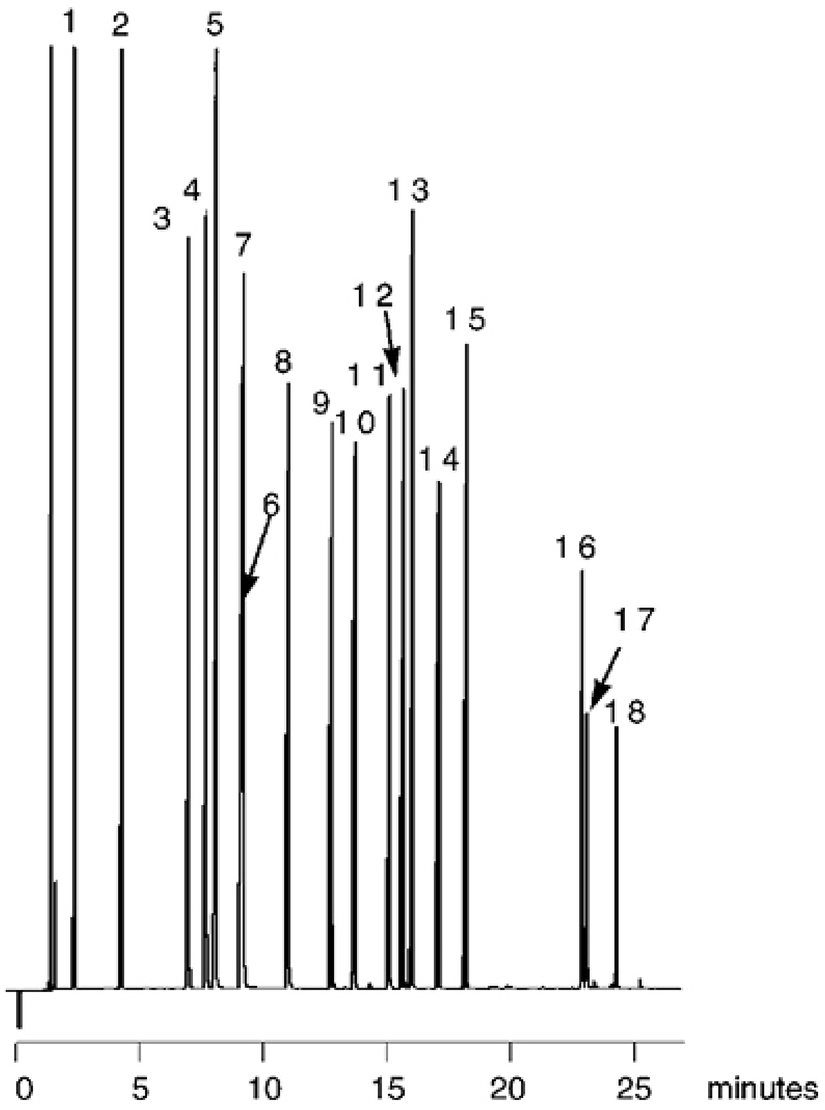
1. Dimethyl Oxalate
2. Dimethyl Malonate
3. Dimethyl Fumarate
4. Dimethyl Succinate
5. Dimethyl Maleate
6. Dimethyl Glutarate
7. Dimethyl Adipate
8. Dimethyl Pimelate
9. Dimethyl Suberate
10. Dimethyl Phthalate
11. Dimethyl Terephthalate
12. Dimethyl iso-Phthalate
13. Dimethyl Azelate
14. Dimethyl Sebacate

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

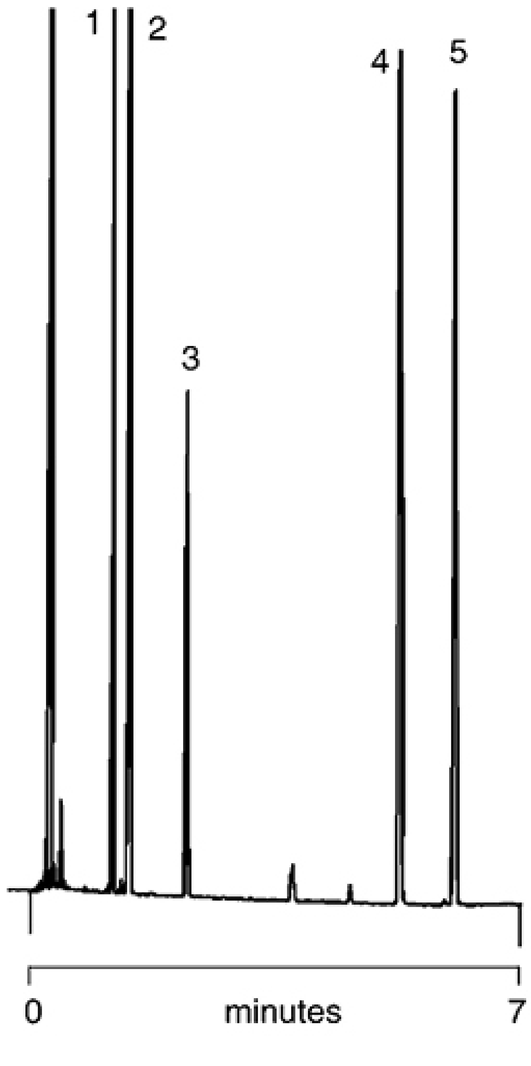
General purpose

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

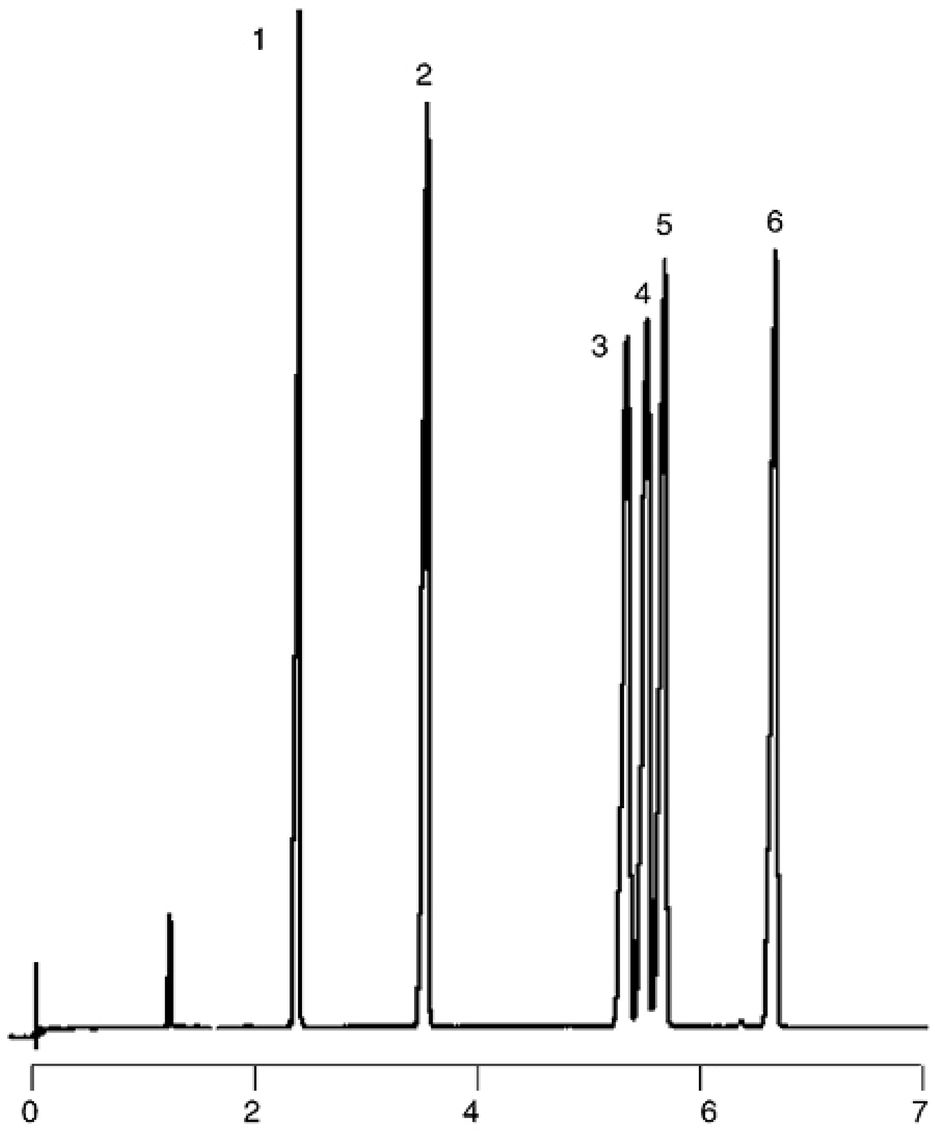
1. Bis (2-chloroethyl) ether
2. Bis (2-chloroisopropyl) ether
3. Bis (2-chloroethoxy) methane
4. 4-Chlorophenyl ether
5. 4-Bromophenyl ether

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

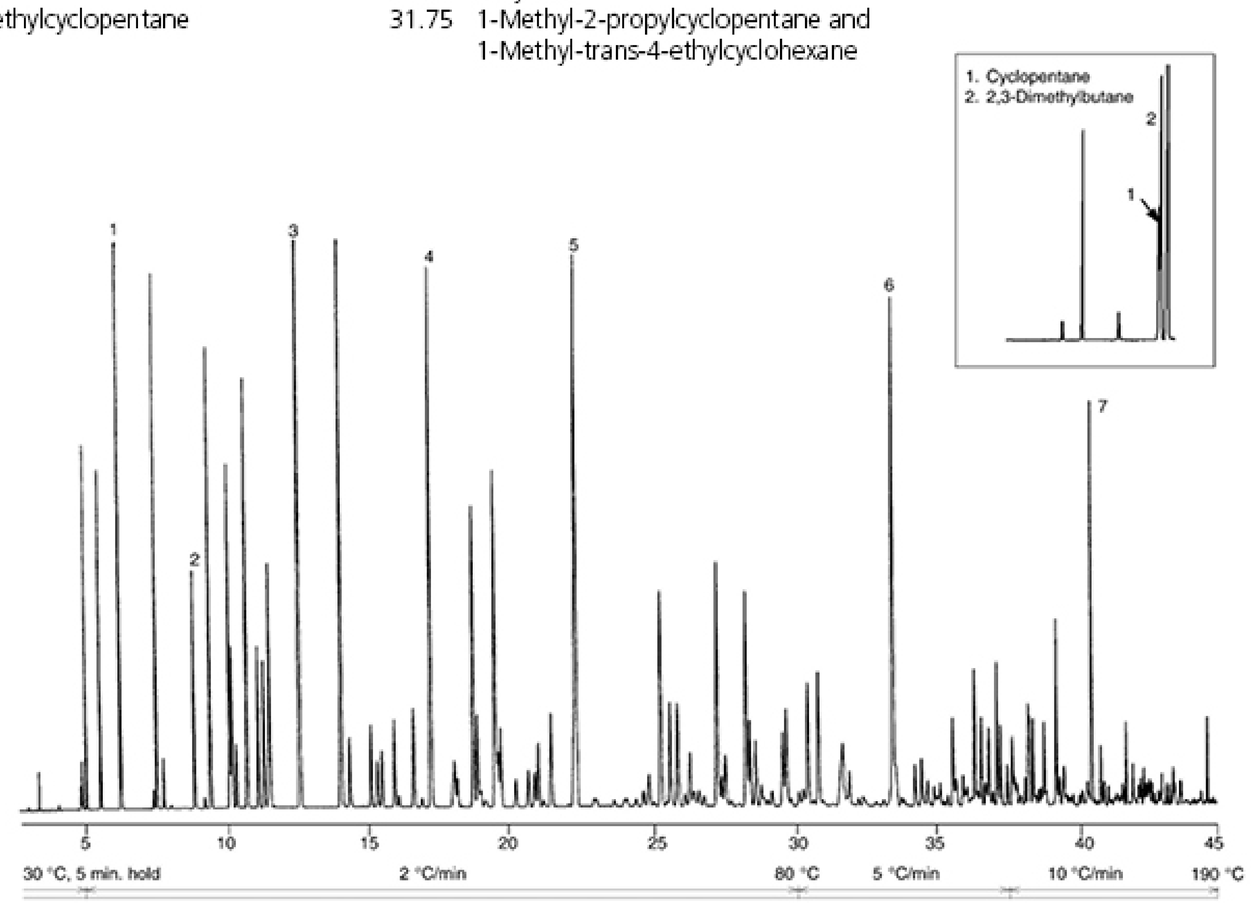
- Designed for the analysis of petroleum products
- Non-polar phase for PONA analysis
- Detailed hydrocarbon analysis according to ASTM (DHA-method)

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.

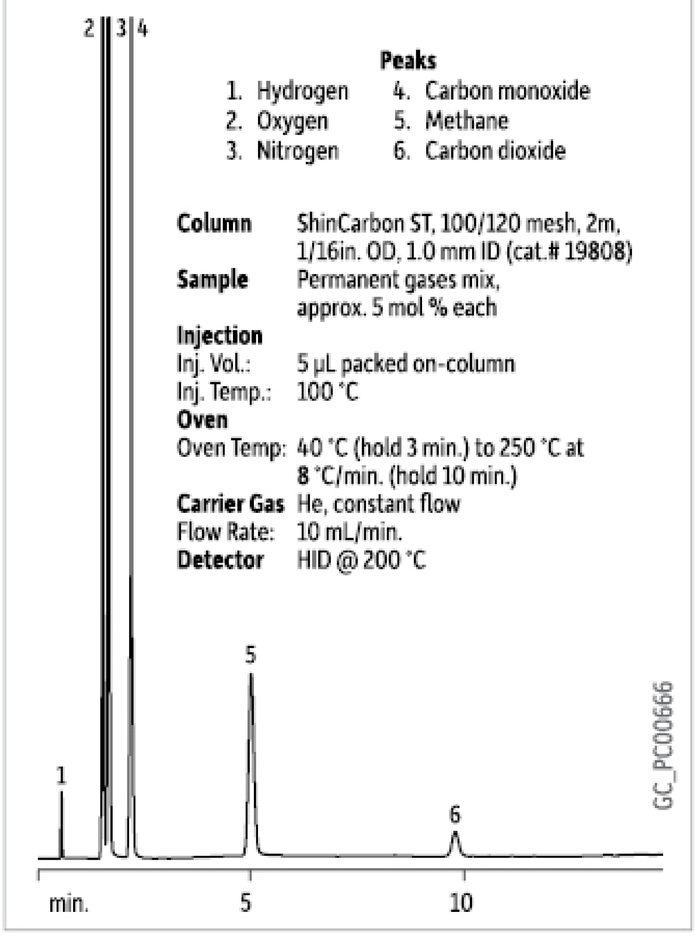


Figure 2 Rapidly analyze light hydrocarbon/permanent gas mixtures.

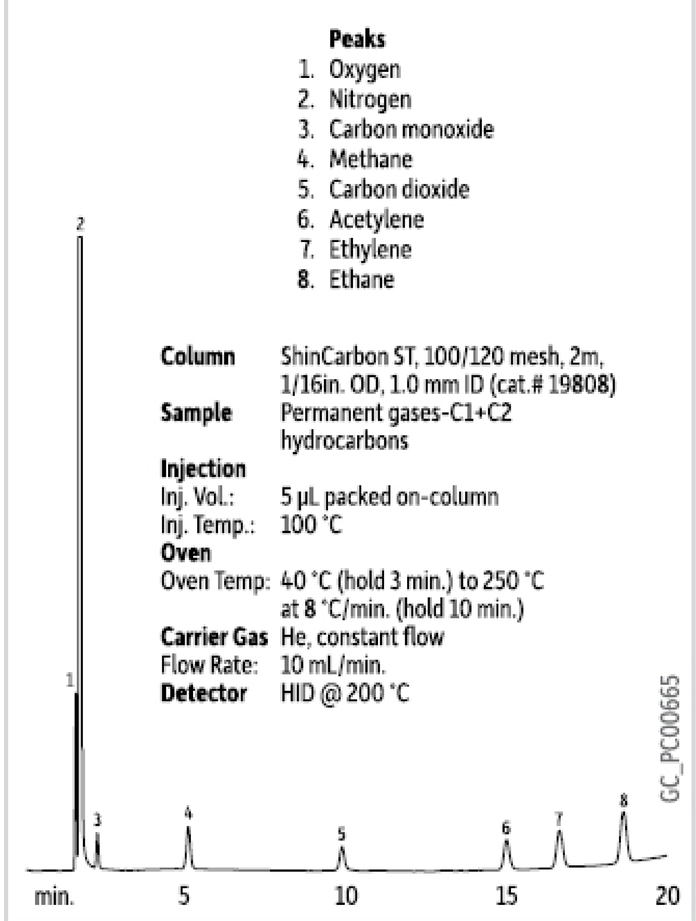
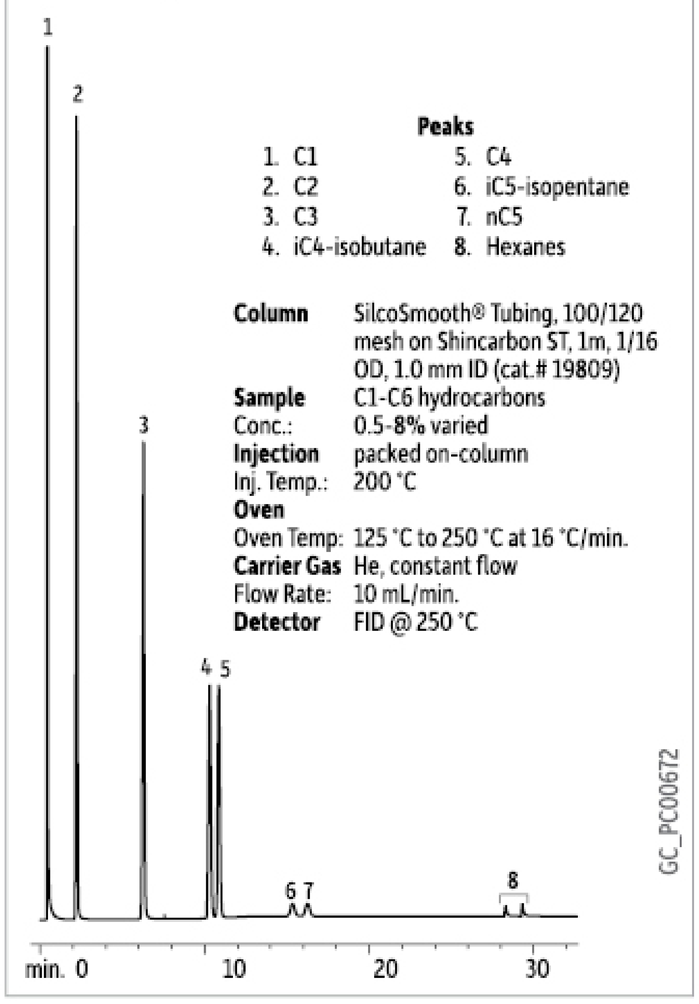


Figure 3 Separate components in natural gas.



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)

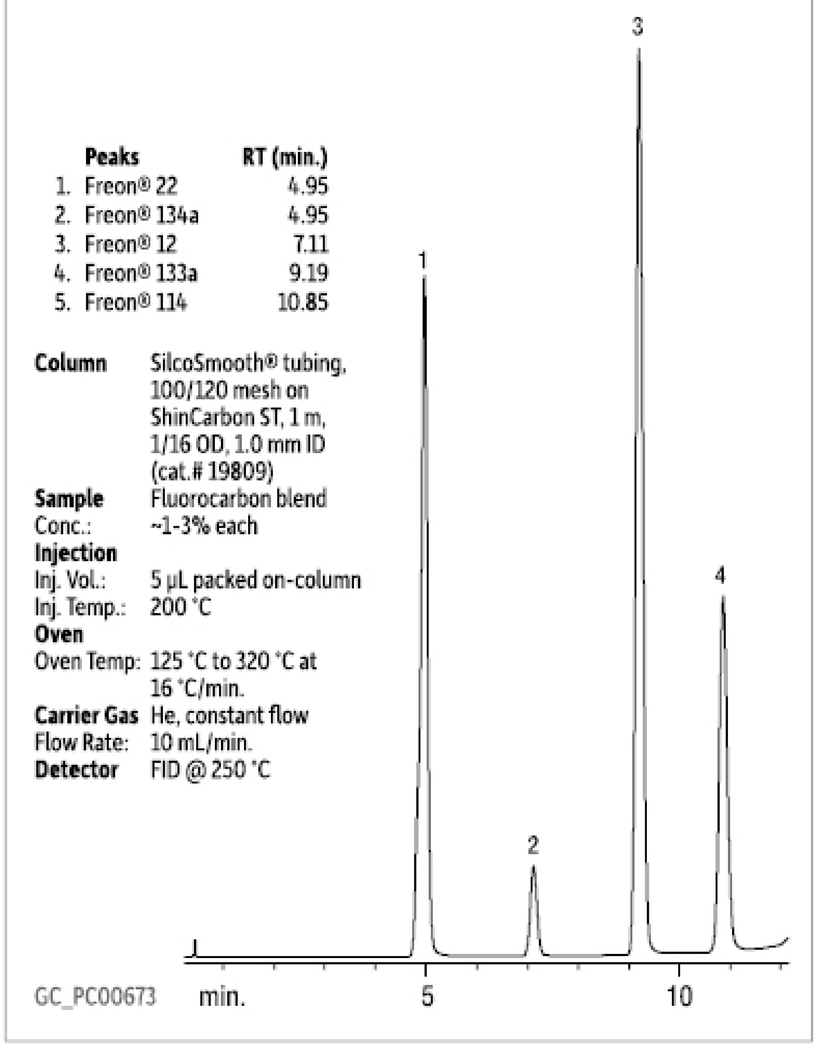
(SilcoSmooth® Stainless Steel)*

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.

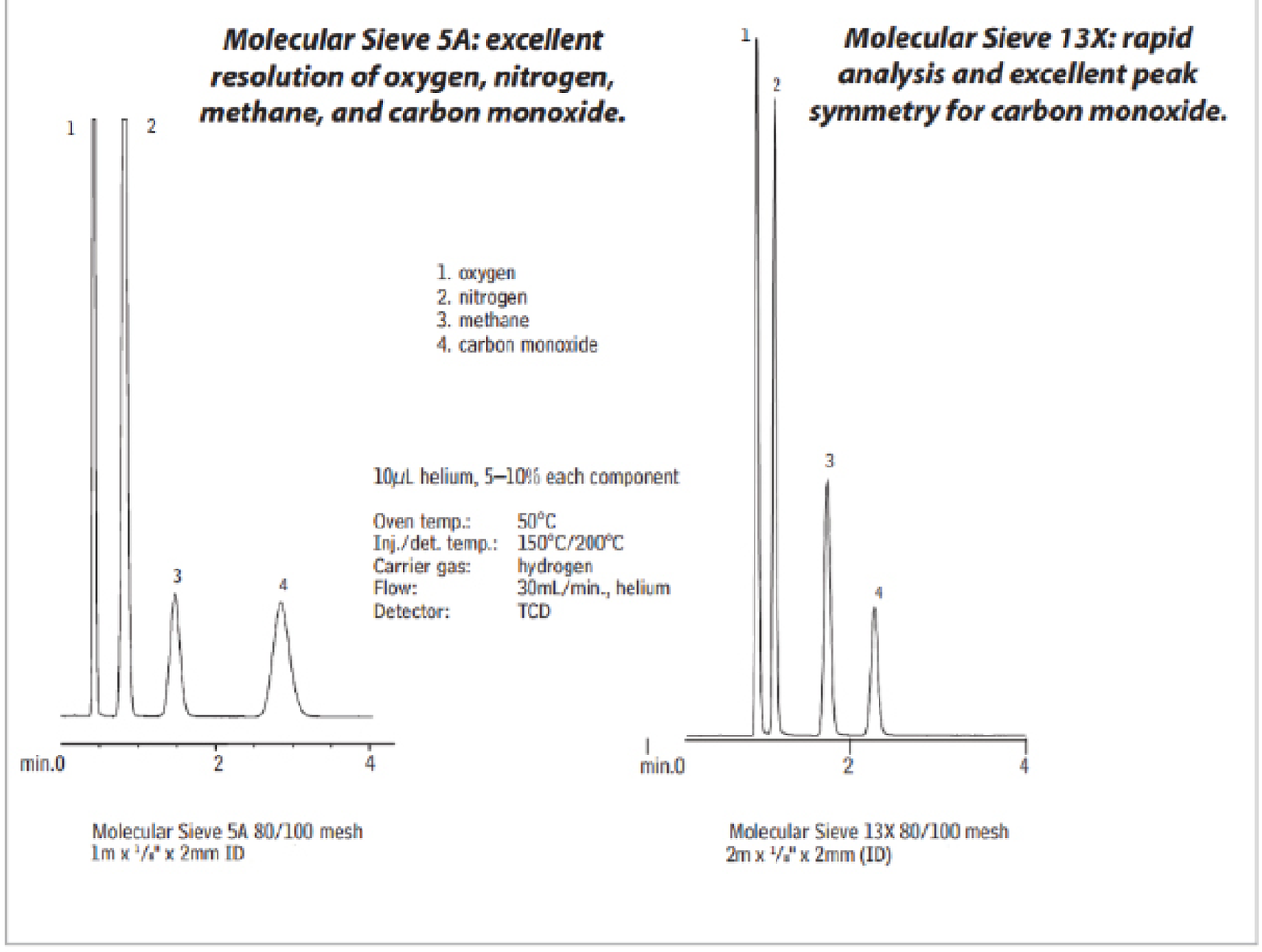


Molecular Sieve 5A / 13X

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

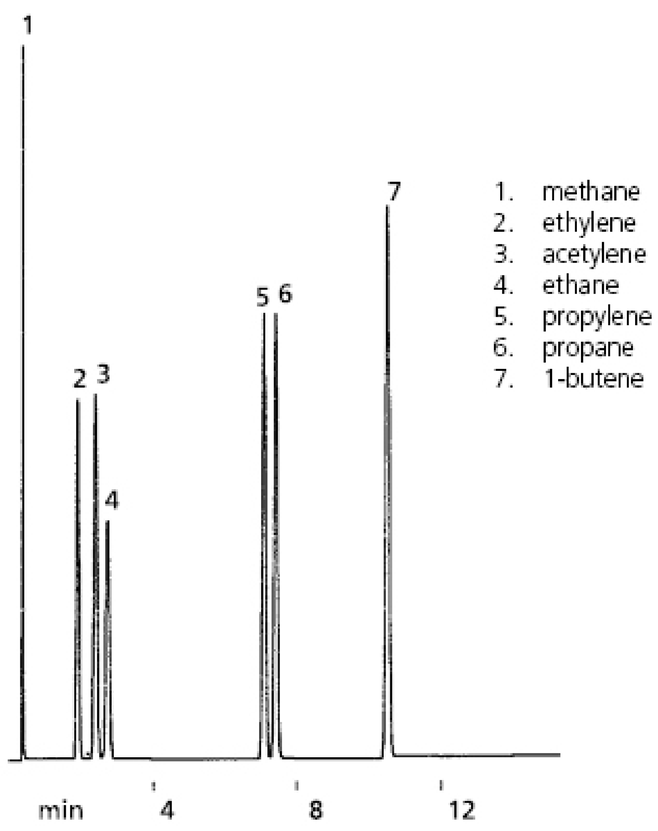
Molecular Sieve 5A and 13X are available in both stainless steel and glass column.

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.

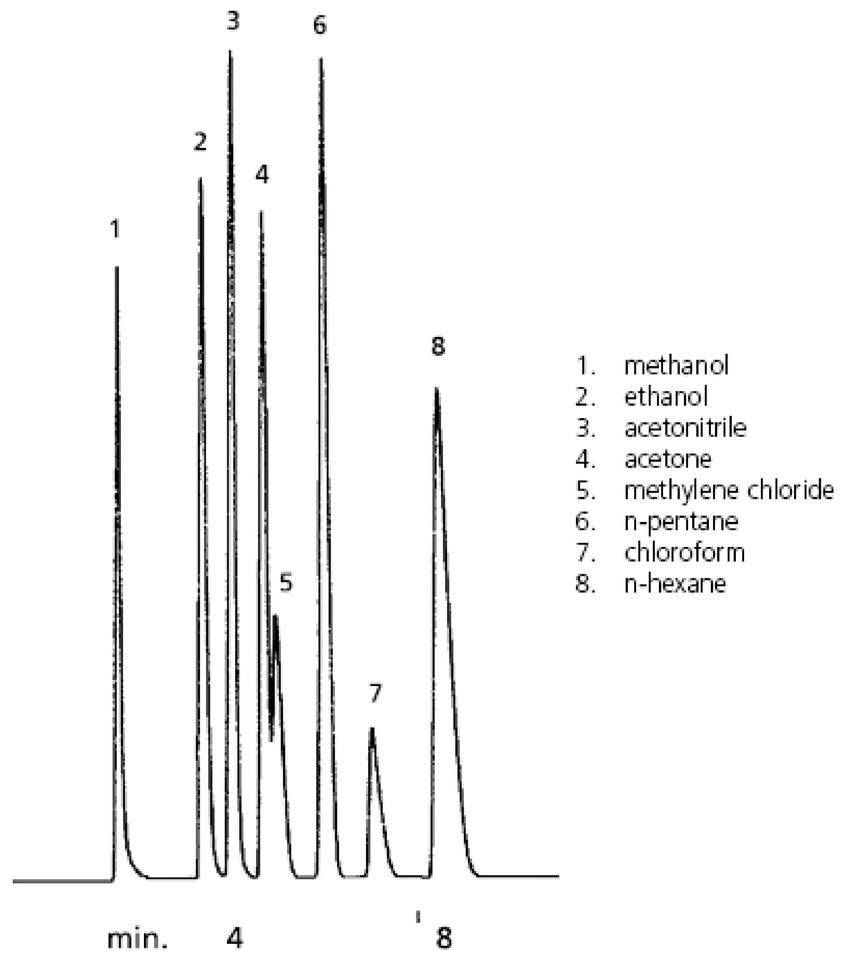
■ **Hydrocarbon Gases**
HayeSep® S
(micropacked)



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)

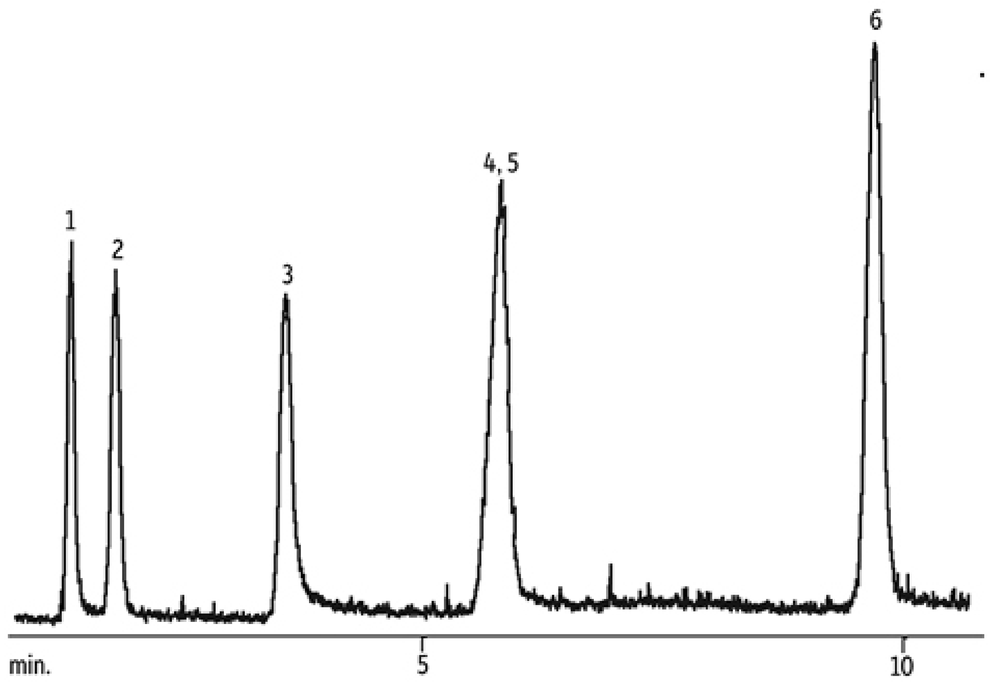
Rt-XLSulfur packed and micropacked columns are designed for ppb-level sulfur analysis. Every component of the sample pathway is treated to provide the highest degree of inertness for reactive, low-level sulfur compounds. The porous polymer phase features a unique surface modification, which results in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

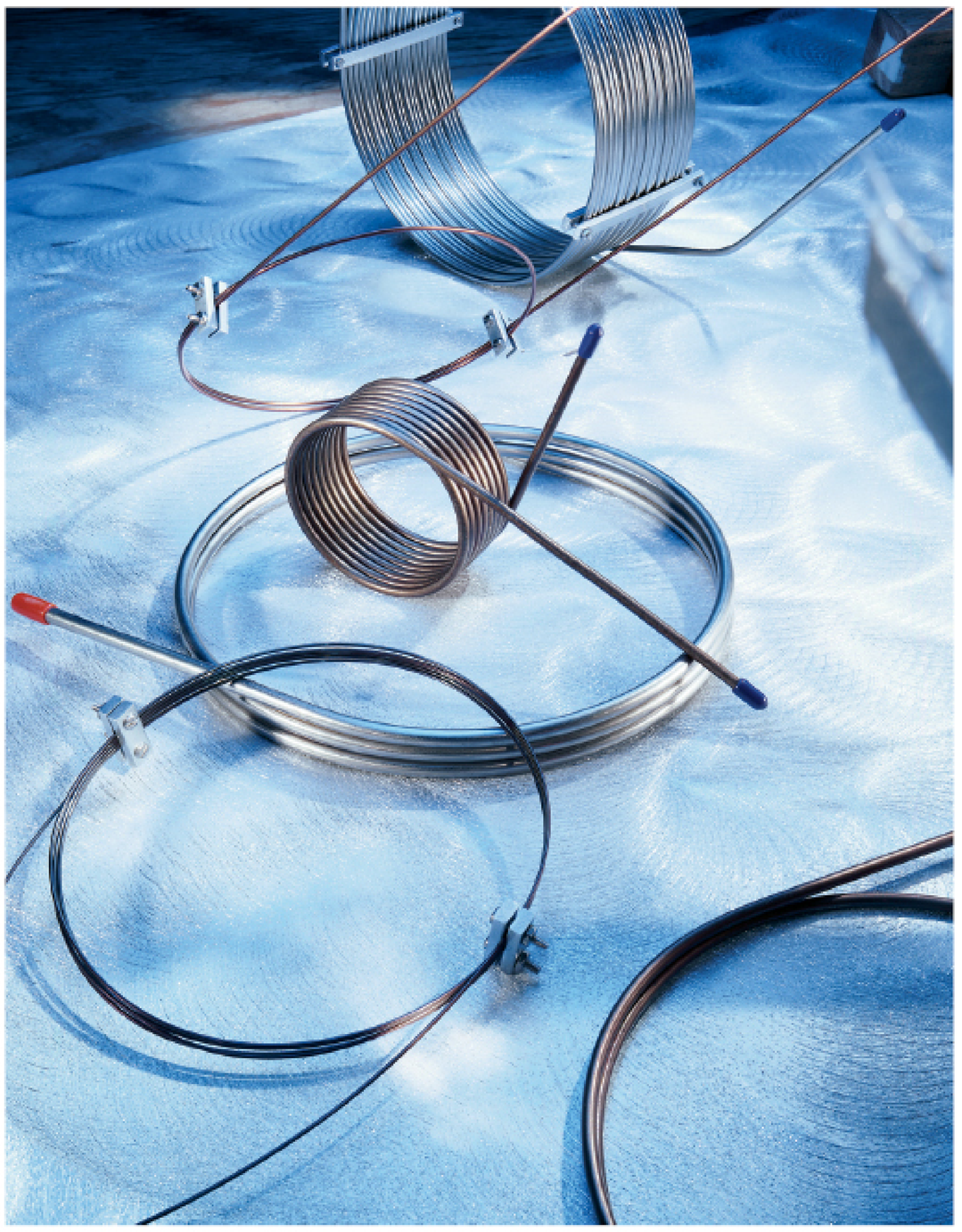
Column	OD	ID / mm	Length / m
Rt-XLSulfur Columns (packed)	1/8″	2.0	1.0
			2.0
	1/16″	3.2	1.0
			2.0
Rt-XLSulfur Columns (micropacked)	1/16″	1.0	1.0
			2.0
	0.95mm	0.75mm	1.0
			2.0

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

GC Packed Columns

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

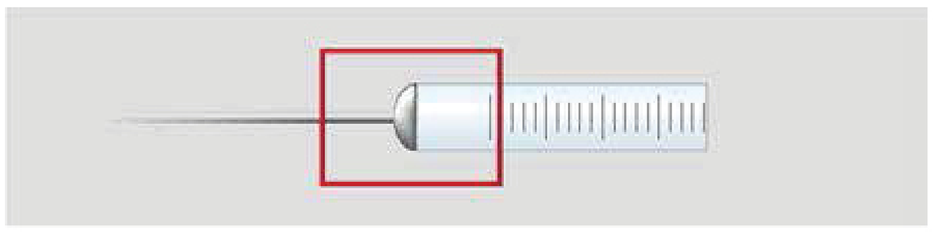
Engineering enhancements have eliminated areas where fluid can become trapped and potentially cause carryover, improving accuracy, precision and analysis results.

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.

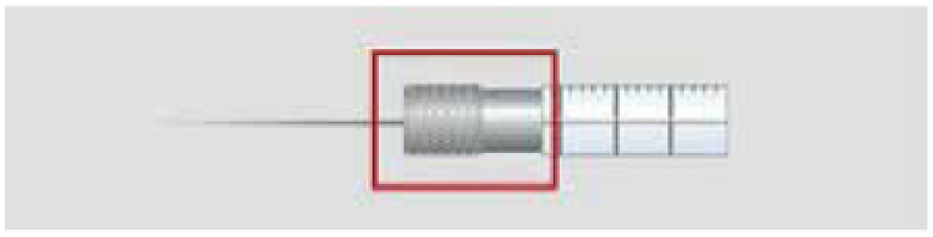
Syringe Style

Fixed Needle



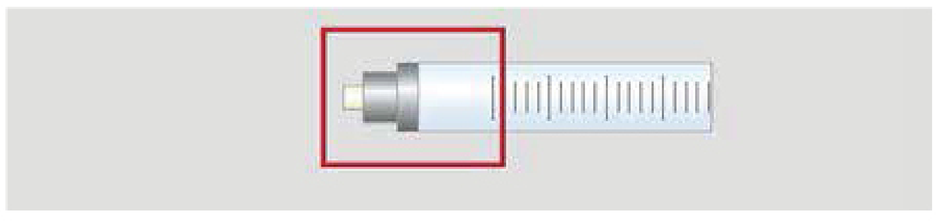
- Better option for experienced users or for applications requiring trace sample levels
- Recommended for use with an autosampler because the probability of needle bending is minimal
- Minimal sample carryover

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



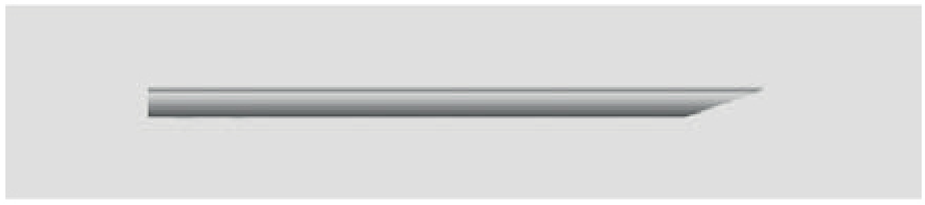
- For Luer Lock needles and fittings
- Specifically designed to install and secure Luer Lock needles easily

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



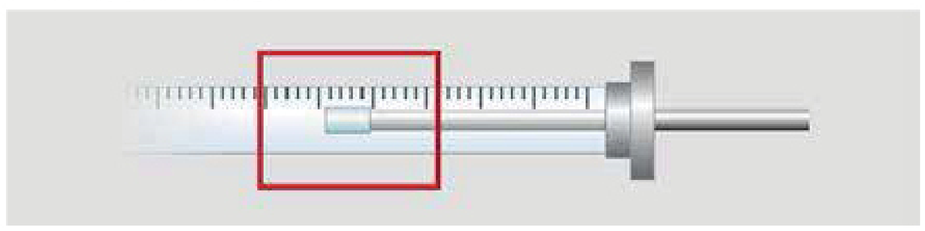
The standard general-purpose needle tip style supplied with many syringes is a 20 ° bevel tip. It is the preferred option for manual injection when piercing the septum in exactly the same place is difficult. The bevel tip is designe d for optimum septum penetration and prevention of septum coring.

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

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

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

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

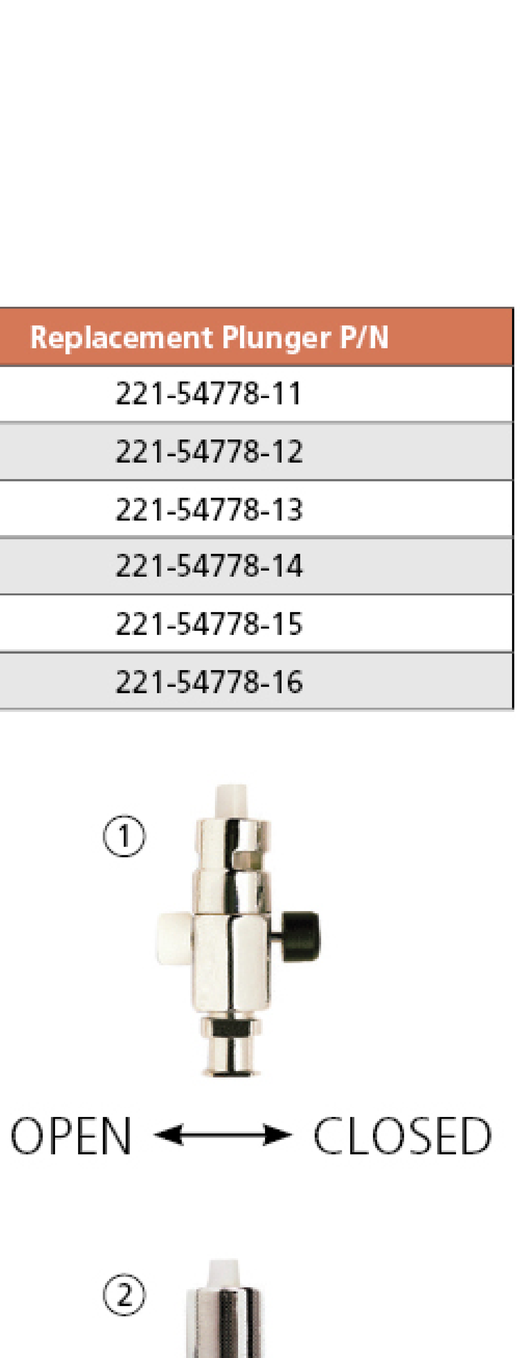
Syringe Volume	PTFE Tipped Plunger	P/N	Replacement Plunger P/N
1 mL	√	221-54778-01	221-54778-11
5 mL	√	221-54778-02	221-54778-12
10 mL	√	221-54778-03	221-54778-13
25 mL	√	221-54778-04	221-54778-14
50 mL	√	221-54778-05	221-54778-15
100 mL	√	221-54778-06	221-54778-16

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

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



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

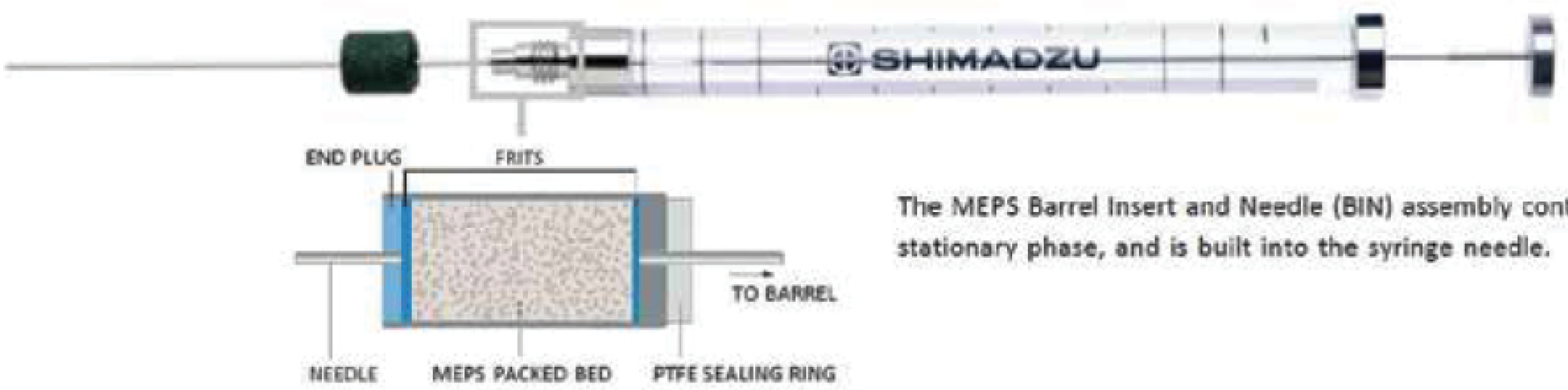
A guide bar is installed parallel to the plunger, which prevents the plunger from bending. A stopper is also provided to allow a preset amount of sample to be injected accurately without reading the scale in each run.

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.

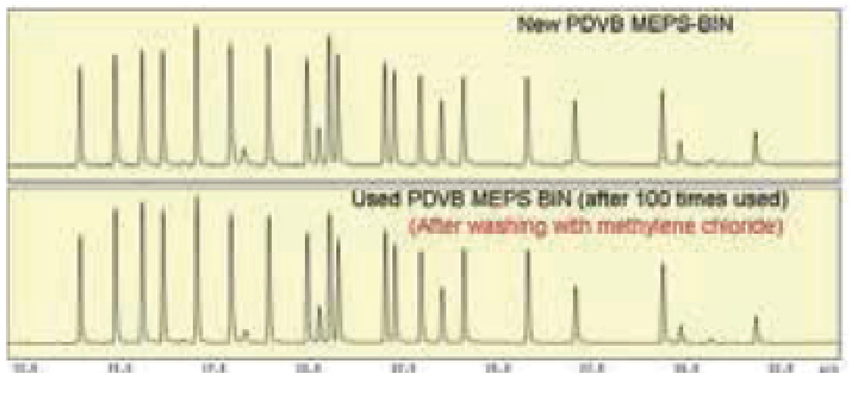
AUTOMATION

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)



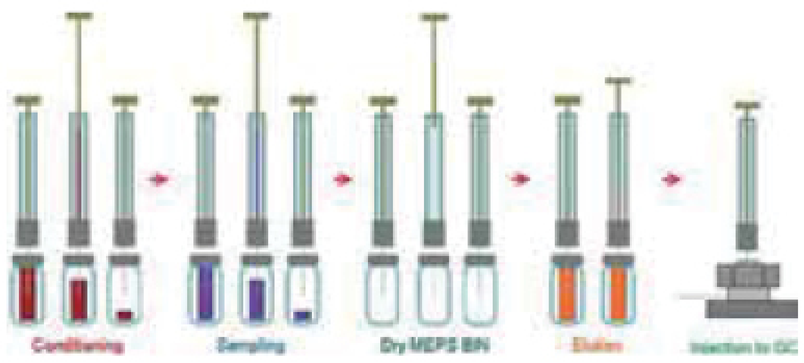
CARRYOVER

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

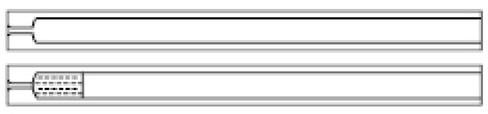
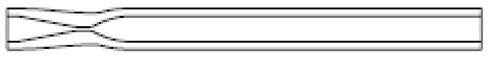
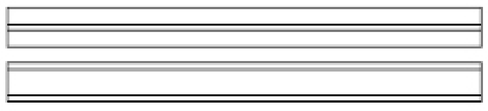
Syringe Volume	PTFE Tipped Plunger	P/N	Replacement Plunger	
			P/N	Qty
100 µL	√	221-75202-01	221-75202-03	1
250 µL	√	221-75202-02	221-75202-04	1

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			
				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 Attach-ment		221-38107 *1	(139mm)			S		S	
			221-39148	(86 mm)						S

			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

*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

Glass Insert for Capillary Column Analysis

S: Standard; O: Option

			Injection Unit –›	WBI-2030	WBI-2010 Plus WBI-2010	WBI-2014	WBI-17	SPL-14	SPL-G9
For CLH-14	Injection Port Side	221-32998-01	(123mm)					S	
	Detector Side	221-33000	(71mm)					S	
For CLH-800	Injection Port Side	221-18384-04	(78mm, for split injection method)						S
	Detector Side	221-18756-02	(78mm)						S

Glass Insert for OCI / PTV

S: Standard; O: Option

	P/N	Injection Unit –›	Nexis GC-2030	GC-2010 / GC-2010 Plus	GC-17
			OCI-2030	OCI/PTV-2010 *1	OCI/PTV-17 *2
Simple On-column Injection Method	221-49381-01		O	O	
	221-49381-02	(deactivated)	O	O	
	P/N	**Specification** / **Injection Unit –›**	**PTV-2030**	**OCI/PTV-2010*1**	**OCI/PTV-17*2**
PTV Injection Method	221-42223				S
	221-49300	(ID 1.5mm; OD 3.5mm; Length 95mm, quartz)	S	S	
	221-74830-09	(for AOC-MEPS™ system, deactivated, with wool, 5 pcs)	O	O	

*1 GC-2010 OCI requires an additional adapter (P/N: 221-49298-91).

*2 GC-17 OCI requires an additional adapter (P/N: 221-42222-91).

Glass Insert for Packed Column Analysis

When using a glass column, one may add a glass insert to prevent the column from accumulating non-volatile components. Please choose a proper insert according to the inter diameter of the glass column.

When using a stainless column, it is necessary to connect a glass insert to a 3.0 mmID column at the side of the injection unit. Please exchange it regularly to avoid poor reproducibility and peak shape caused by the crossover of residual sample, etc.

Note: Glass insert cannot be used in a GC-8A Series instrument when using glass columns.

S: Standard; O: Option

	P/N	Specification	GC-2014	GC-17A ver. 1-3	GC-14A/B
Injection Port Side	221-41484			O	
	221-14093	(for 3.0 mmID column)	S		S
	221-14093-84	(for 3.0 mmID column, 5 pcs)	O		O
	221-14094	(for 2.6 mmID column)	S		S
	221-14094-84	(for 2.6 mmID column, 5 pcs)	O		O

* GC for packed column analysis includes one insert for a 3.0 mmID column and one insert for a 2.6 mmID column as standard accessories.

Ferrules

Ferrules are available in a variety of different materials, shapes and sizes depending on their use, the instrument and the size of the capillary column being used. Probably the most important but difficult aspect of choosing a ferrule is the selection of the material type. The table below will help you choose the appropriate ferrule material for your application.

When choosing ferrules ensure you consider the following:

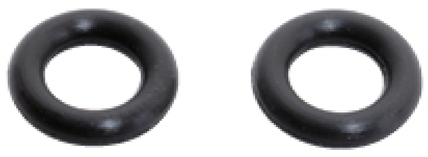
1) The material that best suits your application.
2) The connection type you want.

The following selection table will assist with your decision.

Ferrule Material Type	Graphite	Graphite Vespel®	SilTite™ Metal	ClickTek Ferrule
Features	• Easy to use. • Forms a stable seal. • Soft material. • Porous to oxygen. • Can be reused. • Forms a soft grip with capillary column. • Low emissions.	• A composite of graphite and Vespel®. • Mechanically robust. • Hard material, long lifetime. • Forms a strong grip with capillary column. • Cannot be reused with another capillary column. • Requires re-tightening.	• Specifically developed to overcome the problems associated with the use of 100% graphite and composite ferrules. • Strong seal on capillary columns. • Leak free - The ferrule and nut expand and contract at the same rate eliminating any chance of leaks with temperature cycling. • Nut does not need re-tightening after initial temperature cycles.	• Easy to use • Leak free • Specially designed to use with ClickTek Connector on Nexis GC-2030 • Cannot be reused with another capillary column • Not suitable for stainless steel column
Suitable Uses	• Column to injector connection. • Non-mass spectrometer detectors (FID, TCD, FTD, FPD, ECD, BID).	MS interfaces, although even with a good seal will leak air compared to SilTite™ ferrules.	Ideal for MS interfaces and advanced flow technology due to leak-free	• Column to injector connection • Non-mass spectrometer detectors (FID, TCD, FTD, FPD, ECD, BID).
Not Suitable For	Connecting columns to mass spectrometers, as porous to oxygen.	High temperature applications.	–	–
Risks	• Can leave residue inside your column. • Can extrude into the injector or detector if it is over-tightened.	If not re-tightened after installation and temperature cycles of the GC, air may enter the column or detector decreasing sensitivity of the analysis and possibly degrading the column as well as components of the system.	Over-tightening of the seal can introduce leaks into the system. Follow the recommended installation instructions to avoid this problem.	–
Operating Temperature	Upper limit of 450 °C	Upper limit of 325 °C	No temperature limit in GC use.	–

Description	Specification	P/N
Graphite Ferrule (10 pcs)	For 5 mmOD packed columns	221-75182
Graphite Ferrule (10 pcs)	For 0.25 - 0.32 mmID columns	227-35006-01
Graphite Ferrule (10 pcs)	For 0.53 mmID columns	227-35009-01
Graphite Vespel® Ferrule (10 pcs)	No hole	670-15003-01
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
Graphite Vespel® Ferrule (10 pcs)	For 0.05 - 0.25 mmID columns	670-15003-03
SilTite™ Metal Ferrule (10 pcs)	For 0.05 - 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 0.05 - 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 10/32" 0.8 mm ID Column (5 pc)	–	221-75186
ClickTek Ferrule Kit	Narrow bore 0.43, includes 6 ferrules and prefixing tool (for 0.05 - 0.25 mmID columns)	221-81162-01
ClickTek Ferrule Kit	Middle bore 0.50, includes 6 ferrules and prefixing tool (for 0.32 mmID columns)	221-81162-02
ClickTek Ferrule Kit	Wide bore 0.73, includes 6 ferrules and prefixing tool (for 0.53 mmID columns)	221-81162-03
ClickTek Ferrule	No Hole (for blinding)	221-81162-00

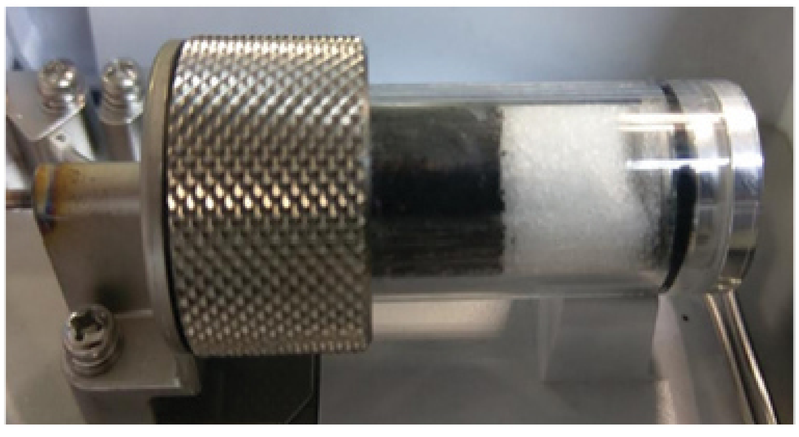
Other Accessories	
Description	P/N
Capillary Ceramic Tube Cutter (3 pc)	221-75181
Stainless Steel Nut/ SSNE-16-012S (Pk 5)	670-11009
O-ring for insert, Max. Temp. 350 °C (10pcs)	227-35005-01
Filter for split, for Nexis GC-2030	221-77580-42



O-ring for insert

Capillary Ceramic tube cutter

Stainless Steel Nut



Filter for split, for Nexis GC-2030

Injection Port Septum

Description	P/N	Color	Description
Standard type (20 pcs)	201-35584	White	• General-purpose septum • Maximum temperature (INJ setting temperature): 250 °C
LL Septum (long life type, 20 pcs)	221-48972-91	Blue	Provides significant durability improvements compared to a conventional low-bleed septum, offering both low bleed and long life. The problem of sticking to the vaporizing chamber during continuous use at high temperatures experienced with a conventional septum has also been eliminated. • Suitable for high-sensitivity analysis • Maximum temperature (INJ setting temperature): 450°C
HT Septum (high temp type, 20 pcs)	221-48398-91	Brown	Using this septum alleviates the problem of reduced durability when the vaporizing chamber is used continuously at 450°C. Compared to the LL septum, the increase in bleed when used at high temperatures is kept at a lower level. The problem of sticking to the vaporizing chamber during continuous use at high temperatures experienced with a conventional septum has also been eliminated. • Suitable for high-sensitivity analysis at high temperatures • Maximum temperature (INJ setting temperature): 450°C
Low-bleed Septum (25 pcs)	221-76650-01	Green	This septum is least influenced by a plasticizer. Better prevents septum coring & • Low-bleed, suitable for high-sensitivity analysis • Maximum temperature (INJ setting temperature): 340°C
Enduro Blue Septum (50 pcs)	221-75180	Light Blue	• Low-bleed, suitable for high-sensitivity analysis at high temperatures • Maximum temperature (INJ setting temperature): 350°C
Premium Green Septa (50 pcs)	227-35004-01	Light green	• Low bleed, highly robust (max. usable temp. 350°C) • High durability, proper sealing and good resistance to most chemical solvents. • Useful for trace analysis and other applications where high sensitivity is critical
Perforated septum for HS-10	221-76863-96	White	• For HS-10 only • To ensure cleanliness and inertness • Maximum temperature (INJ setting temperature): 250 °C

Low-bleed septum is not completely free of bleeding. The type of bleeding that occurs varies with the septum, and results in different patterns on chromatograms. In the case of high-sensitivity analysis, it is necessary to select a septum whose bleeding will not occur at a point that interferes with the peak of the target compound. Conditioning for several hours between 200°C and 250°C after extraction with hexane may help to reduce bleeding.

In the case of using a syringe for AOC, it is recommended to exchange the septum after about 100 injections. If the outside diameter of a needle of a gastight syringe is thick, it is recommended to exchange after about 50 injections.

Shimadzu SPME Arrow

Ferrules are available in a variety of different materials, shapes and sizes depending on their use, the instrument and the size of the capillary column being used. Probably the most important but difficult aspect of choosing a ferrule is the selection of the material type. The table below will help you choose the appropriate ferrule material for your application.

Features:

- Each SPME Arrow is equipped with its unique Smart chip containing parameters, ranges and usage history.
- Automatic application of the correct parameters for the individual Smart Arrow.
- Color Code for easy optical identification of coating type and thickness
- Rugged stainless-steel construction ensures longer lifetimes.
- Faster extraction means higher sample throughput.
- Better sensitivity allows lower LODs.

The table below shows the dimension of a Shimadzu SPME Arrow 1.5 mm (a), 1.1 mm (b) and a SPME Fiber (c) in comparison:

		Sorption Phase Surface	Sorption Phase Volume
a		62.8 m²	11.8 µL
b		44.0 m²	3.8 µL
c		9.4 m²	0.6 µL

Stationary Phase	Color Code	Thickness (µm)	O.D. (mm)	Analytes	Set of 1 Part Number	Set of 3 Part Number	Set of 5 Part Number
Acrylate (Polyacrylate)	Grey	100	1.1	Polar, semivolatile, 80–300 g/mol	227-35301-01*^	227-35301-03	227-35301-05
Carbon WR/PDMS (Carbon Wide Range)	Light Blue	120	1.1	Highly volatile, 30–225 g/mol	227-35302-01*^	227-35302-03	227-35302-05
			1.5		227-35306-01	227-35306-03	227-35306-05
PDMS (Polydimethylsiloxane)	Red	100	1.1	Volatile, 60–275 g/mol	227-35305-01*^	227-35305-03	227-35305-05
			1.5		227-35309-01	227-35309-03	227-35309-05
	Black	250	1.5	Volatile, 60–275 g/mol (high capacity)	227-35310-01*	227-35310-03	227-35310-05
DVB/PDMS (Divinylbenzene)	Violet	120	1.1	Amines and polar compounds, 60–300 g/mol	227-35303-01*^	227-35303-03	227-35303-05
			1.5	Aromatic semi-volatile, 60–300 g/mol	227-35308-01	227-35308-03	227-35308-05
DVB/Carbon WR/PDMS (Divinylbenzene)	Dark Grey	120	1.1	Volatile and semi-volatile, 40–275 g/mol	227-35304-01^	227-35304-03	227-35304-05
			1.5		227-35307-01	227-35307-03	227-35307-05
Shimadzu SPME Arrow Selection5-Set1 Set of 5; includes 1pc of each type listed above with a *							227-35311-01
Shimadzu SPME Arrow Selection5-Set2 Set of 5; includes 1pc of each type listed above with a ^							227-35312-01

All Shimadzu SPME Arrows have a phase length of 20mm bonded onto stainless steel.
Recommended maximum GC inlet pressure is 50 psi or less.

Shimadzu SPME Arrow glass insert

Part number	Inner diameter (mm)	Injection method	GC Model	Pack size
227-35327-03	1.3	Split/Splitless	2010	3
227-35328-03	1.7	Split/Splitless	2010	3

Shimadzu SPME Fiber

SPME is a very effective way of automated sample preparation. It is used for extracting organics from a matrix (solid, liquid or gaseous) into a stationary phase immobilized on a fiber. The analytes are thermally desorbed directly in the injector of a gas chromatograph.

Shimadzu SPME fibers are suitable for a wide range of analyte chemistries and sample matrices. Choose the best SPME fiber for your application based on the properties of your target compounds.

Typical Applications:

- Trace analysis in food
- Drugs and pharmaceuticals
- Herbicides/pesticides
- Medical diagnostics
- Organics in water
- Trace impurities in polymers and solid samples
- Solvent residues in raw materials

Stationary Phase	Color Code	Thickness (µm)	Analytes	Set of 1 Part Number	Set of 3 Part Number	Set of 5 Part Number
PDMS (Polydimethylsiloxane)	Green	7	Non-polar, 125 - 600 g/mol	227-35313-01*	227-35313-03	227-35313-05
	Gold	30	Non-polar semi-volatiles, 80 – 500 g/mol	227-35314-01*	227-35314-03	227-35314-05
	Red	100	Volatiles, 60 – 275 g/mol	227-35315-01*^	227-35315-03	227-35315-05
DVB/Carbon WR/PDMS (Divinylbenzene)	Dark grey	80	Volatile and semi-volatile, 40-275 g/mol	227-35316-01^	227-35316-03	227-35316-05
DVB/PDMS (Divinylbenzene)	Violet	65	Aromatic, semi-volatile, 50-300 g/mol	227-35317-01^	227-35317-03	227-35317-05
Carbon WR/PDMS (Carbon Wide Range)	Dark Blue	95	Gases and low molecular weight compounds, 30 – 225 g/mol	227-35318-01*^	227-35318-03	227-35318-05
Acrylate (Polyacrylate)	Grey	85	Polar semi-volatiles, 80 -300 g/mol	227-35319-01*^	227-35319-03	227-35319-05
Shimadzu SPME Fiber Selection5-Set1 Set of 5; includes 1pc of each type listed above with a *						227-35320-01
Shimadzu SPME Fiber Selection5-Set1 Set of 5; includes 1pc of each type listed above with a ^						227-35321-01

All Shimadzu SPME fibers have a phase length length of 10 mm, gauge 23 and the core material is fused silica.
They can be used for a wide range of GC injector models. Recommended maximum GC inlet pressure is 50 psi or less.

Shimadzu SPME Fiber Glass Insert

Part number	Inner diameter (mm)	Injection method	GC Model	Pack size
227-35322-01	0.8	Split/Splitless	2010	1
227-35322-03		Split/Splitless	2010	3

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