GL Sciences

CONSUMABLES AND SUPPLIES

GL Sciences

GL Sciences' Quality Assurance and Support System

GL Sciences aspires to an Earth-friendly company by environmentally conscious developing, manufacturing, and sales and has obtained ISO14001 for a contribution to achievement of better society. We have given first priority to customer satisfaction and have obtained ISO9001 International Standard at our Fukushima factory and R&D Department to implement continuous improvement for greater customer satisfaction.

ISO14001 Certification

Product Ranges: development, manufacture and sale of instruments, parts, accessories,columns, packing materials, reagents relating to gas chromatography, liquid chromatography and cells for spectrometry

ISO9001 Certification

Product Ranges: design, manufacture and supply of instruments, parts, accessories, columns, packings, reagents relating to gas chromatography, liquid chromatography and cells for spectrometry

R&D/Customer Support Center

Fukushima Factory

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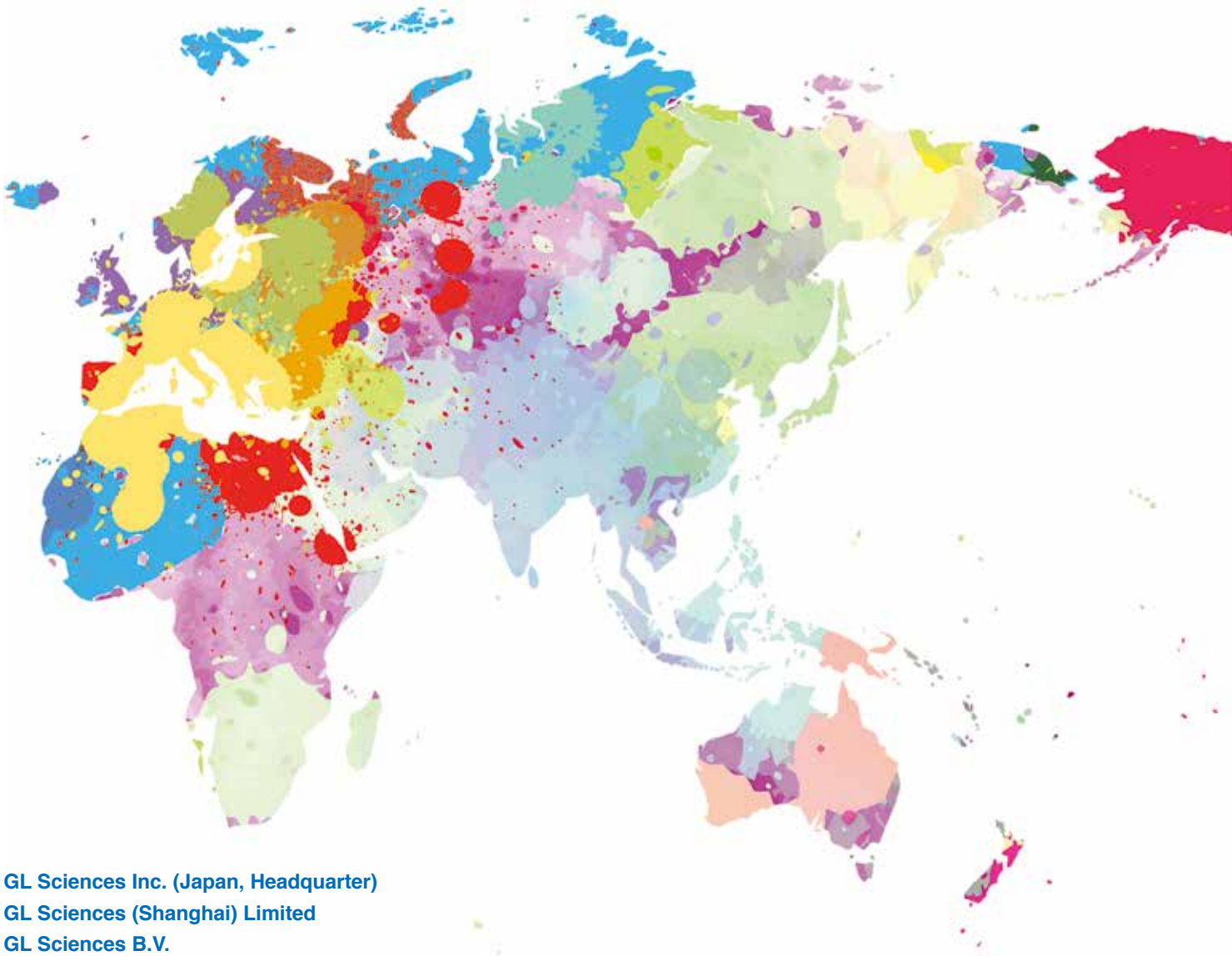

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Worldwide Distribution Network

In order to give our global customer base more convenient access, we have 3 international Sales offices and maintain a distributor network that covers over 80 counties. To find a local distributor in your location, visit our website.

https://www.glsciences.com/company/distributor.html

If your country is not listed, or if you need further assistance, please contact:

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Tel: (+81) 3-5323-6620
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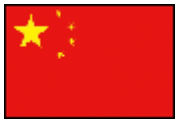
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Introduction

Contact Us

We provide with product information and technical support on our website. You can browse through or search GL Sciences' online library of both GC and LC applications, featuring chromatograms with method, conditions, sorted by technique and compound class by InertSearch.

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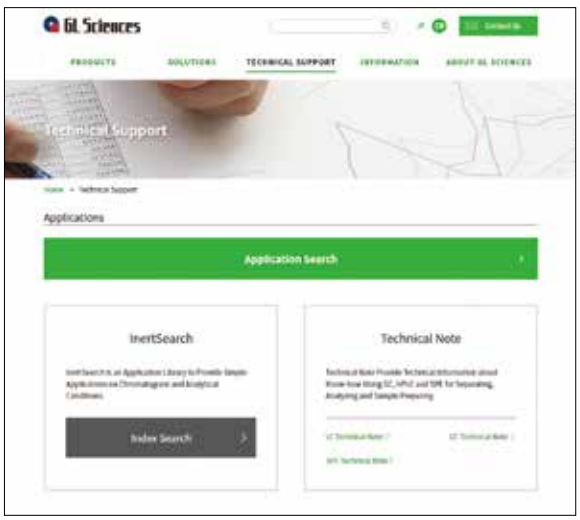
InertSearch

"InertSearch" is GL Sciences' onsite search engine for chromatographic data. A large number of chromatographic results of various analyses are available.

Technical Note

"Technical Note" is a database of chromatographic results and useful information of various analyses. These files provide detailed explanation of each analysis which will help you greatly (e.g. method and instruction, chromatogram with analytic condition, chemical structure of compounds).



https://www.glsciences.com/technique/index.html

CONSUMABLES AND SUPPLIES

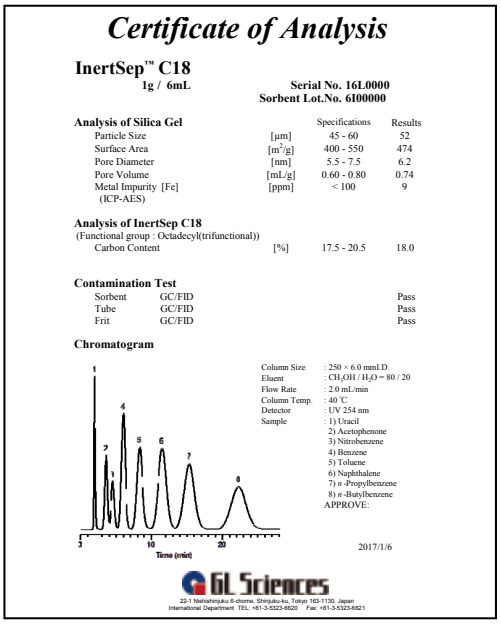
SAMPLE PREPARATION

Quality Control

Quality Control

There have been significant advances in innovation in analytical instrumentation, making it much easier to perform trace analysis. However, no matter how well the instruments are developed, sample preparation and pretreatment are still inevitable. There is a wide variety of techniques available for sample pretreatment, such as mechanical grinding, dissolution and extraction.

This chapter describes the use of solid phase extraction (SPE), a sample pretreatment technique which is fast, clean and economical when compared with the traditional method of liquid-liquid extraction.
Systematic errors can greatly affect the overall accuracy and precision of analysis. To overcome these problems, solid phase extraction can be done using a range of automation technologies. Automation of sample pretreatment greatly improves the reproducibility, reliability and robustness of SPE. The reliability of SPE packing materials has also become increasingly important.
GL Sciences is committed to providing our customers with 'Excellent Products, Quick Delivery' together with 'Fast Technical Support'; giving you confidence in our products to achieve your goals.



Certificate of Analysis

InertSep™ C18
1g / 6mL

Serial No. 16L0000
Sorbent Lot.No. 6100000

Analysis of Silica Gel		Specifications	Results
Particle Size	[μm]	45 - 60	52
Surface Area	[m^2/g]	400 - 550	474
Pore Diameter	[nm]	5.5 - 7.5	6.2
Pore Volume	[mL/g]	0.60 - 0.80	0.74
Metal Impurity [Fe] (ICP-AES)	[ppm]	< 100	9

Analysis of InertSep C18 (Functional group : Octadecyl(trifunctional))			
Carbon Content	[%]	17.5 - 20.5	18.0

Contamination Test		
Sorbent	GC/FID	Pass
Tube	GC/FID	Pass
Frit	GC/FID	Pass

Chromatogram

Column Size : 250 × 6.0 mmI.D.
Eluent : CH_3OH / H_2O = 80 / 20
Flow Rate : 2.0 mL/min
Column Temp. : 40 ℃
Detector : UV 254 nm
Sample : 1) Uracil
2) Acetophenone
3) Nitrobenzene
4) Benzene
5) Toluene
6) Naphthalene
7) *n* -Propylbenzene
8) *n* -Butylbenzene
APPROVE:

2017/1/6

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International Department TEL: +81-3-5323-6620 Fax: +81-3-5323-6621

Quality Control of InertSep Products

The InertSep series is an original GL Sciences brand produced in our own factory through development, manufacturing, quality control and inspection. Our Fukushima Manufacturing factory has obtained the International Organization for Standardization ISO-9001 certification. All solid-phase extraction products are manufactured under strict quality control and widely used in the analysis of food and water samples. All products are inspected and only those which pass our stringent criteria are shipped to customers.
On request, we can provide a customization service and custom-made multi-sorbent beds in a cartridge.

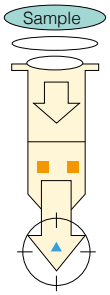
Objective of Solid Phase Extraction (SPE)

Objective of Solid Phase Extraction (SPE)

Separation and Purification of Target Analytes

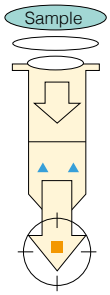
The principle of SPE is divided into the following two methods.

① Retaining the target analyte



Mainly used to concentrate target analytes in aqueous sample matrix.

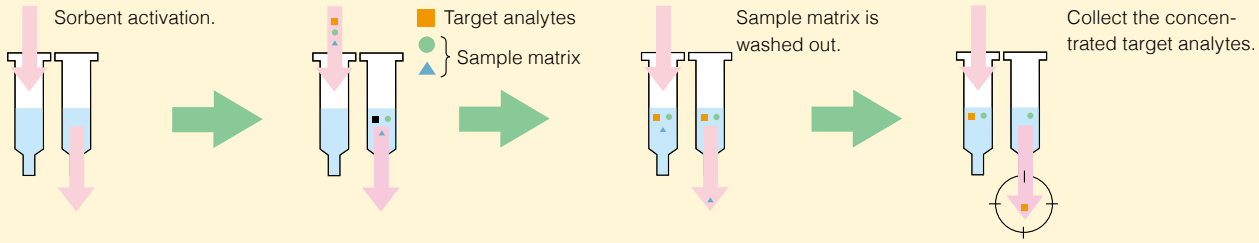
② Retaining the sample matrix and letting the target analytes pass through



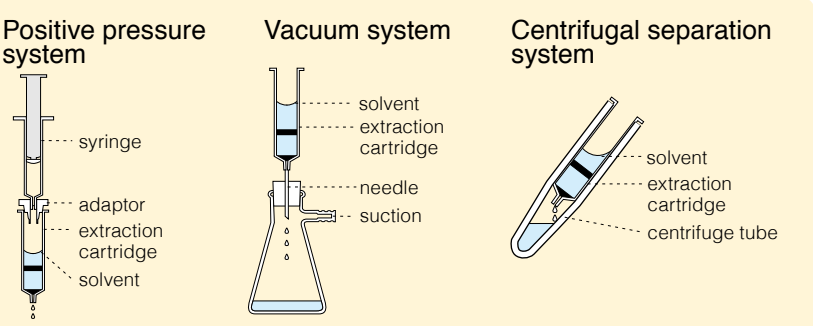
Used in simplification of complex sample matrix such as pesticide residues in crops and organic compounds in soil.

■ Target analyte
▲ Sample matrix

General Four Steps



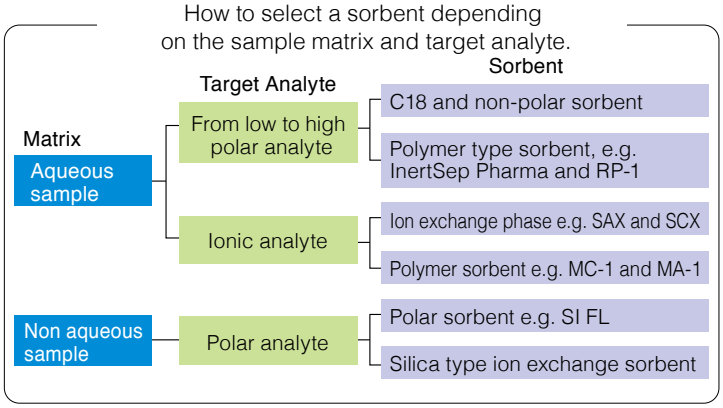
General Methods for Processing Sample



SPE Cartridge Selection Guide

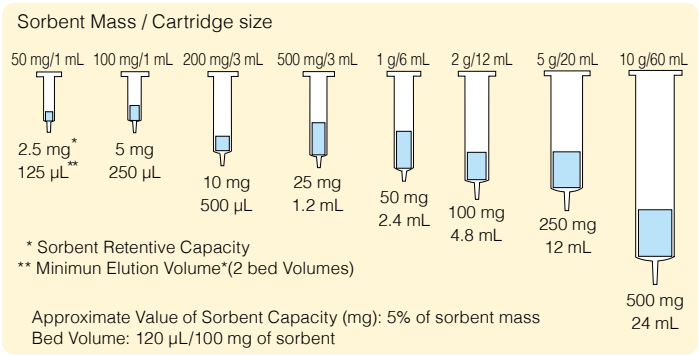
How to Select a Sorbent

How to select a sorbent depending on the sample matrix and target analyte.



One of the most important elements to achieve successful of solid phase extraction is the selection of a sorbent suitable for both the sample matrix and the target analyte.
The sorbent should be carefully selected by taking into account the chemical and physical properties of both the target analyte and the sample matrix. In addition, it is important to develop conditions that are optimal for retaining the target analyte, while removing the sample matrix, then selecting an elution solvent for maximum recovery of the target analyte.

Retentive Capacity of a Sorbent Compared to Sorbent Mass



※Bed volume is the quantity of the solvent necessary to replace the air trapped in the solid phase. Void volume is equivalent to the bed volume

Recommendation for Selecting an Ion Exchange Sorbent

Target Analytes	InertSep		pKa*	Structure	Target Ion	
					Weak Ion	Strong Ion
Acidic	Anion Exchange	MA-1 4Class Amine	–	$-CH_2\ -N^+\ (R)_3$	✓	×
		MA-2 2Class Amine	11.0	$-CH_2\ -N\ (R)_2$	✓	×
		NH2 Aminopropyl	9.8	$-CH_2\ CH_2\ CH_2\ NH_2$	×	✓
		PSA 1Class, 2Class Amine	10.1,10.9	$-CH_2\ CH_2\ CH_2\ NHCH_2\ CH_2\ NH_2$	×	✓
		SAX Tri-Methylaminopropyl	–	$-CH_2\ CH_2\ CH_2\ N^+\ (CH_3)_3$	✓	×
		SAX-2	–	$-CH_2\ CH_2\ CH_2\ N^+\ (CH_3)_3$	✓	×
Basic	Cation Exchange	MC-1 Sulfonic Acid	1.0	$-CH_2\ -SO_3^-$	✓	×
		MC-2 Carboxylic Acid	4.5	$-CH_2\ -COO^-$	✓	×
		CBA Ethyl Carboxylic Acid	4.8	$-CH_2\ CH_2\ COO^-$	×	✓
		PRS Propyl Sulfonic Acid	1.0	$-CH_2\ CH_2\ CH_2\ SO_3^-$	✓	×
		SCX Benzene Sulfonic Acid	1.0	$-CH_2\ CH_2\ C_6\ H_4\ SO_3^-$	✓	×
		SCX-2	–	$-CH_2\ CH_2\ C_6\ H_4\ SO_3^-$	✓	×

* pKa reference value for each functional group.

InertSep Series Sorbent Specifications

Polymer-based Sorbent Specifications

To conduct solid phase extraction, it is necessary to choose the sorbent best suited for the properties of your target compound and sample matrix. The advantages of polymer-based sorbent are the availability in the wide pH range and the absence of secondary interaction which can occur with silica-based sorbents.

Separation mode	InertSep	Base gel	Functional group	Particle size (µm)	Surface area (m^2/g)	Pore volume (mL/g)	Pore size (nm)	Ion exchange capacity (meq/g)	pH range
Reversed phase	PLS-2	SDB*1	–	70	700	1.1	7	–	1-14
	PLS-3	N-MA-SDB*1	–	60	600	1.1	7	–	
	RP-1 (mini)	MA-DVB*1*2	–	70	650	1.5	9	–	
	RP-2	SDB	weak anion exchanger	90	700	0.7	4	–	
	Pharma (FF)	N-MA-SDB*1	–	60	600	1.1	7	–	
	RP-C18	SDB*1	Octadecyl	45	110	0.5	18	–	1-13
Ion exchange	MA-1 (mini)	MA*2	Quaternary ammonium	70	250	0.7	13	0.5	1-14
	MA-2 (mini)	MA*2	Diethyl amine	70	250	0.8	13	0.5	
	MC-1 (mini)	MA*2	Sulufonic acid	70	80	0.4	20	0.5	
	MC-2 (mini)	MA*2	Carboxylic acid	70	80	0.4	18	0.5	
	MPC	SDB*1	C18, Sulfonic acid	40	100	–	18	–	1-13
	ME-1	MA*2	Iminodiacetic acid	70	80	0.5	21	Cu^{2+} 0.3 mmol/g	1-14
	ME-2	MA*2	Iminodiacetic acid + Tertiary amine	70	80	0.5	21	Cu^{2+} 0.3 mmol/g	

*1 : In short time, it can be used pH 1 to 14 depending on method.

Silica-based Sorbent Specifications

The silica-based sorbent materials are more cost-effective and have a higher physical strength compared with polymer-based sorbent materials. Silica offers a wide variety of separation mechanisms using a combination of primary functional group interaction with secondary interactions due to the nature of silica.

Separation mode	InertSep	Base gel	Functional group	End capped*1	Particle size (µm)	Carbon loading (%)	Surface area (m^2/g)	Pore volume (mL/g)	Pore size (nm)	Ion exchange capacity	pH range
Reversed phase	C18 (FF)	SiO_2	Octadecyl (trifunctional)	Excellent	60 (120)	19	450	0.7	6	–	2-8*2
	C18-B (FF)		Octadecyl (monofunctional)	Good	45 (120)	14		0.7	6	–	
	C18-C (FF)		Octadecyl (trifunctional)	Fair	60 (120)	16		0.7	6	–	
	C18-ENV		Octadecyl (trifunctional)	Fair	60	16		0.7	6	–	
	C8		Octyl	Good	60	12		0.7	6	–	
	C8-NE		Octyl	Poor	60	12		0.7	6	–	
	C2		Ethyl	Good	60	5.5		0.7	6	–	
	CH		Cyclohexyl	Good	60	7.5		0.7	6	–	
	PH		Phenyl	Good	60	10		0.7	6	–	
Ion exchaxge	SCX	SiO_2	Benzenesulfonic acid	None	45	8.5	450	0.7	6	0.6	2-8*2
	SCX-2		Benzenesulfonic acid	None	60	17		0.7	6	1.2	
	PRS		Propylsulfonic acid	None	45	8.5		0.7	6	1.2	
	CBA		Propylcarboxylic acid	None	45	8.5		0.7	6	1.2	
	SAX		Quaternary ammonium	None	45	7		0.7	6	0.7	
	SAX-2		Quaternary ammonium	None	60	11.5		0.7	6	0.45	
	PSA		Ethylenediamine-N- propyl	None	60	11.5 (10.0-13.0)		0.7	6	1.5 (1.45-1.90)	
	NH2		AminoPropyl	None	60	10		0.7	6	0.9	
Normal phase	CN	SiO_2	Cyanopropyl	None	45	0.7	450	0.7	6	–	2-8*2
	2OH		Diol	None	60	10	450	0.7	6	–	
	Si		–	None	60	–		0.7	6	–	
	AL	Al_2O_3	Aluminium oxide	None	100	–	130	0.3	8	–	–
	FL	$MgO \cdot SiO_2$	Magnesium silicate	None	50-200	–	230	0.5	9	–	–
	FL-PR			None	100-300	–	230	0.5	9	–	–

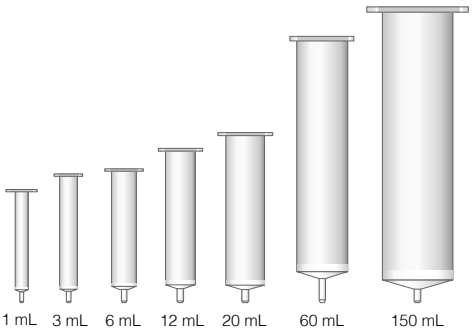
*1 : Styrene divinylbenzene copolymer
*2 : Methacrylate polymer

Specialty Phases

InertSep	Base gel	Particle size	Surface area (m^2/g)	Pore volume (mL/g)	Pore size (nm)
GC	Graphite Carbon	120/400 mesh	85	1	45
GC-e	Graphite Carbon	100/200 mesh	90	1	50
AC	Activated Carbon	65/150 mesh	800-1200	–	–

InertSep Format Guide

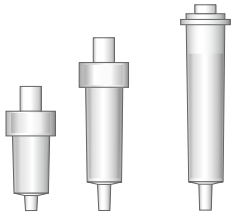
InertSep Format



Cartridge volume : 1, 3, 6, 12, 20, 60, 150 mL
Cartridge material : PP housing and PE frit
Purpose : Processing of small liquid samples up to bulk

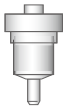
Cartridge Type

Dimensions : Slim : 8.8 mm O.D. length 32 mm, 21 mm
Slim-J : 8.8 mm O.D. length 51 mm, 31 mm
Cartridge material : PP housing and PE frit
Purpose : Tandem processing and automatic SPE system



Slim Type Slim-J Type

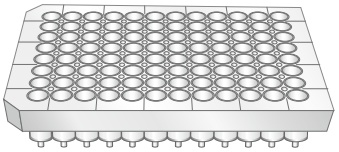
Dimensions : 12.7 mm O.D. length 32 mm, 21 mm
Cartridge material : PP housing and PE frit
Purpose : manual processing, Tandem processing and automatic SPE system



mini Type

Luer Device Type

Cartridge volume : 1.2 mL
Cartridge material : PP housing and PE frit
Purpose : Rapid processing for multiple samples



96-well Plates Type

Cartridge volume : 1 mL
Cartridge material : PP housing
Purpose : Extraction by centrifuge

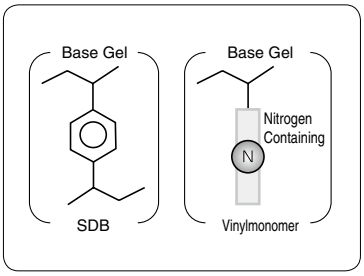
Spin Column

Spin Column Type


InertSep
InertSep

Polymer-Based SPE

InertSep HLB



InertSep HLB is a reversed phase sorbent made of styrene-divinylbenzene (SDB) and a nitrogen-containing vinyl monomer.

Average Particle Size	: 30 µm
Surface Area	: 720 m^2/g
Pore Volume	: 1.3 mL/g
Pore Size	: 7 nm
pH Range	: 1 – 14

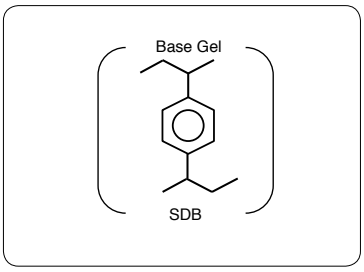
Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep HLB (average particle size 30 µm)	10 mg/1 mL	100 pcs	5010-27520
	30 mg/1 mL	100 pcs	5010-27521
	60 mg/3 mL	50 pcs	5010-27522
	200 mg/6 mL	30 pcs	5010-27523
	500 mg/6 mL	30 pcs	5010-27524
	96 WP 10 mg	1 pc	5010-66440
	96 WP 30 mg	1 pc	5010-66441

Luer Devices

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep HLB FF (average particle size 60 µm)	60 mg/3 mL	50 pcs	5010-27532
	200 mg/6 mL	30 pcs	5010-27533
	200 mg/20 mL	20 pcs	5010-27535
	500 mg/6 mL	30 pcs	5010-27534
	500 mg/20 mL	20 pcs	5010-27536

InertSep PLS-2



InertSep PLS-2 is a SDB polymer-based reversed phase sorbent. Compared to silica based C18 sorbents, InertSep PLS-2 has a quite higher retention capacity and better stability in a wide pH range.

Average Particle Size	: 70 µm
Surface Area	: 700 m^2/g
Pore Volume	: 1.1 mL/g
Pore Size	: 7 nm
pH Range	: 1 – 14

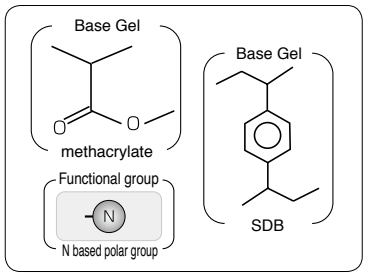
Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep PLS-2	265 mg/6 mL	50 pcs	5010-27430
	265 mg/20 mL	20 pcs	5010-27431
	270 mg/6 mL	50 pcs	5010-25020
	500 mg/6 mL	30 pcs	5010-25025
	1 g/6 mL	20 pcs	5010-25030
	270 mg/20 mL	20 pcs	5010-25035
	500 mg/20 mL	20 pcs	5010-25036

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J PLS-2	230 mg	50 pcs	5010-65720
	265 mg	50 pcs	5010-65721
InertSep Slim-J PLS-2 for AQUA	265 mg	50 pcs	5010-65726

InertSep PLS-3



InertSep PLS-3 is a copolymer-based sorbent comprised of nitrogen-containing methacrylate and SDB, exhibiting adequate retention for a variety of compounds from highly polar to hydrophobic compounds.

Average Particle Size : 60 µm
Surface Area : 600 m^2/g
Pore Volume : 1.1 mL/g
Pore Size : 7 nm
pH Range : 1 – 14

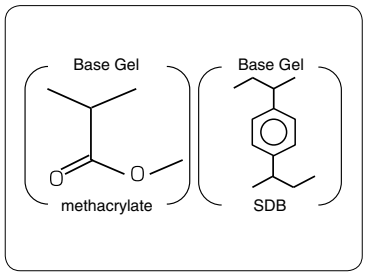
Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep PLS-3	200 mg/6 mL	30 pcs	5010-25050
	200 mg/20 mL	20 pcs	5010-25051
InertSep Glass PLS-3	200 mg/6 mL	20 pcs	5010-26020

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J PLS-3	230 mg	50 pcs	5010-25200
		500 pcs	5010-25205
InertSep Slim-J PLS-3 for AQUA	230 mg	50 pcs	5010-65775

InertSep RP-1



InertSep RP-1 is a copolymer based sorbent comprised of methacrylate and SDB and exhibits adequate retention for a variety of compounds from low-polar to hydrophobic compounds.

Average Particle Size : 70 µm
Surface Area : 650 m^2/g
Pore Volume : 1.5 mL/g
Pore Size : 9 nm
pH Range : 1 – 14

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep RP-1	30 mg/1 mL	100 pcs	5010-27001
	60 mg/3 mL	100 pcs	5010-27002
	250 mg/6 mL	30 pcs	5010-27000
	500 mg/6 mL	30 pcs	5010-27004
	500 mg/12 mL	20 pcs	5010-27005
	1 g/20 mL	20 pcs	5010-27006
	2 g/20 mL	20 pcs	5010-27007

Luer Devices

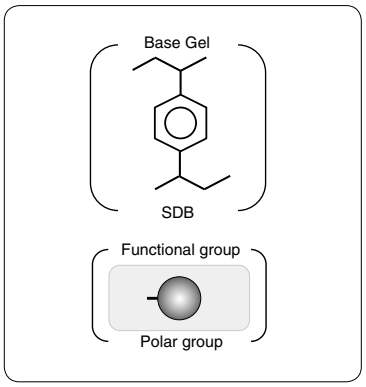
Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J RP-1	230 mg	50 pcs	5010-65730
		500 pcs	5010-65731
InertSep mini RP-1	230 mg	50 pcs	5010-27200
		500 pcs	5010-27220
InertSep Slim-J RP-1 for AQUA	230 mg	50 pcs	5010-65735

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP RP-1	30 mg	1 pc	5010-66200
	60 mg	1 pc	5010-66201

Polymer-Based SPE

InertSep RP-2



The retention of InertSep RP-2 is attributed to hydrophobic interactions of SDB polymer, weak anion exchange and hydrogen bonding of polar functional groups. This sorbent is suited for concentration of polar compounds weakly retained by RP-1, and simultaneous screening by polar interactions.

Average Particle Size : 90 µm
Surface Area : 700 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 4 nm
pH Range : 1 – 14

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep RP-2	60 mg/3 mL	100 pcs	5010-27022
	200 mg/6 mL	30 pcs	5010-27023
	500 mg/6 mL	30 pcs	5010-27024
	2 g/20 mL	20 pcs	5010-27027

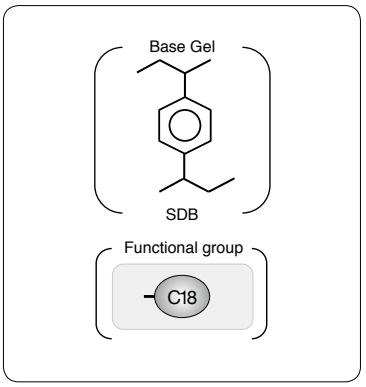
Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim RP-2	230 mg	50 pcs	5010-27700

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP RP-2	30 mg	1 pc	5010-66210
	60 mg	1 pc	5010-66211

InertSep RP-C18



InertSep RP-C18 is a SDB polymer-based sorbent modified with alkyl chains.

Average Particle Size : 45 µm
Surface Area : 110 m^2/g
Pore Volume : 0.5 mL/g
Pore Size : 18 nm
pH Range : 1 – 13
Remark : Dichloromethane is not available

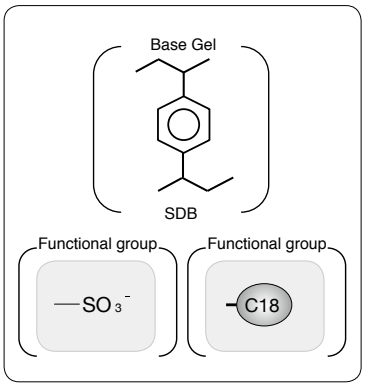
Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep RP-C18	30 mg/1 mL	100 pcs	5010-27130
	60 mg/3 mL	100 pcs	5010-27131
	200 mg/6 mL	30 pcs	5010-27133
	500 mg/6 mL	30 pcs	5010-27134
	500 mg/20 mL	20 pcs	5010-27135

Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J RP-C18	230 mg	50 pcs	5010-65760

InertSep MPC



InertSep MPC is a SDB polymer-based sorbent modified with strong cation exchange and C18 functional groups.

Cartridges

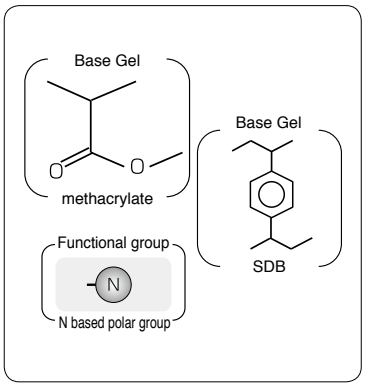
Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep MPC	30 mg/1 mL	100 pcs	5010-27120
	60 mg/3 mL	100 pcs	5010-27121
	150 mg/6 mL	30 pcs	5010-27122
	200 mg/6 mL	30 pcs	5010-27123
	500 mg/6 mL	30 pcs	5010-27124

Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J MPC	230 mg	50 pcs	5010-65750

Average Particle Size : 40 µm
Surface Area : 100 m^2/g
Pore Size : 18 nm
pH Range : 1 – 13
Remark : Dichloromethane is not available

InertSep Pharma



InertSep Pharma is a copolymer-based sorbent comprised of nitrogen-containing methacrylate and SDB. This sorbent was developed for simultaneous screening of drug metabolites in biological samples.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep Pharma	30 mg/1 mL	100 pcs	5010-27100
	60 mg/3 mL	100 pcs	5010-27101
	200 mg/6 mL	30 pcs	5010-27103
	500 mg/6 mL	30 pcs	5010-27104
	500 mg/12 mL	20 pcs	5010-27105

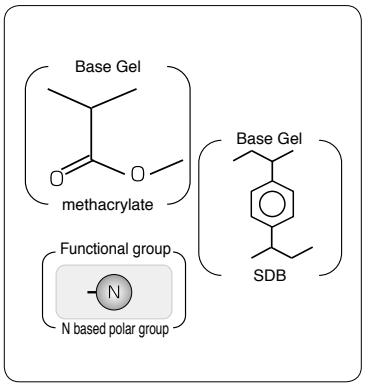
96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP Pharma	30 mg	1 pc	5010-66230
	60 mg	1 pc	5010-66231

Average Particle Size : 30 µm
Surface Area : 600 m^2/g
Pore Volume : 1.1 mL/g
Pore Size : 7 nm
pH Range : 1 – 14

Polymer-Based SPE

InertSep Pharma FF



InertSep Pharma FF is a modified version of InertSep Pharma for high flow lates. This sorbent is suitable for viscous biological samples and large volume samples.

Cartridges

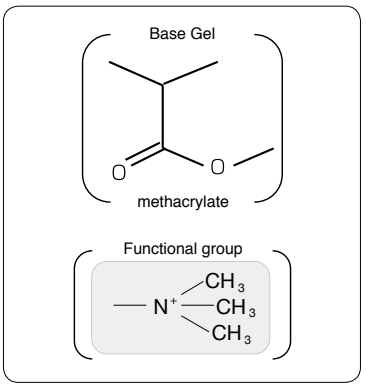
Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep Pharma FF	60 mg/3 mL	100 pcs	5010-27111
	200 mg/6 mL	30 pcs	5010-27113
	500 mg/6 mL	30 pcs	5010-27114

Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J Pharma FF	230 mg	50 pcs	5010-65740

Average Particle Size : 60 µm
Surface Area : 600 m^2/g
Pore Volume : 1.1 mL/g
Pore Size : 7 nm
pH Range : 1 – 14

InertSep MA-1



InertSep MA-1 is a methacrylate polymer-based sorbent modified with strong anion exchange functional groups. This sorbent is highly hydrophilic, and retained anions can be easily eluted.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep MA-1	30 mg/1 mL	100 pcs	5010-27304
	60 mg/3 mL	100 pcs	5010-27305
	100 mg/3 mL	50 pcs	5010-27300
	250 mg/6 mL	30 pcs	5010-27301
	500 mg/6 mL	30 pcs	5010-27302
	1 g/20 mL	20 pcs	5010-27306
	2 g/20 mL	20 pcs	5010-27307

Luer Device

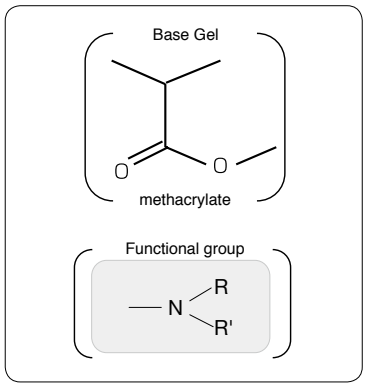
Description	Bed Weight	Qty.	Cat.No.
InertSep mini MA-1	280 mg	50 pcs	5010-27205

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP MA-1	30 mg	1 pc	5010-66700
	60 mg	1 pc	5010-66701

Average Particle Size : 70 µm
Surface Area : 250 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 13 nm
Ion exchange capacity : 0.5 meq/g
pH Range : 1 – 14
Remark : Cl^- ion pair

InertSep MA-2



InertSep MA-2 is a methacrylate polymer based sorbent modified with weak anion exchange groups. Suppressed secondary interactions of methacrylate polymer gel enables SPE solely by ion exchange.

Average Particle Size	: 70 µm
Surface Area	: 250 m^2/g
Pore Volume	: 0.8 mL/g
Pore Size	: 13 nm
Ion exchange capacity	: 0.5 meq/g
pH Range	: 1 – 14
Remark	: Cl^- ion pair

★: mini type

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep MA-2	30 mg/1 mL	100 pcs	5010-27324
	60 mg/3 mL	100 pcs	5010-27325
	100 mg/3 mL	50 pcs	5010-27320
	250 mg/6 mL	30 pcs	5010-27321
	500 mg/6 mL	30 pcs	5010-27322
	1 g/20 mL	20 pcs	5010-27326
	2 g/20 mL	20 pcs	5010-27327

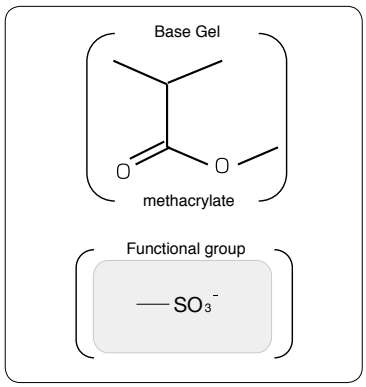
Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep mini MA-2	280 mg	50 pcs	5010-27235

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP MA-2	30 mg	1 pc	5010-66710
	60 mg	1 pc	5010-66711

InertSep MC-1



InertSep MC-1 is a methacrylate polymer based sorbent modified with strong cation exchange functional groups. This sorbent is highly hydrophilic, and retained cations can be easily eluted.

Average Particle Size	: 70 µm
Surface Area	: 80 m^2/g
Pore Volume	: 0.4 mL/g
Pore Size	: 20 nm
Ion exchange capacity	: 0.5 meq/g
pH Range	: 1 – 14
Remark	: Na^+ ion pair

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep MC-1	30 mg/1 mL	100 pcs	5010-27354
	60 mg/3 mL	100 pcs	5010-27355
	100 mg/3 mL	50 pcs	5010-27350
	250 mg/6 mL	30 pcs	5010-27351
	500 mg/6 mL	30 pcs	5010-27352
	1 g/20 mL	20 pcs	5010-27356
	2 g/20 mL	20 pcs	5010-27357

Luer Device

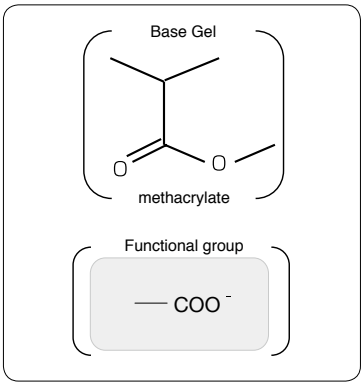
Description	Bed Weight	Qty.	Cat.No.
InertSep mini MC-1	280 mg	50 pcs	5010-27210

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP MC-1	30 mg	1 pc	5010-66500
	60 mg	1 pc	5010-66501

Polymer-Based SPE

InertSep MC-2



Average Particle Size	: 70 µm
Surface Area	: 80 m^2/g
Pore Volume	: 0.4 mL/g
Pore Size	: 18 nm
Ion exchange capacity	: 0.5 meq/g
pH Range	: 1 – 14
Remark	: Na^+ ion pair

InertSep MC-2 is a methacrylate polymer based sorbent modified with week cation exchange functional groups. This sorbent is suitable for SPE of strong anion compounds in ion exchange mode. Suppressed secondary interactions of methacrylate polymer gel enables SPE solely by ion exchange.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep MC-2	30 mg/1 mL	100 pcs	5010-27374
	60 mg/3 mL	100 pcs	5010-27375
	100 mg/3 mL	50 pcs	5010-27370
	250 mg/6 mL	30 pcs	5010-27371
	500 mg/6 mL	30 pcs	5010-27372
	1 g/20 mL	20 pcs	5010-27376
	2 g/20 mL	20 pcs	5010-27377

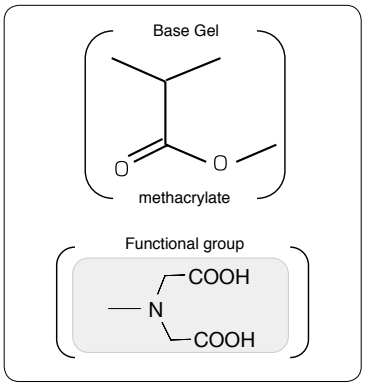
Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep mini MC-2	280 mg	50 pcs	5010-27240

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP MC-2	30 mg	1 pc	5010-66510
	60 mg	1 pc	5010-66511

InertSep ME-1



Average Particle Size	: 70 µm
Surface Area	: 80 m^2/g
Pore Volume	: 0.5 mL/g
Pore Size	: 21 nm
Ion exchange capacity	: Cu^{2+} 0.3 mmol/g
pH Range	: 1 – 14
Remark	: H^+ ion pair

InertSep ME-1 is a methacrylate copolymer based solid sorbent modified with iminodiacetic acid, weak cation exchange functional groups. It is highly hydrophilic and does not retain monovalent Na ion or K ion, but it does retain metal divalent or more cations. This offers selective concentration of such metal ions and is suitable for custom made of Ni affinity plates for protein purification.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep ME-1	30 mg/1 mL	100 pcs	5010-27404
	60 mg/3 mL	100 pcs	5010-27405
	100 mg/3 mL	50 pcs	5010-27400
	250 mg/6 mL	30 pcs	5010-27401
	500 mg/6 mL	30 pcs	5010-27402
	1 g/20 mL	20 pcs	5010-27406
	2 g/20 mL	20 pcs	5010-27407

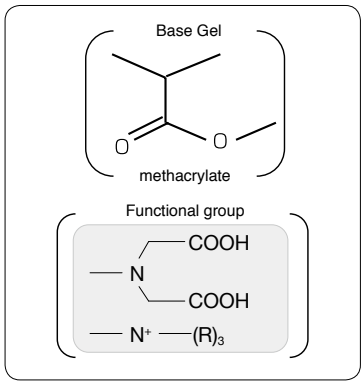
Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep mini ME-1	280 mg	50 pcs	5010-27215

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP ME-1	30 mg	1 pc	5010-66800
	60 mg	1 pc	5010-66801

InertSep ME-2



Average Particle Size	: 70 µm
Surface Area	: 80 m^2/g
Pore Volume	: 0.5 mL/g
Pore Size	: 21 nm
Ion exchange capacity	: Cu^{2+} 0.3 mmol/g
pH Range	: 1 – 14
Remark	: H^+ ion pair

InertSep ME-2 is a chelating resin sorbent, developed for SPE of trace metal ions in seawater. As this sorbent does not retain Ca and Mg ions, desalting can be achieved by passing the sample through the sorbent and wash with purified water.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep ME-2	30 mg/1 mL	100 pcs	5010-27414
	60 mg/3 mL	100 pcs	5010-27415
	100 mg/3 mL	50 pcs	5010-27410
	250 mg/6 mL	30 pcs	5010-27411
	500 mg/6 mL	30 pcs	5010-27412

Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep mini ME-2	280 mg	50 pcs	5010-27216

Silica-Based Reversed Phase (Non-Polar) SPE

InertSep C18

$Si\text{-}(CH_2)_{17}CH_3$

Average Particle Size : 60 µm
Carbon Load : 19 %
End-Capping : High
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep C18 is a silica-based sorbent modified with C18 for non-polar interactions. With our high-level end-capping technology, cation exchange by interaction with the residual silanol groups is suppressed, which reduces adsorption of basic compounds. This sorbent is suitable for removing lipid for simultaneous analysis of pesticide residues in agricultural products.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C18	50 mg/1 mL	100 pcs	5010-61000
	100 mg/1 mL	100 pcs	5010-61001
	200 mg/1 mL	50 pcs	5010-61016
	500 mg/3 mL	50 pcs	5010-61003
	500 mg/6 mL	30 pcs	5010-61004
	500 mg/20 mL	20 pcs	5010-61013
	1 g/6 mL	30 pcs	5010-61005
	1 g/12 mL	20 pcs	5010-61015
	2 g/12 mL	20 pcs	5010-61006
	1 g/20 mL	20 pcs	5010-61014
	5 g/20 mL	20 pcs	5010-61007
	10 g/60 mL	16 pcs	5010-61008
	20 g/60 mL	16 pcs	5010-61009
	25 g/150 mL	8 pcs	5010-61010
	50 g/150 mL	8 pcs	5010-61011
	70 g/150 mL	8 pcs	5010-61012

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J C18	500 mg	50 pcs	5010-65000
	1000 mg	50 pcs	5010-65001
InertSep Slim C18	400 mg	50 pcs	5010-65005
	900 mg	50 pcs	5010-65006

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP C18	50 mg	1 pc	5010-66000
	100 mg	1 pc	5010-66001

InertSep C18 FF

$Si\text{-}(CH_2)_{17}CH_3$

Average Particle Size : 120 µm
Carbon Load : 19 %
End-Capping : High
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep C18 FF is a modified version of InertSep C18 for high flow lates. This sorbent is also suitable for viscous biological samples and large volume samples to increase the throughput.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C18 FF	50 mg/1 mL	100 pcs	5010-62000
	100 mg/1 mL	100 pcs	5010-62001
	200 mg/3 mL	50 pcs	5010-62002
	500 mg/3 mL	50 pcs	5010-62003
	500 mg/6 mL	30 pcs	5010-62004
	1 g/6 mL	30 pcs	5010-62005
	2 g/12 mL	20 pcs	5010-62006
	5 g/20 mL	20 pcs	5010-62007
	10 g/60 mL	16 pcs	5010-62008

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP C18 FF	50 mg	1 pc	5010-66010
	100 mg	1 pc	5010-66011

Silica-Based Reversed Phase (Non-Polar) SPE

InertSep C18-B

$Si\text{-}(CH_2)_{17}CH_3$

Average Particle Size : 45 µm
Carbon Load : 14 %
End-Capping : Middle
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep C18-B is a silica-based sorbent modified with monofunctional C18 groups for non-polar interactions. In addition to the interaction, secondary interaction can be expected.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C18-B	50 mg/1 mL	100 pcs	5010-61020
	100 mg/1 mL	100 pcs	5010-61021
	200 mg/3 mL	50 pcs	5010-61022
	500 mg/3 mL	50 pcs	5010-61023
	500 mg/6 mL	30 pcs	5010-61024
	1 g/6 mL	30 pcs	5010-61025
	2 g/12 mL	20 pcs	5010-61026
	5 g/20 mL	20 pcs	5010-61027
	10 g/60 mL	16 pcs	5010-61028

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J C18-B	500 mg	50 pcs	5010-65020
	1000 mg	50 pcs	5010-65021
InertSep Slim C18-B	360 mg	50 pcs	5010-65025
	840 mg	50 pcs	5010-65026

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP C18-B	50 mg	1 pc	5010-66020
	100 mg	1 pc	5010-66021

InertSep C18-B FF

$Si\text{-}(CH_2)_{17}CH_3$

Average Particle Size : 120 µm
Carbon Load : 14 %
End-Capping : Middle
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep C18-B FF is a modified version of InertSep C18-B for high flow lates. This sorbent is also suitable for viscous biological samples and large volume samples to increase the throughput.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C18-B FF	50 mg/1 mL	100 pcs	5010-62020
	100 mg/1 mL	100 pcs	5010-62021
	200 mg/3 mL	50 pcs	5010-62022
	500 mg/3 mL	50 pcs	5010-62023
	500 mg/6 mL	30 pcs	5010-62024
	1 g/6 mL	30 pcs	5010-62025
	2 g/12 mL	20 pcs	5010-62026
	5 g/20 mL	20 pcs	5010-62027
	10 g/60 mL	16 pcs	5010-62028

Silica-Based Reversed Phase (Non-Polar) SPE

InertSep C18-C

$Si\text{-}(CH_2)_{17}CH_3$

Average Particle Size : 60 µm
Carbon Load : 16 %
End-Capping : Low
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep C18-C is a silica-based sorbent modified with trifunctional C18 groups for non-polar interactions. In addition to the non-polar interactions, secondary interaction between unbonded silanol groups on silica substrate and analytes can be expected.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C18-C	50 mg/1 mL	100 pcs	5010-61040
	100 mg/1 mL	100 pcs	5010-61041
	200 mg/3 mL	50 pcs	5010-61042
	500 mg/3 mL	50 pcs	5010-61043
	500 mg/6 mL	30 pcs	5010-61044
	1 g/6 mL	30 pcs	5010-61045
	2 g/12 mL	20 pcs	5010-61046
	5 g/20 mL	20 pcs	5010-61047
	10 g/60 mL	16 pcs	5010-61048
	20 g/60 mL	16 pcs	5010-61049

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J C18-C	500 mg	50 pcs	5010-65040
	1000 mg	50 pcs	5010-65041
InertSep Slim C18-C	360 mg	50 pcs	5010-65045
	840 mg	50 pcs	5010-65046

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP C18-C	50 mg	1 pc	5010-66030
	100 mg	1 pc	5010-66031

InertSep C18-C FF

$Si\text{-}(CH_2)_{17}CH_3$

Average Particle Size : 120 µm
Carbon Load : 16 %
End-Capping : Low
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep C18-C FF is a modified version of InertSep C18-C for high flow lates. This sorbent is also suitable for viscous biological samples and large volume samples to increase the throughput.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C18-C FF	50 mg/1 mL	100 pcs	5010-62040
	100 mg/1 mL	100 pcs	5010-62041
	200 mg/3 mL	50 pcs	5010-62042
	500 mg/3 mL	50 pcs	5010-62043
	500 mg/6 mL	30 pcs	5010-62044
	1 g/6 mL	30 pcs	5010-62045
	2 g/12 mL	20 pcs	5010-62046
	5 g/20 mL	20 pcs	5010-62047
	10 g/60 mL	16 pcs	5010-62048

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP C18-C FF	50 mg	1 pc	5010-66040
	100 mg	1 pc	5010-66041

Silica-Based Reversed Phase (Non-Polar) SPE

InertSep C8

$Si\text{-}(CH_2)_{17}CH_3$

Average Particle Size	: 60 µm
Carbon Load	: 12 %
End-Capping	: Middle
Surface Area	: 450 m^2/g
Pore Volume	: 0.7 mL/g
Pore Size	: 6 nm
pH Range	: 2 – 8

InertSep C8 is a silica-based sorbent modified with C8 groups that offers weaker non-polar interactions than C18. InertSep C8 is used for analytes that are too strongly retained on C18. With our high-level end-capping, cation exchange by the residual silanol groups is suppressed and adsorption of basic compounds is reduced.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C8	50 mg/1 mL	100 pcs	5010-61080
	100 mg/1 mL	100 pcs	5010-61081
	200 mg/3 mL	50 pcs	5010-61082
	500 mg/3 mL	50 pcs	5010-61083
	500 mg/6 mL	30 pcs	5010-61084
	1 g/6 mL	30 pcs	5010-61085
	2 g/12 mL	20 pcs	5010-61086
	5 g/20 mL	20 pcs	5010-61087
	10 g/60 mL	16 pcs	5010-61088
	20 g/60 mL	16 pcs	5010-61089

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J C8	500 mg	50 pcs	5010-65080
	1000 mg	50 pcs	5010-65081

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP C8	50 mg	1 pc	5010-66050
	100 mg	1 pc	5010-66051

Silica-Based Reversed Phase (Non-Polar) SPE

InertSep C2

Si-C_2H_5

Average Particle Size : 60 µm
Carbon Load : 5.5 %
End-Capping : Middle
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep C2 is silica-based sorbent modified with C2 groups for weaker non-polar interactions than C8. InertSep C2 is used for analytes that are too strongly retained on C8. With our high-level end-capping, cation exchange by the residual silanol groups is suppressed resulting in reduced adsorption of basic compounds.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C2	50 mg/1 mL	100 pcs	5010-61120
	100 mg/1 mL	100 pcs	5010-61121
	200 mg/3 mL	50 pcs	5010-61122
	500 mg/3 mL	50 pcs	5010-61123
	500 mg/6 mL	30 pcs	5010-61124
	1 g/6 mL	30 pcs	5010-61125
	2 g/12 mL	20 pcs	5010-61126
	5 g/20 mL	20 pcs	5010-61127
	10 g/60 mL	16 pcs	5010-61128
	20 g/60 mL	16 pcs	5010-61129

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J C2	500 mg	50 pcs	5010-65120
	1000 mg	50 pcs	5010-65121

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP C2	50 mg	1 pc	5010-66070
	100 mg	1 pc	5010-66071

InertSep CH

Si -

Average Particle Size : 60 µm
Carbon Load : 7.5 %
End-Capping : Middle
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep CH is a silica-based sorbent modified with cyclohexyl functional groups that gives this sorbent a similar moderate polarity with InertSep C2. InertSep CH offers a unique selectivity for the extraction of certain chemical compounds, compared with C18, C8, C2 and PH.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep CH	50 mg/1 mL	100 pcs	5010-61160
	100 mg/1 mL	100 pcs	5010-61161
	200 mg/3 mL	50 pcs	5010-61162
	500 mg/3 mL	50 pcs	5010-61163
	500 mg/6 mL	30 pcs	5010-61164
	1 g/6 mL	30 pcs	5010-61165
	2 g/12 mL	20 pcs	5010-61166
	5 g/20 mL	20 pcs	5010-61167
	10 g/60 mL	16 pcs	5010-61168

Luer Devices

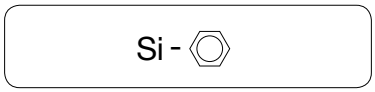
Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J CH	500 mg	50 pcs	5010-65160
	1000 mg	50 pcs	5010-65161

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP CH	50 mg	1 pc	5010-66090
	100 mg	1 pc	5010-66091

Silica-Based Reversed Phase (Non-Polar) SPE

InertSep PH



Average Particle Size	: 60 µm
Carbon Load	: 10 %
End-Capping	: Middle
Surface Area	: 450 m^2/g
Pore Volume	: 0.7 mL/g
Pore Size	: 6 nm
pH Range	: 2 – 8

InertSep PH is a silica-based sorbent modified with phenyl groups having a similar non-polar interaction to C8. The selectivity of PH to aromatic compounds is higher than that of C8 because of the π bonds of the phenyl groups.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep PH	50 mg/1 mL	100 pcs	5010-61180
	100 mg/1 mL	100 pcs	5010-61181
	200 mg/3 mL	50 pcs	5010-61182
	500 mg/3 mL	50 pcs	5010-61183
	500 mg/6 mL	30 pcs	5010-61184
	1 g/6 mL	30 pcs	5010-61185
	2 g/12 mL	20 pcs	5010-61186
	5 g/20 mL	20 pcs	5010-61187
	10 g/60 mL	16 pcs	5010-61188
	20 g/60 mL	16 pcs	5010-61189

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J PH	500 mg	50 pcs	5010-65180
	1000 mg	50 pcs	5010-65181

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP PH	50 mg	1 pc	5010-66100
	100 mg	1 pc	5010-66101

Silica-Based Normal Phase (Polar) SPE

InertSep CN

$Si\text{-}(CH_2)_3\text{-}CN$

Average Particle Size : 45 µm
Carbon Load : 7.5 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep CN is a silica-based sorbent modified with cyanopropyl groups, which enable both non-polar and polar interactions. This feature is useful not only for non-polar analytes irreversibly retained on non-polar sorbents such as C18 or C8, but also for polar analytes irreversibly retained on polar sorbents such as SI or 2OH.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep CN	50 mg/1 mL	100 pcs	5010-61300
	100 mg/1 mL	100 pcs	5010-61301
	200 mg/3 mL	50 pcs	5010-61302
	500 mg/3 mL	50 pcs	5010-61303
	500 mg/6 mL	30 pcs	5010-61304
	1 g/6 mL	30 pcs	5010-61305
	2 g/12 mL	20 pcs	5010-61306
	5 g/20 mL	20 pcs	5010-61307
	10 g/60 mL	16 pcs	5010-61308

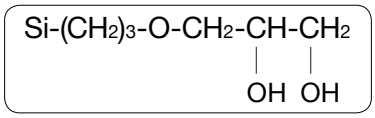
Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J CN	500 mg	50 pcs	5010-65300
	1000 mg	50 pcs	5010-65301

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP CN	50 mg	1 pc	5010-66300
	100 mg	1 pc	5010-66301

InertSep 2OH



Average Particle Size	: 60 µm
Carbon Load	: 10 %
Surface Area	: 450 m^2/g
Pore Volume	: 0.7 mL/g
Pore Size	: 6 nm
pH Range	: 2 – 8

InertSep 2OH is a silica-based sorbent modified with diol groups. Being a fairly polar sorbent, InertSep 2OH is typically used for extraction of polar compounds from low or non-polar solvents.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep 2OH	50 mg/1 mL	100 pcs	5010-61320
	100 mg/1 mL	100 pcs	5010-61321
	200 mg/3 mL	50 pcs	5010-61322
	500 mg/3 mL	50 pcs	5010-61323
	500 mg/6 mL	30 pcs	5010-61324
	1 g/6 mL	30 pcs	5010-61325
	2 g/12 mL	20 pcs	5010-61326
	5 g/20 mL	20 pcs	5010-61327
	10 g/60 mL	16 pcs	5010-61328
	20 g/60 mL	16 pcs	5010-61329
	25 g/150 mL	8 pcs	5010-61330
	50 g/150 mL	8 pcs	5010-61331
	70 g/150 mL	8 pcs	5010-61332

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J 2OH	500 mg	50 pcs	5010-65320
	1000 mg	50 pcs	5010-65321
InertSep Slim 2OH	360 mg	50 pcs	5010-65325

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP 2OH	50 mg	1 pc	5010-66310
	100 mg	1 pc	5010-66311

Silica-Based Normal Phase (Polar) SPE

InertSep SI

Si-OH

Average Particle Size : 60 µm
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep SI is a bare silica for strong polar interactions. It offers selective separation for structurally similar compounds using low-polar solvents. InertSep SI is the most polar sorbent in our lineup.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep SI	50 mg/1 mL	100 pcs	5010-61340
	100 mg/1 mL	100 pcs	5010-61341
	200 mg/3 mL	50 pcs	5010-61342
	500 mg/3 mL	50 pcs	5010-61343
	500 mg/6 mL	30 pcs	5010-61344
	1 g/6 mL	30 pcs	5010-61345
	2 g/12 mL	20 pcs	5010-61346
	5 g/20 mL	20 pcs	5010-61347
	10 g/60 mL	16 pcs	5010-61348
	20 g/60 mL	16 pcs	5010-61349
	25 g/150 mL	8 pcs	5010-61350
	50 g/150 mL	8 pcs	5010-61351
	70 g/150 mL	8 pcs	5010-61352

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J SI	500 mg	50 pcs	5010-65340
	1000 mg	50 pcs	5010-65341
InertSep Slim SI	690 mg	50 pcs	5010-65345

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP SI	50 mg	1 pc	5010-66320
	100 mg	1 pc	5010-66321

InertSep SI FF

Si-OH

Average Particle Size : 120 µm
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep SI FF is a modified version of InertSep SI for high flow lates. This sorbent is also suitable for viscous samples and large volume samples to increase the throughput.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep SI FF	50 mg/1 mL	100 pcs	5010-62340
	100 mg/1 mL	100 pcs	5010-62341
	200 mg/3 mL	50 pcs	5010-62342
	500 mg/3 mL	50 pcs	5010-62343
	500 mg/6 mL	30 pcs	5010-62344
	1 g/6 mL	30 pcs	5010-62345
	2 g/12 mL	20 pcs	5010-62346
	5 g/20 mL	20 pcs	5010-62347
	10 g/60 mL	16 pcs	5010-62348

InertSep AL-A

Al_2O_3

Average Particle Size : 100 µm
Surface Area : 130 m^2/g
Pore Volume : 0.3 mL/g
Pore Size : 8 nm
pH : 3.5 – 5.0 (acid)

InertSep AL-A is packed with alumina (Al_2O_3). Available in Al_2O_3 acidic format.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep AL-A	50 mg/1 mL	100 pcs	5010-61360
	100 mg/1 mL	100 pcs	5010-61361
	200 mg/3 mL	50 pcs	5010-61362
	500 mg/3 mL	50 pcs	5010-61363
	500 mg/6 mL	30 pcs	5010-61364
	1 g/6 mL	30 pcs	5010-61365
	2 g/12 mL	20 pcs	5010-61366
	5 g/20 mL	20 pcs	5010-61367
	10 g/60 mL	16 pcs	5010-61368

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J AL-A	500 mg	50 pcs	5010-65360
	1000 mg	50 pcs	5010-65361
	1710 mg	50 pcs	5010-65362

InertSep AL-B

Al_2O_3

Average Particle Size : 100 µm
Surface Area : 130 m^2/g
Pore Volume : 0.3 mL/g
Pore Size : 8 nm
pH : 9.0 – 10.5 (basic)

InertSep AL-B is packed with alumina (Al_2O_3). Available in Al_2O_3 basic format.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep AL-B	50 mg/1 mL	100 pcs	5010-61380
	100 mg/1 mL	100 pcs	5010-61381
	200 mg/3 mL	50 pcs	5010-61382
	500 mg/3 mL	50 pcs	5010-61383
	500 mg/6 mL	30 pcs	5010-61384
	1 g/6 mL	30 pcs	5010-61385
	2 g/12 mL	20 pcs	5010-61386
	5 g/20 mL	20 pcs	5010-61387
	10 g/60 mL	16 pcs	5010-61388

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J AL-B	500 mg	50 pcs	5010-65380
	1000 mg	50 pcs	5010-65381
	1710 mg	50 pcs	5010-65382

Inorganic SPE

InertSep AL-N

Al_2O_3

Average Particle Size : 100 µm
Surface Area : 130 m^2/g
Pore Volume : 0.3 mL/g
Pore Size : 8 nm
pH : 6.0 – 7.5 (neutral)

InertSep AL-N is packed with alumina (AL_2O_3). Available in Al_2O_3 neutral format.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep AL-N	50 mg/1 mL	100 pcs	5010-61400
	100 mg/1 mL	100 pcs	5010-61401
	200 mg/3 mL	50 pcs	5010-61402
	500 mg/3 mL	50 pcs	5010-61403
	500 mg/6 mL	30 pcs	5010-61404
	1 g/6 mL	30 pcs	5010-61405
	2 g/12 mL	20 pcs	5010-61406
	5 g/20 mL	20 pcs	5010-61407
	10 g/60 mL	16 pcs	5010-61408

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J AL-N	500 mg	50 pcs	5010-65400
	1000 mg	50 pcs	5010-65401
	1710 mg	50 pcs	5010-65402
	1850 mg	50 pcs	5010-65403

InertSep FL

$MgO{\cdot}SiO_2$

Average Particle Size : 50 – 200 µm
Surface Area : 230 m^2/g
Pore Volume : 0.5 mL/g
Pore Size : 9 nm

InertSep FL is packed with synthetic magnesium silicate. This sorbent strongly adsorbs polar compounds from none polar matrices and is typically used for sample cleanup of organic extracts.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep FL	50 mg/1 mL	100 pcs	5010-61420
	100 mg/1 mL	100 pcs	5010-61421
	200 mg/3 mL	50 pcs	5010-61422
	500 mg/3 mL	50 pcs	5010-61423
	500 mg/6 mL	30 pcs	5010-61424
	1 g/6 mL	30 pcs	5010-61425
	2 g/12 mL	20 pcs	5010-61426
	5 g/20 mL	20 pcs	5010-61427
	10 g/60 mL	16 pcs	5010-61428

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J FL	500 mg	50 pcs	5010-65420
	900 mg	50 pcs	5010-65422
	1000 mg	50 pcs	5010-65421

InertSep FL-PR

$MgO{\cdot}SiO_2$

Average Particle Size : 100 – 300 µm
Surface Area : 230 m^2/g
Pore Volume : 0.5 mL/g
Pore Size : 9 nm

InertSep FL-PR cartridges are packed with FL-PR, which is used for sample cleanup for analysis of residual pesticides in crops. This sorbent is also suitable for viscous samples and large volume samples to increase the throughput.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep FL-PR	50 mg/1 mL	100 pcs	5010-61440
	100 mg/1 mL	100 pcs	5010-61441
	200 mg/3 mL	50 pcs	5010-61442
	500 mg/3 mL	50 pcs	5010-61443
	500 mg/6 mL	30 pcs	5010-61444
	910 mg/20 mL	20 pcs	5010-61453
	1 g/6 mL	30 pcs	5010-61445
	2 g/12 mL	20 pcs	5010-61446
	5 g/20 mL	20 pcs	5010-61447
	10 g/60 mL	16 pcs	5010-61448

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J FL-PR	500 mg	50 pcs	5010-65440
	900 mg	50 pcs	5010-65442
	1000 mg	50 pcs	5010-65441

Silica-Based Ion Exchange SPE

InertSep CBA

$Si\text{-}(CH_2)_2\text{-}COO^-$

Average Particle Size : 45 µm
Carbon Load : 8.5 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
Ion exchange capacity : 1.2 meq/g
pH Range : 2 – 8
Remark : H^+ ion pair

InertSep CBA is a silica-based sorbent modified with carboxylethyl functional groups. The primary interactions of this sorbent are cation exchange and the secondary interactions are week-polar and non-polar. This sorbent is suitable for extraction of drugs with strongly cationic amine groups.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep CBA	50 mg/1 mL	100 pcs	5010-61500
	100 mg/1 mL	100 pcs	5010-61501
	200 mg/3 mL	50 pcs	5010-61502
	250 mg/3 mL	50 pcs	5010-61509
	500 mg/3 mL	50 pcs	5010-61503
	250 mg/6 mL	30 pcs	5010-61510
	500 mg/6 mL	30 pcs	5010-61504
	1 g/6 mL	30 pcs	5010-61505
	2 g/12 mL	20 pcs	5010-61506
	5 g/20 mL	20 pcs	5010-61507
	10 g/60 mL	16 pcs	5010-61508

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J CBA	500 mg	50 pcs	5010-65500
	1000 mg	50 pcs	5010-65501

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP CBA	50 mg	1 pc	5010-66400
	100 mg	1 pc	5010-66401

InertSep PRS

$Si\text{-}(CH_2)_3\text{-}SO_3^-$

Average Particle Size : 45 µm
Carbon Load : 8.5 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
Ion exchange capacity : 1.2 meq/g
pH Range : 2 – 8
Remark : H^+ ion pair

InertSep PRS is a silica-based sorbent modified with sulfonylpropyl groups. The primary interactions of this sorbent are anion exchange and secondary interactions are slightly non-polar.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep PRS	50 mg/1 mL	100 pcs	5010-61520
	100 mg/1 mL	100 pcs	5010-61521
	200 mg/3 mL	50 pcs	5010-61522
	500 mg/3 mL	50 pcs	5010-61523
	500 mg/6 mL	30 pcs	5010-61524
	1 g/6 mL	30 pcs	5010-61525
	2 g/12 mL	20 pcs	5010-61526
	500 mg/20 mL	20 pcs	5010-61529
	5 g/20 mL	20 pcs	5010-61527
	10 g/60 mL	16 pcs	5010-61528

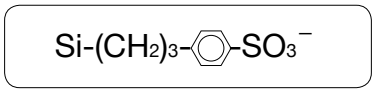
Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J PRS	500 mg	50 pcs	5010-65520
	1000 mg	50 pcs	5010-65521

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP PRS	50 mg	1 pc	5010-66410
	100 mg	1 pc	5010-66411

InertSep SCX



Average Particle Size	: 45 µm
Carbon Load	: 8.5 %
Surface Area	: 450 m^2/g
Pore Volume	: 0.7 mL/g
Pore Size	: 6 nm
Ion exchange capacity	: 0.6 meq/g
pH Range	: 2 – 8
Remark	: H^+ ion pair

InertSep SCX is a silica-based sorbent modified with propylbenzenesulfonyl groups. The primary interactions of this sorbent are both non-polar and strong cation exchange. Because the non-polar interactions on InertSep SCX is stronger than those on InertSep PRS, it is suitable for extractions which require both non-polar interactions and strong cation exchange.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep SCX	50 mg/1 mL	100 pcs	5010-61540
	100 mg/1 mL	100 pcs	5010-61541
	200 mg/3 mL	50 pcs	5010-61542
	500 mg/3 mL	50 pcs	5010-61543
	500 mg/6 mL	30 pcs	5010-61544
	500 mg/20 mL	20 pcs	5010-61553
	1 g/6 mL	30 pcs	5010-61545
	2 g/12 mL	20 pcs	5010-61546
	5 g/20 mL	20 pcs	5010-61547
	10 g/60 mL	16 pcs	5010-61548
	20 g/60 mL	16 pcs	5010-61549
	25 g/150 mL	8 pcs	5010-61550
	50 g/150 mL	8 pcs	5010-61551
	70 g/150 mL	8 pcs	5010-61552

Luer Devices

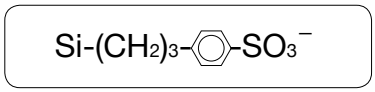
Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J SCX	500 mg	50 pcs	5010-65540
	1000 mg	50 pcs	5010-65541

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP SCX	50 mg	1 pc	5010-66420
	100 mg	1 pc	5010-66421

Silica-Based Ion Exchange SPE

InertSep SCX-2



Average Particle Size : 60 µm
Carbon Load : 17 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
Ion exchange capacity : 1.2 meq/g
pH Range : 2 – 8
Remark : Na^+ ion pair

InertSep SCX-2 employs the same chemical modification with InertSep SCX. The only difference is that propylbenzenesulfonyl groups are bonded more densely on the silica surface to increase ion exchange capacity and retentivity.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep SCX-2	50 mg/1 mL	100 pcs	5010-61720
	100 mg/1 mL	100 pcs	5010-61721
	200 mg/3 mL	50 pcs	5010-61722
	500 mg/3 mL	50 pcs	5010-61723
	500 mg/6 mL	30 pcs	5010-61724
	500 mg/20 mL	20 pcs	5010-61733
	1 g/6 mL	30 pcs	5010-61725
	2 g/12 mL	20 pcs	5010-61726
	5 g/20 mL	20 pcs	5010-61727
	10 g/60 mL	16 pcs	5010-61728
	20 g/60 mL	16 pcs	5010-61729
	25 g/150 mL	8 pcs	5010-61730
	50 g/150 mL	8 pcs	5010-61731
	70 g/150 mL	8 pcs	5010-61732

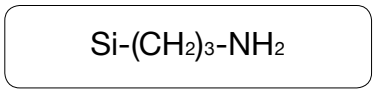
Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J SCX-2	500 mg	50 pcs	5010-65660
	1000 mg	50 pcs	5010-65661

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep SCX-2	50 mg	1 pc	5010-66430
	100 mg	1 pc	5010-66431

InertSep NH2



Average Particle Size : 60 µm
Carbon Load : 10 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
Ion exchange capacity : 0.9 meq/g
pH Range : 2 – 8

InertSep NH2 is a silica-based sorbent modified with an aminopropyl groups. Anion exchange and polar interaction are combined as the primary interactions. As the secondary interactions, it has weak non-polar interactions. Similar to InertSep 2OH and InertSep SI used in normal phase mode, InertSep NH2 can be used for the separation of structural isomers.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep NH2	50 mg/1 mL	100 pcs	5010-61600
	100 mg/1 mL	100 pcs	5010-61601
	200 mg/3 mL	50 pcs	5010-61602
	500 mg/3 mL	50 pcs	5010-61603
	500 mg/6 mL	30 pcs	5010-61604
	1 g/6 mL	30 pcs	5010-61605
	2 g/12 mL	20 pcs	5010-61606
	5 g/20 mL	20 pcs	5010-61607
	10 g/60 mL	16 pcs	5010-61608
	20 g/60 mL	16 pcs	5010-61609

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J NH2	500 mg	50 pcs	5010-65600
	1000 mg	50 pcs	5010-65601
InertSep Slim NH2	360 mg	50 pcs	5010-65605

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP NH2	50 mg	1 pc	5010-66600
	100 mg	1 pc	5010-66601

InertSep NH2 FF

$Si\text{-}(CH_2)_3\text{-}NH_2$

Average Particle Size : 120 µm
Carbon Load : 10 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
Ion exchange capacity : 0.9 meq/g
pH Range : 2 – 8

InertSep NH2 FF is a modified version of InertSep NH2 for high flow lates. This sorbent is also suitable for viscous samples and large volume samples to increase the throughput.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep NH2 FF	50 mg/1 mL	100 pcs	5010-62600
	100 mg/1 mL	100 pcs	5010-62601
	200 mg/3 mL	50 pcs	5010-62602
	500 mg/3 mL	50 pcs	5010-62603
	500 mg/6 mL	30 pcs	5010-62604
	1 g/6 mL	30 pcs	5010-62605
	2 g/12 mL	20 pcs	5010-62606
	5 g/20 mL	20 pcs	5010-62607
	10 g/60 mL	16 pcs	5010-62608

InertSep PSA

$Si\text{-}(CH_2)_3\text{-}N(H)\text{-}(CH_2)_2\text{-}NH_2$

Average Particle Size : 60 µm
Carbon Load : 11.5 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
Ion exchange capacity : 1.5 meq/g
pH Range : 2 – 8

InertSep PSA is a silica-based sorbent modified with ethylene-diamine-N-propyl groups. The primary interactions of this sorbent are anion exchange and secondary interactions are week non-polar.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep PSA	50 mg/1 mL	100 pcs	5010-61620
	100 mg/1 mL	100 pcs	5010-61621
	200 mg/3 mL	50 pcs	5010-61622
	500 mg/3 mL	50 pcs	5010-61623
	500 mg/6 mL	30 pcs	5010-61624
	500 mg/20 mL	20 pcs	5010-61629
	1 g/6 mL	30 pcs	5010-61625
	2 g/12 mL	20 pcs	5010-61626
	5 g/20 mL	20 pcs	5010-61627
	10 g/60 mL	16 pcs	5010-61628

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J PSA	500 mg	50 pcs	5010-65620
	1000 mg	50 pcs	5010-65621

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP PSA	50 mg	1 pc	5010-66610
	100 mg	1 pc	5010-66611

Silica-Based Ion Exchange SPE

InertSep SAX

$Si\text{-}(CH_2)_3\text{-}N^+\text{-}(CH_3)_3$

Average Particle Size : 45 µm
Carbon Load : 7 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
Ion exchange capacity : 0.7 meq/g
pH Range : 2 – 8
Remark : OH^- ion pair

InertSep SAX is a silica-based sorbent modified with trimethylaminopropyl groups. Primary interactions are very strong anion exchange. Secondary interactions are non-polar. It is generally used for the extraction of weak anions such as carboxylic acids.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep SAX	50 mg/1 mL	100 pcs	5010-61640
	100 mg/1 mL	100 pcs	5010-61641
	200 mg/3 mL	50 pcs	5010-61642
	500 mg/3 mL	50 pcs	5010-61643
	500 mg/6 mL	30 pcs	5010-61644
	1 g/6 mL	30 pcs	5010-61645
	2 g/12 mL	20 pcs	5010-61646
	5 g/20 mL	20 pcs	5010-61647
	10 g/60 mL	16 pcs	5010-61648
	20 g/60 mL	16 pcs	5010-61649
	25 g/150 mL	8 pcs	5010-61650
	50 g/150 mL	8 pcs	5010-61651
	70 g/150 mL	8 pcs	5010-61652

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J SAX	500 mg	50 pcs	5010-65640
	1000 mg	50 pcs	5010-65641

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP SAX	50 mg	1 pc	5010-66620
	100 mg	1 pc	5010-66621

InertSep SAX-2

$Si\text{-}(CH_2)_3\text{-}N^+\text{-}(CH_3)_3$

Average Particle Size : 60 µm
Carbon Load : 11.5 %
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
Ion exchange capacity : 0.45 meq/g
pH Range : 2 – 8
Remark : Cl^- ion pair

InertSep SAX is a modified version of InertSep SAX for stronger non-polar interactions.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep SAX-2	50 mg/1 mL	100 pcs	5010-61700
	100 mg/1 mL	100 pcs	5010-61701
	200 mg/3 mL	50 pcs	5010-61702
	500 mg/3 mL	50 pcs	5010-61703
	500 mg/6 mL	30 pcs	5010-61704
	500 mg/20 mL	20 pcs	5010-61713
	1 g/6 mL	30 pcs	5010-61705
	2 g/12 mL	20 pcs	5010-61706
	5 g/20 mL	20 pcs	5010-61707
	10 g/60 mL	16 pcs	5010-61708
	20 g/60 mL	16 pcs	5010-61709
	25 g/150 mL	8 pcs	5010-61710
	50 g/150 mL	8 pcs	5010-61711
	70 g/150 mL	8 pcs	5010-61712

Luer Devices

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J SAX-2	500 mg	50 pcs	5010-65650
	1000 mg	50 pcs	5010-65651

96-well Plates

Description	Bed Weight	Qty.	Cat.No.
InertSep 96WP SAX-2	50 mg	1 pc	5010-66640
	100 mg	1 pc	5010-66641

InertSep AC (Active Carbon)

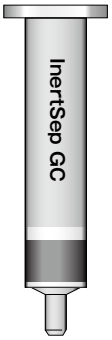
Base Gel : Active Carbon
Average Particle Size : 60/150 mesh
Surface Area : 800 – 1200 m^2/g

InertSep AC is packed with active carbon particles classified for high liquid permeability. There is no impurity elution from the purified active carbon. Good retentivity of this sorbent for highly polar compounds ensures high recovery and reproducibility. Lure device format supports automation of SPE procedures.

Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J AC	400 mg	50 pcs	5010-25500

InertSep GC (Carbograph, Graphite Carbon)



Base Gel : Graphite Carbon
Average Particle Size : 120/400 mesh
Surface Area : 85 m^2/g
Pore Volume : 1 mL/g
Pore Size : 45 nm

InertSep GC is packed with graphite carbon , which has a planar structure. This sorbent is generally used for removal of pigments from crop homogenates. In conjunction with other various normal phase sorbents and ion exchange sorbents, this sorbent can be used for a wide variety of applications as a cleanup sorbent.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep GC	150 mg/3 mL	50 pcs	5010-68000
	250 mg/3 mL	50 pcs	5010-68005
	300 mg/6 mL	30 pcs	5010-68001
	500 mg/6 mL	30 pcs	5010-68002
	1 g/12 mL	20 pcs	5010-68003
	2 g/12 mL	20 pcs	5010-68006
	500 mg/20 mL	20 pcs	5010-68004

Luer Device

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim GC	400 mg	50 pcs	5010-65710

InertSep GC-e

Base Gel : Graphite Carbon
Average Particle Size : 100/200 mesh
Surface Area : 90 m^2/g
Pore Volume : 1 mL/g
Pore Size : 50 nm

InertSep GC-e is packed with graphite carbon, which has a slightly larger surface area and wider pores compared to InertSep GC. InerSep GC-e provides the same extraction performance as InertSep GC at low cost.

Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep GC-e	150 mg/3 mL	50 pcs	5010-68300
	250 mg/3 mL	50 pcs	5010-68301
	250 mg/6 mL	30 pcs	5010-68302
	300 mg/6 mL	30 pcs	5010-68303
	500 mg/6 mL	30 pcs	5010-68304
	500 mg/20 mL	20 pcs	5010-68305

Specialty SPE

InertSep GC/NH2, GC/PSA

6 mL type

20 mL type

These two-layer cartridges are packed with graphite carbon for removing pigments and NH2 or PSA sorbent for sample cleanup of organic extracts. The two-layer format yields high sample cleanup performance never achieved with the single-layer format.

Two Layer Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep GC/NH2	50 mg/50 mg/1 mL	50 pcs	5010-68016
	50 mg/125 mg/1 mL	50 pcs	5010-68017
	250 mg/250 mg/3 mL	50 pcs	5010-68020
	500 mg/500 mg/6 mL	30 pcs	5010-68022
	500 mg/500 mg/20 mL	20 pcs	5010-68024
	1 g/1 g/20 mL	20 pcs	5010-68025
InertSep GC/PSA	300 mg/500 mg/6 mL	30 pcs	5010-68011
	500 mg/500 mg/6 mL	30 pcs	5010-68012
	500 mg/500 mg/20 mL	20 pcs	5010-68014
	1 g/500 mg/6 mL	30 pcs	5010-68013
	1 g/1 g/20 mL	20 pcs	5010-68015

InertSep GC-e/NH2, GC-e/PSA

6 mL type

20 mL type

These two-layer cartridges are packed with GC-e graphite carbon for removing pigments and NH2 or PSA sorbent for sample cleanup of organic extracts. Due to the cost reduction of GC-e, these two-layer cartridges achieve high sample cleanup performance at low cost.

Two Layer Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep GC-e/NH2	500 mg/500 mg/6 mL	30 pcs	5010-68322
		300 pcs	5010-68326
	500 mg/500 mg/20 mL	20 pcs	5010-68324
		200 pcs	5010-68327
InertSep GC-e/PSA	300 mg/500 mg/6 mL	30 pcs	5010-68311
	500 mg/500 mg/6 mL	30 pcs	5010-68312
		300 pcs	5010-68316
	500 mg/500 mg/20 mL	20 pcs	5010-68314
		200 pcs	5010-68317
	1 g/1 g/20 mL	20 pcs	5010-68315

InertSep GC/PSA/SI, GC/SAX/PSA

InertSep GC/PSA/SI is more efficient for removing a wide variety of polar matrix compounds than GC/PSA. InertSep GC/SAX/PSA can be used for clean up of processed food.

Three Layer Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep GC/PSA/SI	500 mg/500 mg/500 mg/20 mL	20 pcs	5010-68034
InertSep GC/SAX/PSA	500 mg/500 mg/500 mg/20 mL	20 pcs	5010-68044

InertSep GC-e/SAX-2/PSA

Due to the cost reduction of GC-e, this three-layer cartridge achieves high sample cleanup performance at low cost.

Three Layer Cartridge

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep GC-e/SAX-2/PSA	500 mg/500 mg/500 mg/20 mL	20 pcs	5010-68344

InertSep GC/SAX/PSA/SI

InertSep GC/SAX/PSA/SI is a four-layer SPE cartridge. GC efficiently removes pigments. SAX, PSA and SI offer superior cleanup when conducting multi-residue pesticide analysis.

Four Layer Cartridge

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep GC/SAX/PSA/SI	500 mg/500 mg/500 mg/500 mg/20 mL	20 pcs	5010-68054

Specialty SPE

InertSep SAX/PSA

InertSep SAX/PSA is a two-layer SPE cartridge packed with SAX and PSA. It is specifically used to remove agrochemical compounds that are often difficult to remove from crop samples by polar interactions.

Two Layer Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep SAX/PSA	250 mg/250 mg/3 mL	50 pcs	5010-68100
	500 mg/500 mg/6 mL	30 pcs	5010-68101
	500 mg/500 mg/20 mL	20 pcs	5010-68104
	1 g/1 g/20 mL	20 pcs	5010-68105

InertSep SAX/PSA/SI

InertSep SAX/PSA/Si is a three-layer SPE cartridge for cleanup. It is available for sample cleanup to make analysis of residual pesticides.

Three Layer Cartridge

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep SAX/PSA/SI	500 mg/500 mg/500 mg/20 mL	20 pcs	5010-68114

InertSep PCB

InertSep PCB is a two-layer SPE cartridge packed with SCX and SI. It has been designed for the extraction of PCBs from complex matrix.

Two Layer Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep PCB	1 g/3 mL	50 pcs	5010-68121
	1 g/6 mL	30 pcs	5010-68120

InertSep for AQUA

InertSep for AQUA

InertSep for AQUA is a SPE cartridge with low background contamination. Without conditioning, it is possible to conduct sample preparation easily and decrease solvent consumption by 50 %.

Luer Device Compatible Cartridges

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J RP-1 for AQUA	230 mg	50 pcs	5010-65735
InertSep Slim-J PLS-2 for AQUA	265 mg	50 pcs	5010-65726
InertSep Slim-J PLS-3 for AQUA	230 mg	50 pcs	5010-65775

InertSep C18-ENV

$Si\text{-}CH_2{}_{17}CH_3$

Average Particle Size : 60 µm
Carbon Load : 16 %
End-Capping : Low End-Capping
Surface Area : 450 m^2/g
Pore Volume : 0.7 mL/g
Pore Size : 6 nm
pH Range : 2 – 8

InertSep C18-ENV is designed for water quality analysis and useful for pretreatment of surfactants in water.

Cartridge

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C18-ENV	500 mg/6 mL	30 pcs	5010-61204

Luer Device Compatible Cartridges

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J C18-ENV	500 mg	50 pcs	5010-65200
		500 pcs	5010-65205
	1000 mg	50 pcs	5010-65201

InertSep Slim-J DRY

Na_2SO_4

InertSep Slim-J DRY cartridge is packed with anhydrous Na_2SO_4 for dehydration.

Luer Device Compatible Cartridges

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J DRY	1.4 g	50 pcs	5010-65700
	2.8 g	50 pcs	5010-65701

InertSep C18/DRY

InertSep C18/DRY is a two-layer SPE cartridge and designed for sample preparation for residual pesticide analysis. C18 is to remove lipids and DRY is for dehydration.

Two Layer Cartridge

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep C18/DRY	1 g/3 g/12 mL	20 pcs	5010-68133

Specialty SPE

InertSep Phase Separator

InertSep PS-SH

InertSep PS-SL

Note:
If the sample forms an emulsion, it will not be possible to make a separation.

InertSep PS-SH

InertSep PS-SH is used for separation of organic and aqueous phases during traditional liquid-liquid extraction procedures. This cartridge fitted with a selectively permeable frit is suitable for the separation of heavier chlorinated solvents from water.

Cartridges

Description	Volume	Qty.	Cat.No.
InertSep PS-SH	1 mL	100 pcs	5010-67000
	6 mL	100 pcs	5010-67002
	12 mL	100 pcs	5010-67003
	20 mL	100 pcs	5010-67004
	60 mL	50 pcs	5010-67005

96-well Plate

Description	Qty.	Cat.No.
InertSep 96WP PS-SH	1 pc	5010-67008

InertSep PS-SL

InertSep PS-SL is used for separation of an upper organic phase from an aqueous phase in extraction procedures. It is suitable when the organic phase is ethyl acetate, hexanes, toluene etc.

Cartridges

Description	Volume	Qty.	Cat.No.
InertSep PS-SL	1 mL	100 pcs	5010-67010
	6 mL	100 pcs	5010-67012
	12 mL	100 pcs	5010-67013
	20 mL	100 pcs	5010-67014
	60 mL	50 pcs	5010-67015

InertSep Phospholipid Remover

InertSep Phospholipid is developed for selective removal of phospholipids and can minimize ion suppression of LC/MS/MS analysis. It can remove more than 90 % of phospholipids.

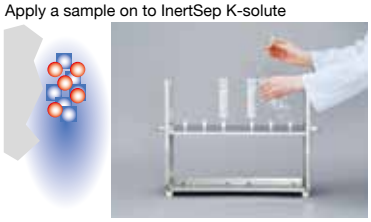
Cartridges

Description	Bed Weight/Volume	Qty.	Cat.No.
InertSep Phospholipid Remover	50 mg/1 mL	100 pcs	5010-27810
	100 mg/3 mL	50 pcs	5010-27811

InertSep K-solute (Diatomaceous Earth)

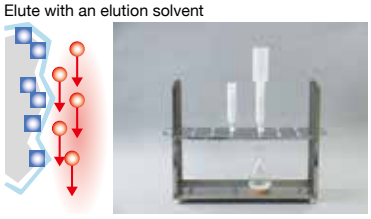
InertSep K-solute

Procedure 1
Apply a sample on to InertSep K-solute



Procedure 2
Leave it to stand for 5 to 15 minutes

Procedure 3
Elute with an elution solvent



InertSep K-solute is packed with diatomaceous earth and ideal for the sample to form an emulsion during liquid-liquid extraction procedures. Dedicated rack for InertSep makes the operation simple and efficient further more.

Volume of Used Reservoir	O.D.	Length
12 mL	18 mm	90 mm
20 mL	23 mm	99 mm
60 mL	30 mm	155 mm
150 mL	41 mm	172 mm

Cartridges

Description	Sample Volume	Reservoir Volume	Qty.	Cat.No.
InertSep K-solute	2 mL	12 mL	100 pcs	5010-68125
	5 mL	20 mL	100 pcs	5010-68127
	10 mL	60 mL	25 pcs	5010-68208
			100 pcs	5010-68218
	20 mL	60 mL	25 pcs	5010-68209
			100 pcs	5010-68219
	50 mL	150 mL	25 pcs	5010-68210
			50 pcs	5010-68220

Bulk

Description	Qty.	Cat.No.
Diatomaceous Earth for Sorbent Supported Liquid Extraction	1 kg	5010-69500

Adaptors

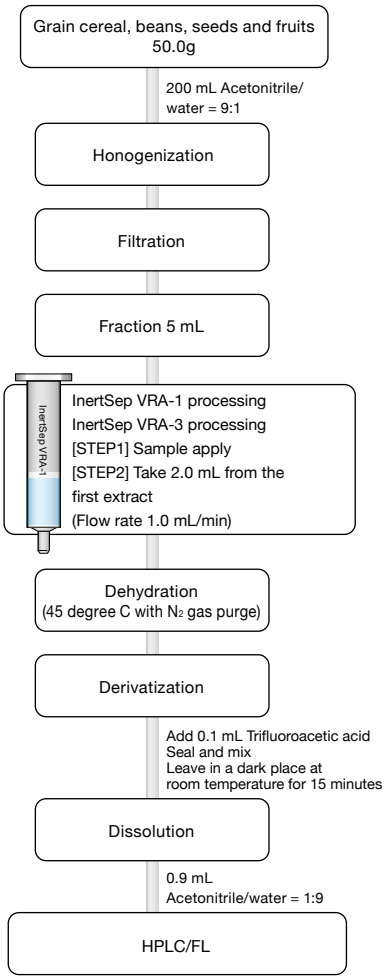
Description	Qty.	Cat.No.
Connecting Adaptor (PP) 12, 20 mL Reservoir	12 pcs	5010-60001
Connecting Adaptor (PP) 60 mL Reservoir	12 pcs	5010-60002
Connecting Adaptor (PP) 150 mL Reservoir	1 pc	5010-50336

Reservior with Adaptors

Description	Qty.	Cat.No.
50 mL Reservior with Adaptor for 12, 20 mL	12 pcs	5010-60016
200 mL Reservior with Adaptor for 60 mL Reservoir	12 pcs	5010-60017

Specialty SPE

InertSep VRA (Multifunctional Cleanup SPE Cartridge for Aflatoxins)



Total Aflatoxin Analysis

A number of mycotoxins are contained in natural food products. Among these, Aflatoxins produced by funguses such as Aspergillus flavus are carcinogenic to liver cells, and have attracted considerable attention in food safety.

InertSep VRA Series

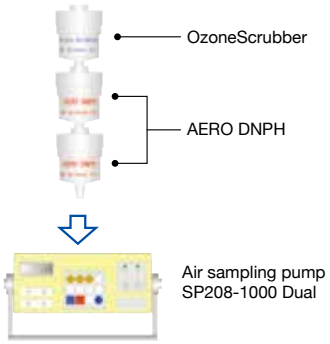
InertSep VRA series are multifunctional solid phase extraction cartridges for cleanup samples in complex organic matrices.

Feature

These multifunctional cartridges have the advantages of both reversed phase and ion exchange silica-based sorbents.

Description	Details	Qty.	Cat.No.
InertSep VRA-1	Mix mode: Reversed and ion exchange phase (Column size : 6 mL)	30 pcs	5010-68140
InertSep VRA-2	Economy model of VRA-1 (Column size : 6 mL)	30 pcs	5010-68141
InertSep VRA-3	Strong reversed phase model (Column size : 6 mL)	30 pcs	5010-68142

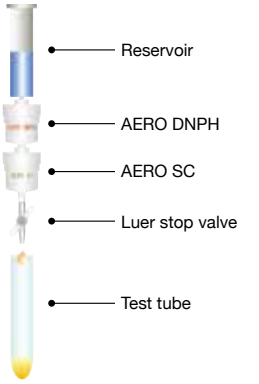
InertSep mini AERO series



Ex 1) How to use InertSep mini AERO

Note) Use the Ozonescrubber depending on the requirement

When used with a manifold



Ex 2) How to use InertSep mini AERO

InertSep mini AERO series are active samplers for the analysis of aldehydes and ketones in outdoor gas, car cabin and exhaust gas in compliance with: Offensive Odor Control Law, Clean Air Act, and EPA. There are four types: AERO DNPH, AERO DNPH-HR, AERO OzoneScrubber, and AERO SC, InertSep mini AERO series.

Features

InertSep mini AERO DNPH

This active sampler is packed with spherical silica coated with 2,4-Dinitrophenylhydrazine reagent for derivatization of aldehydes and ketones. The size of 120 µm spherical silica allows for high air permeability, resulting in high collection efficiency of the target compounds and low blank compared with irregular silica.

InertSep mini AERO DNPH-HR

This is newly developed and offers improved efficiency for acrolein collection, which is difficult to collect with the conventional DNPH cartridges.

InertSep mini AERO OzoneScrubber

Potassium iodide is used to remove ozone interference. It is known that the DNPH derivatives are decomposed by ozone, which affects the results. InertSep AREO OzoneScrubber is used in series with DNPH cartridge at its inlet side.

InertSep mini AERO SC

This cartridge is packed with polymeric packing material of strong cation exchange to remove unreacted DNPH.

Unreacted DNPH interferes with GC analysis, so is connected to the outlet side of DNPH cartridge.

Description	Bed Weight	Qty.	Cat.No.
InertSep mini AERO DNPH [●R/F]	300 mg	20 pcs	5010-23500
InertSep mini AERO DNPH-HR [●R/F]	300 mg	20 pcs	5010-23501
InertSep mini AERO OzoneScrubber	1.5 g	20 pcs	5010-23510
InertSep mini AERO SC	250 mg	20 pcs	5010-23520

Note: [●R/F] Refrigerated/Freezing

InertSep Slim-J AERO SDB400

InertSep Slim-J AERO SDB400 is used for extraction of semi-volatile organic compounds like insecticides and fire retardants in air.

Description	Bed Weight	Qty.	Cat.No.
InertSep Slim-J AERO SDB400	400 mg	20 pcs	5010-65780

Cleanup SPE

Cleanup Bulks for Dioxin Analysis

These bulks are used for sample cleanup for dioxin analysis and are supplied in a glass bottle put in a light-shielding bag.

Description	Volume	Cat.No.
Activated alumina 90 neutral, activity I, 70/230 mesh	1 kg	1050-22133
10 % Silver Nitrate Silicagel 70/200 mesh [■D/G]	100 g	5010-29014
22 % Sulfuric Acid Silicagel 70/200 mesh [■D/G]	100 g	5010-29012
44 % Sulfuric Acid Silicagel 70/200 mesh [■D/G]	100 g	5010-29013
2 % Potassium Hydroxide Silicagel 70/200 mesh [■D/G]	100 g	5010-29015
Silicagel conditioned with Hexane 70/200 mesh	100 g	5010-29011

Note: [■D/G] dangerous goods

Multi-Layer Cleanup Cartridges for Dioxin Analysis

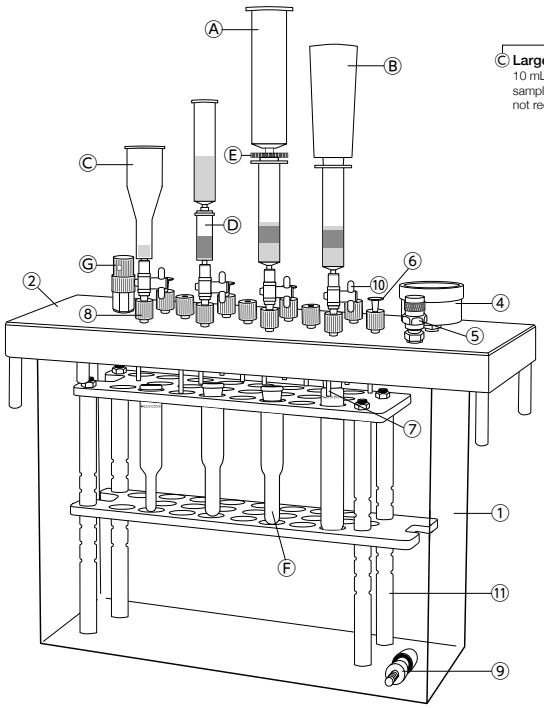
These cartridges are designed for sample cleanup for dioxin analysis in compliance with JIS K-0311-1999, K-0312-1999. The cartridges are made of PP and compatible with automated instruments.

Description	Qty.	Cat.No.
PP 2Layer Cartridges 10 % Silver Nitrate Silicagel (3.0 g) /44 % Sulfuric Acid Silicagel (4.5 g) [■D/G]	10 pcs	1050-24011
PP 4Layer Cartridges 10 % Silver Nitrate Silicagel (3.0 g) /44 % Sulfuric Acid Silicagel (4.5 g) / 22 % Sulfuric Acid Silicagel (6.0 g) /2 % Potassium Hydroxide Silicagel (3.0 g) [■D/G]	5 pcs	1050-24031

Note: [■D/G] dangerous goods

InertSep Vacuum Manifold System

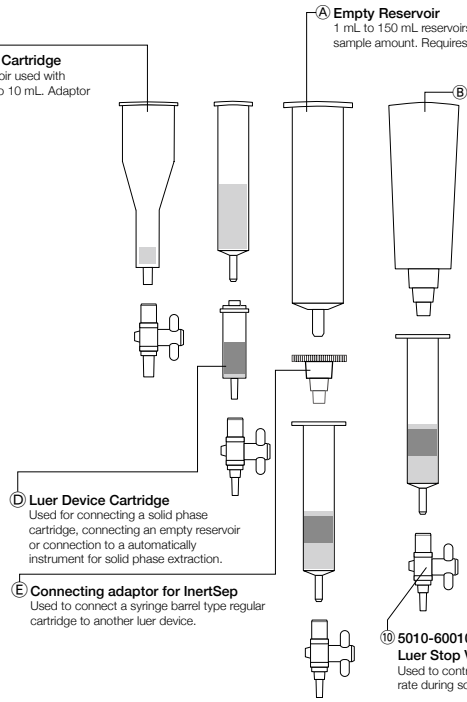
InertSep vacuum manifold is specially developed for performing efficient solid phase extraction. According to the application there are various kinds of useful kits and options.



Ⓒ Large Size Cartridge
10 mL reservoir used with samples up to 10 mL. Adaptor not required.

Ⓐ Empty Reservoir
1 mL to 150 mL reservoirs are available for large sample amount. Requires a connecting adaptor.

Ⓑ Reservoir with adaptor
Ideal for use in the pretreatment of food. Useful when using a cleanup volume of 20 mL approx.



Ⓓ Luer Device Cartridge
Used for connecting a solid phase cartridge, connecting an empty reservoir or connection to a automatically instrument for solid phase extraction.

Ⓔ Connecting adaptor for InertSep
Used to connect a syringe barrel type regular cartridge to another luer device.

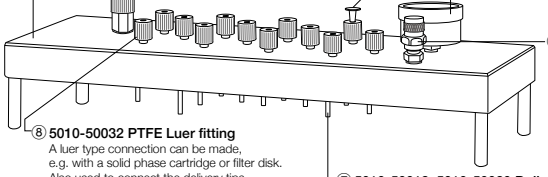
⑩ 5010-60010
Luer Stop Valve (PTFE)
Used to control or stop the flow rate during solid phase extraction.

② 5010-50238 Top Cover Assembly
Fit onto the glass chamber to perform solid phase extraction.

Ⓖ Safety valve
Used to prevent excessive applied vacuum breaking the glass chamber.

⑥ 5010-50016 Sealing plug
Need to plug any line not being used.

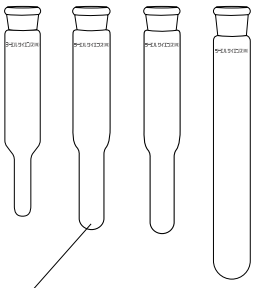
④ 5010-50014 Vacuum gauge
Display the level of vacuum in the glass chamber.



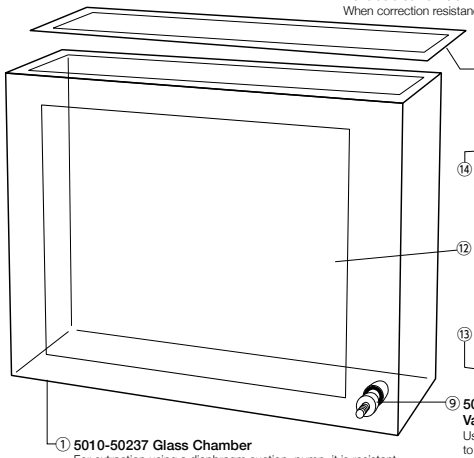
⑤ 5010-50015 Bleed valve
Used to adjust the amount of vacuum applied.
Adjust while monitoring the pressure displayed on the vacuum gauge.

⑧ 5010-50032 PTFE Luer fitting
A luer type connection can be made, e.g. with a solid phase cartridge or filter disk. Also used to connect the delivery tips to the cover.

⑦ 5010-50019, 5010-50020 Delivery Tips
The standard delivery tip is manufactured The standard delivery tip is manufactured from stainless steel (5010-50019).
When correction resistance is required, use the PTFE type (5010-50020).



Ⓕ 5010-51010 etc, GL-SPE Concentration tubes
There are 11 different sizes. Select, depending on the volume of the extraction solvent and concentration volume.

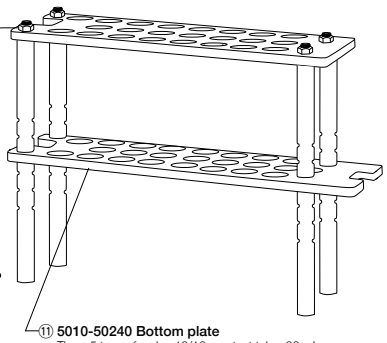


③ 5010-50239 Gasket
Used to seal the cover assembly and the glass chamber to maintain vacuum.

⑭ 5010-50018 Stainless steel nut for rack
5010-50129 Hexagon nut M6x4 for rack

⑫ 5010-50041
Glass protection film

⑬ 5010-50017 O-ring
5010-50128 Resin clip for rack



⑨ 5010-50033
Vacuum tube connector
Used to connect the glass chamber to the vacuum pump.

① 5010-50237 Glass Chamber
For extraction using a diaphragm suction pump, it is resistant to pressure. Stainless bats (5010-50122) are also available.

⑪ 5010-50240 Bottom plate
There 5 type of racks: 12/16 mm test tube, 20 mL concentration tube, 30 mL concentration tube, TS 29/38 eggplant shaped flask, TS 29/38 Florence flask 50/100 mL.

GL-SPE Vacuum Manifold

GL-SPE Vacuum Manifold Kit

5010-50000

5010-50006

5010-50007

Description	Details	Qty.	Cat.No.
InertSep Vacuum Manifold Kit	Glass Chamber 1 pc	1 set	5010-50230
	Cover 1 pc		
	Gasket 1 pc		
	Vacuum Gauge 1 pc		
	Bleed Valve 1 pc		
	Safety Valve 1 pc		
	Plug 12 pcs		
	Cartridge Adaptor 12 pcs		
	PTFE Female Luer 12 pcs		
	Stainless Delivery Tip 12 pcs		
	PTFE Delivery Tip 12 pcs		
	12/16 mm Rack 1 pc		
	12 mm Waste Liquid Funnel 12 pcs		
	16 mm Waste Liquid Funnel 12 pcs		
InertSep Vacuum Manifold Kit (for 4 eggplant-shaped flasks)	Glass Chamber 1 pc	1 set	5010-50234
	Cover 1 pc		
	Gasket 1 pc		
	Vacuum Gauge 1 pc		
	Bleed Valve 1 pc		
	Safety Valve 1 pc		
	Plug 4 pcs		
	PTFE Female Luer 12 pcs		
	Stainless Delivery Tip 12 pcs		
	TS29/38 Rack for 4 Florence Flasks 1 pc		
	PTFE Delivery Tip 4 pcs		
InertSep Vacuum Manifold Kit 20 (for 20 samples)	Glass Chamber 1 pc	1 set	5010-50235
	Gasket 1 pc, plug 20 pcs		
	Stainless Delivery Tip 20 pcs		
	PTFE Delivery Tip 20 pcs		
	Rack for 20/30 mL Concentration Tube 1 pc		
	Vacuum Controller 1 pc		

Accessories for InertSep Vacuum Manifold

Accessories for InertSep Vacuum Manifold

5010-50244

5010-50024 5010-50022

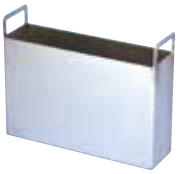
5010-60010

Accessories for InertSep Vacuum Manifold Kit

No.	Item	Specification	Qty.	Cat.No.
1	Glass Chamber	Suction Tube Connector 1 pc	1 pc	5010-50237
2	Top Cover Assembly (PE)	For General Analysis	1 pc	5010-50238
		Eggplant Flask 4 pcs	1 pc	5010-50247
		For 20 Samples	1 pc	5010-50251
3	Gasket	Polystyrene Foam	2 pcs	5010-50239
4	Vacuum Gauge	For General Analysis (brass)	1 pc	5010-50014
5	Bleed Valve	For General Analysis (brass)	1 pc	5010-50015
6	Plug	PP	12 pcs	5010-50016
7	Stainless Delivery Tip	Stainless	12 pcs	5010-50019
	PTFE Delivery Tip	PTFE	12 pcs	5010-50020
—	12 mm Waste Funnel	PP	12 pcs	5010-50022
—	16 mm Waste Funnel	PP	12 pcs	5010-50024
8	Luer Fitting	PTFE	12 pcs	5010-50032
9	Vacuum Tube Connector	PP	1 pc	5010-50033
10	Luer Stop Valve	PTFE	12 pcs	5010-60010

5010-50038

5010-50039



5010-50122

5010-50131

5010-50041

Accessories for InertSep

Description	Qty.	Cat.No.
Cartridge Holder for InertSep mini Jr.	5 pcs	5010-52003
Connector Tubing	1 pc	5010-52021
	5 pcs	5010-52022
Male Luer Union for Backflush	10 pcs	5010-52012
Female Luer Union for Backflush	10 pcs	5010-52013
LS Tube without Adaptor	1 pc	5010-50214
5 mL Syringe for Elution with DNPH	6 pcs	3008-41151
Backflush Adaptor	5 pcs	5010-52011

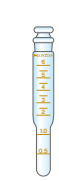
Accessories for GL-SPE Vacuum Manifold

Description	Qty.	Cat.No.
Waste Container (Stainless)	1 pc	5010-50122
Glass Protection Film	2 pcs	5010-50041
O-ring for GL-SPE Vacuum Manifold	10 pcs	5010-50017
Stainless Steel Nut for GL-SPE Vacuum Manifold	4 pcs	5010-50018

Note: When using 5010-50131, 5010-50130 is needed.

Accessories for InertSep Vacuum Manifold

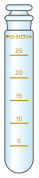
Accessories for InertSep Vacuum Manifold


5010-51011


5010-51015


5010-51020


5010-51021


5010-51041


5010-51031


5010-51032


5010-51033

InertSep Concentration tubes, Test tubes and Eggplant-shaped Flasks

Description	Scale (Volume) mL	Plug	Qty.	Cat.No.
Co-Stoppered Graduated Tube 12 mm	6 mL	Co-Stoppered	20 pcs	5010-51001
Co-Stoppered Graduated Tube 16 mm	14 mL		20 pcs	5010-51002
GL-SPE Concentration Tube (Clear) 1.0 mL for measurement	6 mL		10 pcs	5010-51010
GL-SPE Concentration Tube (Clear) 0.5,1.0 mL for measurement			10 pcs	5010-51011
GL-SPE Concentration Tube (Amber) 0.5,1.0 mL for measurement			10 pcs	5010-51012
GL-SPE Concentration Tube (Clear) 0.5,1.0 mL for measurement		Tapered	10 pcs	5010-51013
GL-SPE Concentration Tube (Amber) 0.5,1.0 mL for measurement			10 pcs	5010-51014
GL-SPE Concentration Tube (Clear) 0.5,1.0 mL for measurement	10 mL	Co-Stoppered	10 pcs	5010-51015
GL-SPE Concentration Tube (Amber) 0.5,1.0 mL for measurement			10 pcs	5010-51016
GL-SPE Concentration Tube (Clear) 1, 2, 5 mL for measurement	6 mL		10 pcs	5010-51017
GL-SPE Concentration Tube (Clear) 1.0, 2.0 mL for measurement	20.5 mL		6 pcs	5010-51020
GL-SPE Concentration Tube (Clear) 1.0, 2.0 mL for measure	30 mL		6 pcs	5010-51021
GL-SPE Test Tube (Clear) 5.0 mL for measurement	16 mL	Tapered	10 pcs	5010-51040
GL-SPE Test Tube (Amber) 5.0 mL for measurement	9 mL		10 pcs	5010-51042
GL-SPE Test Tube (Clear)	25 mL	—	6 pcs	5010-51041

Caution!: Upper Scales than 2.0 mL are rough indications.

Description	Scale (volume)	Qty.	Cat.No.
Eggplant-shaped Flask	50 mL	2 pcs	5010-51031
	100 mL	2 pcs	5010-51032
	200 mL	2 pcs	5010-51033


6010-81150 6010-81140

Solvent Container Cap

Solvent container cap includes four ports to fix 3 mm O.D. tubings and purge solvent with He.

Description	Qty.	Cat.No.
Solvent Container Cap for 500 mL Container	1 pc	6010-81140
Solvent Container Cap for 3000 mL Container	1 pc	6010-81150


6010-81160

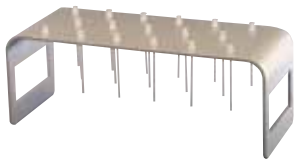
Tube Clip

The tube clip is convenient to fix tubing with a beaker and/or a container.

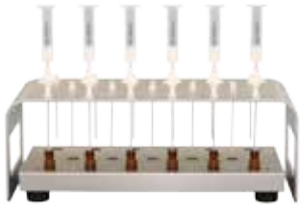
Description	Qty.	Cat.No.
Tube Clip	5 pcs	6010-81160

Note: Not able to fix tubing with glassed/containers of more than 4 mm thickness.

GL-SPE Gravity Flow Manifold



5010-50430



Example with vial rack

Features

- Simple design
- Optimal performance for Mycotoxins sample preparation
- Gravity flow is improved with the delivery tips
- Luer stop valve offers the adjustment of flow rate
- Optional extension panels for concentration tubes and eggplant flasks are available

Description	Qty.	Cat.No.
GL-SPE Gravity Flow Manifold	1 pc	5010-50430
4 mL Vial Tray for GL-SPE Gravity Flow Manifold	1 pc	5010-50432

Options

Description	Qty.	Cat.No.
GL-SPE Gravity Flow Manifold Extension Panel	1 pc	5010-50431
20 mL Concentration Tube Tray for GL-SPE Gravity Flow Manifold	1 pc	5010-50433
200/300 mL Eggplant Flask Tray for GL-SPE Gravity Flow Manifold	1 pc	5010-50434
GL-SPE Delivery Tip for GL-SPE Gravity Flow Manifold	24 pcs	5010-50420
	100 pcs	5010-50421
Luer Stop Valve (PTFE)	12 pcs	5010-60010

SPE Gravity Flow Rack

SPE Gravity Flow Rack

SPE Gravity Flow Rack can be used for the SPE procedure performed under gravity flow with InertSep K-solute. The sizes of collection vessels and stands can be selected by adjusting the height of the rack.

Description	Qty.	Cat.No.
SPE Gravity Flow Rack Base Unit	1 pc	5010-50410
Gravity Flow Collection Stand for Eggplant-shaped Flask 50/100 mL	1 pc	5010-50422
Gravity Flow Collection Stand for Eggplant-shaped Flask 200/300 mL	1 pc	5010-50423
Luer Stop Valve (PTFE)	12 pcs	5010-60010
GL-SPE Delivery Tip for GL-SPE Gravity Flow Manifold	24 pcs	5010-50420
	100 pcs	5010-50421
Gravity Flow Collection Stand for GL-SPE Concentration Tube 20/30 mL	1 pc	5010-50424
Gravity Flow Collection Stand for Centrifuge Tube 50 mL	1 pc	5010-50425
20 mL Rack for 30 mL Eggplant-shaped Flask	1 pc	5010-50400

Other SPE Manifolds

GL-SPE mini Vacuum Manifold

GL-SPE mini Vacuum Manifold

GL-SPE mini vacuum manifold kit is space-saving, and kit 12C for cartridges and kit 96W for 96-well plates are available. Kit 12C can be used with SPE cartridge of up to 6 mL. As its option, vials can be placed.

Features

- Two types for cartridges or 96-well plates
- Space-saving
- Concentration tubes, 7 mL test tubes and tubes with 16 mm O.D. x 100 mm length are placeable as conection tubes.

Description	Format	Qty.	Cat.No.
GL-SPE Mini Vacuum Manifold Kit 12C (12 place positions for SPE cartridges)	Cartridge	1 pc	5010-50150
GL-SPE Mini Vacuum Manifold Kit 96W	96-well plate	1 pc	5010-50155
Vacuum Controller	Common	1 pc	5010-33071

Note: GL-SPE mini manifold kit 12C and 96W don't include the vacuum controller.

Accessories for GL-SPE Mini Manifold

Description	Qty.	Cat.No.
GL-SPE Mini Vacuum Manifold Chamber for 12C	1 pc	5010-50160
GL-SPE Mini Vacuum Manifold Top Plate for 12C *1	1 pc	5010-50161
GL-SPE Mini Vacuum Manifold Concentration Rack for 12C	1 pc	5010-50162
GL-SPE Mini Vacuum Manifold Delivery Tip for 12C	15 pcs	5010-50163
GL-SPE Mini Vacuum Manifold Chamber for 96W	1 pc	5010-50165
GL-SPE Mini Vacuum Manifold Base Unit (Common)	1 pc	5010-50166
GL-SPE Mini Vacuum Manifold Drain Plate (Common)	1 pc	5010-50167
GL-SPE Mini Vacuum Manifold Shim Set 1 t x 2 pcs, 2 t x 1 pc for 96W	1 set	5010-50168
GL-SPE Mini Vacuum Manifold Gasket Set *2 (Common)	1 set	5010-50169

✶1 : Top Plate doesn't include delivery tip.
✶2 : Gasket set contains a gasket for top side and a gasket for bottom side.

InertSep Reservoir

5010-60015 5010-60016 5010-60017

Reservoirs

Empty Cartridges

Reservoirs with Adaptor

Description	Specification	Qty.	Cat.No.
Reservoir with Adaptor for 1, 3, 6 mL SPE Cartridges	25 mL	12 pcs	5010-60015
Reservior with Adaptor for 12, 20 mL SPE Cartridges	50 mL	12 pcs	5010-60016
Reservior with Adaptor for 60 mL SPE Cartridges	200 mL	12 pcs	5010-60017

Empty Cartridges

Description	Specification	Qty.	Cat.No.
Empty Cartridge (PP) without Frit	1 mL	50 pcs	5010-60100
	3 mL	50 pcs	5010-60101
	6 mL	30 pcs	5010-60102
	12 mL	20 pcs	5010-60103
	20 mL	20 pcs	5010-60104
	60 mL	10 pcs	5010-60105
	150 mL	10 pcs	5010-60106
Empty Cartridge (PP) with Frit	1 mL	50 pcs	5010-60120
	3 mL	50 pcs	5010-60121
	6 mL	30 pcs	5010-60122
	12 mL	20 pcs	5010-60123
	20 mL	20 pcs	5010-60124
	60 mL	10 pcs	5010-60125
	150 mL	10 pcs	5010-60126
Frit (PE)	for 1 mL cartridge	100 pcs	5010-60150
	for 3 mL cartridge	100 pcs	5010-60151
	for 6 mL cartridge	60 pcs	5010-60152
	for 12 mL cartridge	40 pcs	5010-60153
	for 20 mL cartridge	40 pcs	5010-60154
	for 60 mL cartridge	20 pcs	5010-60155
	for 150 mL cartridge	20 pcs	5010-60156

Syringe Filters

GL Chromatodisc

GL Chromato disc

GL Chromatodisc is a disposable syringe filter, which is composed of Polypropylene (PP) housing and filters. It can easily be connected to a syringe by the luer lock at the inlet connection. Prewashed membranes of the filters make extremely low back ground contamination. They are ideal for filtering samples or solvents being introduced into the chromatograph.

Specifications

Dimension	Filter Diameter	4 mm	13 mm	25 mm
	Housing	8 x 18 mm	18 x 22 ✶1 mm	29 x 24 ✶3 mm
Housing material		PP (Polypropylene)		
Sample Filtration Volume (mL)		less 1	less 0.5 – 10	less 3 – 50
Bed Volume (µL)		less 10	less 30	less 100
Effective Filtering Area (cm^2)		0.07	0.8	4.0
Maximum Pressure (MPa)		0.49	0.49	0.49
Inlet Connection		Luer lock	Luer lock ✶2	Luer lock
Outlet Connection		Luer Slip	Luer Slip	Luer Slip

✶1 : A type 13S includes a syringe (all-in-one type) and the dimension is 19 x 94 mm.
✶2 : A housing dimension of 25APF is 29 x 27 mm.
✶3 : Maximum pressure of 25APF and AHF is 0.46 MPa.

25A 13A 4A
Hydrophilic type

Integrated with syringe

A Type Filters for Hydrophilic Samples (Olefin Polymer Membrane)

A type filters configured with olefin polymer membrane are suitable for filtering protein samples.

Type	Filter Diameter*	Pore Size	Qty.	Cat.No.
4A	4 mm	0.2 µm	100 pcs	5040-28500
		0.45 µm	100 pcs	5040-28510
13A	13 mm	0.2 µm	100 pcs	5040-28501
		0.45 µm	100 pcs	5040-28511
25A	25 mm	0.2 µm	100 pcs	5040-28502
		0.45 µm	100 pcs	5040-28512
13S	13 mm	0.45 µm	50 pcs	5040-28513

✶: Filter (Olefin polymer)
Note: Sterilized A Type Filters by Ethylene oxide gas are available.

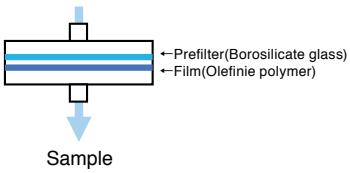
25AHF

High Flow A Type Filters (AHF) for Hydrophilic Samples (Olefin Polymer Membrane)

The flow rate can be doubled with High Flow A Type filters compared to the normal A Type filters.

Type	Filter Diameter*	Pore Size	Qty.	Cat.No.
25AHF	25 mm	0.45 µm	100 pcs	5040-28602

✶: Filter (Olefin polymer)
Note: Sterilized A Type Filters by Ethylene oxide gas are available.



25APF

A Type Filters with Pre-Filter (APF) for Hydrophilic Samples (Olefin Polymer Membrane)

This filter is made up of a borosilicate glass pre-filter and an olefin polymer membrane to prevent clogging by highly contaminated samples.

Type	Filter Diameter*	Pore Size	Qty.	Cat.No.
25APF	25 mm	0.45 µm	100 pcs	5040-28702

✶: Filter (Olefin polymer)
Note: Sterilized A Type Filters by Ethylene oxide gas are available.

GL Chromatodisk

P Type

P Type Filters for Hydrophilic Samples/Hydrophobic Samples (Hydrophilic polytetrafluoroethylene Membrane)

Both hydrophilic and hydrophobic samples can be filtered without any pre-wetting treatment. Up to 100 % acetonitrile can be used. Ideal for filtration of alcohols, ethers, esters, ketones, and hexanes.

Type	Filter Diameter*	Pore Size	Qty.	Cat.No.
4P	4 mm	0.45 µm	100 pcs	5040-28540
13P	13 mm	0.2 µm	100 pcs	5040-28551
		0.45 µm	100 pcs	5040-28541
25P	25 mm	0.2 µm	100 pcs	5040-28552
		0.45 µm	100 pcs	5040-28542

★: Filter (Hydrophilicity polmer)
Note: Sterilized P Type Filters by Autoclaving/Ethylene oxide gas are available.

N Type

N Type Filters for Hydrophobic Samples (PTFE Membrane)

N Type filters have superior chemical compatibility and are ideal for filtration of solvents, strong acids and alkali solutions. Also they can be used as air-venting filters.

Type	Filter Diameter*	Pore Size	Qty.	Cat.No.
4N	4 mm	0.2 µm	100 pcs	5040-28503
		0.45 µm	100 pcs	5040-28530
13N	13 mm	0.2 µm	100 pcs	5040-28504
		0.45 µm	100 pcs	5040-28531
25N	25 mm	0.1 µm	100 pcs	5040-28560
		0.2 µm	100 pcs	5040-28505
		0.45 µm	100 pcs	5040-28532

★: Filter (Hydrophilicity polmer)
Note: Sterilized N Type Filters by Autoclaving/Ethylene oxide gas are available.

AI Type

AI Type Filters for Ion Chromatography Samples (Deionized Olefin polymer Membrane)

The concentrations of metals eluting from the membrane are lower than the values listed below. This filter is ideal for the sample preparation for ion chromatography.

	4 mm Diameter	13 mm Diameter	25 mm Diameter
Na	0.0009 ppm	0.006 ppm	0.011 ppm
K	0.0015 ppm	0.025 ppm	0.2 ppm
Ca	0.002 ppm	0.007 ppm	0.01 ppm

Type	Filter Diameter*	Pore Size	Qty.	Cat.No.
4AI	4 mm	0.2 µm	100 pcs	5040-28506
		0.45 µm	100 pcs	5040-28520
13AI	13 mm	0.2 µm	100 pcs	5040-28507
		0.45 µm	100 pcs	5040-28521
25AI	25 mm	0.2 µm	100 pcs	5040-28508
		0.45 µm	100 pcs	5040-28522

★: Filter (Hydrophilicity polmer)
Note: Sterilized AI Type Filters by Autoclaving/Ethylene oxide gas are available.

GL Chromatodisc

Chemical Resistance

✓: Resistance △: Limited resistance ×: Not resistant

	Reagent	A and AI Type	P Type	N Type		Reagent	A and AI Type	P Type	N Type
Acid	Glacial acetic acid	△		△	Ester	Butyl acetate	×		
	Acetic acid (90 %)	△		△		Amyl acetate	×		
	Acetic acid (30 %)	✓		✓		Cellosolve acetate	×		
	Acetic acid (10 %)	✓		✓	Ketone	Acetone	×	✓	
	Hydrochloric acid (Conc.)	×	×	×		Cyclohexanone	×		
	Hydrochloric acid (6 N)	×	✓	△		Methyl Ethyl Ketone	×	✓	
	Sulfuric acid (Conc.)	×	×	×		Methyl isobutyl ketone	×		
	Sulfuric acid (6 N)	×	✓	△	Aromatic hydrocarbon	Benzene	×	✓	
	Nitrate acid (Conc.)	×	×	×		Toluene	×	✓	
	Nitrate acid (6 N)	×	✓	△		Xylene	×	✓	
Alkali	Alcohol (6 N)	△		△	Halogenated hydrocarbon	Dichloroethane	×		
	Alcohol (3 N)	✓		✓		Ethylene chloride	×	✓	
	Potassium hydroxide (3 N)	△		✓		Chloroform	×	✓	
	Sodium hydroxide (6 N)		✓			Carbon tetrachloride	×		
	Sodium hydroxide (5 N)	△	✓	✓		Perchloroethylene	×		
	Sodium hydroxide (3 N)	△	✓	✓		Trichloroethylene	×		
	Sodium hydroxide (1 N)	✓				Freon TF	×	✓	✓
Alcohol	Methanol	✓	✓	✓		Freon TMC	×		
	Ethanol	✓	✓	✓	Oil	Cotton oil	✓		
	Propanol	✓		✓		lubricant	×		
	Isopropanol	✓	✓	✓		Earthnut oil	✓		
	Butanol	✓	✓	✓		Sesame oil	✓		
	Amyl alcohol	✓		✓	The others	Acetonitrile	×	✓	
	Ethylene glycol	✓		✓		Aniline	×		
	Propylene glycol	✓		✓		Gasoline	✓		
	Glycerin	✓		✓		Kerosene	✓		
Ether	Ethyl ether	✓	✓	✓		Dimethylformamide	×	✓	
	Isopropyl ether	✓		✓		Dimethl sulfoxide	×	✓	
	Dioxane	×	✓	✓		Terpene oil	✓		
	Tetrahydrofuran	×	✓	✓		Pyridine	×		
Ester	Methyl acetate	×	✓	✓		Phenol (Liquid)	×		
	Ethyl acetate	×	✓	✓		Hexane	✓	✓	
	Isopropyl acetate	×		✓		Formaldehyde (37 %)	✓		

Note: The above data is used as the indication.

CONSUMABLES AND SUPPLIES

LIFE SCIENCE

Phosphorylation Purification & Enrichment

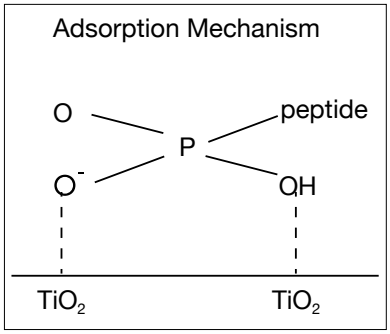
Phosphorylated Protein Research

Protein phosphorylation is recognized as a fundamental process which regulates cell differentiation, growth, and migration. However, in protein phosphorylation analysis, the low concentration of any given phosphoprotein may result in low ionization efficiency and the detection by MS may be affected. Therefore, enrichment of phosphopeptides and the relative reduction of non-phosphorylated peptides is critical to accurate analysis of protein digests by LC/MS.

GL Sciences' Titanium Dioxide (TiO_2 or Titania) products have emerged as the most effect means of phosphopeptide enrichment of protein digests prior to LC/MS analysis, replacing IMAC as the primary means of phosphopeptide sample pretreatment. Enrichment by titanium dioxide and IMAC, remain, however, complimentary techniques and are often used in combination to obtain optimal phosphopeptide analysis.

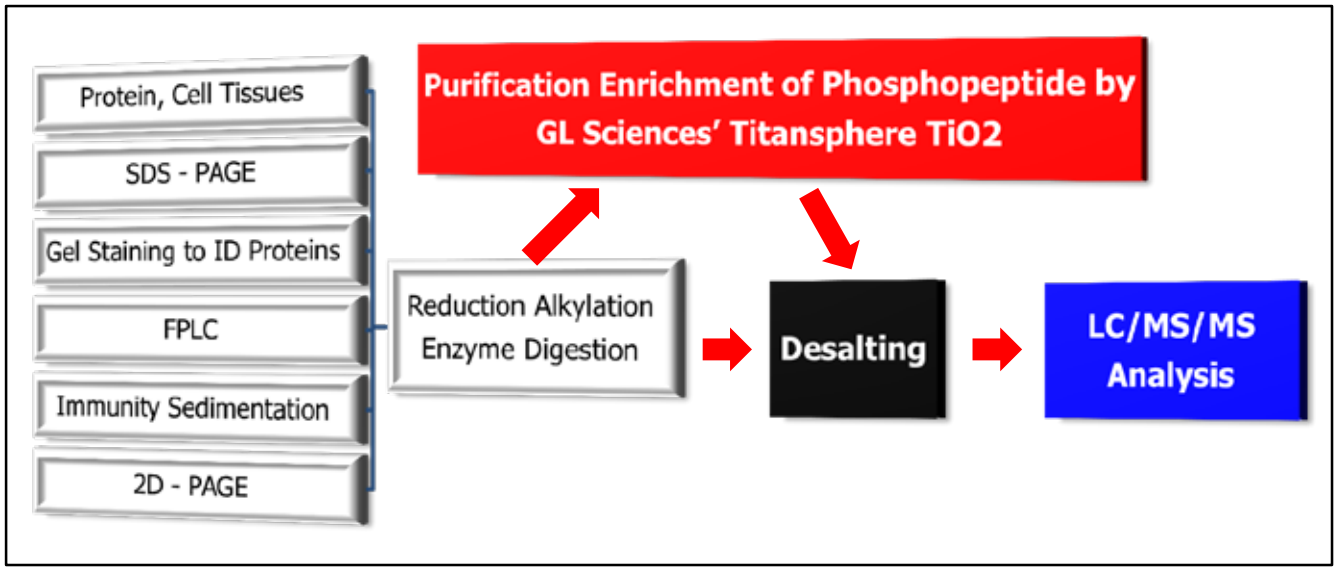
What Makes GL Sciences' Titanium Dioxide Products Unique and Superior?
Titanium Dioxide exists in three crystaline forms, known as rutile, anatase, and brookite. Rutile and Anatase forms are the most common and most useful for phosphopeptide enrichment, and the ratio of rutile form to anatase form has significant implications for applicabililty to enrichment of phosphopeptides. Due to its unique manufacturing technique, GL Sciences can produce phosphopeptide enrichment products with highly spherical beads having the optimum ratio of crystal forms of TiO_2. The primary reasons the GL Sciences' Pho-TiO products show superior performance is a direct result of the unique formulation of our titanium dioxide beads.

Principal of Phosphopeptide Enrichment



Phosphate groups are preferentially adsorbed to the surface of titanium dioxide under acidic condtions and are eluted under basic condition. Non-phosphorylated acid peptides non-specifically bound to the TiO_2 can be reduced by adding acid modifiers to the loading and/or wash buffers.

Basics of Phosphopeptide Analyses by LC/MS/MS



Titansphere Bulk Materials

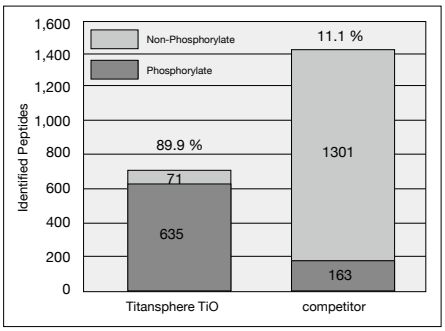
Bulk Sorbent Materials for Purification & Enrichment of Phosphopeptides

While GL Sciences' Phos-TiO spin columns based enrichment products are useful for most sample pretreatment applications, some investigators require bulk titanium dioxide media for specific applications. Our market leading Titansphere Phos-TiO Kit is now available in bulk media which is Titansphere Phos-TiO 10 µm bulk media, and is optimized for purifying and enriching more phosphopeptide.

Applications

Efficient Purification from HeLa Cell Lysate

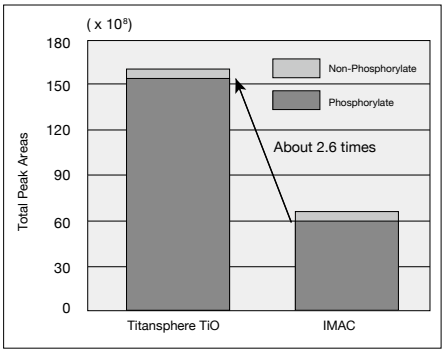
The data on the right shows the superior performance of Titansphere TiO over another competitor brand. HeLa Cell Lysate which consists mainly of non-phosphorylated peptides, was used as sample. Titansphere TiO shows exceptional selectivity - almost 90 % of the bound peptides were phosphopeptides, and excellent capacity for total phosphopeptide binding. While the competitive brand shows more selectivity for non-posphorelated peptides.



Sample : HeLa Cell Lysate, Sample volume : 50 µg,
Titansphere TiO volume : 1 mg

Compare Titansphere TiO with IMAC

The graph on the right shows the difference between Titansphere TiO and the normal IMAC enrichment method. Using Arabidopsis cell extract. Titansphere TiO provides substantially higher total peak area and a much higher number of non-phosphorelated peptides.



Sample : Arabidopsis Cell Extract, Sample volume : 100 µg,
Titansphere TiO volume : 1 mg

Specifications

Description	Titansphere TiO
Particle Size	5 µm, 10 µm
Particle Shape	Spherical
Adsorption Spot	Titanium Dioxide Crystal
Pore Size	100 Å (10 µm)
pH Range	2–12
Gravity	1.74

Titansphere Bulk Materials (Previous Version)

Description	Particle Size	Qty.	Cat.No.
Titansphere TiO 5 µm, 500 mg	5 µm	1/pk	5020-75000
Titansphere TiO 10 µm, 500 mg	10 µm	1/pk	5020-75010

Titansphere Phos-TiO Bulk Material

Bulk Sorbent Materials for Purification & Enrichment of Phosphopeptides

While GL Sciences' Phos-TiO spin tips based enrichment products are useful for most sample pretreatment applications, some investigators require bulk titanium dioxide media for specific applications. A new bulk material is now available: Titansphere Phos-TiO is the new version of Titansphere TiO designed for even better absorption capacity of phosphopetides.

References

1. Phosphopeptide enrichment by aliphatic hydroxy acid-modified metal oxide chromatography for nano-LC-MS/MS in proteomics applications, Sugiyama N, Masuda T, Shinoda K, Nakamura A, Tomita M, Ishihama Y., Mol Cell Proteomics. 2007 Jun;6 (6) : 1103-9.
2. Highly selective enrichment of phosphorylated peptides using titanium dioxide, Nature Protocols 1, 2006, 1929-1935.
3. Global, in vivo, and site-specific phosphorylation dynamics in signaling networks, Olsen JV, Blagoev B, Gnad F, Macek B, Kumar C, Mortensen P, Mann M., Cell. 2006 Nov 3;127 (3) : 635-48.
4. Successive and selective release of phospholylated Peptides captured by Hydroxy Acid-Modified Metal Oxide Chromatography, Yutaka Kyono, Naoyuki Sugiyama, Koshi Imami, Masaru Tomita, and Yasushi Ishihama, J Proteome Res., 2008, 7 (10), 4585-93.
5. Extended coverage of singly and multiply phosphorylated peptides from a single Titanium Dioxide Microcolumn, Anal Chem., 2015, 87 (20), 10213-21.

Titansphere Phos-TiO Bulk Material (New Version)

Description	Particle Size	Qty.	Cat.No.
Titansphere Phos-TiO Bulk 10 µm, 500 mg	10 µm	1 pc	5010-21315

Titansphere Phos-TiO MP Kit

Efficient Enrichment of BOTH Singly and Multiply Phosphorylated Peptides

GL Sciences is widely recognized as the best manufacturer for the enrichment/purification of phosphopeptide, Titansphere Phos-TiO kit and bulk resins are widely used throughout the world in major cancer research institutes and proteomics core facilities.

The new Titansphere Phos-TiO MP Kit employs a new protocol in the HAMMOC method, which enables highly efficient and selective recovery of not only singly, but also multiply phosphorylated peptides. Specifically, with the new kit it is possible to fraction the singly and the multiply phosphorylated peptides separately, preventing ion suppression in LCMS/MS detection and delivering higher recovery of multiply phosphorylated peptides.

Features

- High Recovery of not only Singly, but also Multiply Phosphorylated Peptides.
- All operation is done using an easy-to-use centrifuge.

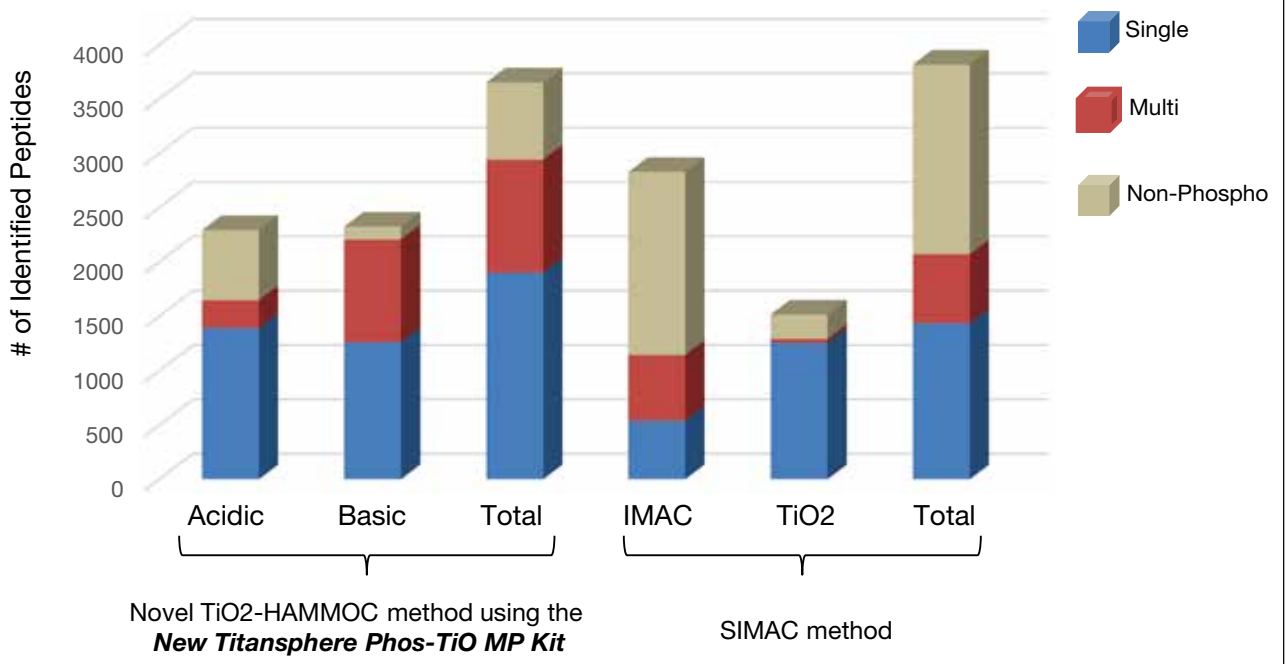
Sample Loading Capacity

Description	Content	
Sample	Tyr (PO_3H_2) - Angiotensin II	
Spin Tip Sorbent Mass/Tip Volume	1 mg/200 µL	3 mg/200 µL
Sample Loading Capacity	1.2 µg	3.5 µg

Titansphere Phos-TiO MP Kit Contents

Cat.No.	5010-21282	5010-21283
Titansphere Phos-TiO MP Kit	24 pcs	24 pcs
Titansphere Sorbent Mass/Tip Volume	1 mg/200 µL	3 mg/200 µL
Spin Tip Quantity	24 pcs (6 x 4 packs)	24 pcs (6 x 4 packs)
Waste Fluid Tube Quantity	24 pcs	24 pcs
Recovery Tube (2.0 mL) Quantity	24 pcs	48 pcs
Recovery Tube (1.5 mL) Quantity	48 pcs	48 pcs
Solution B (Lactic acid) Quantity	2 mL	2 mL
Instruction Manual	1/pk	1/pk

Comparison of Recovery of BOTH Singly and Multiply Phosphorylated Peptides



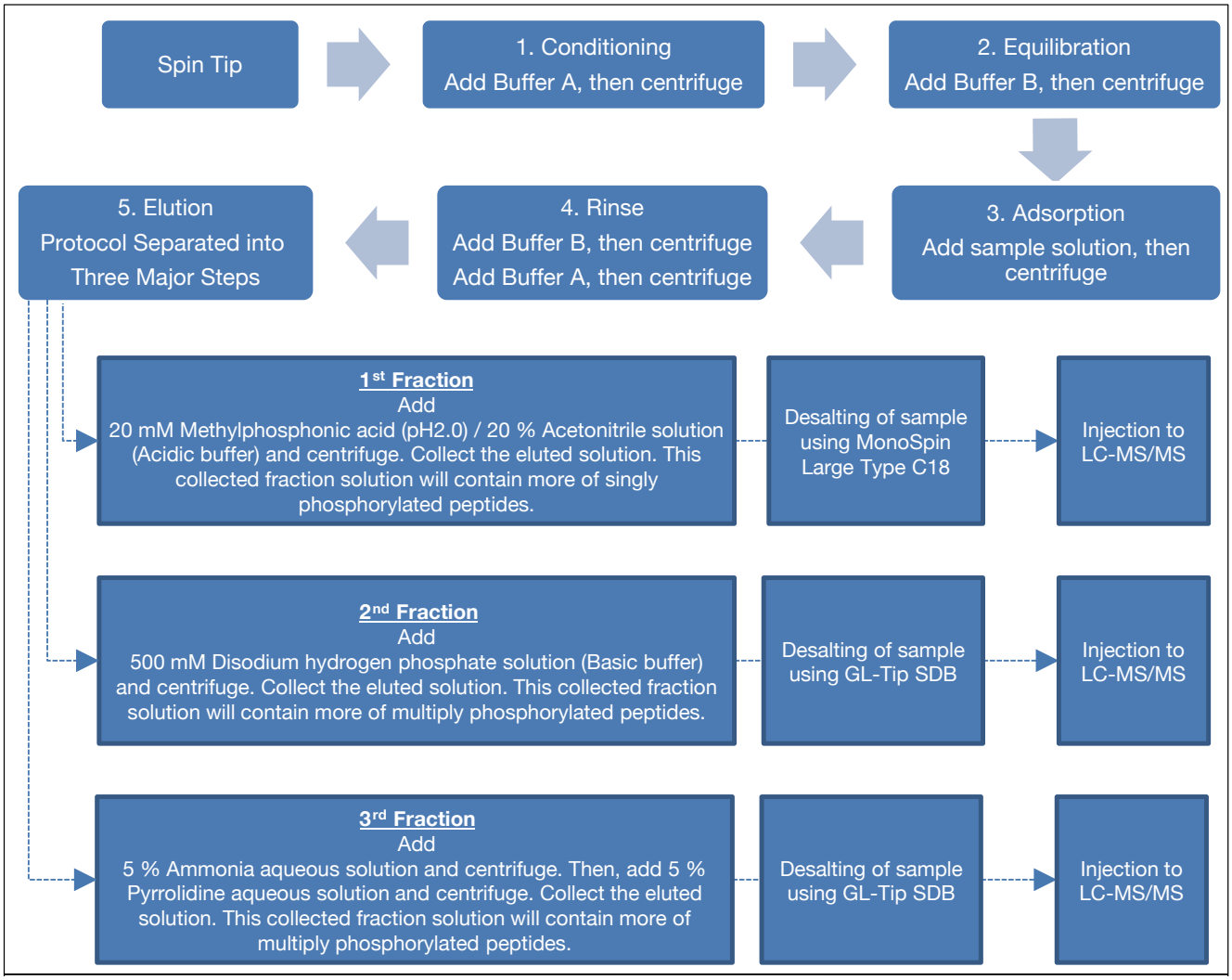
Data from Wakabayashi et al. Ana Chem 2015, 87

The above experiment was done using HeLa cells 100 µg to test the new Titansphere Phos-TiO MP Kit which showed highly efficient recovery of both singly and multiply phosphorylated peptides compared to SIMAC (Sequential Elution from IMAC) method.

The SIMAC method generally consists of into two major protocols, in the first one the Immobilized Metal Ion Affinity Chromatography is used to make the first enrichment and separation of mono and multi-phosphorelated peptides; and in the second one a further enrichment of the mono-phosphorelated peptides is carried out using titanium dioxide chromatography. Finally, the two separated phosphopeptide fractions are analyzed by LC-MS/MS.

In the new Titansphere Phos-TiO MP Kit, more singly phosphorylated peptides were recovered more when using an acidic elution buffer, while the more multiply phosphorylated peptides were recovered more when using a basic elution buffer. As proven above, in total, the new Titansphere Phos-TiO MP Kit is able to recover more both singly and multiply phosphorelated peptides than the SIMAC method.

Typical Enrichment Protocol using Titansphere Phos-TiO MP Kit



Remarks

- Buffer A, Buffer B, Methylphosphonic acid, Disodium hydrogen phosphate, Ammonia aqueous solution and 5 % Pyrrolidine aqueous solution are not included in the kit due to their designation as hazardous materials for the purposes of air transportation. Therefore, the users must prepare these solutions in their lab, according to the procedure described in the instruction manual.
- Solution B is included in the kit, which is Lactic acid.
- The preparation procedure of Buffer A and B are as follows.

Buffer A	2 % TFA solution	1 mL
	Acetonitrile	4 mL
	Total	5 mL (Use 3 mL for making Buffer B)

Buffer B	Solution B	1 mL
	Buffer A	3 mL
	Total	4 mL

Titansphere Phos-TiO MP Kit

- Centrifuge Adapter, 24 pcs/pk (Cat. No. 5010-21514) is needed to use the Titansphere Phos-TiO MP Kit.
- This centrifuge adapter is reusable.
- Lactic acid is Solution B, and is included in the kit. However, it can be also purchased separately for future uses.

Description	Sorbent Mass/Tip Volume	Qty.	Cat.No.
Titansphere Phos-TiO MP Kit	1 mg/200 µL	24 pcs	5010-21282
	3 mg/200 µL	24 pcs	5010-21283
Centrifuge Adapter	–	24 pcs	5010-21514
Lactic acid for Titansphere Phos-TiO (This is Solution B included in the kit)	15 mL	1/pk	5010-21295

Phos-TiO MP Kit with Desalting Columns

- These special packages includes optimized desalting columns/spin tips to be used with Phos-TiO MP Kit.

Package Contents	Package Cat.No.
Titansphere Phos-TiO MP Kit, 1 mg/200 µL, 24 pcs/pk (Cat.No. 5010-21282)	5010-21272
MonoSpin Large type C18, 30 pcs/pk (Cat.No. 7510-11320)	
GL-Tip SDB, 96 pcs/pk (Cat.No. 7820-11200)	

Package Contents	Package Cat.No.
Titansphere Phos-TiO MP Kit, 3 mg/200 µL, 24 pcs/pk (Cat.No. 5010-21283)	5010-21273
MonoSpin Large type C18, 30 pcs/pk (Cat.No. 7510-11320)	
GL-Tip SDB, 96 pcs/pk (Cat.No. 7820-11200)	

Titansphere Phos-TiO Spin Tips

- Spin tips are also available separately.

Description	Sorbent Mass/Tip Volume	Qty.	Cat.No.
Titansphere Phos-TiO Spin Tips	1 mg/200 µL	24 pcs	5010-21316
		96 pcs	5010-21317
	3 mg/200 µL	24 pcs	5010-21307
		96 pcs	5010-21308

Titansphere Phos-TiO Kit

Enrichment of Phosphopeptide Using Spin Tips

This is the previous phosphopeptide enrichment kit that GL Sciences had introduced to the market and this kit became the most popular worldwide. The titanium dioxide particles contained in the spin tips (available in 1 mg/10 µL and 3 mg/200 µL sizes) is specially treated to maximize selectivity of phosphorylated species, and the conditioning and washing buffers contain components to displace the few non-phosphorylated compounds which might originally adhere to the media.

Features

- High Recovery of Singly Phosphorylated Peptides.
- All operation is done using an easy-to-use centrifuge.

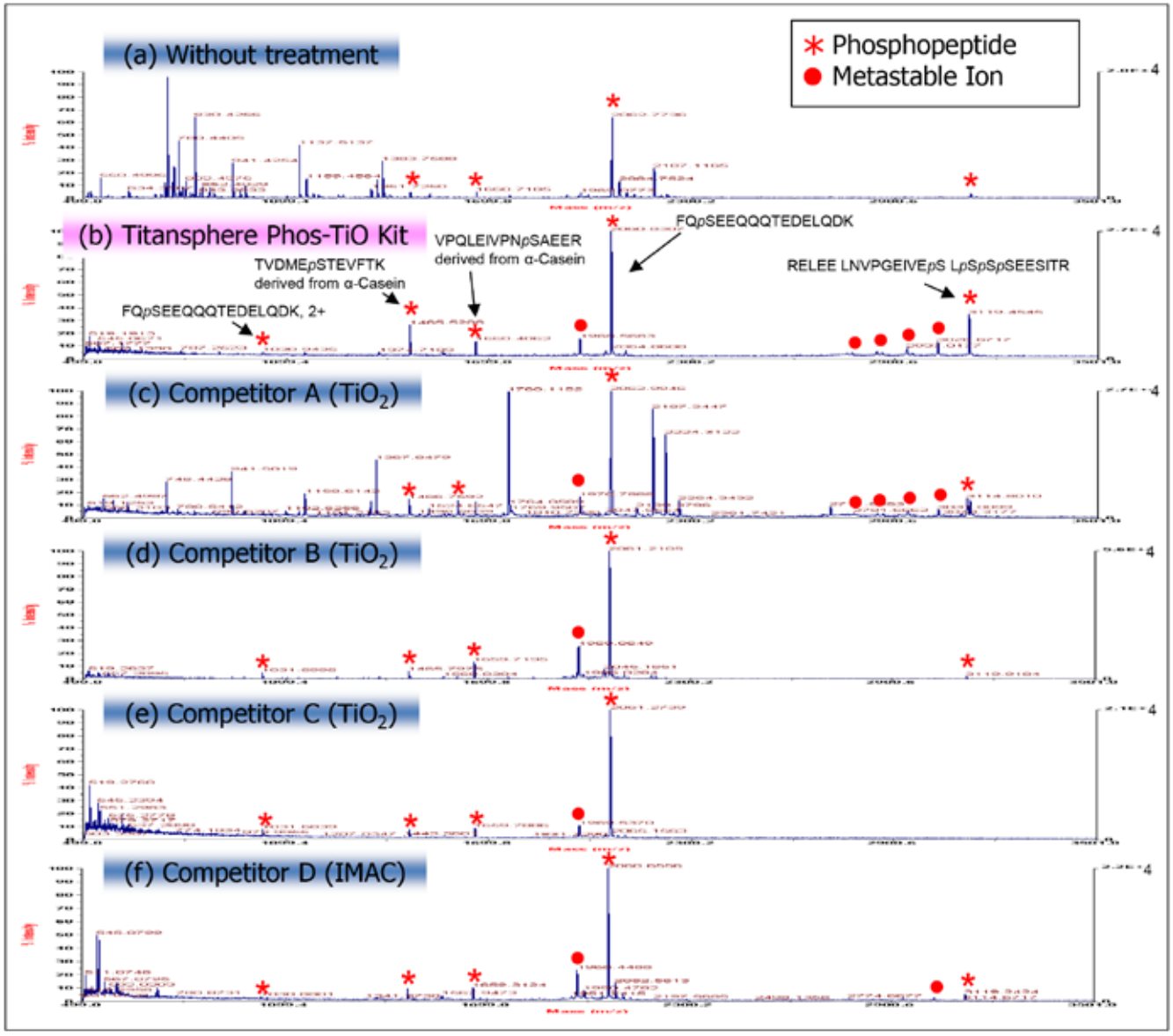
Sample Loading Capacity

Description	Content	
Sample	Tyr (PO_3H_2) - Angiotensin II	
Spin Tip Sorbent Mass/Tip Volume	1 mg/10 µL	3 mg/200 µL
Sample Loading Capacity	1.2 µg	3.5 µg

Titansphere Phos-TiO Kit Contents

Cat.No.	5010-21309	5010-21310	5010-21311	5010-21312
Titansphere Phos-TiO Kit for Export	24 pcs	96 pcs	24 pcs	96 pcs
Titansphere Sorbent Mass/Tip Volume	1 mg/10 µL		3 mg/200 µL	
Spin Tip Quantity	24 pcs (6 x 4 packs)	96 pcs (6 x 16 packs)	24 pcs (6 x 4 packs)	96 pcs (6 x 16 packs)
Waste Fluid Tube Quantity	24 pcs	96 pcs	24 pcs	96 pcs
Recovery Tube Quantity	24 pcs	96 pcs	24 pcs	96 pcs
Solution B (Lactic acid) Quantity	2 mL	6 mL	2 mL	6 mL
Instruction Manual	1/pk	1/pk	1/pk	1/pk

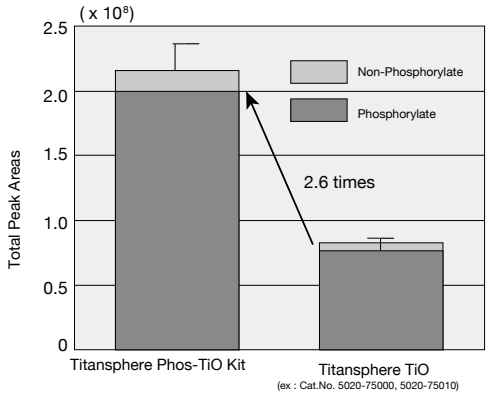
Phos-TiO Kits Outperform 4 Competitive TiO Based Products (MALDI-TOF/MS)



The data above show the purification efficiency of various TiO based products with a 2.5 µg sample of B-casein digest using MALDI-TOF/MS. Compared to the untreated condition (a), phosphopeptides were selectively purified when using Titansphere Phos-TiO Kit. Compared to competitive products (c to e) Titanpshere Phos-TiO Kit showed better selectivity. In general titanium dioxide is said that it has the worse adsorption efficiency of multi-phosphopeptides than IMAC. However, Titansphere Phos-TiO Kit showed higher selectivity, sensitivity and number of individual phosphopeptides isolated for 4 – phosphopeptides than IMAC (f). Metastable ion is a dephosphorylated peak.

Comparison between Previous Version Bulk Material

Optimal TiO beads (Titansphere Phos-TiO Bulk 10 µm, Cat No. 5010-21315) are used for Titansphere Phos-TiO Kit. The existing Titansphere TiO bulk material have been improved for better adsorption capacity of phosphopeptides. Compared to the existing Titansphere bulk material (ex : Cat No. 5020-75000, 5020-75010), Phos-TiO Kit showed 2.6 times more peak area and 1.6 times more identified phosphopeptides.



Sample : HeLa Cell Lysate
Sample Volume : 50 µg
Titansphere TiO Media : 1 mg

Identified Numbers of Phosphopeptides

Product	Phosphorylate	Non-Phosphorylate
Titansphere Phos-TiO Kit	996	185
Titansphere TiO Bulk Media (ex : Cat.No. 5020-75000, 5020-75010)	635	71

Titansphere Phos-TiO Kit

- Centrifuge Adapter, 24 pcs/pk (Cat. No. 5010-21514) is needed once to use the Titansphere Phos-TiO Kit.
- This centrifuge adapter is reusable.
- Lactic acid is Solution B, which is already included in the kit. However, it can be also be purchased separately for future uses.

Description	Sorbent Mass/Tip Volume	Qty.	Cat.No.
Titansphere Phos-TiO Kit	1 mg/10 µL	24 pcs	5010-21309
		96 pcs	5010-21310
Titansphere Phos-TiO Kit	3 mg/200 µL	24 pcs	5010-21311
		96 pcs	5010-21312
Centrifuge Adapter	–	24 pcs	5010-21514
Lactic acid for Titansphere Phos-TiO (This is Solution B included in the kit)	15 mL	1/pk	5010-21295

Titansphere Phos-TiO Spin Tips

- Spin tips are also available separately.

Description	Sorbent Mass/Tip Volume	Qty.	Cat.No.
Titansphere Phos-TiO Spin Tips	1 mg/10 µL	24 pcs	5010-21302
		96 pcs	5010-21303
	3 mg/200 µL	24 pcs	5010-21307
		96 pcs	5010-21308

Titansphere Phos-TiO for Large Volume Samples

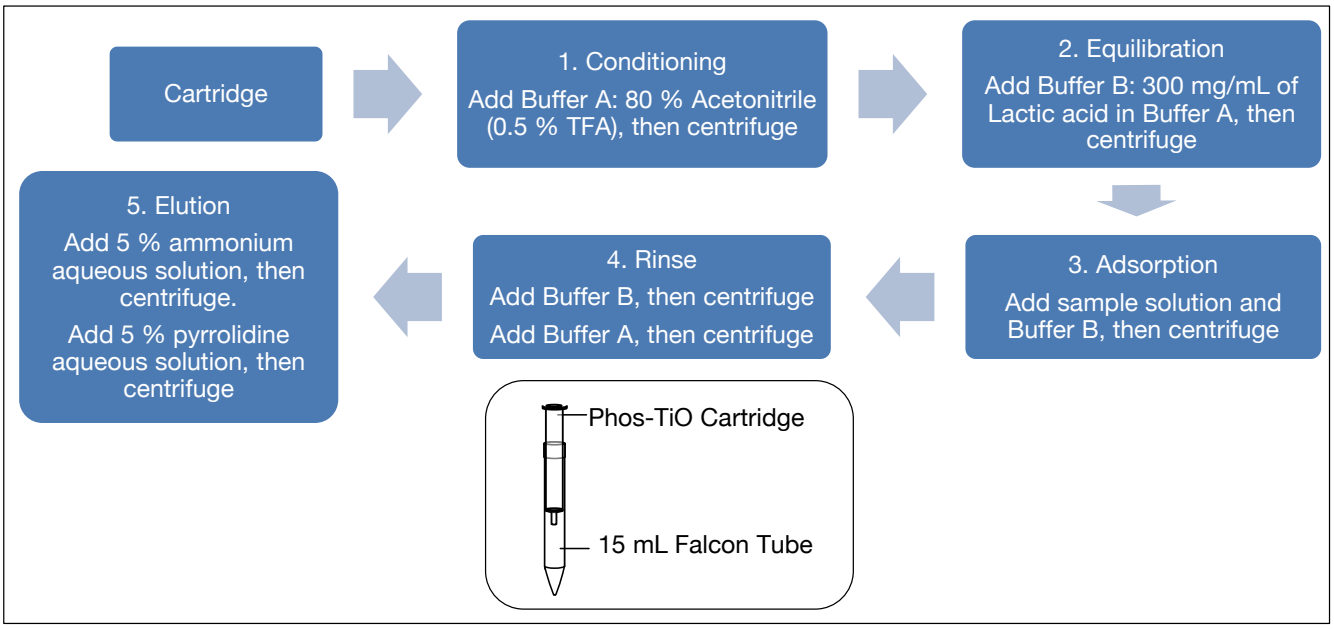
Appropriate for Larger Scale/Volume Purifications

The same specialized bulk media used in our Phos-TiO Kit is available in 50 mg/3 mL and 100 mg/3 mL cartridges as an extension of the Phos-TiO product line.

Sample Loading Capacity

Description	Content	
Sample	Tyr (PO_3H_2) - Angiotensin II	
Spin Tip Sorbent Mass/Tip Volume	50 mg/3 mL	100 mg/3 mL
Sample Loading Capacity	50 µg	100 µg

Typical Enrichment Protocol using Titansphere Phos-TiO for Large Volume Samples



Phos-TiO for Large Volume Samples Cartridges are intended for use with a desktop or other centrifuge. While some of the versions of Phos-TiO are resemble pipette tips or SPE cartridges, these products are not intended for use with pipettes or SPE vacuum manifolds; the cartridge internal configuration and particle size of the TiO bulk media requires centrifugal elution of all solutions.

Titansphere Phos-TiO for Large Volume Samples

Description	Sorbent Mass/Tip Volume	Qty.	Cat.No.
Titansphere Phos-TiO for Large Volume Samples	50 mg/3 mL	25 pcs	5010-21290
	100 mg/3 mL	25 pcs	5010-21291

GL-Tip SDB and GL-Tip GC

Desalting Phosphopeptide-Enriched Samples Prior to LC-MS/MS

Phosphopeptides isolated using TiO_2-based media are typically desalted prior to analysis by LC-MS/MS, typically using a C18 (hydrophobic) micropipette tip. GL Sciences' SDB (styrene divinylbenzene) and GC (graphite carbon) centrifuge-operated micropipette GL-Tip retain more hydrophobic and hydrophilic peptides, respectively, than C18-based tips.

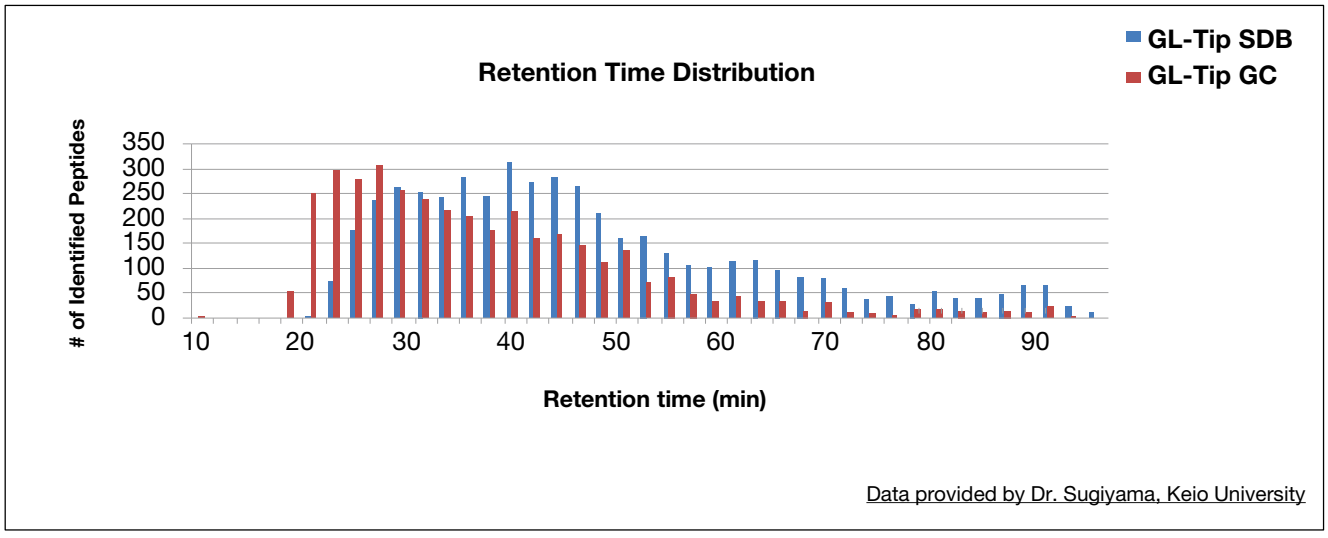
Features

GL-Tip SDB are more hydrophobic than C18 media and retain a wider range of phosphopeptides with high yield, allowing more accurate analysis of phosphopeptides species present in the sample. GL-Tip GC retain many more hydrophilic phosphopeptides than does C18; by using a combination of GL-Tip SDB and GC, almost all peptide samples can be desalted without sample losses due to lack of retention. GL-Tip SDB is designed to be easy-to-use: phosphopeptide-enriched. Phosphopeptide-enriched samples are easily loaded, washed, and eluted using the same centrifuge-based technique used with Phos-TiO spin tips.

Sample Loading Capacity

Description	GL-Tip SDB	GL-Tip GC
Sample	Tyr(PO_3H_2) - Angiotensin II	Gly-Gly-Tyr-Arg
Spin Tip Sorbent Mass/Tip Volume	200 µL	1 mg/200 µL
Sample Loading Capacity	60 µg	30 µg

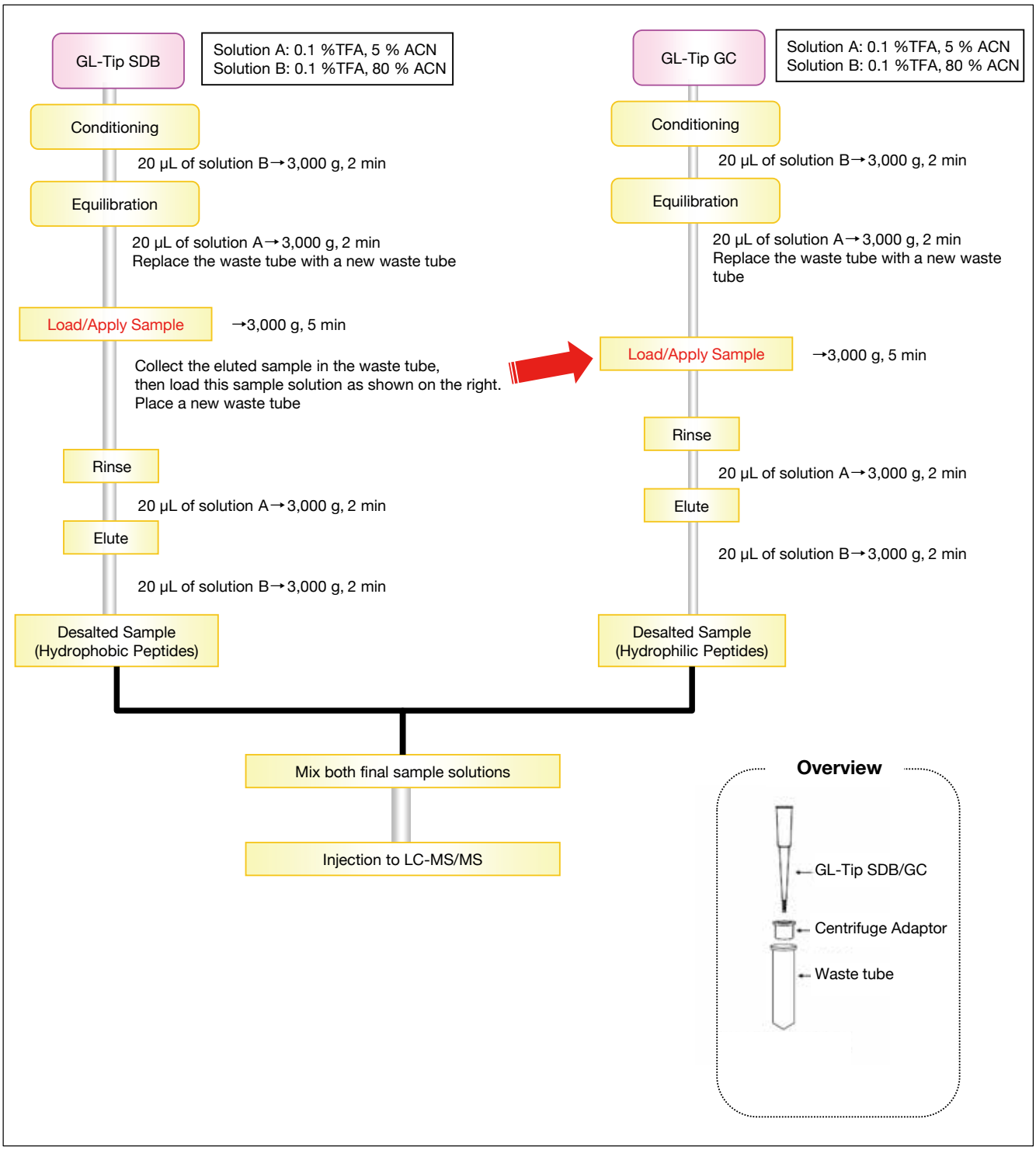
Relative Retention of Peptides Collected using GL-Tip SDB and GC Desalting Tips



Data provided by Dr. Sugiyama, Keio University

As shown above GL-Tip SDB preferentially binds hydrophobic peptides while GC preferentially binds hydrophilic peptides.

Recommended Protocol using GL-Tip SDB and GL-Tip GC



GL-Tip SDB and GL-Tip GC

- Centrifuge Adapter, 24 pcs/pk (Cat. No. 5010-21514) is needed to use the GL-Tip SDB and GL-Tip GC desalting spin tips.
- This centrifuge adapter is reusable.

Description	Tip Volume	Qty.	Cat.No.
GL-Tip SDB	200 µL	96 pcs	7820-11200
GL-Tip GC	200 µL	96 pcs	7820-11201
Centrifuge Adapter	–	24 pcs	5010-21514

GL-Tip SCX and GL-Tip SDB-SCX

Spin Tips for Peptide Fractionation

GL-Tip SCX is packed with strong cation polymer (SCX) and GL-Tip SDB-SCX are packed with styrene divinylbenzene polymer (SDB) and strong cation polymer (SCX). GL-Tip SDB-SCX is packed in a two layer format consisting of a SDB and SCX media. Undesalted peptide samples can be used in GL-Tip SDB-SCX as the first SDB layer makes the first desalination, while the SCX layer desalts the remaining not desalted peptides.

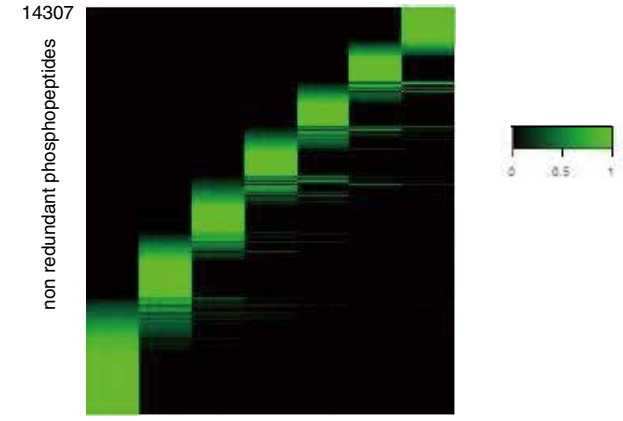
Sample Loading Capacity

Description	GL-Tip SCX	GL-Tip SDB-SCX
Sample	Angiotensin II	Angiotensin II
Tip Volume	200 µL	200 µL
Sample Loading Capacity	60 µg	60 µg

Comparison of Traditional Gradient Elution vs TFA Gradient Elution

Comparison of Efficiency between Traditional Gradient Elution vs TFA Gradient Elution using DLD-1 Human Large Intestinal Cancer Cell derived Phosphopeptides

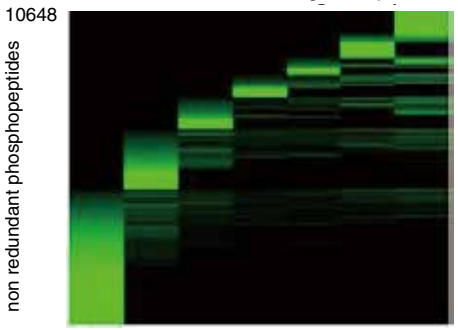
< NEW TFA Gradient Elution using GL-Tip SDB-SCX >



Fraction	1	2	3	4	5	6	7
TFA (%)	0	1	2	3	3	4	0
Ammonium acetate (mM)	0	0	0	0	100	500	500

Concentration in elution buffer

< Traditional Gradient Elution using GL-Tip SDB-SCX >



Fraction	1	2	3	4	5	6	7
Ammonium acetate (mM)	20	50	75	125	200	500	0
NH_4OH (%)	0	0	0	0	0	0	0.1

Concentration in elution buffer

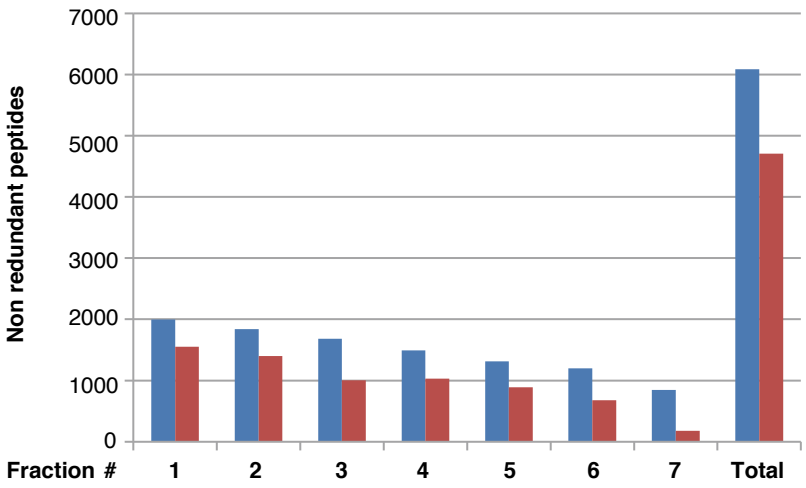
As proven above, the newly developed TFA gradient elution identified 14307 peptides promising higher efficiency than the traditional gradient elution method.

(Data provided from the National Institute of Biomedical Innovation, Dr. Jun Adachi)

A gradient elution using cation SCX media is commonly used in shotgun proteomics to fractionate peptide samples from complex samples such as cell or tissue extracts. The biggest challenge arises when identifying the same peptide from one fractionated peptide sample to another because this may affect efficiency in a bad fashion. efficiency. The newly developed TFA gradient elution method (patent applied) identifies more peptides without decreasing operation efficiency.

Comparison of Number of Quantified Peptides

The figure below shows a comparison between the analysis results obtained respectively by GL-Tip SCX and another brand tip column which we will call below Brand G. GL-Tip SCX recovered more peptides. The usage of the newly developed TFA gradient elution method prevents from identifying the same peptide from one fractionated sample peptide to another resulting in higher efficiency.



Sample Procedure :
Trypsin digestion of HeLa cell lysate 25 µg each were fractionated and 40 % of the recovered sample were identified via LTQ-Orbitrap XL, 45 minutes gradient using Maxquant 1.5.1.2, uniprot human database.

Number of Identified Non Redundant Peptides

Fractions	1	2	3	4	5	6	7	total
GL-Tip SCX	1996	1839	1684	1491	1311	1196	847	6085
Brand G	1552	1397	1004	1032	890	676	179	4704

(Data provided from the National Institute of Biomedical Innovation, Dr. Jun Adachi)

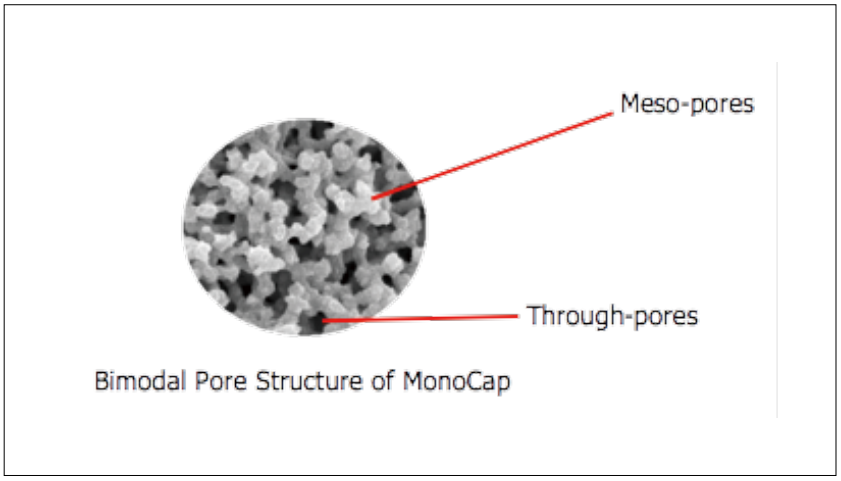
GL-Tip SCX and GL-Tip SDB-SCX

- Centrifuge Adapter, 24 pcs / pk (Cat. No. 5010-21514) is needed to use the GL-Tip SCX and GL-Tip SDB-SCX peptide fractionation spin tips.
- This centrifuge adapter is reusable.

Description	Tip Volume	Qty.	Cat.No.
GL-Tip SCX	200 µL	96 pcs	7510-11203
GL-Tip SDB-SCX	200 µL	96 pcs	7510-11202
Centrifuge Adapter	–	24 pcs	5010-21514
Centrifuge Adapter for 96-Well Plate	–	1 pc	5010-21341
Centrifuge Adapter for 96-Well Plate	–	2 pcs	5010-21343

MonoCap HighResolution 2000 Series

Optimized for Identification of Peptides/Proteins for Proteome Research



MonoCap HighResolution 2000 is a 2 meter length monolithic silica capillary column which is designed for identifying extremely high number of peptides/proteins for proteome research via LC-MS/MS.

GL Sciences' MonoCap capillary columns are created via sol-gel processing and octadecylsilylated. The monolithic structure of MonoCap has a very uniform three dimensional structure that shows excellent reproducibility from batch-to-batch.
Due to the solid structure of GL Sciences' monolithic silica, no frits or filters at the ends of the column. In this way band broadening caused by dead volume is avoided.
The high porosity of our monolithic silica allows for high flow rates to be used without loss of resolution or of high operating pressure. An optimized balance of through-pores and meso-pores provides the critically important combination of efficiency, separation speed, large volume sample-loading, and small volume sample-recovery.

MonoCap HighResolution provides extremely high efficiency, delivering over 200,000 plates for a 2,000 mm length column. The MonoCap HighResolution Ultra type delivers over 300,000 plates.

Physical Properties

Product Description	Bonded Phase	Meso-pore	End-capping	Max. Operating Pressure
MonoCap C18 HighResolution 2000	Octadecyl Groups	15 nm	Yes	35 MPa
MonoCap C18 HighResolution Ultra 2000	Octadecyl Groups	11 nm	Yes	35 MPa
MonoCap HILIC-UP HighResolution 2000	Ureidopropyl Groups	12 nm	None	35 MPa

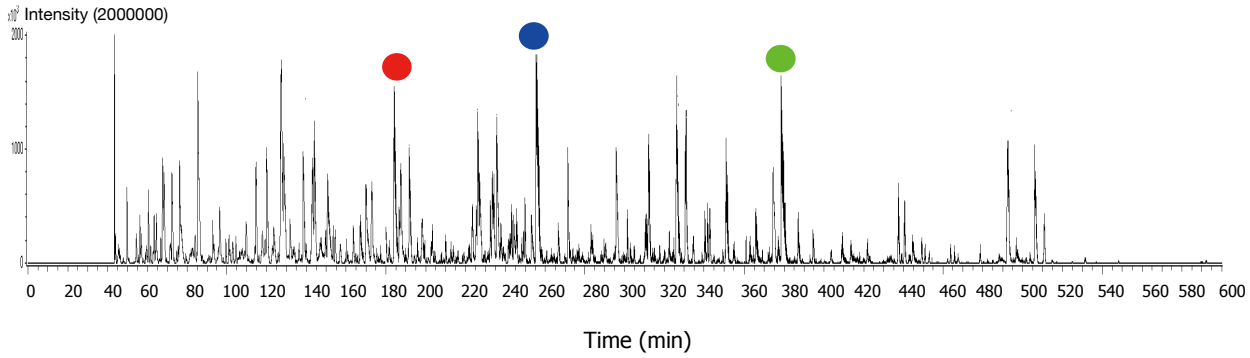
Discover New Peptides/Proteins

As proven below, MonoCap C18 HighResolution 2000 mm length column identifies more peptides/proteins than traditional particle packed capillary HPLC columns.

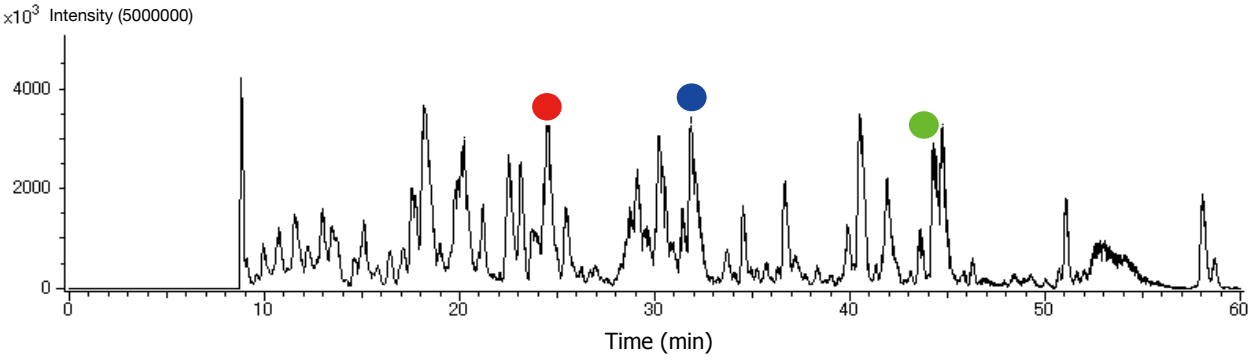
MS : LTQ-Orbitrap XL (Mascot Search)
Sample : THP-1 Cell Lysate Tryptic Digest, 5 µg

Column Name	Number of Identified Proteins in average	Analysis Time
MonoCap C18 HighResolution 2000 0.1 mm I.D. x 2000 mm	2,087 (2013, 2116, 2131)	10 Hours
Particle packed column 0.1 mm I.D. x 150 mm	680 (685, 679, 675)	2 Hours

[1] MonoCap C18 HighResolution 2000 (2000 mm x 0.1 mm I.D.)



[2] Particle Packed column (3 µm, 150 mm x 0.075 mm I.D.)



Conditions

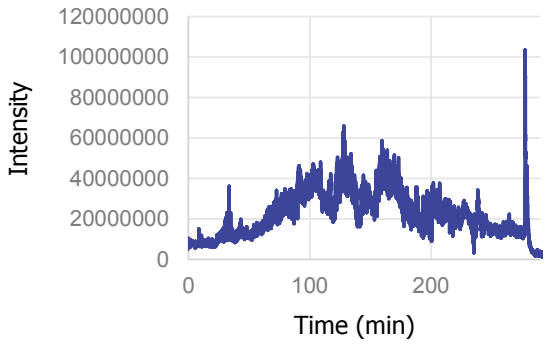
System : GLS Capillary HPLC system
Column : [1] MonoCap C18 High Resolution 2000 (2000 mm x 0.1 mm I.D)
: [2] Particle packed column (3 µm, 150 mm x 0.075 mm I.D.)
Trap column : MonoCap C18 Trap Column (50 mm x 0.075 mm I.D.)
Eluent : A) 0.1 %HCOOH in CH_3CN
B) 0.1 %HCOOH in H_2O
[1] A/B = 10/90 - 600 min - 45/55
[2] A/B = 10/90 - 180 min - 45/55

Flow Rate : [1] 0.5 µL/min
[2] 0.3 µL/min
Injection Vol. : 5 µL
Detection : MS (TIC m/z 500-1500)
Sample : Tryptic digest of proteins

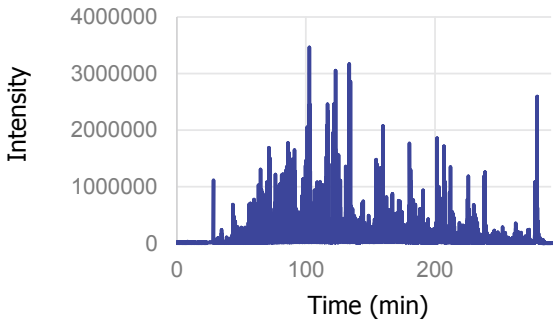
● ● ● are analytes having the same molecular weight

For Identifying Highly Hydrophilic, Hydrophobic Peptides/Proteins

MonoCap HILIC-UP is an important addition to the MonoCap C18 HighResolution 2000 column series.
MonoCap HILIC-UP can retain highly hydrophilic peptides/proteins which may lead to discovering new peptides/proteins which a C18 phase cannot identify.
In HILIC, the higher the organic concentration, the greater the retention of more polar analytes. One of the biggest benefit of HILIC mode is, a high organic solvent concentration of the mobile phase will lead to a high sensitivity LC-MS/MS analysis.



Total Ion Chromatogram



Base Peak Chromatogram

Remarks

Results of MonoCap C18 HighResolution 2000

Number of Identified Peptides : 8,358
Number of Identified Proteins : 1,992
Gradient Program : 4 hrs

Results of MonoCap HILIC-UP HighResolution 2000

Number of Identified Peptides : 7,194 (14,736 PSM*)
Number of Identified Proteins : 2,201
*: Peptide Spectrum Match

Conditions

Column : MonoCap HILIC-UP High Resolution 2000
Eluent : A) CH_3CN : H_2O=10/90 (0.5 % CH_3COOH)
B) CH_3CN : H_2O=95/5 (0.5 % CH_3COOH)
A/B=0/100 - (240 min) - 20/80 - (10 min) - 100/0 - (10 min) - 100/0
Flow Rate : 0.5 µL
Injection Vol. : 1 µL (1 mg/mL)
Detection : TIC MS (m/z 300-1500)
Sample : Tryptic Digest of Hela Cell Lysate, 5 µg

Reference

Hydrophilic Interaction Chromatography Using a Meter-Scale Monolithic silica capillary Column for Proteomics LC-MS,
K Horie et al. *Anal. Chem.* 2014, 86, 3817-3824

References

1. M.H.M. van de Meent et al.
   Improvement of the liquid-chromatographic analysis of protein tryptic digests by the use of long-capillary monolithic columns with UV and MS detection, Anal Bioanal Chem, 2007,388, 195-200.

2. Mio Iwasaki et al.
   One-Dimensional Capillary Liquid Chromatographic Separation Coupled with Tandem Mass Spectorometry Unveils the Escherichia coli Proteome on a Microarray Scale, Anal. Chem. 2010, 82, 2616-2620.

3. Mio Iwasaki et al.
   Human Proteome analysis by using reversed phase monolithic silica capillary columns with enhanced sensitivity, J Chromatogr A 2012, 1228, 292-297.

4. Ryota Yamana ea al.
   Rapid and deep profiling of human induced pluripotent stem cell proteome by one-shot NanoLC-MS/MS analysis with meter-scale monolithic silica columns, J Proteome Res. 2013, 12, 214-21.

5. Mari Ogawa-Ohnishi et al.
   Identification of three hydroxyproline O-arabinosyltransferases in Arabidopsis thaliana, Nature Chem. Biol. 2013, 9, 726-730.

6. Satoru Okamoto et al.
   Root-derived CLE glycopeptides control nodulation by direct binding to HAR1 receptor kinase, Nature Commun. 2013,4, 2191.

7. Kanta Horie et al.
   Hydrophilic interaction chromatography using a meter-scale monolithic silica capillary column for proteomics LC-MS, Anal. Chem. 2014, 86, 3817-3824.

MonoCap C18 HighResolution Ultra 2000

- End-fittings are not included.
- The column connection kit is available separately to ensure proper connections.
- Please refer to the below ordering information.

Description	I.D.	Length	Qty.	Cat.No.
MonoCap C18 HighResolution Ultra 2000	0.1 mm	2000 mm	1 pc	5020-10018

MonoCap C18 HighResolution 2000

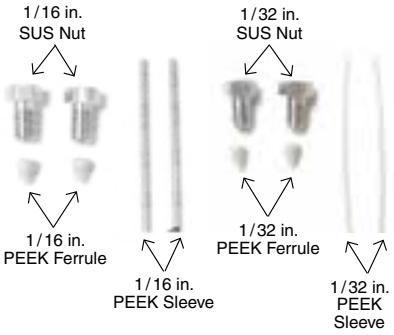
- End-fittings are not included.
- The column connection kit is available separately to ensure proper connections.
- Please refer to the below ordering information.

Description	I.D.	Length	Qty.	Cat.No.
MonoCap C18 HighResolution 2000	0.1 mm	2000 mm	1 pc	5020-10015

MonoCap HILIC-UP HighResolution 2000

- End-fittings are not included.
- The column connection kit is available separately to ensure proper connections.
- Please refer to the below ordering information.

Description	I.D.	Length	Qty.	Cat.No.
MonoCap HILIC-UP HighResolution 2000	0.1 mm	2000 mm	1 pc	5020-10019



Connection Kit for MonoCap HighResolution 2000

- Dedicated connection kit for MonoCap C18 High Resolution 2000.
- Use this connection kit when connecting the column directly to the system.

Description	Qty.	Cat.No.
1/16 in. PEEK Ferrule, SUS Nut, Sleeve, 2 pcs each. 1/32 in. PEEK Ferrule, SUS Nut, Sleeve, 2 pcs each.	1 pc	5020-10017

Zero Dead Volume Union

- The union is used to connect the system tubing to the column to achieve zero dead volume.

Description	Orifice Size	Qty.	Cat.No.
U-435	0.25 mm	1 pc	6010-72352
U-411	178 µm	1 pc	6010-72351

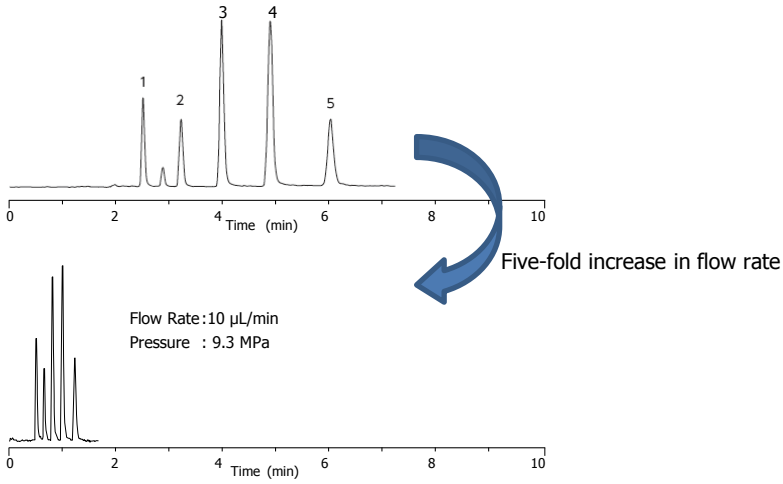
MonoCap C18 Fast-Flow

Physical Properties

Product Description	Bonded Phase	Meso-pore	End-capping	Max. Operating Pressure
MonoCap C18 Fast-flow	Octadecyl Groups	15 nm	Yes	22 MPa

Workable at a broad range of linear velocity from 0.5 to 5 mm/s without sacrificing efficiency and separation at high speed. The number of theoretical plates produced by MonoCap C18 Fast-Flow is nearly equivalent to a totally porous particle type capillary column packed with a 5 µm packing material. Columns are protected by either metal or PEEK hardware.

Workable at High Flow Rates without Sacrificing Efficiency



Conditions

Column : MonoCap C18 for Fast-flow (150 x 0.2 mm I.D.)
Eluent : A) CH_3CN B) H_2O A/B=50/50, v/v
Col.Temp. : Ambient
Detection : UV 210 nm (MU701, Cell Volume 18 nL)
Injection Vol. : 0.5 µL
Sample : 1. Thiourea
2. Acetophenone
3. Benzene
4. Toluene
5. Naphthalene

Proteomics

MonoCap C18 Nano-flow

Physical Properties

Product Description	Bonded Phase	Meso-pore	End-capping	Max. Operating Pressure
MonoCap C18 Nano-flow	Octadecyl Groups	11 nm	Yes	22 MPa

MonoCap C18 Nano-flow delivers higher number of theoretical plates compared to a totally porous particle type capillary column packed with a 3 µm packing material. It can be operated at a wide range of flow rate with low back pressure and achieve very high sensitive results in Nano-LC-ESI/MS applications. Columns are protected by either metal or PEEK hardware.

MonoCap C18 WideBore

Physical Properties

Product Description	Bonded Phase	Meso-pore	End-capping	Max. Operating Pressure
MonoCap C18 WideBore	Octadecyl Groups	11 nm	Yes	22 MPa

The MonoCap C18 Fast-flow is also available in 0.5 mm I.D. size, which can be used at a wide range of flow rate from 6 to 100 µL/min without sacrificing efficiency. The number of theoretical plates delivered by MonoCap C18 WideBore is nearly equivalent to a totally porous particle type capillary column packed with a 5 µm packing material. Columns are protected by a metal hardware.

MonoCap C18 Trap Column

Physical Properties

Product Description	Bonded Phase	Meso-pore	End-capping	Max. Operating Pressure
MonoCap C18 Trap Column	Octadecyl Groups	11 nm	Yes	20 MPa

MonoCap C18 Trap columns have a relatively big throughpore and can be used at high flow rates such as 10 µL/min. This benefit makes MonoCap C18 Trap columns appropriate for on-line preconcentration or desalting of protein and peptide samples prior to HPLC separation with mass spectrometry detection. End-fittings are 1/16" (10-32 UNF). 1/32" end-fittings are also available upon request.

MonoCap Amide

Physical Properties

Product Description	Bonded Phase	Meso-pore	End-capping	Max. Operating Pressure
MonoCap Amide	Carbamoyl Groups	15 nm	None	22 MPa

Amide groups are chemically bonded to the monolithic silica and makes it suitable for the analysis of sugars via HILIC mode. As the back pressure is significantly low, a 500 mm length MonoCap Amide column delivers over 40,000 plates offering high efficiency. Generally, HILIC mode uses acetonitrile at a concentration between 65-95 % in an aqueous buffer such as ammonium acetate or ammonium formate, which have high solubility in organic solvents. Columns are protected by either metal or PEEK hardware.

MonoCap SCX

Physical Properties

Product Description	Bonded Phase	Meso-pore	End-capping	Max. Operating Pressure
MonoCap SCX	Benzenesulfonyl Groups	11 nm	None	20 MPa

MonoCap SCX is bonded with benzene sulfonic acid groups (strong cation exchange) and is suitable for 2D LC applications for the separation of biomolecules such as peptides and proteins.

MonoCap C18 Fast-Flow

- For end-fittings information, please refer to P82
- All 50 mm length PEEK columns does not come with a hardware and will be supplied with 3 pcs of columns only.

Description	I.D.	Length	Hardware	Qty.	Cat.No.
MonoCap C18 Fast-Flow	0.05 mm	50 mm	Metal	1 pc	5020-10102
		150 mm		1 pc	5020-10101
		250 mm		1 pc	5020-10100
		50 mm	PEEK	3 pcs	5020-10002
		150 mm		1 pc	5020-10001
		250 mm		1 pc	5020-10000
	0.075 mm	50 mm	Metal	1 pc	5020-10211
		150 mm		1 pc	5020-10212
		250 mm		1 pc	5020-10213
		50 mm	PEEK	3 pcs	5020-10221
		150 mm		1 pc	5020-10222
		250 mm		1 pc	5020-10223
	0.1 mm	50 mm	Metal	1 pc	5020-10112
		150 mm		1 pc	5020-10111
		250 mm		1 pc	5020-10110
		50 mm	PEEK	3 pcs	5020-10012
		150 mm		1 pc	5020-10011
		250 mm		1 pc	5020-10010
	0.2 mm	50 mm	Metal	1 pc	5020-10122
		100 mm		1 pc	5020-10124
		150 mm		1 pc	5020-10121
		250 mm		1 pc	5020-10120
		50 mm	PEEK	3 pcs	5020-10022
		150 mm		1 pc	5020-10021
		250 mm		1 pc	5020-10020

MonoCap C18 Nano-Flow

- For end-fittings information, please refer to P82
- All 50 mm length PEEK columns does not come with a hardware and will be supplied with 3 pcs of columns only.

Description	I.D.	Length	Hardware	Qty.	Cat.No.
MonoCap C18 Nano-Flow	0.05 mm	50 mm	Metal	1 pc	5020-10143
		150 mm		1 pc	5020-10141
		50 mm	PEEK	3 pcs	5020-10043
		150 mm		1 pc	5020-10041
	0.075 mm	50 mm	Metal	1 pc	5020-10231
		150 mm		1 pc	5020-10232
		50 mm	PEEK	3 pcs	5020-10241
		150 mm		1 pc	5020-10242
	0.1 mm	50 mm	Metal	1 pc	5020-10153
		150 mm		1 pc	5020-10151
		50 mm	PEEK	3 pcs	5020-10053
		150 mm		1 pc	5020-10051
	0.2 mm	50 mm	Metal	1 pc	5020-10163
		150 mm		1 pc	5020-10161
		50 mm	PEEK	3 pcs	5020-10063
		150 mm		1 pc	5020-10061

MonoCap C18 WideBore

- For end-fittings information, please refer to P84

Description	I.D.	Length	Hardware	Qty.	Cat.No.
MonoCap C18 WideBore	0.5 mm	50 mm	Metal only	1 pc	5020-10202
		150 mm		1 pc	5020-10201
		250 mm		1 pc	5020-10200

MonoCap C18 Trap Column

・For end-fittings information, please refer to P81

Description	I.D.	Length	Hardware	Qty.	Cat.No.
MonoCap C18 Trap Column	0.05 mm	50 mm	With Hardware	1 pc	5020-10026
		100 mm		1 pc	5020-10038
		150 mm		1 pc	Contact Us
		50 mm	Without Hardware	1 pc	5020-10027
		100 mm		1 pc	5020-10039
		150 mm		1 pc	Contact Us
	0.075 mm	50 mm	With Hardware	1 pc	5020-10028
		100 mm		1 pc	5020-10036
		150 mm		1 pc	Contact Us
		50 mm	Without Hardware	1 pc	5020-10029
		100 mm		1 pc	5020-10037
		150 mm		1 pc	Contact Us
	0.2 mm	50 mm	With Hardware	1 pc	5020-10033
		100 mm		1 pc	Contact Us
		150 mm		1 pc	Contact Us
		50 mm	Without Hardware	1 pc	5020-10034
		100 mm		1 pc	Contact Us
		150 mm		1 pc	5020-10031

MonoCap Amide

・For end-fittings information, please refer to P82

Description	I.D.	Length	Hardware	Qty.	Cat.No.
MonoCap Amide	0.075 mm	150 mm	Metal	1 pc	5020-10191
		250 mm		1 pc	5020-10192
		500 mm		1 pc	5020-10193
		150 mm	PEEK	1 pc	5020-10091
		250 mm		1 pc	5020-10092
		500 mm		1 pc	5020-10093
	0.1 mm	150 mm	Metal	1 pc	5020-10181
		250 mm		1 pc	5020-10182
		500 mm		1 pc	5020-10183
		150 mm	PEEK	1 pc	5020-10081
		250 mm		1 pc	5020-10082
		500 mm		1 pc	5020-10083
	0.2 mm	150 mm	Metal	1 pc	5020-10171
		250 mm		1 pc	5020-10172
		500 mm		1 pc	5020-10173
		150 mm	PEEK	1 pc	5020-10071
		250 mm		1 pc	5020-10072
		500 mm		1 pc	5020-10073

MonoCap SCX

・For end-fittings information, please refer to the following information.

Description	I.D.	Length	Hardware	Qty.	Cat.No.
MonoCap SCX	0.2 mm	50 mm	Metal	1 pc	5020-10174
		150 mm		1 pc	5020-10175
		250 mm		1 pc	5020-10176
		500 mm		1 pc	5020-10177
		50 mm	PEEK	1 pc	5020-10074
		150 mm		1 pc	5020-10075
		250 mm		1 pc	5020-10076
		500 mm		1 pc	5020-10077

Connection Kit for MonoCap C18 Trap Column

Description	Cat.No.
MonoCap C18 Trap Column Connection Kit 1/16 in. (Union·Sleeve·Capillary Tubing 2 pcs each, Nut·Ferrule 4 pcs each)	5020-10044
MonoCap C18 Trap Column Connection Kit 1/32 in. (Union·Sleeve·Capillary Tubing 2 pcs each, Nut·Ferrule 4 pcs each)	5020-10045
MonoCap C18 Trap Column Assembly Parts 1/16 in. (Nut·Ferrule 4 pcs each)	5020-10046
MonoCap C18 Trap Column Assembly Parts 1/32 in. (Nut·Ferrule 4 pcs each)	5020-10047

End-fittings of MonoCap Monolithic Capillary HPLC Columns

MonoCap C18 High Resolution 750
MonoCap C18 Fast-flow
MonoCap Nano-flow
MonoCap C18 WideBore
MonoCap Amide
MonoCap SCX

→

1. Metal Hardwares
   End-fittings are Parker Style (UP type).
   Valco 1/32 inch (6-40 UNF) end-fittings are also available upon request, indicate 1/32 inch when ordering.

2. PEEK Hardwares
   1/16 inch male nut, ferrule and PTFE sleeve are included.

MonoCap C18 High Resolution 2000
MonoCap C18 High Resolution Ultra 2000
MonoCap C18 High Resolution 1000
MonoCap C18 High Resolution Ultra 1000
MonoCap HILIC-UP High Resolution

→

End-fittings are not included.
The connection kits shown at page 74 must be purchased separately once.

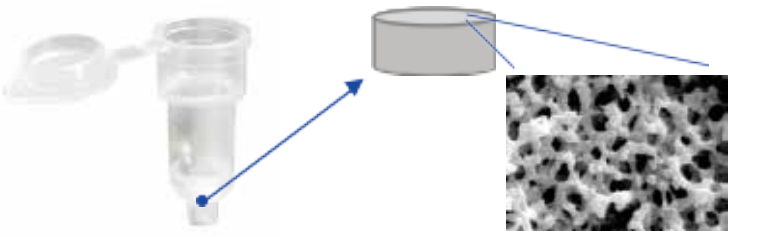
MonoSpin Series

Low-Molecular Compounds Extraction and Purification

The low-pressure, high-flow, and low-liquid-retention properties of GL Sciences' monolith silica technology make it uniquely suited for handling of small samples. MonoSpin SPE centrifugal spin columns have been developed to improve concentration and yields in low-volume sample preparation.

Features

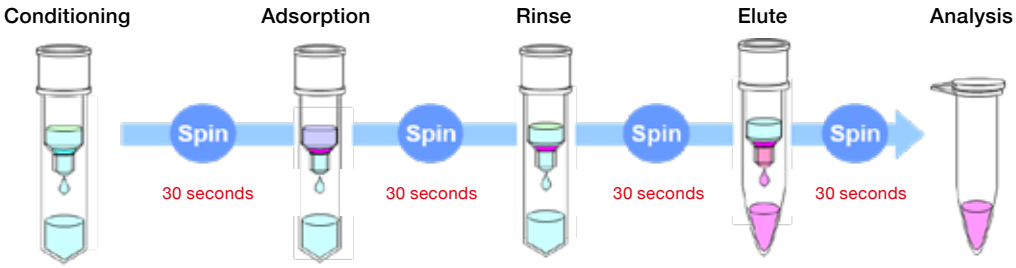
- Easy-to-Operate
- Ideal for Small Sample Volumes
- Wide Variety of Functional Groups
- Rapid Operation Time

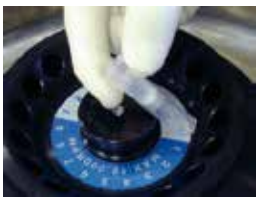


MonoSpin　　Silica Monolith Enlarged View

How to Operate

Centrifuge elution allows loss-free and efficient processing of many samples simultaneously, with little or no liquid retained by the separation matrix. And, excellent mass transfer and rapid sample binding on MonoSpin's monolith silica allows extremely rapid sample preparation compared with other methods.





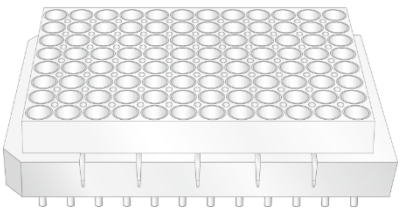
Formats

S Type (Small)

- Disc Size : 4.2 O.D. x 1.5 mm
- Sample Volume : 50 ～ 800 µL
- Elution Volume : 50 ～ 800 µL
- Centrifugation Speed : 2,000 ～ 10,000 x *g*

L Type (Large)

- Disc Size : 9 O.D. x 3 mm
- Sample Volume : 0.5 ～ 8 mL
- Elution Volume : 0.5 ～ 8 mL
- Centrifugation Speed : 1,000 x *g*



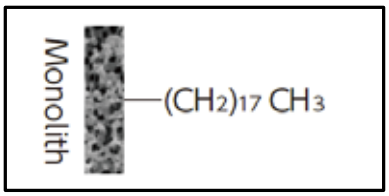
96 Well-Plate

- Dise Size : ～ 800 µL
- Elution Volume : 50 ～ 800 µL
- Centrifugation Speed : 1,000 ～ 5,000 x *g*
  (also can be used in vacuum aspiration)

Sample Preparation for LC/MS

Product Lineup

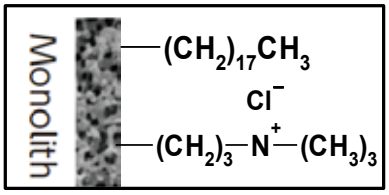
MonoSpin C18/C18 FF



Formats : S L 96

Octadecyl functional group. Optimal for drug extraction in biological samples, and desalting & enrichment of peptide samples C18 FF type employs large through-pore monolith silica for high viscosity samples.

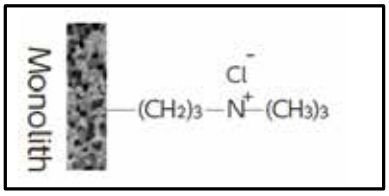
MonoSpin C18-AX



Formats : S 96

Bonded with octadecyl and trimethylaminopropyl, a mix mode type. Delivers great retention for high salt concentrated serum samples. Optimal for the recovery of acidic drugs.

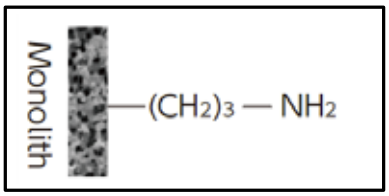
MonoSpin SAX



Formats : S L 96

Bonded with trimethylaminopropyl combining both strong anion exchange & weak hydrophobic interaction. Optimal for the extraction of acidic drugs.

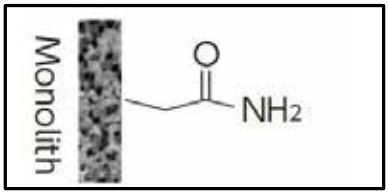
MonoSpin NH2



Formats : S L 96

Bonded with aminopropyl. Optimal for the enrichment of sugar chain and/or hydrophilic compounds by HILIC mode.

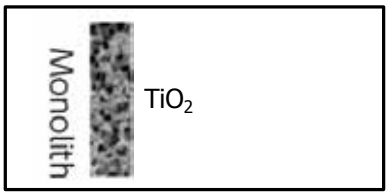
MonoSpin Amide



Formats : S 96

Bonded with amide. Optimal for the extraction of sugar chains and various hydrophilic acidic and basic compounds by HILIC mode.

MonoSpin TiO



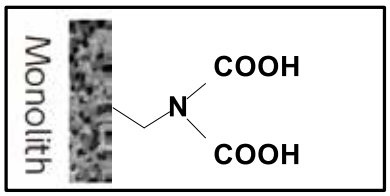
Formats : S

Monolith skeleton coated with titanium dioxide. Excellent for the enrichment of phosphopeptides.

S : Small Type L : Large Type 96 : 96-well plate

Product Lineup

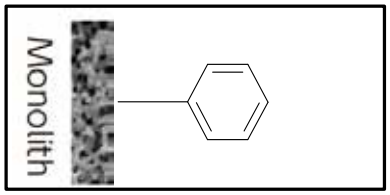
MonoSpin ME



Formats : S L

Bonded with iminodiacetic acid. Optimal for the recovery of trace metals.

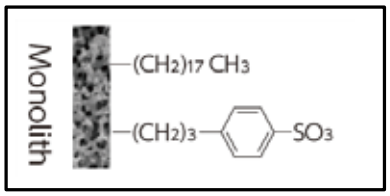
MonoSpin Ph



Formats : S

Phenyl functional group. Optimal for the recovery of hydrophobic drugs in biological samples due to its weak retentivity and different selectivity compared to a C18 phase.

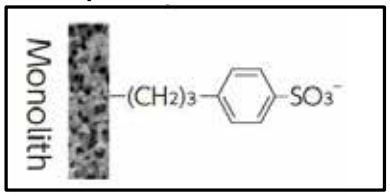
MonoSpin C18-CX



Formats : S 96

Bonded with octadecyl and benzene sulfonic acid combining both ion exchange & hydrophobic interaction. Optimal for dissociated basic drug in biological samples. Delivers higher cleanup efficiency compared to C18 or SCX.

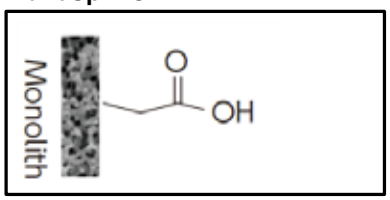
MonoSpin SCX



Formats : S L 96

Bonded with benzenesulfonic acid combining both strong cation exchange & hydrophobic interaction. Optimal for the extraction of basic drugs.

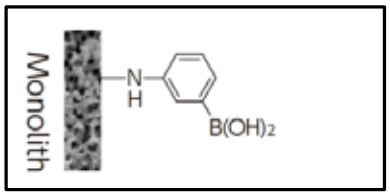
MonoSpin CBA



Formats : S L 96

Bonded with carboxyl acid combining both weak cation exchange. Optimal for the extraction of basic drugs.

MonoSpin PBA



Formats : S 96

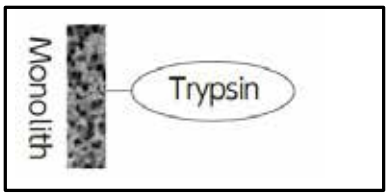
Specific column combined with phenyl boric acid. Excellent for the selective extraction of cis diol compounds, such as catechol amines.

S : Small Type L : Large Type 96 : 96-well plate

Sample Preparation for LC/MS

Product Lineup

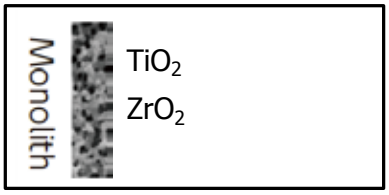
MonoSpin Trypsin



Formats : S

Immobilized trypsin is available for performing rapid and efficient tryptic digests of proteins.

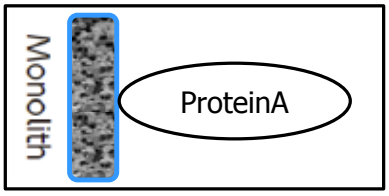
MonoSpin Phospholipid



Formats : S L

Monolith skeleton coated with TiO_2 and ZrO_2. Excellent for the adsorption and removal of phospholipids.

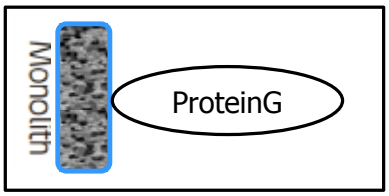
MonoSpin ProA



Formats : S 96

Protein A immobilized affinity spin column for the rapid purification of antibodies.

MonoSpin ProG



Formats : S 96

Protein G immobilized affinity spin column for the rapid purification of antibodies.

S : Small Type L : Large Type 96 : 96-well plate

Physical Properties

Product	Stationary Phases	S Type (Small)		L Type (Large)		Surface Area	Sample Loading Capacity (Small Type)	Filter
		Through-pore	Meso-pore	Through-pore	Meso-pore			
MonoSpin C18	Octadecyl	5 µm	10 nm	10 µm	10 nm	350 m^2/g	100 µg (Amitriptyline)	None
MonoSpin C18 FF	Octadecyl	20 µm	15 nm	–	–	300 m^2/g	50 µg (Amitriptyline)	
MonoSpin Ph	Phenyl	5 µm	10 nm	–	–	350 m^2/g	100 µg (Amitriptyline)	
MonoSpin C18-AX	Octadecyl, Trimethylaminopropyl	5 µm	10 nm	–	–	350 m^2/g	100 µg (Ibuprofen)	
MonoSpin C18-CX	Octadecyl, Benzenesulfonic acid	5 µm	10 nm	–	–	350 m^2/g	100 µg (Amitriptyline)	
MonoSpin SAX	Trimethylaminopropyl	5 µm	10 nm	10 µm	10 nm	350 m^2/g	100 µg (Ibuprofen)	
MonoSpin SCX	Benzenesulfonic acid	5 µm	10 nm	10 µm	10 nm	350 m^2/g	100 µg (Amitriptyline)	
MonoSpin NH2	Aminopropyl	5 µm	10 nm	10 µm	10 nm	350 m^2/g	100 µg (Maltopentaose)	
MonoSpin CBA	Carboxyl	5 µm	10 nm	10 µm	10 nm	350 m^2/g	100 µg (Amitriptyline)	
MonoSpin Amide	Amide	5 µm	10 nm	–	–	350 m^2/g	100 µg (Angiotensin II)	
MonoSpin PBA	Phenyl boric acid	5 µm	10 nm	–	–	350 m^2/g	100 µg (Dopamine)	
MonoSpin TiO	Titanium dioxide	20 µm	15 nm	–	–	200 m^2/g	40 µg (Adenosine monophosphate)	
MonoSpin Trypsin	TPCK treated Trypsin	5 µm	10 nm	–	–	100 m^2/g	–	
MonoSpin ME	Iminodiacetic acid	5 µm	10 nm	10 µm	10 nm	350 m^2/g	25 µg (Cu ion)	
MonoSpin Phospholipid	TiO_2 + ZrO_2	5 µm	10 nm	10 µm	10 nm	350 m^2/g	10 µL (Human serum)	
MonoSpin ProA	Protein A	2 µm	60 nm	–	–	–	400 µg (Human IgG)	
MonoSpin ProG	Protein G	2 µm	60 nm	–	–	–	400 µg (Human IgG)	

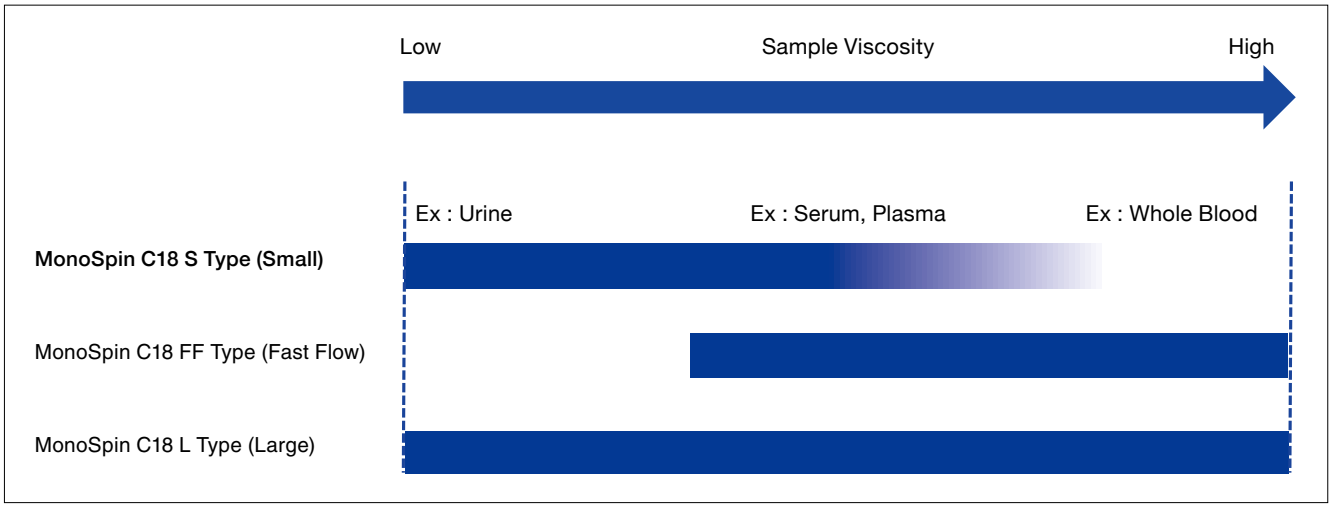
Specifications

Description	MonoSpin S Type*1	MonoSpin FF*2	MonoSpin L Type	MonoSpin 96 Well-Plate
Disc Size	4.2 O.D. x 1.5 mm	4.2 O.D. x 1.5 mm	9 O.D. x 3 mm	4.2 O.D. x 1.5 mm
Sample Volume	50 ~ 800 µL	50 ~ 800 µL	0.5 ~ 8 mL	~ 800 µL
Elution Volume	50 ~ 800 µL	50 ~ 800 µL	0.5 ~ 8 mL	100 ~ 800 µL
Centrifugation Speed	2,000 ~ 10,000 x *g*	1,000 x *g*	1,000 x *g*	1,000 ~ 5,000 x *g*
Sample Loading Capacity	100 µg	50 µg	1 mg	

Sample Preparation for LC / MS

Appropriate for Various Viscosity Samples

MonoSpin series are ideal for the sample preparation of biological samples. MonoSpin C18 Fast Flow (FF) type is excellent for high viscosity biological samples. Select the appropriate MonoSpin column type depending on the viscosity of sample and volume.



MonoSpin Applications

The low-pressure, high-flow, and low-liquid-retention properties of GL Sciences' monolith silica technology make it uniquely suited for handling of small samples. MonoSpin SPE centrifugal spin columns have been developed to improve concentration and yields in low-volume sample preparation with no need for evaporation or reconstitution.

Purification and Enrichment of Trace Samples

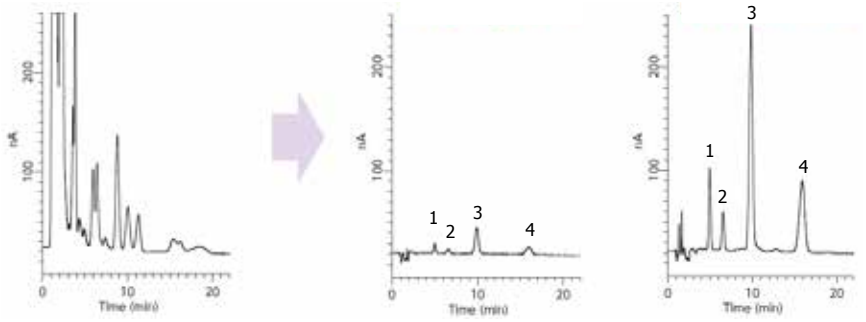
Without MonoSpin PBA

Purification using MonoSpin PBA S Type (Small)

Sample Volume : 500 µL

Elution Volume : 500 µL

Elution Volume : 50 µL
(10-fold concentration)



Conditions

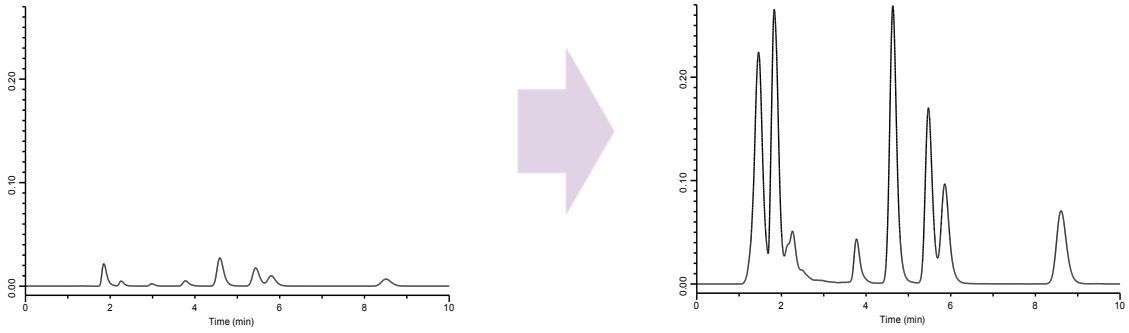
Column : Inertsil ODS-3
(5 µm, 150 mm x 2.1 mm I.D.)
Eluent : 50 mM Phosphate
buffer (pH 5.6)
50 mg/L EDTA
600 mg/L IPCC-008
-10 % Methanol
Flow Rate : 0.3 mL/min
Col.Temp. : 35 °C
Injection : 5 µL
Detection : ECD Pulse Mode
Sample : 1. Noradrenaline
2. Adrenaline
3. DHBA
4. Dopamine

Without MonoSpin C18

Purification of Serum using MonoSpin C18 L Type (Large)

Sample Volume : 5000 µL

Elution Volume : 500 µL
(10-fold concentration)



5000 µL serum sample was purified with MonoSpin C18 and enriched by 500 µL.

Conditions

Column : Inertsil ODS-3 (5 µm, 150 x 4.6 mm I.D.)
Eluent : CH_3CN/3 mM KH_2PO_4, 27 mM SDS = 48 = 52
Flow Rate : 1.0 mL/min
Col.Temp : 40 °C
Injection Vol. : 1 µL
Detection : 230 nm

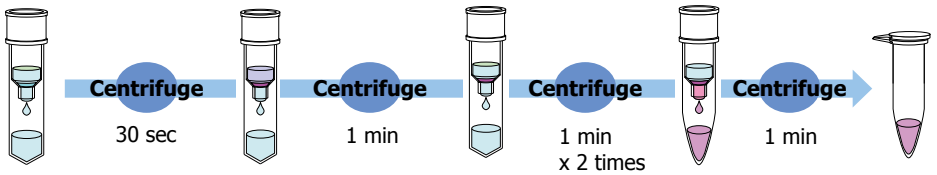
Sample Preparation for LC/MS

Purification of Amphetamine in Urine using MonoSpin C18

Sample Preparation

800 µL sample solution mixed with 400 µL urine and 400 µL buffer solution (pH 13.0).

Centrifugation
Speed : 5,000 x g



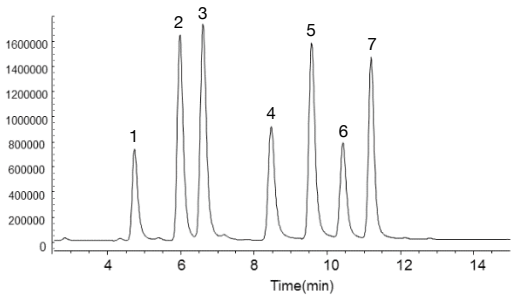
1. Conditioning
Add 100 µL methanol
↓ Centrifuge
Add 300 µL buffer
Solution (pH 13.0)

2. Adsorption
Add 800 µL
sample solution

3. Rinsing
Add 300 µL
buffer solution
(pH 13.0)

4. Elution
Add 100 µL
0.1 % formic
acid-methanol
(1 : 1, v/v)

Purified Sample



※ Data provided from Hiroshima University, Dr. Namera

Conditions

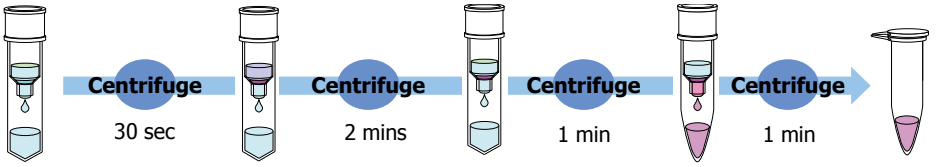
Column : InertSustainSwift C18 (3 µm, 150 x 2.1 mm I.D.)
Eluent : A) 10 mM Ammonium acetate-Formic acid (pH 3.3)
B) CH_3OH
A/B = 90/10 - 2 min - 90/10 - 13 min - 70/30, v/v
Flow Rate : 0.3 mL/min
Col. Temp. : 40 °C
Detection : LC/MS
Sample : 1. Norephedrine
2. Ephedrine
3. Methylephedrine
4. Amphetamine
5. Methamphetamine
6. 3, 4-methylenedioxyamphetamine
7. 3, 4-methylenedioxymethamphetamine

Recovery of Drugs in Serum using MonoSpin C18

Sample Preparation

600 µL sample solution mixed with 200 µL serum and 400 µL 10 mM potassium phosphate buffer solution (pH 7.0).

Centrifugation
Speed : 2,300 x g



1. Conditioning
Add 300 µL methanol
↓ Centrifuge
Add 300 µL 10 mM
potassium
phosphate (pH 7.0)

2. Adsorption
Add 600 µL
sample solution

3. Rinsing
Add 300 µL
water

4. Elution
Add 200 µL
acetonitrile

Purified Sample

Reproducibility study for drugs in serum sample for three days using MonoSpin C18 (n=10)
MonoSpin demonstrated high reproducibility for purification of drugs.

Sample	Con.	Rec.	RSD
Desipramine	5 ng/mL	91.2 %	4.8 %
	10 ng/mL	86.1 %	3.3 %
	50 ng/mL	85.2 %	5.9 %
	250 ng/mL	88.4 %	6.5 %
Imipramine	5 ng/mL	96.3 %	9.5 %
	10 ng/mL	95.8 %	1.5 %
	50 ng/mL	94.5 %	0.9 %
	250 ng/mL	95.9 %	0.9 %
Fluvoxamine	5 ng/mL	96.8 %	11.6 %
	10 ng/mL	87.1 %	5.0 %
	50 ng/mL	86.8 %	8.1 %
	250 ng/mL	87.5 %	9.7 %

Sample	Con.	Rec.	RSD
Paroxetine	5 ng/mL	83.7 %	3.9 %
	10 ng/mL	84.1 %	7.8 %
	50 ng/mL	83.9 %	8.2 %
	250 ng/mL	86.7 %	7.5 %
Maprotiline	5 ng/mL	85.7 %	8.1 %
	10 ng/mL	84.7 %	3.2 %
	50 ng/mL	88.6 %	5.4 %
	250 ng/mL	87.5 %	7.7 %
Duloxetine	5 ng/mL	106.3 %	9.9 %
	10 ng/mL	104.8 %	6.7 %
	50 ng/mL	99.8 %	8.7 %
	250 ng/mL	99.8 %	6.0 %

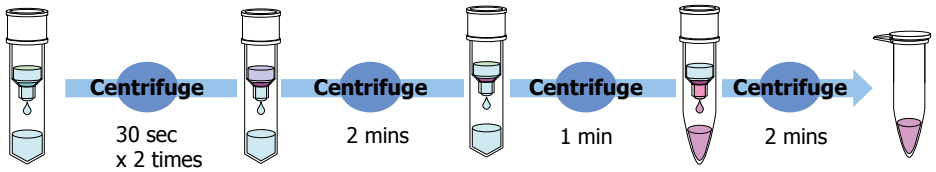
Sample	Con.	Rec.	RSD
Amitriptyline	5 ng/mL	83.7 %	7.0 %
	10 ng/mL	81.8 %	2.8 %
	50 ng/mL	83.8 %	3.0 %
	250 ng/mL	88.4 %	2.7 %
Sulpiride	5 ng/mL	97.9 %	9.0 %
	10 ng/mL	95.5 %	8.5 %
	50 ng/mL	90.8 %	2.6 %
	250 ng/mL	92.6 %	3.0 %

Desalting of Protein Digests using MonoSpin C18

Sample Preparation

800 µL sample solution : Add TFA to tryptic digest sample and adjust the TFA final concentration to 0.1 %.

Centrifugation
Speed : 2,300 x g



1. Conditioning
Add 200 µL acetonitrile
↓ Centrifuge
Add 200 µL 0.1 % TFA aqueous solution

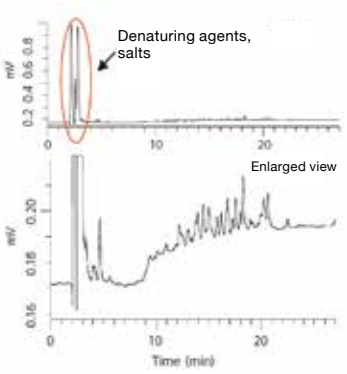
2. Adsorption
Add 800 µL sample solution

3. Rinsing
Add 200 µL 0.1 % TFA aqueous solution

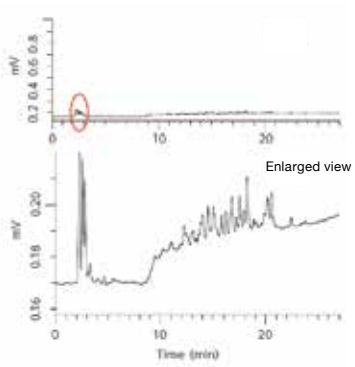
4. Elution
Add 200 µL 60 % acetonitrile

Desalted Sample

Without MonoSpin C18



Desalting using MonoSpin C18



Conditions

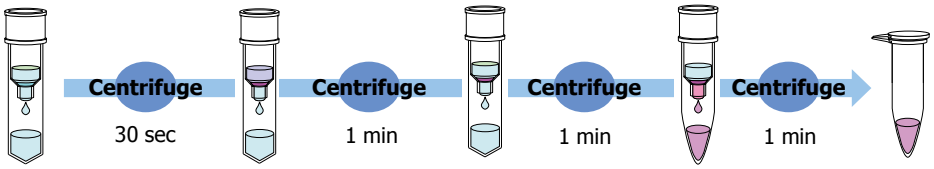
Column	: Inertsil ODS-3 (3 µm, 150 x 2.1 mm I.D.)
Eluent	: A) H_2O (0.1 % TFA) B) Acetonitrile (0.1 % TFA) A/B = 90/10 - 20 min - 50/50
Flow Rate	: UV 210 nm
Col. Temp.	: 0.2 mL/min
Detection	: 40 °C
Sample	: Digested BSA 2 µL

Recovery of Hormone in Serum using MonoSpin C18

Sample Preparation

Add 20 µL of 1 mg/mL of Adrenomedullin to 190 µL of serum. Add 0.1 % TFA to the serum solution and centrifuge at 10,000 x g for 1 min. Take the supernatant.

Centrifugation
Speed : 2,300 x g



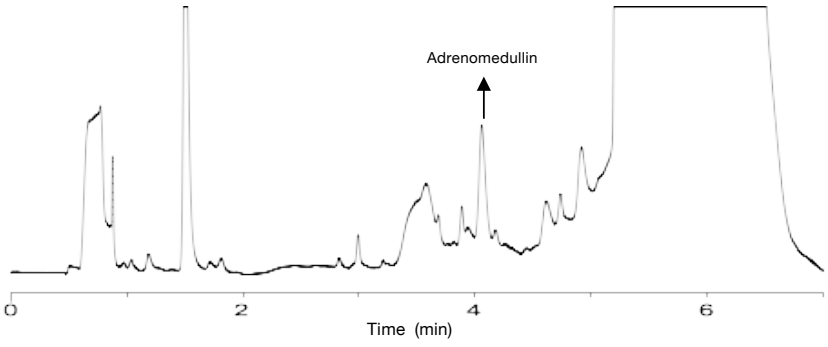
1. Conditioning
Add 200 µL acetonitrile
↓ Centrifuge
Add 200 µL 0.1 % TFA aqueous solution

2. Adsorption
Add 400 µL sample solution

3. Rinsing
Add 200 µL 0.1 % TFA aqueous solution

4. Elution
Add 200 µL 0.1 % TFA in 60 % acetonitrile

Purified Sample



Conditions

Column	: InertSustain C18
	: (2 µm, 50 x 2.1 mm I.D.)
Eluent	: A) 0.1 % TFA in H_2O B) 0.1 % TFA in Acetonitrile A/B = 85/15 – 5 min – 50/50 - 2 min - 50/50
Flow Rate	: 200 µL/min
Col. Temp.	: 40 °C
Detection	: UV 210 nm
Injection Vol.	: 10 µL

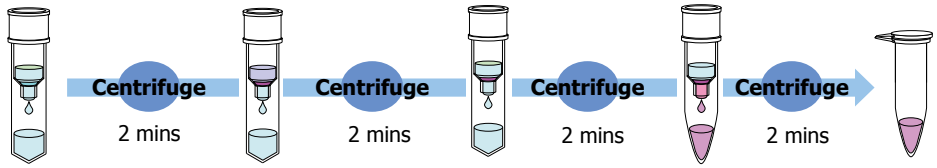
Sample Preparation for LC/MS

Purification of Whole Blood using MonoSpin C18 FF (Fast Flow)

Sample Preparation

Mix 0.3 mL whole blood and 1.2 mL 300 mM phosphate buffer (pH 10). Centrifuge at 12,100 x g for 5 mins and take the supernatant.

Centrifugation Speed : 1,000 x g



1. Conditioning
Add 300 µL methanol
↓ Centrifuge
Add 300 µL 300 mM phosphate buffer (pH 10)

2. Adsorption
Add 1 mL supernatant sample solution

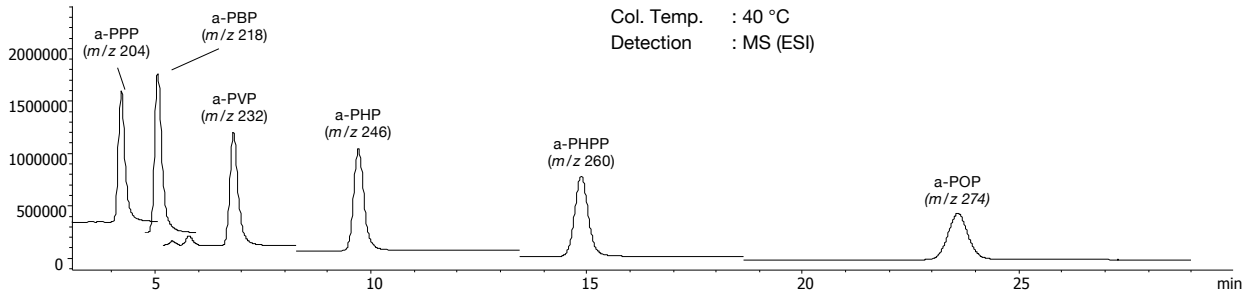
3. Rinsing
Add 300 µL 300 mM phosphate buffer (pH 10)

4. Elution
Add 100 µL methanol

Purified Sample

Conditions

Column : InertSustain Phenyl (3 µm, 150 x 2.1 mm I.D.)
Eluent : acetonitrile-$HCOONH_4$ (10 mM, 0.1 % HCOOH) = 25:75 (v/v)
Flow Rate : 0.2 mL/min
Col. Temp. : 40 °C
Detection : MS (ESI)



Features of MonoSpin C18 FF (Fast Flow)

MonoSpin C18 FF is ideal for high viscosity samples, such as whole blood and complex matrix samples.

Specification

Through-pore	20 µm
Meso-pore	15 nm
Disc Size	4.2 O.D. x 1.5 mm
Sample Volume	50 ~ 800 µL
Elution Volume	50 ~ 800 µL
Centrifugation Speed	Under 1,000 x *g*
Sample Loading Capacity	50 µg (Amitriptyline)

MonoSpin C18 FF offer fast flow of viscosity samples at a low centrifugation speed (1,000 x g).
The following is a comparison of flow of solvents between MonoSpin C18 and MonoSpin C18 FF.

Solvents	Volume	MonoSpin C18	MonoSpin C18 FF
Methanol	500 µL	○	○
Water	500 µL	400 µL	○
Serum*	500 µL	300 µL	○

Testing Conditions

1,000 x *g* 30 sec

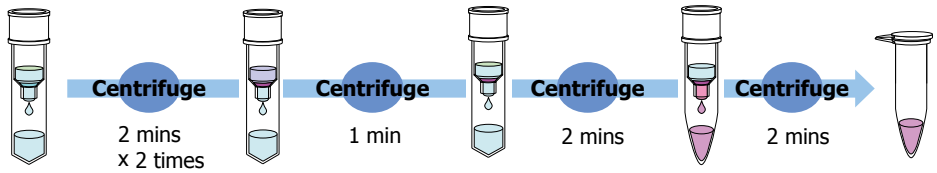
* A supernatant from serum sample was used, and was centrifuged at 10, 000 x g for 1 min.

Purification of Pyridylaminated (PA) Sugar Chain using MonoSpin NH2

Sample Preparation

800 µL sample solution : Add acetonitrile to PA sugar chain sample solution and adjust the acetonitrile final concentration from 90 to 95 %.

Centrifugation
Speed : 2,300 x g



1. Conditioning
Add 500 µL solution mixed with 250 µL 0.1 % formic acid* in water and 250 µL 0.1 % formic acid in acetonitrile
↓ Centrifuge
Add 500 µL solution mixed with 50 µL 0.1 % formic acid* in water and 450 µL 0.1 % formic acid in acetonitrile

2. Adsorption
Add 800 µL sample solution

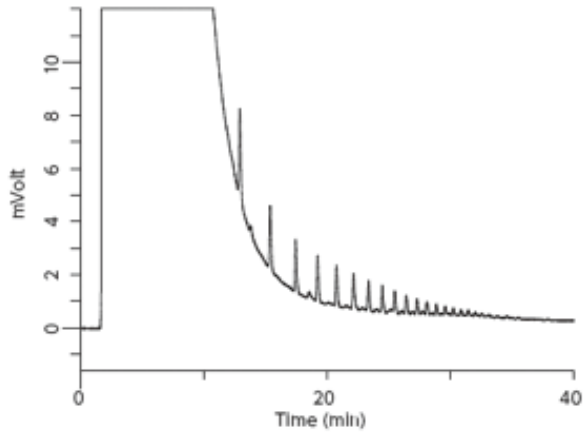
3. Rinsing
Add 500 µL solution mixed with 50 µL 0.1 % formic acid* in water and 450 µL 0.1 % formic acid in acetonitrile

4. Elution
Add 50-800 µL 0.1 % formic acid in 50 % acetonitrile

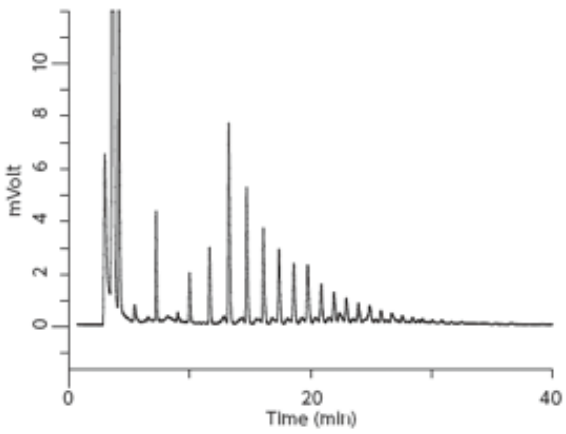
Purified Sample

* Acetic acid or TFA can also be used as an alternative to formic acid.

Without MonoSpin NH2



Purification of PA using MonoSpin NH2



Conditions

Column	: NH_2 Column (5 µm, 250 x 4.6 mm I.D.)
Eluent	: A) H_2O/Acetonitrile = 5/95 0.1 % Formic acid B) H_2O/Acetonitrile = 95/5 0.1 % Formic acid A/B = 90/10-10 min-90/10-40 min-60/40
Flow Rate	: 1 mL/min
Detection	: FL Em 320 nm, Ex 400 nm
Injection Vol.	: 1.5 µL

Purified PA sugar chain by HILIC mode.
MonoSpin NH2 additionally removes residual fluorescent labeling reagents.

Sample Preparation for LC/MS

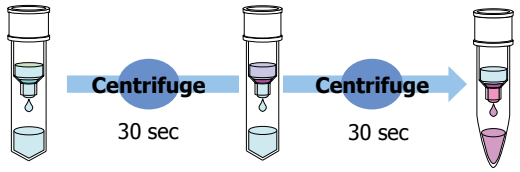
Fractionation of Protein Digests using MonoSpin SCX

MonoSpin SCX provide a rapid and easy fractionation of peptides by stepwise elution using buffers with various salt concentration.

Sample Preparation

500 µL sample solution : First, desalt the peptide solution using MonoSpin C18. Then, dissolve the desalted sample solution with 0.1 % formic acd.

Centrifugation
Speed : 10,000 x g

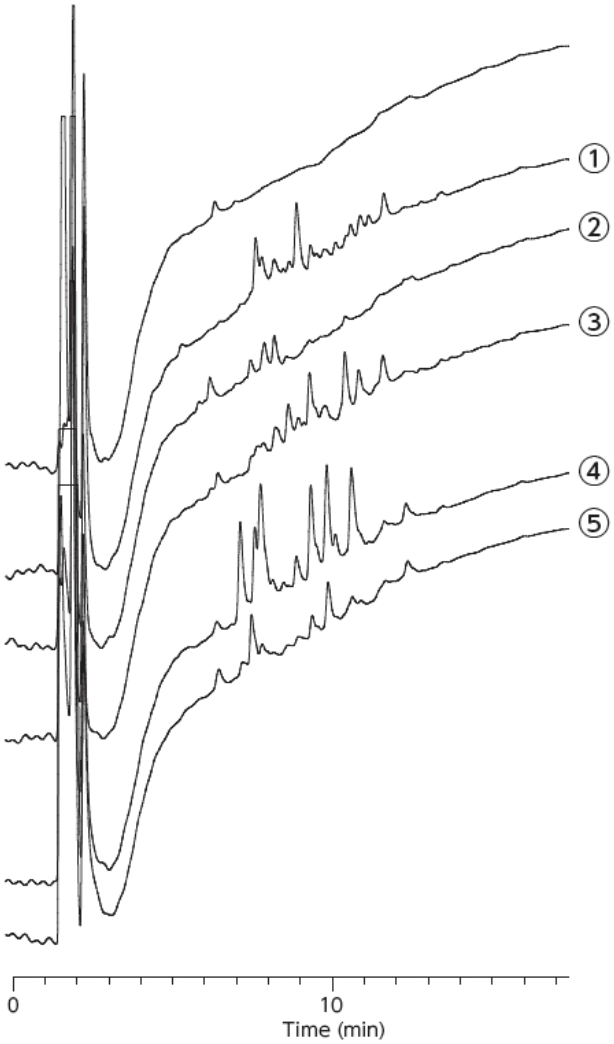


1. Conditioning
Add 300 µL 0.1 % formic acid

2. Adsorption
Add 500 µL peptide sample solution

3. Elution

Sample solution in 0.1 % formic acid



Always replace and attach a new recovery tube whenever adding a new elution buffer

Details of each elution buffer

① 25 mM $HCOONH_4$	200 µL
② 50 mM $HCOONH_4$	200 µL
③ 100 mM $HCOONH_4$	200 µL
④ 500 mM $HCOONH_4$	200 µL
⑤ 1 M $HCOONH_4$	200 µL

* Each elution buffer contains 10 % acetonitrile

Conditions

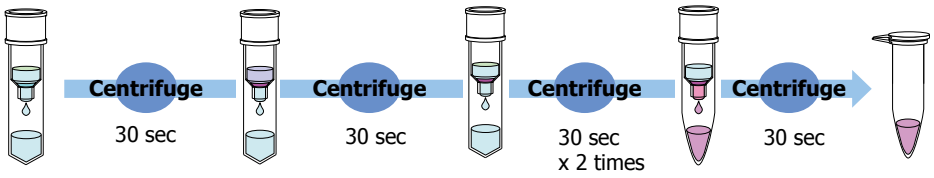
Column : Inertsil ODS-3 (3 µm, 2.1 x 150 mm)
Eluent : A) H_2O (0.1 % HCOOH)
B) Acetonitrile (0.1 % HCOOH)
A/B = 90/10 - 20 min - 50/50
Detection : UV 210 nm
Flow Rate : 0.2 mL/min
Col. Temp. : 40 °C
Injection Vol. : 2 µL

Purification of Paraquat and Diquat using MonoSpin CBA

Sample Preparation

600 µL sample solution :
Add 200 µL urine and and 400 µL 10 mM potassium phosphate buffer (pH 7.0)

Centrifugation
Speed : 10,000 x g



1. Conditioning
Add 200 µL 10 mM potassium phosphate buffer (pH 7.0)

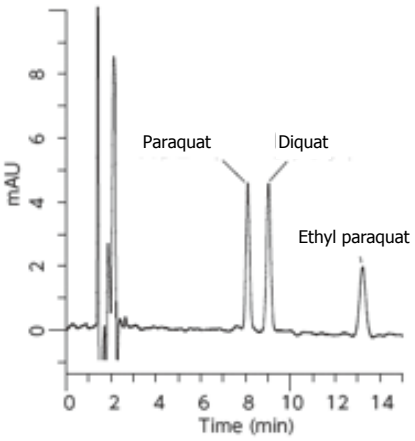
2. Adsorption
Add 600 µL sample solution

3. Rinsing
Add 200 µL 10 mM potassium phosphate buffer (pH 7.0)

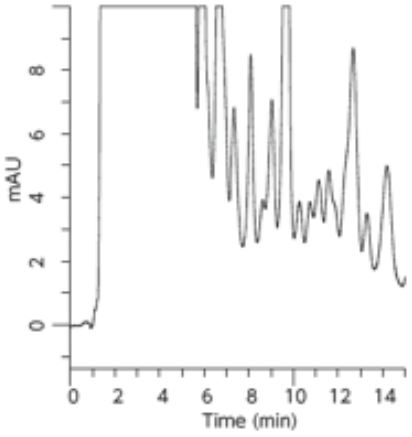
4. Elution
Add 200 µL solution mixed 1 % HCL, 30 % methanol and 69 % water

Purified Sample

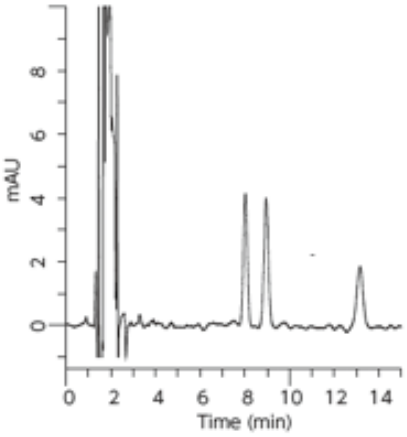
Standard Solution (1 µg/mL)



Urine + Pesticide (1 µg/mL)



Purification using MonoSpin CBA



MonoSpin CBA deliver highly efficient purification of strong basic pesticides such as Paraquat and Diquat.

Conditions

Column	: Inertsil ODS-3 (5 µm, 150 mm x 4.6 mm I.D.)
Eluent	: 0.2 M phosphoric acid, 0.1 M diethyl amine, 7.5 mM IPCC08 (IPCC-0.8, Sodium 1-Octanesulfonate) /Acetonitrile = 89/11
Flow Rate	: 1 mL/min
Col.Temp.	: 40 °C
Detection	: PDA 290 nm
Injection Vol.	: 50 µL

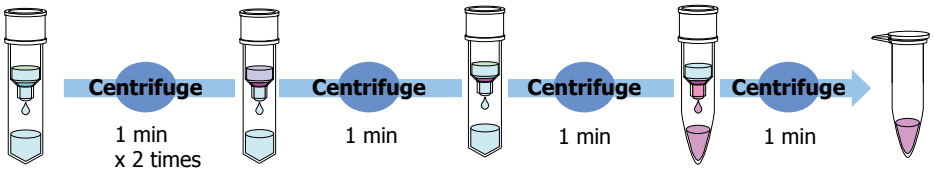
Sample Preparation for LC/MS

Purification of Catecholamines using MonoSpin PBA

Sample Preparation

250 µL sample solution :
Add 200 µL urine or serum and 50 µL 1 M potassium phosphate buffer (pH 8.0 adjust using phosphoric acid)

Centrifugation
Speed : 10,000 x g



1. Conditioning
Add 200 µL 1 % acetic acid
↓ Centrifuge
Add 200 µL 100 mM potassium phosphate buffer (pH 8.0)

2. Adsorption
Add 250 µL sample solution

3. Rinsing
Add 200 µL 100 mM potassium phosphate buffer (pH 8.0)

4. Elution
Add 200 µL 1 % acetic acid

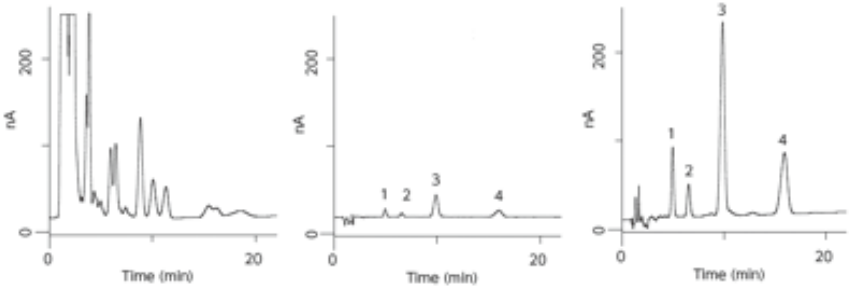
Purified Sample

Without MonoSpin PBA

Purification using MonoSpin PBA

500 µL elution

50 µL elution



Conditions

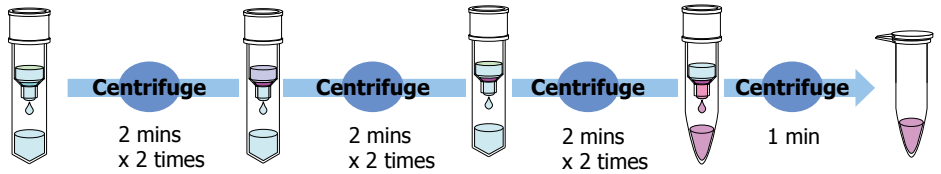
Column : Inertsil ODS-3 (5 µm, 150 mm x 2.1 mm I.D.)
Eluent : 50 mM Phosphate buffer (pH 5.6)
50 mg/L EDTA
600 mg/L IPCC-008
-10 % Methanol
Flow Rate : 0.3 mL/min
Col.Temp. : 35 °C
Injection : 5 µL
Detection : ECD Pulse Mode
Sample : 1. Noradrenaline
2. Adrenaline
3. DHBA
4. Dopamine

Purification of Organic Phosphorous Pesticides in Serum using MonoSpin TiO

Sample Preparation

50 µL sample solution :
Add 10 µL serum sample and 40 µL water

Centrifugation
Speed : 5,200 x g



1. Conditioning
Add 20 µL 0.1 % TFA in 80 % acetonitrile
↓ Centrifuge
Add 20 µL 0.1 % TFA in 50 % acetonitrile

2. Adsorption
Add 50 µL sample solution
↓ Centrifuge
Collect the eluate from the recovery tube & attach a new recovery tube. Then, applythe eluate to MonoSpin TiO again.

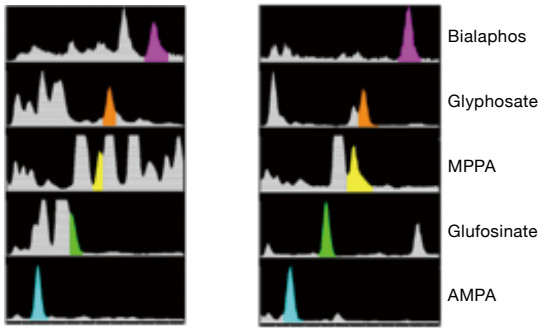
3. Rinsing
Add 20 µL 0.1 % TFA in 50 % acetonitrile
↓ Centrifuge
Add 20 µL 0.1 % TFA in 50 % acetonitrile

4. Elution
Add 50 µL 2 % ammonia aqueous solution

Purified Sample
Derivatize the purified sample with N-Acetyl-O-methyl and then inject to LC/MS

Without MonoSpin PBA

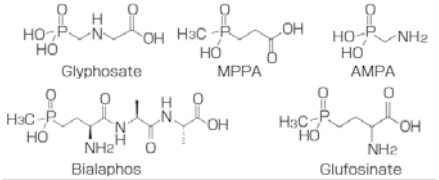
Purification using MonoSpin TiO



Conditions

Column : ODS (150 mm x 2.1 mm I.D.)
Eluent : CH_3OH/20 mM HCO_2NH_4 (pH 3.0) = 15/85
Flow Rate : 200 µL/min
Injection : 5 µL
Detection : SIM

Sample : 1. Bialaphos
2. Glyphosate
3. MPPA
4. Glufosinate
5. AMPA
(1 ppm each)



Rapid Digestion of BSA using MonoSpin Trypsin

Example of Reduction and Alkylation Protocol

1 mg Bovine serum albumin

---- Add 175 µL 500 mM Tris-HCL (pH 8.0) and 8 M urea (Solution 1).

----- Add 25 µL 40 mg/mL dithiothreitol in Solution 1.

----- Incubation at 37 °C for 90 mins

----- Add 50 µL 40 mg/mL iodoacetoamide in Solution 1.

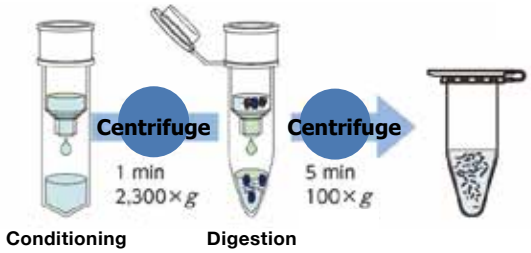
----- Incubation at 37 °C for 30 mins without exposure to light.

250 µL Reduced and alkylated protein

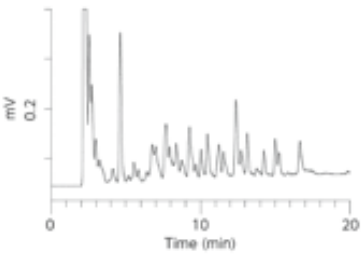
----- Add 50 mM ammonium bicarbonate to make the urea final concentration to 2 M and dilute it to 750 µL

MonoSpin Trypsin

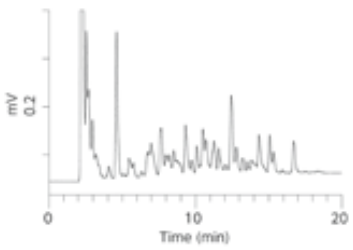
The protocol above is just an example.
Optimize the protocol of preparation of reduced and Alkylated sample depending on the types of proteins.



Incubation at 37 °C
for 10 hours



Protein Digestion at 25 °C for 10 minutes using MonoSpin Trypsin



Conditions

Column	: Inertsil ODS-3 (3 µm, 150 x 2.1 mm I.D.)
Eluent	: A) H_2O (0.1 % HCOOH) B) Acetonitrile (0.1 % HCOOH) A/B = 90/10 - 20 min - 50/50
Flow Rate	: UV 210 nm
Col.Temp.	: 0.2 mL/min
Detection	: 40 °C
Sample	: Digested BSA 2 µL

MonoSpin Trypsin provide rapid and efficient protein digestion at room temperature in 10 mins.

Sample Preparation for LC/MS

List of References

Products	Target Analytes	Sample Matrix	Concentration	Recovery Rate	Detection	Reference No.
MonoSpin C18	amitraz, metabolites	serum	5 ng/mL	95.5, 92.2 %	LC–MS	[1]
	dibudcaine, naphazoline	serum	5 – 10 ng/mL	70.2 – 78.6 %	LC–MS	[2]
	MA, AP, MDA, MDMA	urine	100 ng/mL	96 – 111 %	LC–UV	[3]
	9 cold medicines	serum	5 – 50 ng/mL	2.5 – 73.8 %	GC–MS	[4]
	amphetamines (AP, MA, MDA, MDMA)	urine	5 – 10 ng/mL	84 – 94 %	GC–MS	[5]
	eperison	serum	0.5 ng/mL	92.8 – 96.0 %	GC–MS	[6]
	paraquat, diquat, fenitrothion	serum, urine	25 – 100 ng/mL	51.3 – 106.1 %	GC–MS	[7]
	arsenics	urine	1 ng/mL	91.9 – 106.5 %	GC–MS	[8]
	MAM-2201	blood	1 ng/mL	–	LC–MS/MS	[9]
	a-PVP, a-PBP	urine	1 ng/mL	82 – 100 %	GC–MS	[10]
	a-PVP, a-PBP	hair	0.2 ng/mL	75.5 – 101.5 %	LC–MS	[11]
	Phthalic acid esters	physiological saline	0.2 – 50 µg/L	71.2 – 107.3 %	–	[12]
	<desalting>	digested peptides	–	–	–	[13]
	<desalting>	iTRAQ labeled samples	–	–	–	[14]
	MAM-2201	blood	2.5 – 100 ng/mL	1 ng/mL	–	[15]
	Naringin	grapefruit juice	10 – 500 µM	10 µM	–	[16]
MonoSpin SCX	opiates benzodiazepines, metabolites	urine serum	10 ng/mL 1 – 10 ng/mL	69.2 – 98.9 % 83.3 – 112.3 %	LC–MS	[17]
	<Pre-column fluorescence derivatization>	–	–	–	–	[18]
	<desalting of amino acid>	–	–	–	–	[19]
MonoSpin C18-CX	acidic and basic drugs	urine	1 – 25 ng/mL	65 – 123 %	GC–MS	[20]
	<halogenated compounds>	cells	–	–	–	[21]
MonoSpin C18-AX	amphetamines (AP, MA), opiates, THC	urine	2 – 10 ng/mL	93.1 – 108.1 %	GC–MS	[22]
MonoSpin PBA	Adenosine	urine	6 µM	80 – 113 %	–	[23]

[1] J. Chromatogr., B 867 (2008) 99-104.
[2] J. Chromatogr., B 872 (2008) 186-190.
[3] J. Chromatogr., A 1208 (2008) 71-75.
[4] Chromatographia., 70 (2009) 519-526.
[5] Anal. Chim. Acta., 661 (2010) 42-46.
[6] J. Health Sci., 56 (2010) 598-605.
[7] Anal. Bioanal. Chem., 400 (2011) 25-31.
[8] J. Sep. Sci., 35 (2012) 2506-2513.
[9] Forensic Toxicol., 31 (2013) 333-337.
[10] Forensic Toxicol., 32 (2014) 68-74.
[11] J. Chromatogr., B 942-943 (2013) 15-20.
[12] J Pharm Anal., 1 (2011) 92-99.
[13] Proteomics., 13 (2013) 751-755.
[14] Journal of proteomics., 84 (2013) 40-51.
[15] Forensic Toxicol., 31 (2013) 333-337.
[16] The Journal of Clinical Pharmacology., 54 (2013).
[17] J. AOAC Int., 94 (2011) 765-774.
[18] Biomed. Chromatogr., 26 (2012) 147-151.
[19] Orig Life Evol Bjosph., 43 (2013) 99-108.
[20] J. Sep. Sci., 34 (2011) 2232-2239.
[21] Toxicology., 314 (2013) 22-29.
[22] Forensic Toxicol., 31 (2013) 312-321.
[23] Biosensors and Bioelectronics., 41 (2013) 379-385.

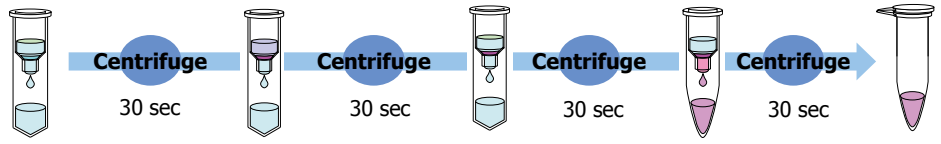
Recovery of Metal Ions using MonoSpin ME

MonoSpin ME is bonded with iminodiacetic acid and optimal for the recovery and purification of metal ions. Specifically, it is excellent for the extraction and purification of trace Pb in blood or urine. Additionally, it is appropriate for removing inorganic divalent cations from sample to prevent ion suppression for LC-MS/MS applications.

Sample Preparation

500 µL 25 µg/mL Cu^{2+}

Centrifugation
Speed : 3,000 x g



1. Conditioning
Add 200 µL water
↓ Centrifuge
Add 200 µL 2N-HNO_3
↓ Centrifuge
Add 400 µL
100 mM CH_3COONH_4
(pH 5.5)

2. Adsorption
Add 500 µL
25 µg/mL Cu^{2+}

3. Rinsing
Add 100 mM
CH_3COONH_4
(pH 5.5)

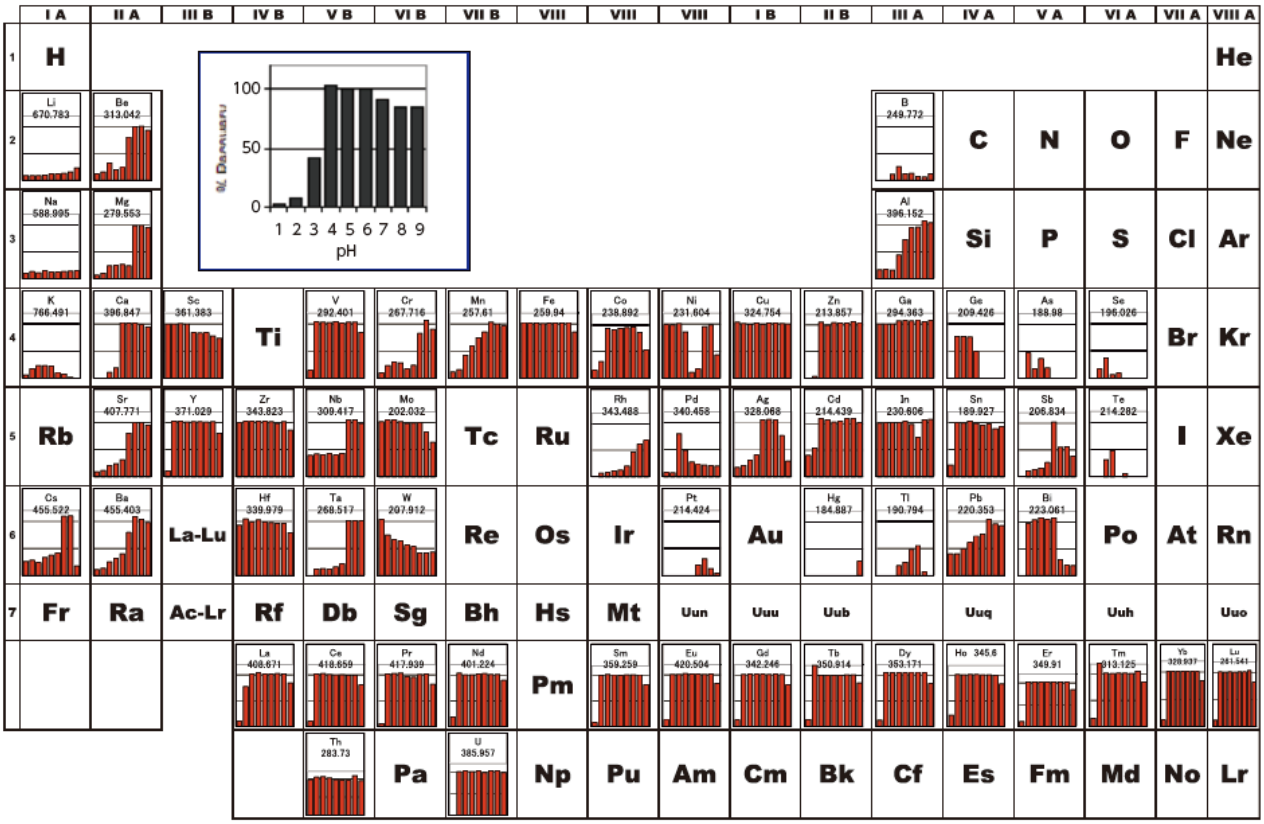
4. Elution
Add 500 µL
2N-HNO_3

Purified Sample

Recovery rate of Cu^{2+} using Zeeman GF-A-AF system

Number of Injections	Volume of solvent introduced	Recovery rate
1	0.8 mL	98 ± 4 %
2	1.6 mL	97 ± 5 %
3	2.4 mL	95 ± 5 %
4	3.2 mL	95 ± 5 %
5	4 mL	94 ± 3 %

Retention Characteristics of Metal Element using Iminodiacetic Acid Functional Groups with Various pH



Sample Preparation for LC/MS

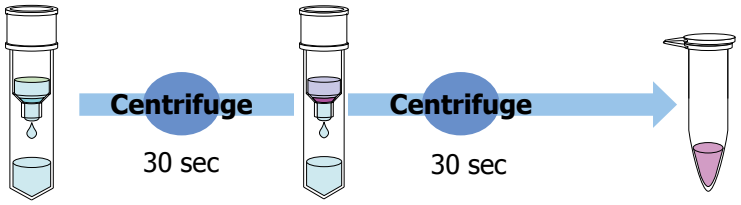
Removal of Phospholipids using MonoSpin Phospholipid

MonoSpin Phospholipid removes more than 90 % of phospholipids from biological samples resulting in eliminating ion suppression in LC-MS/MS analysis. The MonoSpin Phospholipid also removes phospholipids from a serum sample volume of 50 µL.

Sample Preparation

Mix 0.1 % formic acid in acetonitrile with serum (4 : 1) in 2 mL tube. Centrifuge at 10,000 x g for 30 sec. Take the supernatant.

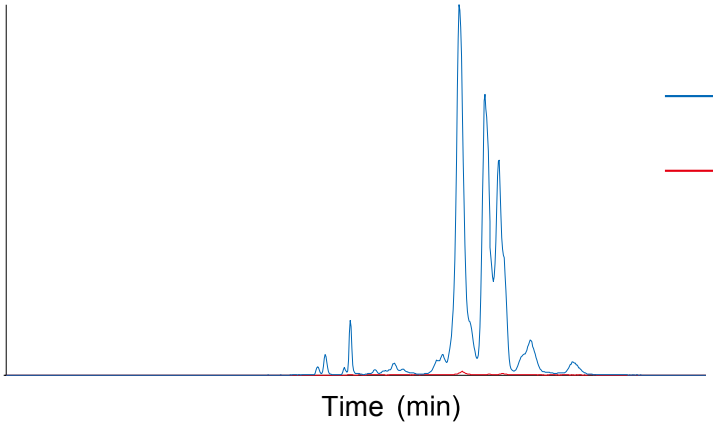
Centrifugation
Speed : 3,000 x g



1. Conditioning
Add 200 µL 0.1 % formic acid in acetonitrile
↓ Centrifuge
Add 200 µL 2N-HNO_3
↓ Centrifuge
Add 400 µL
100 mM CH_3COONH_4
(pH 5.5)

2. Adsorption
Add 500 µL sample solution

Phospholipid-free sample

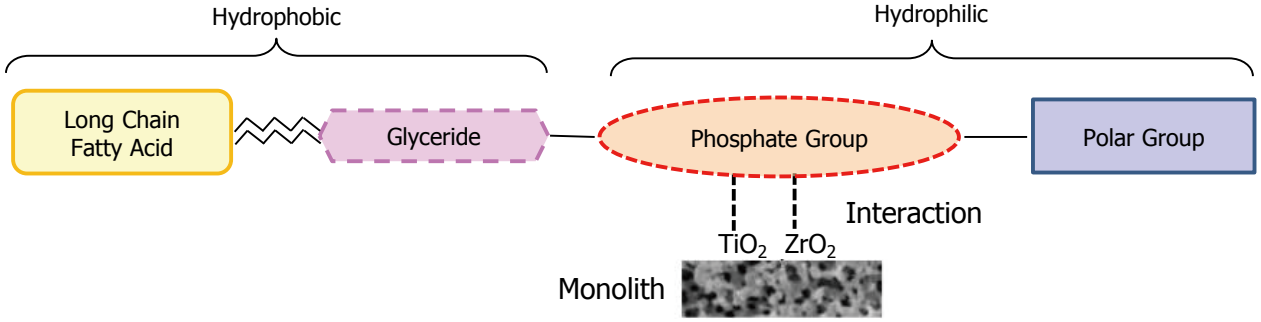


Phospholipid Removal Efficiency of MonoSpin Phospholipid

Retention Mechanism of Phospholipids

Monolith skeletal structure coated with TiO_2 and ZrO_2 selectively interacts with metal oxides and phosphorylated compounds, resulting in removing more than 90 % of phospholipids.

Structure of Phospholipids

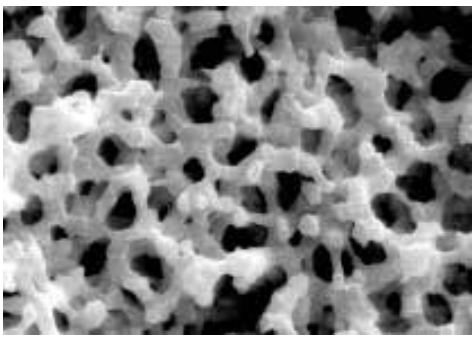


Rapid Purification of Antibodies using MonoSpin ProA and ProG

MonoSpin ProA and MonoSpin ProG are immobilized with protein A or protein G onto a silica monolith offering rapid purification of antibodies. A 96-well plate format is also available for high throughput purification.

Features

The silica is modified with a hydrophilic polymer and then immobilized with either Protein A or Protein G to prevent the adsorption of proteins, resulting in rapid purification and high recovery of antibodies.



Specification

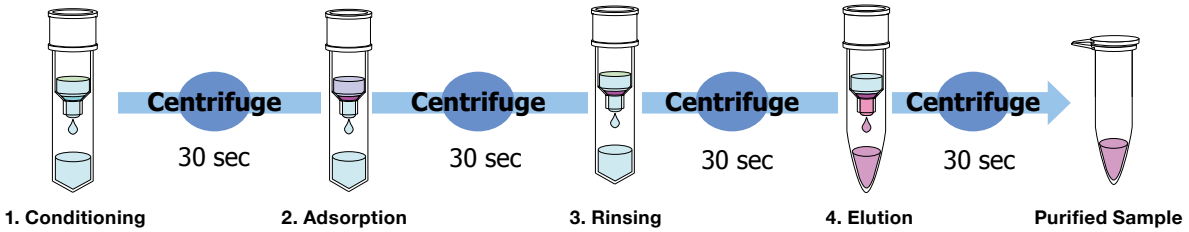
Bonded Phase	Protein A or Protein G
Through-pore	2 µm
Meso-pore Size	60 nm
Disc Size	4.6 O.D. x 1.5 mm
Sample Volume	50 - 500 µL
Recovery Rate	MonoSpin ProA : IgG 90 % (With 400 mg IgG)
	MonoSpin ProG : IgG 90 % (With 300 mg IgG)
Elution Volume	50 µL
Centrifugation speed	2,300 x *g*

Antibody Compatibility Table

Species	Antibody Class	Protein A	Protein G
Human	IgG	Excellent	Excellent
	IgG1	Excellent	Excellent
	IgG2	Excellent	Excellent
	IgG3	—	Excellent
	IgG4	Excellent	Excellent
	IgM	—	—
	IgA	—	—
	IgE	—	—
	IgD	—	—
	Fab	Good	Good
	ScFv	Good	—

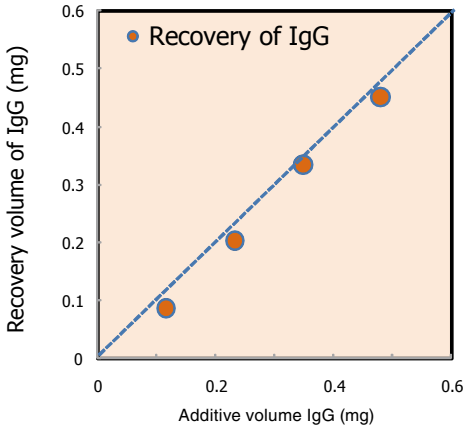
Sample Preparation for LC/MS

Purification of IgG in only Five Minutes using MonoSpin ProA and ProG

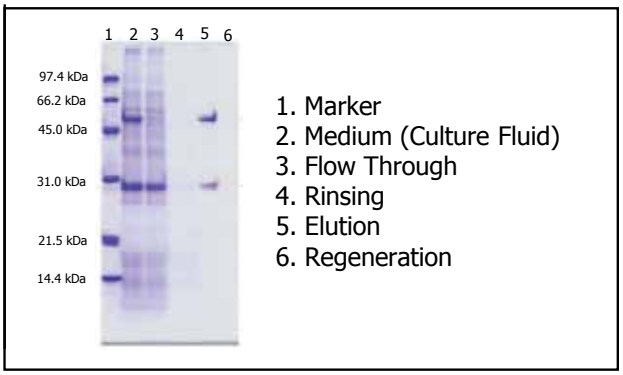


As shown below, the antibody concentrations were determined quantitatively from medium of CHO cells. The purified antibodies show very less impurities by the results from electrophoresis.

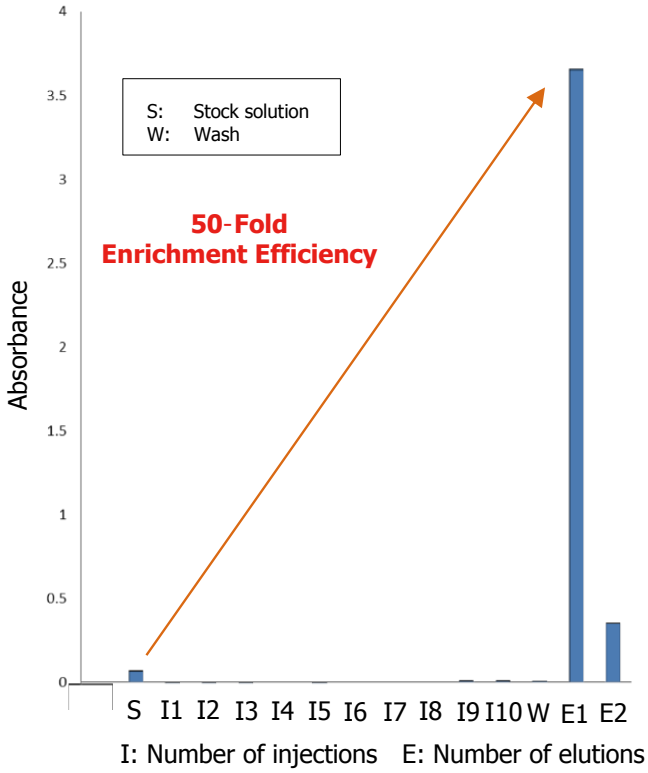
Calibration Curve of IgG Concentration



Results of Recovery by Electrophoresis



Enrichment of Antibody Solution using MonoSpin ProA



500 µL volume of 0.025 mg/mL of human IgG solution was applied to MonoSpin ProA spin column (ten consecutive times).
Then, the elution of IgG concentration was measured with 100 µL elution buffer twice (E1 and E2). The first IgG elution (E1) was 50-fold concentration of the stock solution and showed 90 % recovery of IgG without the loss of IgG.

Comparison of Elution Volume & Recovery Rate with other Brands' Products

MonoSpin ProA only requires 100 µL elution buffer, providing a recovery rate of at least 90 % IgG. On the other hand, other brands' products requires 400 µL of elution buffer with a recovery rate of 70 % IgG.

MonoSpin ProA

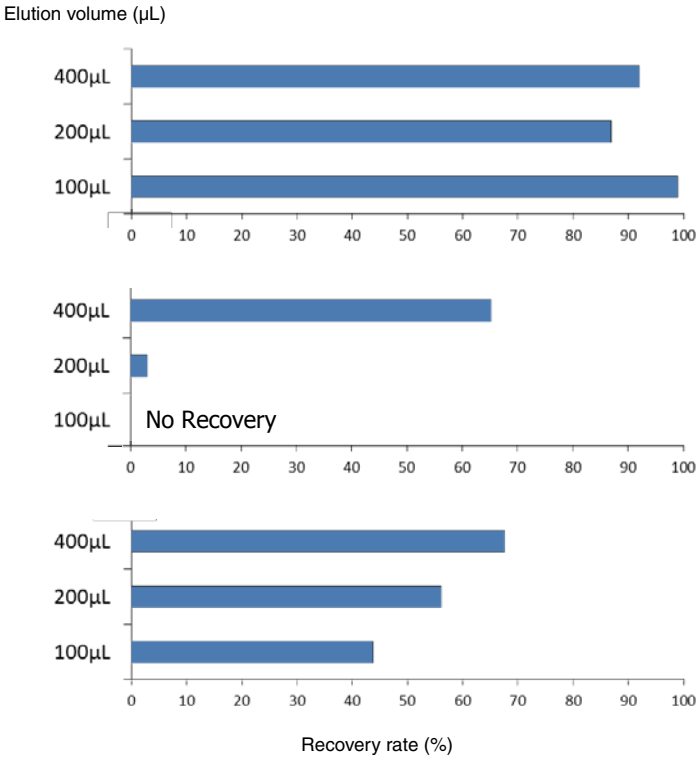
90 % recovery rate of IgG with 100 µL elution

Brand T's Product

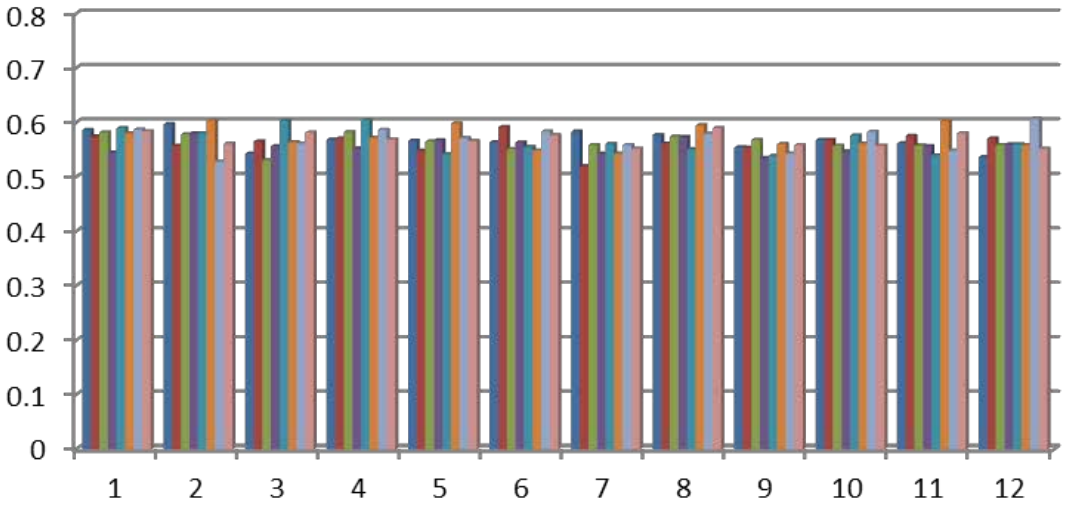
60-65 % recovery rate of IgG with 400 µL elution

Brand G's Product

65-70 % recovery rate of IgG with 400 µL elution



Recovery Rate and Reproducibility of IgG from medium cultured CHO cells with MonoSpin ProA 96-Well Plate



Sample volume : 150 mL
Elution volume : 150 mL
Recovery rate : 90 % (CV 3.1 %)
IgG concentration : 1.3 mg/mL

Sample Preparation for LC/MS

MonoSpin S Type (Small) Columns

・Each MonoSpin S Type (Small) columns are attached with 1.7 mL recovery tubes and 2.0 mL waste tubes.

Description	Qty.	Cat.No.
MonoSpin C18	50 pcs	5010-21700
	100 pcs	5010-21701
MonoSpin C18 FF	50 pcs	5010-21670
	100 pcs	5010-21671
MonoSpin Ph	50 pcs	5010-21733
	100 pcs	5010-21734
MonoSpin C18-AX	50 pcs	5010-21735
	100 pcs	5010-21736
MonoSpin C18-CX	50 pcs	5010-21731
	100 pcs	5010-21732
MonoSpin SAX	50 pcs	5010-21720
	100 pcs	5010-21721
MonoSpin SCX	50 pcs	5010-21725
	100 pcs	5010-21726
MonoSpin NH2	50 pcs	5010-21710
	100 pcs	5010-21711

Description	Qty.	Cat.No.
MonoSpin CBA	50 pcs	5010-21729
	100 pcs	5010-21730
MonoSpin Amide	50 pcs	5010-21727
	100 pcs	5010-21728
MonoSpin PBA	50 pcs	5010-21715
	100 pcs	5010-21716
MonoSpin TiO	50 pcs	5010-21705
	100 pcs	5010-21706
* MonoSpin Trypsin	50 pcs	7820-11300
	100 pcs	7820-11301
MonoSpin ME	50 pcs	5010-21737
	100 pcs	5010-21738
MonoSpin Phospholipid	50 pcs	5010-21698
	100 pcs	5010-21699

* MonoSpin Trypsin must be refrigerated when not in use.

MonoSpin S Type (Small)

Recovery Tube (1.7 mL)

Waste Tube (2 mL)

MonoSpin 96 Well-Plate

Description	Qty.	Cat.No.
MonoSpin 96WP C18	1 pcs	5010-21900
MonoSpin 96WP NH2	1 pcs	5010-21901
MonoSpin 96WP PBA	1 pcs	5010-21902
MonoSpin 96WP SAX	1 pcs	5010-21903
MonoSpin 96WP SCX	1 pcs	5010-21904
MonoSpin 96WP Amide	1 pcs	5010-21905
MonoSpin 96WP CBA	1 pcs	5010-21906
MonoSpin 96WP C18-CX	1 pcs	5010-21907
MonoSpin 96WP C18-AX	1 pcs	5010-21908

MonoSpin L Type (Large)

MonoSpin L Type (Large) Columns

Description	Qty.	Cat.No.
MonoSpin L C18	30 pcs	7510-11320
MonoSpin L SAX	30 pcs	7510-11321
MonoSpin L SCX	30 pcs	7510-11322
MonoSpin L NH2	30 pcs	7510-11323
MonoSpin L CBA	30 pcs	7510-11324
MonoSpin L ME	30 pcs	7510-11325
MonoSpin L Phospholipid	30 pcs	7510-11326

* Each MonoSpin L Type (Large) columns does not include either recovery nor waste tubes.
* Prepare a 50 mL centrifuge tube separately (Ex : Falcon tube).

MonoSpin ProA, MonoSpin ProG

Description	Qty.	Cat.No.
MonoSpin ProA	10 pcs	7510-11310
MonoSpin ProG	10 pcs	7510-11311
MonoSpin ProA 96-Well Plate	1 pc	7510-11312
MonoSpin ProG 96-Well Plate	1 pc	7510-11313

* MonoSpin ProA, ProG must be refrigerated when not in use.

MonoSpin S Type (Small) Trial Kits

・The following trial kits are available for purchase to test the whole range of MonoSpin columns to help the customer to make the best decision on which MonoSpin to use.

Description	Available Phases	Qty.	Cat.No.
MonoSpin Trial Kit 1	C18, TiO, SCX, SAX, 10 pcs each.	10 pcs/4 packs	5010-21740
MonoSpin Trial Kit 2	C18, Amide ,CBA, NH2, 10 pcs each.	10 pcs/4 packs	5010-21741
MonoSpin Trial Kit 3	SCX, SAX, CBA, NH2, 10 pcs each.	10 pcs/4 packs	5010-21742

・MonoSpin Trial Kit 1 : Optimal for drug extraction in biological samples & purification of pesticides.

・MonoSpin Trial Kit 2 : Compatible with both hydrophilic/hydrophobic applications. Optimal for purification of peptide and sugar chains.

・MonoSpin Trial Kit 3 : Optimal for purification of ionic analytes.

Sample Preparation for LC/MS

FastRemover for Protein

Maximizes Sample Yield

FastRemover is a 96-well type filter plate ideal for preparing precipitated protein samples. High-throughput processing of plasma samples is performed simply, accurately, and reproducibly.

Features

- Easy filtration of biological samples.
- Trace analytes can be processed with minimal sample loss due to the low volume design of the elution tip and filter.
- Perfect for processing with automated vacuum instruments.
- High sensitivity analysis is unaffected by contamination from plasticizers or other impurities found in other 96-well plates.
- Removal of microparticle contaminants enables injection to LC/MS/MS directly from the collection plate.

Typical Protocol using FastRemover for Protein

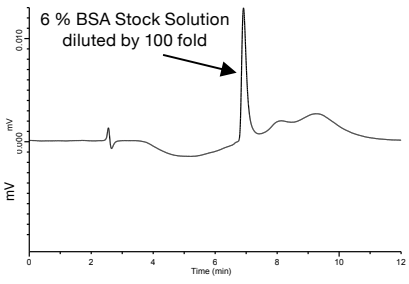
To demonstrate the performance of FastRemover for Protein, a BSA solution was prepared as follows :

Performance of Removal of Proteins

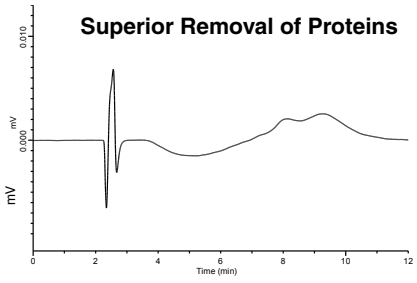
1. 200 µL of plasma is thoroughly mixed in a test tube containing 800 µL of acetonitrile.
2. The FastRemover and collection plate are attached to a vacuum manifold.
3. The BSA sample mixture is loaded into the 96-well plate and vacuum applied above 0.02 Mpa (0.2 Bar) for 2 minutes.

* Methanol can be used as well as a replacement of acetonitrile.

[Standard Sample]



[After filtrated with FastRemover]



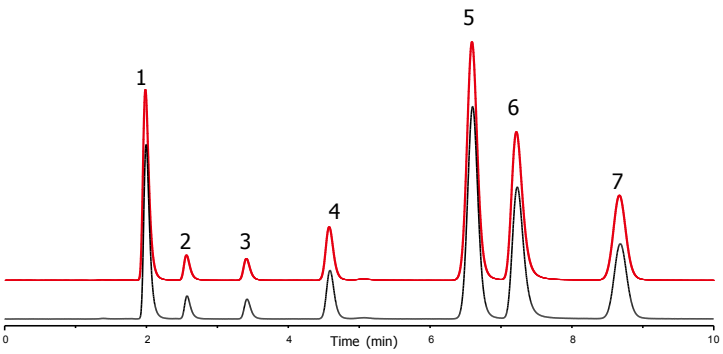
Conditions

Column	: Inertsil WP300 C8 (5 µm, 150 x 2.1 mm I.D.)
Eluent	: A) 0.1 % TFA in CH_3CN B) 0.1 % TFA in H_2O A/B=10/90 - 5 min - 50/50
Flow Rate	: 0.2 mL/min
Col.Temp.	: 40 °C
Detection	: 280 nm
Injection Vol.	: 2 µL

Adsorption Test

A standard mixture containing 7 compounds were analyzed to evaluate potential non-specific adsorption to the plate. As shown in the following chromatograms, FastRemover for Protein provides minimal loss of target samples.

Black : Before treatment with FastRemover
Red : After treatment with FastRemover



Conditions

Column : Inertsil ODS-3 (3 µm, 150 x 2.1 mm I.D.)
Eluent : 48 % CH_3CN (0.7 % KH_2PO_4 + 0.17 % SDS, pH 4.5)
Flow Rate : 0.2 mL/min
Col.Temp. : 40 °C
Detection : 230 nm
Injection Vol. : 1 µL
Samples
1. Acetaminophen
2. Pyridine
3. Phenol
4. Hexobarbital
5. Propranolol
6. Berberine
7. Doxepin

Excellent Non-Specific Adsorption to the Plate

FastRemover for Protein

Description	Qty.	Cat.No.
FastRemover for Protein (0.45 µm) 96-well	1 pc	7820-11001
	5 pcs	7820-11005
FastRemover for Protein (0.20 µm) 96-well	1 pc	7820-11011
	5 pcs	7820-11015

Related Accessories

Description	Qty.	Cat.No.
Vacuum Manifold with shims	1 Set	5010-33101
Sealing Mat for Microplate, WSM-3SX (PTFE/SILCON)	5 pcs	1030-43831
Sealing Tape for Microplate, (Polyolefin)	100 pcs	1065-70002

Sample Preparation for LC/MS

FastRemover for Phospholipid

Rapid and Efficient Removal of Proteins and Phospholipids

The FastRemover for Phospholipid 96-well plate deliver a rapid and effective removal of proteins and phospholipids in plasma and serum samples without sacrificing the recovery of your target analytes.

Features

- Simple & easy protocol to remove proteins and phospholipids.
- High sensitivity analysis is unaffected by contamination from plasticizers or other impurities found in other 96-well plates.
- Removal of microparticle contaminants enables injection to LC/MS/MS directly from the collection plate.
- Removes more than 90 % of phospholipids resulting in eliminating ion-suppression.
- Prolong HPLC/UHPLC column lifetime by removing proteins and phospholipids that can damage your column.

Typical Protocol using FastRemover for Phospholipid

The presence of phospholipids in plasma or serum samples is one of the major problems in LC/MS- (MS) analysis. Phospholipids can build up on your MS system and bleed off the HPLC/UHPLC column, causing ion suppression, shifts in retention time and peak shape and necessitating time consuming column and system maintenance. Use of FastRemover for Phospholipid 96-well plate will eliminate these effects and extend the lifetime of your HPLC/UHPLC column and deliver more predictable/accurate mass spectrometry results.

Easy Protocol by FastRemover for Phospholipid

Step 1 : Solvent Loading

Add 400 µL of 1 % Formic Acid in Acetonitrile into the wells

Step 2 : Sample Loading

Add 100 µL of serum sample into the wells

Step 3 : Mixing

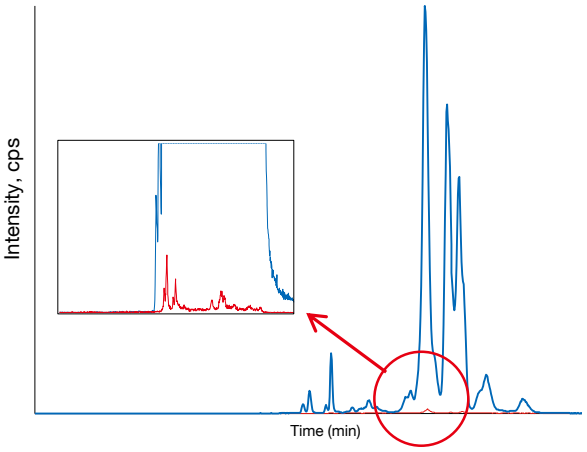
Aspirate the samples up & down couple of times by a manual pipette or an automated pipetting system may be used to ensure complete mixing

Step 4 : Analysis

Collect the extracted sample from the 96-well plate & inject to LC/MS(MS)

*** Traditional Protein Precipitation method :**
Adding acetonitrile to sample and collecting the supernatant layer

RED : FastRemover for Phospholipid
BLUE : * Traditional Protein Precipitation

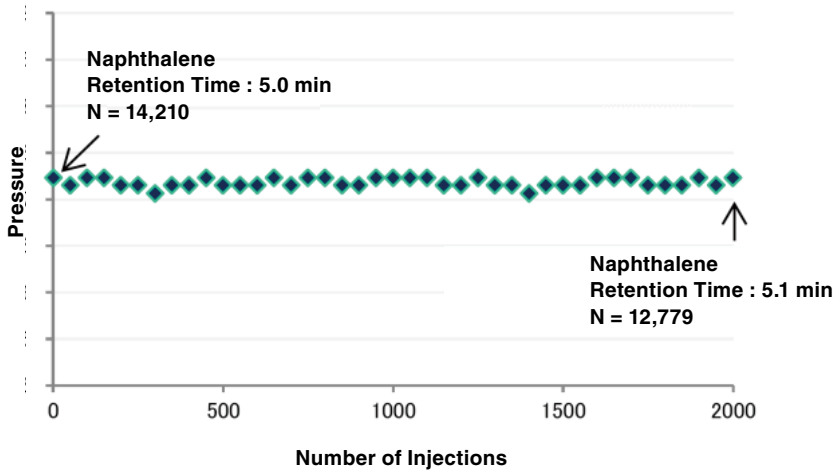


Comparison of Phospholipid Removal between

*** Traditional Protein Precipitation method and FastRemover for Phospholipid**

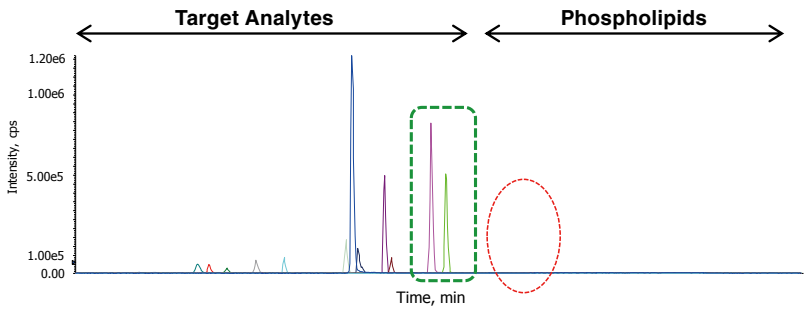
Extend HPLC/UHPLC Column Lifetime

Over the course of multiple injections, phospholipids build up and can lead to reduced column lifetime, showing increase in column back pressure, decrease in column sensitivity and efficiency. The figure below illustrates the removal efficiency of phospholipids, proteins and microparticles by FastRemover for Phospholipid.



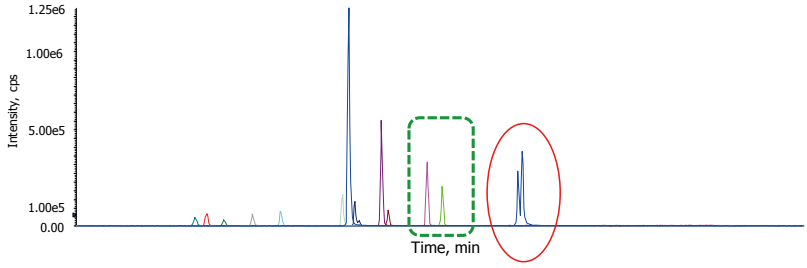
Industry Leading High Recovery for Bioanalysis

As shown below, the FastRemover for Phospholipid 96-well plate delivers a rapid and effective removal of proteins and phospholipids in plasma and serum samples without sacrificing the recovery of your target analytes.



FastRemover for Phospholipid

As shown on the left, not only FastRemover for Phospholipid completely removes phospholipids, but also provide high recovery even for those highly hydrophobic analytes.



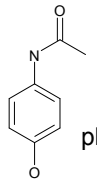
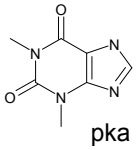
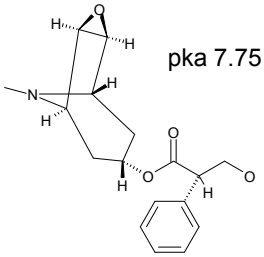
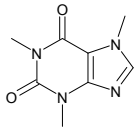
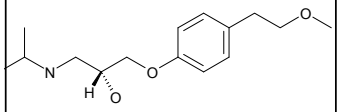
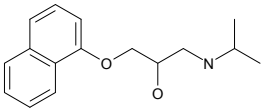
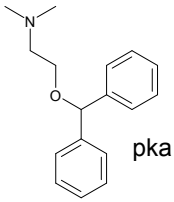
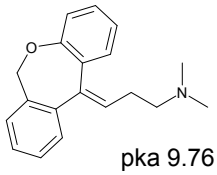
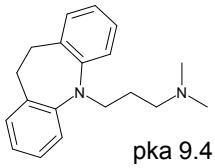
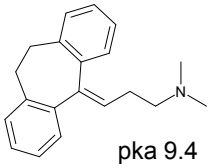
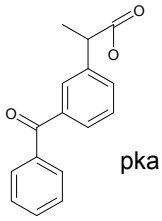
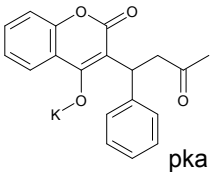
Brand A Phospholipid Removal Plate

Brand A shows adsorption of hydrophobic analytes resulting in poor recovery and elution of phospholipids.

Sample Preparation for LC/MS

Comparison of Recovery Rate using Various Solvents for Deproteinization

The following seven solvents were used to deproteinate a serum sample. As a result, 0.1 % formic acid in 100 % acetonitrile showed the best recovery not only of basic, but also of acidic compounds.

1. Acetaminophen  pka 9.38	2. Theophylline  pka 8.81	3. Scopolamine  pka 7.75	4. Caffeine  pka 10.4
5. Metoprolol  pka 14.09	6. Propranolol(I.S.)  pka 9.42	7. Diphenhydramine  pka 8.98	8. Doxepin  pka 9.76
9. Imipramine  pka 9.4	10. Amitriptyline  pka 9.4	11. Ketoprofen  pka 4.45	12. Warfarin  pka 5.08

Analyte	CH_3OH	CH_3CN	0.1 %HCOOH-CH_3OH	0.1 %HCOOH-CH_3CN	1 %HCOOH-CH_3ON	0.1 %$HCOONH_4$-CH_3OH	1% $HCOONH_4$-CH_3OH
1. Acetaminophen	116.2	92.3	106.9	103.5	102.2	2.7	92.2
2. Scopolamine	75.2	87.4	86.0	87.8	83.6	0.9	68.9
3. Theophylline	104.2	95.7	107.2	96.3	94.1	5.1	94.9
4. Caffeine	97.1	98.2	106.4	97.7	90.6	6.0	98.3
5. Metoprolol	90.7	98.4	89.3	90.8	95.5	1.0	76.8
6. Propranolol	88.2	97.4	92.6	106.4	102.9	1.5	78.3
7. Diphenhydramine	89.1	106.6	92.8	106.3	102.5	2.7	75.7
8. Doxepin	76.9	101.6	86.1	107.2	97.7	1.0	64.7
9. Imipraine	80.9	105.8	82.1	99.9	99.7	1.0	72.8
10. Warfarin	85.4	98.6	84.5	103.1	108.4	1.1	80.6
11. Amitriptyline	60.6	103.9	54.8	86.9	90.9	0.9	73.2
12. Keroprofen	N.D.	39.3	1.4	98.1	108.6	1.9	39.2
13. Diclofenac	8.4	89.2	4.4	102.9	104.9	1.1	67.9

FastRemover for Phospholipid

Description	Qty.	Cat.No.
FastRemover for Phospholipid (0.2 µm)	1 pc	7510-11021

Exosome

EVSecond

Exosome Purification Columns

Recent studies have reported significant roles of extracellular vesicle "Exosome" in development and progression of various diseases including cancer metastasis. Therefore, exosomes are considered as important targets for biomarkers and drugs. However, it remains difficult to isolate high-purity exosomes from biological fluids such as serum. EVSecond is a size exclusion chromatography open column optimized for effective purification of exosomes. Highly-purified exosomes can be easily collected from serum, plasma, or cell culture supernatant.

Features

- Simple gravity-flow handling without ultracentrifugation.
- EVSecond-purified exosomes possess efficient purity for comprehensive miRNA, proteome, and metabolome analysis.
- Exosomes are gently eluted in PBS without structural damage, allowing re-administration experiments of collected exosomes to cells or animals.

Advantages Over Traditional Procedures

- Much higher-purity exosomes can be obtained compared to ultracentrifugation or polymer precipitation methods.
- Unlike immuno-affinity purification using anti-tetraspanin antibodies, whole exosomes can be collected regardless of surface antigen profiles.

Typical Protocol using EVSecond

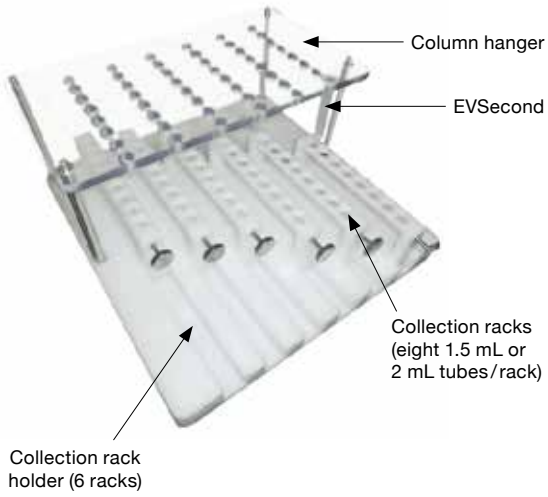
Gravity-flow is applied to each step.

1. Set columns on GL-SPE EXO fraction rack after mixing beads gently and thoroughly.
2. Block beads with 0.22 µm filter-purified FBS.
3. Equilibrate columns with PBS.
4. Load 50-700 µL 0.22 µm filter-purified samples (serum, plasma, or cell culture supernatant).
5. Load PBS and collect appropriate fractions including exosomes.

* Exosome-containing fractions can be identified by western blotting or ELISA experiments detecting tetraspanins (CD9, CD63, CD81, etc.)

GL-SPE EXO Fraction Rack

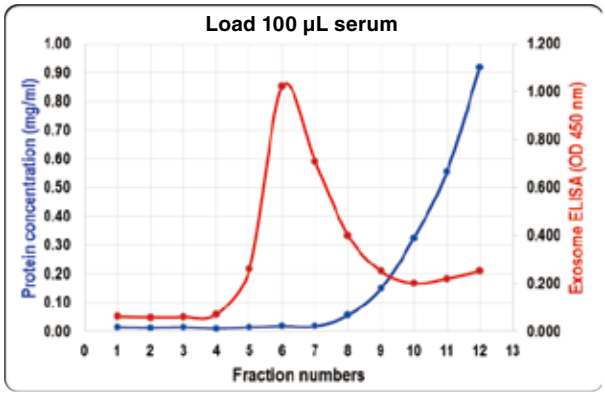
Open column rack optimized for EVSecond.
It helps smooth column handling and fractionation.

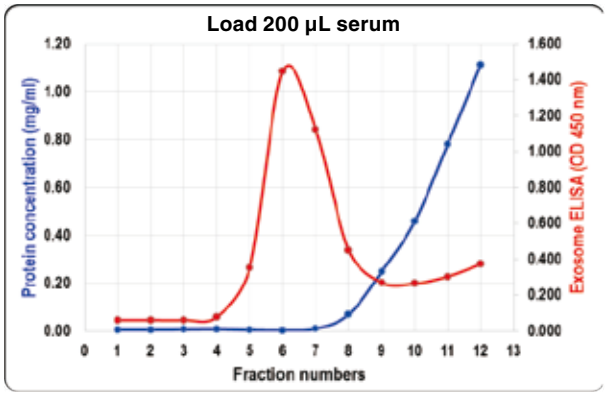


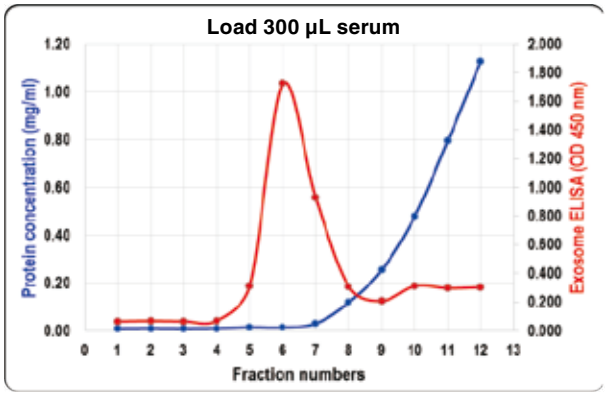
Dimensions : 300 (W) x 300 (D) x 150 (H) mm

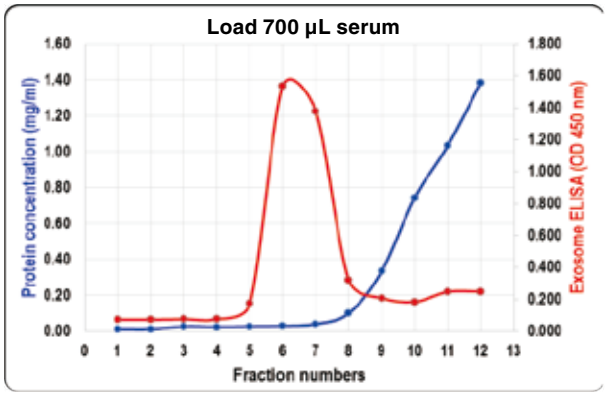
Purification of Exosomes from Human Serum

A large amount of free proteins, metabolites, and nucleotides are involved in serum samples. Insufficient purification of exosomes often causes co-detection of non-exosomal components, leading to incorrect quantification results in omics studies. Exosomes were isolated from 100, 200, 300, or 700 µL of human serum using EVSecond method. Exosomes were clearly separated from serum free proteins such as albumin or immunoglobulins.







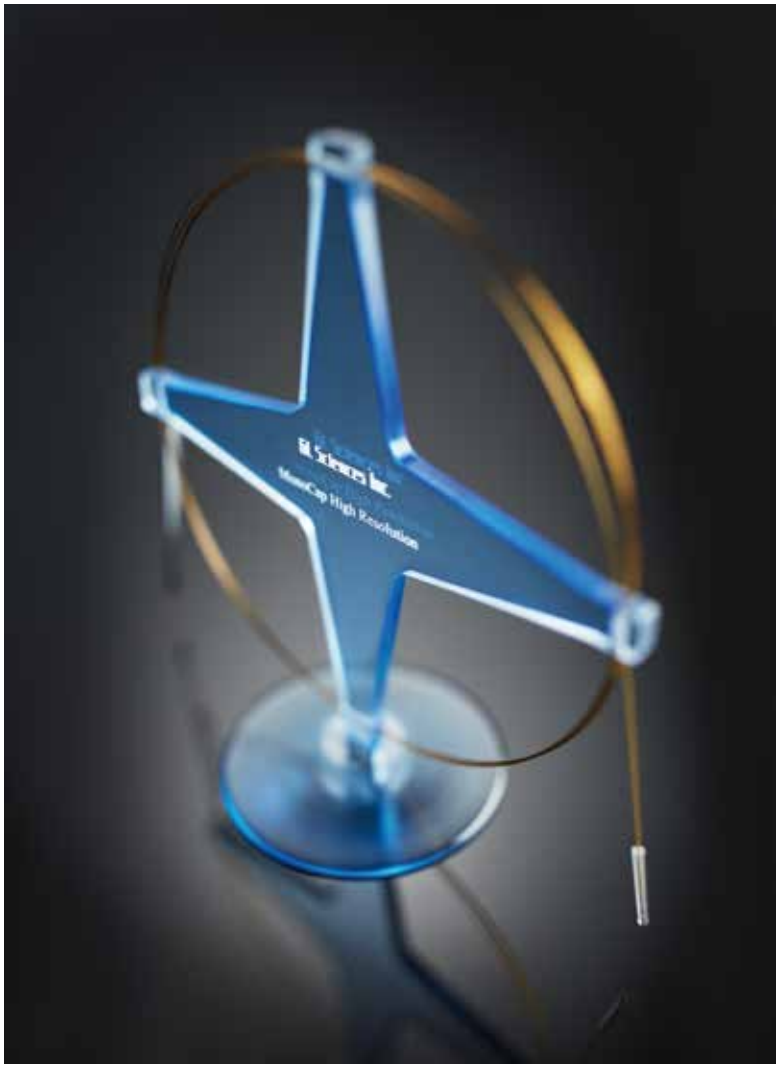


(100 µL/fraction)
Red line : CD9-CD9 exosome sandwich ELISA (detecting exosomes)
Blue line : Bradford assay (detecting serum free proteins)
Data provided by Dr. Koji Ueda from Graduate School of Frontier Sciences, The University of Tokyo

EVSecond

Description	Qty.	Cat.No.
EVSecond L70	10 pcs	5010-21395
EVSecond	10 pcs	5010-21390
	25 pcs	5010-21392
GL-SPE EXO Fraction Rack	1 set	5010-50450

EVSecond was developed based on the cooperation from Dr. Koji Ueda from Graduate School of Frontier Sciences, The University of Tokyo.



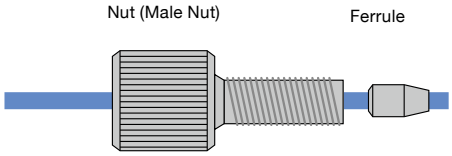
CONSUMABLES AND SUPPLIES

LC ACCESSORIES

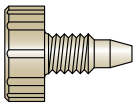
Outline of HPLC Connectors

Connectors Types

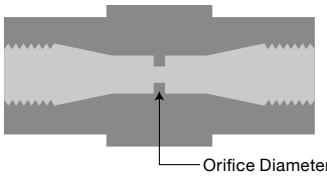
Fittings
The fitting is made up of a nut and a ferrule.
Integrated-type fittings are also available.



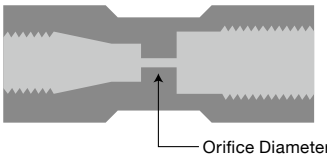
Plugs
Plugs are used to store the column. They have no holes and are designed to be fixed to the column ends.



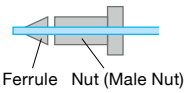
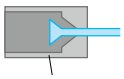
Unions
The union is a connector with both ports having the same shape.



Adaptors
The adaptor is a connector with different ports.



Fitting Configurations

Fitting Type	Features and Application	Configuration
Fittings	This is the most popular and resistant connection to high pressure. Tubes such as 1/16 inches SUS tube or 1.5 mm PTFE tubes are used with nut and ferrule. But the length from the ferrule to the tube end differs according to the column manufacturer.	 Ferrule Nut (Male Nut)
Flanged	This configuration is used in case of medium pressure. The PTFE tube' end is shaped like "T" by using specific tubing tools. But tubes with 0.5 mm I.D. are difficult to be modified. Therefore, fittings without flanged which don`t need any tube shape modification are also available (see p. 121).	 Nut for Flanged
Flared	This configuration is used in case of low pressure. The PTFE tube' end is shaped like a bugle and fixed to a specific nut. Specific tubing tool is needed to shape the tube`s end. But, 1.0 mm I.D. tubes are difficult to shape.	 Box Nut for Flared

Remarks

If two different types of fittings are connected, dead volume, bad peak shape and column damage may occur.
In order to avoid dead volume and liquid leak, the tube must be cut vertically and it must not damage the tube internal diameter shape.
In case of liquid leak, do not try to fix the fitting by tightening it because this may cause damage to the fitting. Instead, the leak might be caused by damage on the tube or the fitting itself.
Too large extra-column volume may cause peak distortion. In order to avoid this, the tubes which connect the injector port to the column, and the column to the detector port should be short and narrow do not use SUS ferrule with resin tubes because this may damage the tubes and cause high pressure.

Outline of HPLC Connectors

Materials

The most used materials for HPLC connectors and tubes.

Material	Features	Chemical Resistance
Stainless Steel	Highest pressure resistance, but note the chemical resistance.	Strong acid and basic compounds (except halogens)
PTFE (Polytetrafluoroethylene)	Low pressure resistance, but high chemical resistance.	Resistant to a wide range of compounds.
ETFE (Ethylenetetrafluoroethylene)	Ca. 3 times higher pressure resistance than PTFE and comparable chemical resistance.	Resistant to pH 1-14
PEEK (Polyetheretherketone)	Both pressure resistance and chemical resistance are higher than ETFE.	pH 1-14 (except THF, chloroform, sulfuric acid)
PEEKsil	Polymer-coated fused silica. High pressure resistance and narrow ID, suitable for capillary LC columns.	Resistant to pH 1-7
PCTFE (Polychlorotrifuruoroethylene)	Both heat resistance and chemical resistance are slightly lower than PTFE, but mechanical strength is higher.	Resistant to a wide range of compounds (except halogens)

Note: The values in the table above are only a rough estimation and they may change according to sizes and the way of using.

Screw Thread Standards

Each fitting must be used with the right screw thread standard. In HPLC the most used thread is 10-32 UNF.
Below are the sizes of each thread standard.

Types	Tubing O.D.	Standard
10-32UNF	4.8 mm (0.19 in.)	Screw pitch 0.79 mm (32 crests per inch)
1/4-28UNF	1/4 in.	Screw pitch 0.90 mm (28 crests per inch)
5/16-24UNF	5/16 in.	Screw pitch 1.05 mm (24 crests per inch)
M6	6 mm	Screw pitch 1 mm
M4	4 mm	Screw pitch 0.7 mm

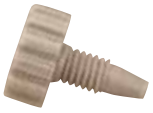
Nut head shape

Below are the available nut head shapes.
The shape depends on whether the nut can be tighten by a wrench or by hand.

Hexagonal nut | Round nut | Wingnut

HPLC Fittings and Connectors

PEEK Tough Connectors



PEEK Fingertight Fitting

PEEK Fingertight Fitting Type Wing

PEEK Fingertight Fitting Long Type

PEEK Fingertight Fitting Plug

Maximum operating pressure of these PEEK fittings are 21.5 MPa with finger tightening; the thread is 10-32UNF which fits popular 10-32 coned receiving ports.

Specifications

Tube O.D.: 1/16 in.
Max. operating pressure: 21.5 MPa
Threads: 10-32 UNF
Material: PEEK

PEEK Tough Fittings

The ferrule is integrated into the nut. Select the fitting depending on the applications.

Description	Qty.	Cat.No.
PEEK Fingertight Fitting	5 pcs	6010-48600
PEEK Fingertight Fitting Wing Type	5 pcs	6010-48601
PEEK Fingertight Fitting Long Type	5 pcs	6010-48602
PEEK Tough Plug	5 pcs	6010-48800

PEEK Union

PEEK Tough Unions

Description	Orifice Diameter	Qty.	Cat.No.
PEEK Union	0.8 mm	3 pcs	6010-48620
	0.5 mm	3 pcs	6010-48621
	0.25 mm	3 pcs	6010-48622

PEEK Tee

PEEK Tees (3 way)

Description	Orifice Diameter	Qty.	Cat.No.
PEEK Tee	0.8 mm	1 pc	6010-48630
	0.5 mm	1 pc	6010-48631
	0.25 mm	1 pc	6010-48632

PEEK Cross

PEEK Crosses (4 way)

Description	Orifice Diameter	Qty.	Cat.No.
PEEK Tough Cross	0.8 mm	1 pc	6010-48640
	0.5 mm	1 pc	6010-48641
	0.25 mm	1 pc	6010-48642

PEEK Tough Connector Set

Description	Cat.No.
PEEK Tough Ferrule 10 pcs + PEEK Fingertight Fitting 10 pcs PEEK Fingertight Fitting Plug 5 pcs + PEEK Tough Union 3 pcs	6010-48900

* The orifice I.D. must be chosen according to the tube I.D.
0.8 mm: for preparative columns
0.5 mm: for semi-preparative columns
0.25 mm: for analytical columns

Super PEEK Tough Connectors

Super Tough PEEK Fitting

Super Tough PEEK Set

The nut part is made of stainless steel and is easy to tighten by hand. It has higher pressure resistance than PEEK fitting. The ferrule has superior chemical resistance.

Specifications

Tube O.D.: 1/16 in.
Max. operating pressure: 34.3 MPa
Threads: 10-32 UNF
Material: Stainless steel (Nut), PEEK (Ferrule)

Super PEEK Tough Connector

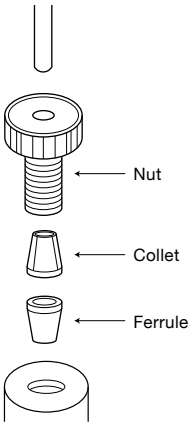
Description	Qty.	Cat.No.
Super PEEK Tough Connector	1 set	6010-48710
Spare PEEK Double Ferrule	5 pcs	6010-41400

Super PEEK Tough Set

Description	Cat.No.
PEEK Tough Nut x 10 pcs / PEEK Tough Plug x 5 pcs / PEEK Tough Union x 3 pcs / PEEK Double Ferrule x 5 pcs / Super PEEK Tough Connector x 1 pc	6010-48910

Super Tough Connectors

Super Tough Fitting



The nut and collet are made of stainless steel, the ferrule is made of resin. The resin ferrule does not deform the tubing and locks securely with the collet. Pressure resistance of up to 41.3 MPa can be achieved with hand tightening.

Specifications

Tube O.D.: 1/16 in.
Max. operating pressure: 41.3 MPa
Threads: 10-32 UNF
Material: Stainless steel (Nut, Collet), PEEK (Ferrule)

Super Tough Connector

Description	Detail	Qty.	Cat.No.
Super Tough Fitting	Nut, Collet, Ferrule (1 pc of each)	1 set	6010-48700
Spare PEEK Tough Ferrule	Ferrule	10 pcs	6010-41300

Super Tough Set

Description	Cat.No.
PEEK Tough Ferrule x 10 pcs / PEEK Tough Nut x 10 pcs / PEEK Tough Plug x 5 pcs / PEEK Tough Union x 3 pcs / Super Tough Connector x 1 set	6010-48905

HPLC Fittings and Connectors

PEEK Fittings, Union

The PEEK fittings can be tightened with wrenches. These fittings are a set of 5 nuts and 5 PEEK double ferrules.

Specifications

Tube O.D.: 1/16 in.
Threads: 10-32 UNF
Head Dimension: 1/4 in.
Material: PEEK

PEEK Hex Head Nut (short type)
PEEK Hex Head Nut (long type)

PEEK Hexagonal Head Nuts (for tightening with wrench)

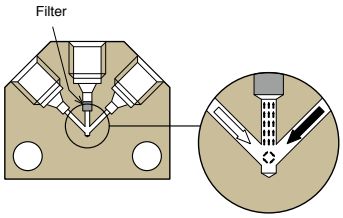
Description	Qty.	Cat.No.
PEEK Hexagonal Head Nut, Short Type 1/16 in.	5 pcs	6010-48720
PEEK Hexagonal Head Nut, Long Type 1/16 in.	5 pcs	6010-48730
PEEK Double Ferrule (Replacement Ferrule)	5 pcs	6010-41400

PEEK Union

PEEK Union (for tightening with wrenches)

Description	Orifice Diameter	Qty.	Cat.No.
PEEK Union	0.3 mm	3 pcs	6010-48740

PEEK Mixing Tee



PEEK Mixing Tee

PEEK Mixing Tee

Titanium filter (10 µm) is installed at the outlet to increase mixing efficiency.

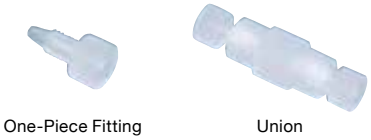
Description	Specification	Qty.	Cat.No.
PEEK Mixing Tee	with PEEK Fittings	1 pc	6010-48650

PCTFE Connectors

These connectors are easy to use and suitable for attaching a column by finger tightening. Select a type depending on applications.

Specifications

Tube O.D.: 1/16 in.
Max. Operating Pressure: 9.8 MPa
Threads: 10-32 UNF
Material: PCTFE
Allowable Operating Temp. Range: -20 °C～120 °C



One-Piece Fitting
Union

Tee

PCTFE Tough Connectors

Description	Specification	Qty.	Cat.No.
One-Piece Fitting FA	With Bushing & Ferrule	5 pcs	6010-47010
Plug FA	–	5 pcs	6010-47020
Union FA	Body only	3 pcs	6010-47110
Tee FA	Body only	1 pc	6010-47210

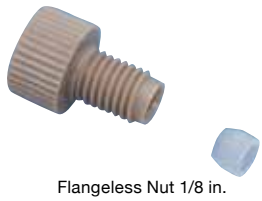
Flangeless Fittings

Flangeless fittings can be connected to the flange type receiving port without flange tubing. They can be used not only for PTFE tube but also SUS and PEEK tubes too.

Specifications

Threads: 1/4-28 UNF

Material: PEEK (Nut), ETFE (Ferrule)



Flangeless Nut 1/8 in.

Flangeless Fitting Set

Flangeless Fittings

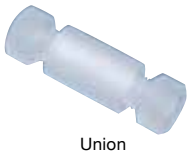
Description	Specification	Qty.	Cat.No.
Flangeless Nut 1/16 in.	Nut, Ferrule	5 sets	6010-46350
Flangeless Nut 1/8 in.	Nut, Ferrule	5 sets	6010-46360
Flangeless Ferrule 1/16 in.	Ferrule	10 pcs	6010-46370
Flangeless Ferrule 1/8 in.	Ferrule	10 pcs	6010-46380

Flangeless Fitting Set

Description	Qty.	Cat.No.
Flangeless Nut 1/16 in.	10 pcs of each	6010-46390
Flangeless Nut 1/8 in.	10 pcs of each	
Flange Union	5 pcs	
Flange Plug	5 pcs	
Handy Cutter JC-2	1 pc	
Tube Clip	5 pcs	

Flanged Connectors

Flanged Fitting



Union

Tee

Cross

These fittings are used to connect the PTFE tubing of 0.5 ~ 2 mm I.D.

Specifications

Threads: 1/4-28 UNF

Material: PCTFE

Flanged Fittings

Description	Qty.	Cat.No.
Flanged Fittings for 1/16 in. O.D. Tubing	5 pcs	6010-46010
Flanged Fittings for 2.0 mm O.D. Tubing	5 pcs	6010-46020
Flanged Fittings for 1/8 in. O.D. Tubing	5 pcs	6010-46030
Plug	5 pcs	6010-46040

Union

This Union is used to connect two flanged PTFE tubing butt to butt, without dead volume. 1/16 in., 2mm and 1/8 in. O.D. tubing are allowed to connect.

Description	Qty.	Cat.No.
Flanged Fitting Union	5 pcs	6010-46110

Note: Flanged Fitting is not included.

Tees (3 way)

Description	Qty.	Cat.No.
Flanged Fitting Tee for 1/16 in. O.D. Tubing	1 pc	6010-46210
Flanged Fitting Tee for 1/8 in. O.D. Tubing	1 pc	6010-46220

Note: Flanged Fitting is not included.

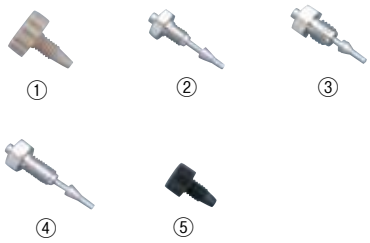
Crosses (4 way)

Description	Qty.	Cat.No.
Flanged Fitting Cross for 1/16 in. O.D. Tubing	1 pc	6010-46310
Flanged Fitting Cross for 1/8 in. O.D. Tubing	1 pc	6010-46320

Note: Flanged Fitting is not included.

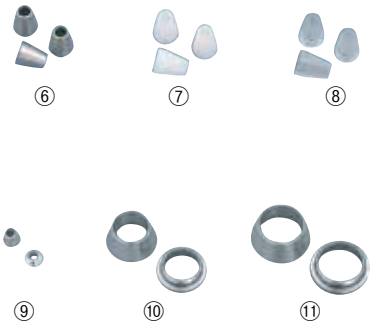
HPLC Fittings and Connectors

Plugs



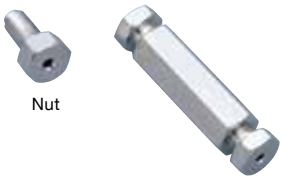
Model	Type	Material	Qty.	Cat.No.
① Plug W	Common inch Bushing	PEEK	5 pcs	6010-48800
② CB-7	Common inch Bushing	SUS	5 pcs	6010-63010
③ CB-3	Hitachi mm Bushing		5 pcs	6010-63410
④ CB-5	JASCO Bushing		5 pcs	6010-63610
Plug N	JASCO Bushing	Delrin	5 pcs	6010-63220
⑤ Plug EX	Inertsil Columns		5 pcs	6010-63810

Ferrules



Model	Description	Tubing O.D.	Material	Qty.	Cat.No.
1/16 FP	–	1/16 in.	PEEK	10 pcs	6010-41300
⑥ 1/16 FS	One Ring Ferrule		SUS	10 pcs	6010-41200
⑦ 1/16 FT			PTFE	10 pcs	6010-41210
⑧ 1/16 FD			PCTFE	10 pcs	6010-41220
⑨ 1/16 LF	Double Ring Ferrule	1/16 in.	SUS	10 pcs	6010-41010
1/8 LF		1/8 in.		10 pcs	6010-41020
⑩ 1/4 LF		1/4 in.		10 pcs	6010-41030
⑪ 3/8 LF		3/8 in.		10 pcs	6010-41040
6 LF		6 mm		10 pcs	6010-41050
8 LF		8 mm		10 pcs	6010-41060
10 LF		10 mm		10 pcs	6010-41070

SUS Connectors


Nut

Union


Tee


Cross

Material: SUS

Screw Standard: 10-32 UNF

Model	Description	Screw Standard & Tubing O.D.	Qty.	Cat.No.
1/16 OJ	Nut	1/16 (N)	10 pcs	6010-43010
1/16 OW		1/16 (W, ON, OS, T)	10 pcs	6010-43020
1/16 OH		1/16 (H)	10 pcs	6010-44210
1/16 OUN	Union	1/16-1/16 (N)	3 pcs	6010-43110
1/16 OUW		1/16-1/16 (W)	3 pcs	6010-43120
1/16 OUC		1/16-1/16 (ON)	3 pcs	6010-43130
1/16 OUZ		1/16-1/16 (OS)	3 pcs	6010-44810
1/16 OTW	Tee	1/16-1/16-1/16 (W)	1 pc	6010-43210
1/16 OFW	Cross	1/16-1/16-1/16-1/16 (W)	1 pc	6010-43310
1/16 OJW	Tighten Connector	1/16-M8×1 (W)	3 pcs	6010-43400

W, Waters Nut; ON, JASCO nut; OS, Shimadzu nut; T, Tosou nut; H, Hitachi mm nut.
Note: Unions, Tees, Cross and tighten joints including nuts and ferrules.

HPLC Fittings and Connectors (IDEX Products)

VHP Fittings for UHPLC

VHP-320x

VHP-325x

VHP-920x

Features

- Designed for modern UHPLC systems
- Proprietary PEEK polymer blended is used for ferrules
- Original materials of construction for UHPLC analysis
- Pressure Rating: 137 MPa (1,380 bar, 20,000 psi), 172 MPa (1,720 bar, 25,000 psi)
- Available for use of 1/16 in. and 1/32 in. O.D. tubing

Description	P/N	Pressure Rating	Thread	Hex Head Size	Qty.	Cat.No.
1/16 in. Fittings	VHP-320	172 MPa	10-32	1/4 in.	1 pc	6010-77007
	VHP-320x				10 pcs	6010-77006
VHP 1/16 in. Long Type Fittings	VHP-325		10-32	1/4 in.	1 pc	6010-77009
	VHP-325x				10 pcs	6010-77008
1/32 in. Fittings	VHP-920		M4	4 mm	1 pc	6010-77011
	VHP-920x				10 pcs	6010-77010

VHP PK Fittings for UHPLC

PK-120BLKx

PK-110 with PK-100 for 1/16 in.

PK-110 with PK-132 for 1/32 in.

Description	P/N	Pressure Rating	Thread	Qty.	Cat.No.
1/16 One-Piece Fitting	PK-120BLKx	82.7 MPa	10-32	10 pcs	6010-77015
1/16 PEEK Nut	PK-110x	113.8 MPa	10-32	10 pcs	6010-77021
1/16 PEEK Ferrule	PK-100x	113.8 MPa	10-32	10 pcs	6010-77020
1/32 PEEK Ferrule	PK-132x	113.8 MPa	10-32	10 pcs	6010-77022

Tightening Tools for VHP Fittings

VHP-1000

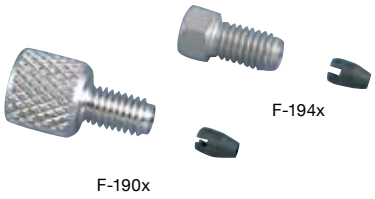
P-291

For connect VHP fittings, tighten them with a VHP-1000, -3000, -9000 or P-291.

Description	P/N	Head Type	Qty.	Cat.No.
VHP Torque Tool	VHP-1000	1/4 in. Hex Head	1 pc	6010-77050
	VHP-9000	4 mm Hex Head	1 pc	6010-77055
Extender Tool to Torque Driver	P-291	Standard 1/4 in. Hex Head	1 pc	6010-77063

HPLC Fittings and Connectors (IDEX Products)

SealTight Fingertight Fittings



Specifications

Designed to connect 1/16 in. O.D. tubing
For 10-32 coned ports
Hold up to 9,000 psi (620 bar)
Two-Piece SealTight Fingertight Fittings (Includes F-192x Ferrule)

P/N	Description	Material	Qty.	Cat.No.
F-193x	Hex Head-short Nuts	PEEK	10 pcs	6010-72302
F-195x	Short Nuts	PEEK	10 pcs	6010-72304
F-196x	Long Nuts	PEEK	10 pcs	6010-72305
F-350x	Flash Nuts	Stainless	10 pcs	6010-72311

Note: F-350x does not include F-192x ferrules.

Replacement Ferrules

Available O.D. Tubing: 1/16 in.

P/N	Description	Material	Qty.	Cat.No.
F-192x	SealTight Ferrule	PEEK	10 pcs	6010-72301

EXP Hand-Tight Fittings

Specification

Tubing O.D. : 1/16in. Max. Operating Presure : 60 MPa (600bar)

P/N	Description	Qty.	Cat.No.
25937	EXP Hand-Tight Fitting (Nut, Ferrule)	1 set	6045-90201
25938	EXP Hand-Tight Fitting (Nut, Ferrule)	10 Set	6045-90202
25939	EXP Hand-Tight Nut	1 pc	6045-90203

HPLC Fittings and Connectors (IDEX Products)

MarvelXACT UHPLC Connection Systems

MarvelXACT is a fit connector resistant to high pressure. Its unique feature is a torque limiting mechanism which emits a haptic "click" feedback when it reaches the optimum torque , assuring a perfect installation every time. Thanks to its sealing technology, no ferrule is needed and delivering precise face sealing (sealing at the port bottom) is possible. In this way there is no more length difference between the ferrule and the tube, zero dead volume is avoided and separation improved. The customer can choose from a wide range of connector: SUS and PLS (PEEK-Lined S.S) connector material, 7 I.D. and 5 length sizes for a total of 35 connector types.

Specifications

Max. Operating Pressure: 130 MPa (1300 bar)

Installation : Connectable by using only your hand, a haptic "click" feedback when it reaches the optimum torque.

Tubing : Flexible 316 Stainless steel 1/32 inch O.D., tip top 1/16 inch O.D.

Fitting : PEEK fitting with 10-32 stainless steel male nuts

Connection Material : PEEK-Linked version: PEEK
Stainless steel version: 316 stainless steel or PEEK

Max. Operating Temp. : 120℃

Note: The performance specifications described above apply only when water is used at the maximum temperature of 120 °C with appropriate connections to the appropriate ports and under appropriate conditions. Different pressure tolerance thresholds may be used under different conditions.

Description	P/N	Tube I.D. (μm)	Tube Length (mm)	Cat.No.
MarvelXACT PLS (PEEK-Lined Type)	UPFP-7025150	25	150	6010-73801
	UPFP-7025250	25	250	6010-73802
	UPFP-7025350	25	350	6010-73803
	UPFP-7025500	25	500	6010-73804
	UPFP-7025600	25	600	6010-73805
	UPFP-7050150	50	150	6010-73806
	UPFP-7050250	50	250	6010-73807
	UPFP-7050350	50	350	6010-73808
	UPFP-7050500	50	500	6010-73809
	UPFP-7050600	50	600	6010-73810
	UPFP-7075150	75	150	6010-73811
	UPFP-7075250	75	250	6010-73812
	UPFP-7075350	75	350	6010-73813
	UPFP-7075500	75	500	6010-73814
	UPFP-7075600	75	600	6010-73815
	UPFP-7100150	100	150	6010-73816
	UPFP-7100250	100	250	6010-73817
	UPFP-7100350	100	350	6010-73818
	UPFP-7100500	100	500	6010-73819
	UPFP-7100600	100	600	6010-73820
MarvelXACT SS (SUS Type)	UPFS-7100150	100	150	6010-73821
	UPFS-7100250	100	250	6010-73822
	UPFS-7100350	100	350	6010-73823
	UPFS-7100500	100	500	6010-73824
	UPFS-7100600	100	600	6010-73825
	UPFS-7125150	125	150	6010-73826
	UPFS-7125250	125	250	6010-73827
	UPFS-7125350	125	350	6010-73828
	UPFS-7125500	125	500	6010-73829
	UPFS-7125600	125	600	6010-73830
	UPFS-7254150	254	150	6010-73831
	UPFS-7254250	254	250	6010-73832
	UPFS-7254350	254	350	6010-73833
	UPFS-7254500	254	500	6010-73834
	UPFS-7254600	254	600	6010-73835

HPLC Fittings and Connectors (IDEX Products)

Quick Connect Luer Adapters


P-624


P-625


P-642


P-655 , P-675


P-658 , P-678


P-659

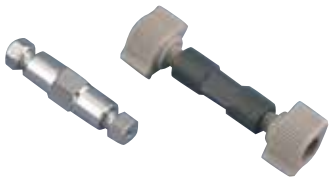

P-683


P-686

The following adapters are used for connecting 2 different joints.

P/N	Detail	Material	Material of Nut	Qty.	Cat.No.
P-624	Female Luer, 1/4-28 Flange Male	ETFE	–	5 pcs	6010-72005
P-625	Male Luer, 1/4-28 Flange Male	ETFE	–	5 pcs	6010-72006
P-628	Female Luer, 1/4-28 Flange Male	ETFE	–	5 pcs	6010-72007
P-642	Female Luer, 10-32 Nut Male	ETFE	–	5 pcs	6010-72010
P-655	Male Luer lock, 1/4-28 Flange Male	PEEK	PEEK	1 pc	6010-72016
P-656	Male Luer lock, 10-32 Nut Male	PEEK	PEEK	1 pc	6010-72017
P-658	Female Luer, 1/4-28 Flange Male	PEEK	–	1 pc	6010-72019
P-659	Female Luer, 10-32 Nut Male	PEEK	–	1 pc	6010-72020
P-675	Male Luer lock, 1/4-28 Flange Male	ETFE	PP	5 pcs	6010-72023
P-678	Female Luer, 1/4-28 Flange Male	ETFE	–	5 pcs	6010-72025
P-683	Male Luer lock, 1/4-28 Flange Male	PEEK	PEEK	1 pc	6010-72027
P-686	Female Luer, M6 Flange Male	ETFE	–	5 pcs	6010-72028

Zero-Dead-Volume Unions


U-435

P-742

Specifications

Allowable Tubing O.D.: 1/16 in.

Max. Operating pressure: 137.8 MPa (SUS), 41.4 MPa (PEEK)

P/N	Description	Nut Standard	Orifice Diameter	Qty.	Cat.No.
U-411	SUS ZDV Union	10-32 UNF	178 µm	1 pc	6010-72351
U-435	SUS Union	10-32 UNF	0.25 mm	1 pc	6010-72352
U-438	SUS True ZDV Union	10-32 UNF	1.70 mm	1 pc	6010-72353
U-322	SUS for Valco Union	10-32 UNF	0.50 mm	1 pc	6010-72354
U-352	SUS for SSI Union	1/4-28 UNF	0.50 mm	1 pc	6010-72355
U-412	SUS for Waters Union	10-32 UNF	0.50 mm	1 pc	6010-72356
P-742	PEEK Union	10-32 UNF	0.25 mm	1 pc	6010-72322
P-779	PEEK Nano-tight Union	10-32 UNF	0.125 mm	1 pc	6010-72321

About 1/32" and 360 µm O.D. tubing, please contact us.

Tees & Crosses


U-428


U-430


P-727


P-729

Specifications

Tube O.D.: 1/16 in.

Nut Threads: 10-32 UNF

Max. pressure: 137.8 MPa (SUS), 24.1 MPa (PEEK)

P/N	Description	Orifice Diameter	Qty.	Cat.No.
U-428	SUS Tee	0.50 mm	1 pc	6010-72357
U-430	SUS Cross	0.50 mm	1 pc	6010-72358
P-727	PEEK Tee	0.50 mm	1 pc	6010-72323
P-729	PEEK Cross	0.50 mm	1 pc	6010-72324

Note: All the Union is packed with 1 pc, and of each fitting is included.

Capillary PEEK Tubing

Capillary PEEK Tubing, 1/16 in. O.D.

Capillary PEEK Tubing, 360 µm O.D.

Capillary PEEK Tubing, 1/16 in. O.D.

P/N	I.D.	Color	Max.Pressure	Length	Qty.	Cat.No.
1560	65 µm	Natural	48.2 MPa	1.5 m	1 pc	6010-74060
1561	100 µm	Black			1 pc	6010-74061

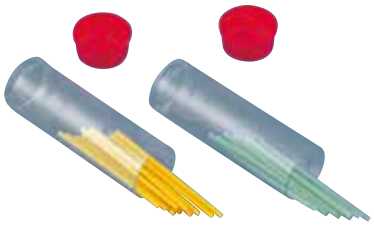
Capillary PEEK Tubing, 1/32 in. O.D.

P/N	I.D.	Color	Max.Pressure	Length	Qty.	Cat.No.
1576	125 µm	Red	34.4 MPa	1.5 m	1 pc	6010-74260
1577	175 µm	Yellow		1.5 m	1 pc	6010-74270
1577-12x				0.3 m	10 pcs	6010-74271

Capillary PEEK Tubing, 360 µm O.D.

P/N	I.D.	Color	Max.Pressure	Length	Qty.	Cat.No.
1570	50 µm	Natural	13.7 MPa	1.5 m	1 pc	6010-74400
1573-12x	75 µm	Black		0.3 m	10 pcs	6010-74431
1571	100 µm	Red		1.5 m	1 pc	6010-74410

Tubing Sleeves



F-238x F-242x

Tubing Sleeves

These tubing sleeves are designed to be used with 1/16 in. O.D.

Length (material): 31.8 mm (PEEK), 40.6 mm (FEP)

P/N	Size	Material	Color	Qty.	Cat.No.
F-229	330 µm (for O.D. 275~315 µm tubing)	PEEK	Natural	10 pcs	6010-72421
F-230	405 µm (for O.D. 350~390 µm tubing)	PEEK	Orange	10 pcs	6010-72422
F-238x	180 µm (for O.D. 125~165 µm tubing)	FEP	Yellow	10 pcs	6010-72431
F-241x	330 µm (for O.D. 275~315 µm tubing)	FEP	Orange	10 pcs	6010-72432
F-242x	395 µm (for O.D. 340~380 µm tubing)	FEP	Green	10 pcs	6010-72433

Silica Sealtight Kit

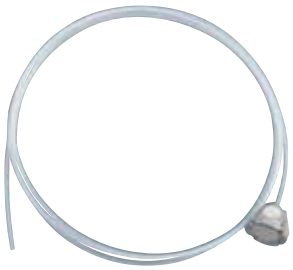
Sleeve for installing to capillary tubing to fit the outer diameter to 1/16 inch.

Each kit contains 1/16 inch O.D. Tubing Sleeves 10 pcs, Nano Tight PEEK Long Nut (F-330N) 4 pcs, Nano Tight ETFE Ferrules (F-142N) 4 pcs.

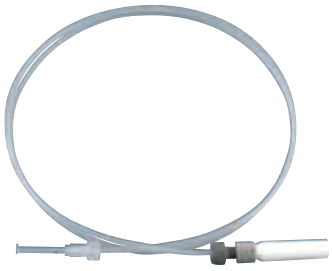
P/N	Size	Color	Cat.No.
1238	180 µm (for O.D.125~165 µm tubing)	Yellow	6010-72407
1241	330 µm (for O.D.275~315 µm tubing)	Orange	6010-72413
1242	395 µm (for O.D.340~380 µm tubing)	Green	6010-72415

Filters

Inlet Solvent Filters

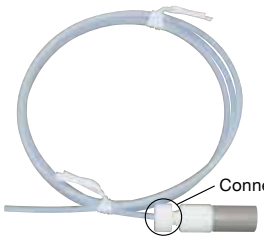


PEEK Bottom-of-the-Bottle Solvent Filter with a Free End Tubing

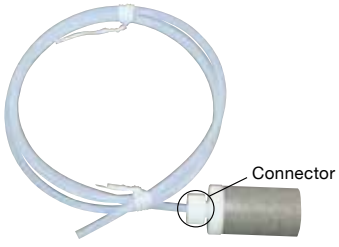


PTFE Bottom-of-the-Bottle Solvent Filter with a Flanged End.

PE Bottom-of-the-Bottle Solvent Filter with a Flared End and an Air Trap Unit



SUS Bottom-of-the-Bottle Solvent Filter for Analytical Flow



SUS Bottom-of-the-Bottle Solvent Filter for Preparative Flow

PEEK Bottom-of-the-Bottle Solvent Filter

Filter Pore Size	Other End of Tubing	Cat.No.
10 µm	Flanged	6010-50001
	Flared	6010-50002
	Free	6010-50003
	Flared with Air Trap Unit	6010-50005

Note: PTFE tubing with 3 mm O.D. x 2 mm I.D. x 1 m is used.

PTFE Bottom-of-the-Bottle Solvent Filter

Filter Pore Size	Other End of Tubing	Cat.No.
5 µm	Flanged	6010-50011
	Flared	6010-50012
	Free	6010-50013
	Flared with Air Trap Unit	6010-50015
	Replacement Filter (without tubing)	6010-50010

Note: PTFE tubing with 3 mm O.D. x 2 mm I.D. x 1 m is used.

PE Bottom-of-the-Bottle Solvent Filter

Filter Pore Size	Other End of Tubing	Cat.No.
20 µm	Flanged	6010-50021
	Flared	6010-50022
	Free	6010-50023
	Flared with Air Trap Unit	6010-50025
	Replacement Filter (without tubing)	6010-50020

Note: PTFE tubing with 3 mm O.D. x 2 mm I.D. x 1 m is used.

SUS Bottom-of-the-Bottle Solvent Filter (for analytical flow)

Filter Pore Size	Other End of Tubing	Cat.No.
10 µm	Flanged	6010-51501
	Flared	6010-51502
	Free	6010-51503
	Flared with Air Trap Unit	6010-51540
	Replacement Filter (without tubing)	6010-51500
20 µm	Flanged	6010-51511
	Flared	6010-51512
	Free	6010-51513
	Flared with Air Trap Unit	6010-51550
	Replacement Filter (without tubing)	6010-51510
40 µm	Flanged	6010-51521
	Flared	6010-51522
	Free	6010-51523
	Flared with Air Trap Unit	6010-51560
	Replacement Filter (without tubing)	6010-51520
–	Connector for Solvent Filter 3 mm x 2 pcs	6010-51702

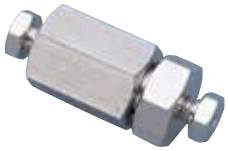
Note: PTFE tubing with 3 mm O.D. x 2 mm I.D. x 1 m is used.

SUS Bottom-of-the-Bottle Solvent Filter (for preparative flow)

Filter Pore Size	Other End of Tubing	Cat.No.
25 µm	Flared	6010-51612
	Free	6010-51613
	Replacement Filter (without tubing)	6010-51600
–	Connector for Solvent Filter 4 mm x 2 pcs	6010-51703

Note: PTFE tubing with 3 mm O.D. x 2 mm I.D. x 1 m is used.

In-Line Filters

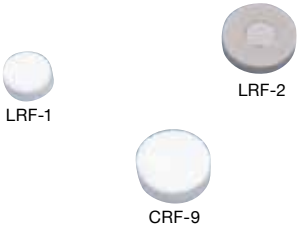


SUS In-Line Filter

SUS Semi-Prep In-Line Filter

PTFE In-Line Filter

Biocompatible PEEK Semi-Prep In-Line Filter



Placed between the pump and sample injection valve, these line filters trap particles, dust and dirt which would go the valve or column. If the filter becomes clogged, simply unscrew the assembly, remove the frit and replace it.

SUS In-Line Filters

Description	Detail	Cat.No.
In-Line Filters Fittings for 1/16 in. O.D. Tubing	with Nuts, Ferrules	6010-52600
Semi-Prep In-Line Filter Fittings for 1/16 in. O.D. Tubing	with Nuts, Ferrules	6010-52700

PTFE In-Line Filters

Description	Detail	Cat.No.
In-Line Filters Fittings for 1/16 in. O.D. Tubing	with Nuts, Ferrules	6010-52100
Flat-bottom Ports for Flanging Tubing Connection	without Fittings*	6010-52200

*: please prepare the 1.5~3mm flanged fittings.

Biocompatible PEEK Semi-Prep In-Line Filter

Description	Detail	Cat.No.
Semi-Prep In-Line Filter Fittings for 1/16 in. O.D. Tubing	with PEEK Fittings	6010-52750

Replacement filter for In-Line Filters

P/N	Applications line filter	Pore size	Qty.	Cat.No.
LRF-2	1/16 in. SUS In-Line Filter, Bushing Type	2 µm	5 pcs	6010-54010
LRF-7	1/16 in. SUS Semi-Prep In-Line Filter Bushing Type	10 µm	2 pcs	6010-54060
CRF-9	1/16 in. PTFE In-Line Filter Bushing Type	10 µm	5 pcs	6010-53090
LRF-1	1/16 in. PTFE In-Line Filter Flange Type	10 µm	5 pcs	6010-54000
LRF-8	1/16 in. PEEK Semi-Prep In-Line Filter Bushing Type	2 µm	2 pcs	6010-54070

Filters

High Pressure Precolumn Filters

Ultra-sealed Precolumn Filter

The ultra-sealed precolumn filter is designed to be used at higher pressures up to 103.4 MPa.

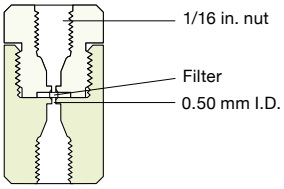
Specifications

Threads: 10-32 UNF
Max Operating Pressure: 103.4 MPa
Filter Pore Size: 0.5 µm
Filter Material: Titanium
Fitting Material: SUS (Nut), PEEK (Ferrule)

Description	P/N	Qty.	Cat.No.
Ultra-Sealed Precolumn Filter	850-1010	1 pc	6010-55500
	850-1010-10	10 pcs	6010-55505

Precolumn Filters

Precolumn Filter



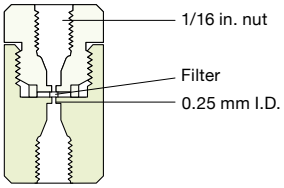
Specifications

Tubing O.D.: 1/16 in.
Threads: 10-32 UNF
Filter Pore Size: 2 µm

Description	Jecket Material	P/N	Qty.	Cat.No.
Precolumn Filter with 2 µm SUS Frit	SUS	A-315	1 pc	6010-55100
Replacement 2 µm SUS Frit	–	A-101	1 pc	6010-55110
Biocompatible Precolumn Filter with 2 µm PEEK Frit	PEEK	A-355	1 pc	6010-55300
Replacement 2µm PEEK Frit for Biocompatible Precolumn Filter	–	A-700	1 pc	6010-55310

Ultra-Low Volume Precolumn Filters

Ultra-Low Volume Precolumn Filter



Specifications

Tubing O.D.: 1/16 in.
Threads: 10-32 UNF
Filter Pore Size: 0.5 µm

Description	Jecket Material	P/N	Qty.	Cat.No.
Ultra-Low Volume Precolumn Filter with 0.5 µm SUS Frit	SUS	A-318	1 pc	6010-55200
Replacement 0.5 µm SUS Frit for Ultra-Low Volume Precolumn Filter	–	A-102	1 pc	6010-55210
Biocompatible Precolumn Filter with 0.5 µm PEEK Frit	PEEK	A-356	1 pc	6010-55400
Replacement 0.5 µm PEEK Frit for Biocompatible Precolumn Filter	–	A-701	1 pc	6010-55410

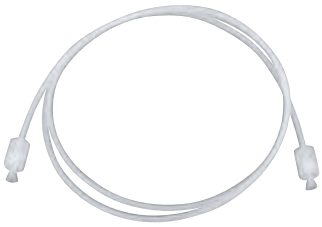
PTFE Tubing

PTFE Tubing

O.D.	I.D.	Length	Cat.No.
2.0 mm	1.0 mm	5 m	6010-35205
		10 m	6010-35210
3.0 mm	1.5 mm	5 m	6010-35505
		10 m	6010-35510
3.0 mm	2.0 mm	5 m	6010-35305
		10 m	6010-35310
1/16 in.	0.17 mm	5 m	6010-35601
		10 m	6010-35602
1/16 in.	0.25 mm	5 m	6010-35603
		10 m	6010-35604
1/16 in.	0.33 mm	5 m	6010-35030
		10 m	6010-35031
1/16 in.	0.50 mm	5 m	6010-35605
		10 m	6010-35606
1/16 in.	0.75 mm	5 m	6010-35607
		10 m	6010-35608
1/16 in.	1.0 mm	5 m	6010-35609
		10 m	6010-35610
1/8 in.	1.58 mm	5 m	6010-35701
		10 m	6010-35702

PTFE Connection Tubing

Flanged PTFE Tubing



Flared PTFE Tubing

End Fitting	O.D.	I.D.	Length	Cat.No.
Flange Type	1.5 mm	0.5 mm	0.5 m	6010-46610
			1 m	6010-46615
	2 mm	1 mm	0.5 m	6010-46620
			1 m	6010-46625
	3 mm	2 mm	0.5 m	6010-46630
			1 m	6010-46635
Flare Type	2 mm	1 mm	0.5 m	6010-45910
			1 m	6010-45915
	3 mm	2 mm	0.5 m	6010-45920
			1 m	6010-45925

ETFE Tubing

ETFE Tubing

Specifications

pH Range: 1~14

Operating Temp.: up to 140°C

O.D.	I.D.	Max. Pressure	Length	Cat.No.
1/16 in.	0.25 mm	14.7 MPa	5 m	6010-36205
			10 m	6010-36210
1/16 in.	0.50 mm	6.8 MPa	5 m	6010-36505
			10 m	6010-36510
1/16 in.	0.75 mm	6.8 MPa	5 m	6010-36705
			10 m	6010-36710

HPLC Tubing

PEEK Tubing

PEEK tubing is color-coded for quick identification of internal diameter. For greater visibility, choose the solid color coding, for greater chemical resistance and biocompatibility, choose the striped coding.

Striped PEEK Tubing (green)

Striped PEEK Tubing

O.D.	I.D.	Color	Max. Pressure	Length	Cat.No.
1/16 in.	0.13 mm	Red	34.3 MPa	5 m	6010-37205
				10 m	6010-37210
1/16 in.	0.25 mm	Blue	34.3 MPa	5 m	6010-37305
				10 m	6010-37310
1/16 in.	0.50 mm	Orange	34.3 MPa	5 m	6010-37505
				10 m	6010-37510
1/16 in.	0.75 mm	Green	27.4 MPa	5 m	6010-37705
				10 m	6010-37710
1/8 in.	1.60 mm	–	27.4 MPa	5 m	6010-37911
				10 m	6010-37912
1/8 in.	2.00 mm	–	20.5 MPa	5 m	6010-37921
				10 m	6010-37922

Precut Striped PEEK Tubing

Precut Striped PEEK Tubing

O.D.	I.D.	Color	Detail	Cat.No.
1/16 in.	0.13 mm	Red	50 mm, 100 mm, 200 mm, 5 pcs of each	6010-37111
1/16 in.	0.25 mm	Blue		6010-37121
1/16 in.	0.50 mm	Orange		6010-37151
1/16 in.	0.75 mm	Green		6010-37171

Solid PEEK Tubing

O.D.	I.D.	Color	Max. Pressure	Length	Cat.No.
1/16 in.	0.13 mm	Red	34.3 MPa	5 m	6010-37811
				10 m	6010-37812
1/16 in.	0.25 mm	Blue	34.3 MPa	5 m	6010-37821
				10 m	6010-37822
1/16 in.	0.50 mm	Orange	34.3 MPa	5 m	6010-37851
				10 m	6010-37852
1/16 in.	0.75 mm	Green	27.4 MPa	5 m	6010-37871
				10 m	6010-37872

Natural Color PEEK Tubing

Natural Color PEEK Tubing

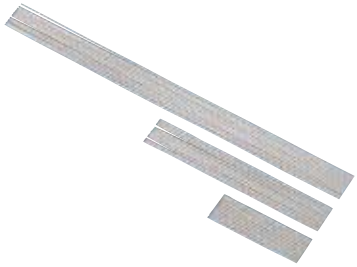
O.D.	I.D.	Max. Pressure	Length	Cat.No.
1/16 in.	0.13 mm	34.3 MPa	5 m	6010-37215
			10 m	6010-37220
1/16 in.	0.25 mm	34.3 MPa	5 m	6010-37315
			10 m	6010-37320
1/16 in.	0.50 mm	34.3 MPa	5 m	6010-37515
			10 m	6010-37520
1/16 in.	0.75 mm	27.4 MPa	5 m	6010-37715
			10 m	6010-37720

Stainless Steel Tubing

316 Stainless Steel Tubing

316 Stainless Steel Tubing

O.D.	I.D.	Length	Cat.No.
1/16 in.	0.10 mm	5 m	6010-32105
		10 m	6010-32110
1/16 in.	0.25 mm	5 m	6010-32205
		10 m	6010-32210
1/16 in.	0.50 mm	5 m	6010-32505
		10 m	6010-32510
1/16 in.	0.80 mm	5 m	6010-32805
		10 m	6010-32810
1/16 in.	1.00 mm	5 m	6010-32905
		10 m	6010-32910



Precut Stainless Steel Tubing Set

Precut Stainless Steel Tubing (1/16 in. O.D.)

Type	Dimension	Qty.	Cat.No.
1/16CT-1	0.25 mm I.D. x 50 mm L	10 pcs	6010-33010
1/16CT-2	0.25 mm I.D. x 100 mm L	10 pcs	6010-33020
1/16CT-3	0.25 mm I.D. x 200 mm L	10 pcs	6010-33030
1/16CT-4	0.5 mm I.D. x 50 mm L	10 pcs	6010-33040
1/16CT-5	0.5 mm I.D. x 100 mm L	10 pcs	6010-33050
1/16CT-6	0.5 mm I.D. x 200 mm L	10 pcs	6010-33060
1/16CT-7	0.8 mm I.D. x 50 mm L	10 pcs	6010-33070
1/16CT-8	0.8 mm I.D. x 100 mm L	10 pcs	6010-33080
1/16CT-9	0.8 mm I.D. x 200 mm L	10 pcs	6010-33090

PEEKsil Tubing

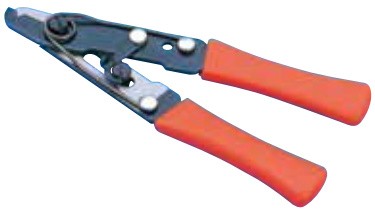
PEEKsil Tubing

PEEKsil tubing is PEEK covered fused silica capillary tubing which achieves mechanical strength and industry accepted chemical properties.

O.D.	I.D.	Max. Operating Pressure	Length	Qty.	Cat.No.
1/16 in.	0.05 mm	98.0 MPa	100 mm	5 pcs	6010-38051
			500 mm	2 pcs	6010-38055
1/16 in.	0.10 mm	98.0 MPa	100 mm	5 pcs	6010-38101
			500 mm	2 pcs	6010-38105
1/16 in.	0.175 mm	58.8 MPa	100 mm	5 pcs	6010-38171
			500 mm	2 pcs	6010-38175
1/16 in.	0.22 mm	39.2 MPa	100 mm	5 pcs	6010-38221
			500 mm	2 pcs	6010-38225

Tubing Cutters

Tubing Cutters



Plier-Type Tubing Cutter

Plier-Type Tubing Cutter

This tubing cutter makes clean cuts on 1/16 in. O.D. stainless steel tubing and ideal for cutting tubing in tight places.

Description	Qty.	Cat.No.
Plier-Type Tubing Cutter	1 pc	6010-81230

Rotary Tubing Cutter

Rotary Tubing Cutter

This tubing cutter cuts 1/16 in. and 1/8 in. O.D. tubings, Burr-Free leaving tubing I.D. open and also works with Glass-Lined tubings.

Description	Qty.	Cat.No.
Rotary Tubing Cutter	1 pc	3001-31701
Replacement Cutting Wheels	3 pcs	3001-31712

Handy Cutter

Handy Cutter

This cutter can cut tubing of a variety of materials from soft PTFE to hard PEEK without deforming the inner shape.
Usable tubing O.D. range: 1.5 ~ 8 mm

Description	Qty.	Cat.No.
Handy Cutter JC-2 (with 1 pc replacement blade)	1 pc	6010-81260
Replacement Blades For Handy Cutter JC-2	3 pcs	6010-81261

Clean Cut Tubing Cutter

Clean Cut Tubing Cutter

This cutter provides square, clean cuts on PEEK, PTFE and ETFE tubing with O.D.'s between 1/16 in. to 4 mm. Slide the tubing into the appropriate hole and engage the blade to make a perfect, square cut without distorting the tubing I.D..

Description	Qty.	Cat.No.
Clean Cut Tubing Cutter (with 1 pc replacement blade)	1 pc	6010-81270
Replacement Blade for Clean Cut Tubing Cutter	1 pc	6010-81271

Note: Usable tubing O.D.'s: 1/16 in., 2 mm, 3 mm, 1/8 in. and 4 mm

A view of a cut end

Capillary Fine Cutter

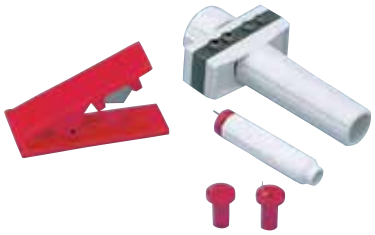
Capillary Fine Cutter

Using a rotary diamond blade, it is possible to cut silica capillary tubing cleanly and vertically. A magnifying glass is built-in for checking the cut surface.

Description	Qty.	Cat.No.
Capillary Fine Cutter for GC/LC (Black)	1 pc	3001-31020
Replacement Blade for GC/LC	1 pc	3001-31021
Capillary Fine Cutter for CE* (Blue)	1 pc	3001-31025
Replacement Blade for CE*	1 pc	3001-31026

*: Capillary electrophoresis

Tubing Flanger



Tube Flanger

Tubing Flanger

This uses mechanical force to form flanges, no electricity or heat is required.

Description	Specification	Cat.No.
Tubing Flanger	Tube Flanger, Pin 0.5/0.8/1.3 1 pc of each	6010-81500
Molding Pin	0.5 mm	6010-81505
Molding Pin	0.8 mm	6010-81508
Molding Pin	1.3 mm	6010-81513

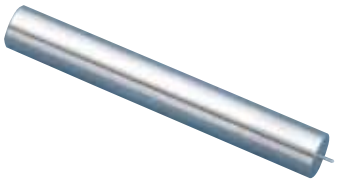
Tubing Tools for PTFE

Flare Working Tool

Flare Working Tool

Flared processing can be done by pinching the PTFE tube with the pliers contained in the kit, heating electrically the end of the tube, expanding the tube and then cooling it.

Description	Tube I.D. (mm)	Power	Cat.No.
Flaring Tool for PTFE Tubing	2×1-6×4	AC100 V (60 W)	3001-32302



Flange Making Tip

Flange Making Tip

Below tips are used to replace the old used ones.

Description	Tube I.D. (mm)	Cat.No.
FG-0.5	0.5	6010-81405
FG-1.0	1.0	6010-81410
FG-2.0	2.0	6010-81420

Tools

Spanner Set

Spanner Set

It contains a set of 6 pcs.

Sizes: 5.5 × 7, 8 × 9, 10 × 12, 11 × 13, 12 × 14, 14 × 17 mm

Description	Cat.No.
Spanner Set	6010-81200

Hexagon Wrench Set

HEXAGON WRENCH SET

It contains a set of 10 pcs.

Sizes: 1.5, 2, 2.5, 3, 4, 5, 5.5, 6, 8, 10 mm

Description	Cat.No.
Hexagon Wrench Set	6010-81210

Inch Hexalene Set

INCH HEXALENE SET

It contains a set of 12 pcs.

Sizes: 1/20, 1/16,5/64, 3/32, 7/64, 1/8, 9/64, 5/32, 3/16, 7/32, 1/4, 5/16 inch

Description	Cat.No.
Inch Hexalene Set	6010-81215

Solvent Bottle Cap

Solvent Reservoir Caps


Solvent Reservoir Caps


Tube Clip


Screw Bottles


Cap for 1/8 in. Tubing Insertion

Solvent Reservoir Caps

The caps are for 500 mL, 3 L solvent bottles, and both have 4 holes of 3 mm I.D..

Description	Qty.	Cat.No.
Solvent Reservoir Cap for 500 mL	1 pc	6010-81140
Solvent Reservoir Cap for 3000 mL	1 pc	6010-81150

Tubing Clip

Tubing clip can easily fix the 1/16 in. (1.5 mm) O.D or 1/8 in. (3 mm) PTFE tubing to a beaker or a waste solvent bottle.

Description	Qty.	Cat.No.
Tubing Clip	5 pcs	6010-81160

Note: Tubing Clip can not be used for over 4 mm thick bottles.

Screw Bottles & Caps

Material: Bottle (Borosilicate glass), Cap (PP)

Screw size: GL45

Description	Bottle Diamater	Bottle Length	Cat.No.
Screw Bottle 250 mL	70 mm	138 mm	6010-92501
Screw Bottle 500 mL	86 mm	176 mm	6010-92502
Screw Bottle 1000 mL	101 mm	225 mm	6010-92503

Description	Material	Qty.	Cat.No.
Screw Bottle Plug Cap	PP	1 pc	6010-92510

Cap for 1/8 in. Tubing Insertion

This cap is for GL45 threated bottles and has two ports for 1/8 in. tubing insertion.

Cap and PTFE tubings are sealed with flange free fittings.

Wetted Material: PTFE, ETFE, PEEK

Cap Material: Phenol Resin

Thread: GL45

Description	Qty.	Cat.No.
Cap for 1/8 in. Tubing Insertion	1 set	6010-92522

Note: Including 1 pc PTFE plug.

LC Caps


6010-81720


6010-81721


6010-81722


6010-81700


6010-81701


6010-81702


6010-81760


6010-81761


6010-81762

These caps are for GL45 and GL38 solvent bottles. The wide choice includes caps with 2 to 4 ports for tubing and filter connection. A Safety Cap is installed in each line to avoid evaporation and volatilization of the solvents.

Caps

Description	Size	No. of ports	Qty.	Cat.No.
Solvent Bottle Cap	GL38	2 ports	1	6010-81720
		3 ports	1	6010-81721
		4 ports	1	6010-81722
	GL45	2 ports	1	6010-81700
		3 ports	1	6010-81701
		4 ports	1	6010-81702
Safety Cap GL45	GL45	2 ports	1	6010-81760
		3 ports	1	6010-81761
		4 ports	1	6010-81762


Exhaust Gas Filter


Inlet Valves


Flexible Tube

Spare Parts

Description	Size	For GL45	For GL38	Qty.	Cat.No.
O-ring	FEP-coated	•	–	1	6010-81705
		–	•	1	6010-81725
Adapter Ring	PTFE	–	•	1	6010-81726
1/4-28 Thread	For 1/16” Tube (PPS)	•	•	10	6010-81706
	For 1/18” Tube (PPS)	•	•	10	6010-81707
Ferrule	For 1/16” Tube (ETFE)	•	•	10	6010-81708
	For 1/8” Tube (ETFE)	•	•	10	6010-81709
1/4-28 Plug	PEEK	•	•	1	6010-81710
1/4-28 Plug	Polypropylene	•	•	1	6010-81711
Hose Adapter	For 1/8” Tube (ETFE)	•	•	1	6010-81712
Color-sleeve Adapter	2 color (2 each)	•	•	24	6010-81734

Exhaust Gas Filter

Description	Qty.	Cat.No.
With Indicator	1	6010-81745
Without Indicator	1	6010-81746

Air Inlet Filter

Description	Qty.	Cat.No.
CO_2 Filter	1	6010-81747
Moisture Filter	1	6010-81748

Inlet Valve

Description	Type	Qty.	Cat.No.
Safety Air Inlet Valve	Without Filter	1	6010-81750

Flexible Tube

Description	Qty.	Cat.No.
Nut, Ferrule (2 set)	1	6010-81755

Safe Bottle (Polymer Coated Exterior)

Description	Qty.	Cat.No.
0.5 L	1	6010-81715
1 L	1	6010-81716
2 L	1	6010-81717

Gradient Mixer

Low Volume Static Mixers

Feature

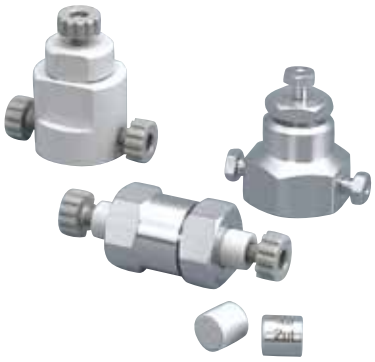
- Low volume can shorten analysis time.
- The special internal structure delivers excellent mixing efficiency and sharp peaks.
- Gradient accuracy achieves high reproducibility.
- Improves reaction efficiency of post-column derivatization.
- Mixer cartridges can be changed depending on the flow volume.

Specifications

- Max. Operating Pressure:
  34.3 MPa for high pressure,
  24.5 MPa for Non-metal
- Wetted Flow Pah Materials:
  SUS 316, PEEK for high pressure,
  PEEK for non-metal

Cartridge Volume	Recommend Flow Rate Range
5 µL	~ 5 µL/min
10 µL	5 ~ 10 µL/min
25 µL	10 ~ 20 µL/min
50 µL	20 ~ 150 µL/min
150 µL	150 ~ 500 µL/min
250 µL	500 µL/min ~ 1.0 mL/min

Note: The flow rate range is case of using high pressure gradient analysis.



Micro Static Mixer

Static Mixer for High Pressure

Non-metal Static Mixer

Micro Static Mixers

Model	Detail	Cartridge Volume	Cat.No.
SM1-000.5A	High Pressure, 1 Line	0.5 µL	6010-93204
SM1-002A	High Pressure, 1 Line	2.0 µL	6010-93200
SM1-005A	High Pressure, 1 Line	5.0 µL	6010-93201
SM1-010A	High Pressure, 1 Line	10.0 µL	6010-93202
SM1-025A	High Pressure, 1 Line	25.0 µL	6010-93203
SM2-000.5A	High Pressure, 2 Lines	0.5 µL	6010-93224
SM2-002A	High Pressure, 2 Lines	2.0 µL	6010-93220
SM2-005A	High Pressure, 2 Lines	5.0 µL	6010-93221
SM2-010A	High Pressure, 2 Lines	10.0 µL	6010-93222
SM2-025A	High Pressure, 2 Lines	25.0 µL	6010-93223
RMC-000.5A	High Pressure, Replacement Cartridge	0.5 µL	6010-93214
RMC-002A	High Pressure, Replacement Cartridge	2.0 µL	6010-93210
RMC-005A	High Pressure, Replacement Cartridge	5.0 µL	6010-93211
RMC-010A	High Pressure, Replacement Cartridge	10.0 µL	6010-93212
RMC-025A	High Pressure, Replacement Cartridge	25.0 µL	6010-93213
SM1-000.5AP	Non-metal, 1 Line	0.5 µL	6010-93304
SM1-002AP	Non-metal, 1 Line	2.0 µL	6010-93300
SM1-005AP	Non-metal, 1 Line	5.0 µL	6010-93301
SM1-010AP	Non-metal, 1 Line	10.0 µL	6010-93302
SM1-025AP	Non-metal, 1 Line	25.0 µL	6010-93303
SM2-000.5AP	Non-metal, 2 Lines	0.5 µL	6010-93324
SM2-002AP	Non-metal, 2 Lines	2.0 µL	6010-93320
SM2-005AP	Non-metal, 2 Lines	5.0 µL	6010-93321
SM2-010AP	Non-metal, 2 Lines	10.0 µL	6010-93322
SM2-025AP	Non-metal, 2 Lines	25.0 µL	6010-93323
RMC-000.5AP	Non-metal, Replacement Cartridge	0.5 µL	6010-93314
RMC-002AP	Non-metal, Replacement Cartridge	2.0 µL	6010-93310
RMC-005AP	Non-metal, Replacement Cartridge	5.0 µL	6010-93311
RMC-010AP	Non-metal, Replacement Cartridge	10.0 µL	6010-93312
RMC-025AP	Non-metal, Replacement Cartridge	25.0 µL	6010-93313

Note: Please contact for 3 ways mixer.

Static Mixers

Model	Detail	Cartridge Volume	Cat.No.
SM1-05A	High Pressure, 1 Line	50 µL	6010-93057
SM1-15A	High Pressure, 1 Line	150 µL	6010-93058
SM1-25A	High Pressure, 1 Line	250 µL	6010-93059
SM2-05A	High Pressure, 2 Lines	50 µL	6010-93055
SM2-15A	High Pressure, 2 Lines	150 µL	6010-93051
SM2-25A	High Pressure, 2 Lines	250 µL	6010-93052
RMC-05A	High Pressure, Replacement Cartridge	50 µL	6010-93063
RMC-15A	High Pressure, Replacement Cartridge	150 µL	6010-93061
RMC-25A	High Pressure, Replacement Cartridge	250 µL	6010-93062
SM1-05AP	Non-metal, 1 Line	50 µL	6010-93077
SM1-15AP	Non-metal, 1 Line	150 µL	6010-93078
SM1-25AP	Non-metal, 1 Line	250 µL	6010-93079
SM2-05AP	Non-metal, 2 Lines	50 µL	6010-93071
SM2-15AP	Non-metal, 2 Lines	150 µL	6010-93072
SM2-25AP	Non-metal, 2 Lines	250 µL	6010-93073
RMC-05AP	Non-metal, Replacement Cartridge	50 µL	6010-93065
RMC-15AP	Non-metal, Replacement Cartridge	150 µL	6010-93066
RMC-25AP	Non-metal, Replacement Cartridge	250 µL	6010-93067

Note: Please contact for 3 ways mixer.

Back Pressure Regulator & In-Line Check Valves

Back Pressure Regulators

For post column labeling method, the back pressure regulator is used to provide the pump for reaction with back pressure for stable delivery of flow.

Back Pressure Regulators

Back Pressure Regulators (PEEK Holder)

Specifications

Fittings: 1/16 in. Flangeless Nut

P/N	Pressure Setting	Cartridge	Cat.No.
P-790	0.03 MPa	–	6010-57000
P-791	0.14 MPa	–	6010-57001
P-786	0.52 MPa	P-762	6010-57003
P-788	1.7 MPa	P-764	6010-57005
P-789	3.4 MPa	P-765	6010-57006

Note: Fitting shape vary with the types.

Back Pressure Regulators (SUS Holder)

P/N	Pressure Setting	Cartridge	Cat.No.
U-606	0.52 MPa	P-762	6010-57013
U-608	1.7 MPa	P-764	6010-57015
U-609	3.4 MPa	P-765	6010-57016
U-610	5.2 MPa	P-795	6010-57017

Note: Fitting shape will be changed by the types.

Replacement Cartridges

Replacement Cartridges

Specifications

Wetted Flow Path Materials : PEEK, ETFE, Fluorine Rubber,
Gold-Plated Stainless Steel

P/N	Pressure Setting	Color Coding		Cat.No.
		Body	Cap	
P-761	0.28 MPa	Yellow Brown	Blue	6010-57022
P-762	0.52 MPa	Yellow Brown	Yellow	6010-57023
P-763	0.69 MPa	Yellow Brown	Red	6010-57024
P-764	1.7 MPa	Yellow Brown	White	6010-57025
P-765	3.4 MPa	Yellow Brown	Green	6010-57026
P-795	5.2 MPa	Black	Blue	6010-57027
P-796	6.9 MPa	Black	Green	6010-57028

In-Line Check Valves

In-Line Check Valves

Specifications

Max. Operating Pressure: 6.9 MPa
Fittings: 1/16 in., 1/8 in. Flangeless Nut
Wetted Flow Path Materials:
CV-3000 (PEEK, Gold-Plated Stainless Steel, Perfluorelastomer, ETFE)
CV-3010 (PEEK, Stainless Steel, Ethylene-propylene, ETFE)

P/N	Description	Cat.No.
CV-3000	In-Line Check Valve 1/16 in.	6010-57100
CV-3010	In-Line Check Valve 1/8 in.	6010-57110

HPLC Column Hardware

Stainless Steel Analytical Column Hardware

Analytical Column Hardware

Analytical Column Hardware with Waters End Fittings

O.D.	I.D.	Length	Cat.No.
1/4 in.	4.0 mm	50 mm	6010-11041
		150 mm	6010-11043
		250 mm	6010-11045
	4.6 mm	50 mm	6010-11051
	4.0 mm	50 mm	6010-11053
	4.6 mm	250 mm	6010-11055
8 mm	6.0 mm	50 mm	6010-11061
		150 mm	6010-11063
		250 mm	6010-11065
3/8 in.	7.6 mm	50 mm	6010-11071
		150 mm	6010-11073
		250 mm	6010-11075

Mini Guard Column Hardware

Mini Guard Column Hardware

Specifications

Size: 4 mm I.D. x 10 mm Length
Filter Pore: 2 µm

Description	Cat.No.
Waters End Fitting W Type	6010-11000

Column End Fittings with A Frit

Waters End Fitting

Type	Tubing size (O.D. x I.D.)	without Nut & Ferrule	with A Nut & A Ferrule
		Cat.No.	Cat.No.
Waters End Fitting	1/4 in. × 4.6 mm	6010-13043	6010-13042
	1/4 in. × 4.0 mm	6010-13046	6010-13045
	8.0 × 6.0 mm	6010-13051	6010-13050
	3/8 in. × 7.6 mm	6010-13071	6010-13070

Stainless Steel Preparative Column Hardware

Preparative Column Hardware

Preparative Columns Hardware

Max. Pressure: 29.4 MPa

Connection: 1/16 in. Nut

Filter Pore: 2 µm

O.D.	I.D.	Length	Cat.No.
12.7 mm	10.7 mm	50 mm	6010-15000
		250 mm	6010-15003
		500 mm	6010-15005
25.0 mm	20.0 mm	50 mm	6010-15020
		250 mm	6010-15023
		500 mm	6010-15025
38.0 mm	30.0 mm	50 mm	6010-15040
		250 mm	6010-15043
		500 mm	6010-15045

Note: Besides above length, 16.7 mm I.D., 22.2 mm I.D. size are also available.

Packers

Packer

The packer is used to slurry pack a columns with packing materials. It can be used for various I. D. columns by changing the attachments.

Model	Capacity	Max. Pressure	Cat.No.
CP-25	25 mL	58.8 MPa	6010-61100
CP-40	40 mL		6010-61200
CP-50	50 mL		6010-61300
CP-100	100 mL		6010-61400

CPA-4 Attachment

Attachments

Model	Column O.D. Size	Threads	Cat.No.
CPA-3	Micro-column	5/16 - 20	6010-61903
CPA-4	Stainless Steel 1/4 in. O.D. Column	7/16 - 20	6010-61904
CPA-5	Stainless Steel 3/8 in. O.D. Column	9/16 - 20	6010-61905
CPA-10	Glass 10 mm I.D. Column	M24 × 1	6010-61911

Replacement Sealings

Description	Qty.	Cat.No.
Outlet Sealing for CP-25, CP-40, CP-50, CP-100	5 pcs	6010-61800
Inlet Sealing for CP-25	5 pcs	6010-61810
Inlet Sealing for CP-40	5 pcs	6010-61820
Inlet Sealing for CP-50, CP-100	5 pcs	6010-61830

Column Filters

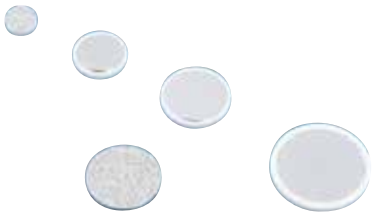
Replacement Stainless Steel Frits for Analytical Columns

Replacement Stainless Steel Frits for Analytical Columns

Model	Column O.D., I.D. Size	Porosity	Qty.	Cat.No.
CRF-1	Outlet Frit for Mini Guard Column	2 µm	5 pcs	6010-53000
CRF-2	1/8 in. O.D.	2 µm	5 pcs	6010-53010
CRF-3	6 mm O.D., 2.6 mm I.D.	2 µm	5 pcs	6010-53020
CRF-4	6 mm O.D., 4 mm I.D.	2 µm	5 pcs	6010-53030
CRF-5	1/4 in. O.D., Inlet for Mini Guard Column	2 µm	5 pcs	6010-53040
CRF-6	8 mm O.D.	2 µm	5 pcs	6010-53060
CRF-7	3/8 in. O.D.	2 µm	5 pcs	6010-53070
CRF-8	10 mm O.D.	2 µm	5 pcs	6010-53080
CRF-9	Glass Column (PTFE)	10 µm	5 pcs	6010-53090
CRF-10	0.7 mm I.D. Micro-column	0.5 µm	5 pcs	6010-53100
CRF-11	1.0, 1.5 mm I.D. Micro-column	0.5 µm	5 pcs	6010-53110
CRF-13	1/4 in. O.D., 2.1 mm I.D.	0.5 µm	5 pcs	6010-53130
CRF-14	1/4 in. O.D., 3.0 mm I.D.	0.5 µm	5 pcs	6010-53140
CRF-15	1/4 in. O.D., 4.0 mm I.D.	0.5 µm	5 pcs	6010-53150

Note: CRF-1~8 and CRF-10~15 are stainless steel frits with sealing ring.

Replacement Stainless Steel Frits for Preparative Columns



Replacement Stainless Steel Frits for Preparative Columns

Model	Column O.D., I.D. Size	Porosity	Qty.	Cat.No.
ARF-10	12.7 mm O.D., 10.7 mm I.D.	2 µm	2 pcs	6010-54510
ARF-20	25.0 mm O.D., 20.0 mm I.D.	2 µm	2 pcs	6010-54520
ARF-30	38.0 mm O.D., 30.0 mm I.D.	2 (40) µm	2 pcs	6010-54530

Note: These frits come complete with a PTFE sealing ring.
ARF-30 includes two sets of a main frit (2 µm) and a sub-frit (40 µm).

Manual Sample Injector Valves

7725·7725i SUS Model Injector

The patented Make-Before-Break (MBB®) design allows for continuous flow when the injector is switched between LOAD and INJECT positions. No interruption of the flow is a good use for flow-sensitive detectors, fragile columns or pumps. 7725i is an injector with a built-in position sensing switch which provides the systems with a reproducible start signal.

7725

Specifications

Tubing O.D.: 1/16 in.
Port: 10-32 UNF
Sample Loop Volumes: 2 µL ～ 5 mL
Max. Operating Pressure: 48 MPa
Max. Operating Temp.: 80 °C
Wetted Material: SUS316, PEEK, Ceramic, Vespel.

Description	Cat.No.
7725 SUS Model injector	6020-76000
7725i SUS Model injector	6020-77000

9725·9725i PEEK Model Injector

Both Valves (PEEK) has no metal in contact with the flow for sample compatibility. Patented Make-Before-Break (MBB®) architecture allows for continuous flow when the injector is switched between LOAD and INJECT positions which virtually eliminates transient pressure shocks for extended column life. 9725i is an injector with a built-in position sensing switch which provides the system with a reproducible start signal.

9725

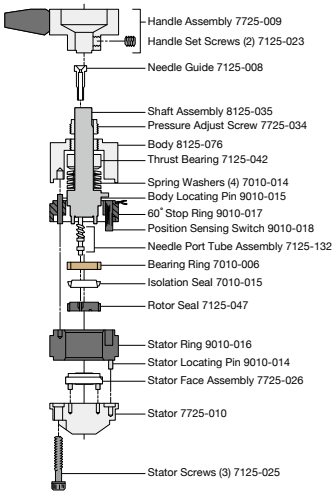
Specification

Tubing O.D.: 1/16 in.
Port: 10-32 UNF
Sample Loop Volumes: 2 µL ～ 10 mL
Max. Operating Pressure: 34 MPa
Max. Operating Temp.: 50 °C
Wetted Material: PEEK, Ceramic, Tefzel.

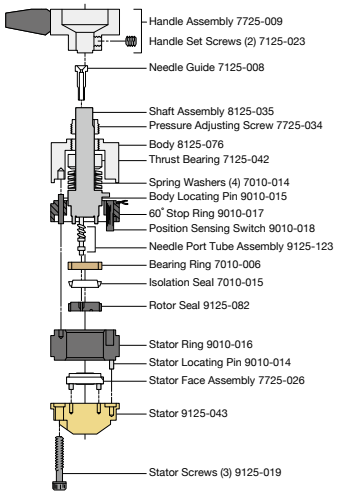
Description	Cat.No.
9725 PEEK Model injector	6020-93000
9725i PEEK Model injector	6020-94000

Note: About tubing, please use RHEFLEX fitting and ETFE tubing or PEEK tubing.

Valve Connecting Diagram



7725i



9725i

RHEODYNE Valve Accessories

Fittings

6000-054

6000-055

6000-282

P/N	Description	Qty.	Cat.No.
6000-051	1/16 RheFlex Ferrule	5 pcs	6020-34051
6000-054	1/16 RheFlex Fitting Set	5 pcs	6020-34054
6000-055	1/16 RheFlex Short Fitting Set	5 pcs	6020-34055
6000-076	1/8-1/16 Port Adaptor	1 pc	6020-34076
6000-078	1/8 RheFlex Fitting Set	1 pc	6020-34078
6000-090	1/16 RheFlex Plug	5 pcs	6020-34090
6000-277	1/16 RheFlex Ferrule	10 pcs	6020-34277
6000-278	1/8 RheFlex Flangeless Fitting Set	10 pcs	6020-34278
6000-282	1/16 RheFlex One-Piece Fitting Set	10 pcs	6020-34282

Stainless Steel Fittings

7010-009

7010-010

7010-011

P/N	Description	Qty.	Cat.No.
6000-082	1/8 Fitting Set	1 set	6020-34082
6000-083	1/8 Ferrule	5 pcs	6020-34083
7010-009	1/16 Nut	5 pcs	6020-37009
7010-010	1/16 Ferrule	5 pcs	6020-37010
7010-011	1/16 Long Nut	5 pcs	6020-37011
7010-062	1/16 Extra Long Nut	5 pcs	6020-37062

Needle Port Accessories

7125-008

7215

7125-054

7125-132

Valve Model No.	P/N	Description	Qty.	Cat.No.
7725, 7725i, 7125	7125-008	Needle Guide	1 pc	6020-61008
7725, 7725i, 7125	7215	#22 Gauge Needle	1 pc	6020-67000
7725, 7725i, 7125	7125-054	Needle Port Cleaner	1 pc	6020-61054
7725, 7725i, 7125	7125-132	Needle Port Tube Assembly	1 pc	6020-61132
9725, 9725i	9125-076	Suction Needle Adaptor	1 pc	6020-92076
9725, 9725i	9125-123	Needle Port Tube Assembly	1 pc	6020-92123
3725	3725-056	#16 Gauge PEEK Needle	1 pc	6020-99056
3725-038	3725-086	#16 Gauge SUS Needle	1 pc	6020-99086

CONSUMABLES AND SUPPLIES

AIR SAMPLING

Gas Sampling Bags

Gas sampling bags are widely used as whole air sampling devices for monitoring gases in cabin, emission, workplace environments, indoor, etc. The gas sampling method by bags is ideal for many applications because of easy introduction to GC or enrichment by concentration tubes. However the results of analyses may vary depending on the material of the gas sampling bags, which is caused due to permeation or adsorption of gases. In addition, background delivered from the bag materials may disturb the determination of the target compounds. Therefore selecting a right bag material is inevitable for leading your analysis to success.
GL Sciences is proud to introduce "Smart Bag" series of new sampling bags, which were developed based on many years of our experiences and along with some other bags fulfills customer's demanding requirements worldwide.
In accordance with the following directions, select an appropriate bag to achieve highly reliable analytical results.

Select the Appropriate Sampling Bags for your Application

Smart Bag PA
- Polyvinyl alcohol film
- Chemically inert, resistant to heat and permeation
- Low background contamination
- Max. Operating Temp. : 120 °C
- Film thinkness: 53 µm

Applications: In-cabin VOC's, Vehicle Emission, Emitted gases from materials, Permanent gases, etc.

Smart Bag 2F
- Polyvinylidene fluoride (PVDF) film
- Chemically inert and resistant to heat
- Max. Operating Temp. : 120 °C
- Film thinkness: 50 µm

Applications: In-cabin VOC's, Vehicle Emission, Emitted gases from materials, etc.

Tedlar Bag
- Polyvinyl fluoride (PVF)
- Max. Operating Temp. : 100 °C
- Film thickness : 50 µm

Applications: Permanent gases and organic solvent gases.

ANALYTIC-BARRIER Bag
- Resistant to permeation
- Low background contamination
- Max. Operating Temp. : 70 °C
- Film thinkness: 45 µm

Applications: In-cabin VOC's, Vehicle Emission, Permanent Gases, etc.

Fluororesin Bag
- Tetrafluoroethylene hexafluoropropylene copolymer film
- Chemically inert and resistant to heat
- Max. Operating Temp. : 110 °C
- Film thinkness: 50 µm

Applications: Organic solvent gases.

Aluminum Bag (5-Layer Foil)
- Aluminum Bag is made of laminated film (from outer: nylon, polyethylene, alum foil and polyethylene, polyethylene)
- Resistant to permeation of permanent gases and methane
- Max. Operating Temp. : 65 °C
- Film thinkness: 120 µm

Applications: Permanent gases.

Polyester Bag
- Polyester film
- Resistant to VOC permeation
- Film thinkness: 38 µm

Applications: VOC's and malodorous compounds.

SKYPIA Bag
- Ethylene-vinyl alcohol copolymer (EVOH)
- Resistant to permeation
- Low background Contamination
- Max. Operating Temp: 100 °C

Applications: Automobile Interior Material VOC Emissions Testing

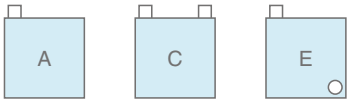
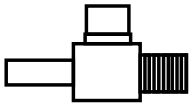
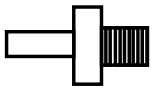
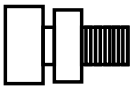
As shown above, GL Sciences has a wide variety of sampling bags to offer. It is extremely important to select the appropriate sampling bag depending on the target compound you are required to sample/collect to avoid any sampling error as much as possible. Please select the appropriate sampling bag to achieve highly reliable test results.

How to Choose a Gas Sampling Bag

(Example)

①	②	③	④
Smart Bag PA	A	A	10

※ This is the example for a Smart Bag PA with type A, standard sleeve at one end (6 mm), 10L.

①	**Name of Bag**	Smart Bag PA / Smart Bag 2F / ANALYTIC-BARRIER Bag Tedlar Bag / Fluororesin Bag / Aluminum Bag / Polyester Bag
②	**Type**	 □ : Sleeve or sleeve with mini valves ○ : M6 Connector
③	**Connector** Standard is: ・6 mm for less than 20 L ・8 mm for not less than 20 L	A : Standard sleeve at one end AS : 7 mm sleeve at one end AK : 6 mm sleeve with mini valve at one end B : M6 connector at one end C : Standard sleeves at both ends CS : 7 mm sleeve at both ends CK : 6 mm sleeve with mini valve at both ends D : M6 connectors at both ends E : Standard sleeve at one end + M6 connector at the other end EK : 6 mm sleeve with mini valve at one end + M6 connector at the other end F : PP sleeve at one end (Type A of Smart Bag only avilable) G : PP sleeve at both ends (Type C of Smart Bag only avilable) AA8 : 8 mm sleeve at one end AAJ8 : PTFE joint for 8 mm sleeve at one end (Aluminum bag A type only) CCJ8 : PTFE joint for 8 mm sleeve at both ends (Aluminum bag C type only) AAP8 : PTFE joint for 8 mm sleeve at one end ＋ 8 mm sleeve with valve at the other end (Aluminum bag only)  Sleeve with mini valve (6 mm)  Standard sleeve (6 mm)  M6 Connector
④	**Bag Capacity (L)**	Standard: 1 L, 2 L, 3 L, 5 L, 10 L Other sizes such as from 0.1 L ～ 500 L can be manufactured upon request.

Connectors for Gas Sampling Bags

Standard Sleeve
(O.D.: 6, 7, 8 mm; PTFE)

6 mm O.D. Sleeve with
Mini Valve (PTFE)

M6 Connector with
Septum (PTFE)

8 mm O.D. Sleeve with Valve (PP)

6 mm O.D. Sleeve (PP)
for Smart Bag

8 mm O.D. Sleeve with
Valve (PTFE)

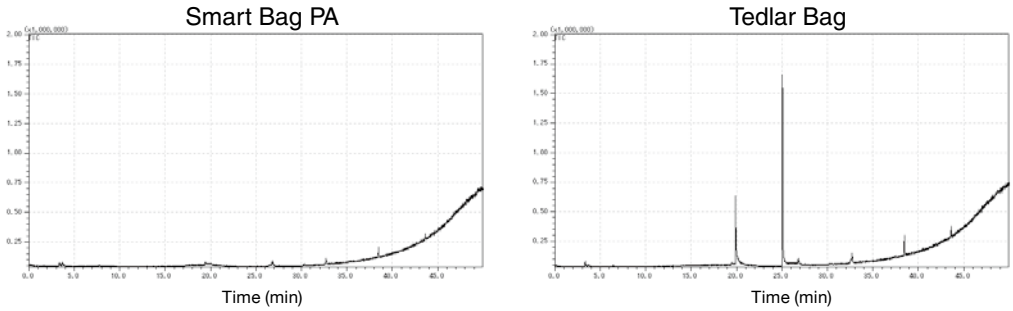
Smart Bag PA

Smart Bag PA is made of poly vinyl alcohol film and delivers superior resistance to solvent gases, heat and adsorption for low back ground contamination. Smart Bag PA also avoids the permeation of most gases. This feature enables a wide range of sampling from permanet gases to organic gases.
Max. Operating Temp. : 120 °C

Blank Test

【Testing Procedure】

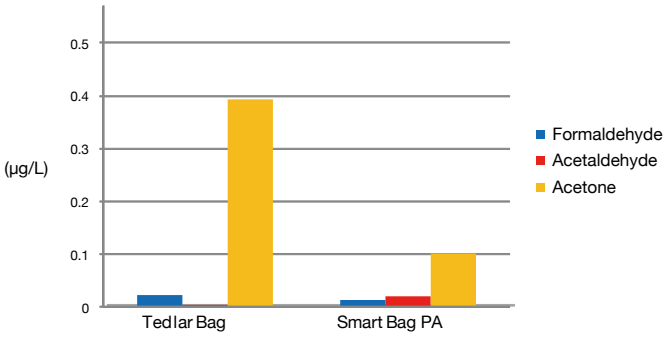
Each sampling bag (1L) was filled with nitrogen and put in an oven at 60 °C. 1 hour later, the each gas in the bags was withdrawn into a gas tight micro syringe and injected directly to a GC/MS. The both bags were not flushed/cleaned in advance.



Aldehydes/Acetone Blank Test

【Testing Procedure】

After being filled with nitrogen, both bags were closed and put in an oven at 60 °C. 1 hour later, each 1L gas in the bags was vacuumed with a pump through a DNPH cartridge and eluted sample was analyzed by HPLC. The both bags were not flushed/cleaned before test.



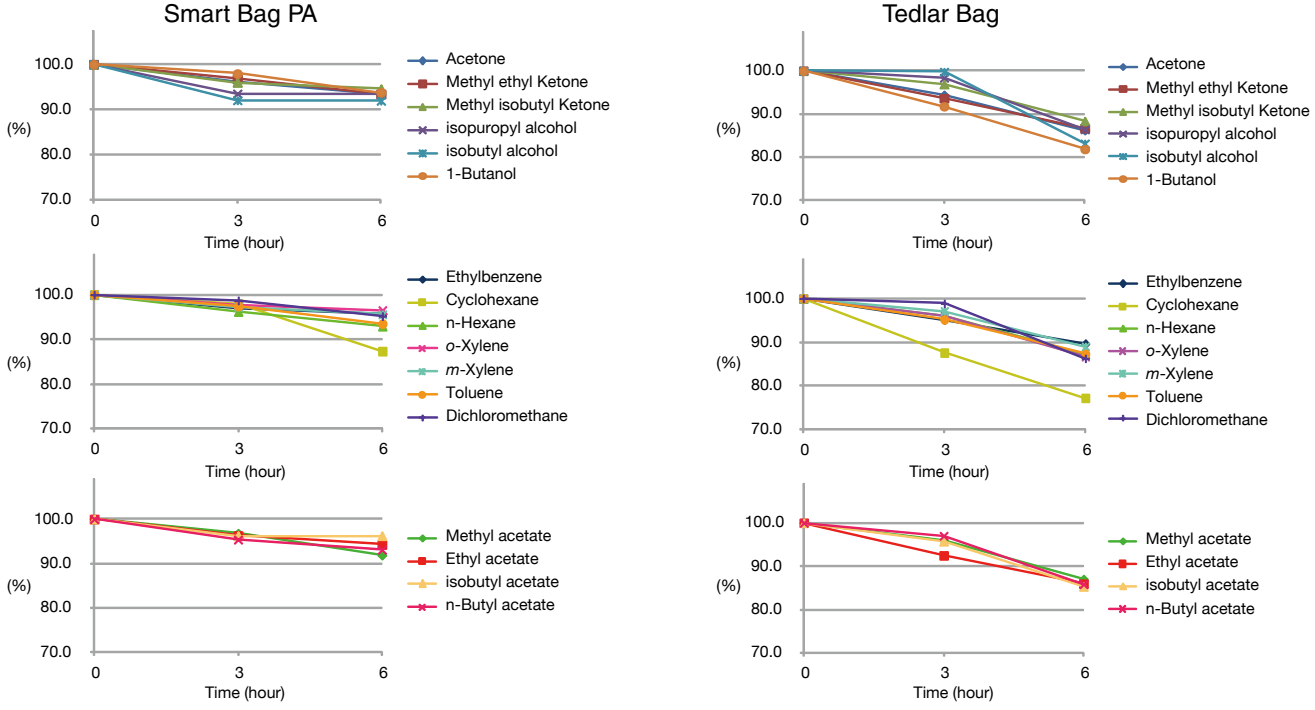
Storage Stability of Organic Solvent Gas in Smart Bag PA and Tedlar Bag

【Testing Procedure】

The same volume with the same constitution of vaporized standards were introduced to each bag. Then nitrogen was added to each bag and concentration changes over time were measured by a GC/FID.

【Standard Compound List】

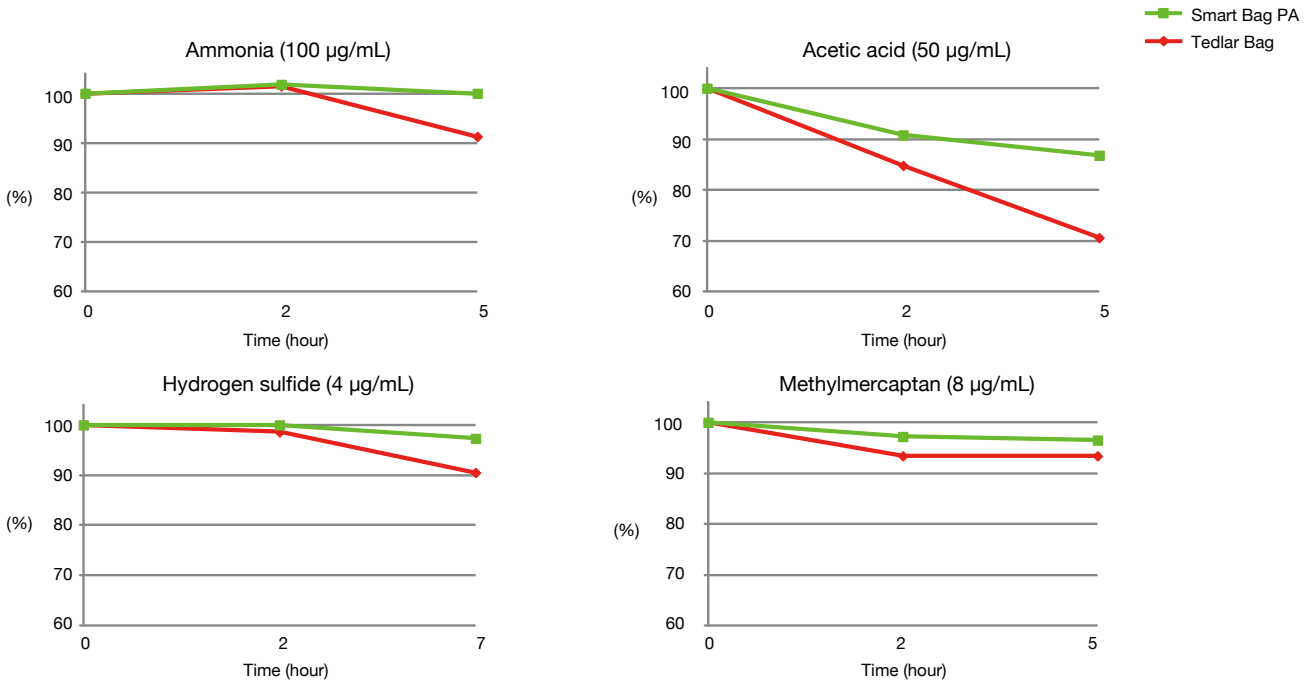
Acetone, Methylethylketone, Methyl isobutyl ketone, Isopropyl alcohol, Isobutyl alcohol, 1-Butanol, Ethylbenzene, Cyclohexane, n-Hexane, *o*-Xylene, *m*-Xylene, Toluene, Dichloromethane, Methyl acetate, Ethyl acetate, Isobutyl acetate, n-Butyl acetate (50 ng/mL each)



Storage Stability of Malodorous Compounds in Smart Bag PA and Tedlar Bag

【Testing Procedure】

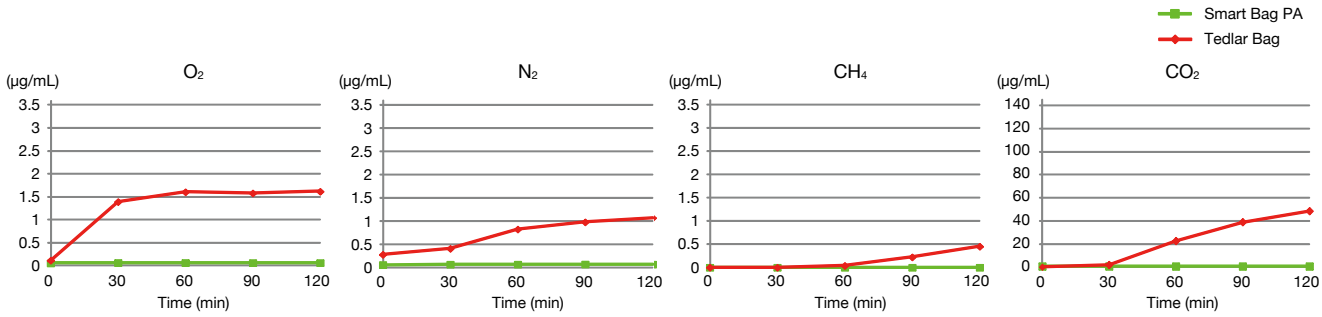
After preparation of each malodorous sample as described below, 5L Smart Bag PA and Tedlar Bag were filled with the sample together with nitrogen gas. Concentration changes over time were calculated with a detecting tube at certain times.



Gas Permeability Test

【Testing Procedure】

Permeation rates of O_2, N_2, CH_4 and CO_2 were measured using a permeation rate measurement system on each sampling bag.



Smart Bag PA

Type	1 L	2 L	3 L	5 L	10 L	20 L	30 L	50 L	100 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AF	3008-48101	3008-48102	3008-48103	3008-48105	3008-48110	3008-48120	3008-48130	3008-48150	3008-48160
AA	3008-97101	3008-97102	3008-97103	3008-97105	3008-97110	3008-97120	3008-97130	3008-97150	3008-97160
AAK	3008-97201	3008-97202	3008-97203	3008-97205	3008-97210	3008-97220	3008-97230	3008-97250	3008-97260
CG	3008-48401	3008-48402	3008-48403	3008-48405	3008-48410	3008-48420	3008-48430	3008-48450	3008-48460
CC	3008-97401	3008-97402	3008-97403	3008-97405	3008-97410	3008-97420	3008-97430	3008-97450	3008-97460
CCK	3008-97501	3008-97502	3008-97503	3008-97505	3008-97510	3008-97520	3008-97530	3008-97550	3008-97560
CEK	3008-97701	3008-97702	3008-97703	3008-97705	3008-97710	3008-97720	3008-97730	3008-97750	3008-97760

* Other bag sizes available upon request.

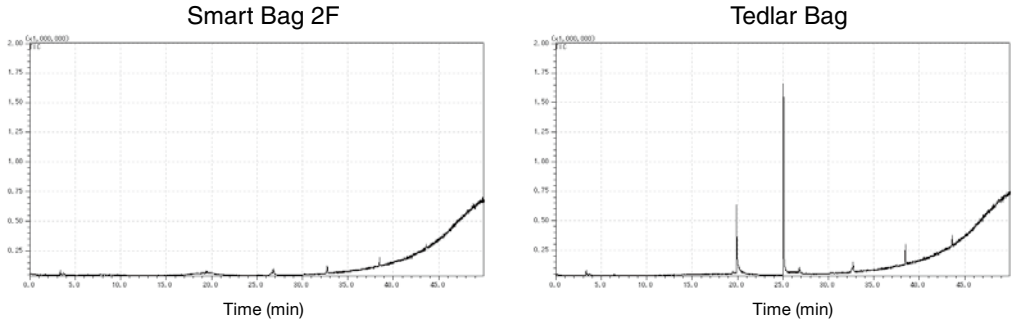
Smart Bag 2F

Smart Bag 2F is made of polyvinylidene fluoride (PVDF) film and delivers superior resistance to solvent gases and heat. In addition, this bag is suitable for sampling of VOC's from in-cabin, indoors, workplace environment, etc.
Max. Operating Temp. : 120 ˚C

Blank Test

【Testing Procedure】

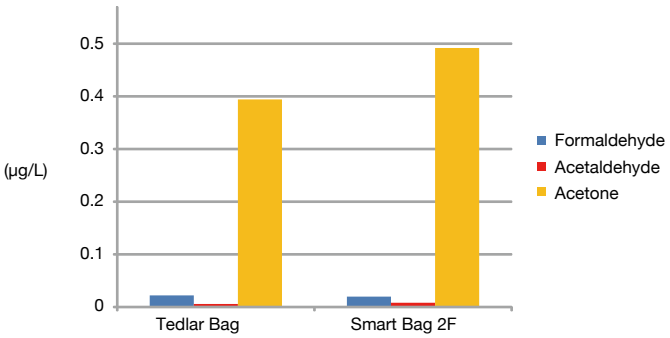
Each sampling bag (1L) was filled with nitrogen and put in an oven at 60 ˚C. 1 hour later, the each gas in the bags is withdrawn into a gas tight micro syringe and injected directly to a GC/MS. Both bags were not flushed/cleaned with nitrogen.



Aldehydes/Acetone Blank Test

【Testing Procedure】

After being filled with nitrogen, both bags were closed and put in an oven at 60 ˚C. 1 hour later, each 1L gas in the bags was vacuumed with a pump through a DNPH cartridge and eluted sample was analyzed by HPLC. The both bags were not flushed/cleaned before the test.



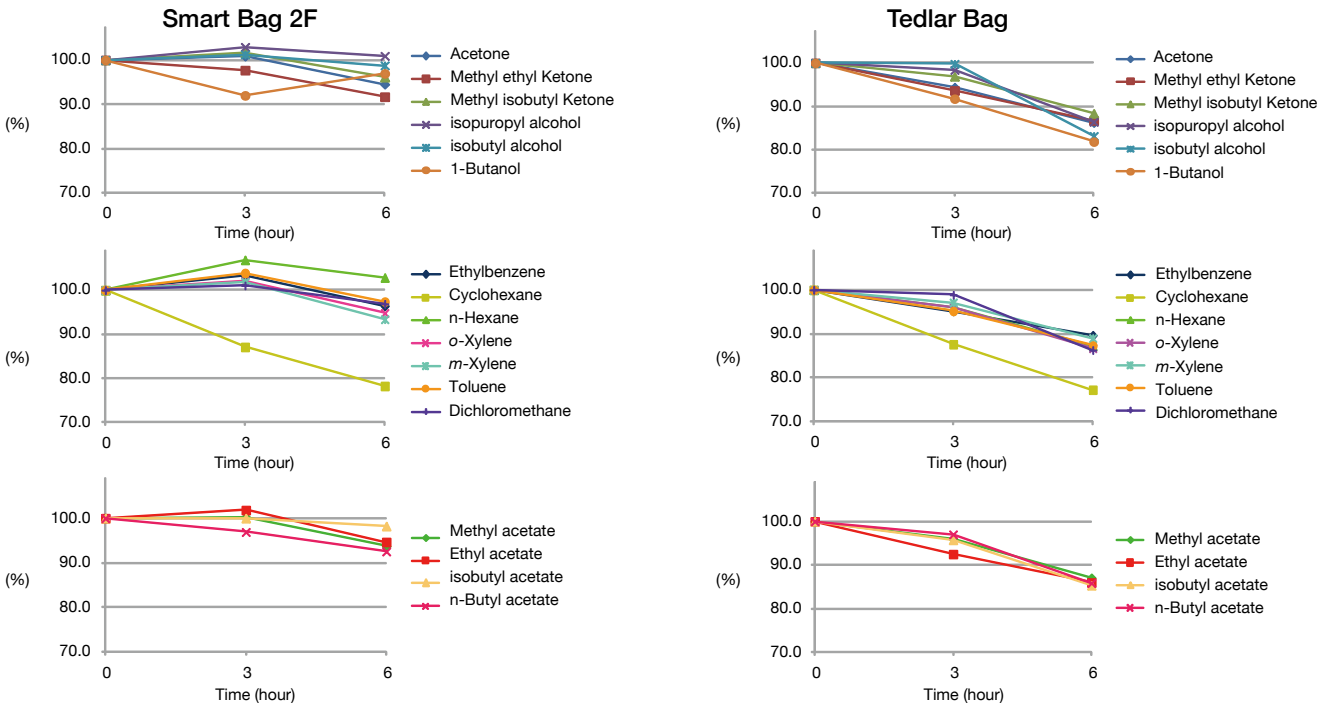
Storage Stability of Organic Solvent Gases in Smart Bag 2F and Tedlar Bag

【Testing Procedure】

The same volume with the same constitution of vaporized standards were introduced to each bag. Then nitrogen was added to each bag and were measured by a GC/FID.

【Standard Compound List】

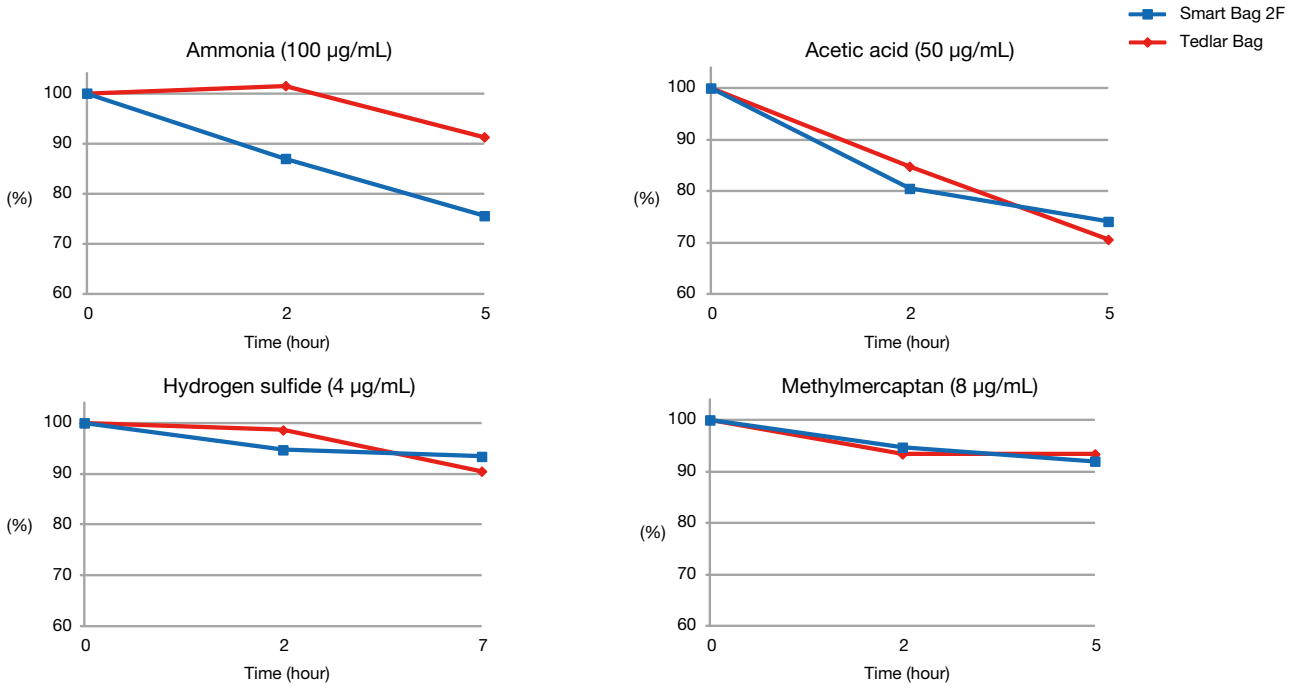
Acetone, Methylethylketone, Methyl isobutyl ketone, Isopropyl alcohol, Isobutyl alcohol, 1-Butanol, Ethylbenzene, Cyclohexane, n-Hexane,*o*-Xylene, *m*-Xylene Toluene, Dichloromethane, Methyl acetate, Ethyl acetate, Isobutyl acetate, n-Butyl acetate (50 ng/mL each)



Storage Stability of Malodorous Compounds in Smart Bag 2F and Tedlar Bag

【Testing Procedure】

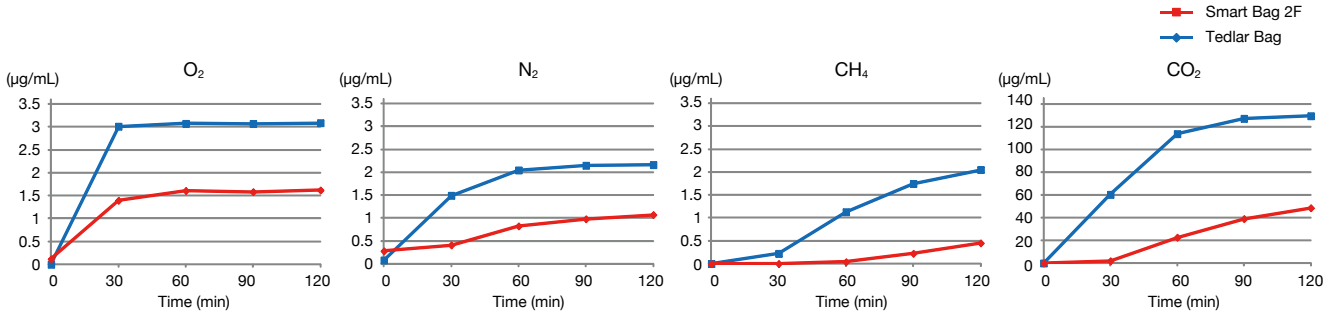
After preparation of each malodorous sample as described below, 5L Smart Bag 2F and 5 L Tedlar Bag were filled with the sample together with nitrogen gas. Concentration changes over time were calculated with a detecting tube at certain times.



Gas Permeability Test

【Testing Procedure】

Permeation rates of O_2, N_2, CH_4 and CO_2 were measured using a permeation rate measurement system on each sampling bag.



Smart Bag 2F

Type	1 L	2 L	3 L	5 L	10 L	20 L	30 L	50 L	100 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AF	3008-49101	3008-49102	3008-49103	3008-49105	3008-49110	3008-49120	3008-49130	3008-49150	3008-49160
AA	3008-98101	3008-98102	3008-98103	3008-98105	3008-98110	3008-98120	3008-98130	3008-98150	3008-98160
AAK	3008-98201	3008-98202	3008-98203	3008-98205	3008-98210	3008-98220	3008-98230	3008-98250	3008-98260
CG	3008-49401	3008-49402	3008-49403	3008-49405	3008-49410	3008-49420	3008-49430	3008-49450	3008-49460
CC	3008-98401	3008-98402	3008-98403	3008-98405	3008-98410	3008-98420	3008-98430	3008-98450	3008-98460
CCK	3008-98501	3008-98502	3008-98503	3008-98505	3008-98510	3008-98520	3008-98530	3008-98550	3008-98560
CEK	3008-98701	3008-98702	3008-98703	3008-98705	3008-98710	3008-98720	3008-98730	3008-98750	3008-98760

* Other bag sizes available upon request.

Tedlar Bag

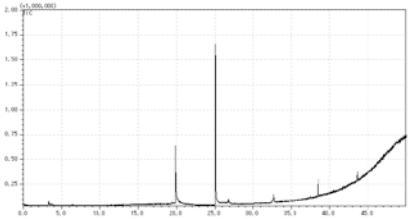
Tedlar Bag is made of Polyvinyl fluoride (PVF) film and delivers superior resistance to organic solvent gases, abrasion-resistant and a wide operating temperature range from -70 ℃ to 100° C.
Tedlar Bag is suitable for various compounds from permanent gases to organic solvent gases.

Blank Test

【Testing Procedure】

A Tedlar Bag (1L) was filled with nitrogen gas and put in an oven at 60 ℃. 1 hour later, the gas in the bag was withdrawn into a gastight micro syringe and injected directly to a GC/MS. The bag was not flushed / cleaned in advance.

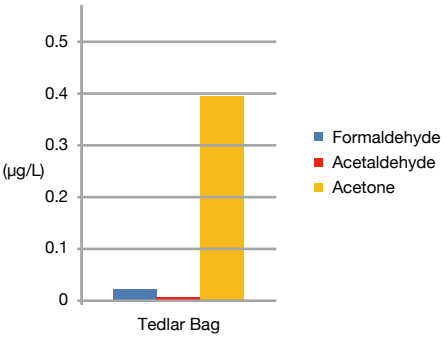
Tedlar Bag



Aldehydes/Acetone Blank Test

【Testing Procedure】

After being filled with nitrogen gas, a Tedlar bag was closed and put in an oven at 60 ℃. 1 hour later, 1L gas in the bag was vacuumed with a pump through a DNPH cartridge and eluted sample was analyzed by HPLC. These bag was not flushed / cleaned in advance.



Storage Stability of Organic Solvent Gases in Tedlar Bag

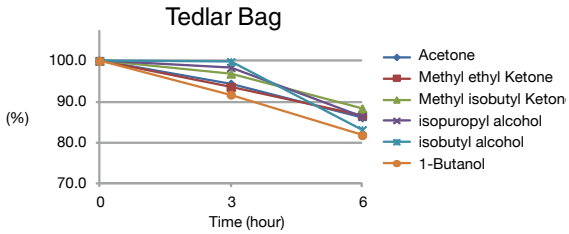
【Testing Procedure】

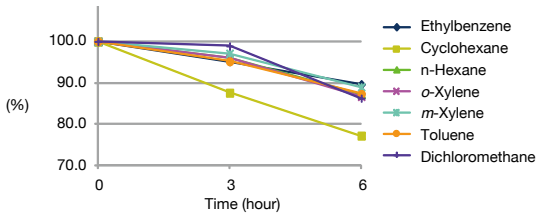
Vaporized standards as described below were introduced into Tedlar Bags. Then nitrogen gas was added into the Tedlar Bags and were measured by a GC/FID.

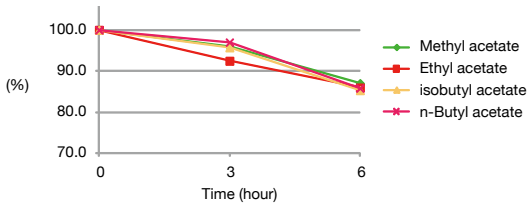
【Standard Compound List】

Aceton, Methylethylketone, Methyl isobutyl ketone, Isopropyl alcohol, Isobutyl alcohol, 1-Butanol, Ethylbenzene, Cyclohexane, n-Hexane,
o-Xylene, *m*-Xylene, Toluene, Dicholoromethane, Methyl acetate, Ethyl acetate, Isobutyl acetate, n-Butyl acetate (50ng/mL each)

Tedlar Bag



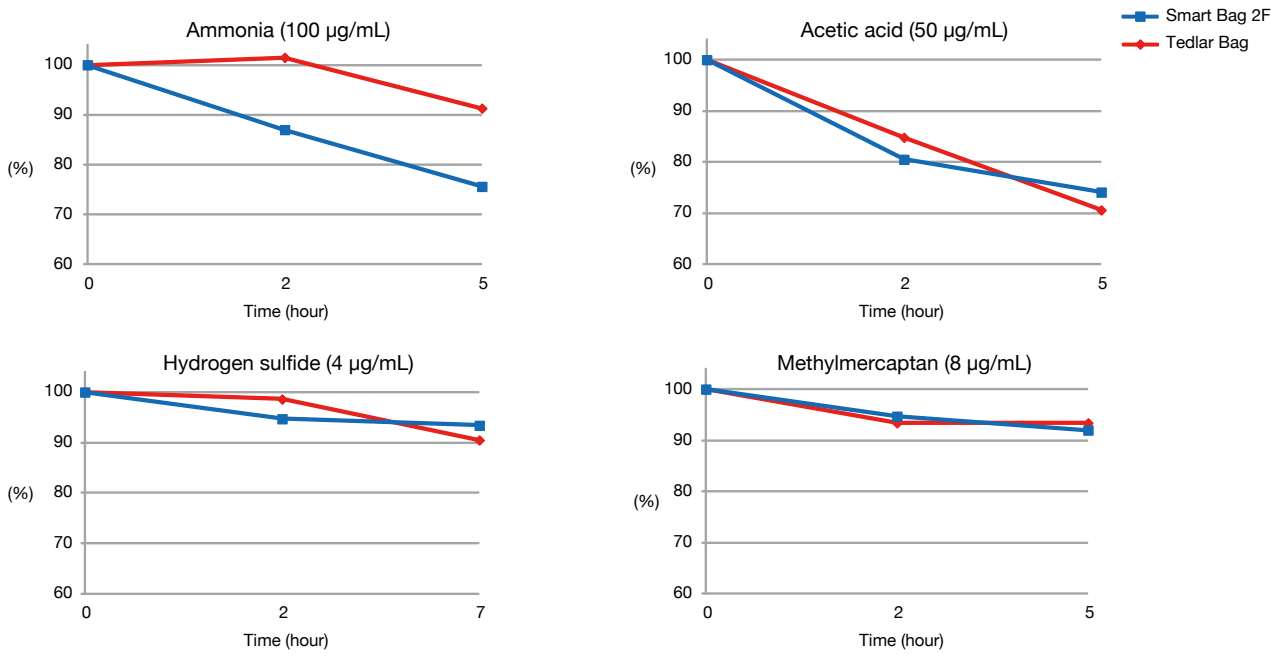




Storage Stability of Malodorous Compounds in Tedlar Bag

【Testing Procedure】

Each concentration of malodorous compound was prepared as described below and filled in a 5L Tedlar Bag together with nitrogen gas. Concentration changes over time were calculated with a detecting tube at certain times.



Gas Permeability Test

Permeation rate of O_2, N_2, CH_4 and CO_2 was measured using a permeation rate measurement system on Tedlar Bag.

($cm^3/(m^2 \cdot 24\ h \cdot 1\ atm)$)

Material	Hydrogen	Oxygen	Nitrogen	Carbon dioxide
Tedlar Bag	324.9	20.4	2.9	158.5

Tedlar Bag

Type	1 L	2 L	3 L	5 L	10 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AA	3008-11101	3008-11102	3008-11103	3008-11105	3008-11110
AAK	3008-91101	3008-91102	3008-91103	3008-91105	3008-91110
AAS	3008-11701	3008-11702	3008-11703	3008-11705	3008-11710
AB	3008-11201	3008-11202	3008-11203	3008-11205	3008-11210
CC	3008-13301	3008-13302	3008-13303	3008-13305	3008-13310
CCK	3008-93301	3008-93302	3008-93303	3008-93305	3008-93310
CCS	3008-13801	3008-13802	3008-13803	3008-13805	3008-13810
CD	3008-13401	3008-13402	3008-13403	3008-13405	3008-13410
CE	3008-13501	3008-13502	3008-13503	3008-13505	3008-13510
CEK	3008-93501	3008-93502	3008-93503	3008-93505	3008-93510
EE	3008-15501	3008-15502	3008-15503	3008-15505	3008-15510
EEK	3008-95501	3008-95502	3008-95503	3008-95505	3008-95510

* Other bag sizes available upon request.

Special large type Tedlar bag, 500 mL, 1000 mL and 2000 mL are available upon request.

ANALYTIC-BARRIER Bag & Fluororesin Bag

ANALYTIC-BARRIER Bag

- Good resistance to permeation
- Low background contamination
- Max. Operating Temp. : 70 ˚C

Applications: In-cabin VOC, Permanent gases, etc.

Type	1 L	2 L	3 L	5 L	10 L	20 L	30 L	50 L	100 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AA	3008-99101	3008-99102	3008-99103	3008-99105	3008-99110	3008-99120	3008-99130	3008-99150	3008-99160
AAK	3008-99201	3008-99202	3008-99203	3008-99205	3008-99210	3008-99220	3008-99230	3008-99250	3008-99260
AB	3008-99301	3008-99302	3008-99303	3008-99305	3008-99310	3008-99320	3008-99330	3008-99350	3008-99360
CC	3008-99401	3008-99402	3008-99403	3008-99405	3008-99410	3008-99420	3008-99430	3008-99450	3008-99460
CCK	3008-99501	3008-99502	3008-99503	3008-99505	3008-99510	3008-99520	3008-99530	3008-99550	3008-99560
CE	3008-99601	3008-99602	3008-99603	3008-99605	3008-99610	3008-99620	3008-99630	3008-99650	3008-99660
CEK	3008-99701	3008-99702	3008-99703	3008-99705	3008-99710	3008-99720	3008-99730	3008-99750	3008-99760

* Other bag sizes available upon request.

Fluororesin Bag

- Ethylene-tetrafluoroethylene copolymer film
- Good resistance to chemical compounds and heat
- Max. Operating Temp. : -70 ˚C ~ 110 ˚C

Applications: Organic solvent gases

Type	1 L	2 L	3 L	5 L	10 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AA	3008-21101	3008-21102	3008-21103	3008-21105	3008-21110
AAK	3008-38101	3008-38102	3008-38103	3008-38105	3008-38110
CC	3008-23301	3008-23302	3008-23303	3008-23305	3008-23310
CCK	3008-38301	3008-38302	3008-38303	3008-38305	3008-38310

* Other bag sizes available upon request.

Aluminum Bag(5-Layer Foil)

- Aluminum Bag is made of laminated film (from outer: nylon, polyethylene, alum foil and polyethylene, polyethylene)
- Good permeation resistance to permanent gases, methane
- Shows relatively higher adsorption of high-boiling organic solvents, which background of organic compounds
- Max. Operating Temp. : 65 ˚C

Applications: Permanent gases

Type	1 L	2 L	3 L	5 L	10 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AA	3008-26101	3008-26102	3008-26103	3008-26105	3008-26110
AAK	3008-26201	3008-26202	3008-26203	3008-26205	3008-26210
CCK	3008-26301	3008-26302	3008-26303	3008-26305	3008-26310
CEK	3008-26401	3008-26402	3008-26403	3008-26405	3008-26410

Type	20 L	30 L	50 L	100 L	200 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AAK	3008-26220	3008-26230	3008-26250	–	–
CCK	3008-26320	3008-26330	3008-26350	–	–
CEK	3008-26420	3008-26430	–	–	–
AA8*	3008-28520	3008-28530	3008-28550	3008-28591	3008-28592

* Other bag sizes available upon request.

ANALYTIC-BARRIER Bag & Fluororesin Bag

Polyester Bag

- Polyester film
- Good permeation resistance to VOC's
- Compatible with sampling of malodorous compounds at boundary lines for environmental analysis
  Applications: Volatile Organic Compounds, odor analysis

Type	1 L	2 L	5 L	10 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AA	3008-60101	3008-60102	3008-60105	3008-60110
AAK	3008-60201	3008-60202	3008-60205	3008-60210
CCK	3008-60401	3008-60402	3008-60405	3008-60410

Description	Cat.No.
Polyester Bag 20 L 8 mm Sleeve, 10 pcs	3008-62000

* Other bag sizes available upon request.

SKYPIA Bag

Skypia bag is made of Ethylene-vinyl alcohol copolymer (EVOH). It is excellent in gas barrier properties, adsorption resistant.

Type	1 L	2 L	3 L	5 L	10 L
	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
AA	3008-21101	3008-21102	3008-21103	3008-21105	3008-21110
AAK	3008-38101	3008-38102	3008-38103	3008-38105	3008-38110
CC	3008-23301	3008-23302	3008-23303	3008-23305	3008-23310
CCK	3008-38301	3008-38302	3008-38303	3008-38305	3008-38310

* Other bag sizes available upon request.

Odor Bag

- Polyester Bag
- Thickness: 25 µm
  Glass Tube: 10 (I.D) x 12 (O.D)mm
  Size: 3L (250 × 280mm)
  10L (390 × 400mm)

Description	Detail	Qty.	Cat.No
Odor Bag 3L	No.1, No.2, No.3	100 pcs	3008-31130
Odor Bag 3L	None No.	100 pcs	3008-31030
Odor Bag 10L	None No.	1 pc	3008-31500
Nose Mask	for odor bag	100 pcs	3008-35300
Silicon Cap	for odor bag	50 pcs	3008-35200

Custom Size Gas Sampling Bags

Custom size 300 L sampling bag

Our great deal of experience in this industry enable us to provide custom size gas sampling bags from 0.1 L to 500 L on request.

Accessories for Sampling Bags

Accessories for Sampling Bags

Details of Connectors for Sampling Bags and Availability of Replacement

Description	Standard Sleeve (O.D.: 6, 7, 8 mm)	6 mm O.D. Sleeve	6 mm O.D. Sleeve with Mini Valve	M6 Connector with a Septa	8 mm O.D. Sleeve with Valve	8 mm O.D. Sleeve with Valve
Photo						
Purpose	Easy to connect to the tube.	Sleeve for Smart Bags. Easy to connect to the tube. The special shape avoids the gases to remain inside the bag.	Easy to connect to the tube. The open/close valve avoids gas leak.	The silicon makes this valve suitable for using by syringe.	For Aluminium Bag. The silicon makes this valve suitable for using by syringe.	For Aluminium Bag. The silicon makes this valve suitable for using by syringe.
Material	PTFE	Polypropylene (PP)	PTFE	PTFE	Polypropylene (PP)	PTFE
Replacement	Not available	Not available	3008-39998	3008-39997	3008-29999	3008-29998

Description	Qty.	Cat.No.
6 mm O.D. Sleeve with Mini Valve	1 pc	3008-39998
M6 Connector with Septum	1 pc	3008-39997
8 mm O.D. PP Valve with sleeve	1 pc	3008-29999
8 mm O.D. PTFE Valve with sleeve	1 pc	3008-29998

Accessories for Connector

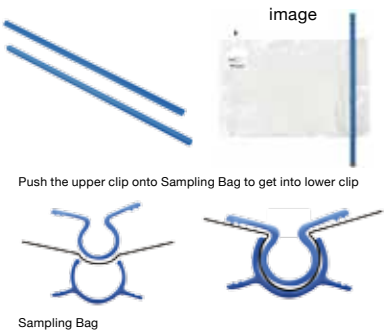
Plug for 7 and 8 mm O.D.

Cap for 6 mm O.D. sleeve

Septum for M6 connector

Description	Qty.	Cat.No.
Plug for 7 and 8 mm O.D. Sleeve	50 pcs	3008-35006
Cap for 6 mm O.D. Sleeve	30 pcs	3008-35105
Septum for M6 Connector	50 pcs	3008-35016

Clip for 10L Sampling Bags



To use with one side open sampling bags.

Specifications

length : 50 cm

Max. Operating Temp. : 65 ˚C

Description	Qty.	Cat.No.
Clip for 10L Sampling Bag	1 pc	3008-18000

Sampling Pump

SP209-100Dual·SP209-1000Dual Features

For Accuracy Control of Flow Measurement

SP209 can perform two (2) lines sampling at once by two (2) pumps. It also can perform integration of suction and its volume. Flow rate is set to display the value in 20℃ conversion.

The Large Flow Rate Range is Covered

1000 type corresponds to the sampling cartridge which suction resistance can be large different by formaldehyde and VOC by one set.
100 type is very high accuracy in low flow rate range and suitable for thermal desorption.

Correspondence to Suction Resistance Change

The suction capability of pumps is adjusted to be able to perform sampling at stable flow rate since it has a function that setting flow rate is maintained even if suction resistance of trapping materials or cartridge is changed. Especially when sampling is performed in a low flow rate range, the pump's revolution speed is getting slower, and noise or consumption power can be down.

Multiple Function

Setup of sampling conditions

A sampling start can be selected from the conditions of Real Time (year, month, day, hour and min) after setting time (minute) progress.

Setup of sampling end conditions

A sampling end can be selected from the lapsed time from a sampling start, the total sampling volume and the conditions of sequencing (it stops manually).

Sampling conditions are saved as file

Checking functions can be performed by a personal computer. Software is an option.

Data logging function

It is possible to visualize the sampling results on the PC.

Pulse Adjustment to Obtain Optimal Conditions

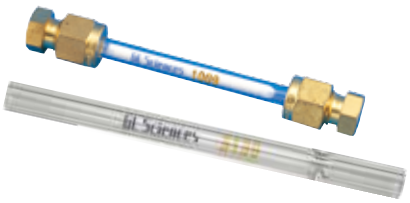
In order to obtain optimal conditions between the sampling tube and cartridge friction and the suction capability, the pump pulse is detected and the result is indicated by a three color LED (High, Good, Low). When pulse (High, Low) is displayed, adjust the pulse valve manually till you obtain "Good".

Model	SP209-100Dual	SP209-1000Dual
Suction Flow Rate Range	2 ～ 100 mL/min	20 ～ 1000 mL/min
Flow Rate Measurement Accuracy	10 ～ 20 mL/min (within ± 10 %) 21 ～ 100 mL/min (within ± 5 %)	100 ～ 200 mL/min (± 10 %) 201 ～ 1000 mL/min (± 5 %)
Flow Rate Measurement Tolerance	± 1 digit	
Setting Items	Start Condition: Promptly, After setting time, Real time End Condition: After setting time, after reaching to integrating capacity, sequence (manual stop)	
Integrating Range	0.1 ～ 999.9 L	0.1 ～ 9999.9 L
Storage Files	5	
Flow Channels	2	
Operation Temp. Humidity Range	10 ～ 35 °C (10 ～ 30 °C), 20 ～ 80 % RH (No condensation)	
Power Supply	DC12 V (AC adaptor: AC100-240 V 50/60 Hz)	
Power Consumption	DC12 V: 0.5 A AC100 V: 0.15 A AC220 V: 0.08 A	DC12 V: 0.9 A AC100 V: 0.2 A AC220 V: 0.1 A
Weight	3 kg approx.	
Dimension	260 (W) × 230 (D) × 99 (H) mm	

Description	Qty.	Cat.No.
Air Sampling Pump SP209-100Dual	1	2702-17590
Air Sampling Pump SP209-1000Dual	1	2702-17595
SP209 Dual Filter Element	10	2702-37632

Accessories for Sampling Bags

Thermal Desorption Tubes AERO TD Tube Series



AERO TD Tube is an efficient thermal desorption tube for collection of trace amount of VOC's in air. Quite wide range of adsorbents are available in AERO TD Tubes.

Description	Adsorbent Material	Qty.	Cat.No.
AERO TD Tube (for T-Dex, ATD, Markes)	Tenax TA 35/60 150 mg	10 pcs	1003-74101
	Tenax TA 60/80 150 mg	10 pcs	1003-74102
	Tenax GR 35/60 150 mg	10 pcs	1003-74201
	Carbopack B 190 mg + Carboxen 1000 140 mg	10 pcs	1003-74301
	Carbotrap 50 mg + Carboxen 1000 75 mg	10 pcs	1003-74302

Sample Tube Conditioner STC-4200

- 12 sample tubes can be installed
- 5 temperature programs can be installed
- Compatible with sample tube dimensions 6-6.35 mm O.D. and 35-178 mm in length

Specifications

Temperature Range: ambient + 10 °C to 450 °C
Dimension: 562 (W) × 520 (D) × 450 (H) mm
Weight：Approx. 44 kg

Description	Cat.No.
Sample Tube Conditioner STC-4200	2701-13075

MonoTrap (Monolithic Material Sorptive Extraction)

MonoTrap is a newly-developed, state-of-the-art sorptive media, based on the high surface area of silica monolith technology. It has been designed for the simple and fast enrichment of flavors, aromas, and fragrances; and can easily be used for the analysis of volatile and semi-volatile compounds for quality control, environmental, and forensic applications.

Features

Easy-to-use

MonoTrap performs a very low blank, it can be used directly without any conditioning.

Highly Efficient Adsorption

MonoTrap's large surface area offers larger sample loading capacity, ensuring a higher concentration of adsorbed compounds.

Complete Desorption with Low Solvent Volume

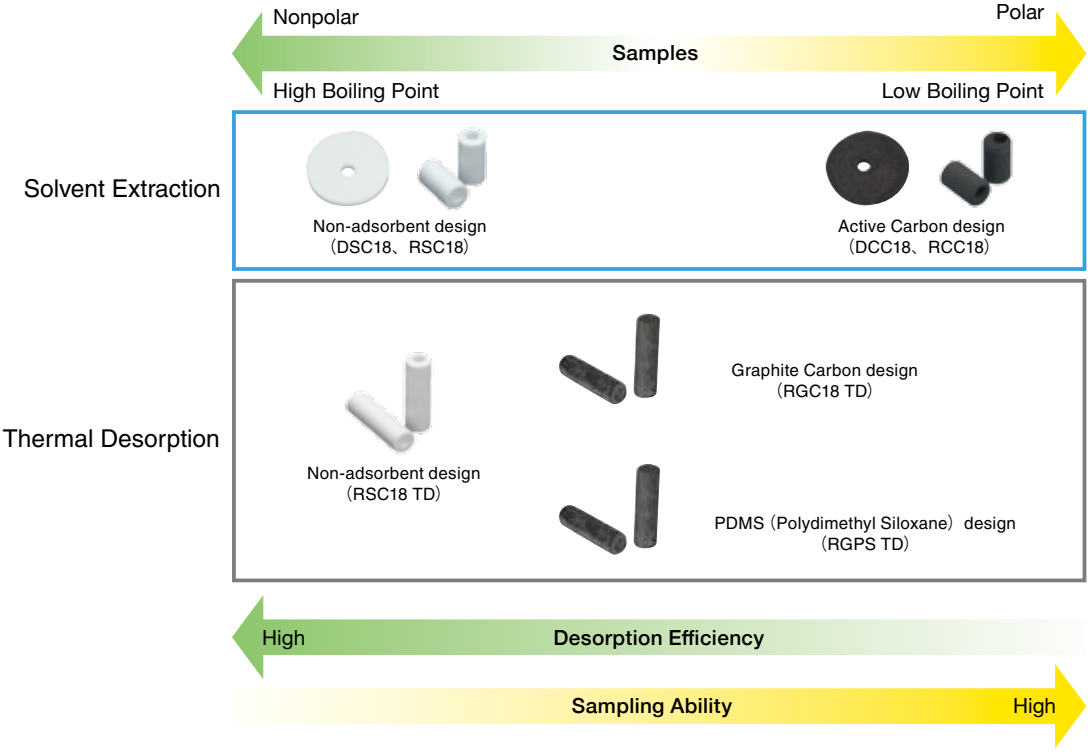
It only takes a small amount of solvent, 200 µL, to completely saturate the monolithic network and achieve desorption, though more solvent can be used to control the final concentration of your samples.

Hydrophobic Surface

MonoTrap's monolithic network is functionalized using hydrophobic ODS groups, therefore, MonoTrap will not adsorb water from aqueous samples. No need to worry about injecting water onto your GC or GC/MS when using MonoTrap as with liquid-liquid extraction or other sorptive media. This also allows for the addition of ionic salts to improve sample adsorption with MonoTrap.

Multiple Injections & Analyses

Because compounds adsorbed to MonoTrap can be extracted using 200 µL (or more) of organic solvent, it is no problem to perform multiple injections of your sample. With MonoTrap, it is even possible to make injections on different GC systems utilizing different column phases! Solvent extraction can even be accomplished within a GC autosampler vial using the rod shaped MonoTrap.

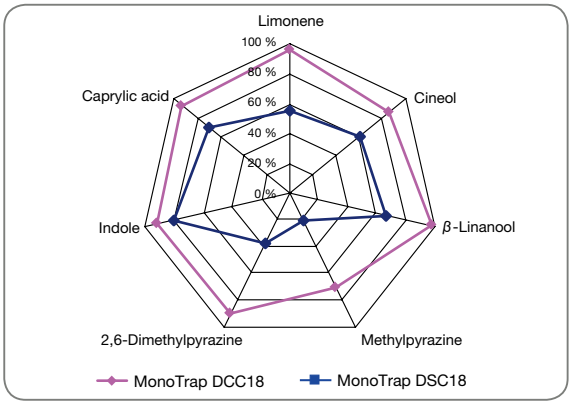


Superior Enrichment Capabilities Using Activated Carbon/Graphite Carbon in Addition to ODS

The graph on the right shows a comparison between the recovery rate of DCC18 (containing activated carbon) and DSC18 (containing only ODS groups). For a relatively non-polar compound such as Indole, both the MonoTrap DCC18 and DSC18 have approximately the same enrichment capabilities.

With more polar compounds, such as Methylpyrazine, the activated carbon groups on the MonoTrap DCC18 do a much better job of enrichment than the MonoTrap DSC18, which contains only hydrophobic ODS groups.

Recoveries were calculated using dichloromethane as the extraction solvent.



MonoTrap (Monolithic Material Sorptive Extraction)

How to Use MonoTrap

Solvent Extraction

Thermal Desorption

Sample Adsorption

Head Space Gas Sampling

MT Holder & MT Stand
Grasp the MonoTrap with tweezers and insert the holder into the hole on MonoTrap.

Hold MT Holder with pliers which ends have been cleaned and pass it through septum. Put a cap on top of holder.

Clean Pin Hole Septum with Vial (40 mL)
Tighten the septum on vial.

Stirring Sampling

Use an agitation bath for heating and stirring.
For screening without heating, use handless shaker
(Cat.No. 8500 - 50000)
and special holder
(Cat.No. 8500 - 50001)
※ We recommend EYELA NTS- 4000 B series for agitation bath.
Please contact our local dealer for more details of the agitation bath and vial rack.

Put the sample into the vial and float MonoTrap

Handsfree shaker and holder

Passive Sampling

※ Please contact our local dealer for the Tedlar bags

Solvent Extraction

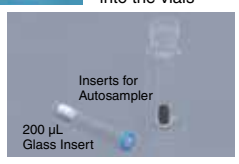
Extraction from the Disk Type

Fill the MT Extract Cup with the extraction solvent

Put the MonoTrap and tighten the septum

Pour pure water into the vials

Extraction from the Rod Type



Thermal Desorption

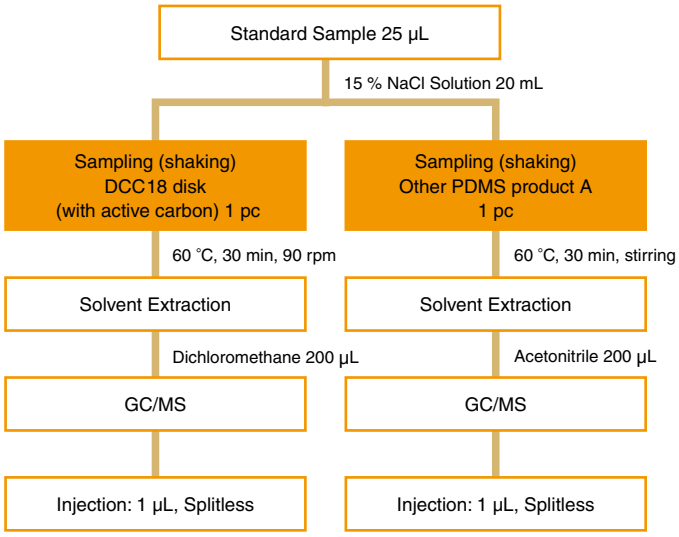
Gerstel, T-Dex and Linex glass tubes are available

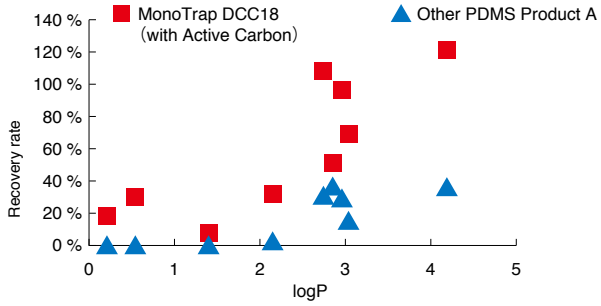
MonoTrap Performs High Recovery

MonoTrap for Solvent Extraction

MonoTrap DCC18 shows high recovery rates for low to high logP compounds and hydrophilic to hydrophobic compounds. Unlike other products for which usable extraction solvents are limited to methanol and acetonitrile, dichloromethane with higher solvent extraction power can be used for MonoTrap.
To obtain a high recovery MonoTrap is an easy-to use media to select the types of extraction solvents.

Standard samples : Limonene, Cineol, β -Linalool, Methylpyrazine, 2,6-dimethylpyrazine, Indole, Camphor, Octanoic acid, Coumarin, 2' -acetonaphthone.
200 µg/mL of each in Methanol.

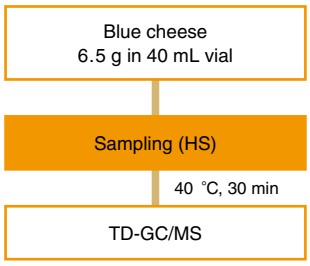




Recovery rate comparison between
MonoTrap DCC18 and other PDMS product A

Component	logP	MonoTrap DCC18 (with Active Carbon)	Other PDMS Product A
Methylpyrazine	0.21	18.8 %	0.6 %
2,6-Dimethylpyrazine	0.54	30.7 %	1.8 %
Indole	2.14	32.0 %	3.5 %
Cineol	2.74	107.0 %	30.5 %
Linalool	2.97	97.0 %	29.8 %

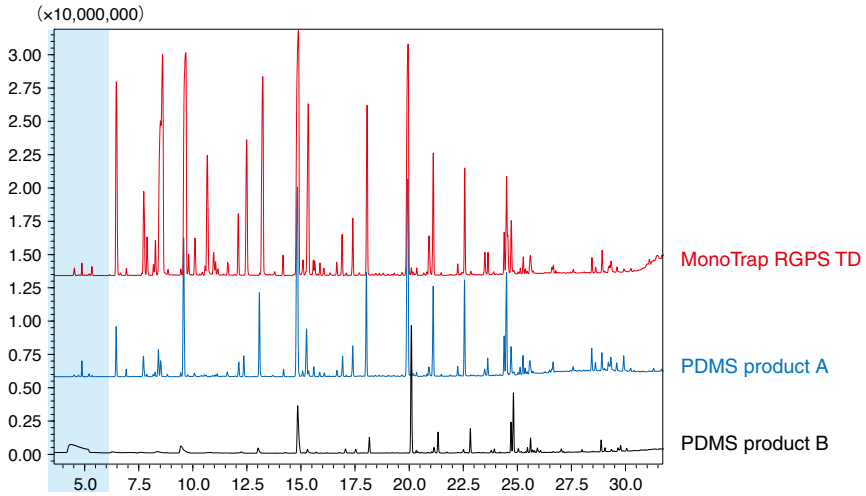
MonoTrap for Thermal Desorption



Here is an example of blue cheese, after sampling fragrance of blue cheese with MonoTrap RGPS TD, analysis was performed with Thermal Desorption system.

System	: GC/MS-Thermal Desorption (T-Dex Ⅱ)
Column	: InertCap Pure-WAX
	0.32 mm I.D. x 60 m df = 0.50 µm
Col.Temp.	: 40 °C (3 min hold) - 6 °C/min - 250 °C (30 min hold)
Carrier Gas	: He 1 mL/min (constant flow)
Desorb Temp.	: 250 °C
Time	: 5 min
Flow	: 7 mL/min
Split	: Splitless
Cryo Trapping	: -150 °C
Injection Temp.	: 250 °C
Detection	: MS Scan (28.5 - 600 m/z)

Comparison of different sampling tools on the flavor of blue cheese analysis.



Sampling blue cheese with MonoTrap RGPS TD

MonoTrap (Monolithic Material Sorptive Extraction)

MonoTrap Series Line-up

	Description	Recommended Operating Temperature	Appearance	Type	Size	Active Carbon	Graphite Carbon	ODS Function	PDMS	Qty.	Cat.No.
Solvent Extraction	MonoTrap DCC18	—		Disk	Diameter：10 mm Thickness：1 mm	●		●		50 pcs	1050-72101
	MonoTrap RCC18	—		Rod	Diameter：2.9 mm Length：5 mm	●		●		50 pcs	1050-72201
	MonoTrap DSC18	—		Disk	Diameter：10 mm Thickness：1 mm			●		50 pcs	1050-71101
	MonoTrap RSC18	—		Rod	Diameter：2.9 mm Length：5 mm			●		50 pcs	1050-71201
Thermal Desorption	MonoTrap RGPS TD*	250 °C		Rod	Diameter：2.9 mm Length：10 mm		●		●	30 pcs	1050-74202
	MonoTrap RSC18 TD*	200 °C		Rod	Diameter：2.9 mm Length：10 mm			●		30 pcs	1050-73201
	MonoTrap RGC18 TD*	200 °C		Rod	Diameter：2.9 mm Length：10 mm		●	●		30 pcs	1050-74201

* : MonoTrap for Thermal Desorption is packed individually in an ampoule

MonoTrap's Nomenclature & Character

Ex) MonoTrap ① R ② G ③ C18 ④ TD

① Shape --- D：disk type, R：rod type
② Adsorbent --- C：Chemical bonded with active carbon, G：Chemical bonded with graphite carbon, S：without adsorbent
③ Function group/stationary phase --- C18：octadecyl C18, end-capped
PS ：coded withPDMS (Polydimethyl Siloxane), end-capped
④ Desorption --- TD：for thermal desorption

MonoTrap (Monolithic Material Sorptive Extraction)

Start-up Kit

Type	Description	Contens	Cat.No.
Solvent Extraction	MMSE Start Up KIT for SE	①～④ x 20 pcs, ⑧～⑩, ⑪ x 5 pcs, ⑫ x 40 pcs	1050-79001
Thermal Desorption	MMSE Start Up KIT for TD(OPTIC/LINEX)	⑤～⑦ x 10 pcs, ⑧～⑨, ⑪ x 5 pcs, ⑬ x 3 pcs	1050-78001
	MMSE Start Up KIT for TD(T-Dex/ATD/TD-20)	⑤～⑦ x 10 pcs, ⑧～⑨, ⑪ x 5 pcs, ⑭ x 3 pcs	1050-78002
	MMSE Start Up KIT for TD(Gerstel-TDS)	⑤～⑦ x 10 pcs, ⑧～⑨, ⑪ x 5 pcs, ⑮ x 3 pcs	1050-78003
	MMSE Start Up KIT for TD(Gerstel-TDU)	⑤～⑦ x 10 pcs, ⑧～⑨, ⑪ x 5 pcs, ⑯ x 3 pcs	1050-78005

Solvent Extraction


① DCC18


② RCC18


③ DSC18


④ RSC18

Thermal Desorption


⑤ RSC18 TD

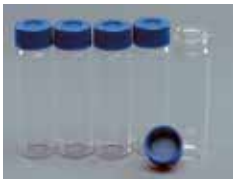

⑥ RGC18 TD

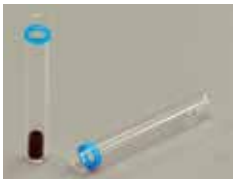

⑦ RGPS TD


⑧ MT Holder 5 pcs


⑨ MT Stand 1 pcs


⑩ MT Extract Cup with Vial (20 mL) 5 pcs


⑪ Clean Pin Hole Septum with Vial (40 mL)


⑫ 200 µL Glass Insert


⑬ MonoTrap TD Liner for OPTIC/LINEX


⑭ MonoTrap TD Liner for T-Dex/ATD/TD- 20

Accessories

Description	Qty.	Cat. No.
⑧ MT Holder	5 pcs	1050-79003
⑨ MT Stand	1 pc	1050-79004
⑩ MT Extract Cup with Vial (20 mL)	5 pcs	1050-79005
⑪ Clean Pin Hole Septum with Vial (40 mL)	72 pcs	1050-79006
⑫ 200 µL Glass Insert (Flat-bottom)	500 pcs	1030-17211

Glass Tube for Thermal Desorption

Description	Qty.	Cat. No.
⑬ MonoTrap TD Liner for OPTIC/LINEX	1 pc	1003-75001
⑭ MonoTrap TD Liner for T-Dex/ATD/TD-20	1 pc	1003-75002
⑮ MonoTrap TD Liner for Gerstel-TDS	1 pc	1003-75003
⑯ MonoTrap TD Liner for Gerstel-TDU	1 pc	1003-75004

Passive Sampling Bag

Convenient Tedlar bags for passive sampling with MonoTrap

Description	Qty.	Cat.No.
TK-5 MT Passive Bag	1pc	1050-79007
TK-10 MT Passive Bag	1pc	1050-79008

Sampler for Skin Gases MonoTrap SG DCC18

MonoTrap SG DCC18 is a sampler for skin gases which uses monolithic silica adsorption with high adsorption efficiency, and enables to adsorb diffused gases from the skin out of touch with human body but adsorb in space from surface of the skin.

Description	Qty.	Cat.No.
MonoTrap SG DCC18	10 sets	1050-70001
	20 sets	1050-70002

Applications

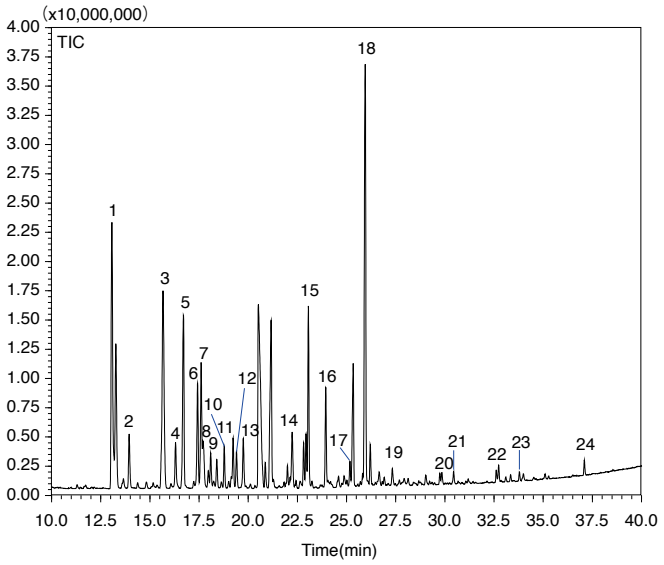
Easy Enrichment of Coffee Fragrance

Sample (coffee) 3.0 g

Sampling (HS)
MonoTrap RGPS TD 1 pc

60 ℃, 10 min

TD-GC/MS



System : GC/MS-Thermal Desorption (OPTIC-4)
Column : InertCap Pure-WAX
0.25 mm I.D. x 60 m df = 0.25 µm
Col.Temp. : 40 ˚C (3 min hold)- 5 ˚C /min - 250 ˚C
Carrier Gas : He 1 mL/min (constant flow)

Desorb Temp. : 250 ˚C
Time : 10 min
Flow : 1 mL/min
Split : Split 1:20 (split flow 20 mL/min)
Cryo Trapping : -150 ˚C
Injection Temp. : 250 ˚C
Detection : MS Scan (28.8 - 600 m/z)

1. Pyridine
2. Pyrazine
3. Methylpyrazine
4. 3-Hydroxy-2-butanone
5. 1-Hydroxy-2-propanone
6. Dimethylpyrazine
7. Dimethylpyrazine
8. Ethylpyrazine
9. Dimethylpyrazine
10. 1-Hydroxy-2-butanone
11. Ethylmethylpyrazine
12. Ethylmethylpyrazine
13. Trimethylpyrazine
14. Acetylfuran
15. Furfuryl acetate
16. 2-Formyl-5-methylfuran
17. 2-Formyl-1-methylpyrrole
18. 2-Furanmethanol
19. 1-Acetyl-1,4-dihydropyridine
20. 1-Furfurylpyrrole
21. Guaiacol
22. Maltol
23. 1H-Pyrrole-2-carboxaldehyde
24. 2-Methoxy-4-vinylphenol

* According to NIST Mass Spectral Library, Sample 6, 7, 9 and Sample 11, 12 are isomers.

Fragrance of Peach Juice

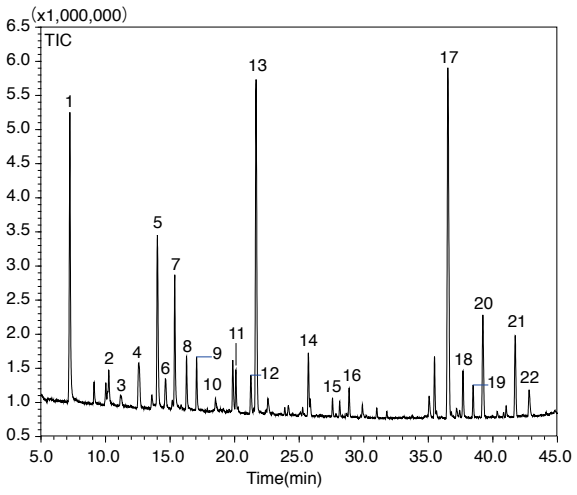
Peach juice 30 mL

Sampling (agitate)
MonoTrap RGPS TD 1 pc

36 ℃, 10 min, 160 rpm

Rinse

TD-GC/MS



System : GC/MS-Thermal Desorption (OPTIC-4)
Column : InertCap Pure-WAX
0.25 mm I.D. x 30 m df = 0.25 µm
Col.Temp. : 40 ˚C (5 min hold) - 4 ˚C /min - 250 ℃
Carrier Gas : He 1 mL/min (constant flow)

Desorb Temp. : 250 ˚C
Time : 10 min
Flow : 1 mL/min
Split : Split 1:20 (split flow 20 mL/min)
Detection : MS Scan (28.8 - 600 m/z)

1. Isoamyl acetate
2. Isopentanol
3. Ethyl hexanoate
4. Hexyl acetate
5. Hexenyl acetate
6. Hexenyl acetate
7. Hexanol
8. 3-Hexenol
9. 2-Hexenol
10. Furfural
11. Benzaldehyde
12. *p*-Menthan-2-one
13. Linalool
14. Terpineol
15. Geranyl acetate
16. Damascenone
17. γ -Decalactone
18. δ -Decalactone
19. 6-Pentyl-5,6-dihydro-2H-pyran-2-one
20. δ -Undecalactone
21. γ -Dodecalactone
22. δ -Dodecalactone

* According to NIST Mass Spectral Library, Sample 5 and 6 are isomers.

Flower Hyacinth Aroma

Sample

Sampling (passive)
MonoTrap DCC18 1 pc

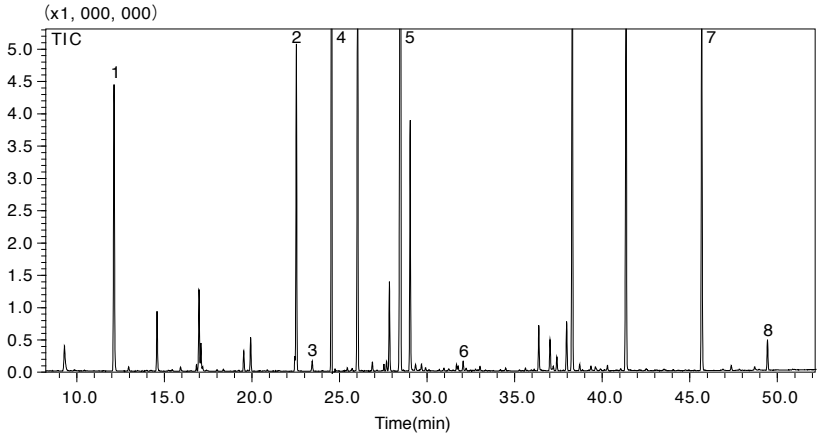
Leave at room temperature
for 3 hours

Solvent Extraction
/ Concentration

Dichloromethane 1000 µL
Ultrasonication for 5 min
Enrich by N_2 purge to 100 µL

GC/MS

System : GC/MS
Column : InertCap Pure-WAX
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold - 4 °C /min - 250 °C (5 min hold)
Carrier Gas : He 120 kPa
Injection : Splitless 0.5 min
250 °C
Detection : MS Scan (40-350 m/z)
Sample Size : 1.0 µL



1. β -cis-Ocimene
2. β -Linalool
3. Caryophyllene
4. Benzoic acid, methyl ester
5. α -Farnesene
6. Benzyl Alcohol
7. Indole
8. Benzyl Benzoate

* Identificated the results from standard samples.

Red Wine Aroma

Sample 20 mL

Sampling (HS)
MonoTrap DCC18 1 pc

60 ℃, 30 min

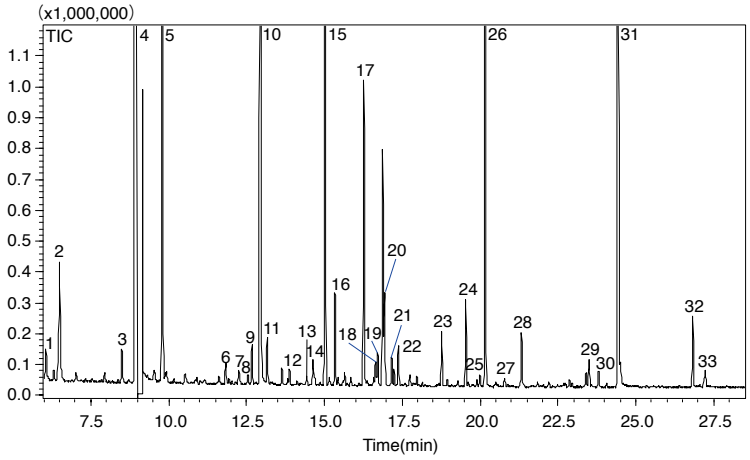
Solvent Extraction

Dichloromethane 300 µL
Ultrasonication for 5 min

GC/MS

image

System : GC/MS
Column : InertCap Pure-WAX
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) - 6 °C /min -250 °C (5 min hold)
Carrier Gas : He 95 kPa
Injection : Splitless
250 °C
Detection : MS Scan (55-400 m/z)
Sample Size : 1.0 µL



1. 2,2,6-Trimethyl-6-vinyltetrahydropyran
2. Isoamyl acetate
3. Limonene
4. 1-Pentanol
5. Ethyl hexanoate
6. Maleic anhydride
7. 3-Methylpentanol
8. 1,1-Dimethoxy-2-propanol
9. Ethyl 2-hexenoate
10. 1-Hexanol
11. *cis*-3-Hexen-1-ol
12. Nonanal
13. *cis*-2-Hexen-1-ol
14. Ethyl 2-hydroxy-3-methylbutanoate
15. Ethyl octanoate
16. Furfural
17. 2-Ethyl-1-hexanol
18. Benzaldehyde
19. 3-Ethyl-4-methylpentanol
20. 2-Bornene
21. *n*-Propyl propionate
22. Ethyl dl-2-hydroxycaproate
23. β -Cyclocitral
24. Ethyl decanoate
25. α -D-Galactopyranose methyl glycoside
26. Diethyl succinate
27. 3- (Methylthio) -1-propanol
28. 1,5,8-Trimethyl-1,2-dihydronaphthalene
29. Hexanoic acid
30. Benzyl Alcohol
31. Phenylethyl Alcohol
32. Diethyl dl-malate
33. Octanoic Acid

* According to NIST Mass Spectral Library: Red.... [Food] Fragrance Encyclopedia by Japan Perfumery & Flavoring Association.

Applications

Mushroom Fragrance

Sample

2 kinds of Mushrooms produced in different areas 38 g/each

Sampling (Still Standing)
MonoTrap DCC18 5 pcs

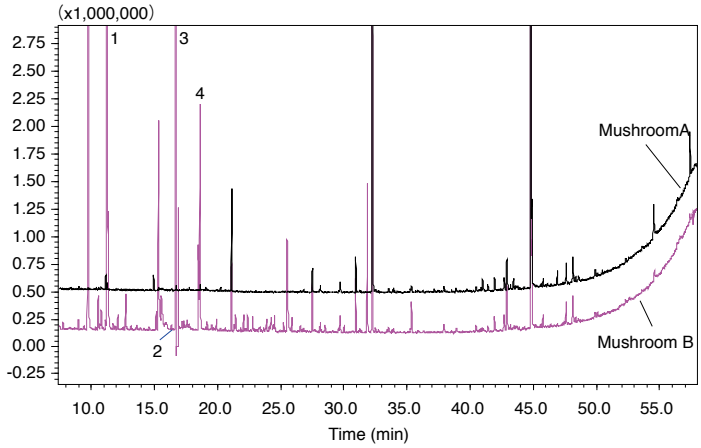
Room temperature, 12 hours

Solvent Extraction / Concentration

Diethylether 1000 µL
Ultrasonication for 5 min
Enrich by N_2 purge to a few µL

GC/MS

System : GC/MS
Column : InertCap Pure-WAX
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) - 4 °C /min - 250 °C (5 min hold)
Carrier Gas : He 95 kPa
Injection : Split 1:10
: 250 °C
Detection : MS Scan (25-450 m/z)
Sample size : 1.0 µL



< Comparison of Fragrances by Area % >

	Mushroom A	Mushroom B
1. 3-Octanone	1.8 %	35.8 %
2. Dimethyl trisulfide	1.7 %	4.5 %
3. 3-Octanol	1.7 %	33.1 %
4. 1-Octen-3-ol	2.3 %	4.5 %

* References: [Food] Fragrance Encyclopedia by Japan Perfumery & Flavoring Association.

Pu-erh Tea

Sample

Brew 5 g tea leaves with 15 mL hot water

Sampling
MonoTrap DCC18 1 pc

60 °C, 30 min

Solvent Extraction

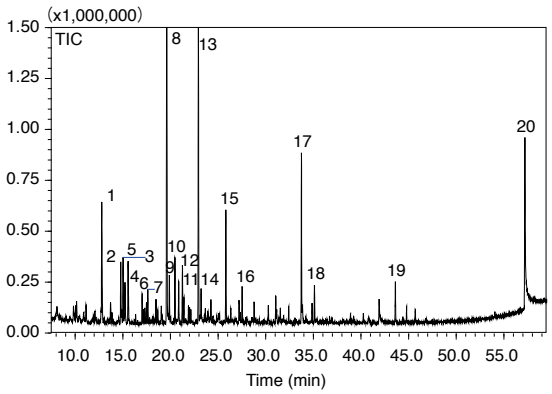
Dichloromethane 1000 µL
Ultrasonication for 5 min

Enrichment

Enrich by N_2 purge to 100 µL

GC/MS

System : GC/MS
Column : InertCap Pure-WAX
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) - 4 °C /min - 250 °C
Carrier Gas : He 1 mL/min
Injection : Splitless
250 °C
Detection : MS Scan (40-600 m/z)
Sample Size : 1.0 µL



1. Methylpyrazine
2. Dimethylpyrazine
3. Dimethylpyrazine
4. Ethylpyrazine
5. 6-Methyl-5-hepten-2-one
6. 2-Ethyl-6-methylpyrazine
7. Trimethylpyrazine
8. Furfural
9. Acetol acetate
10. 2,4-Heptadien-1-al
11. 2-Acetylfuran
12. Benzaldehyde
13. 2-Formyl-5-methylfuran
14. Methyl 2-furoate
15. 2-Furanmethanol
16. Dimethoxybenzene
17. Trimethoxybenzene
18. Pyrrole-2-aldehyde
19. Coumaran
20. Caffeine

* According to NIST Mass Spectral Library, Sample 2 and 3 are isomers.

Cinnamon

Sample

Sampling (HS)
MonoTrap RCC18 2 pcs

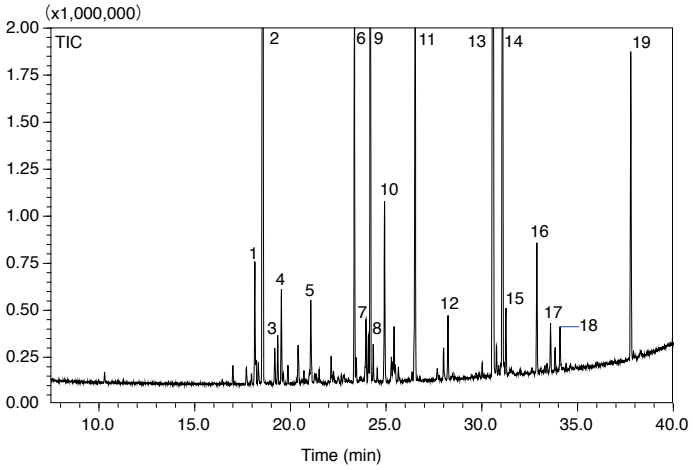
Solvent Extraction

Ethanol 200 µL
Ultrasonication 5 min

GC/MS

Image

System : GC/MS
Column : InertCap Pure-WAX
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) - 5 °C /min - 250 °C
Carrier Gas : He 1 mL/min
Injection : Split 1 : 20
250 °C
Detection : MS Scan (35-600 m/z)
Sample Size : 1.0 µL



1. Cycloisosativene
2. α -Cubebene
3. Sativen
4. Sativen
5. β -Elemene
6. γ -Muurolene
7. Eudesma-4 (14) ,11-diene
8. β -Chamigrene
9. α -Muurolene
10. δ -Cadinene
11. Calamenene
12. α -Calacorene
13. Cinnamaldehyde
14. 3-Methyl-7,8-dihydroquinolin-5 (6H) -one
15. Cedr-8-ene
16. Murolan-3,9 (11) -diene-10-peroxy
17. α -Cadinol
18. Cadalene
19. Coumarin

* According to NIST Mass Spectral Library, Sample 3 and 4 are isomers.

VOC from Burnt Materials

Sample

Put the wood (12.75 g) on soil, pour gasoline over the wood and burn.

Sampling (Passive)
MonoTrap RCC18 2 pcs

Leave for 1 hour at room temperature.

Rinse

Take the MonoTrap out after sampling. Rinse lightly with pure water to remove soil and dirt from the surface.

Solvent Extraction

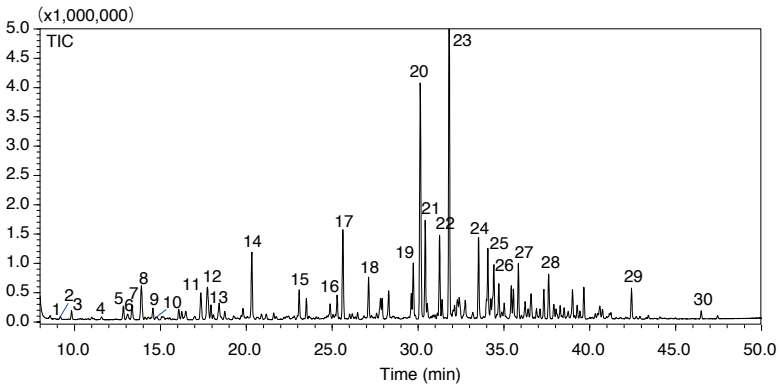
Acetone 200 µL
Ultrasonication 5 min

GC/MS


Burning


Recovered clod part

System : GC/MS
Column : InertCap AQUATIC
0.25 mm I.D. x 60 m df = 1.00 µm
Col.Temp. : 40 °C (5 min hold) - 4 °C /min - 220 °C
Carrier Gas : He 1 mL/min
Injection : Split 1:50
220 °C
Detection : MS Scan (30 - 600 m/z)
Sample Size : 1.0 µL



1. 2-Methylpentane
2. 3-Methylpentane
3. Hexane
4. Methylcyclopentane
5. 2-Methylhexane
6. 2,3-Dimethylpentane
7. 3-Methylhexane
8. Trimethylpentane
9. Heptane
10. Benzene
11. Trimethylpentane
12. Trimethylpentane
13. 2-Methylheptane
14. Toluene
15. 2-Methyloctane
16. Ethylbenzene
17. *m,p* -Xylene
18. o -Xylene
19. Propyl benzene
20. Ethyl methyl benzene
21. Trimethyl benzene
22. Ethyl methyl benzene
23. Trimethyl benzene
24. Propyl toluene
25. Cymene
26. Indane
27. Cymene
28. 1-Ethyl-3,5-dimethylbenzene
29. Naphthalene
30. 1-Methylnaphthalene

* According to NIST Mass Spectral Library, Sample 8, 11 and 12; 20 and 22; 21 and 23; 25 and 27 are isomers.

VOC from Papers Before & After Printing

Sample

1.Chopped paper before color print 10 g
2.Chopped paper after color print 10 g

Sampling
MonoTrap RCC18 5 pcs

Put MonoTrap into the vial
and leave for 3 days at 60 ℃

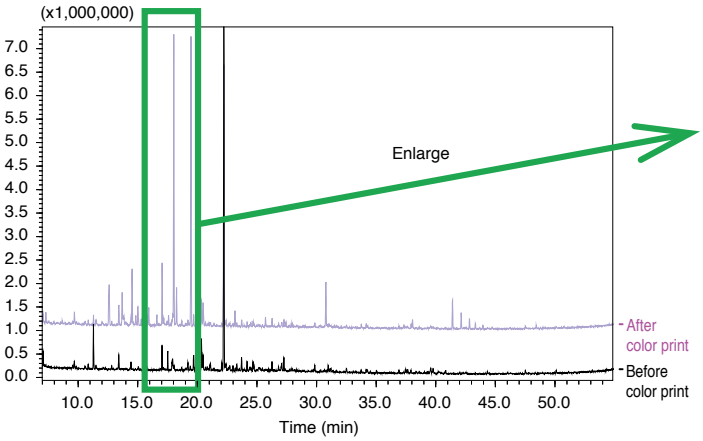
Solvent Extraction

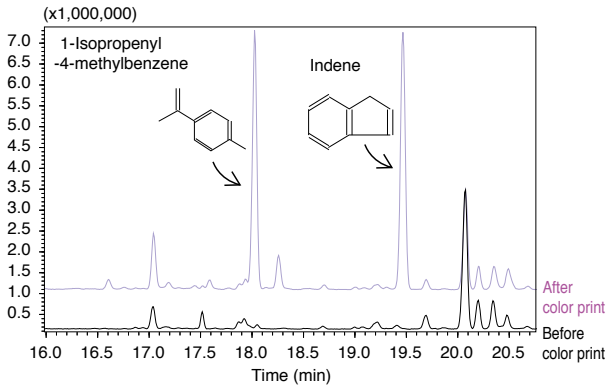
Dichloromethane 500 µL
Ultrasonication for 5 min

GC/MS

Left : Before color print
Right : After Before color print

System : GC/MS
Column : InertCap Pure-WAX
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 40 ˚C (5 min hold) - 4 ˚C /min - 250 ˚C
Carrier Gas : He 1 mL/min
Injection : Splitless
250 ˚C
Detection : MS Scan (35-500 m/z)
Sample Size : 1.0 µL





* According to NIST Mass Spectral Library.

VOC from Putrid Cabbage

Sample

Cut into strips, put 25 g into 100 mL vial

Putrefacient cabbage

60 ˚C, a certain period

Sampling (Passive)
MonoTrap RCC18 3 pcs

Room temperature, 3 hours

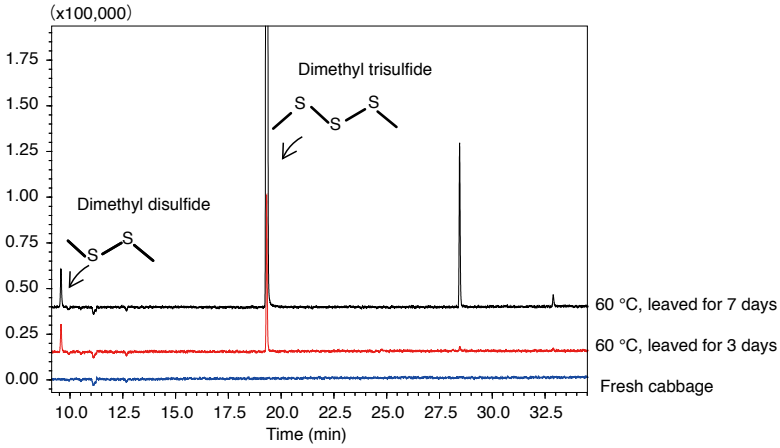
Solvent Extraction

Diethyl ether/ n-pentane = 1:1
Mixed sample 500 µL
Ultrasonication for 5 min

GC/FPD

Left : frewwsh Cabbage
Right : 60 ˚C, putrefacient cabbage
leaved for 3 days

System : GC/FPD
Column : InertCap AQUATIC
0.25 mm I.D. x 60 m df = 1.00 µm
Col. Temp. : 40 ˚C (5 min hold) - 6 ˚C /min - 220 ˚C (10 min hold)
Carrier Gas : He 1 mL/min
Injection : Split 1:50
220 ˚C
Detection : FPD (S)
Sample Size : 1.0 µL



* According to NIST Mass Spectral Library.

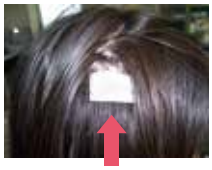
VOC from Scalp

Sample

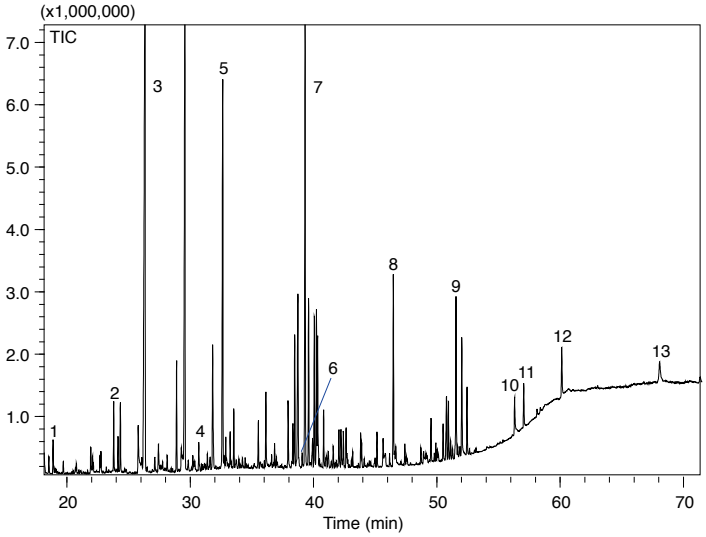
Sampling (Passive)
MonoTrap RGPS TD 1 pc

Room temperature 3 hours

TD-GC/MS



System	: GC/MS-Thermal Desorption (T-Dex Ⅱ)
Column	: InertCap Pure-WAX
	0.25 mm I.D. x 60 m df = 0.25 µm
Col.Temp.	: 35 °C (5 min hold) - 4 °C /min - 250 °C
Carrier Gas	: He 1 mL/min (constant flow)
Desorb Temp.	: 250 °C
Time	: 5 min
Flow	: 5 mL/min
Split	: Splitless
Cryo Trapping	: -150 °C
Injection Temp.	: 250 °C
Detection	: MS Scan (28.8 - 600 m/z)



1. D-Limonene
2. 6-Methyl-5-hepten-2-one
3. Nonanal
4. Linalool
5. Octadecane
6. Hexanoic acid
7. Dinonyl sebacate
8. Phenoxyethyl alcohol
9. Octanal, 2- (phenylmethylene) -
10. 1-Octadecanol
11. Benzyl Benzoate
12. Tetradecanoic acid
13. Squalane

* According to NIST Mass Spectral Library.

Tabacco

Sample

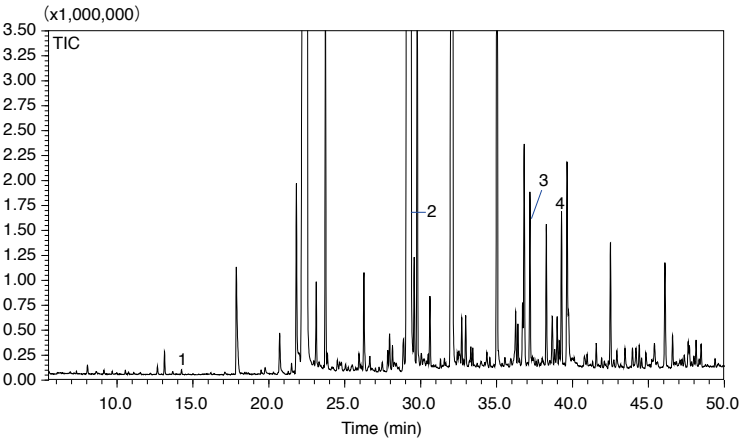
Samapling (Still Standing)
MonoTrap RGC 18 TD 1 pc

60 °C, 90 min

TD-GC/MS

Image

System	: GC/MS-Thermal Desorption (T-Dex Ⅱ)
Column	: InertCap Pure-WAX
	0.25 mm I.D. x 30 m df = 0.25 µm
Col.Temp.	: 40 °C (5 min hold) - 4 °C /min- 250 °C
Carrier Gas	: He 1 mL/min (constant flow)
Desorb Temp.	: 200 °C
Time	: 5 min
Flow	: 2 mL/min
Split	: Splitless
Cryo Trapping	: -160 °C
Injection Temp.	: 250 °C
Detection	: MS Scan (40 - 600 m/z)



1. 6-Methyl-5-hepten-2-one
2. *trans*-Geranylacetone
3. Megastigmatrienone
4. Megastigmatrienone

* According to NIST Mass Spectral Library, Sample 3 and 4 are isomers.

Applications

Parmesan Cheese

Sample 10 g

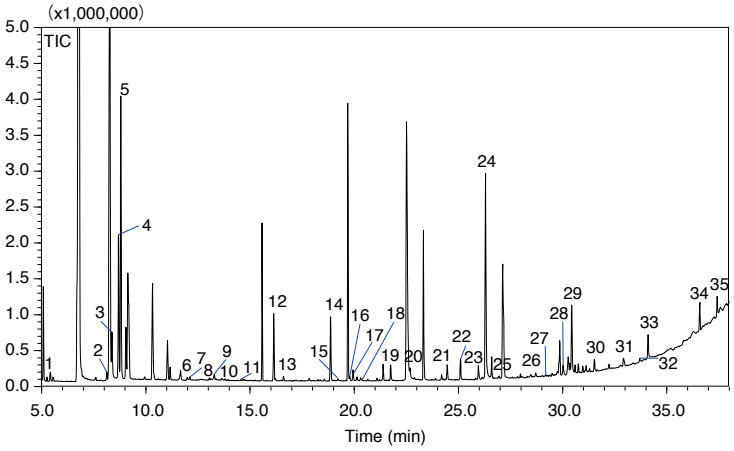
Sampling (HS)
MonoTrap RGC 18 TD 1 pc

60 ℃, 30 min

TD-GC/MS

System : GC/MS-Thermal Desorption (T-Dex Ⅱ)
Column : InertCap Pure-WAX
0.25 mm I.D. x 60 m df = 0.25μm
Col.Temp. : 40 ℃ (5 min hold) - 6 ℃ /min - 250 ℃
Carrier Gas : He 1 mL/min (constant flow)

Desorb Temp. : 200 ℃
Time : 5 min
Flow : 1 mL/min
Split : Splitless
Cryo Trapping : -150 ℃
Injection Temp. : 250 ℃
Detection : MS Scan (28.5 - 600 m/z)



1. Methanethiol
2. Ethyl Acetate
3. 2-Butanone
4. 2-methylbutanal
5. 3-methylbutanal
6. 1-Propanol
7. Toluene
8. Dimethyl disulfide
9. Hexanal
10. 2-Pentenal
11. 3-Penten-2-one
12. 2-Heptanone
13. D-Limonene
14. Acetoin
15. Acetol
16. Dimethylpyrazine
17. Dimethylpyrazine
18. Dimethylpyrazine
19. 2-Nonanone
20. 2,5-Dimethyl-3-ethylpyrazine
21. Benzaldehyde
22. Isobutyric acid
23. 2-Undecanone
24. Butanoic acid
25. 2-Furanmethanol
26. Acetamide
27. 2-Tetradecanol
28. 2-Tridecanone
29. Hexanoic acid
30. Dimethyl sulfone
31. δ -Octalactone
32. 2-Pentadecanone
33. Octanoic acid
34. δ -Decalactone
35. Decanoic acid

* According to NIST Mass Spectral Library, Sample 16 - 18 are isomers.

Maple Sugar

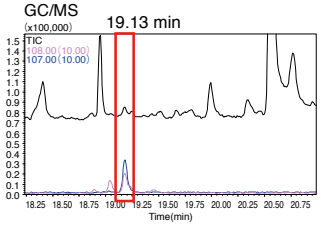
Sample

Sampling (HS)
MonoTrap RGC 18 TD 1 pc

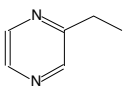
60 ℃, 1 hours

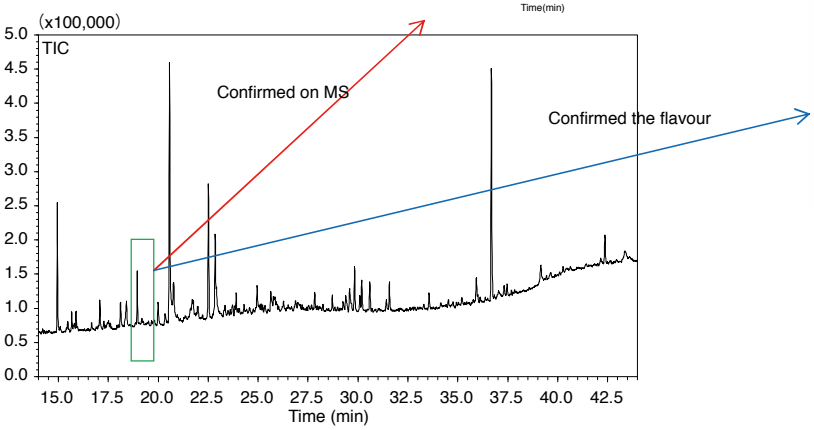
TD-GC/MS-O

GC/MS



Ethylpyrazine

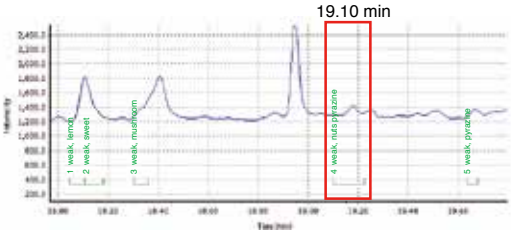




System : GC/MS-Thermal Desorption (T-Dex Ⅱ)
Column : InertCap Pure-WAX
0.25 mm I.D. x 60 m df = 0.25 μm
Col.Temp. : 40 ℃ (5 min hold) - 6 ℃ /min - 250 ℃
Carrier Gas : He 1 mL/min (constant flow)

Desorb Temp. : 200 ℃
Time : 5 min
Flow : 1 mL/min
Split : Split 1:2 (Desorb 10 mL/min, Split 20 mL/min)
Cryo Trapping : -150 ℃
Injection Temp. : 250 ℃
Detection : MS Scan (28.8 - 600 m/z)

Screen of Olfactory Voicegram Software



No.	Start (min)	End (min)	Intensity	Smell
1	18.05	18.11	weak	lemon
2	18.11	18.18	weak	sweet
3	18.30	18.36	weak	mushroom
4	19.10	19.23	weak	nuts pyrazine
5	19.64	19.68	weak	pyrazine

CONSUMABLES AND SUPPLIES

GC CAPILLARY COLUMNS

Operation Information of GC Capillary Columns

Column Installation Procedure

1. Uncoil the ends of the column long enough to reach the injector and detector.
2. Slide the nut and ferrule onto the inlet end of the column and cut 1 cm from the end of the column using a recommended cutter such as a capillary fine cutter or ceramic tube cutter. The column must be square cut otherwise this may cause column wall damage and clogging, leading to performance loss.
3. Refer to the GC Capillary instruction manual for the insertion length of the inlet end into the injection port.
4. Set the pressure of carrier gas and make sure that the flow rate is correctly adjusted and there is no leak. Linear carrier gas velocity is approx. 30 cm/sec (He). For setting the head pressure, refer to the table below (internal injection port pressure). The column head pressure differs depending on the type of GC and carrier gas.

Relationship Between Column and Head Pressure

Length and I.D.	0.18 mm I.D.	0.25 mm I.D.	0.32 mm I.D.	0.53 mm I.D.
20 m	150 kPa (1.5 bar, 21.8 psi)	–	–	–
30 m	–	100 kPa (1.0 bar, 14.5 psi)	70 kPa (0.7 bar, 10.2 psi)	20 kPa (0.2 bar, 2.9 psi)
60 m	–	200 kPa (2.0 bar, 29.0 psi)	140 kPa (1.4 bar, 20.3 psi)	50 kPa (0.5 bar, 7.2 psi)

5. The installation procedure of the outlet end is the same as for the inlet end. Slide the nut and ferrule onto the outlet end of the column and cut 1 cm from the end of the column using the cutter. Connect the end as described in the instruction manual. When conditioning the column, disconnect the outlet end from the detector to prevent contamination.

   To check for gas leaks, use the leak detector LD239 (Cat. No. 2702-19330). Do not use soap solution such as snoop for high sensitivity analysis as it may cause contamination of the entire system.

Column Conditioning

1. Verify if the needed carrier gas flow rate has been set. Replace the gas purification tube (moisture, oxygen and for organic matter removal) as necessary.
2. Do not connect the capillary column to the detector.
3. Purge the column with the carrier gas for more than 20 minutes at room temperature. If the column is not purged enough, the sensitivity may decrease.
4. Set the oven temperature ramp rate at 5-10 ˚C/min. Conditioning for 1-2 hours at 10 ˚C higher temperature than the maximum temperature set for the analysis (but if in this way the temperature will be higher than the isothermal maximum temperature - Iso.Max.Temp. – the Iso.Max.Temp. must be set).

On Silicone Stationary Phase

Temperature programing rate: 10 ˚C/minute
Holding Time at the Final Temperature: 2 hours

On Wax Stationary Phase

Temperature programing rate: 5 ˚C/minute
Holding Time at 100 ˚C 30 minutes (For dehydration)
Holding Time at the Final Temperature: 2 hours

5. After the conditioning completed, connect the column to the detector. After resetting to the analysis initial temperature, the baseline gradually decreases for approx. 10 minutes. Then the baseline stabilizes, and the analysis can be started.

Features - InertCap series

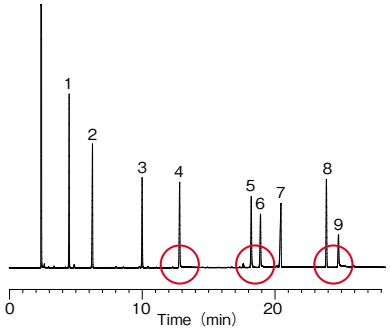
High Inertness

Inertness is one of the most difficult attributes to achieve in an analytical column. GL Sciences' unique manufacturing technology completely eliminates residues of metal, halide and silanol which are in the column's inner surface. In this way it is possible to obtain excellent symmetry peaks for polar, basic, acidic compounds and metal ligands.

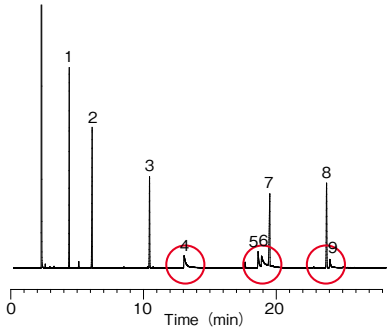
Comparison of High-Adsorptive Samples

System : GC/FID
Column : 0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 60 ˚C- 4 ˚C/min - 250 ˚C
Injection : 250 ˚C
Detection : 250 ˚C
Sample Size : 0.1 mg/mL in methanol 0.2 µL

1. *n*-Undecane
2. *n*-Dodecane
3. 4.6-Dimethylpyrimidine
4. 1-Aminooctane
5. *N,N*-Dicyclohexylamie
6. 1-Aminodecane
7. *n*-Heptadecane
8. 2.6-Dimethylaniline
9. 1-Aminododecane



InertCap Pure-WAX



Brand A

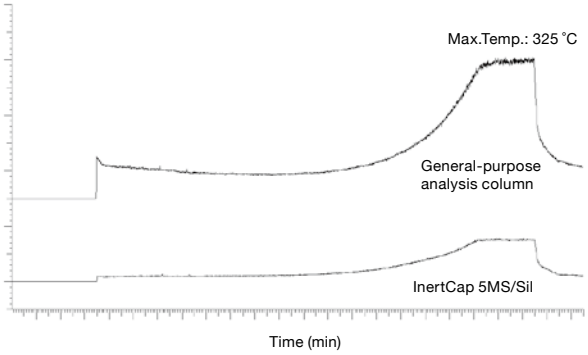
Ultra-Low Bleed

In GC/MS analysis, it is important to select a low bleed column that has little baseline rise to improve the S/N ratio and detection limit, also to prevent contamination in the MS detector.

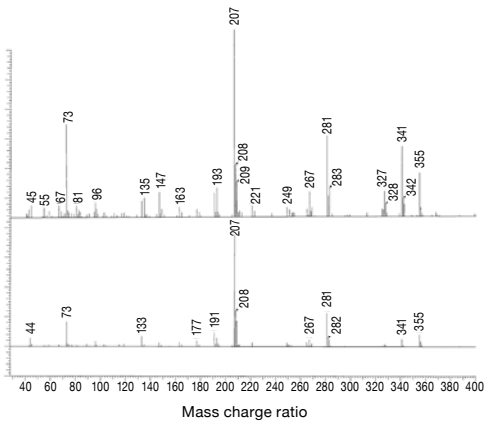
The baseline increases when the siloxane (Si-O) liquid phase is damaged by high temperature into cyclic siloxane. This can be seen in the MS spectrum as m/z 207.

Based on superior technologies for cross-linking of stationary phases and surface deactivation of fused silica, InertCap columns for GC/MS analysis offers technologies, with ultra-low bleed.

Column Bleed Comparison



Spectrum Intensity Comparison



Quality Assurance InertCap Series

InertCap Capillary column are manufactured and shipped under strict quality control at the GL Science factory, Japan, in accordance with ISO9001 quality certification. InertCap is tested by standard samples which contain high adsorption compounds.

Inspection Report

To achieve the highest quality assurance standards, all the columns are tested in order to verify their quality. The inspection report includes theoretical plate number (N) and coating efficiency (CE), to ensure optimal separation and stable quality.

Also, to guarantee the specific performance of some products, a test chromatogram reporting the separation and adsorption of related standard components is included.

InertCap Series

Lineup - InertCap Series

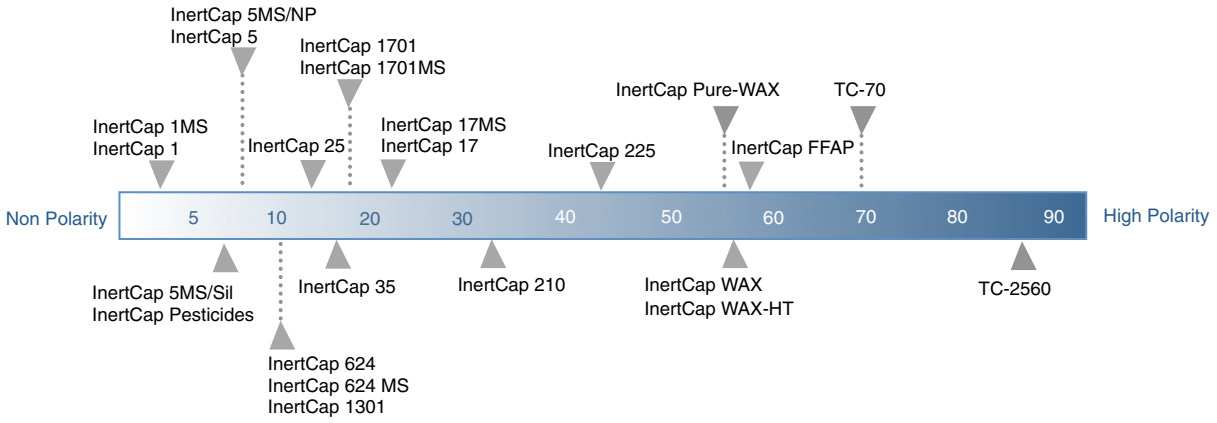
General Purpose Columns

InertCap Phase	Phase Composition	USP Code	Polarity	Application
InertCap 1MS	100 % Dimethylpolysiloxane	G2	Non	General purpose, Hydrocarbons, PCBs, High Volatile solvents, Phenols.
InertCap 1	100 % Dimethylpolysiloxane	G2	Non	General purpose, Hydrocarbons, PCBs, High Volatile solvents, Phenols.
InertCap 5MS/Sil	5 % Diphenyl(equiv.)-Dimethylpolysilphenylene siloxane	G27	Low	General purpose, Halogenated compounds, Phenols, Pesticides, FAME.
InertCap 5MS/NP	5 % Diphenyl 95 % Dimethylpolysiloxane	G27	Low	General purpose, Halogenated compounds, Phenols, Pesticides, FAME.
InertCap 5	5 % Diphenyl 95 % Dimethylpolysiloxane	G27	Low	General purpose, Halogenated compounds, Phenols, Pesticides, FAME.
InertCap 624/MS	6 % Cyanopropylphenyl 94 % Dimethylpolysiloxane	G43	Medium	VOCs, Alcohols.
InertCap 1301	6 % Cyanopropylphenyl 94 % Dimethylpolysiloxane	G43	Medium	Pesticides, PCBs, Alcohols, VOCs.
InertCap 25	25 % Diphenyl 75 % Dimethylpolysiloxane	G28	Medium	Pesticides, PCBs, Alcohols, VOCs.
InertCap 35/MS	35 % Diphenyl 65 % Dimethylpolysiloxane	G42	Medium	Pesticides, Amines, Drugs, PCBs.
InertCap 1701/MS	14 % Cyanopropylphenyl 86 % Dimethylpolysiloxane	G46	Medium	Sugars, TMS derivatives, Drugs, Alcohol, Steroids.
InertCap 17/MS	50 % Diphenyl 50 % Dimethylpolysiloxane	G3	Medium	Steroids, Drugs, Pesticides.
InertCap 210	50 % Trifluoropropyl 50 % Methylpolysiloxane	G6	Medium	Organ phosphorus acids.
InertCap 225	50 % Cyanopropylmethyl 50 % Phenylmethylpolysiloxane	G19	Medium ~ High	FAME
InertCap Pure-WAX	Polyethylene Glycol	G16	High	General purpose, Eaters, Perfumes, Alcohols, Aromatic hydrocarbons, FAME.
InertCap WAX	Polyethylene Glycol	G16	High	General purpose, Eaters, Perfumes, Alcohols, Aromatic hydrocarbons, FAME.
InertCap WAX-HT	Polyethylene Glycol	G16	High	General purpose, Eaters, Perfumes, Alcohols, Aromatic hydrocarbons, FAME.
InertCap FFAP	Nitroterephthalic acid modified Polyethylene Glycol	G35	High	FAME, Free fatty acids, Organic acids, Alcoholaldehydes.

Specific Application Columns

InertCap Phase	Phase Composition	USP Code	Polarity	Application
InertCap Pesticides	5 % Diphenyl(equiv.)-Dimethylpolysilphenylene siloxane	G27	Low	Pesticides screening.
InertCap AQUATIC	25 % Diphenyl 75 % Dimethylpolysiloxane	G28	Medium	VOCs, 1,4- dioxane, Organic solvents.
InertCap AQUATIC-2	25 % Diphenyl 75 % Dimethylpolysiloxane	G28	Medium	VOCs, Organic solvents.
InertCap for Amines	Special Phase	–	–	Amines, Alcohols.
InertCap CHIRAMIX	Special Phase	–	–	Optical isomers

Columns Polarity



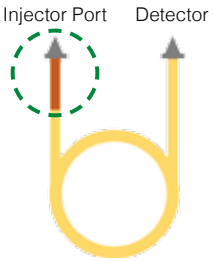
Column Cross Reference - InertCap Series

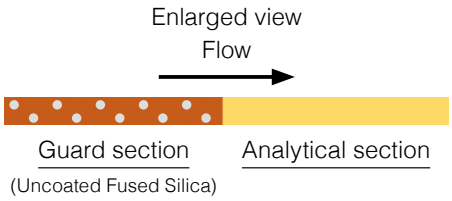
ジーエルサイエンス	液　相	Agilent	Agilent (Varian)	Agilent (Chrompack)	Restek	Supelco
InertCap 1MS	100 % Dimethylpolysiloxane	DB-1ms HP-1ms	VF-1ms	CP-Sil 5 CB Low Bleed/MS	Rxi-1ms	Equity-1
InertCap 1	100 % Dimethylpolysiloxane	DB-1 HP-1 ULTRA-1	–	CP-Sil 5 CB	Rtx-1	SPB-1
InertCap 5MS/Sil	5 % Diphenyl (equiv.) - Dimethylpolysilphenylene siloxane	DB-5ms	VF-5ms	CP-Sil 8 CB Low Bleed/MS	Rxi-5Sil MS	SLB-5ms
InertCap 5MS/NP	5 % Diphenyl 95 % Dimethylpolysiloxane	HP-5ms	–	–	Rxi-5ms Rtx-5MS	Equity-5
InertCap 5	5 % Diphenyl 95 % Dimethylpolysiloxane	DB-5, HP-5 ULTRA-2	–	CP-Sil 8 CB	Rtx-5	SPB-5
InertCap 624MS	6 % Cyanopropylphenyl 94 % Dimethylpolysiloxane	DB-624 HP-VOC	VF-624ms	–	Rtx-624 Rxi-624Sil MS	–
InertCap 624	6 % Cyanopropylphenyl 94 % Dimethylpolysiloxane	DB-624 HP-VOC	VF-624ms	CP-Select 624 CB	Rtx-624	–
InertCap 1301	6 % Cyanopropylphenyl 94 % Dimethylpolysiloxane	DB-1301 HP-1301	VF-1301ms	CP-1301	Rtx-1301	SPB-1301
InertCap 25	25 % Diphenyl 75 % Dimethylpolysiloxane	–	–	–	–	–
InertCap 35MS	35 % Diphenyl (equiv.) 65 % Dimethylpolysiloxane	DB-35ms UI	VF-35ms	–	Rxi-35Sil MS	–
InertCap 35	35 % Diphenyl 65 % Dimethylpolysiloxane	DB-35 HP-35	VF-35ms	–	Rtx-35	SPB-35
InertCap 1701MS	14 % Cyanopropylphenyl 86 % Dimethylpolysiloxane	DB-1701	VF-1701ms	–	Rtx-1701	SPB-1701
InertCap 1701	14 % Cyanopropylphenyl 86 % Dimethylpolysiloxane	DB-1701	VF-1701ms	CP-Sil 19 CB	Rtx-1701	SPB-1701
InertCap 17MS	50 % Diphenyl 50 % Dimethylpolysiloxane	DB-17ms	VF-17ms	CP-Sil 24 CB Low Bleed/MS	Rxi-17Sil MS	–
InertCap 17	50 % Diphenyl 50 % Dimethylpolysiloxane	DB-17 HP-50+	–	CP-Sil 24 CB	Rxi-17 Rtx-50	SPB-50
InertCap 210	50 % Trifluoropropyl 50 % Methylpolysiloxane	DB-210 DB-200	VF-200ms	–	Rtx-200	–
InertCap 225	50 % Cyanopropylmethyl 50 % Phenylmethylpolysiloxane	DB-225	–	CP-Sil 43 CB	Rtx-225	–
InertCap Pure-WAX	Polyethylene Glycol (PEG)	DB-WAX HP-INNOWax	–	CP-WAX 52 CB	Rtx-Wax Stabilwax	SUPELCOWAX-10
InertCap WAX	Polyethylene Glycol (PEG)	DB-WAX HP-INNOWax	–	CP-WAX 52 CB	Rtx-Wax Stabilwax	SUPELCOWAX-10
InertCap WAX-HT	Polyethylene Glycol (PEG)	DB-WAXetr	VF-WAXms	CP-WAX 52 CB	–	SUPELCOWAX-10
InertCap FFAP	Nitroterephthalic acid modified Polyethylene Glycol	DB-FFAP HP-FFAP	–	CP-WAX 58 CB	Stabilwax-DA	–
InertCap Pesticides	5 % Diphenyl (equiv.) - Dimethylpolysilphenylene siloxane	–	–	–	–	–
InertCap AQUATIC	25 % Diphenyl 75 % Dimethylpolysiloxane	–	–	–	–	–
InertCap AQUATIC-2	25 % Diphenyl 75 % Dimethylpolysiloxane	–	–	–	–	–
InertCap for Amines	特殊液相	–	–	CP-Volamine	–	–
InertCap CHIRAMIX	特殊液相	–	–	–	–	–

InertCap Series

InertCap ProGuard - Build-in Guard Column

Guard columns and retention gaps are used widely in gas chromatography. Both of them are short (1-10 m) piece of uncoated deactivated fused silica tubing which are placed in-line between the GC injection port and the analytical capillary column. Guard column is to protect the analytical column from contamination, not allowing nonvolatile materials to reach the analytical column. Retention gap is to help focus the compounds in large volume injected from the inlet to a small band at the head of the analytical column. InertCap ProGuard is a "guard column built-in" analytical capillary column without the connection for such purposes. For this reason, now there is no need to worry about leakage and compounds adsorption.





- Minimize matrix effects
- Expect longer column life time
- Trap foreign substances
- Protects analytical column

InertCap ProGuard

Phase (column)	I.D.	Length	Thickness	Guard column Length	Max. Temperature	Cat.No.
InertCap 1MS	0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-12172
				5 m		1010-12173
				10 m		1010-12174
InertCap 1	0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-11172
				5 m		1010-11173
				10 m		1010-11174
InertCap 5MS/Sil	0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-15172
				5 m		1010-15173
				10 m		1010-15174
InertCap 5MS/NP	0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-18941
				5 m		1010-18942
				10 m		1010-18943
InertCap 5	0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-18172
				5 m		1010-18173
				10 m		1010-18174
InertCap Pesticides	0.25 mm	30 m	0.2 µm	2 m	iso.325-prog.350 °C	1010-15175
				5 m		1010-15176
				10 m		1010-15177
InertCap Pure-WAX	0.25 mm	30 m	0.25 µm	2 m	iso.260-prog.260 °C	1010-68490
				5 m		1010-68491
				10 m		1010-68494

FAQS

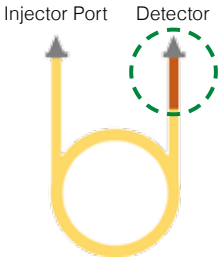
Q.1 How does it work?
By cutting the edge of the guard column, the analytical column's lifetime can be longer.

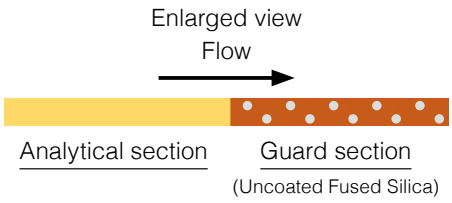
Q.2 Doesn't it leak as guard section and analytical section are connected?
There is no need to worry about leakage as no connecting union is used.

Q.3 When should we cut the edge of the column?
In case you observe retention lost , high bleed and poor peek shapes.

InertCap T.L. - Built-in Transfer Line

Transfer lines are widely used for connecting interface of GC chromatography and MS. InertCap T.L. is a "transfer line built-in" analytical capillary column without connectors. Transfer line prevents degradation of stationary phase and keeps it low bleed. Additionally, transfer line is inert to transfer samples with no adsorption. Therefore there is no need to worry about leakage and compound adsorption.





- Minimize the contamination originating from the column
- Expect longer column life time
- Traps highly polar analytes such as H_2O, O_2.
- Protects GC-MS

InertCap T.L.

Phase (column)	I.D.	Length	Thickness	Transfer Line Length	Max. Temperature	Cat.No.
InertCap 1MS	0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-12192
InertCap 5MS/Sil	0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-15192
InertCap Pesticides	0.25 mm	30 m	0.20 µm	2 m	iso.325-prog.350 °C	1010-15191
InertCap Pure-WAX	0.25 mm	30 m	0.25 µm	2 m	iso.260-prog.260 °C	1010-68492
	0.25 mm	60 m	0.25 µm	2 m	iso.260-prog.260 °C	1010-68493

Japanese Pharmacopeia

Target Compounds	Phase	Column Dimension	Recommend Column Cat.No.
Acetohexamide	InertCap 1	0.53 mm I.D. x 30 m df = 1.50 µm	1010-11446
Ethanol Dehydrated Ethanol Ethanol for Disinfection	InertCap 624 Note: If necessary, identify suitable analysis conditions with stationary phase which is different from polarity of benzene.	0.32 mm I.D. x 30 m df = 1.80 µm	1010-14747
Epirubicin Hydrochloride	InertCap WAX InertCap Pure-WAX	0.53 mm I.D. x 30 m df = 1.00 µm 0.53 mm I.D. x 30 m df = 1.00 µm	1010-67445 1010-68445
Glycerol Concentrated Glycerin	InertCap 1701	0.32 mm I.D. x 30 m df = 1.00 µm	1010-61245
Wood Creosote Purity test of Coal Creosote	InertCap 5 InertCap 5MS/NP InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm	1010-18142 1010-18642 1010-15142
Wood Creosote Purity test of Acenaphthene	InertCap 1	0.25 mm I.D. x 60 m df = 0.25 µm 0.25 mm I.D. x 60 m df = 0.40 µm	1010-11162 1010-11163
Colchicine	InertCap Pure-WAX	0.53 mm I.D. x 30 m df = 1.00 µm	1010-68445
Magnesium Stearate	InertCap Pure-WAX InertCap WAX	0.32 mm I.D. x 30 m df = 0.50 µm 0.32 mm I.D. x 30 m df = 0.50 µm	1010-68244 1010-67244
Sevoflurane	InertCap 624	0.32 mm I.D. x 30 m df = 1.80 µm	1010-14747
Teceleukin (Gene Recombination)	G-300	1.20 mm I.D. x 40 m df = 1.00 µm	On Request
Panipenem	G-950	1.20 mm I.D. x 40 m df = 25 µm	On Request
Benzyl Alcohol	InertCap Pure-WAX InertCap WAX	0.32 mm I.D. x 30 m df = 0.50 µm 0.32 mm I.D. x 30 m df = 0.50 µm	1010-68244 1010-67244
Labetalol Hydrochloride	InertCap 1	0.53 mm I.D. x 30 m df = 5.00 µm	1010-11449
Iohexol (Supplement I to the Japanese Pharmacopoeia,16th Edition)	InertCap 5	0.25 mm I.D. x 30 m df = 0.25 µm	1010-18142
Clomiophene Citrate (Supplement I to the Japanese Pharmacopoeia,16th Edition)	InertCap 1	0.25 mm I.D. x 15 m df = 0.10 µm	1010-11120
Anhydrous Lactose (Supplement I to the Japanese Pharmacopoeia,16th Edition)	InertCap 5 Medium polar - deactivated fused silica tube	0.25 mm I.D. x 15 m df = 0.25 µm 0.53 mm I.D. x 2 m	1010-18122 1010-36782
Bupivacaine Hydrochloride Hydrate (Supplement I to the Japanese Pharmacopoeia,16th Edition)	InertCap 5	0.32 mm I.D. x 30 m df = 0.25 µm	1010-18242
Lenograstim (Gene Recombination) (Supplement I to the Japanese Pharmacopoeia,16th Edition)	InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm	1010-61142

5.01 Crude Drugs Test

Description (Japanese Pharmacopoeia,16th Edition)	Application Column	Dimension	Cat.No.
Polygala root, polygala root powder, Licorice, Licorice powder, Chinese Cinnamon, Chinese Cinnamon powder, Red Ginseng, Asiasarum Root, Cornus Fruit, Senna Leaf, Senna Leaf Powder, Perilla Herb, Jujube, Citrus Unshiu Peel, Carrot, Carrot Powder, Eriobotryae Folium, Moutan Bark, Moutan Bark Powder.	InertCap 1701	0.32 mm I.D. x 30 m df = 0.25 µm 0.32 mm I.D. x 30 m df = 0.50 µm 0.32 mm I.D. x 30 m df = 1.00 µm	1010-61242 1010-61244 1010-61245

Japanese Pharmacopeia

7.02 Test Methods for Plastic Containers

Description (Japanese Pharmacopoeia,16th Edition)	Phase	Column Dimensions	Cat.No.
Polyvinyl chloride containers for aqueous injection	CP-PoraBOND Q	0.25 mm I.D. x 25 m df = 3.00 µm	1010-77348

9.41 Reagents, Test Solutions

Description (Japanese Pharmacopoeia,16th Edition)	Phase	Column Dimensions	Cat.No.
α-BHC (α-hexachlorocyclohexane)	InertCap 1701	0.32 mm I.D. x 30 m df = 0.25 µm 0.32 mm I.D. x 30 m df = 0.50 µm 0.32 mm I.D. x 30 m df = 1.00 µm	1010-61242 1010-61244 1010-61245
p,p'-DDD (2,2-bis (4-chlorophenyl)-1, 1-dichloroethane)	InertCap 1701	0.32 mm I.D. x 30 m df = 0.25 µm 0.32 mm I.D. x 30 m df = 0.50 µm 0.32 mm I.D. x 30 m df = 1.00 µm	1010-61242 1010-61244 1010-61245
Guaiacol, for quantitative determination	InertCap 1	0.25 mm I.D. x 60 m df = 0.25 µm 0.25 mm I.D. x 60 m df = 0.40 µm	1010-11162 1010-11163
Diethyl Ether, for purity test of Crude Drugs	InertCap 1701	0.32 mm I.D. x 30 m df = 0.25 µm 0.32 mm I.D. x 30 m df = 0.50 µm 0.32 mm I.D. x 30 m df = 1.00 µm	1010-61242 1010-61244 1010-61245
Dibenz[a,h] anthracene	InertCap 5 InertCap 5MS/NP InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm	1010-18142 1010-18642 1010-15142
N,N-dimethylacetamide	InertCap Pure-WAX InertCap WAX	0.25 mm I.D. x 30 m df = 0.50 µm 0.25 mm I.D. x 30 m df = 0.50 µm	1010-68144 1010-67144
Cilastatinammonium, for quantitative determination	InertCap 5	0.53 mm I.D. x 30 m df = 5.00 µm	1010-18449
1-vinyl-2-Pyrrolidone	InertCap Pure-WAX InertCap WAX InertCap WAX-HT	0.53 mm I.D. x 30 m df = 1.00 µm 0.53 mm I.D. x 30 m df = 1.00 µm 0.53 mm I.D. x 30 m df = 1.00 µm	1010-68445 1010-67445 1010-68745
Hexane, for purity test of Crude Drugs	InertCap 1701	0.32 mm I.D. x 30 m df = 0.25 µm 0.32 mm I.D. x 30 m df = 0.50 µm 0.32 mm I.D. x 30 m df = 1.00 µm	1010-61242 1010-61244 1010-61245
Benz[a] anthracene	InertCap 5 InertCap 5MS/NP InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm	1010-18142 1010-18642 1010-15142
Benzo[a] Pyrene	InertCap 5 InertCap 5MS/NP InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm	1010-18142 1010-18642 1010-15142
2-methoxy-4-methylphenol	InertCap 1	0.25 mm I.D. x 60 m df = 0.25 µm 0.25 mm I.D. x 60 m df = 0.40 µm	1010-11162 1010-11163
3-chloro-1,2-propanediol (Supplement I to the Japanese Pharmacopoeia,16th Edition)	InertCap 5	0.25 mm I.D. x 30 m df = 0.25 µm	1010-18142
Ethyl formate (Supplement I to the Japanese Pharmacopoeia,16th Edition)	InertCap Pure-WAX InertCap WAX InertCap WAX-HT	0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm	1010-68142 1010-67142 1010-68542

United States Pharmacopeia (USP) GC Phases

USP	Phase Composition	GL Phase		
G1	Dimethylpolysiloxane oil	InertCap 1MS	InertCap 1	
G2	Dimethylpolysiloxane gum	InertCap 1MS	InertCap 1	
G3	50 % Phenyl - 50 % methylpolysiloxane	InertCap 17MS	InertCap 17	
G6	Trifluoropropylmethyl polysiloxane	InertCap 210		
G7	50 % 3-Cyanopropyl - 50 % phenylmethylsilicone	InertCap 225		
G14	Polyethylene glycol (av.mot.wt.of 950 to 1050)	InertCap Pure-WAX	InertCap WAX	InertCap WAX-HT
G15	Polyethylene glycol (av.mot.wt.of 3000 to 3700)	InertCap Pure-WAX	InertCap WAX	InertCap WAX-HT
G16	Polyethylene glycol compound (av.mot.wt.about 15,000). A high molecular weight compound of with a diepoxide linker Polyethylene glycol	InertCap Pure-WAX	InertCap WAX	InertCap WAX-HT
G19	25 % Phenyl - 25 % cyanopropyl - 50 % methylsilicone	InertCap 225		
G20	Polyethylene glycol (av.mot.wt.of 380 to 420)	InertCap Pure-WAX	InertCap WAX	InertCap WAX-HT
G25	Polyethylene glycol compound TPA. A high molecular weight compound of polyethylene glycol and diepoxide that is esterified with terephtharic acid. Available commercially as Carbowax 20M-TPA from suppliers of chromatographic reagents.	InertCap FFAP		
G27	5 % Phenyl - 95 % methylpolysiloxane	InertCap 5MS/Sil	InertCap 5MS/NP	InertCap 5
G28	25 % Phenyl - 75 % methylpolysiloxane	InertCap 25	InertCap AQUATIC	InertCap AQUATIC-2
G35	A high molecular weight compound of a polyethylene glycol and a diepoxide that is eaterified with nitroterephthalic acid.	InertCap FFAP		
G36	1 % Vinyl - 5 % phenylmethylpolysiloxane	InertCap 5MS/Sil	InertCap 5MS/NP	InertCap 5
G38	Phase G1 containing a small percentage of a tailing inhibitor	InertCap 1MS	InertCap 1	
G39	Polyethylene glycol (av.mol.wt.of about 1500)	InertCap Pure-WAX	InertCap WAX	InertCap WAX-HT
G42	35 % phenyl-65 % dimethylpolysiloxane (percentage refer to molar substitution)	InertCap 35		
G43	6 % cyanopropylphenyl-94 % dimethylpolysiloxane	InertCap 624	InertCap 1301	
G46	14 % Cyanopropylphenyl - 86 % methylpolysiloxane	InertCap 1701		
G47	Polyethylene glycol (av.mol.wt.of about 8000)	InertCap Pure-WAX	InertCap WAX	InertCap WAX-HT

EPA Method

Method	Applications	Phase	Column Dimensions	Cat.No.
501.3	Measurement of trihalomethanes in drinking water	InertCap 624	0.53 mm I.D. x 30 m df = 3.00 µm	1010-14948
502.2	Volatile organic compounds(VOC) in water	InertCap 624	0.53 mm I.D. x 30 m df = 3.00 µm	1010-14948
504.1	1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP),and 1,2,3-Trichloropropane (123TCP)	InertCap 1	0.32 mm I.D. x 30 m df = 1.00 µm	1010-11245
505	Organohalide pesticides	InertCap 1 InertCap 5	0.32 mm I.D. x 30 m df = 1.00 µm 0.25 mm I.D. x 30 m df = 1.00 µm	1010-11245 1010-18145
506	Determination of phthalate and adipate esters	InertCap 1 InertCap 5	0.32 mm I.D. x 30 m df = 0.25 µm 0.32 mm I.D. x 30 m df = 0.25 µm	1010-11242 1010-18242
507	Determination of nitrogen- and phosphorus-containing pesticides in water	InertCap 5MS/Sil InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm 0.53 mm I.D. x 30 m df = 1.00 µm	1010-15142 1010-61445
508.1	Organochlorine pesticides and PCBs	InertCap 5MS/Sil InertCap 5 InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142 1010-18142 1010-61142
515	Determination of chlorinated acids in water	InertCap 5	0.25 mm I.D. x 30 m df = 0.25 µm	1010-18142
515.2	Determination of chlorinated acids in water	InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm	1010-61142
515.3	Determination of chlorinated acids in drinking water by liquid-liquid extraction, derivatization and gas chromatography with electron capture detection	InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm	1010-61142
515.4	Determination of chlorinated acids in water by liquid-liquid microextraction, derivatization, and fast gas chromatography with electron capture detection	InertCap 1701	0.32 mm I.D. x 30 m df = 0.25 µm	1010-61242
524.2	Measurement of purgeable organic compounds in water by capillary column gas chromatography/mass spectrometry (GC/MS)	InertCap 624	0.53 mm I.D. x 30 m df = 3.00 µm 0.53 mm I.D. x 75 m df = 3.00 µm	1010-14948 1010-14978
525.2	Determination of organic compounds in drinking water	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142
526	Determination of selected semivolatile organic compounds in drinking water by solid phase extraction and capillary column gas chromatography/ mass spectrometry (GC/MS)	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142
527	Determination of selected pesticides and flame retardants in drinking water by solid phase extraction and capillary column gas chromatography/ mass spectrometry (GC/MS)	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142
528	Determination of phenols in drinking water by solid phase extraction and capillary column gas chromatography/mass spectrometry (GC/MS)	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142
529	Determination of phenols in drinking water by solid phase extraction and capillary column gas chromatography/mass spectrometry (GC/MS)	InertCap 5MS/Sil	0.25 mm I.D. x 15 m df = 0.25 µm	1010-15122
551	Determination of chlorination disinfection byproducts, chlorinated solvents, and halogenated pesticides, herbicides in drinking water	InertCap 5	0.25 mm I.D. x 30 m df = 1.00 µm	1010-18145
551.1	Chlorinated solvents & disinfection by-products	InertCap 1MS InertCap 1301	0.25 mm I.D. x 30 m df = 1.00 µm 0.25 mm I.D. x 30 m df = 1.00 µm	1010-12145 1010-60145
552	Haloacetic acids	InertCap 5 InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 30 m df = 0.25 µm	1010-18142 1010-61142
556	Determination of carbonyl compounds in drinking water by pentafluorobenzylhydroxylamine derivatization and capillary gas chromatography with electron capture detection	InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm	1010-61142
556.1	Determination of carbonyl compounds in drinking water by fast gas chromatography	InertCap 5MS/Sil	0.10 mm I.D. x 10 m df = 0.10 µm	Contact Us
		InertCap 1701	0.10 mm I.D. x 10 m df = 0.10 µm	Contact Us
601	Purgeable halocarbons	InertCap 624	0.53 mm I.D. x 30 m df = 1.00 µm 0.53 mm I.D. x 30 m df = 3.00 µm	Contact Us 1010-14948
602	Purgeable aromatics	InertCap 624	0.53 mm I.D. x 30 m df = 1.00 µm 0.53 mm I.D. x 30 m df = 3.00 µm	Contact Us 1010-14948
603	Acrolein and acrylonitrile	InertCap 624	0.25 mm I.D. x 30 m df = 1.00 µm 0.53 mm I.D. x 30 m df = 3.00 µm	Contact Us 1010-14948
604/605	Phenols & benzidines	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm 0.53 mm I.D. x 30 m df = 1.40 µm	1010-15142 Contact Us
606	Phthalate esters	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm 0.53 mm I.D. x 15 m df = 1.50 µm	1010-15142 Contact Us
607	Nitrosamines	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.50 µm 0.53 mm I.D. x 30 m df = 1.50 µm	1010-15144 Contact Us

Applications and Method Guides

EPA Method

Method	Applications	Phase	Column Dimensions	Cat.No.
609	Nitroaromatics and isophorone	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.50 µm 0.53 mm I.D. x 30 m df = 1.50 µm	1010-15144 Contact Us
610	Polycyclic aromatic hydrocarbons	InertCap 5MS/Sil	0.32 mm I.D. x 30 m df = 0.10 µm 0.32 mm I.D. x 30 m df = 0.25 µm	1010-15240 1010-15242
611	Haloethers	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.50 µm 0.53 mm I.D. x 15 m df = 1.50 µm	1010-15144 Contact Us
612	Chlorinated hydrocarbons	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.10 µm 0.25 mm I.D. x 60 m df = 0.10 µm 0.32 mm I.D. x 30 m df = 1.00 µm	1010-15140 1010-15160 Contact Us
615	Chlorinated pesticides	InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm 0.53 mm I.D. x 30 m df = 1.00 µm	1010-61142 1010-61445
619	Triazine herbicides	InertCap 17	0.25 mm I.D. x 30 m df = 0.50 µm 0.53 mm I.D. x 30 m df = 1.00 µm	Contact Us 1010-65445
624	Purgeables	InertCap 624	0.25 mm I.D. x 30 m df = 1.40 µm 0.53 mm I.D. x 30 m df = 3.00 µm	1010-14646 1010-14948
625	Semi volatile organic compounds	InertCap 5MS/Sil	0.32 mm I.D. x 30 m df = 0.25 µm	1010-15242
680	Pesticides and PCBs in water and soil/sediment	InertCap 1MS InertCap 5MS/Sil	0.32 mm I.D. x 30 m df = 0.25 µm 0.32 mm I.D. x 30 m df = 0.25 µm	1010-12242 1010-15242
1624	Volatile organic compounds by isotope dilution GC/MS	InertCap 624	0.25 mm I.D. x 30 m df = 1.40 µm 0.53 mm I.D. x 30 m df = 3.00 µm	1010-14646 1010-14948
1625	Semivolatile organic compounds by isotope dilution	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142
1653	Chlorinated phenols in waste water by in-situ MS acylation and GC low bleed/MS	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm 0.32 mm I.D. x 30 m df = 0.25 µm	1010-15142 1010-15242
8010	Halogenated volatile organics	InertCap 624	0.25 mm I.D. x 30 m df = 1.40 µm	1010-14646
8011	1,2-dibromoethane and 1,2-dibromo-3-chloropropane	InertCap 1	0.32 mm I.D. x 30 m df = 0.25 µm	1010-11242
8015	Non-halogenated volatile organics	InertCap 624	0.25 mm I.D. x 30 m df = 1.40 µm 0.53 mm I.D. x 30 m df = 3.00 µm	1010-14646 1010-14948
8021	Aromatic volatile organics	InertCap 624	0.25 mm I.D. x 30 m df = 1.40 µm 0.53 mm I.D. x 30 m df = 3.00 µm	1010-14646 1010-14948
8030/8031	Acrolein, acrylonitrile, acetonitrile	InertCap 624	0.25 mm I.D. x 30 m df = 1.40 µm 0.53 mm I.D. x 30 m df = 3.00 µm	1010-14646 1010-14948
8040/8041	Phenols	InertCap 5	0.25 mm I.D. x 30 m df = 0.25 µm 0.53 mm I.D. x 30 m df = 1.50 µm	1010-18142 1010-18446
8061	Determination of phthalate and adipate esters	InertCap 5 InertCap 1701	0.53 mm I.D. x 30 m df = 1.50 µm 0.53 mm I.D. x 30 m df = 1.00 µm	1010-18446 1010-61445
8080	Organochlorine pesticides and PCBs	InertCap 1 InertCap 5MS/Sil	0.53 mm I.D. x 30 m df = 1.50 µm 0.25 mm I.D. x 30 m df = 0.50 µm	1010-11446 1010-15144
8081/8082	Organochlorine pesticides and PCBs as Arochlor	InertCap 5 InertCap 1701	0.53 mm I.D. x 30 m df = 1.50 µm 0.53 mm I.D. x 30 m df = 1.00 µm	1010-18446 1010-61445
8090/8091	Nitroaromatics and cyclic ketones	InertCap 5MS/Sil InertCap 5	0.25 mm I.D. x 30 m df = 0.50 µm 0.53 mm I.D. x 30 m df = 1.50 µm	1010-15144 1010-18446
8100	Polynuclear aromatic hydrocarbons	InertCap 5MS/Sil	0.32 mm I.D. x 30 m df = 0.25 µm	1010-15242
8120/8121	Chlorinated hydrocarbons	InertCap 1MS	0.32 mm I.D. x 30 m df = 1.00 µm	1010-12245
8140	Organophosphorus pesticides	InertCap 1MS InertCap 1 InertCap 1701	0.25 mm I.D. x 30 m df = 0.25 µm 0.53 mm I.D. x 30 m df = 1.50 µm 0.53 mm I.D. x 30 m df = 1.00 µm	1010-12142 1010-11446 1010-61445
8141	Organophosphorus compounds	InertCap 5MS/Sil InertCap 5	0.25 mm I.D. x 15 m df = 0.25 µm 0.53 mm I.D. x 15 m df = 1.50 µm	1010-15122 1010-18426
8150/8151	Chlorinated herbicides	InertCap 5MS/Sil InertCap 1701	0.25 mm I.D. x 30 m df = 0.50 µm 0.53 mm I.D. x 30 m df = 1.00 µm	1010-15144 1010-61445
8240	Volatile organic compounds	InertCap 624	0.25 mm I.D. x 30 m df = 1.00 µm 0.53 mm I.D. x 30 m df = 3.00 µm	Contact Us 1010-14948
8250	Semi-volatile organic compounds	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.50 µm	1010-15144
8260	Volatile organic compounds	InertCap 624	0.32 mm I.D. x 60 m df = 1.80 µm 0.53 mm I.D. x 75 m df = 3.00 µm	1010-14767 1010-14978
8270	Semi volatile organic compounds(SVOC)	InertCap 5	0.25 mm I.D. x 30 m df = 1.00 µm	1010-18145
8280	Analysis of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm 0.25 mm I.D. x 60 m df = 0.10 µm	1010-15142 1010-15160

EPA Method

Method	Applications	Phase	Column Dimensions	Cat.No.
D 1983	Fatty acid	InertCap Pure-WAX InertCap WAX	0.25 mm I.D. x 30 m df = 0.25 µm	1010-68142 1010-67142
D 2268	Analysis of n-heptane and iso-octane (high purity)	InertCap 1	0.25 mm I.D. x 60 m df = 0.50 µm	1010-11164
D 2306	Xylene isomer	InertCap Pure-WAX InertCap WAX	0.25 mm I.D. x 60 m df = 0.25 µm	1010-68162 1010-67162
D 2426	Butadiene and styrene in butadiene concentrates	InertCap 1	0.53 mm I.D. x 30 m df = 5.00 µm	1010-11449
D 2427	C2-C5 hydrocarbons in gasolines	InertCap 1	0.53 mm I.D. x 30 m df = 5.00 µm	1010-11449
D 2580	Phenols in water	InertCap 5MS/Sil	0.32 mm I.D. x 25 m df = 0.40 µm	Contact Us
D 2804	Purity of methyl ethyl ketone	InertCap Pure-WAX InertCap WAX	0.53 mm I.D. x 30 m df = 1.00 µm	1010-68445 1010-67445
D 2908	Volatile organics compounds(VOC) in water	InertCap 624 InertCap Pure-WAX	0.32 mm I.D. x 30 m df = 1.80 µm 0.32 mm I.D. x 30 m df = 0.50 µm	1010-14747 1010-68244
D 2998	Polyhydric alcohols	InertCap 1	0.32 mm I.D. x 30 m df = 1.00 µm	1010-11245
D 2999	Monopentaerythritol in commercial pentaerythritol	InertCap 1	0.53 mm I.D. x 30 m df = 1.50 µm	1010-11446
D 3009	Composition of turpentine	InertCap Pure-WAX InertCap WAX	0.32 mm I.D. x 30 m df = 0.50 µm	1010-68244 1010-67244
D 3168	Polymers in emulsion paints	InertCap 1	0.32 mm I.D. x 30 m df = 1.00 µm	1010-11245
D 3257	Aromatics in mineral spirits	InertCap 624	0.53 mm I.D. x 30 m df = 3.00 µm	1010-14948
D 3329	Purity of methyl isobutyl ketone	InertCap Pure-WAX InertCap WAX	0.53 mm I.D. x 30 m df = 1.00 µm	1010-68445 1010-67445
D 3432	Toluene diisocyanates in urethane prepolymers	InertCap 1	0.32 mm I.D. x 30 m df = 1.00 µm	1010-11245
D 3447	Purity of halogenated organic solvents	InertCap 1	0.53 mm I.D. x 60 m df = 5.00 µm	1010-11469
D 3452	Identification of rubber	InertCap 1	0.53 mm I.D. x 30 m df = 1.50 µm	1010-11446
D 3606	Benzene and toluene in gasoline	InertCap 1	0.25 mm I.D. x 15 m df = 0.10 µm	1010-11120
D 3687	Volatile organic compounds vapors(VOC)	InertCap Pure-WAX InertCap WAX	0.32 mm I.D. x 30 m df = 0.50 µm	1010-68244 1010-67244
D 3695	Volatile alcohols in water	InertCap Pure-WAX InertCap WAX	0.53 mm I.D. x 30 m df = 1.00 µm	1010-68445 1010-67445
D 3725	Fatty acids in drying oils	InertCap FFAP	0.53 mm I.D. x 30 m df = 1.00 µm	1010-28945
D 3760	Analysis of cumene	InertCap Pure-WAX InertCap WAX	0.32 mm I.D. x 60 m df = 0.25 µm	1010-68262 1010-67262
D 3797	Analysis of o-xylene	InertCap Pure-WAX InertCap WAX	0.32 mm I.D. x 60 m df = 0.50 µm	1010-68264 1010-67264
D 3798	Analysis of p-xylene impurities	InertCap Pure-WAX InertCap WAX	0.32 mm I.D. x 60 m df = 0.50 µm	1010-68264 1010-67264

Applications and Method Guides

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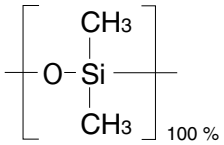
Method	Applications	Phase	Column Dimensions	Cat.No.
D 3876	Methoxyl and hydroxypropyl substitution in cellulose ether products	InertCap 1	0.32 mm I.D. x 30 m df = 1.00 µm	1010-11245
D 3962	Impurities in styrene	InertCap FFAP	0.53 mm I.D. x 30 m df = 1.00 µm	1010-28945
D 4367	Benzene in hydrocarbon solvent	InertCap 1	0.25 mm I.D. x 15 m df = 0.10 µm	1010-11120
D 4420	Aromatics compounds in gasoline	InertCap 1	0.25 mm I.D. x 15 m df = 0.10 µm	1010-11120
D 4735	Thiophene impurities in benzene	InertCap FFAP	0.53 mm I.D. x 30 m df = 1.00 µm	1010-28945
D 4768	Phenol and cresol inhibitors in insulating oils	InertCap FFAP	0.53 mm I.D. x 30 m df = 1.00 µm	1010-28945
D 4864	Methanol in propylene concentrates	InertCap Pure-WAX InertCap WAX	0.53 mm I.D. x 30 m df = 1.00 µm	1010-68445 1010-67445
D 4947	Chlordane and heptachlor residues in indoor air	InertCap 5	0.53 mm I.D. x 30 m df = 1.50 µm	1010-18446
D 5060	Impurities in ethylbenzene	InertCap Pure-WAX InertCap FFAP	0.32 mm I.D. x 60 m df = 0.50 µm	1010-68264 1010-28764
D 5075	Nicotine and 3-ethenylpyridine in indoor air	InertCap 5	0.53 mm I.D. x 30 m df = 1.50 µm	1010-18446
D 5135-35	Analysis of styrene	InertCap Pure-WAX InertCap WAX	0.32 mm I.D. x 60 m df = 0.50 µm	1010-68264 1010-67264
D 5310	Tar acid composition	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142
D 5320	Determination of 1,1,1-trichloroethane and methylene chloride content in stabilized trichloroethylene and tetrachloroethylene	InertCap 1	0.53 mm I.D. x 30 m df = 3.00 µm	1010-11448
D 5442	Analysis of petroleum waxes	InertCap 1	0.32 mm I.D. x 30 m df = 0.25 µm	1010-11242
D 5580	Aromatics in finished gasoline	InertCap 1	0.53 mm I.D. x 30 m df = 5.00 µm	1010-11449
D 5599	Determination of oxygenates in gasoline	InertCap 1	0.25 mm I.D. x 60 m df = 1.00 µm	1010-11165
D 5769	Determination of benzene, toluene, and total aromatics in finished gasolines	InertCap 1	0.25 mm I.D. x 60 m df = 1.00 µm	1010-11165
D 5812	Determination of organochlorine pesticides in water	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142
D 6160	Determination of polychlorinated biphenyls (PCBs) in waste materials	InertCap 5MS/Sil	0.25 mm I.D. x 30 m df = 0.25 µm	1010-15142

InertCap 1MS

- 100 % Dimethylpolysiloxane
- USP Phase G2
- Non-Polarity
- Cross-Linked
- Ultra Low Bleed
- Equivalents : DB-1ms, HP-1ms, Rxi-1ms, VF-1ms, Equity-1

Structure

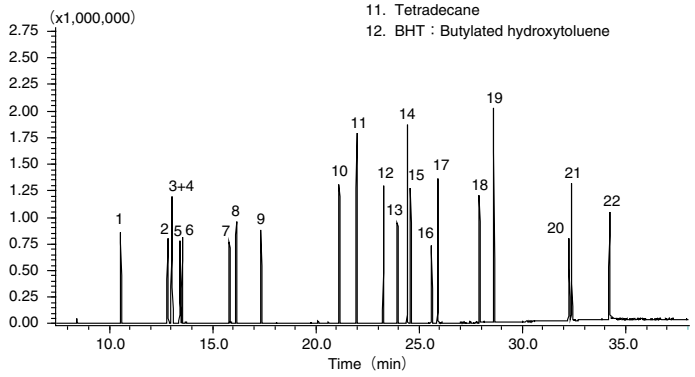


InertCap 1MS is a non-polar column bonded with 100 % dimethylpolysiloxane. Samples elute in order of low boiling points. Designed for GC/MS, InertCap 1MS delivers high inertness and ultra low bleed.

Automobile Interior Material Analysis

System : GC/MS Thermal Desorption (T-Dex Ⅱ)
Column : InertCap 1MS
0.25 mm I.D. x 60 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) - 10 °C/min - 280 °C (21 min hold)
Carrier Gas : He 1 mL/min (constant flow)
Injection : Thermal Desorption 270 °C
Split 1 : 5
Detection : MS Scan
Sample Size : 100 µg/mL in Ethanol
1 µL

1. Toluene
2. Ethylbenzene
3. *m*-Xylene
4. *p*-Xylene
5. Styrene
6. *o*-Xylene
7. *p*-Dichlorobenzene
8. 2-Ethyl-1-hexanol
9. Nonanal
10. D6 : Hexamethylcyclotrisiloxane
11. Tetradecane
12. BHT : Butylated hydroxytoluene
13. DEP : Diethyl phthalate
14. C16 : *n*-Hexadecane
15. TBP : Tributyl phosphate
16. TCEP : Tris (2-chloroethyl) phosphate
17. DBA : Di-n-butyl adipate
18. DBP : Di-n-butyl phthalate
19. C20 : *n*-Eicosane
20. TPP : Triphenyl phosphate
21. DOA : Di (2-ethylhexyl) adipate
22. DOP : Di (2-ethylhexyl) phthalate



InertCap 1MS

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.325-prog.350 °C	1010-12122
	30 m	0.10 µm	Iso.325-prog.350 °C	1010-12140
		0.25 µm	iso.325-prog.350 °C	1010-12142
		1.00 µm	iso.300-prog.320 °C	1010-12145
	60 m	0.25 µm	iso.325-prog.350 °C	1010-12162
		1.00 µm	iso.300-prog.320 °C	1010-12165
0.32 mm	15 m	0.25 µm	iso.325-prog.350 °C	1010-12222
	30 m	0.25 µm	iso.325-prog.350 °C	1010-12242
		1.00 µm	Iso.300-prog.320 °C	1010-12245
	60 m	0.25 µm	iso.325-prog.350 °C	1010-12262
		1.00 µm	Iso.300-prog.320 °C	1010-12265

InertCap 1MS ProGuard (Built-in Guard Column)

I.D.	Length	Thickness	Guard Column Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-12172
			5 m	iso.325-prog.350 °C	1010-12173
			10 m	iso.325-prog.350 °C	1010-12174

InertCap 1MS T.L. (Built-in Transfer Line)

I.D.	Length	Thickness	Transfer Line Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-12192

InertCap 1MS Fast GC

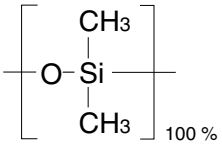
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.325-prog.350 °C	1010-12031

InertCap 1

InertCap 1

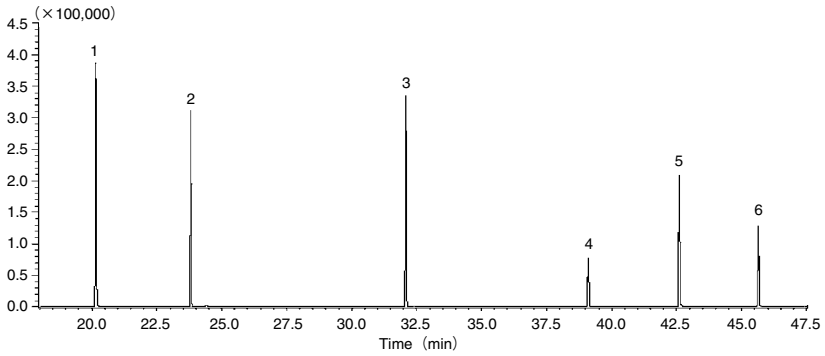
- 100 % Dimethylpolysiloxane
- USP Phase G2
- Non-Polarity
- Cross-Linked
- Equivalents : DB-1, HP-1, Rtx-1, CP-Sil 5CB, SPB-1, BP-1

Structure



InertCap 1 is a non-polar column bonded with 100 % dimethylpolysiloxane. Compounds elute in order of increasing boiling point. InertCap 1 finds use in a wide range of general analyses.

Phthalate



System : GC/MS
Column : InertCap 1
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 60 °C (3 min hold) - 5 °C/min - 280 °C (3 min hold)
Injection : Splitless
280 °C
Detection : MS SIM
Sample Size : 1 µL

1. Dimethylphthalate
2. Diethylphthalate
3. Di-*n*-butylphthalate
4. Butylbenzylphthalate
5. Di (2-ethylhexyl) phthalate
6. Dioctylphthalate

InertCap 1

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.10 µm	iso.325-prog.350 °C	1010-11120
		0.25 µm	iso.325-prog.350 °C	1010-11122
		0.40 µm	iso.325-prog.350 °C	1010-11123
		5.00 µm	iso.260-prog.300 °C	1010-11129
	30 m	0.10 µm	iso.325-prog.350 °C	1010-11140
		0.25 µm	iso.325-prog.350 °C	1010-11142
		0.40 µm	iso.325-prog.350 °C	1010-11143
		1.00 µm	iso.300-prog.320 °C	1010-11145
		1.50 µm	iso.300-prog.320 °C	1010-11146
		5.00 µm	iso.260-prog.300 °C	1010-11149
	60 m	0.25 µm	iso.325-prog.350 °C	1010-11162
		0.40 µm	iso.325-prog.350 °C	1010-11163
		1.00 µm	iso.300-prog.320 °C	1010-11165
		1.50 µm	iso.300-prog.320 °C	1010-11166
0.32 mm	15 m	0.25 µm	iso.325-prog.350 °C	1010-11222
		0.40 µm	iso.325-prog.350 °C	1010-11223
		5.00 µm	iso.260-prog.300 °C	1010-11229

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.32 mm	30 m	0.25 µm	iso.325-prog.350 °C	1010-11242
		0.40 µm	iso.325-prog.350 °C	1010-11243
		1.00 µm	iso.300-prog.320 °C	1010-11245
		5.00 µm	iso.260-prog.300 °C	1010-11249
	60 m	0.25 µm	iso.325-prog.350 °C	1010-11262
		0.40 µm	iso.325-prog.350 °C	1010-11263
		0.50 µm	iso.325-prog.350 °C	1010-11264
		1.00 µm	iso.300-prog.320 °C	1010-11265
		5.00 µm	iso.260-prog.300 °C	1010-11269
0.53 mm	15 m	1.00 µm	iso.300-prog.320 °C	1010-11425
		1.50 µm	iso.300-prog.320 °C	1010-11426
		2.00 µm	iso.300-prog.320 °C	1010-11427
		3.00 µm	iso.260-prog.280 °C	1010-11428
		5.00 µm	iso.260-prog.280 °C	1010-11429
	30 m	1.00 µm	iso.300-prog.320 °C	1010-11445
		1.50 µm	iso.300-prog.320 °C	1010-11446
		2.00 µm	iso.300-prog.320 °C	1010-11447
		3.00 µm	iso.260-prog.280 °C	1010-11448
		5.00 µm	iso.260-prog.280 °C	1010-11449
	60 m	2.00 µm	iso.300-prog.320 °C	1010-11467
		5.00 µm	iso.260-prog.280 °C	1010-11469

InertCap 1 ProGuard (Built-in Guard Column)

I.D.	Length	Thickness	Guard Column Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-11172
			5 m	iso.325-prog.350 °C	1010-11173
			10 m	iso.325-prog.350 °C	1010-11174

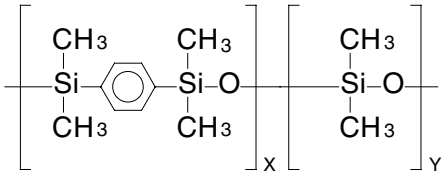
InertCap 1 Fast GC

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	15 m	0.18 µm	iso.325-prog.350 °C	1010-11021
		0.28 µm	iso.325-prog.350 °C	1010-11022
	20 m	0.18 µm	iso.325-prog.350 °C	1010-11031
		0.28 µm	iso.325-prog.350 °C	1010-11032

InertCap 5MS/Sil

- 5 % Diphenyl (equiv.) - Dimethylpolysilphenylene Siloxane
- USP Phase G27
- Low Polarity
- Cross-Linked
- Ultra Low Bleed
- Equivalents：DB-5ms, Rxi-5Sil MS, VF-5ms, SLB-5, BPX-5

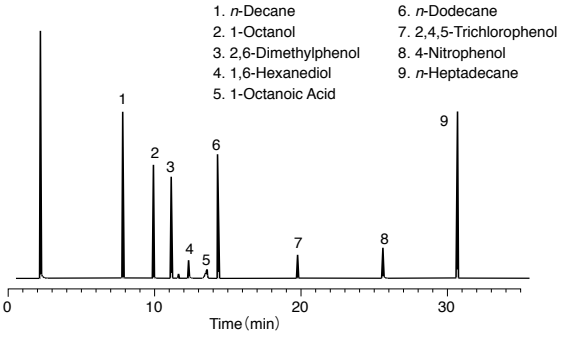
Structure



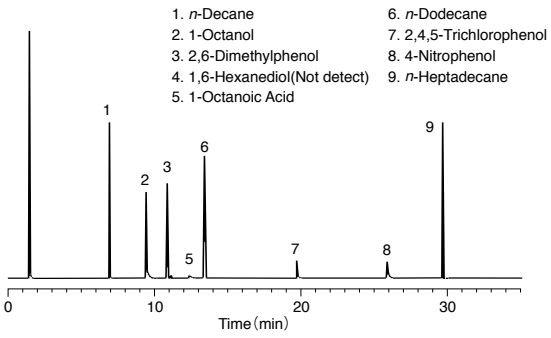
InertCap 5MS/Sil is a low polar column bonded with 5 % diphenyl (equiv.) – 95 % dimethylpolysilphenylene siloxane. Designed for GC/MS, InertCap 5MS/Sil achieves the higher heat resistance and lower bleeding due to arylene phase. In addition to our basic performance and quality inspection, each lot is inspected by using a pesticide mixture sample in order to guarantee the product reliability.

Comparison with Other Brands

Acidic Compounds

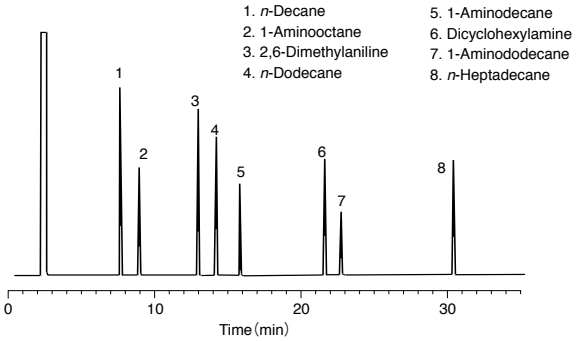


InertCap 5MS/Sil

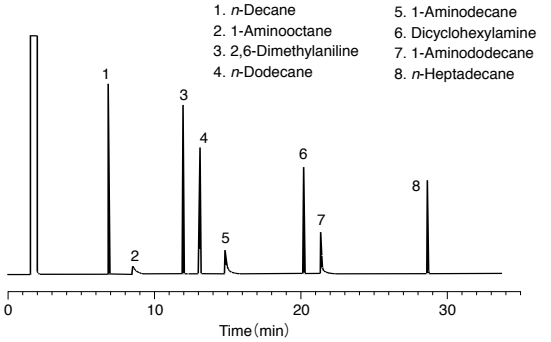


ZB - 5MS

Basic Compounds



InertCap 5MS/Sil

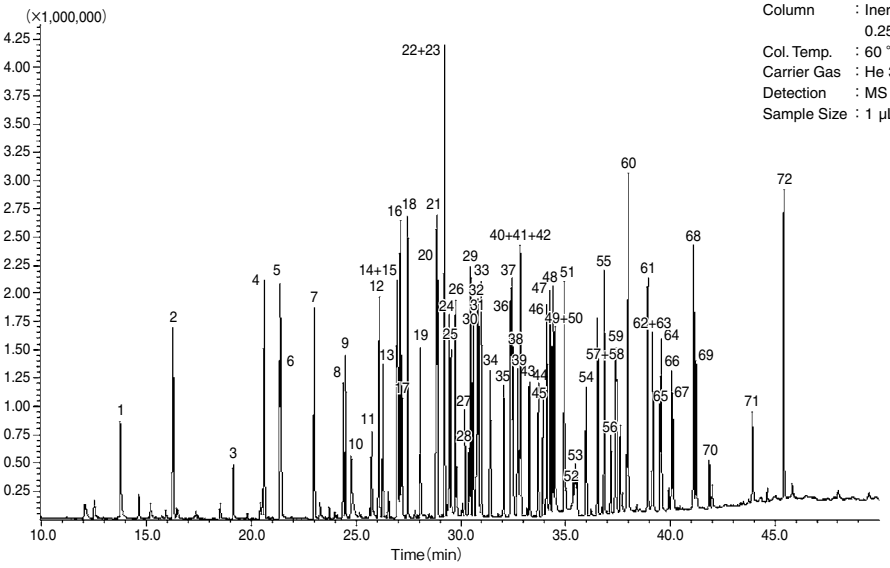


ZB - 5MS

InertCap 5MS/Sil

InertCap 5MS/Sil

Pesticides



System : GC/MS
Column : InertCap 5MS/Sil
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 60 °C (1 min hold) - 5 °C/min - 280 °C
Carrier Gas : He 35 cm/sec.
Detection : MS
Sample Size : 1 µL

1. dichlorvos (DDVP)
2. dichlobenil
3. etridiazole
4. chloroneb
5. Isoprocarb
6. molinate
7. fenobucarb
8. trifluralin
9. benfluralin
10. pencycuron
11. dimethoate
12. simazine
13. atrazine
14. propyzamide
15. pyroquilon
16. diazinon
17. chlorothalonil
18. disulfoton
19. iprobenfos
20. terbucarb
21. bromobutide
22. alachlor
23. tolclophosmethyl
24. simetryn
25. metalaxyl
26. dithiopyr
27. fenitrothion
28. probenazole
29. esprocarb
30. malathion
31. chlorpyrifos
32. benthiocarb
33. fenthion
34. fthalide
35. pendimethalin
36. dimethametryn
37. isofenphos
38. methyl dymron
39. phenthoate
40. procymidone
41. captan
42. dimepiperate
43. methidathion
44. α-Endosulfan
45. butamifos
46. napropamide
47. flutranil
48. pretilachlor
49. isoprothiolane
50. tricyclazole
51. buprofezin
52. isoxathion
53. carpropamid
54. β-Endosulfan
55. mepronil
56. chlornitrofen
57. propiconazole
58. edifenphos
59. endosulfan sulfate
60. thenylchlor
61. pyributicarb
62. pyridaphenthion
63. iprodione
64. EPN
65. piperophos
66. anilofos
67. bifenox
68. pyriproxyfen
69. mefenacet
70. benfuracarb
71. cafenstrole
72. ethofenprox

InertCap 5MS/Sil

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.10 µm	iso.325-prog.350 °C	1010-15120
		0.25 µm	iso.325-prog.350 °C	1010-15122
		0.50 µm	iso.325-prog.350 °C	1010-15124
	30 m	0.10 µm	iso.325-prog.350 °C	1010-15140
		0.25 µm	iso.325-prog.350 °C	1010-15142
		0.50 µm	iso.325-prog.350 °C	1010-15144
		1.00 µm	iso.325-prog.350 °C	1010-15145
	60 m	0.10 µm	iso.325-prog.350 °C	1010-15160
		0.25 µm	iso.325-prog.350 °C	1010-15162
0.32 mm	15 m	0.10 µm	iso.325-prog.350 °C	1010-15220
		0.25 µm	iso.325-prog.350 °C	1010-15222
		0.50 µm	iso.325-prog.350 °C	1010-15224
	30 m	0.10 µm	iso.325-prog.350 °C	1010-15240
		0.25 µm	iso.325-prog.350 °C	1010-15242
		0.50 µm	iso.325-prog.350 °C	1010-15244
		1.00 µm	iso.325-prog.350 °C	1010-15245
	60 m	0.10 µm	iso.325-prog.350 °C	1010-15260
		0.25 µm	iso.325-prog.350 °C	1010-15262

InertCap 5MS/Sil ProGuard (Built-in Guard Column)

I.D.	Length	Thickness	Guard Column Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-15172
			5 m	iso.325-prog.350 °C	1010-15173
			10 m	iso.325-prog.350 °C	1010-15174

InertCap 5MS/Sil T.L. (Built-in Transfer Line)

I.D.	Length	Thickness	Transfer Line Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-15192

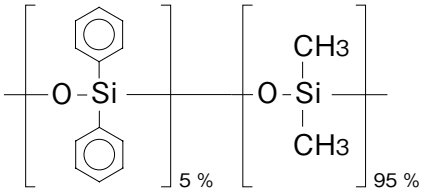
InertCap 5MS/Sil Fast GC

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.325-prog.350 °C	1010-15031
	40 m	0.18 µm	iso.325-prog.350 °C	1010-15051

InertCap 5MS/NP

- 5 % Diphenyl - 95 % Dimethylpolysiloxane
- USP Phase G27
- Low Polarity
- Cross-Linked
- Ultra Low Bleed
- Equivalents：HP-5ms, Rxi-5ms, Equity-5, SPB-5

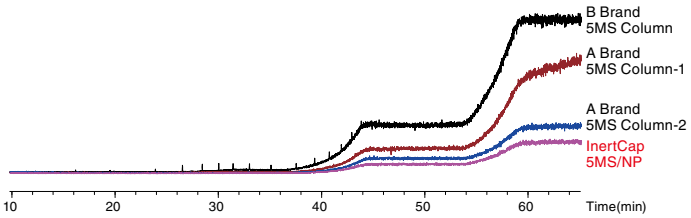
Structure



InertCap 5MS/NP is a low polar column bonded with 5 % diphenyl - 95 % dimethylpolysiloxane. Designed as a column for GC/MS, InertCap 5MS/NP achieves very high inertness inertness and extremely low bleeding.

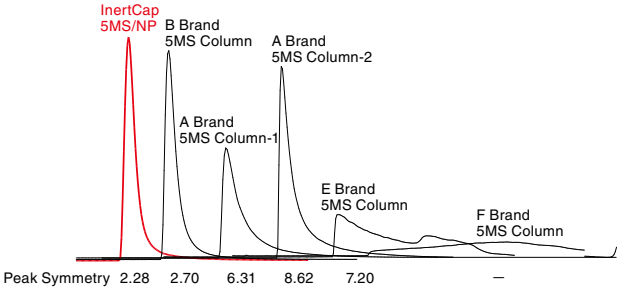
Comparison of Bleed

System : GC-MS
Column : 0.25 mm I.D. x 30 m df = 0.25 µm
Col Temp : 40 °C (5 min hold) - 10 °C/min - 150 °C (5 min hold)
- 10 °C/min - 250 °C (5 min hold) - 10 °C/min
- 325 °C (10 min hold) - 10 °C/min - 350 °C (10 min hold)



Inertness Comparison

sample: *n*-octylamine



InertCap 5MS/NP

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.10 µm	iso.325-prog.350 °C	1010-18620
		0.25 µm	iso.325-prog.350 °C	1010-18622
		0.50 µm	iso.325-prog.350 °C	1010-18624
	30 m	0.10 µm	iso.325-prog.350 °C	1010-18640
		0.25 µm	iso.325-prog.350 °C	1010-18642
		0.50 µm	iso.325-prog.350 °C	1010-18644
		1.00 µm	iso.325-prog.350 °C	1010-18645
	60 m	0.10 µm	iso.325-prog.350 °C	1010-18660
		0.25 µm	iso.325-prog.350 °C	1010-18662
0.32 mm	15 m	0.10 µm	iso.325-prog.350 °C	1010-18720
		0.25 µm	iso.325-prog.350 °C	1010-18722
		0.50 µm	iso.325-prog.350 °C	1010-18724
	30 m	0.10 µm	iso.325-prog.350 °C	1010-18740
		0.25 µm	iso.325-prog.350 °C	1010-18742
		0.50 µm	iso.325-prog.350 °C	1010-18744
		1.00 µm	iso.325-prog.350 °C	1010-18745
	60 m	0.10 µm	iso.325-prog.350 °C	1010-18760
		0.25 µm	iso.325-prog.350 °C	1010-18762

InertCap 5MS/NP ProGuard (Built-in Guard Column)

I.D.	Length	Thickness	Guard Column Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-18941
			5 m	iso.325-prog.350 °C	1010-18942
			10 m	iso.325-prog.350 °C	1010-18943

InertCap 5MS/NP Fast GC

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.325-prog.350 °C	1010-18531

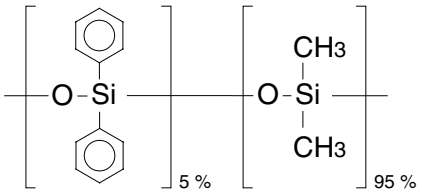
InertCap 5

InertCap 5

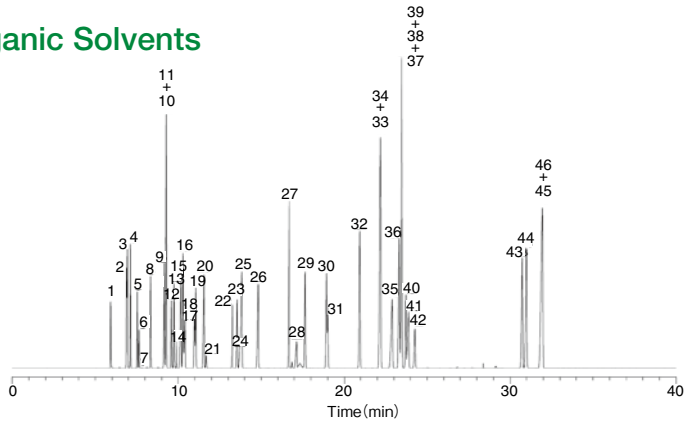
- 5 % Diphenyl - 95 % Dimethylpolysiloxane
- USP Phase G27
- Low Polarity
- Cross-Linked
- Equivalents：DB-5, HP-5, Rtx-5, CP-Sil 8CB, SPB-5

InertCap 5 is a low polar column bonded with 5 % diphenyl – 95 % dimethylpolysiloxane. InertCap 5 is an optimal first choice column for a variety of general analyses such as pesticides and volatile compounds etc.

Structure



Organic Solvents



System : GC/FID
Column : InertCap 5
0.25 mm I.D. x 60 m df = 0.40 µm
Col. Temp. : 40 °C (5 min hold) - 4 °C/min - 230 °C (5 min hold)
Carrier Gas : He 130 kPa
Injection : Split flow 100 mL/min
250 °C
Detection : FID Range 10^1
250 °C
Sample Size : Mixed evenly 1 µL

1. Methanol
2. Acetone
3. i-Propanol
4. Ethyl ether
5. Methyl acetate
6. Dichloromethane
7. Carbon disulfide
8. *trans*-1,2-Dichloroethylene
9. Methyl ethyl ketone
10. 2-Butanol
11. *n*-Hexane
12. *cis*-1,2-Dichloroethylene
13. Ethyl acetate
14. Chloroform
15. i-Butanol
16. Tetrahydrofuran
17. Methyl cellosolve
18. 1,1,1-Trichloroethane
19. 1,2-Dichloroethane
20. *n*-Butanol
21. Carbon tetrachloride
22. Trichloroethylene
23. 1,4-Dioxane
24. Ethyl cellosolve
25. *n*-Propyl acetate
26. i-Amyl alchol
27. Toluene
28. *N,N*-Dimethyl formamide
29. Methyl-n-butyl ketone
30. *n*-Butyl acetate
31. Tetrachloroethylene
32. Chlorobenzene
33. *m*-Xylene
34. *p*-Xylene
35. Cyclohexanol
36. Styrene
37. Cyclohexanone
38. 1-Methylcyclohexanol
39. *o*-Xylene
40. Cellosolve acetate
41. Butyl cellosolve
42. 1,1,2,2-Tetrachloroethane
43. *o*-Dichlorobenzene
44. *o*-Cresol
45. *m*-Cresol
46. *p*-Cresol

InertCap 5

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.325-prog.350 °C	1010-18122
		0.40 µm	iso.325-prog.350 °C	1010-18123
	30 m	0.01 µm	iso.325-prog.350 °C	1010-18140
		0.25 µm	iso.325-prog.350 °C	1010-18142
		0.40 µm	iso.325-prog.350 °C	1010-18143
		1.00 µm	iso.300-prog.320 °C	1010-18145
		1.50 µm	iso.300-prog.320 °C	1010-18146
	60 m	0.25 µm	iso.325-prog.350 °C	1010-18162
		0.40 µm	iso.325-prog.350 °C	1010-18163
		1.00 µm	iso.300-prog.320 °C	1010-18165
		1.50 µm	iso.300-prog.320 °C	1010-18166
0.32 mm	15 m	0.25 µm	iso.325-prog.350 °C	1010-18222
		0.40 µm	iso.325-prog.350 °C	1010-18223
	30 m	0.25 µm	iso.325-prog.350 °C	1010-18242
		0.40 µm	iso.325-prog.350 °C	1010-18243
		1.00 µm	iso.300-prog.320 °C	1010-18245

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.32 mm	60 m	0.25 µm	iso.325-prog.350 °C	1010-18262
		0.40 µm	iso.325-prog.350 °C	1010-18263
0.53 mm	15 m	1.00 µm	iso.300-prog.320 °C	1010-18425
		1.50 µm	iso.300-prog.320 °C	1010-18426
		2.00 µm	iso.300-prog.320 °C	1010-18427
		3.00 µm	iso.260-prog.280 °C	1010-18428
		5.00 µm	iso.260-prog.280 °C	1010-18429
	30 m	1.00 µm	iso.300-prog.320 °C	1010-18445
		1.50 µm	iso.300-prog.320 °C	1010-18446
		2.00 µm	iso.300-prog.320 °C	1010-18447
		3.00 µm	iso.260-prog.280 °C	1010-18448
		5.00 µm	iso.260-prog.280 °C	1010-18449
	50 m	5.00 µm	iso.260-prog.280 °C	1010-18459
	60 m	2.00 µm	iso.300-prog.320 °C	1010-18467

InertCap 5 ProGuard (Built-in Guard Column)

I.D.	Length	Thickness	Guard Column Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.325-prog.350 °C	1010-18172
			5 m	iso.325-prog.350 °C	1010-18173
			10 m	iso.325-prog.350 °C	1010-18174

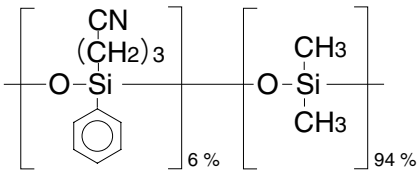
InertCap 5 Fast GC

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	15 m	0.18 µm	iso.325-prog.350 °C	1010-18021
		0.28 µm	iso.325-prog.350 °C	1010-18022
	20 m	0.18 µm	iso.325-prog.350 °C	1010-18031
		0.28 µm	iso.325-prog.350 °C	1010-18032

InertCap 624MS

- 6 % Cyanopropylphenyl - 94 % Dimethylpolysiloxane
- USP Phase G43
- Medium Polarity
- Cross-Linked
- Equivalents: DB-624, HP-VOC, Rtx-624, Rxi-624Sil MS, VF-624MS

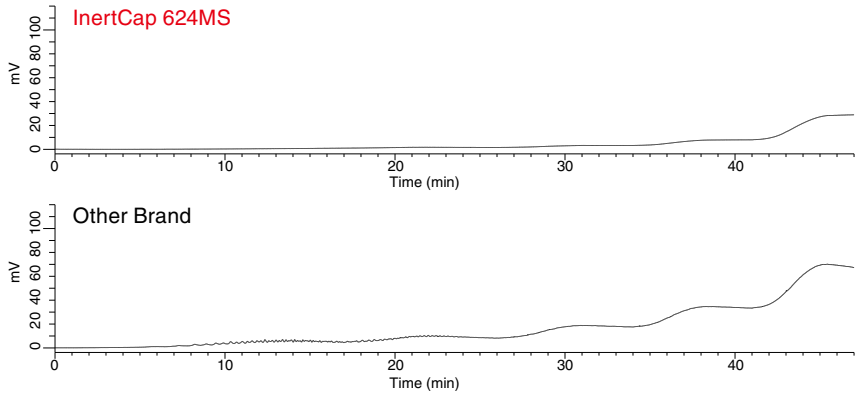
Structure



InertCap 624MS is a medium polar column bonded with 6 % cyanopropylphenyl and 94 % dimethylpolysiloxane. The structure is the same as InertCap 624, designed for low bleed, stable batch control and highest inertness.

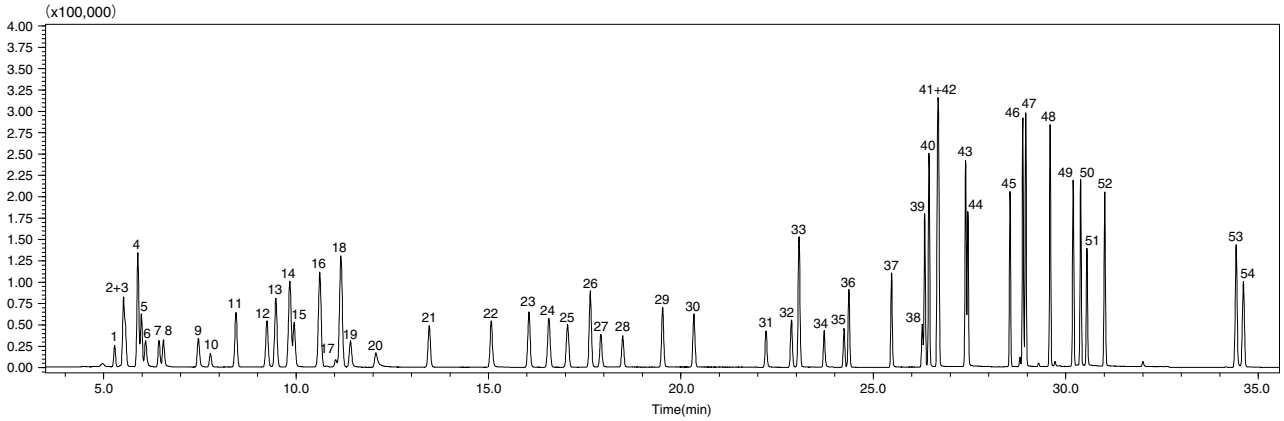
Bleed Comparison

Oven Temp. : 50 °C - 10 °C/min - 250 °C (5 min) - 10 °C /min - 280 °C (5 min) - 10 °C/min- 300 °C (5 min) - 10 °C/min - 320 °C (5 min)



Analysis of Volatile Organic Compounds in Air.

Column : InertCap 624MS 0.25 mm I.D. x 60 m df = 1.40 µm
Col. Temp. : 40 °C (5 min) - 3.5 °C/min - 80 °C (0 min hold) - 6 °C/min - 120 °C - 15 °C/min - 200 °C (11 min hold)
Detection : MS SIM
Sample : 51 Compounds VOC 500 ppt (v/v) + Internal Standard (I.S.) 3 Compounds 500 ppt (v/v)

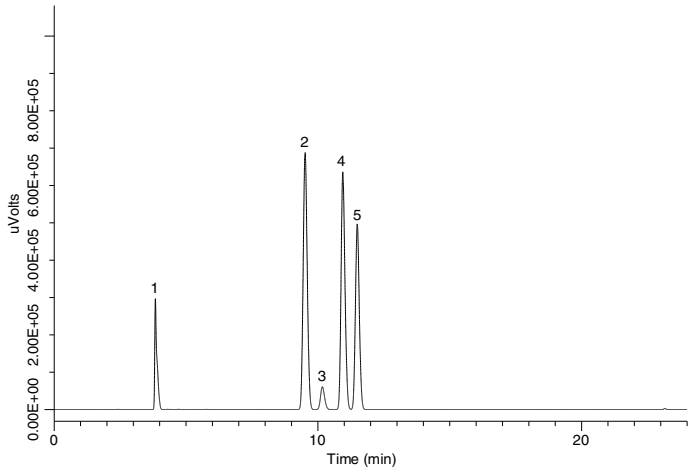


No.		No.		No.		No.	
1.	HFC-134a	14.	CFC-113	27.	1,2-Dichloroethane	40.	Ethylbenzene
2.	CFC-12	15.	1,1-Dichloroethylene	28.	Fluorobenzene(I.S.)	41+42.	*m, p*-Xylene
3.	HCFC-22	16.	HCFC-225ca	29.	Trichloroethylene	43.	*o*-Xylene
4.	CFC-114	17.	3-Chloro-1-propene	30.	1,2-Dichloropropane	44.	Styrene
5.	HCFC-142b	18.	HCFC-225cb	31.	*cis*-1,3-Dichloropropene	45.	1,1,2,2-Tetrachloroethane
6.	Chloromethane	19.	Dichloromethane	32.	Toluene-d8(I.S.)	46.	4-Ethyltoluene
7.	Vinyl chloride	20.	Acrylonitrile	33.	Toluene	47.	1,3,5-Trimethylbenzene
8.	1,3-Butadiene	21.	1,1-Dichloroethane	34.	*trans*-1,3-Dichloropropene	48.	1,2,4-Trimethylbenzene
9.	Bromomethane	22.	*cis*-1,2-Dichloroethylene	35.	1,1,2-Trichloroethane	49.	1,3-Dichlorobenzene
10.	Ethyl chloride	23.	Chloroform	36.	Tetrachloroethylene	50.	1,4-Dichlorobenzene
11.	CFC-11	24.	1,1,1-Trichloroethane	37.	1,2-Dibromoethane	51.	Benzylchloride
12.	Dichlorofluoroethane	25.	Tetrachloromethane	38.	Chlorobenzene-d5(I.S.)	52.	1,2-Dichlorobenzene
13.	HCFC-123	26.	Benzene	39.	Monochlorobenzene	53.	1,2,4-Trichlorobenzene
						54.	Hexachloro-1,3-butadiene

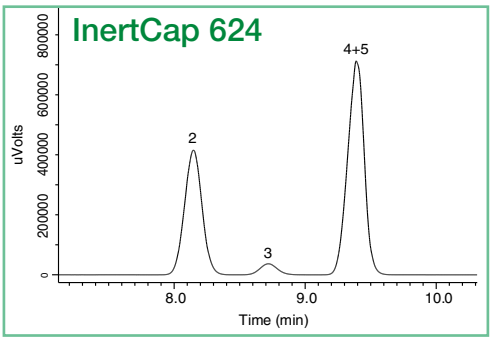
InertCap 624MS

System : GC-4000 Plus-FID
Column : InertCap 624MS
0.32 mm I.D. x 30 m df = 1.80 µm
Col. Temp. : 40 °C (20 min hold) - 10 °C/min - 240 °C (20 min hold)
Carrier Gas : He 2.2 mL/min
Injection : Split flow 44 mL/min
140 °C
Detection : FID Auto Range
250 °C
Sample Size : 1.0 µL
Analyte in Dimethyl sulfoxide

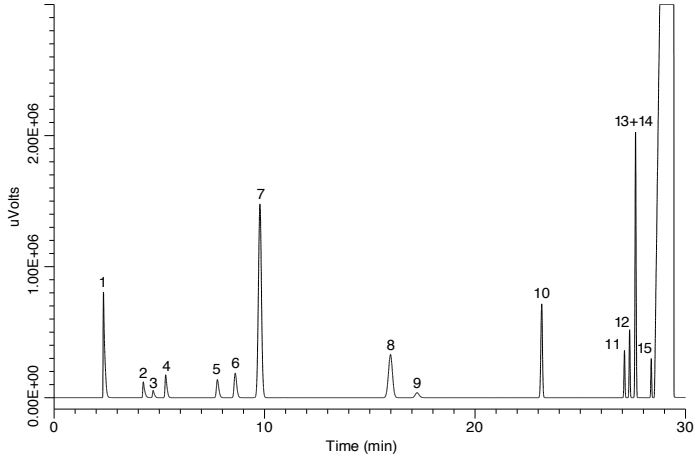
Organic Solvent-1



1. 1,1-Dichloroethene (40 mg/mL)
2. 1,1,1-Trichloroethan (50 mg/mL)
3. Carbon tetrachloride (20 mg/mL)
4. Benzene (10 mg/mL)
5. 1,2-Dichloroethane (25 mg/mL)



Organic Solvent-2



1. Methanol (15.0 mg/mL)
2. Acetonitrile (2.05 mg/mL)
3. Dichloromethane (3.00 mg/mL)
4. *trans*-1,2-Dichloroethylene (4.70 mg/mL)
5. *cis*-1,2-Dichloroethylene (4.70 mg/mL)
6. Tetrahydrofuran (3.45 mg/mL)
7. Cyclohexane (19.4 mg/mL)
8. Methylcyclohexane (5.90 mg/mL)
9. 1,4-Dioxane (1.90 mg/mL)
10. Toluene (4.45 mg/mL)
11. Chlorobenzene (1.80 mg/mL)
12. Ethylbenzene (1.84 mg/mL)
13. *m*-Xylene (6.51 mg/mL)
14. *p*-Xylene (1.52 mg/mL)
15. *o*-Xylene (0.98 mg/mL)

InertCap 624MS

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	1.40 µm	iso.300-prog.320 °C	1010-64646
	60 m		iso.300-prog.320 °C	1010-64666
0.32 mm	30 m	1.80 µm	iso.300-prog.320 °C	1010-64747
	60 m		iso.300-prog.320 °C	1010-64767
0.53 mm	30 m	3.00 µm	iso.280-prog.300 °C	1010-64948
	60 m		iso.280-prog.300 °C	1010-64968

InertCap 624MS Fast GC

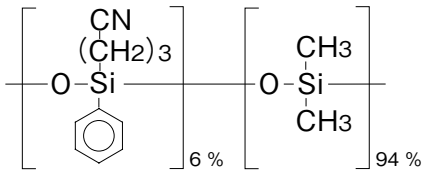
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	1.00 µm	iso.300-prog.320 °C	1010-64535

InertCap 624

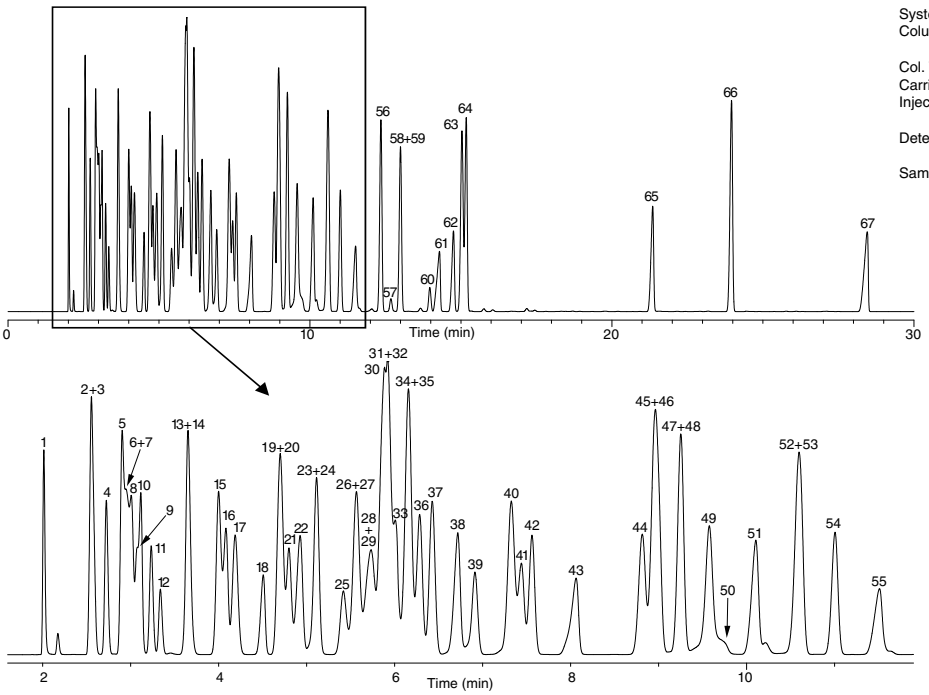
- 6 % Cyanopropylphenyl - 94 % Dimethylpolysiloxane
- USP Phase G43
- Medium Polarity
- Cross-Linked
- Equivalents：DB-624, HP-VOC, Rtx-624, VF-624ms

InertCap 624 is a medium polar column bonded with 6 % cyanopropylphenyl and 94 % dimethylpolysiloxane and designed for VOC analysis.

Structure



Residual Solvents in Pharmaceuticals



System : GC-FID
Column : InertCap 624
0.53 mm I.D. x 30 m df = 3.00 µm
Col. Temp. : 40 °C - 5 °C/min - 230 °C
Carrier Gas : He 20 kPa
Injection : Split flow 25 mL/min
240 °C
Detection : FID Range 10^2
240 °C
Sample Size : Mixed evenly
0.5 µL

1. Methanol
2. Ethanol
3. *n*-Pentane
4. Diethyl ether
5. Acetone
6. 1,1-Dichloroethylene
7. 1,1-Dimethoxymethane
8. 2-Propanol (Isopropyl alcohol)
9. Ethyl formate
10. Acetonitrile
11. Methyl acetate
12. Dichloromethane
13. *trans*-1,2-Dichloroethylene
14. *tert*-Butyl methyl ether
15. *n*-Hexane
16. 1-Propanol
17. Diisopropyl ether
18. Nitromethane
19. 2-Butanone(MEK)
20. *cis*-1,2-Dichloroethylene
21. Ethyl acetate
22. 2-Butanol
23. Tetrahydrofuran
24. Chloroform
25. 1,1,1-Trichloroethane
26. Cyclohexane
27. 2,2-Dimethoxypropane
28. Carbon tetrachloride
29. 2-Methyl-1-propanol (Isobutyl alcohol)
30. 1,2-Dimethoxyethane
31. 1,2-Dichloroethane
32. Benzene
33. Isopropyl acetate
34. 2,2,4-Trimethylpentane
35. 2-Methyltetrahydrofuran
36. Methyl isopropyl ketone
37. *n*-Heptane
38. 1-Butanol
39. Trichloroethylene
40. Methylcyclohexane
41. 1,4-Dioxane
42. *n*-Propyl acetate
43. 2-Ethoxyethanol
44. 4-Methyl-2-pentanone(MIBK)
45. Pyridine
46. 3-Methyl-1-butanol (Isoamyl alcohol)
47. Toluene
48. Ethylene glycol
49. Isobutyl acetate
50. Formamide
51. 1-Pentanol(Amyl alcohol)
52. Propionaldehyde diethyl acetal
53. 2-Hexanone(MBK)
54. *n*-Butyl acetate
55. *N,N*-Dimethylformamide
56. Chlorobenzene
57. Ethylbenzene
58. *m*-Xylene
59. *p*-Xylene
60. *o*-Xylene
61. Dimethyl sulfoxide(DMSO)
62. *N,N*-Dimethylacetamide
63. Cumene
64. Anisole
65. N-methyl-2-pyrrolidone
66. 1,2,3,4-Tetrahydronaphthalene
67. Sulfolane

Xylene mixture (*m*-Xylene, *p*-Xylene, *o*-Xylene, Ethylbenzene) was used.

InertCap 624

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	1.40 µm	iso.260-prog.260 °C	1010-14646
	60 m	1.40 µm	iso.260-prog.260 °C	1010-14666
0.32 mm	30 m	1.80 µm	iso.260-prog.260 °C	1010-14747
		3.00 µm	iso.260-prog.260 °C	1010-14748
	60 m	1.80 µm	iso.260-prog.260 °C	1010-14767
0.53 mm	30 m	3.00 µm	iso.260-prog.260 °C	1010-14948
	75 m	3.00 µm	iso.260-prog.260 °C	1010-14978

InertCap 624 Fast GC

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	1.00 µm	iso.260-prog.260 °C	1010-14535
	40 m	1.00 µm	iso.260-prog.260 °C	1010-14555

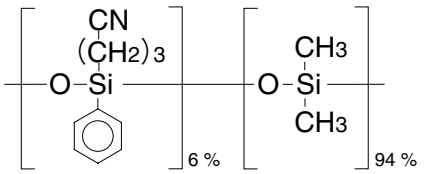
InertCap 1301

InertCap 1301

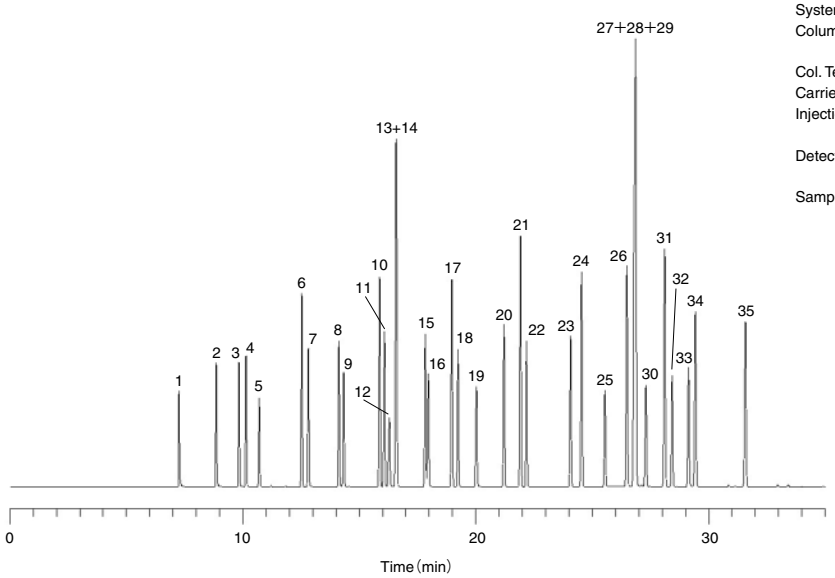
- 6 % Cyanopropylphenyl - 94 % Dimethylpolysiloxane
- USP Phase G43
- Medium Polarity
- Cross-Linked
- Equivalents：DB-1301, HP-1301, Rtx-1301, VF-1301ms

InertCap 1301 is a medium polar column bonded with 6 % cyanopropylphenyl and 94 % dimethylpolysiloxane. Compared to InertCap 25, polarity of InertCap 1301 is slightly lower. Cyano groups contained in the stationaly phase offer unique selectivity.

Structure



Organic Solvents



System : GC/FID
Column : InertCap 1301
0.25 mm I.D. x 60 m df = 1.00 µm
Col. Temp. : 40 °C (5 min hold) - 5 °C/min - 200 °C
Carrier Gas : He 160 kPa
Injection : Split flow 100 mL/min
200 °C
Detection : FID Range 10^1
200 °C
Sample Size : Mixed evenly
0.2 µL

1. Methanol
2. Ethanol
3. Acetone
4. 2-Propanol(Isopropyl alcohol)
5. Methyl acetate
6. *n*-Hexane
7. 1-Propanol
8. 2-Butanone(MEK)
9. Ethyl acetate
10. Cyclohexane
11. 2-Methyl-1-propanol(Isobutyl alcohol)
12. 2-Methoxyethanol(Methyl cellosolve)
13. Benzene
14. Isopropyl acetate
15. 1-Butanol
16. 1-Methoxy-2-propanol (Propylene glycol monomethyl ether)
17. Methylcyclohexane
18. *n*-Propyl acetate
19. 2-Ethoxyethanol(Cellosolve)
20. 4-Methyl-2-pentanone(MIBK)
21. Toluene
22. Isobutyl acetate
23. *n*-Butyl acetate
24. Ethylcyclohexane
25. 2-Methoxyethyl acetate (Methyl cellosolve acetate)
26. Ethylbenzene
27. 1-Methoxy-2-propyl acetate (Propylene glycol monomethyl ether acetate)
28. *m*-Xylene
29. *p*-Xylene
30. Diacetone alcohol
31. *o*-Xylene
32. 2-Ethoxyethyl acetate(Cellosolve acetate)
33. 2-Butoxyethanol(Butyl cellosolve)
34. Cyclohexanone
35. 2-Methylcyclohexanone

InertCap 1301

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-60122
		0.50 µm	iso.280-prog.300 °C	1010-60124
		1.00 µm	iso.260-prog.280 °C	1010-60125
	30 m	0.25 µm	iso.280-prog.300 °C	1010-60142
		0.50 µm	iso.280-prog.300 °C	1010-60144
		1.00 µm	iso.260-prog.280 °C	1010-60145
	60 m	0.25 µm	iso.280-prog.300 °C	1010-60162
		0.50 µm	iso.280-prog.300 °C	1010-60164
		1.00 µm	iso.260-prog.280 °C	1010-60165

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.32 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-60222
		0.50 µm	iso.280-prog.300 °C	1010-60224
		1.00 µm	iso.260-prog.280 °C	1010-60225
	30 m	0.25 µm	iso.280-prog.300 °C	1010-60242
		0.50 µm	iso.280-prog.300 °C	1010-60244
		1.00 µm	iso.260-prog.280 °C	1010-60245
	60 m	0.25 µm	iso.280-prog.300 °C	1010-60262
		0.50 µm	iso.280-prog.300 °C	1010-60264
		1.00 µm	iso.260-prog.280 °C	1010-60265
0.53 mm	15 m	1.00 µm	iso.260-prog.280 °C	1010-60425
	30 m	1.00 µm	iso.260-prog.280 °C	1010-60445

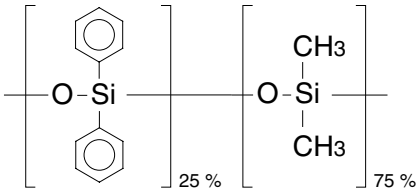
InertCap 1301 Fast GC

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.280-prog.300 °C	1010-60031

InertCap 25

- 25 % Diphenyl - 75 % Dimethylpolysiloxane
- USP Phase G28
- Medium Polarity
- Cross-Linked
- No Equivalent

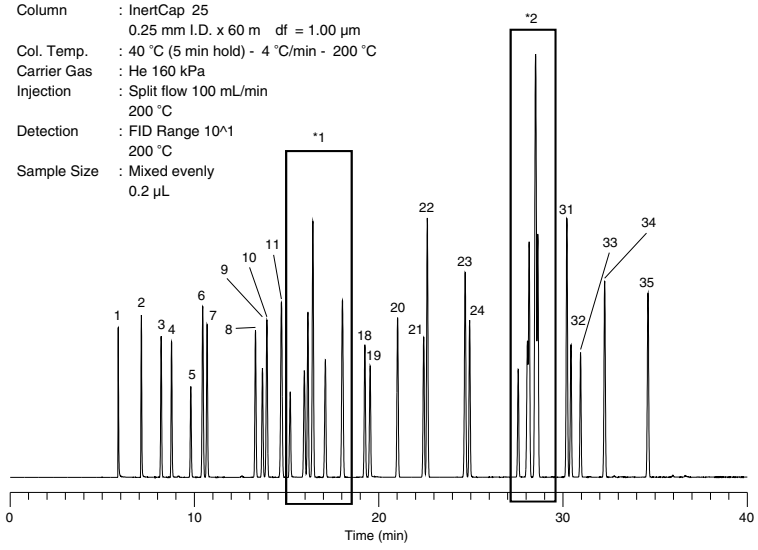
Structure

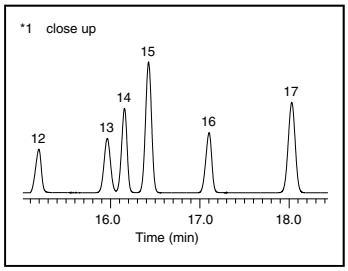


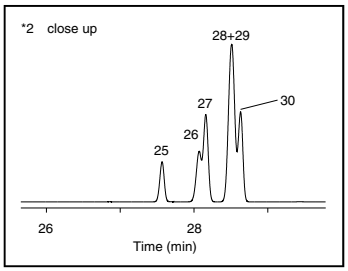
InertCap 25 is a medium polar column bonded with 25 % diphenyl - 75 % dimethylpolysiloxane. With different selectivities compared to other medium polar columns, InertCap 25 is useful to identify and quantify different analytes.

Organic Solvents (packing material)

System : GC/FID
Column : InertCap 25
0.25 mm I.D. x 60 m df = 1.00 µm
Col. Temp. : 40 °C (5 min hold) - 4 °C/min - 200 °C
Carrier Gas : He 160 kPa
Injection : Split flow 100 mL/min
200 °C
Detection : FID Range 10^1
200 °C
Sample Size : Mixed evenly
0.2 µL







1. Methanol
2. Ethanol
3. 2-Propanol(Isopropyl alcohol)
4. Acetone
5. Methyl acetate
6. *n*-Hexane
7. 1-Propanol
8. 2-Butanone(MEK)
9. Ethyl acetate
10. 2-Methyl-1-propanol(Isobutyl alcohol)
11. Cyclohexane
12. 2-Methoxyethanol(Methyl cellosolve)
13. Isopropyl acetate
14. 1-Butanol
15. Benzene
16. 1-Methoxy-2-propanol (Propylene glycol monomethyl ether)
17. Methylcyclohexane
18. *n*-Propyl acetate
19. 2-Ethoxyethanol(Cellosolve)
20. 4-Methyl-2-pentanone(MIBK)
21. Isobutyl acetate
22. Toluene
23. Ethylcyclohexane
24. *n*-Butyl acetate
25. 2-Methoxyethyl acetate (Methyl cellosolve acetate)
26. Diacetone alcohol
27. Ethylbenzene
28. *m*-Xylene
29. *p*-Xylene
30. 1-Methoxy-2-propyl acetate (Propylene glycol monomethyl ether acetate)
31. *o*-Xylene
32. 2-Butoxyethanol(Butyl cellosolve)
33. 2-Ethoxyethyl acetate(Cellosolve acetate)
34. Cyclohexanone
35. 2-Methylcyclohexanone

InertCap 25

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-62122
		0.50 µm	iso.280-prog.300 °C	1010-62124
		1.00 µm	iso.260-prog.280 °C	1010-62125
	30 m	0.25 µm	iso.280-prog.300 °C	1010-62142
		0.50 µm	iso.280-prog.300 °C	1010-62144
		1.00 µm	iso.260-prog.280 °C	1010-62145
	60 m	0.25 µm	iso.280-prog.300 °C	1010-62162
		0.50 µm	iso.280-prog.300 °C	1010-62164
		1.00 µm	iso.260-prog.280 °C	1010-62165

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.32 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-62222
		0.50 µm	iso.280-prog.300 °C	1010-62224
		1.00 µm	iso.260-prog.280 °C	1010-62225
	30 m	0.25 µm	iso.280-prog.300 °C	1010-62242
		0.50 µm	iso.280-prog.300 °C	1010-62244
		1.00 µm	iso.260-prog.280 °C	1010-62245
	60 m	0.25 µm	iso.280-prog.300 °C	1010-62262
		0.50 µm	iso.280-prog.300 °C	1010-62264
		1.00 µm	iso.260-prog.280 °C	1010-62265
0.53 mm	15 m	1.00 µm	iso.260-prog.280 °C	1010-62425
	30 m	1.00 µm	iso.260-prog.280 °C	1010-62445

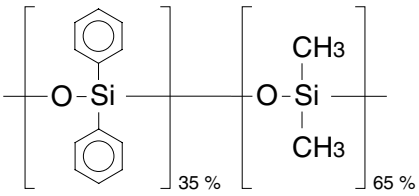
InertCap 35

InertCap 35

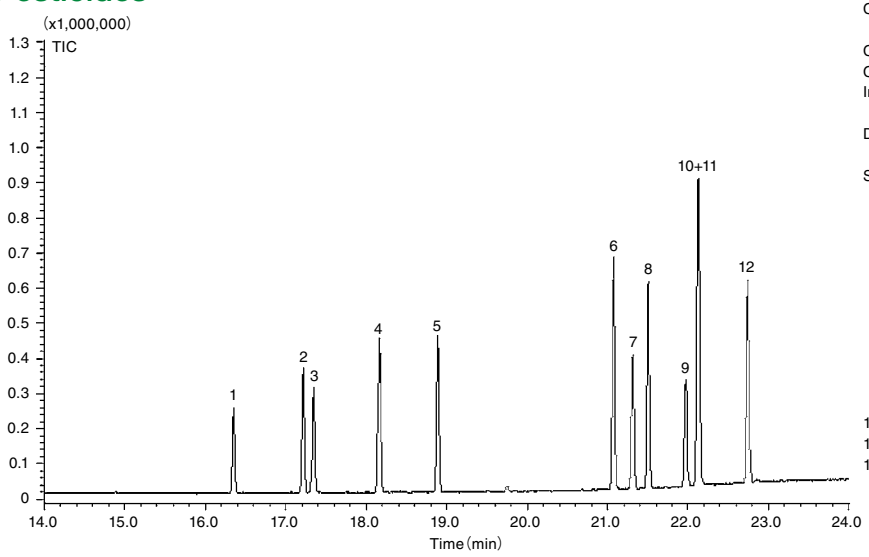
- 35 % Diphenyl - 65 % Dimethylpolysiloxane
- USP Phase G42
- Medium Polarity
- Cross-Linked
- Equivalents：DB-35ms, DB-35, HP-35ms, HP-35, Rtx-35, VF-35ms

InertCap 35 is a medium polar column bonded with 35 % diphenyl - 65 % dimethylpolysiloxane. With a stronger polarity than InertCap 25, InertCap 35 also shows high separation efficiency semi volatile compounds and solvent analyses.

Structure



Pesticides



System : GC/MS
Column : InertCap 35
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 60 ℃ - 10 ℃/min - 290 ℃ (7 min hold)
Carrier Gas : He 35cm/sec
Injection : Split 1:30
250 ℃
Detection : MS Scan (45 - 500 m/z)
Interface Temp. 280 ℃
Sample Size : 10 µg/mL in Isooctane
1 µL

1. α-BHC
2. γ-BHC
3. β-BHC
4. Heptachlor
5. Aldrin
6. *p,p'*-DDE
7. Dieldrin
8. *o,p'*-DDD
9. Endrin
10. *p,p'*-DDD
11. *o,p'*-DDT
12. *p,p'*-DDT

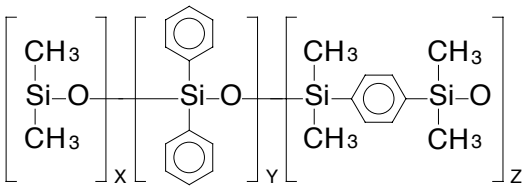
InertCap 35

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-63122
		0.50 µm	iso.280-prog.300 °C	1010-63124
		1.00 µm	iso.260-prog.280 °C	1010-63125
	30 m	0.25 µm	iso.280-prog.300 °C	1010-63142
		0.50 µm	iso.280-prog.300 °C	1010-63144
		1.00 µm	iso.260-prog.280 °C	1010-63145
	60 m	0.25 µm	iso.280-prog.300 °C	1010-63162
		0.50 µm	iso.280-prog.300 °C	1010-63164
		1.00 µm	iso.260-prog.280 °C	1010-63165
0.32 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-63222
		0.50 µm	iso.280-prog.300 °C	1010-63224
		1.00 µm	iso.260-prog.280 °C	1010-63225
	30 m	0.25 µm	iso.280-prog.300 °C	1010-63242
		0.50 µm	iso.280-prog.300 °C	1010-63244
		1.00 µm	iso.260-prog.280 °C	1010-63245
	60 m	0.25 µm	iso.280-prog.300 °C	1010-63262
		0.50 µm	iso.280-prog.300 °C	1010-63264
		1.00 µm	iso.260-prog.280 °C	1010-63265
0.53 mm	15 m	1.00 µm	iso.260-prog.280 °C	1010-63425
	30 m	0.50 µm	iso.280-prog.300 °C	1010-63444
		1.00 µm	iso.260-prog.280 °C	1010-63445

InertCap 35MS

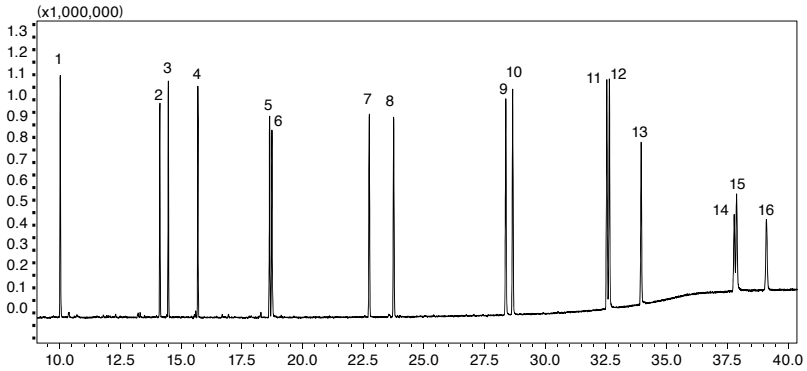
- 35 % Diphenyl (equiv.) - 65 % Dimethylpolysiloxane
- USP Phase G42
- Medium Polarity
- Cross-Linked
- Equivalents : DB-35ms UI, VF-35ms, Rxi-35sil MS

Structure



InertCap 35MS is a medium polar column. It is more polar than InertCap 25 and extremely low bleeding.

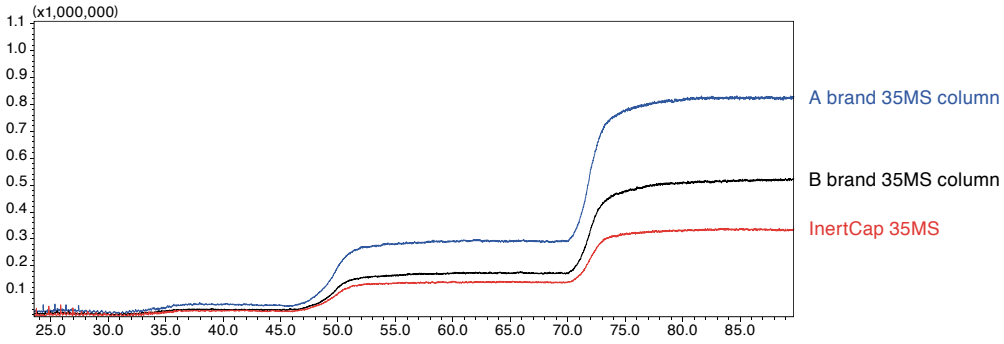
Aromatic Compounds



System : GC/MS
Column : InertCap 35MS
0.25 mm I.D. x 30 m df= 0.25 µm
Col. Temp. : 55 ˚C (1 min) -10 ˚C/min-200 ˚C
-6 ˚C/min-320 ˚C (10 min)
Carrier Gas : He, 40 cm/sec constant
Injection : Splitless
300 ˚C
Detection : MS TIC (m/z = 70-400), SIM
Detector Temp : 300 ˚C
Sample : TIC: 16 PAHs 1 ppm in
(Dichloromethane/Benzene=1/1), 1 µL

1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. enz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Indeno (1, 2, 3-C, D) pyrene
15. Dibenz[a,h]anthracene
16. Benzo[ghi]perylene

Comparison of Column Bleeding



System : GC/MS
Column : 0.25 mm I.D. x 30 m df= 0.25 µm
Col. Temp. : 40 ˚C (5 min) -10 ˚C/min-250 ˚C (5 min) -10 ˚C/min-300 ˚C (10 min)
-10 ˚C/min-340 ˚C (20 min) -10 ˚C/min-360 ˚C (20 min)
Carrier Gas : He 1.0 mL/min (constant flow)
Injection : Splitless
250 ˚C
Detection : MS TIC (m/z = 46 -450)

InertCap 35MS

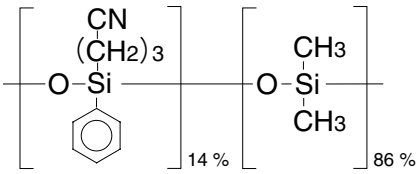
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.340 - prog.360 °C	1010-63531
0.25 mm	15 m	0.25 µm	iso.340 - prog.360 °C	1010-63622
	30 m	0.25 µm	iso.340 - prog.360 °C	1010-63642
	60 m	0.25 µm	iso.340 - prog.360 °C	1010-63662
0.32 mm	15 m	0.25 µm	iso.340 - prog.360 °C	1010-63722
	30 m	0.25 µm	iso.340 - prog.360 °C	1010-63742
	60 m	0.25 µm	iso.340 - prog.360 °C	1010-63762

InertCap 1701MS

InertCap 1701MS

- 14 % Cyanopropylphenyl - 86 % Dimethylpolysiloxane
- USP Phase G46
- Medium Polarity
- Cross-Linked
- Equivalent: VF-1701ms

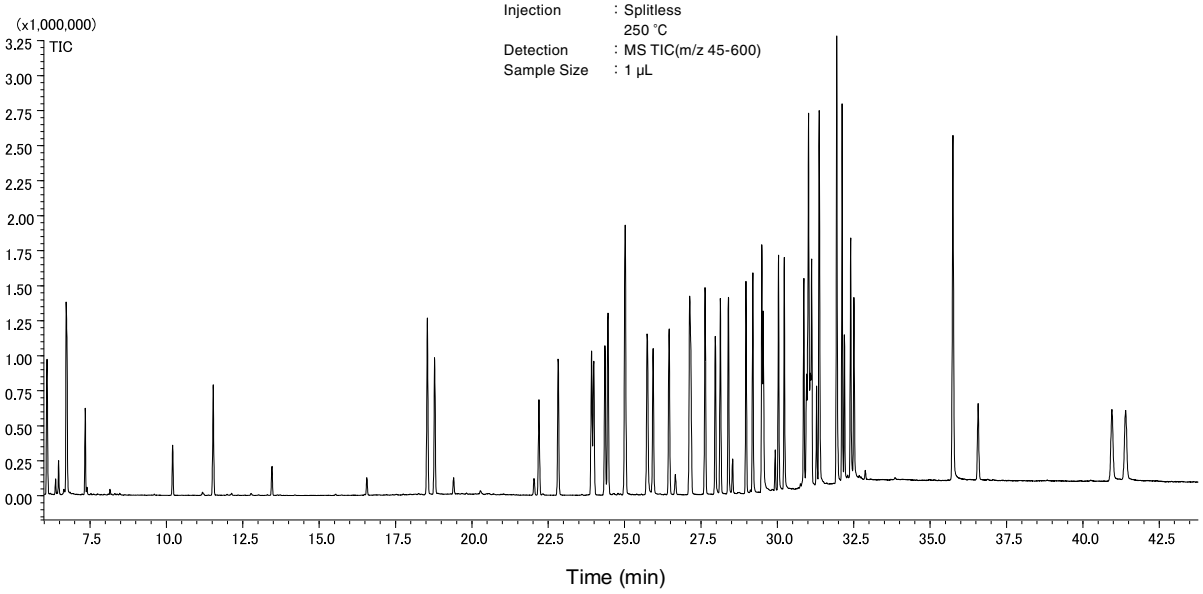
Structure



InertCap 1701MS is a medium polar column bonded with 14 % cyanopropylphenyl and 86 % dimethylpolysiloxane, and designed for GC/MS. Containing cyano groups as InertCap 1301, InertCap 1701MS has a stronger polarity than InertCap 25. It is suitable for pesticides screening analyses.

Pesticides

System : GC/MS
Column : 0.25 mm I.D. x 30 m df = 0.25 µm
Col.Temp. : 40 °C (1 min) - 30 °C /min - 120 °C - 5 °C/min - 240 °C - 12 °C/min - 300 °C(20 min)
Carrier Gas : He 1.0 mL/min (constant flow)
Injection : Splitless
250 °C
Detection : MS TIC(m/z 45-600)
Sample Size : 1 µL



InertCap 1701MS

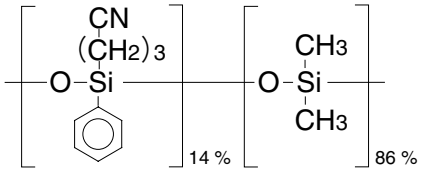
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-61622
		0.50 µm	iso.280-prog.300 °C	1010-61624
		1.00 µm	iso.280-prog.300 °C	1010-61625
	30 m	0.25 µm	iso.280-prog.300 °C	1010-61642
		0.50 µm	iso.280-prog.300 °C	1010-61644
		1.00 µm	iso.280-prog.300 °C	1010-61645
	60 m	0.25 µm	iso.280-prog.300 °C	1010-61662
		0.50 µm	iso.280-prog.300 °C	1010-61664
		1.00 µm	iso.280-prog.300 °C	1010-61665
0.32 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-61722
		0.50 µm	iso.280-prog.300 °C	1010-61724
		1.00 µm	iso.280-prog.300 °C	1010-61725
	30 m	0.25 µm	iso.280-prog.300 °C	1010-61742
		0.50 µm	iso.280-prog.300 °C	1010-61744
		1.00 µm	iso.280-prog.300 °C	1010-61745
	60 m	0.25 µm	iso.280-prog.300 °C	1010-61762
		0.50 µm	iso.280-prog.300 °C	1010-61764
		1.00 µm	iso.280-prog.300 °C	1010-61765

InertCap 1701

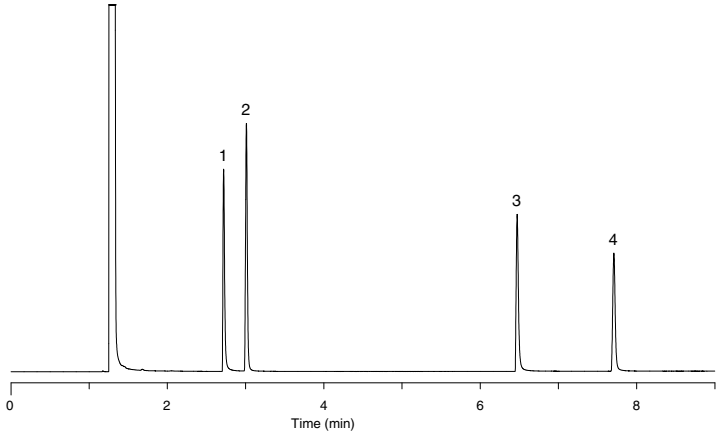
- 14 % Cyanopropylphenyl - 86 % Dimethylpolysiloxane
- USP Phase G46
- Medium Polarity
- Cross-Linked
- Equivalents：DB-1701, HP-1701, Rtx-1701, VF-1701ms, SPB-1701

InertCap 1701 is a medium polar column bonded with 14 % cyanopropylphenyl and 86 % dimethylpolysiloxane. It contains cyano groups as InertCap 1301 InertCap 1701 has a stronger polarity than InertCap 25, InertCap 1701 and is suitable for pesticides screening analyses.

Structure



Glycols and Glycerine



System : GC-FID
Column : InertCap 1701
0.32 mm I.D. x 30 m df= 1.00 µm
Col. Temp. : 100 °C (5 min hold) - 7.5 °C/min - 220 °C
Carrier Gas : He 100 kPa
Injection : Split flow 53.6 mL/min
220 °C
Detection : FID Range 10^0
250 °C
Sample Size : 500 µg/mL in Methanol
1 µL
Data Source : GC InertSearch No.GA100

Analyte : 1. Ethylene glycol
2. Propylene glycol
3. Diethylene glycol
4. Glycerine

InertCap 1701

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-61122
		0.50 µm	iso.280-prog.300 °C	1010-61124
		1.00 µm	iso.260-prog.280 °C	1010-61125
	30 m	0.25 µm	iso.280-prog.300 °C	1010-61142
		0.50 µm	iso.280-prog.300 °C	1010-61144
		1.00 µm	iso.260-prog.280 °C	1010-61145
	60 m	0.25 µm	iso.280-prog.300 °C	1010-61162
		0.50 µm	iso.280-prog.300 °C	1010-61164
		1.00 µm	iso.260-prog.280 °C	1010-61165
0.32 mm	15 m	0.25 µm	iso.280-prog.300 °C	1010-61222
		0.50 µm	iso.280-prog.300 °C	1010-61224
		1.00 µm	iso.260-prog.280 °C	1010-61225
	30 m	0.25 µm	iso.280-prog.300 °C	1010-61242
		0.50 µm	iso.280-prog.300 °C	1010-61244
		1.00 µm	iso.260-prog.280 °C	1010-61245
	60 m	0.25 µm	iso.280-prog.300 °C	1010-61262
		0.50 µm	iso.280-prog.300 °C	1010-61264
		1.00 µm	iso.260-prog.280 °C	1010-61265
0.53 mm	15 m	1.00 µm	iso.260-prog.280 °C	1010-61425
	30 m	1.00 µm	iso.260-prog.280 °C	1010-61445

InertCap 1701 Fast GC

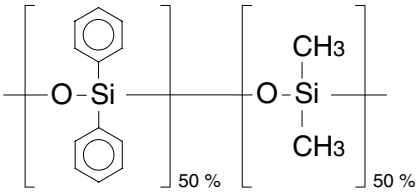
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.280-prog.300 °C	1010-61031

InertCap 17MS

InertCap 17MS

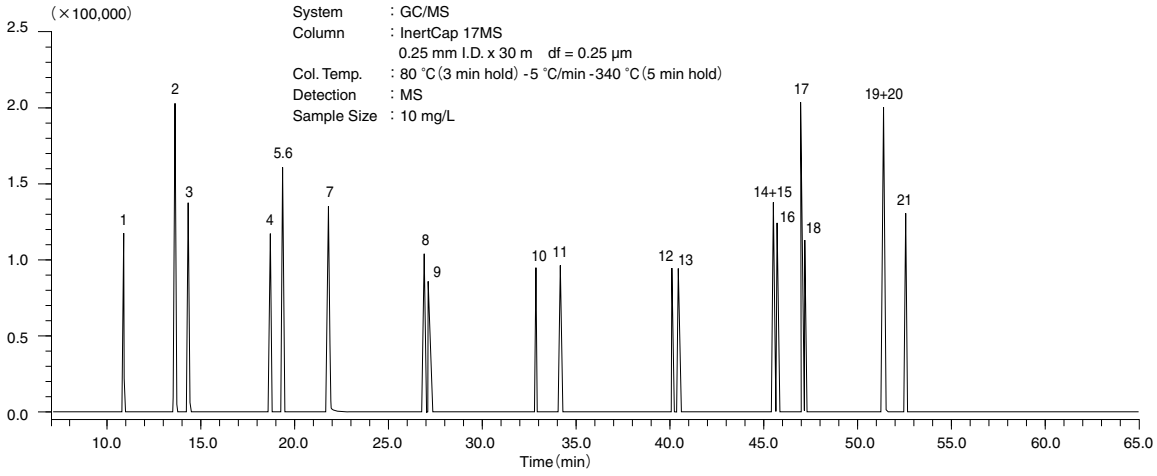
- 50 % Diphenyl - 50 % Dimethylpolysiloxane
- USP Phase G3
- Medium Polarity
- Cross-Linked
- Ultra Low Bleed
- Equivalents：DB-17ms, Rxi-17, VF-17ms, SPB-17

Structure



InertCap 17MS is a medium polar column bonded with 50 % diphenyl - 50 % dimethylpolysiloxane and designed for GC/MS. InertCap 17MS achieves one of the world highest inertness and lowest bleed, and is suitable for microanalyses such as pesticides analyses.

Aromatic Hydrocarbons



1. Naphthalene
2. 2-Methylnaphthalene
3. 1-Methylnaphthalene
4. Acenaphthylene
5. Acenaphthene
6. Biphenyl
7. Fluorene
8. Phenanthrene
9. Anthracene
10. Fluoranthene
11. Pyrene
12. Chrysene
13. Benzo[*a*]anthracene
14. Benzo[*b*]fluoranthene
15. Benzo[*k*]fluoranthene
16. Benzo[*e*]pyrene
17. Benzo[*a*]pyrene
18. Benzo[*j*]fluoranthene
19. Dibenz[*a,h*]anthracene
20. Benzo[*g,h,i*]perylene
21. Indeno[1,2,3-*cd*]pyrene

InertCap 17MS

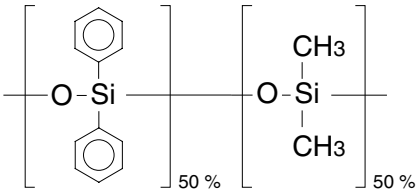
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.320-prog.340 °C	1010-20122
	30 m	0.25 µm	iso.320-prog.340 °C	1010-20142
	60 m	0.25 µm	iso.320-prog.340 °C	1010-20162
0.32 mm	15 m	0.25 µm	iso.320-prog.340 °C	1010-20222
	30 m	0.25 µm	iso.320-prog.340 °C	1010-20242
	60 m	0.25 µm	iso.320-prog.340 °C	1010-20262

InertCap 17

- 50 % Diphenyl - 50 % Dimethylpolysiloxane
- USP Phase G3
- Medium Polarity
- Cross-Linked
- Equivalents：DB-17, HP-50, Rtx-50, CP-Sil 24CB, SPB-50

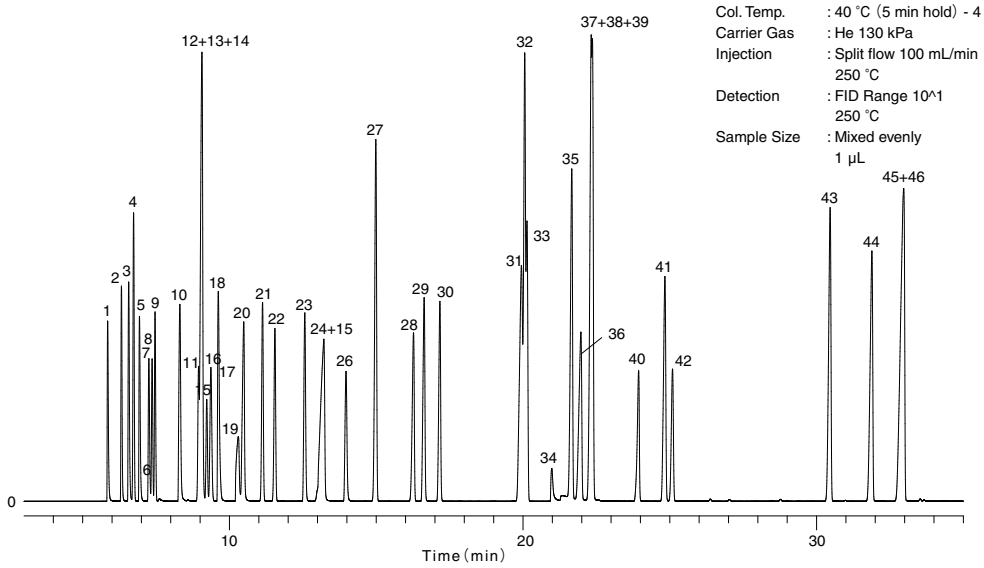
InertCap 17 is a medium polar column bonded with 50 % diphenyl - 50 % dimethylpolysiloxane. It is stronger than InertCap 35, and it also shows high separation efficiency for general and pesticides analyses.

Structure



Organic Solvents

System : GC/FID
Column : InertCap 17
0.25 mm I.D. x 60 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) - 4 °C/min - 230 °C (5 min hold)
Carrier Gas : He 130 kPa
Injection : Split flow 100 mL/min
250 °C
Detection : FID Range 10^1
250 °C
Sample Size : Mixed evenly
1 µL



1. Methanol
2. Ethyl ether
3. i-Propanol
4. *n*-Hexane
5. Acetone
6. Carbon disulfide
7. Methyl acetate
8. Dichloromethane
9. *trans*-1,2-Dichloroethylene
10. 2-Butanol
11. *cis*-1,2-Dichloroethylene
12. Methyl ethyl ketone
13. i-Butanol
14. Ethyl acetate
15. Chloroform
16. 1,1,1-Trichloroethane
17. Carbon tetrachloride
18. Tetrahydrofuran
19. Methylcellosolve
20. *n*-Butanol
21. 1,2-Dichloroethane
22. Trichloroethylene
23. *n*-Propyl acetate
24. i-Amyl alchol
25. Ethyl cellosolve
26. 1,4-Dioxane
27. Toluene
28. Tetrachloroethylene
29. Methyl-n-butyl ketone
30. *n*-Butyl acetate
31. *p*-Xylene
32. *m*-Xylene
33. Chlorobenzene
34. *N,N*-Dimethyl formamide
35. *o*-Xylene
36. 1-Methylcyclohexanol
37. Cyclohexanol
38. Butyl cellosolve
39. Styrene
40. Cellosolve acetate
41. Cyclohexanone
42. 1,1,2,2-Tetrachloroethane
43. *o*-Dichlorobenzene
44. *o*-Cresol
45. *p*-Cresol
46. *m*-Cresol

InertCap 17

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.320-prog.340 °C	1010-65122
	30 m	0.25 µm	iso.320-prog.340 °C	1010-65142
	60 m	0.25 µm	iso.320-prog.340 °C	1010-65162
0.32 mm	30 m	0.25 µm	iso.320-prog.340 °C	1010-65242
	60 m	0.25 µm	iso.320-prog.340 °C	1010-65262
0.53 mm	15 m	1.00 µm	iso.300-prog.320 °C	1010-65425
	30 m	1.00 µm	iso.300-prog.320 °C	1010-65445

InertCap 17 Fast GC

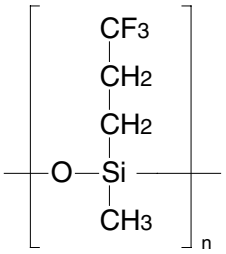
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.320-prog.340 °C	1010-65031

InertCap 210

InertCap 210

- 50 % Trifluoropropyl - 50 % Methylpolysiloxane
- USP Phase G6
- Medium Polarity
- Cross-Linked
- Excellent Separation for Organophosphorous Pesticides
- Equivalents：DB-210, Rtx-200, VF-200ms

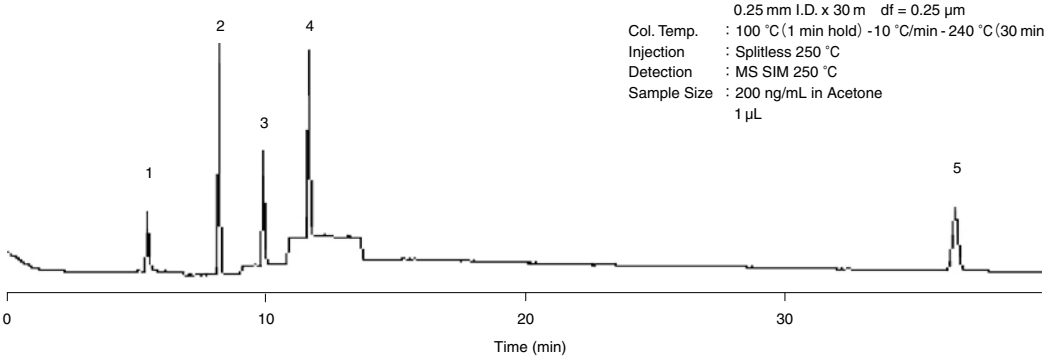
Structure



InertCap 210 is a medium polar column bonded with 50 % trifluoropropyl and 50 % methylpolysiloxane. It shows a unique selectivity for polar compounds, and due to the phosphorous nitrogen contained, InertCap 210 is suitable for the analysis of these kind of compounds.

Organophosphorous Pesticides

System : GC/MS
Column : InertCap 210
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 100 °C (1 min hold) -10 °C/min - 240 °C (30 min hold)
Injection : Splitless 250 °C
Detection : MS SIM 250 °C
Sample Size : 200 ng/mL in Acetone
1 µL



1. Acephate
2. Fenchlorphos
3. Omethoate
4. Monocrotophos
5. Phosmet

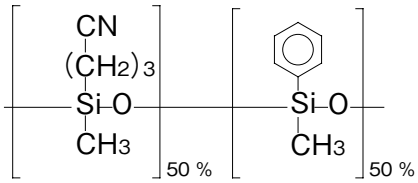
InertCap 210

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	iso.240-prog.260 °C	1010-66142
0.32 mm	30 m	0.25 µm	iso.240-prog.260 °C	1010-66242
0.53 mm	15 m	1.00 µm	iso.220-prog.240 °C	1010-66425
	30 m	1.00 µm	iso.220-prog.240 °C	1010-66445

InertCap 225

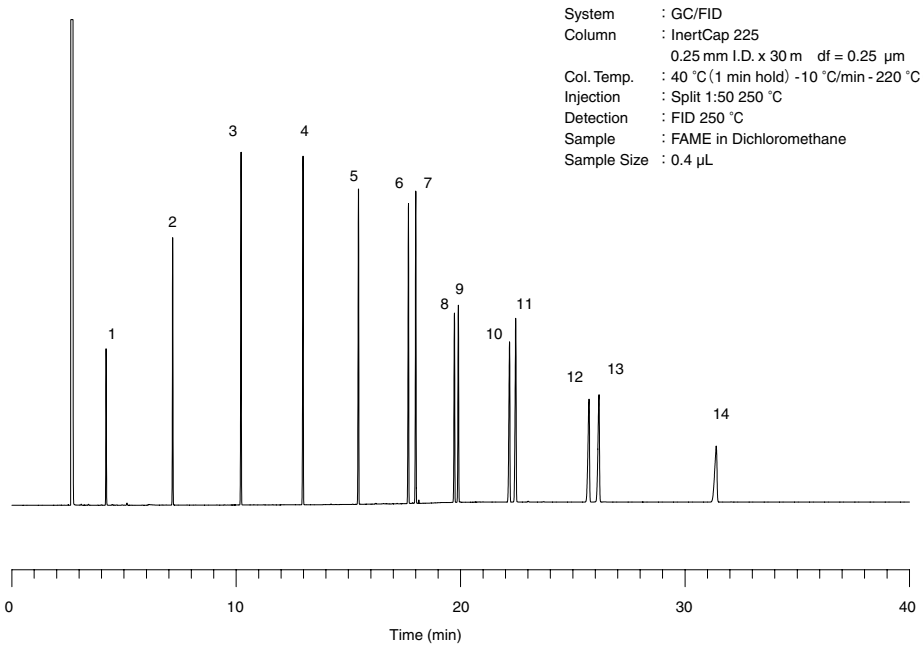
- 50 % Cyanopropylmethyl - 50 % Phenylmethylpolysiloxane
- USP Phase G19
- Medium Polarity
- Cross-Linked
- Excellent Separation for FAME
- Equivalents：DB-225, HP-225, Rtx-225, CP-Sil 43CB

Structure



InertCap 225 is a medium polar column bonded with 50 % cyanopropylmethyl and 50 % phenylmethylpolysiloxane. The cyano group in the stationary phase includes a triple bond and retains compounds stronger according to the increase of the number of unsaturated bonds by their dipole/dipole interactions.
For this reason InertCap 225 shows high separation efficiency for analyses of geometrical isomers.

FAME (Fatty Acid Methyl Esters)



1. Methyl Butanoate
2. Methyl Hexanoate
3. Methyl Octanoate
4. Methyl Decanoate
5. Methyl Dodecanoate
6. Methyl Tetradecanoate
7. Methyl Myristoleate
8. Methyl Hexadecanoate
9. Methyl Palmitelaidate
10. Methyl Octadecanoate
11. Methyl Oleate
12. Methyl Eicosanoate
13. Methyl-*cis*-11-Eicoseate
14. Methyl Docosanoate

InertCap 225

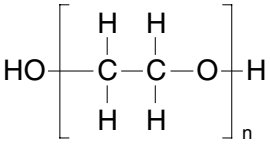
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	iso.220-prog.240 °C	1010-66642
0.32 mm	30 m	0.25 µm	iso.220-prog.240 °C	1010-66742
0.53 mm	30 m	0.50 µm	iso.220-prog.240 °C	1010-66844

InertCap Pure-WAX

InertCap Pure-WAX

- Polyethylene Glycol (PEG)
- USP Phase G16
- High Polarity
- Cross-Linked
- Equivalents：DB-WAX, HP-INNOWax, Rtx-Wax, Stabilwax

Structure



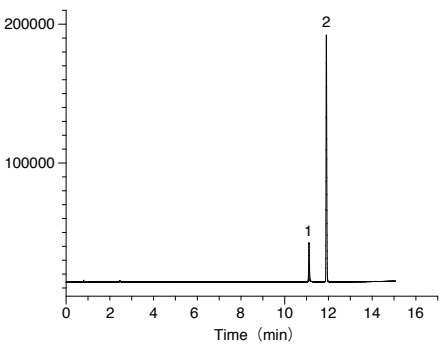
InertCap Pure-WAX is a high polar column bonded with polyethylene glycol. Based on newly developed inner treatment technology, InertCap Pure-WAX achieves the highest inertness among the columns available on the market. InertCap Pure-WAX is an optimal column for analyses of acidic compounds and basic compounds that commercially available WAX columns are not able to analyze.

[Comparison]

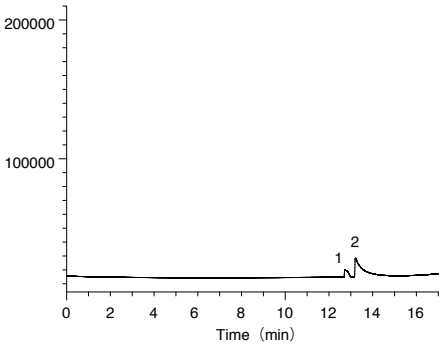
Acidic Compounds

System : GC-FID
Column : 0.25 mm I.D. x 30 m df = 0.25 µm
Col.Temp. : 90 °C (5min hold) – 10 °C/min - 240 °C
Carrier Gas : He 100 kPa
Injection : Split flow 100 mL/min
240 °C
Detection : FID Range 10^0
240 °C
Sample Size : 5 mg/mL 0.4 µL

1. Acrylic acid
2. Methacrylic acid



InertCap Pure-WAX

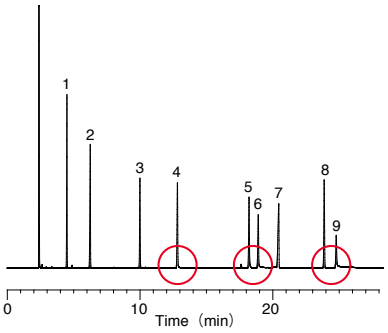


DB-WAX

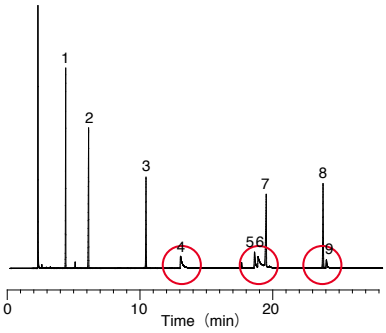
Basic Compounds

System : GC-FID
Column : 0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 60 °C- 4 °C/min - 250 °C
Injection : 250 °C
Detection : 250 °C
Sample Size : 0.1 mg/mL in Methanol 0.2 µL

1. *n*-Undecane
2. *n*-Dodecane
3. 4.6-Dimethylpyrimidine
4. 1-Aminooctane
5. *N,N*-Dicyclohexylamine
6. 1-Aminodecane
7. *n*-Heptadecane
8. 2.6-Dimethylaniline
9. 1-Aminododecane



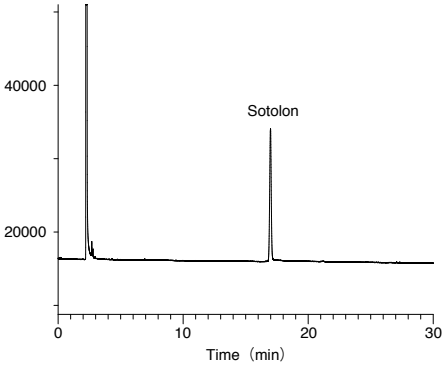
InertCap Pure-WAX



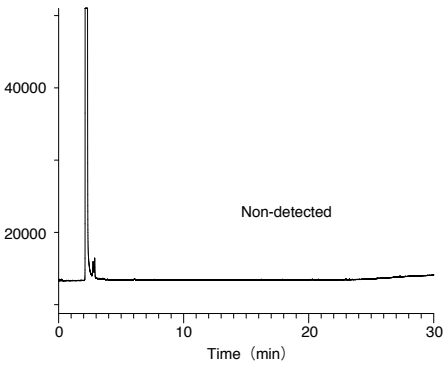
DB-WAX

Chelating Compounds

System : GC-FID
Column : 0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 160 °C Isothermal
Carrier Gas : He 100 kPa
Injection : Split flow 50 mL/min
240 °C
Detection : FID Range 10^0
240 °C
Sample Size : 1 mg/mL in Ethanol
1 µL

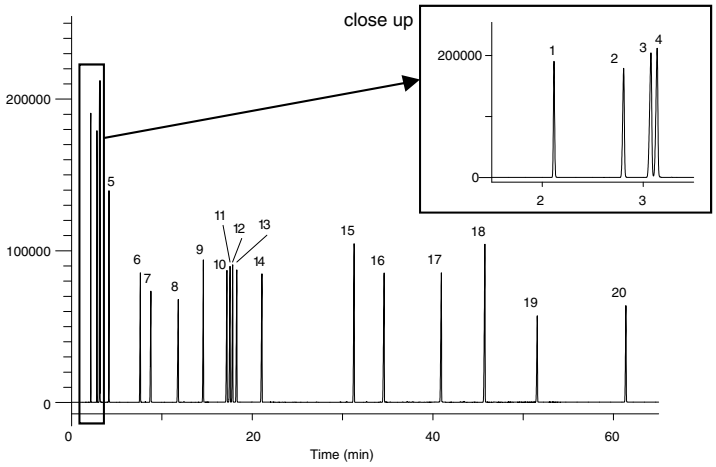


InertCap Pure-WAX



DB-WAX

Flavor



System : GC-FID
Column : InertCap Pure-WAX
0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 40 °C(5 min hold) - 3 °C/min - 250 °C
Carrier Gas : He 100 kPa
Injection : Split flow 150 mL/min
260 °C
Detection : FID Range 10^1
260 °C
Sample Size : Mixed evenly
0.3 µL
Data Source : GC InertSearch No.GA160

1. Propionaldehyde
2. Ethyl acetate
3. 2-Methylbutyraldehyde
4. Isovaleraldehyde
5. *n*-Valeraldehyde
6. 3-Methyl-2-butanol
7. 2-Pentanol
8. Isoamyl propionate
9. 2-Methylpyrazine
10. 2,5-Dimethylpyrazine
11. 2,6-Dimethylpyrazine
12. 2-Ethylpyrazine
13. 2,3-Dimethylpyrazine
14. 2-Ethyl-3-methylpyrazine
15. Acetophenone (Acetylbenzene)
16. 5,6,7,8-Tetrahydroquinoxaline
17. Isobutyl phenyl acetate
18. 6-Methylquinoline
19. Piperonal
20. Vanillin

InertCap Pure-WAX

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	iso.260-prog.260 °C	1010-68142
		0.50 µm	iso.260-prog.260 °C	1010-68144
	60 m	0.25 µm	iso.260-prog.260 °C	1010-68162
		0.50 µm	iso.260-prog.260 °C	1010-68164
0.32 mm	30 m	0.25 µm	iso.260-prog.260 °C	1010-68242
		0.50 µm	iso.260-prog.260 °C	1010-68244
	60 m	0.25 µm	iso.260-prog.260 °C	1010-68262
		0.50 µm	iso.260-prog.260 °C	1010-68264
0.53 mm	15 m	1.00 µm	iso.240-prog.240 °C	1010-68425
	30 m		iso.240-prog.240 °C	1010-68445
	60 m		iso.240-prog.240 °C	1010-68465

InertCap Pure-WAX ProGuard (Built-in Guard Column)

I.D.	Length	Thickness	Guard Column Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.260-prog.260 °C	1010-68490
			5 m	iso.260-prog.260 °C	1010-68491
			10 m	iso.260-prog.260 °C	1010-68494

InertCap Pure-WAX T.L. (Built-in Transfer Line)

I.D.	Length	Thickness	Transfer Line Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	2 m	iso.260-prog.260 °C	1010-68492
	60 m	0.25 µm	2 m	iso.260-prog.260 °C	1010-68493

InertCap Pure-WAX Fast GC

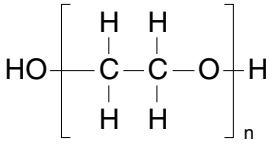
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.260-prog.260 °C	1010-68031
	40 m	0.18 µm	iso.260-prog.260 °C	1010-68051

InertCap WAX

InertCap WAX

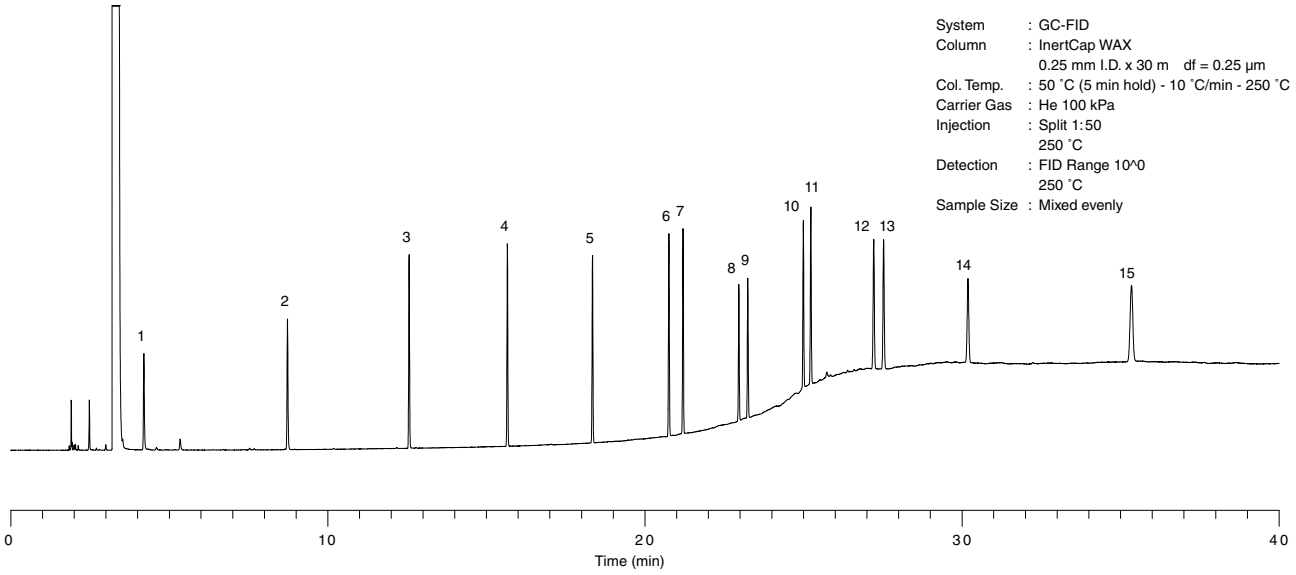
- Polyethylene Glycol (PEG)
- USP Phase G16
- High Polarity
- Cross-Linked
- Equivalents：DB-WAX, HP-INNOWax, Rtx-Wax, Stabilwax

Structure



InertCap WAX is a high polar column bonded with polyethylene glycol. It is slightly more polar than InertCap Pure-WAX and suitable for analyses of high polar samples such as solvents.

Fatty Acid Methyl Esters (FAME)



1. Methyl butanoate
2. Methyl hexanoate
3. Methyl octanoate
4. Methyl decanoate
5. Methyl dodecanoate
6. Methyl tetradecanoate
7. Methyl myristoleate
8. Methyl hexadecanoate
9. Methyl palmitoleate
10. Methyl octadecanoate
11. Methyl oleate
12. Methyl eicosanoate
13. Methyl *cis*-11-eicosenoate
14. Methyl docosanoate
15. Methyl tetracosanoate

InertCap WAX

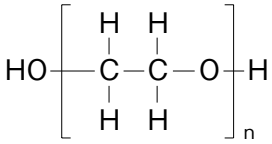
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.250-prog.260 °C	1010-67122
	30 m	0.25 µm	iso.250-prog.260 °C	1010-67142
		0.50 µm	iso.250-prog.260 °C	1010-67144
	60 m	0.25 µm	iso.250-prog.260 °C	1010-67162
		0.50 µm	iso.250-prog.260 °C	1010-67164

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.32 mm	15 m	0.25 µm	iso.250-prog.260 °C	1010-67222
	30 m	0.25 µm	iso.250-prog.260 °C	1010-67242
		0.50 µm	iso.250-prog.260 °C	1010-67244
	60 m	0.25 µm	iso.250-prog.260 °C	1010-67262
		0.50 µm	iso.250-prog.260 °C	1010-67264
		1.00 µm	iso.230-prog.240 °C	1010-67265
0.53 mm	15 m	1.00 µm	iso.230-prog.240 °C	1010-67425
		2.00 µm	iso.230-prog.240 °C	1010-67427
	30 m	1.00 µm	iso.230-prog.240 °C	1010-67445
		2.00 µm	iso.230-prog.240 °C	1010-67447
		3.00 µm	iso.230-prog.240 °C	1010-67449
	60 m	1.00 µm	iso.230-prog.240 °C	1010-67465

InertCap WAX-HT

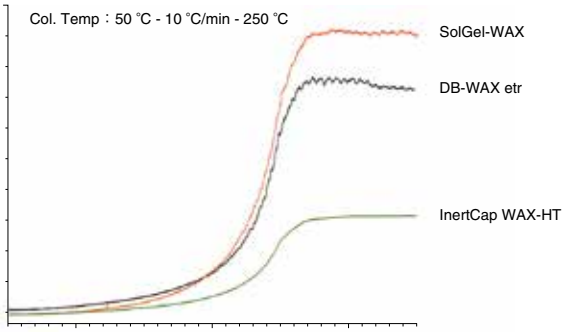
- Polyethylene Glycol (PEG)
- USP Phase G16
- High Polarity
- Cross-Linked
- Equivalents：DB-WAXetr, SolGel-WAX

Structure



InertCap WAX-HT is a strong polar column bonded with polyethylene glycol. By increasing the heat resistance of the stationary phase, InertCap WAX-HT can be also used at the maximum temperature of 280 ˚C. It is optimal for the analyses of polar samples such as solvents and also for the analyses of high-boiling compounds.

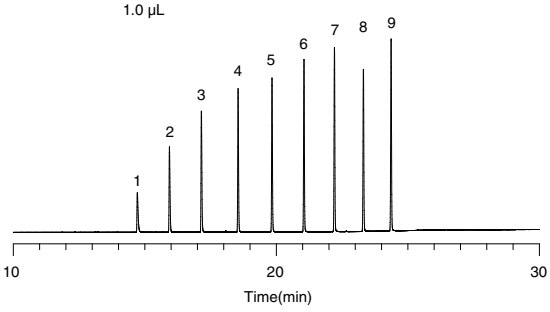
Comparison of Column Bleed



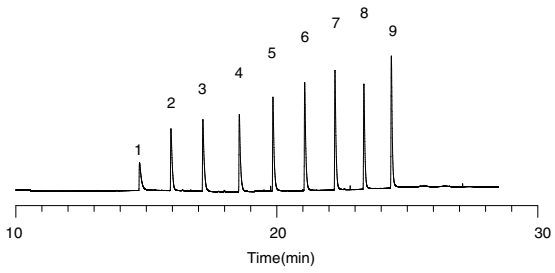
Short-chain Fatty Acids

System : GC/FID
Column : InertCap WAX-HT 0.25 mm I.D. x 30 m df = 0.25 µm
Col. Temp. : 40 ˚C (5min hold) -10 ˚C/min-240 ˚C
Carrier Gas : He 100 kPa
Injection : Split flow 50 mL/min 240 ˚C
Detection : FID Range 10^0 240 ˚C
Sample Size : 1000 µg/mL in Acetone
1.0 µL

1. Acetic Acid
2. Propionic Acid
3. Butyric Acid
4. Valeric Acid
5. Caproic Acid
6. Heptyric Acid
7. Caprylic Acid
8. Pelargonic Acid
9. Capric Acid



InertCap WAX-HT



SolGel-WAX

InertCap WAX-HT

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	iso.270-prog.280 °C	1010-68542
		0.50 µm	iso.260-prog.270 °C	1010-68544
	60 m	0.25 µm	iso.270-prog.280 °C	1010-68562
		0.50 µm	iso.260-prog.270 °C	1010-68564

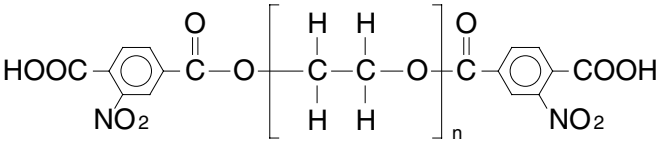
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.32 mm	30 m	0.25 µm	iso.270-prog.280 °C	1010-68642
		0.50 µm	iso.260-prog.270 °C	1010-68644
	60 m	0.25 µm	iso.270-prog.280 °C	1010-68662
		0.50 µm	iso.260-prog.270 °C	1010-68664
0.53 mm	15 m	1.00 µm	iso.250-prog.260 °C	1010-68725
	30 m	1.00 µm	iso.250-prog.260 °C	1010-68745
	60 m	1.00 µm	iso.250-prog.260 °C	1010-68765

InertCap FFAP

InertCap FFAP

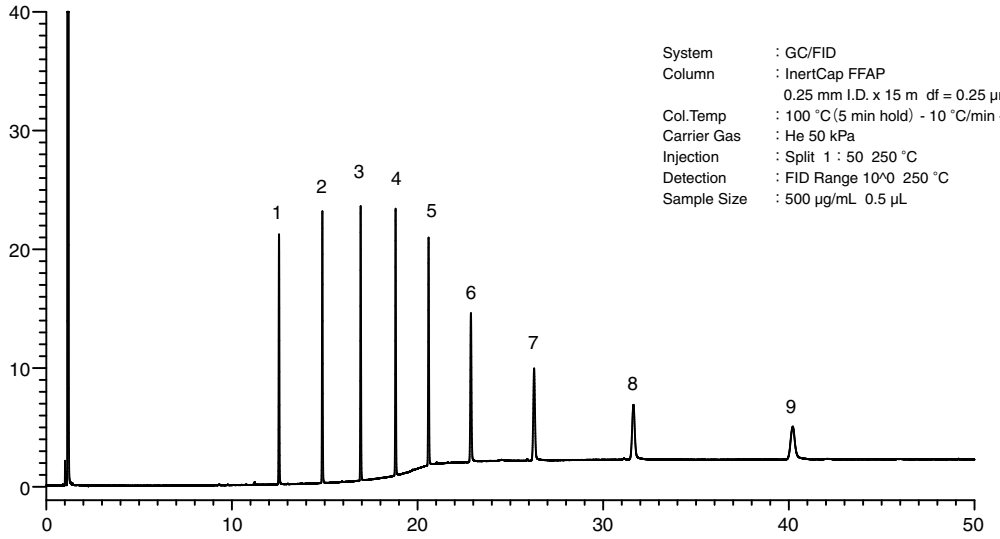
- Nitroterephthalic Acid Modified Polyethylene Glycol
- USP Phase G35
- High Polarity
- Cross-Linked
- Equivalents：DB-FFAP, HP-FFAP, CP-WAX 58 (FFAP) CB

Structure



InertCap FFAP is a high polar column bonded with nitroterephthalic acid modified polyethylene glycol. As the liquid phase shows acidity, it is possible to analyze free fatty acids without derivatization. InertCap FFAP is optimal for the analyses of acidic compounds.

Odd Free Fatty Acids



System : GC/FID
Column : InertCap FFAP
0.25 mm I.D. x 15 m df = 0.25 µm
Col.Temp : 100 °C (5 min hold) - 10 °C/min - 250 °C (30 min hold)
Carrier Gas : He 50 kPa
Injection : Split 1 : 50 250 °C
Detection : FID Range 10^0 250 °C
Sample Size : 500 µg/mL 0.5 µL

1. C7 Heptanoic acid
2. C9 Nonanoic acid
3. C11 Undecanoic acid
4. C13 Tridecanoic acid
5. C15 Pentadecanoic acid
6. C17 Heptadecanoic acid
7. C19 Nonadecanoic acid
8. C21 Heneicosanoic acid
9. C23 Tricosanoic acid

InertCap FFAP

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	15 m	0.25 µm	iso.240-prog.250 °C	1010-28622
	30 m	0.25 µm	iso.240-prog.250 °C	1010-28642
		0.50 µm	iso.240-prog.250 °C	1010-28644
	60 m	0.25 µm	iso.240-prog.250 °C	1010-28662
		0.50 µm	iso.240-prog.250 °C	1010-28664
0.32 mm	15 m	0.25 µm	iso.240-prog.250 °C	1010-28722
	30 m	0.25 µm	iso.240-prog.250 °C	1010-28742
		0.50 µm	iso.240-prog.250 °C	1010-28744
		1.00 µm	iso.230-prog.240 °C	1010-28745
	60 m	0.25 µm	iso.240-prog.250 °C	1010-28762
		0.50 µm	iso.240-prog.250 °C	1010-28764
		1.00 µm	iso.230-prog.240 °C	1010-28765
0.53 mm	15 m	0.50 µm	iso.240-prog.250 °C	1010-28924
		1.00 µm	iso.230-prog.240 °C	1010-28925
	30 m	0.25 µm	iso.240-prog.250 °C	1010-28942
		0.50 µm	iso.240-prog.250 °C	1010-28944
		1.00 µm	iso.230-prog.240 °C	1010-28945

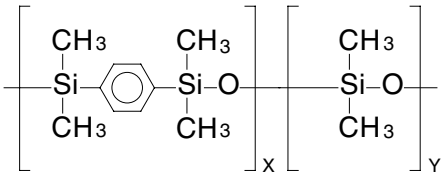
InertCap FFAP Fast GC

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.18 mm	20 m	0.18 µm	iso.240-prog.250 °C	1010-28531
	40 m	0.18 µm	iso.240-prog.250 °C	1010-28551

InertCap Pesticides

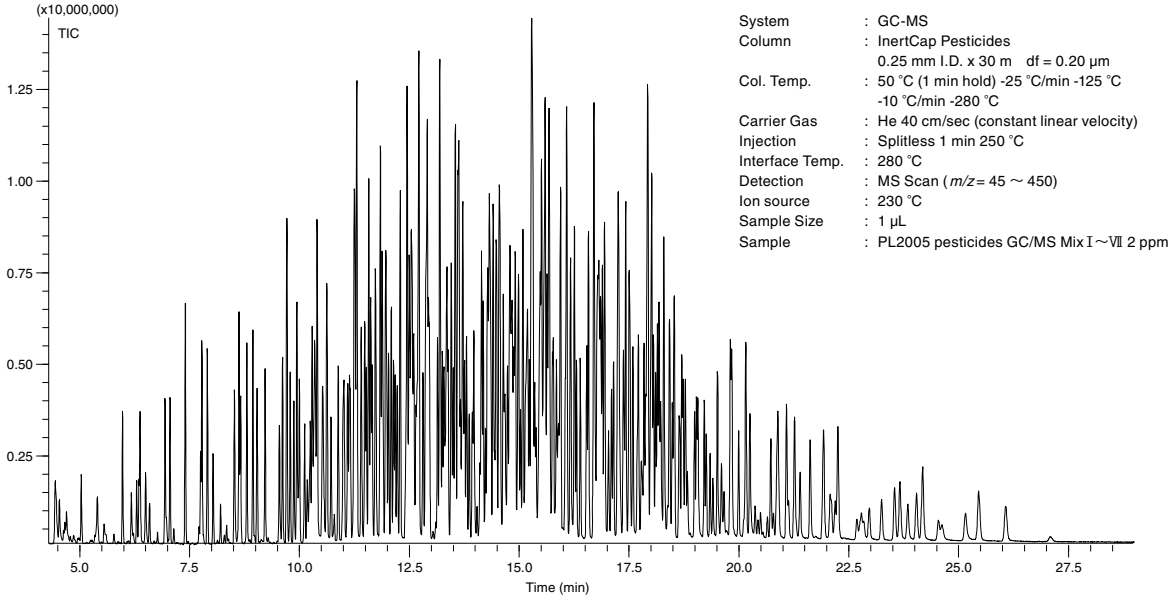
- 5 % Diphenyl (equiv.) - Dimethylpolysilphenylene Siloxane
- USP Phase G27
- Low Polarity
- Cross-Linked
- Ultra Low Bleed
- GL Sciences' original, No equivalent

Structure



InertCap Pesticides is specially designed for simultaneous analyses of pesticides with GC/MS. Heat decomposition of pesticides inside the column and influence by matrix can be eliminated.

Pesticides



System	:	GC-MS
Column	:	InertCap Pesticides 0.25 mm I.D. x 30 m df = 0.20 µm
Col. Temp.	:	50 ˚C (1 min hold) -25 ˚C/min -125 ˚C -10 ˚C/min -280 ˚C
Carrier Gas	:	He 40 cm/sec (constant linear velocity)
Injection	:	Splitless 1 min 250 ˚C
Interface Temp.	:	280 ˚C
Detection	:	MS Scan (*m/z*= 45 ~ 450)
Ion source	:	230 ˚C
Sample Size	:	1 µL
Sample	:	PL2005 pesticides GC/MS Mix Ⅰ~Ⅶ 2 ppm

Note: About the sample details please see "GC Technical Note No.6" on our website.

InertCap Pesticides

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	0.20 µm	iso.325-prog.350 °C	1010-15141

InertCap Pesticides ProGuard (Built-in Guard Column)

I.D.	Length	Thickness	Guard Column Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.20 µm	2 m	iso.325-prog.350 °C	1010-15175
			5 m	iso.325-prog.350 °C	1010-15176
			10 m	iso.325-prog.350 °C	1010-15177

InertCap Pesticides T.L. (Built-in Transfer Line)

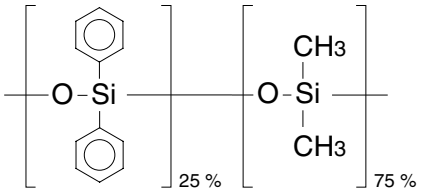
I.D.	Length	Thickness	Transfer Line Length	Max. Temperature	Cat.No.
0.25 mm	30 m	0.20 µm	2 m	iso.325-prog.350 °C	1010-15191

InertCap AQUATIC

InertCap AQUATIC

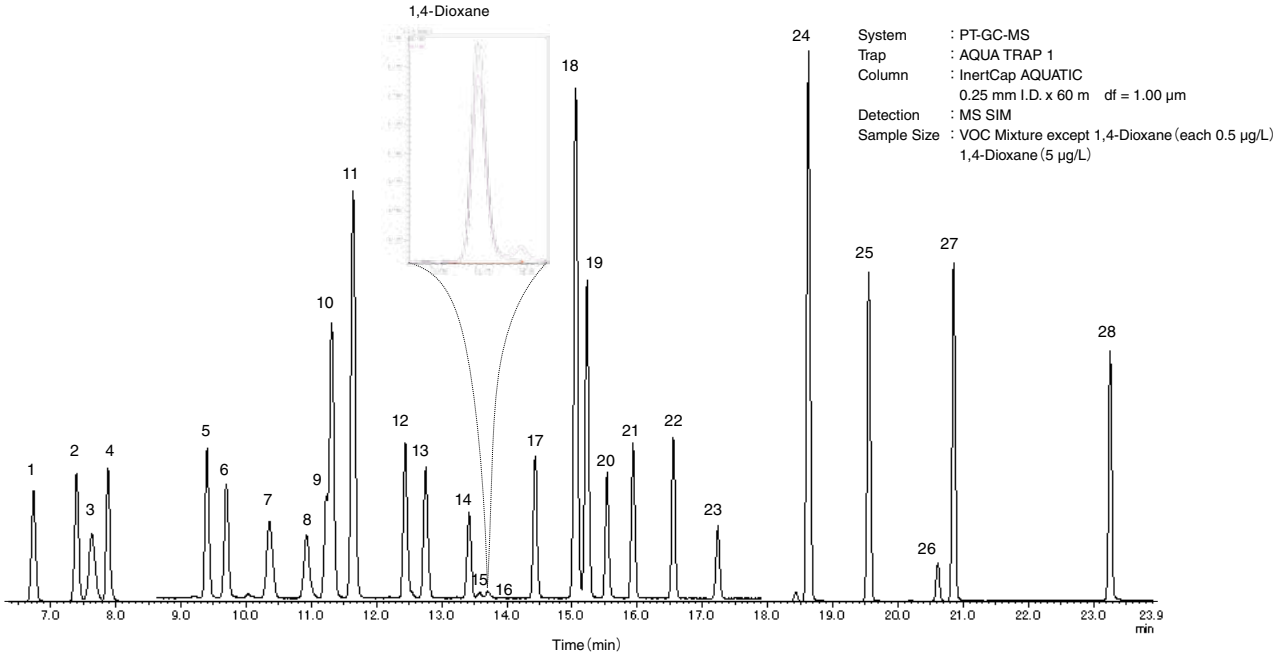
- 25 % Diphenyl - 75 % Dimethylpolysiloxane
- USP Phase G28
- Medium Polarity
- Cross-Linked
- No Equivalent

Structure



AQUATIC is a medium polar column bonded with 25 % diphenyl - 75 % dimethylpolysiloxane specifically designed for the analyses of volatile organic compounds in water. As the column polarity is optimized, AQUATIC enables high separations. Column performance report with analysis of 33 compounds is attached to every column which guarantee its separation efficiency and reproducibility. AQUATIC is suitable for VOCs simultaneous analyses by purge and trap.

Volatile Organic Compounds in Water



1. 1,1-Dichloroethene
2. Dichloromethane
3. MTBE
4. *trans* -1,2- Dichloroethene
5. *cis* -1,2- Dichloroethene
6. Chloroform
7. 1,1,1-Trichloroethane
8. Carbon tetrachloride
9. 1,2- Dichloroethene
10. Benzene
11. Fluorobenzene
12. Trichloroethene
13. 1,2-Dichloropropane
14. Bromodichloromethane
15. 1,4-Dioxane-d8
16. 1,4-Dioxane
17. *cis*-1,3-Dichloropropene
18. Toluene-d8
19. Toluene
20. *trans*-1,3-Dichloropropene
21. 1,1,2-Trichloroethane
22. Tetrachloroethylene
23. Dibromochloromethane
24. *m,p*-Xylene
25. *o*-Xylene
26. Bromoform
27. *p*-Bromofluorobenzene
28. 1,4-Dichlorobenzene

InertCap AQUATIC

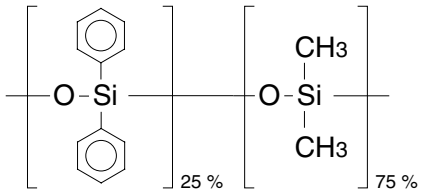
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	1.00 µm	iso.200-prog.220 °C	1010-29145
	60 m		iso.200-prog.220 °C	1010-29165
0.32 mm	60 m	1.40 µm	iso.200-prog.220 °C	1010-29266
0.53 mm	75 m	2.00 µm	iso.200-prog.220 °C	1010-29477

InertCap AQUATIC-2

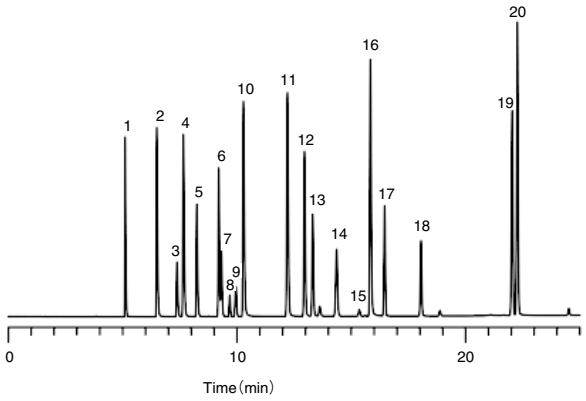
- 25 % Diphenyl - 75 % Dimethylpolysiloxane
- USP Phase G28
- Medium Polarity
- Cross-Liked
- No Equivalent

AQUATIC-2 can be used up to 260 °C. Separation pattern is almost same as AQUATIC. Selectivity for a few types of compounds may be slightly different from InertCap AQUATIC.

Structure



Organic Solvents



System : GC/FID
Column : AQUATIC-2
0.25 mm I.D. x 60 m df = 1.4 µm
Col. Temp. : 40 °C (5 min hold) - 4 °C/min - 120 °C - 10 °C/min - 250 °C
Carrier Gas : He 200 kPa
Injection : Split 1:80
Detection : FID
Sample Size : 1 µL

1. Methanol
2. Ethanol
3. Diethylether
4. 2-Propanol
5. Acetone
6. Acetonitrile
7. Methylacetate
8. Dichloromethane
9. *n*-Hexane
10. *n*-Propanol
11. 2-Butanol
12. MEK
13. Ethylacetate
14. Cyclohexane
15. Carbontetrachloride
16. 1-Butanol
17. 1,2-Dichloroethane
18. Trichloroethylene
19. Isobutylacetate
20. Toluene

InertCap AQUATIC-2

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	1.40 µm	iso.260-prog.260 °C	1010-19146
	60 m	1.40 µm	iso.260-prog.260 °C	1010-19166
0.32 mm	30 m	1.40 µm	iso.260-prog.260 °C	1010-19245
		1.80 µm	iso.260-prog.260 °C	1010-19247
	60 m	1.80 µm	iso.260-prog.260 °C	1010-19267
0.53 mm	30 m	3.00 µm	iso.260-prog.260 °C	1010-19448
	75 m	3.00 µm	iso.260-prog.260 °C	1010-19478

InertCap for Amines

InertCap for Amines

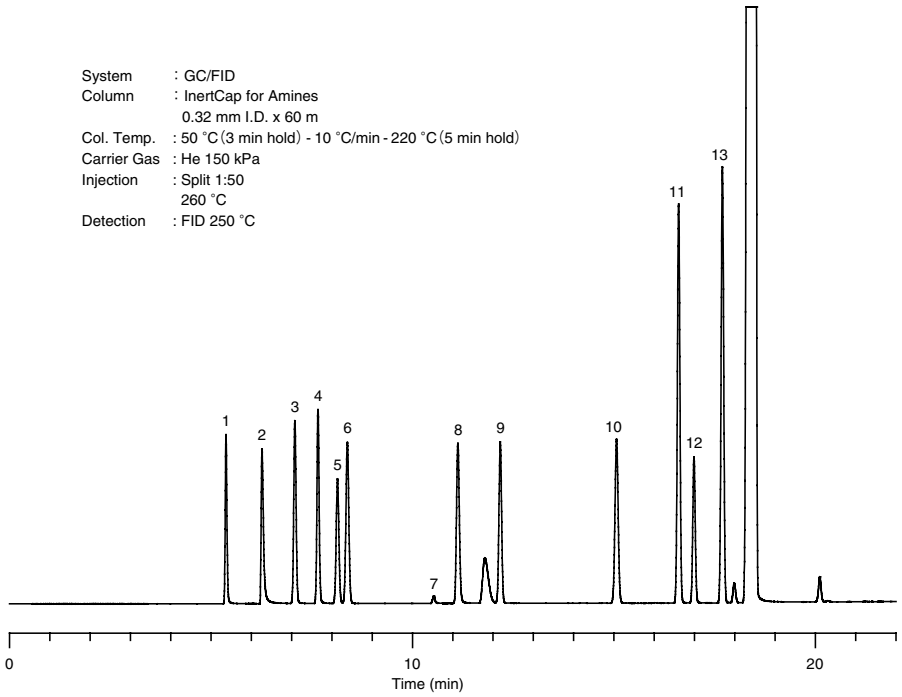
- Cross-Linked
- Optimized Performance for Analysis of Amines from C2 ~ C10
- Ideal for the simultaneous analyses of mixed sample such as alcohol etc.
- Equivalent : CP-Volamine

InertCap for Amines shows excellent inertness and separation performances in analysis of amines from C2 ~ C10. Basic compounds can be perfectly eluted without any adsorption by the column. Unlike other manufacturer's columns, InertCap for Amines can simultaneous analyze the other polar compounds such as alcohols due to our state-of-art inner column deactivation treatment techniques.

Solvent and Amine Mixture Analyses

System : GC/FID
Column : InertCap for Amines
0.32 mm I.D. x 60 m
Col. Temp. : 50 °C (3 min hold) - 10 °C/min - 220 °C (5 min hold)
Carrier Gas : He 150 kPa
Injection : Split 1:50
260 °C
Detection : FID 250 °C

1 Methanol
2 Dimethylamine
3 Ethanol
4 Acetonitrile
5 Acetone
6 Isopropanol
7 Acetic acid
8 Diethylamine
9 Ethylacetate
10 Triethylamine
11 Pyridine
12 Dimethylformamide
13 Toluene



InertCap for Amines

I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.32 mm	15 m	–	iso.265-prog.300 °C	1010-69229
	30 m	–	iso.265-prog.300 °C	1010-69249
	60 m	–	iso.265-prog.300 °C	1010-69269

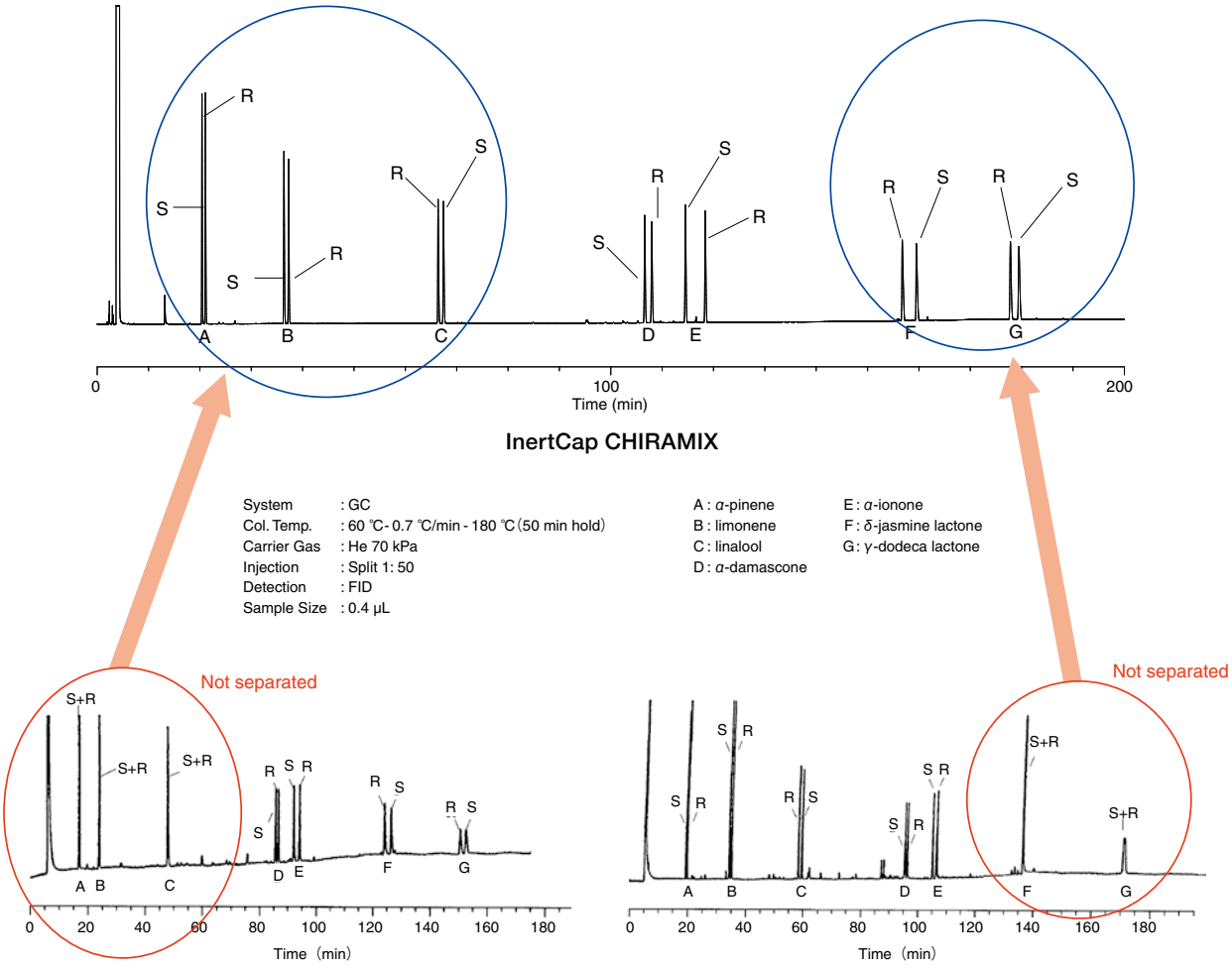
InertCap CHIRAMIX

- Optimized Performance for Separation of Enantiomers
- Coated with more than 2 kinds of cyclodextrin derivatives
- Sharp peaks
- GL Sciences' original

InertCap CHIRAMIX has been designed to improve the separation of enantiomers coated with a mixture of cyclodextrin derivatives. Compared to the other commercially available columns which are coated with single cyclodextrin, InertCap CHIRAMIX can effectively separates a variety of enantiomers in a short time as the 1st choice column.

※InertCap CHIRAMIX was jointly developed with T. HASEGAWA CO., LTD.
※CHIRAMIX is a brand name of T. HASEGAWA CO., LTD.

Enantiomer Analysis



InertCap CHIRAMIX

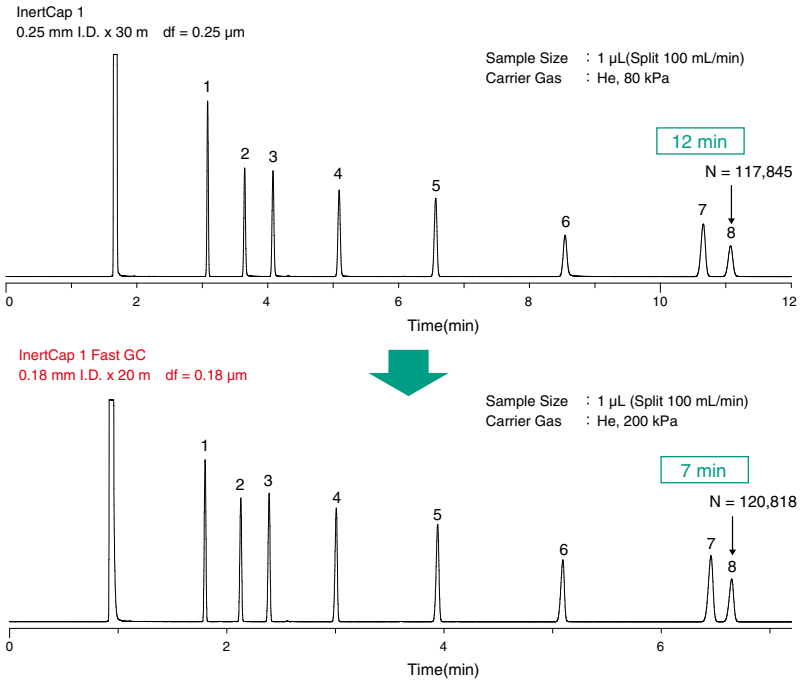
I.D.	Length	Thickness	Max. Temperature	Cat.No.
0.25 mm	30 m	0.25 µm	iso.180-prog.200 °C	1010-69142

InertCap Fast GC Columns

InertCap Fast GC Columns

The internal diameter of InertCap Fast GC is 0.18 mm. With this column it is possible to obtain fast analysis and the best performances with your GC system without loosing separation power.

Shorten Analysis Time



1. *n*-Decane
2. *n*-Octanol
3. 2,6-Dimethylphenol
4. 2,6-Dimethylaniline
5. *n*-Dodecane
6. 1-Decanol
7. *n*-Tridecane
8. Methyl-n-Decanoate

Downsizing Example

0.25 mm I.D. x 30 m df = 0.25 µm
↓
0.18 mm I.D. x 20 m df = 0.18 µm

0.25 mm I.D. x 30 m df = 0.40 µm
↓
0.18 mm I.D. x 20 m df = 0.28 µm

InertCap Fast GC

Phase	I.D.	Length	Thickness	Max. Temperature	Cat.No.
InertCap 1MS	0.18 mm	20 m	0.18 µm	iso.325-prog.350 °C	1010-12031
InertCap 1	0.18 mm	15 m	0.18 µm	iso.325-prog.350 °C	1010-11021
			0.28 µm		1010-11022
		20 m	0.18 µm	iso.325-prog.350 °C	1010-11031
			0.28 µm		1010-11032
InertCap 5MS/Sil	0.18 mm	20 m	0.18 µm	iso.325-prog.350 °C	1010-15031
		40 m	0.18 µm	iso.325-prog.350 °C	1010-15051
InertCap 5MS/NP	0.18 mm	20 m	0.18 µm	iso.325-prog.350 °C	1010-18531
InertCap 5	0.18 mm	15 m	0.18 µm	iso.325-prog.350 °C	1010-18021
			0.28 µm		1010-18022
		20 m	0.18 µm	iso.325-prog.350 °C	1010-18031
			0.28 µm		1010-18032
InertCap 17	0.18 mm	20 m	0.18 µm	iso.320-prog.340 °C	1010-65031
InertCap 1301	0.18 mm	20 m	0.18 µm	iso.280-prog.300 °C	1010-60031
InertCap 624	0.18 mm	20 m	1.00 µm	iso.260-prog.260 °C	1010-14535
		40 m	1.00 µm	iso.260-prog.260 °C	1010-14555
InertCap 35MS	0.18 mm	20 m	0.18 µm	iso.340-prog.360 °C	1010-63531
InertCap 1701	0.18 mm	20 m	0.18 µm	iso.280-prog.300 °C	1010-61031
InertCap Pure-WAX	0.18 mm	20 m	0.18 µm	iso.260-prog.260 °C	1010-68031
		40 m	0.18 µm	iso.260-prog.260 °C	1010-68051
InertCap FFAP	0.18 mm	20 m	0.18 µm	iso.240-prog.250 °C	1010-28531
		40 m	0.18 µm	iso.240-prog.250 °C	1010-28551

Fused Silica Capillary Tubing

Guard Column

When injecting samples with contaminants or nonvolatile compounds in the column, active sites and/or degradation of the stationary phase may occur. With the use of on-column and splitless injections, and even with split injection, contamination and degradation of the columns are unavoidable problems. One method to protect the analytical column from such damage is to connect a 2 m fused silica deactivated capillary tubing to the inlet of the column and replace the tubing as the absorbed contaminant levels increase.

Retention Gap Column

Retention gap helps to prevent peak broadening and peak splitting when using on-column or split-less methods.

Transfer Line

Transfer line can be used for GC/MS, LC/MS, GC/FTIR, LC/GC, Multi - Dimensional GC, or sniffer adaptors. There are many uses such as resistance tube in GC/MS and SFC (supercritical fluid chromatography)

Deactivated Fused Silica Capillary Tubing

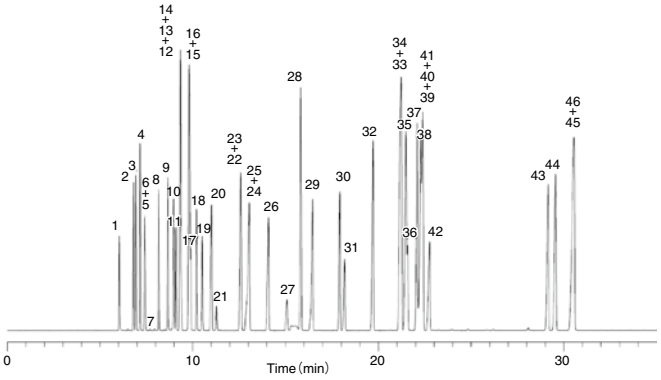
I.D.	O.D.	10 m	25 m	50 m
		Cat.No.	Cat.No.	Cat.No.
0.005 mm	0.15 mm	1010-35102	1010-35105	–
	0.375 mm	1010-35142	1010-35145	–
0.01 mm	0.15 mm	1010-35202	1010-35205	–
	0.375 mm	1010-35242	1010-35245	–
0.015 mm	0.15 mm	1010-35302	1010-35305	–
	0.375 mm	1010-35342	1010-35345	–
0.02 mm	0.15 mm	1010-35402	1010-35405	–
	0.375 mm	1010-35442	1010-35445	–
0.025 mm	0.15 mm	1010-35502	1010-35505	–
	0.375 mm	1010-35542	1010-35545	–
0.03 mm	0.15 mm	1010-35602	1010-35605	–
	0.375 mm	1010-35642	1010-35645	–
0.04 mm	0.15 mm	1010-35702	1010-35705	–
	0.375 mm	1010-35742	1010-35745	–
0.05 mm	0.15 mm	1010-35802	1010-35805	–
	0.375 mm	1010-35842	1010-35845	–
0.075 mm	0.15 mm	1010-35902	1010-35905	–
	0.375 mm	1010-35942	1010-35945	–
0.10 mm	0.20 mm	1010-36012	1010-36015	1010-36017
	0.375 mm	1010-36042	1010-36045	1010-36047
0.15 mm	0.375 mm	1010-36132	1010-36135	1010-36137
0.18 mm	0.35 mm	1010-36172	1010-36175	1010-36177
0.20 mm	0.35 mm	1010-36222	1010-36225	1010-36227
0.25 mm	0.35 mm	1010-36322	1010-36325	1010-36327
0.32 mm	0.45 mm	1010-36452	1010-36455	1010-36457
0.53 mm	0.66 mm	1010-36682	1010-36685	–

Medium Polarity Deactivated Fused Silica Capillary Tubing

I.D.	O.D.	Length	Cat.No.
0.53 mm	0.66 mm	2 m	1010-36782

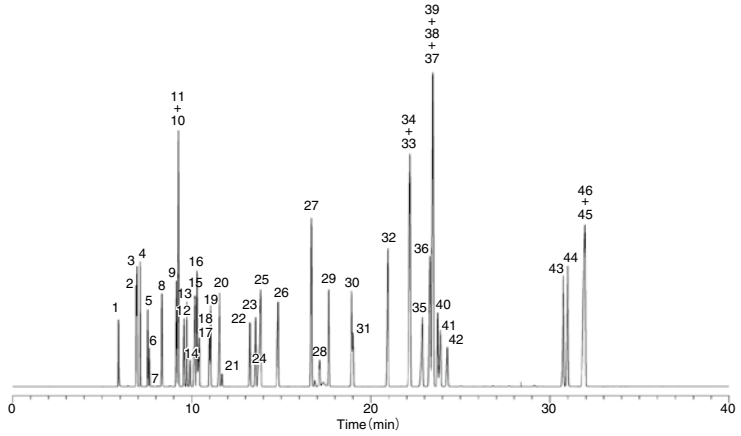
Applications

46 organic solvents



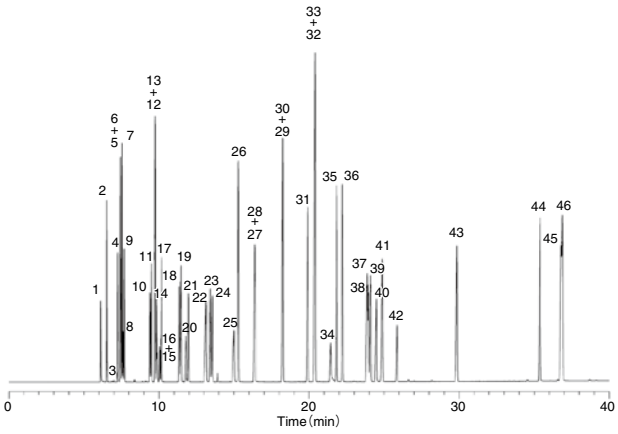
System : GC/FID
Column : InertCap 1
0.25 mm I.D. x 60 m df = 0.40 µm
Col. Temp. : 40 °C (5 min hold) – 4 °C/min
– 230 °C (5 min hold)
Carrier Gas : He 130 kPa
Injection : Split flow 100 mL/min
250 °C
Detection : FID Range 10^1
250 °C
Sample Size : Mixed evenly
1 µL

1. Methanol
2. Acetone
3. Isopropanol
4. Ethyl ether
5. Dichloromethane
6. Methyl acetate
7. Carbon disulfide
8. *trans*-1,2-Dichloroethylene
9. Methyl ethyl keton
10. 2-Butanol
11. *cis*-1,2-Dichloroethylene
12. Ethyl acetate
13. *n*-Hexane
14. Chloroform
15. Tetrahydrofuran
16. Isobutanol
17. Methyl cellosolve
18. 1,2-Dichloroethane
19. 1,1,1-Trichloroethane
20. *n*-Butanol
21. Carbon Tetrachloride
22. 1,4-Dioxane
23. Trichloroethylene
24. Ethyl cellosolve
25. *n*-Propyl acetate
26. Isoamyl alchol
27. *N,N*-Dimethyl formamide
28. Toluene
29. Methyl-*n*-butyl ketone
30. *n*-Butyl acetate
31. Tetrachloroethylene
32. Chlorobenzene
33. *m*-Xylene
34. *p*-Xylene
35. Cyclohexanone
36. Cyclohexanol
37. Styrene
38. 1-Methylcyclohexanol
39. *o*-Xylene
40. 1,1,2,2-Tetrachloroethane
41. Cellosolve acetate
42. Butyl cellosolve
43. *o*-Dichlorobenzene
44. *o*-Cresol
45. *p*-Cresol
46. *m*-Cresol



System : GC/FID
Column : InertCap 5
0.25 mm I.D. x 60 m df = 0.40 µm
Col. Temp. : 40 °C (5 min hold) – 4 °C/min
– 230 °C (5 min hold)
Carrier Gas : He 130 kPa
Injection : Split flow 100 mL/min
250 °C
Detection : FID Range 10^1
250 °C
Sample Size : Mixed evenly
1 µL

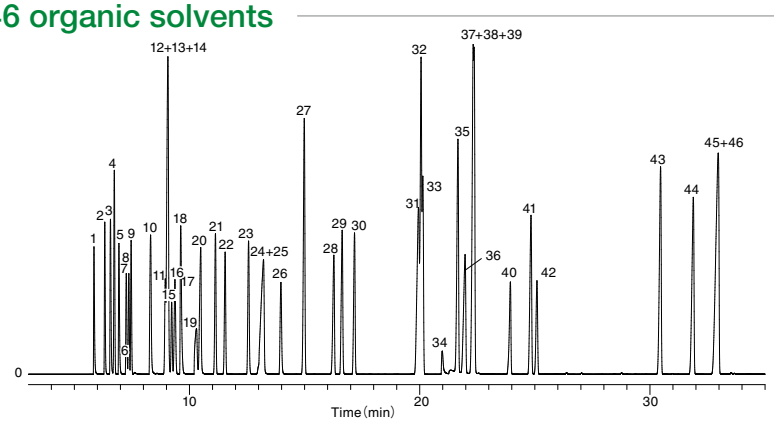
1. Methanol
2. Acetone
3. Isopropanol
4. Ethyl ether
5. Methyl acetate
6. Dichloromethane
7. Carbon disulfide
8. *trans*-1,2-Dichloroethylene
9. Methyl ethyl keton
10. 2-Butanol
11. *n*-Hexane
12. *cis*-1,2-Dichloroethylene
13. Ethyl acetate
14. Chloroform
15. Isobutanol
16. Tetrahydrofuran
17. Methyl cellosolve
18. 1,1,1-Trichloroethane
19. 1,2-Dichloroethane
20. *n*-Butanol
21. Carbon Tetrachloride
22. Trichloroethylene
23. 1,4-Dioxane
24. Ethyl cellosolve
25 *n*-Propyl acetate
26. Isoamyl alchol
27. Toluene
28. *N,N*-Dimethyl formamide
29. Methyl-*n*-butyl ketone
30. *n*-Butyl acetate
31. Tetrachloroethylene
32. Chlorobenzene
33. *m*-Xylene
34. *p*-Xylene
35. Cyclohexanol
36. Styrene
37. Cyclohexanone
38. 1-Methylcyclohexanol
39. *o*-Xylene
40. Cellosolve acetate
41. Butyl cellosolve
42. 1,1,2,2-Tetrachloroethane
43. *o*-Dichlorobenzene
44. *o*-Cresol
45. *p*-Cresol
46. *m*-Cresol



System : GC/FID
Column : InertCap 1701
0.25 mm I.D. x 60 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) – 4 °C/min
– 230 °C (5 min hold)
Carrier Gas : He 130 kPa
Injection : Split flow 100 mL/min
250 °C
Detection : FID Range 10^1
250 °C
Sample Size : Mixed evenly
1 µL

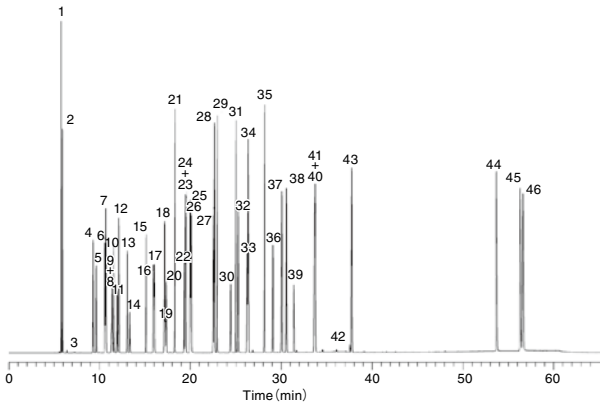
1. Methanol
2. Ethyl ether
3. Carbon disulfide
4. Acetone
5. Isopropanol
6. Methyl acetate
7. *n*-Hexane
8. Dichloromethane
9. *trans*-1,2-Dichloroethylene
10. *cis*-1,2-Dichloroethylene
11. Ethyl acetate
12. Tetrahydrofuran
13. Methyl ethyl ketone
14. 1,1,1-Trichloroethane
15. Carbon Tetrachloride
16. Chloroform
17. 2-Butanol
18. 1,2-Dichloroethane
19. Isobutanol
20. Methyl cellosolve
21. Trichloroethylene
22. *n*-Butanol
23. *n*-Propyl acetate
24. 1,4-Dioxane
25. Ethyl cellosolve
26. Toluene
27. Tetrachloroethylene
28. Isoamyl alchol
29. Methyl-*n*-butyl ketone
30. *n*-Butyl acetate
31. Chlorobenzene
32. *m*-Xylene
33. *p*-Xylene
34. *N,N*-Dimethyl formamide
35. *o*-Xylene
36. Styrene
37. 1-Methylcyclohexanol
38. Cellosolve acetate
39. Cyclohexanol
40. Butyl cellosolve
41. Cyclohexanone
42. 1,1,2,2-Tetrachloroethane
43. *o*-Dichlorobenzene
44. *o*-Cresol
45. *p*-Cresol
46. *m*-Cresol

46 organic solvents



System : GC/FID
Column : InertCap 17
0.25 mm I.D. x 60 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) – 4 °C/min
– 230 °C (5 min hold)
Carrier Gas : He 130 kPa
Injection : Split flow 100 mL/min
250 °C
Detection : FID Range 10^1
250 °C
Sample Size : Mixed evenly
1 µL

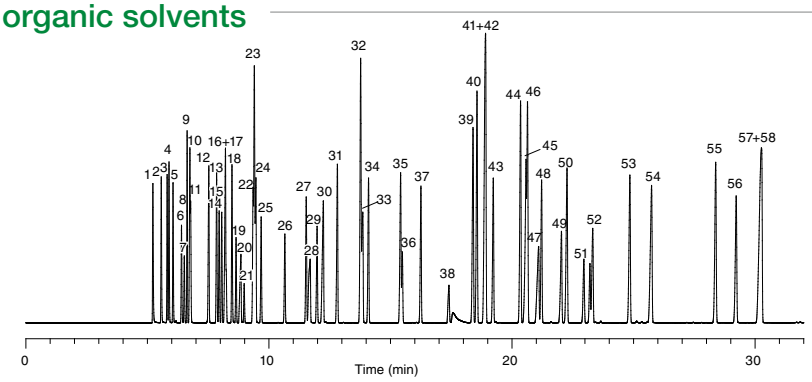
1. Methanol
2. Ethyl ether
3. Isopropanol
4. *n*-Hexane
5. Acetone
6. Carbon disulfide
7. Methyl acetate
8. Dichloromethane
9. *trans*-1,2-Dichloroethylene
10. 2-Butanol
11. *cis*-1,2-Dichloroethylene
12. Methyl ethyl keton
13. Isobutanol
14. Ethyl acetate
15. Chloroform
16. 1,1,1-Trichloroethane
17. Carbon Tetrachloride
18. Tetrahydrofuran
19. Methylcellosolve
20. *n*-Butanol
21. 1,2-Dichloroethane
22. Trichloroethylene
23. *n*-Propyl acetate
24. Isoamyl alchol
25. Ethyl cellosolve
26. 1,4-Dioxane
27. Toluene
28. Tetrachloroethylene
29. Methyl-*n*-butyl ketone
30. *n*-Butyl acetate
31. *p*-Xylene
32. *m*-Xylene
33. Chlorobenzene
34. *N,N*-Dimethyl formamide
35. *o*-Xylene
36. 1-Methylcyclohexanol
37. Cyclohexanol
38. Butyl cellosolve
39. Styrene
40. Cellosolve acetate
41. Cyclohexanone
42. 1,1,2,2-Tetrachloroethane
43. *o*-Dichlorobenzene
44. *o*-Cresol
45. *p*-Cresol
46. *m*-Cresol



System : GC/FID
Column : InertCap WAX
0.25 mm I.D. x 60 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) – 4 °C/min
– 230 °C (5 min hold)
Carrier Gas : He 130 kPa
Injection : Split flow 100 mL/min
250 °C
Detection : FID Range 10^1
250 °C
Sample Size : Mixed evenly
1 µL

1. *n*-Hexane
2. Ethyl ether
3. Carbon disulfide
4. Acetone
5. Methyl acetate
6. *trans*-1,2-Dichloroethylene
7. Tetrahydrofuran
8. Carbon Tetrachloride
9. 1,1,1-Trichloroethane
10. Ethyl acetate
11. Methanol
12. Methyl ethyl keton
13. Isopropanol
14. Dichloromethane
15. *n*-Propyl acetate
16. *cis*-1,2-Dichloroethylene
17. Trichloroethylene
18. 2-Butanol
19. Chloroform
20. Tetrachloroethylene
21. Toluene
22. 1,4-Dioxane
23. *n*-Butyl acetate
24. 1,2-Dichloroethane
25. Methyl-*n*-butyl ketone
26. Isobutanol
27. *n*-Butanol
28. *p*-Xylene
29. *m*-Xylene
30. Methyl cellosolve
31. *o*-Xylene
32. Isoamyl alcohol
33. Ethyl cellosolve
34. Chlorobenzene
35. Styrene
36. Cellosolve acetate
37. Cyclohexanone
38. 1-Methylcyclohexanol
39. *N,N*-Dimethyl formamide
40. Butyl cellosolve
41. Cyclohexanol
42. 1,1,2,2-Tetrachloroethane
43. *o*-Dichlorobenzene
44. *o*-Cresol
45. *p*-Cresol
46. *m*-Cresol

58 organic solvents



System : GC/FID
Column : InertCap 25
0.25 mm I.D. x 60 m df = 0.25 µm
Col. Temp. : 40 °C (5 min hold) – 4 °C/min – 230 °C
Carrier Gas : He
Injection : Split
Detection : FID
Sample : Mixed evenly

1. Methanol
2. Ethanol
3. Ethyl ether
4. Isopropanol
5. Acetone
6. Methyl acetate
7. Dichloromethane
8. Carbon disulfide
9. Hexane
10. *n*-Propanol
11. *trans*-1,2-Dichloroethylene
12. 2-Butanol
13. Methyl ethyl ketone
14. Ethyl acetate
15. *cis*-1,2-Dichloroethylene
16. Chloroform
17. Isobutanol
18. Tetrahydrofuran
19. 1,1,1-Trichloroethane
20. Methyl cellosolve
21. Carbon Tetrachloride
22. Isopropyl acetate
23. Benzene
24. *n*-Butanol
25. 1,2-Dichloroethane
26. Trichloroethylene
27. *n*-Propyl acetate
28. Ethyl cellosolve
29. 1,4-Dioxane
30. Isoamyl alcohol
31. Methyl Isobutyl ketone
32. Toluene
33. *n*-Amyl alcohol
34. Isobutyl acetate
35. Methyl *n*-butyl ketone
36. Tetrachloroethylene
37. *n*-Butyl acetate
38. *N,N*-Dimethylformamide
39. Chlorobenzene
40. Ethylbenzene
41. *m*-Xylene
42. *p*-Xylene
43. Isoamyl acetate
44. *o*-Xylene
45. Cyclohexanol
46. Styrene
47. Butyl cellosolve
48. *n*-Amyl acetate
49. Cellosolve acetate
50. Cyclohexanone
51. 1,1,2,2-tetrachloroethane
52. Methylcyclohexanol
53. Methylcyclohexanone
54. Phenol
55. *o*-Dichlorobenzene
56. *o*-Cresol
57. *p*-Cresol
58. *m*-Cresol

Retention Index Data – 61 Organic Solvent

System : GC4000/FID
Column : InertCap 1, InertCap 5, InertCap 25, InertCap 1301, InertCap 1701, InertCap 17, InertCap WAX, InertCap Pure-WAX
0.25 mm I.D. x 60 m df = 0.25 µm
Col. Temp. : 40 °C - 5 °C/min - 220 °C
Carrier Gas : He 160 kPa
Injection : Split flow 150 mL/min (InertCap 5 のみ 192 mL/min) 240 °C
Detection : FID Range 10^0 240 °C
Sample Size : Mixed evenly
0.2 µL

Description	InertCap 1	InertCap 5	InertCap 25	InertCap 1301	InertCap 1701	InertCap 17	InertCap WAX	InertCap Pure-WAX
Acetone	460	487	548	525	581	617	820	808
Acetonitrile	445	484	580	540	620	658	1016	996
Benzene	645	659	714	679	714	768	949	936
1-Butanol	639	656	712	712	769	764	1142	1126
2-Butanol	579	600	639	639	699	693	1025	1011
tert-Butanol	506	517	556	560	614	607	903	888
2-Butanone (MEK)	567	596	654	629	685	720	908	895
2-Butoxyethanol (Butyl cellosolve)	886	906	966	949	1009	1030	1394	1388
n-Butyl acetate	795	756	867	838	879	919	1078	1064
Carbon disulfide	527	598	590	542	562	633	735	727
Carbon tetrachloride	651	660	703	668	691	740	885	874
Chlorobenzene	829	848	916	871	917	987	1219	1207
Chloroform	601	615	672	646	695	725	1027	1013
m-Cresol	1047	1072	1165	1186	1303	1277	2121	2065
o-Cresol	1026	1052	1141	1156	1265	1252	2029	1977
p-Cresol	1046	1071	1164	1184	1301	1276	2112	2057
Cyclohexanol	862	885	958	934	1002	1033	1395	1387
Cyclohexanone	861	897	995	945	1021	1089	1301	1286
1,2-Dichlorobenzene	1016	1042	1118	1072	1128	1216	1503	1483
1,2-Dichloroethane	622	644	721	678	729	785	1077	1055
cis-1,2-Dichloroethylene	589	607	661	630	672	717	1000	983
trans-1,2-Dichloroethylene	546	557	609	576	607	644	861	849
Dichloromethane	512	526	594	555	604	635	935	921
Diethyl ether	497	504	523	511	523	550	616	616
N,N-Dimethylacetamide	826	872	981	944	1039	1100	1406	1389
N,N-Dimethylformamide	735	782	895	853	952	1012	1333	1313
1,4-Dioxane	683	708	779	732	783	855	1072	1051
Ethanol	426	440	498	500	548	541	935	920
2-Ethoxyethanol (Cellosolve)	691	711	769	752	815	835	1219	1207
2-Ethoxyethyl acetate (Cellosolve acetate)	877	905	984	939	997	1063	1289	1281
Ethyl acetate	595	612	662	633	674	719	893	879
Ethylbenzene	848	864	918	882	917	977	1135	1121
n-Hexane	600	599	600	600	599	600	599	603
2-Hexanone(MBK)	763	787	851	827	881	912	1089	1071
Isobutyl acetate	739	813	822	799	836	870	1018	982
Isopentyl acetate (Isoamyl acetate)	857	875	927	902	941	978	1126	1115
Isopropyl acetate	639	657	709	684	720	753	903	893
Methanol	357	380	418	421	481	466	902	882
2-Methoxyethanol (Methyl cellosolve)	610	629	697	676	740	762	1179	1160
Methyl acetate	509	522	581	547	595	634	831	820
3-Methyl-1-butanol (Isoamyl alcohol)	715	730	781	783	841	832	1201	1191
1-Methylcyclohexanol	926	897	960	939	997	1025	1321	1311
4-Methylcyclohexanone	927	960	1051	1010	1079	1143	1349	1333
4-Methyl-2-pentanone (MIBK)	717	736	798	775	826	849	1014	1003
2-Methyl-1-propanol (Isobutyl alcohol)	608	622	667	672	730	719	1093	1073
1-Pentanol (Amyl alcohol)	745	763	818	815	874	871	1243	1233
n-Pentyl acetate	894	912	968	939	980	1022	1173	1164
Phenol	952	976	1059	1098	1214	1167	2036	1980
1-Propanol	532	549	605	606	660	655	1039	1022
2-Propanol (Isopropyl alcohol)	471	491	530	532	593	585	927	914
n-Propyl acetate	695	712	764	736	777	820	979	967
Styrene	875	894	960	918	963	1034	1263	1249
1,1,2,2-Tetrachloroethane	879	913	1007	966	1038	1092	1502	1492
Tetrachloroethylene	802	813	855	819	842	906	1029	1016
Tetrahydrofuran	611	627	683	645	687	742	866	855
Toluene	752	767	820	786	820	877	1050	1034
1,1,1-Trichloroethane	630	643	691	658	689	730	888	876
Trichloroethylene	685	701	746	715	743	799	1001	987
m-Xylene	857	871	925	890	925	983	1149	1135
o-Xylene	880	897	955	917	955	1019	1190	1178
p-Xylene	858	872	924	891	924	981	1143	1128

Retention Index Data – Food Pesticide Residue

System	: GC-MS(GC MS-QP2010Plus, Shimadzu)
Column	: InertCap 5MS/Sil, InertCap 5MS/NP 0.25 mm I.D. x 30 m df = 0.25 µm InertCap Pesticides 0.25 mm I.D. x 30 m df = 0.20 µm
Col. Temp.	: 50 ℃(1 min hold) - 25 ℃/min - 125 ℃ - 10 ℃/min - 280 ℃
Carrier Gas	: He 40 cm/sec (constant linear velocity)
Injection	: Splitless 1 min 250 ℃
Liner	: Splitless(Cat.No. 3001-16329)
Interface Temp.	: 280 ℃
Detection	: MS Scan (m/z = 45 ～ 450)
Ion source	: 230 ℃
Inj. Vol.	: 1 µL
Sample	: PL2005 pesticide GC/MS Mix Ⅰ～Ⅶ each 2 ppm

Description	＊	InertCap 5MS/NP	InertCap 5MS/Sil	InertCap Pesticides
α-BHC	V	1718	1711	1706
β-BHC	V	1767	1776	1771
γ- BHC (Lindane)	V	1782	1776	1771
δ- BHC	V	1825	1830	1825
DCIP	IV	1057	1054	–
EPN	I	2491	2483	2477
EPTC	VI	1364	1361	1359
MCPA thioethyl	V	1835	1834	1831
MCPB ethyl	VI	1863	1860	1858
TCMTB	VII	2166	2176	2168
XMC	VII	1568	1568	1566
Acrinathrin	II	2638	2613	2617
Azaconazole	II	2228	2219	2215
Azamethiphos	VI	2337	2336	2329
Azinphosethyl	VI	2658	2654	2646
Azinphosmethyl	I	2576	2578	2571
Acetamiprid	VII	2475	2470	2462
Acetochlor	IV	1903	1882	1881
Acenaphthene - d10	I.S.	1499	1499	1496
Azoxystrobin	II	3109	3090	3090
Atrazine	II	1758	1756	1756
Anilofos	I	2534	2517	2512
Amitraz	VI	2606	2599	2595
Ametrine	V	1921	1918	1916
Alachlor	II	1923	1901	1899
Allidochlor	IV	1295	1289	1288
Allethrin -1	III	2081	2064	2064
Allethrin -2	III	2083	2066	2067
Allethrin -3 (Bioallethrin)	III	2088	2074	2075
Allethrin -4 (Bioallethrin)	III	2090	2077	2077
Anthracene –d10	I.S.	1809	1809	1809
Isazophos	I	1837	1817	1816
Isocarbophos	III	2018	2007	2005
Isoxadifen-ethyl	VII	2336	2336	2332
Isoxathion	III	2241	2234	2232
Isofenphos	I	2090	2065	2065
Isofenphos oxon	VII	2017	1999	1997
Isoprocarb	VII	1547	1542	1540
Isoprothiolane	II	2185	2179	2177
Iprodione	V	2461	2457	2454
Iprodione metabolite	V	2550	2541	2537
Iprobenfos	IV	1855	1843	1842
Imazamethabenz-methyl	VII	2163	2158	2151
Imibenconazole		–	2162	2156
Imibenconazole desbenzyl type	VII	3188	3186	3182
	VII	2216	2219	2212
Indanofan	VI	2528	2521	2512
Indoxacarb	IV	3063	3036	3038
Uniconazole (Uniconazole P)	III	2200	2194	2190
EsprocarbEthy	IV	1971	1966	1964
Ethalfluralin	III	1669	1648	1650
Ethion	I	2301	2282	2279
Ethylchlozate	VI	2071	2077	2072
Edifenphos	I	2360	2354	2348
Etoxazole	IV	2512	2492	2491
Etoxazole metabolite	VII	2541	2513	2515
Ethofenprox	I	2880	2873	2871

＊: Group name about PL2005 Pesticide GC/MS Mix (Ⅰ～Ⅶ)

Description	＊	InertCap 5MS/NP	InertCap 5MS/Sil	InertCap Pesticides
Ethofumesate	VII	1966	1956	1953
Ethoprophos	I	1644	1640	1639
Etobenzanide	IV	2779	2771	2766
Etridiazole	III	1466	1456	1455
Etrimfos	I	1841	1825	1825
Epoxyconazole	VII	2445	2434	2427
α-Endosulfan	II	2157	2149	2142
β-Endosulfan	II	2279	2278	2270
Endosulfansulfate	VII	2373	2365	2354
Oxadiazon	III	2207	2188	2188
Oxadixyl	V	2299	2285	2279
Oxabetrinil	V	1851	1848	1846
Oxyfluorfen	III	2217	2199	2199
Oxpoconazole	VI	2723	2694	2686
Oxpoconazole Formyl decomposition product	VI	1892	1892	1888
Omethoate	III	1600	1598	1596
Oryzalin	VII	2698	2675	2673
Orthophenyl phenol	VI	1528	1532	1527
Cadusafos	I	1699	1690	1689
Cafenstrole	II	2793	2772	2768
Captafol	V	2424	2426	2416
Carfentrazone-ethyl	IV	2351	2330	2330
Carbethamide	VI	2005	2010	2008
Carboxin	VII	2216	2219	2212
Carbophenothion	III	2350	2344	2340
Carbofuran	VII	1751	1747	1745
Quizalofop-ethyl (Quizalofop P ethyl)	VI	2860	2856	2850
Xylylcarb	VI	1606	1606	1603
Quinalphos	I	2096	2085	2082
Quinoxyfen	III	2362	2356	2351
Quinoclamin	II	1975	1980	1974
Quinomethionate	V	2126	2129	2120
Captan	V	2091	2094	2087
Quintozene	III	1792	1765	1761
Chrycene -d12	I.S.	2492	2492	2484
Crimidin	VI	1528	1518	1514
Kresoxim-methyl	II	2227	2208	2208
Chlozolinate	VII	2080	2065	2062
Clothianidin	VI	1501	1480	1477
Clofentezine decomposition product	V	1181	1180	1177
Clomazone	VII	1767	1765	1761
Chlomethoxyfen (Chlomethoxynil)	VI	2464	2457	2450
Clomeprop	II	2537	2531	2527
Chloridazon	VI	2373	2380	2371
Chlorethoxyphos	VII	1635	1622	1619
Chlorthal-dimethyl	III	2017	1991	1989
Chlorthiophos -1	VI	2308	2240	2236
Chlorthiophos -2	VI	2263	2262	2257
Chlorthiophos -3	VI	2281	2290	2285
Chlornitrofen	V	2345	2341	2335
Chlorpyrifos	I	2006	1980	1979
Chlorpyrifos-Methyl	I	1907	1887	1885
Chlorfenapyr	II	2255	2223	2222
Chlorfenson	II	2170	2173	2169
(E)-Chlorfenvinphos	I	2064	2047	2046
(Z)-Chlorfenvinphos	I	2089	2069	2068
Chlorbufam	VII	1753	1759	1757
Chlorpropham	II	1658	1662	1662
Chlorbenside	VII	2115	2123	2115
Chlorobenzilate	IV	2271	2263	2260
Chlormephos	VI	1449	1445	1442
Chlorothalonil	V	1837	1808	1803
Chloroneb	VII	1519	1513	1511
Chloropropylate	V	2272	2263	2259
Cyanazine	II	1999	1992	1991
Cyanofenphos	III	2358	2349	2345

Note: This retention index is obtained under heating conditions, use as a reference for GC under similar conditions.
Refer to the GC technical note on the website for details.

Retention Index Data – Food Pesticide Residue

∗ : Group name about PL2005 Pesticide GC/MS Mix (Ⅰ～Ⅶ)

Description	∗	InertCap 5MS/NP	InertCap 5MS/Sil	InertCap Pesticides
CYANOFOS	I	1788	1785	1782
Dialifos	VI	2672	2659	2652
Diethofencarb	IV	1988	1983	1984
Dioxation	VI	2760	2735	2729
Dioxation decomposition product	VI	1781	1775	1771
Dioxabenzofos (Salithion)	I	1682	1680	1677
Diclocymet-1	V	2094	2083	2079
Diclocymet-2	V	2129	2117	2113
Dicrotophos	III	1677	1668	1668
Dichlofenthion	I	1888	1874	1872
Diclobutrazol	II	2228	2214	2209
Dichlofluanid	V	1980	1966	1962
Dichlofluanid metabolite	V	1665	1668	1665
Dichlobenil	III	1357	1349	1347
Diclofop-methyl	VII	2408	2401	2397
Dicloran	II	1738	1736	1732
Dichlorvos	I	1251	1244	1244
1,1-Dichloro-2,2-bis (4-ethylphenyl)ethane	VII	2255	2248	2243
2,6-Dichlorobenzamide	VI	1678	1676	1672
Disulfoton	III	1823	1815	1813
Disulfoton sulfone	VII	2146	2139	2134
Ditalimfos	VI	2161	2154	2147
Dithiopyr	II	1954	1923	1924
Diniconazole	VI	2287	2277	2270
Cinidon-ethyl	VII	3216	3204	3201
Cyhalothrin-1	III	2592	2573	2573
Cyhalothrin-2	III	2617	2595	2596
Cyhalofop butyl	II	2591	2584	2583
Diphenamide	IV	2042	2030	2027
Diphenyl	V	1394	1397	1394
Diphenylamine	IV	1633	1636	1633
Difenoconazole-1	II	3024	3018	3016
Difenoconazole-2	II	3034	3026	3025
Cyfluthrin-1	II	2795	2779	2778
Cyfluthrin-2	II	2807	2794	2794
Cyfluthrin-3	II	2818	2802	2802
Cyfluthrin-4	II	2822	2808	2808
Cyflufenamid	II	2247	2224	2225
Diflufenican	III	2411	2399	2399
Cyproconazole	IV	2251	2237	2232
		–	2241	2236
Cyprodinil	IV	2057	2052	2050
Cypermethrin-1	III	2837	2825	2824
Cypermethrin-2	III	2850	2839	2839
Cypermethrin-3	III	2862	2847	2846
Cypermethrin-4	III	2866	2853	2853
Simazine	IV	1748	1749	1748
Simeconazole	II	1914	1899	1897
Dimethametryn	IV	2068	2062	2061
Dimethipin	II	1756	1765	1762
(E)-Dimethylvinfos	I	1973	1958	1957
(Z)-Dimethylvinfos	I	2001	1986	1984
Dimethenamide (Dimethenamide P)	IV	1893	1876	1873
Dimethoate	I	1739	1737	1734
Dimethomorph-1	VI	3115	3105	3102
Dimethomorph-2	VI	3154	3148	3145
Simetryn	V	1911	1911	1909
Dimepiperate	IV	2097	2094	2090
Silafluofen	V	2903	2892	2890
Cinmethylin	VI	1932	1922	1918
Swep	V	1756	1758	1756
Spiroxamine-1	VII	1906	1897	1894
Spiroxamine-2	VII	1961	1950	1947
Spirodiclofen	VI	2723	2694	2686
Sulprofos	III	2328	2320	2316
Sulfotep	VI	1696	1677	1676
Zoxamide	VII	2442	2433	2428
Zoxamide decomposition product	VII	2080	2065	2062
Turbacil	IV	1824	1821	1820
Diazinon	I	1811	1791	1792
Diallate-1	VII	1706	1699	1696
Diallate-2	VII	1723	1716	1713
Thiabendazole	VII	2081	2097	2089
Thiamethoxam decomposition product	VI	2040	2047	2041
Thiocyclam	V	1509	1516	1511
Thiobencarb	III	1984	1985	1982
Thiomethon	III	1727	1724	1722
Thifluzamide	III	2228	2189	2189
Tecnazene	III	1620	1599	1596
Desmedipham decomposition product	IV	1721	1729	1729
Tetrachlorvinphos	I	2146	2126	2124
Tetraconazole	IV	2020	2000	2000
Tetradifon	III	2553	2548	2542
Tetramethrin-1	V	2474	2464	2462
Tetramethrin-2	V	2489	2483	2481
Thenylchlor	IV	2408	2389	2384
Tebuconazole	IV	2406	2399	2394
Tebupirimfos	VI	1853	1839	1837
Tebufenpyrad	IV	2515	2509	2507
Tefluthrin	III	1832	1815	1818
Demeton-S-methyl (Methyl Demeton)	III	1630	1628	1627
Decamethrin (Tralomethrin decomposition product)	II	3071	3059	3059
Terbucarb	VI	1904	1879	1877
Terbutryn	IV	1955	1948	1947
Terbufos	I	1791	1781	1779
Triadimenol-1	III	2097	2091	2088
Triadimenol-2	III	2111	2106	2104
Triadimefon	III	2012	2003	2001
Triazophos	I	2326	2319	2317
Triallate	II	1840	1829	1827
Trichlamide	V	2138	2128	2124
Tricyclazole	VII	2195	2195	2185
Tribufos	II	2199	2196	2194
Trifluralin	III	1685	1663	1666
Trifloxystrobine	III	2367	2340	2342
Tolylfluanid	V	2084	2070	2066
Tolylfluanid metabolite	V	1772	1775	1772
Tolclofos-methyl	I	1917	1903	1900
Tolfenpyrad	VI	3124	3126	3123
Naphthalin-d8	I.S.	1198	1198	1198
2-(1-Napthyl)acetamide	VII	1949	1953	1947
Napropamide	IV	2176	2163	2159
Naled	III	1670	1662	1659
Nitralin	V	2439	2415	2413
Nitrothal-isopropyl	III	2020	2009	2010
Nitrofen	V	2248	2249	2243
Nereistoxin	VI	1283	1290	1285
Norflurazon	VII	2362	2349	2343
Paclobutrazol	IV	2138	2131	2127
Parathion	I	2007	1998	1996
Parathion-methyl	I	1906	1902	1899
Halfenprox	II	2847	2834	2833
Picolinafen	VII	2493	2485	2480
Bitertanol-1	V	2707	2703	2698
Bitertanol-2	V	2720	2717	2712
Bifenazate	V	2493	2492	2489
Bifenox	II	2527	2521	2517
Bifenthrin	II	2491	2470	2470
Piperonyl butoxide	V	2421	2413	2412
Piperophos	I	2501	2483	2480
Hymexazol	VI	1193	1201	1199
Pyraclostrobin	VI	2973	2973	2968
Pyraclofos	I	2666	2666	2664
Pyrazoxyfen	V	3045	3031	3028

Note: This retention index is obtained under heating conditions, use as a reference for GC under similar conditions.
Refer to the GC technical note on the website for details.

Retention Index Data – Food Pesticide Residue

＊: Group name about PL2005 Pesticide GC/MS Mix (Ⅰ～Ⅶ)

Description	＊	InertCap 5MS/NP	InertCap 5MS/Sil	InertCap Pesticides
Pyrazophos	II	2649	2623	2623
Pyraflufen-ethyl	VI	2377	2361	2360
Pyridaphenthion	I	2473	2457	2453
Pyridaben	III	2736	2732	2727
(E)-Pyrifenox	III	2135	2124	2121
(Z)-Pyrifenox	III	2080	2070	2067
Pyributicarb	III	2457	2441	2438
Pyriproxyfen	V	2582	2584	2579
Pyrimidifen	III	2941	2925	2924
(E)-Pyriminobac methyl	III	2383	2354	2354
(Z)-Pyriminobac methyl	III	2288	2259	2258
Pirimiphos-methyl	I	1964	1943	1942
Pyrimethanil	VI	1805	1806	1802
Pyrene-d10	I.S.	2141	2141	2137
Pyroquilone	V	1796	1800	1795
Vinclozolin	III	1906	1894	1892
Famoxadone	V	3112	3116	3114
Fipronil	II	2089	2052	2053
Fenamiphos	I	2167	2157	2156
Fenarimol	II	2642	2633	2627
Fenitrothion	I	1961	1951	1949
Fenoxanil	IV	2260	2241	2238
		–	2243	2240
Fenoxaprop-ethyl (Fenoxaprop P ethyl)	V	2677	2675	2672
Phenoxycarb	IV	2482	2490	2488
Phenothiocarb	IV	2135	2139	2137
Phenothrin-1	VI	2541	2533	2529
Phenothrin-2	VI	2553	2548	2544
Ferimzone	VI	2107	2104	2102
Fenamidone	VII	2518	2508	2502
Fenchlorphos	II	1937	1921	1919
Fensulfothion	I	2278	2272	2268
Fenthion	I	2000	1992	1990
Phenthoate	I	2097	2083	2081
Fenvalerate-1	II	2968	2952	2951
Fenvalerate-2 (Esfenvalerate)	II	2998	2982	2981
Fenvalerate-2 (Esfenvalerate)	VI	2998	2985	2981
Fenbuconazole	V	2798	2785	2779
Fenpropathrin	II	2506	2498	2496
Fenpropimorph	VI	2004	1994	1991
Phenmedipham decomposition product	VI	1645	1656	1653
Fthalide	II	2039	2022	2016
Butachlor	IV	2156	2130	2129
Butafenacil	IV	2764	2746	2747
Butamifos	I	2173	2149	2146
Butilate	VI	1438	1432	1430
BUPIRIMATE	III	2226	2203	2203
Buprofezin	II	2223	2206	2203
Flufenprop-methyl	VII	2217	2197	2194
Furametpyr	V	2553	2530	2526
Furametpyr metabolite	V	2610	2592	2588
Furilazole	VII	1752	1745	1742
Fluacrypyrim	III	2323	2292	2295
Fluquinconazole	II	2746	2729	2724
Fludioxonil	V	2189	2174	2171
Flucythrinate-1	II	2868	2847	2847
Flucythrinate-2	II	2896	2876	2876
Flusilazole	IV	2222	2203	2201
Flusilazole metabolite	IV	1671	1667	1666
Fluthiacet-methyl	VI	3234	3235	3231
Fluthiacet-methyl	II	2176	2164	2163
Flutriafol	VII	2164	2160	2154
Fluvalinate-1	II	2998	2964	2965
Fluvalinate-2	II	3005	2975	2975
Flufenpyr-ethyl	VII	2271	2256	2255
Flumioxazin	IV	2967	2954	2953
Flumiclorac pentyl	VII	3095	3083	3081
Fluridone	VII	2924	2908	2904
Pretalachlor	IV	2199	2174	2172

Description	＊	InertCap 5MS/NP	InertCap 5MS/Sil	InertCap Pesticides
Procymidone	III	2109	2090	2088
Prothiofos	I	2188	2174	2170
Propachlor	IV	1624	1613	1612
Propazine	VII	1767	1763	1761
Propanil	V	1883	1881	1878
Propaphos	I	2124	2118	2118
Propargite-1	V	2412	2400	2397
Propargite-2	V	2414	2403	2400
Propiconazole-1	IV	2364	2349	2346
Propiconazole-2	IV	2379	2363	2360
Propyzamide	III	1794	1788	1787
Prohydrojasmon-1	VI	1821	1815	1813
Prohydrojasmon-2	VI	1850	1845	1843
Profenofos	I	2192	2184	2180
Propoxur	VII	1620	1614	1613
Bromacil	V	1963	1961	1959
Bromoconazole-1	V	2480	2472	2465
Bromoconazole-2	V	2537	2526	2518
Prometryn	IV	1928	1922	1921
Bromobutide	II	1896	1886	1883
Bromopropylate	II	2490	2483	2478
Bromophos	II	2043	2027	2024
Bromophos-ethyl	VII	2132	2113	2109
Hexaconazole	V	2180	2173	2168
Hexazinone	VII	2394	2385	2378
Benalaxyl	IV	2356	2336	2332
Benoxacor	VII	1864	1856	1851
Permethrin-1	III	2716	2708	2706
Permethrin-2	III	2732	2725	2723
Penconazole	III	2074	2062	2059
Benzo[a]pyrene-d12	I.S.	2892	2892	2883
Pendimethalin	III	2072	2048	2046
Pentoxazone	V	2569	2555	2551
Benfluralin	II	1689	1669	1671
Benfuresate	VI	1880	1877	1872
Phosalone	I	2575	2561	2555
Fosthiazate-1	I	2039	2033	2029
Fosthiazate-2	I	2044	2037	2034
Phosphamidon-1	I	1813	1794	1793
Phosphamidon-2	I	1886	1870	1869
Phosmet	III	2484	2481	2474
Fonofos	I	1798	1791	1788
Folpet	V	2105	2107	2100
Formothion	III	1861	1860	1857
Phorate	I	1707	1699	1697
Malathion	I	1981	1967	1967
Myclobutanil	II	2215	2200	2198
Mecarbam	III	2090	2074	2073
Methacrifos	I	1510	1500	1501
Metalaxyl (Mefenoxam)	IV	1932	1915	1914
Methidathion	I	2126	2117	2113
Methoxychlor	VII	2504	2497	2491
Methoprene	V	2104	2097	2098
(E) -Metominostrobin	IV	2189	2174	2171
(Z) -Metominostrobin	VII	2234	2216	2212
Metolachlor (S- Metolachlor)	IV	1998	1976	1974
Metribuzin	V	1890	1890	1887
Mevinphos	I	1433	1424	1424
		–	1427	1427
Mefenacet	V	2600	2598	2590
Mefepyrdiethyl	VII	2449	2433	2430
Mepronil	IV	2316	2314	2312
Monocrotophos	III	1686	1685	1686
Molinate	II	1548	1552	1549
Resmethrin-1	VII	2414	2406	2403
Resmethrin-2 (Bioresmethrin)	IV	2426	2418	2418
Resmethrin-2 (Bioresmethrin)	VII	2426	2421	2418
Lenacil	VI	2365	2370	2362
Leptophos	VI	2583	2566	2557

Note: This retention index is obtained under heating conditions, use as a reference for GC under similar conditions.
Refer to the GC technical note on the website for details.

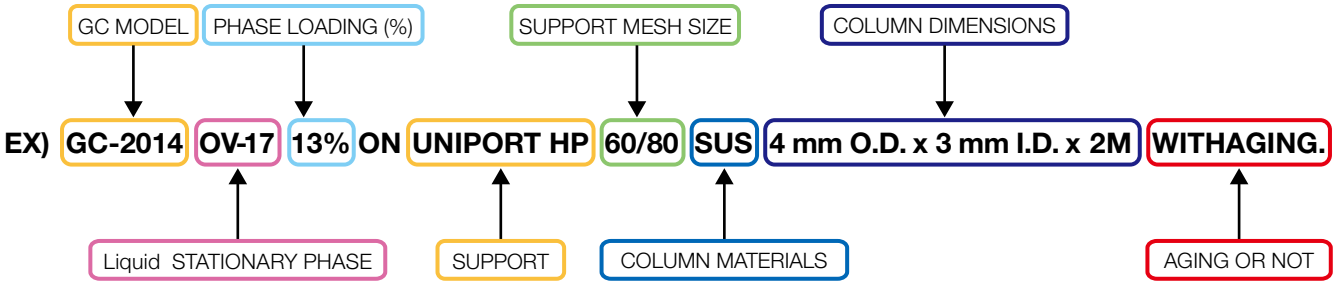
Notes:

CONSUMABLES AND SUPPLIES

GC PACKED COLUMNS

GC Packed Columns' Ordering Guide

When you inquire packed columns, please be sure to specify the information as following example.



Operating Precautions

- When performing analysis or conditioning the column, do not set the oven temperature exceeding the maximum temperature. It may induce the column deterioration.

- Purge the packed column with enough carrier gas before start heating.
  Use inert gas for carrier gas in analysis such as Nitrogen (N_2), Helium (He), Argon (Ar), which are purer than 99.99 %.

- Especially polyester or polyethylene glycol type packing materials are easily oxidized by air. If the column still contains air and the temperature is increased, it may cause damage and a deterioration of the column performance.
  (Ex. purge the column with carrier gas at least 1 hour, then raise the temperature with 1 ˚C / min. rate)

- When conditioning, do not connect the outlet of the column to the detector. It may contaminate the detector with eluted stationary phase from the column.

USP Stationary Phase & Solid Support Cross-Reference

Code	Support	Commercially Available
S1A	Siliceous earth for gas chromatography has been flux-calcined by mixing diatomite with Na_2CO_3 flux and calcining above 900 °C. The siliceous earth is acid-washed, then water-washed until neutral, but not base-washed. The siliceous earth may be silanized by treating with an agent such as dimethyldichlorosilane to mask surface silanol groups.	Uniport HP Chromosorb W HP Chromosorb W AW DMCS
S1AB	The siliceous earth as described above is both acid- and base-washed.	Chromosorb W HP
S1C	A support prepared from crushed firebrick and calcined or burned with a clay binder above 900 °C with subsequent acid-wash. It may be silanized.	Uniport C, Uniport CS Chromosorb P AW Chromosorb P AW DMCS
S1NS	The siliceous earth is untreated.	Celite 545 etc.
S3	Copolymer of ethylvinylbenzene and divinylbenzene having a nominal surface area of 500 to 600 m^2 per g and an average pore diameter of 0.0075 µm.	Porapak Q Hayesep Q
S4	Styrene-divinylbenzene copolymer with aromatic - O and – N groups, having a nominal surface area of 400 to 600 m^2 per g and an average pore diameter of 0.0076 µm.	Porapak R Hayesep R
S5	40- to 60-mesh, high-molecular weight tetrafluoroethylene polymer.	Flusin T, Flusin T6 Chromosorb T
S6	Styrene-divinylbenzene copolymer having a nominal surface area of 250 to 350 m^2 per g and an average pore diameter of 0.0091 µm.	Chromosorb 102* Porapak P Hayesep P
S7	Graphitized carbon having a nominal surface area of 12 m^2 per g.	Unicarbon A Carbopack C
S8	Copolymer of 4 - vinyl - pyridine and styrene - divinylbenzene.	Porapak S Hayesep S
S9	A porous polymer based on 2,6-diphenyl-p-Phenylene oxide.	Tenax TA
S10	A highly polar cross-linked copolymer of acrylo-nitrile and divinylbenzene.	Hayesep C
S11	Graphitized carbon having a nominal surface area of 100 m^2 per g modified with small amounts of petrolatum and polyethylene glycol Compound.	3 % SP1500/Carbopack B
S12	Graphitized carbon having a nominal surface area of 100 m^2 per g.	Carbopack B

*: Items are not available.

USP Stationary Phase & Solid Support Cross-Reference

Code	Phases	Commercially Available
G1	Dimethylpolysiloxane oil	OV-101
G2	Dimethylpolysiloxane gum	OV-1, SE-30
G3	50 % Phenyl-50 % methylpolysiloxane	OV-17
G4	Diethylene glycol succinate polyester	DEGS
G5	3-Cyanopropylpolysiloxane	OV-275
G6	Trifluoropropylmethylpolysiloxane	OV-210, DC-QF-1
G7	50 % 3-Cyanopropyl-50 %phenylmethylsilicone	OV-235
G8	80 % Bis (3-Cyanopropyl)-20 % 3-cyanopropylphenylpolysiloxane	OV-255
G9	Methylvinylpolysiloxane	OV-1
G11	Bis (2-ethylhexyl) sebacate polyester	DOS
G13	Sorbitol	Sorbitol
G14	Polyethylene glycol (av.mol.wt. of 950 to 1050)	PEG-1000
G15	Polyethylene glycol (av.mol.wt. of 3000 to 3700)	PEG-4000
G16	Polyethylene glycol compound (av. mol. wt. about 15,000). A high molecular weight compound of polyethylene glycol with a diepoxide linker. Available commercially as Polyethylene Glycol Compound 20M, or as Carbowax 20 M, from suppliers of chromatographic reagents.	PEG-20M
G17	75 % Phenyl – 25 % methylpolysiloxane	OV-25
G18	Polyalkylene glycol	Ucon LB-550X
G19	25 % Phenyl – 25 % Cyanopropyl – 50 % methylsilicone	OV-225
G20	Polyethylene glycol (av.mol.wt. of 380 to 420)	PEG-400
G21	Neopentyl glycol succinate	NPGS
G22	Bis (2-ethylhexyl) phthalate	DOP
G23	Polyethylene glycol adipate	PEGA
G24	Diisodecyl phthalate	DIDP
G25	Polyethylene glycol compound TPA. A high molecular weight compound of a polyethylene glycol and a diepoxide that is esterified with terephtharic acid. Available commercially as Carbowax 20M-TPA from supplier of chromatographic reagents.	PEG-20M TPA
G26	25 % 2-Cyanoethyl – 75 % methylpolysiloxane	OV-225
G27	5 % Phenyl – 95 % methylpolysiloxane	SE-52 etc.
G28	25 % Phenyl – 75 % methylpolysiloxane	DC-550
G29	3,3'-Thiodipropionitrile	TDPN
G30	Tetraethylene glycol dimethyl ether	BMEE
G31	Nonylphenoxypoly (ethyleneoxy) ethanol (av. Ethyleneoxy chain length is 30); Nonoxynol 30	Igepal CO-880
G32	20 % Phenylmethyl – 80 % dimethylpolysilicone	OV-7
G34	Diethylene glycol succinate polyester stabilized with phosphoric acid.	DEGS + H_3PO_4
G35	A high molecular weight compound of polyethylene glycol and a diepoxide that is esterified with nitroterephthalic acid.	FFAP (Unisole400)
G36	1 % Vinyl – 5 % phenylmethylpolysiloxane	SE-54 etc.
G39	Polyethylen glycol (av.mol.wt. about 1500)	PEG-1500
G40	Ethylene glycol adipate	EGA
G41	Phenylmethyldimethylpolysiloxane (10 % Phenyl substituted)	OV-3
G44	2 % low molecular weight petroleum hydrocarbon grease and 1 % solution of potassium hydroxide.	Apiezon Grease L + KOH
G45	Divinylbebzebe-ethylene glycol-dimethylacrylate	Porapak N, Hayesep N

Stationary Phases	Temp. °C Min./Max.
A	
Apiezon grease H	20/300
Apiezon grease L	50/300
Apiezon grease M	50/275
Apiezon grease N	50/250
Apiezon grease T	20/250
APS-201	/150
4, 4'-Azoxydianisole	/140
p, p'-Azoxydiphenetole (4, 4'-Azoxydiphenetole)	135/150
B	
Bentone 34 (Organic-aluminium silicate deriv.)	50/200
Bentone 34 + SP1200	50/175
Benzyl cyanide	20/50
Bis (2-methoxyethyl) adipate (BMEA)	20/80
C	
Citroflex A-4 (Acetyl tributyl citrate)	-25/180
D	
Daifl oil #100	0/120
Di-n-butyl maleate (DBM)	20/50
Di-n-butyl phthalate (DBP)	20/100
Diisodecyl phthalate (DIDP)	20/150
Di-n-decyl phthalate (DNDP)	20/150
Diethylene glycol adipate (DEGA)	20/225
Diethyleneglycol succinate (DEGS)	20/225
Diglycerol	20/150
Dinonyl phthalate (DNP)	20/150
Dioctyl phthalate (DOP) / [Di (2-ethylhexyl) phthalate]	20/150
Dioctyl sebacate (DOS) / [Di (2-ethylhexyl) sebacate]	0/125
Dodecylbenzene sulfonic acid sodium salt (ABS)	20/150
E	
ECNSS-M (Organo silicone polymer)	50/220
F	
FFAP (Free Fatty Acid Phase)	50/275
H	
Halocarbon oil 14-25	20/150
n-Hexadecane	20/50
I	
Igepal CO-880 [Nonylphenoxy poly (ethyleneoxy) ethanol]	80/200
K	
Kel F oil #10	10/100
KRYTOX 143AC	/280
N	
Neopentyl glycol adipate (NPGA)	50/225
Neopentyl glycol isophthalate	50/225
Neopentyl glycol sebacate	50/225
Neopentyl glycol succinate (NPGS)	50/225

[■D/S] Deleterious substance

Stationary Phases	Temp. °C Min./Max.
O	
n-Octadecane	30/60
OV-1 (dimethyl silicone gum)	50/350
OV-3 (10 % phenyl methyl silicone)	20/350
OV-7 (20 % phenyl methyl silicone)	20/350
OV-11 (35 % phenyl methyl silicone)	30/350
OV-17 (50 % phenyl methyl silicone)	20/340
OV-22 (65 % phenyl methyl silicone)	20/300
OV-25 (75 % phenyl methyl silicone)	20/300
OV-61 (33 % phenyl methyl silicone)	20/350
OV-73 (diphenyl dimethyl silicone)	20/325
OV-101 (dimethyl silicone fluid)	20/350
OV-105 (cyanopropyl silicone)	20/270
OV-202 (trifluoropropyl methyl silicone)	0/250
OV-210 (trifluoropropyl methyl silicone)	20/275
OV-215 (trifluoropropyl methyl silicone)	20/250
OV-225 (25 % phenyl 25 % cyanopropyl silicone)	20/280
OV-275 (cyano silicone)	20/250
OV-330 (silyl wax)	30/250
OV-351 (similar to FFAP)	50/270
OV-1701 (dimethyl phenylcyano silicone)	20/340
β, β'- Oxydipropionitrile (β, β'-ODPN) [■D/S]	20/100
P	
PEG 200 (Polyethylene glycol 200)	20/100
PEG 300 (Polyethylene glycol 300)	20/100
PEG 400 (Polyethylene glycol 400)	20/100
PEG 600 (Polyethylene glycol 600)	35/125
PEG 1000 (Polyethylene glycol 1000)	40/150
PEG 1500 (Polyethylene glycol 1500)	40/150
PEG 1540 (Polyethylene glycol 1540)	50/150
PEG 4000 (Polyethylene glycol 4000)	60/170
PEG 6000 (Polyethylene glycol 6000)	60/190
PEG 6000-P (Polyethylene glycol 6000-P)	60/210
PEG 20M (Polyethylene glycol 20M)	60/230
PEG 20M-P (Polyethylene glycol 20M-P)	60/250
PEG 20M-TPA (Polyethylene glycol 20M-TPA)	60/250
Polyphenyl ether 5ring (PPE-5ring) (OS-124)	10/200
Propylene carbonate	0/50
Propylene glycol adipate	10/225
Propylene glycol sebacate	10/225
Propylene glycol succinate	10/225
Q	
Quadrol [N, N, N', N'-tetrakis (2-hydroxy propyl) ethylene diamine]	10/150
R	
Reoplex 400	10/225

Stationary Phases

Stationary Phases	Temp. °C Min./Max.
S	
Sebaconitrile [■D/S]	-10/90
Silicone DC-11	50/300
Silicone DC-200 (dimethyl silicone)	10/250
Silicone DC-550 (25 % phenyl methyl silicone)	10/250
Silicone DC-QF-1 (FS-1265) (50 % trifluoropropyl methyl silicone)	10/250
Silicone GS-1 (dimethyl silicone)	50/350
Silicone GS-17 (50 % phenyl methyl silicone)	20/340
Silicone GS-101 (dimethyl silicone)	20/350
Silicone GS-210 (50 % trifluoropropyl methyl silicone)	20/275
Silicone GS-275 (cyano silicone)	20/250
Silicone HV grease	/300
Silicone KF-96 (dimethyl silicone)	30/300
Silicone SE-30 (dimethyl silicone gum)	50/300
Silicone SE-30 GC grade	50/350
Silicone SE-52 (5 % phenyl methyl silicone)	50/300
Silicone SE-54 (1 % vinyl 5 % phenyl silicone)	100/300
Silicone SF-96 (methyl silicone fluid)	0/250
Silicone W-96 (methyl silicone)	20/300
Silicone W-98 (methyl silicone)	20/300
Sorbitol (d-Sorbitol)	100/150
Squalane	20/150
T	
Tetraethylene glycol dimethyl ether (BMEE)	20/80
Tetraethylene pentamine (TEP) [■D/S]	20/80
Tetrahydroxyethyl ethylenediamine (THEED)	10/180
Tricresyl phosphate (TCP)	0/125
1,2,3-Tris (2-cyanoethoxy) propane (TCEP) [■D/S]	30/150
Triton X-100	20/190
Triton X-305	20/200
U	
Ucon oil 50HB 2000	20/200
Ucon oil LB 550X	20/200

[■D/S] Deleterious substance

Uniport Series

Supports	Mesh	Features
Uniport B	30/60	A diatomaceous earth prepared for GC. Surface metals have been carefully eliminated by a special process and due to no catalytic activity it offers excellent results.
	60/80	
	80/100	
	100/120	
Uniport HP	60/80	Uniport HP is subjected to special silanization. This is the most inert silanized support on the market today. As hydrogen chloride generated in the silanization process is completely eliminated, this support is ideal for ECD applications.
	80/100	
	100/120	
Uniport HPS	60/80	Uniport HPS is specially treated to make it suitable for analysis of weakly basic compounds and pesticides.
	80/100	
	100/120	
Uniport R	60/80	Ideal for the analysis of highly polar substances such as alcohols and amines. As this support deteriorates when kept under high temperature for long periods. It is advised not to use it above 250 °C.
	80/100	
	100/120	
Uniport S	60/80	Diatomaceous support with acidic surface for analysis of acidic or weakly acidic compounds such as cresol.
	80/100	

Flusin Series

Supports	Mesh	Cat.No.	Features	Type	Packing Density	Max.Temp.
Flusin T6	30/60	1001-32203	Despite of high operating temperature, its mechanical strength is weak.	Screened Teflon	0.58 g/mL	200 °C
Flusin GU	30/60	1001-32503	-ditto-	Glass Beads	1.5 g/mL	400 °C
	60/80	1001-32506				
	80/100	1001-32508				
Flusin GH	30/60	1001-32603	-ditto-	Silanized GU	1.5 g/mL	400 °C
	60/80	1001-32606				
	80/100	1001-32608				
Flusin P	30/60	1001-32303	An inert acid support. Suitable for analysis of free acids.	Terephthalic Acid	0.5 g/mL	185 °C
	60/80	1001-32306				

Supports for GC

Chromosorb Series

Chromosorb W *(Note: Only Packed Columns Can be Supplied.)*

Treatment	Mesh	Surface Area	Packing Density
NAW	30/60	0.29 m^2/mL	0.24 g/mL
	60/80		
	80/100		
	100/120		
AW	30/60		
	60/80		
	80/100		
	100/120		
AW DMCS	30/60		
	60/80		
	80/100		
	100/120		
HP	60/80		
	80/100		
	100/120		

Chromosorb P *(Note: Only Packed Columns Can be Supplied.)*

Treatment	Mesh	Surface Area	Packing Density
NAW	30/60	1.88 m^2/mL	0.47 g/mL
	60/80		
	80/100		
	100/120		
AW	30/60		
	60/80		
	80/100		
	100/120		
AW DMCS	60/80		
	80/100		
	100/120		

Celite Series

Chemical composition of Celite (%)	
SiO_2	89 ~ 90.5
Al_2O_3	4 ~ 5.5
Fe_2O_3	1.4 ~ 1.6
CaO	0.4 ~ 0.7
MgO	0.5 ~ 0.6

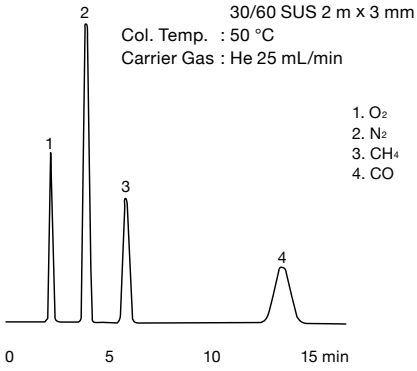
Treatment	Mesh	Surface Area	Packing Density
Celite 545 (heat treated)	30/60	0.28 m^2/mL	0.56 g/mL
	60/80		
	80/100		
	100/120		
Celite 545 SK (acid washed)	30/60		
	60/80		
	80/100		
	100/120		
Celite 545 SK DMCS (DMCS-silanized)	30/60		
	60/80		
	80/100		
	100/120		

Description	Max.Temp.	Mesh	Cat.No. 100 mL	Cat.No. 500 mL	Main Applications
Molecular Sieve 5A	350 °C	30/60	1001-11503	1001-11553	Separation of O_2, N_2, CH_4, CO_2, H_2, Xe and Kr. Separation of Ar and O_2 at low temp.
		60/80	1001-11506	1001-11556	
		80/100	1001-11508	1001-11558	
Molecular Sieve 13X	350 °C	30/60	1001-11603	1001-11653	Separation of O_2, N_2, CO, CH_4, Faster retention time than MS5A
		60/80	1001-11606	1001-11656	
		80/100	1001-11608	1001-11658	
Molecular Sieve 13X-S	350 °C	60/80	1001-11686	–	Detection of Trace CO, PID
Active Carbon	200 °C	30/60	1001-13003	1001-13053	City gas, CO, CO_2
		60/80	1001-13006	1001-13056	
		80/100	1001-13008	1001-13058	
Silica Gel	200 °C	30/60	1001-14003	1001-14053	Separation of CH_4, C_2H_6, C_2H_4, CO_2
		60/80	1001-14006	1001-14056	
		80/100	1001-14008	1001-14058	

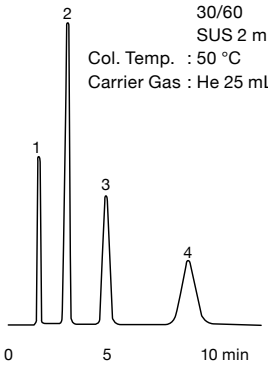
Comparision Data between Molecular Sieve A and 13X

Column : Molecular Sieve 5A 30/60 SUS 2 m x 3 mm I.D.
Col. Temp. : 50 °C
Carrier Gas : He 25 mL/min

1. O_2
2. N_2
3. CH_4
4. CO



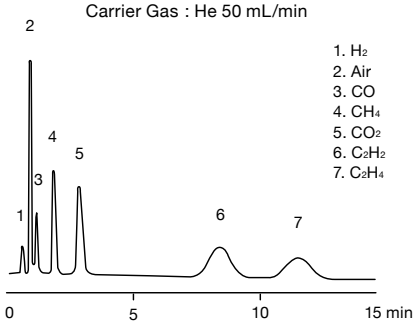
Column : Molecular Sieve 13X 30/60 SUS 2 m x 3 mm I.D.
Col. Temp. : 50 °C
Carrier Gas : He 25 mL/min



City Gas Analysis on Active Carbon

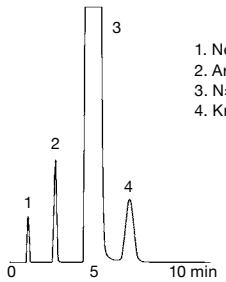
Column : Active Carbon 30/60 SUS 2 m x 3 mm I.D.
Col. Temp. : 100 °C
Carrier Gas : He 50 mL/min

1. H_2
2. Air
3. CO
4. CH_4
5. CO_2
6. C_2H_2
7. C_2H_4



Inert Gases

1. Ne 0.5 %
2. Ar 0.5 %
3. N_2 97.5 %
4. Kr 1.5 %

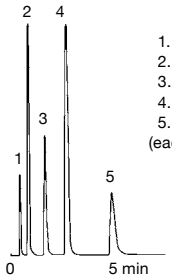


Column : Molecular Sieve 5A 60/80 SUS 3 m x 3 mm I.D.
Col.Temp. : 40 °C
Carrier Gas : He 21 mL/min
Detector : TCD 120 mA x 4
Sample Size : 1 mL

Trace Amount of CO

1. H_2
2. O_2
3. N_2
4. CH_4
5. CO

(each 10 ppm in He)

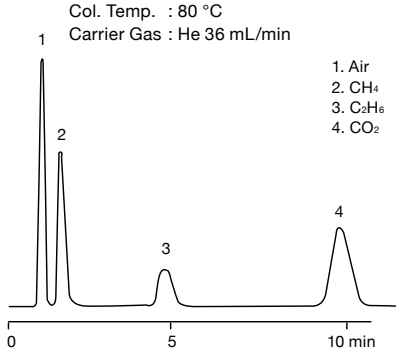


Column : Molecular Sieve 13X-S 60/80 SUS 2 m x 3 mm I.D.
Col.Temp. : 50 °C
Carrier Gas : He 50 mL/min
Detector : PID 750 V 10 x 32
Sample Size : 1 mL

Gas Analysis with Silicagel

Column : Silicagel 60/80 SUS 3 m x 3 mm I.D.
Col. Temp. : 80 °C
Carrier Gas : He 36 mL/min

1. Air
2. CH_4
3. C_2H_6
4. CO_2



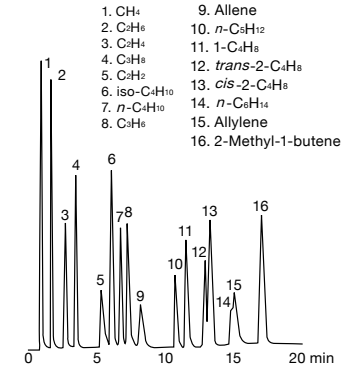
Adsorbents

Unibeads Series

Unibeads series consists of spherical porous silica beads with different characteristics. Unibeads 1S, 2S and 3S are spherical silica beads with pores size of 25 Å, 70 Å, 100 Å. Unipak S is spherical shape silica beads useful for analysis of ethane, ethylene, acetylene, and also for higher hydrocarbons number by temp. programmed analysis.

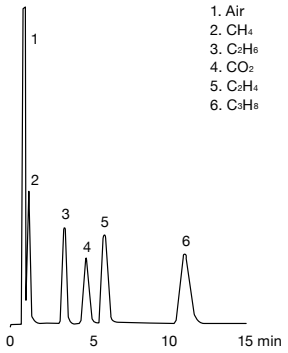
Description	Mesh	Qty.	Cat.No.	Characteristics			
				Comp.	Packing density	Pore size	Max.Temp.
Unibeads 1S	30/60	100 mL	1001-15303	SiO_2	0.71	25 Å	200 °C
	60/80		1001-15306				
	80/100		1001-15308				
Unibeads 2S	30/60	100 mL	1001-15403	SiO_2	0.53	70 Å	200 °C
	60/80		1001-15406				
	80/100		1001-15408				
Unibeads 3S	30/60	100 mL	1001-15503	SiO_2	0.37	100 Å	200 °C
	60/80		1001-15506				
	80/100		1001-15508				
Unipak S	100/150	50 mL	1001-16200	SiO_2	–	–	200 °C

Unipak S



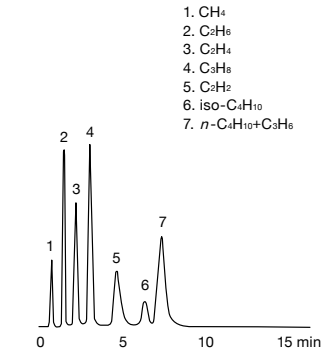
Column : Unipak S 100/150
SUS 2 m x 3 mm I.D.
Col.Temp. : 40 - 120 °C (5 °C/min)
Carrier Gas : He 40 mL/min
Detector : FID 10^2 x 4
Sample Size : 1 mL

Unibeads 1S



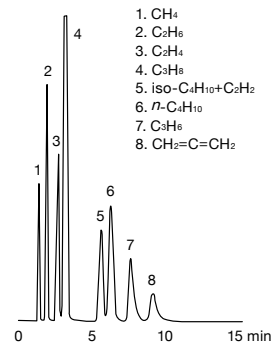
Column : Unibeads 1S 60/80
SUS 2 m x 3 mm I.D.
Col.Temp. : 70 °C
Carrier Gas : He 40 mL/min
Detector : TCD 120 mA x 8
Sample Size : 0.2 mL

Unibeads 2S



Column : Unibeads 2S 60/80
SUS 2 m x 3 mm I.D.
Col.Temp. : 70 °C
Carrier Gas : N_2 26 mL/min
Detector : FID 10 x 64
Sample Size : 0.1 mL

Unibeads 3S



Column : Unibeads 3S 60/80
SUS 2 m x 3 mm I.D.
Col.Temp. : 50 °C
Carrier Gas : N_2 16 mL/min
Detector : FID 10^2 x 64
Sample Size : 0.4 mL

Gaskuropack Series

Gaskuropack 54

Gaskuropack 54 consists of porous polymer beads made of a poly (styrene-divinylbenzene) copolymer with a high degree of bridging. Special treatment for this packing provides high thermal stability and low batch-to-batch variation. As it is a porous polymer, it is suitable for work environment determinations which are almost free from ghost peaks due to water or air. If coated with a stationary phase, it can in some cases permit analyses which were difficult to carry out with diatomaceous earths.

Gaskuropack 55

Gaskuropack 55 is a porous polymer type packing which makes use of the advantages of Gaskuropack 54, and is specially designed to analyze traces of glycols. It is also suitable for solvent analysis; see table of solvent retention times.

Description	Max. Temp.	Cat.No.
Gaskuropack 54 60/80	250 °C	1002-45406
Gaskuropack 54 80/100	250 °C	1002-45408
Gaskuropack 54-DA 60/80	230 °C	1002-45430
Unisole 10T 0.1 % Gaskuropack 54 60/80	250 °C	1002-45440
FFAP 20 % Gaskuropack 54 80/100	230 °C	1002-45450
Gaskuropack 55 60/80	250 °C	1002-45506
Gaskuropack 55 80/100	250 °C	1002-45508
Gaskuropack 56 60/80	220 °C	1002-45606
Gaskuropack 56 80/100	220 °C	1002-45608

Gaskuropack 56

Gaskuropack 56 has an acidic surface and is thus suited to the analysis of acidic samples. It can also be used for work environment determinations with little problem of ghost peaks due to air or water.

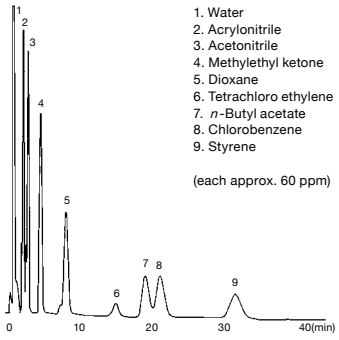
Low Hydrocarbon Retention Time Table by Gaskuropack 54

Condition	Gaskuropack 54 80/100 SUS 2 m x 3 mm I.D. He 45 mL/min Column Temp. 40 °C											
Compounds	O_2	N_2	Ar	CO	CO_2	CH_4	C_2H_6	C_2H_4	C_2H_2	C_3H_8	C_3H_6	H_2O
Retention time (min)	0.45	0.45	0.45	0.45	1.17	0.62	2.95	1.92	2.12	12.92	9.85	3.67

RT.Index 190 °C of McReynolds samples

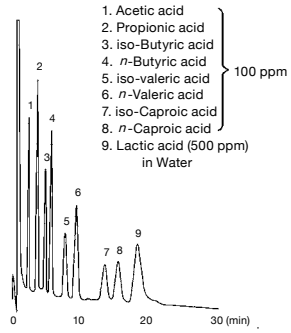
Samples	RT.Index	Samples	RT.Index	Samples	RT.Index
1-Butanol	622	Benzene	650	2-Pentanone	661
Nitropropane	700	Pyridine	715	2-Methyl-2-pentanol	732
2-Octyne	843	–	–	–	–

Solvents in Water



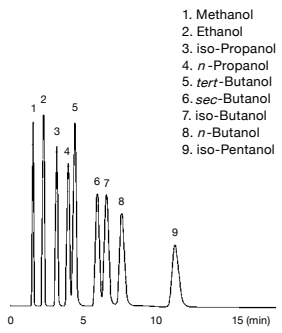
Column : Gaskuropack 54 60/80 Glass 2 m x 3 mm I.D.
Col.Temp. : 200 °C
Carrier Gas : He 25 mL/min
Detector : FID 10 x 4
Sample Size : 4 µL

Free Fatty Acids and Lactic Acid



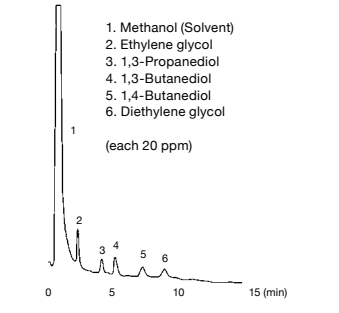
Column : FFAP 20 % Gaskuropack 54 80/100 Glass 2 m x 3 mm I.D.
Col.Temp. : 200 °C
Carrier Gas : N_2 44 mL/min
Detector : FID 10 x 8
Sample Size : 1 µL

Alcohols



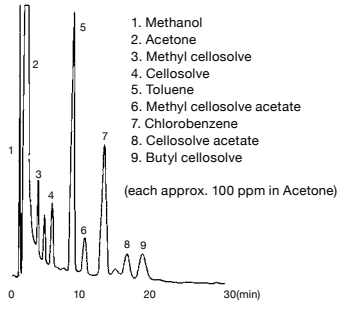
Column : Gaskuropack 54 80/100 SUS 2 m x 3 mm I.D.
Col.Temp. : 200 °C
Carrier Gas : N_2 28 mL/min
Detector : FID
Sample Size : 0.2 µL

Glycols



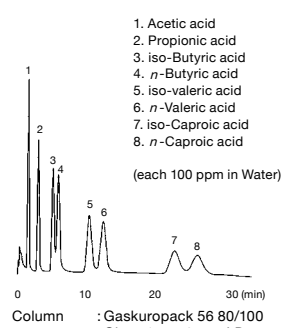
Column : Gaskuropack 55 60/80 Glass 2 m x 3 mm I.D.
Col.Temp. : 230 °C
Carrier Gas : N_2 46 mL/min
Detector : FID 1 x 64
Sample Size : 2 µL

Cellosolves



Column : Gaskuropack 55 60/80 Glass 2 m x 3 mm I.D.
Col.Temp. : 200 °C
Carrier Gas : N_2 30 mL/min
Detector : FID 10 x 16
Sample Size : 2 µL

Isolation Fatty Acid in Water



Column : Gaskuropack 56 80/100 Glass 1 m x 3 mm I.D.
Col.Temp. : 200 °C
Carrier Gas : N_2 18 mL/min
Detector : FID 10 x 16
Sample Size : 3 µL

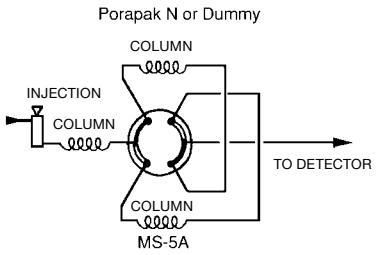
Porous Polymers

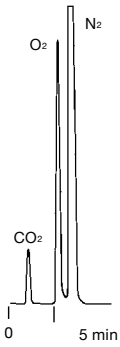
Porapak

Type	Max.Temp.	Mesh	Weight	Cat.No.	Surface Area	Bulk Density	Applications	Polymer Type
P	250	50/80	20 g	1002-11105	100 ~ 200 m^2/g	0.27 g/cm^2	Non-Polar Glycols, Alcohols	Stylene-Divinylbenzene
		80/100		1002-11108				
		100/120		1002-11110				
PS	250	50/80	20 g	1002-11205	100 ~ 200 m^2/g	0.27 g/cm^2	Aldehydes, Glycols	Stylene-Divinylbenzene
		80/100		1002-11208				
		100/120		1002-11210				
Q	250	50/80	26 g	1002-11305	500 ~ 600 m^2/g	0.34 g/cm^2	Most widely used Hydrocarbons, Organic compounds in water	Ethylvinylbenzene-Divinylbenzene
		80/100		1002-11308				
		100/120		1002-11310				
QS	250	50/80	26 g	1002-11405	500 ~ 600 m^2/g	0.34 g/cm^2	Q's silane finished Organic acids, Polar compounds	Ethylvinylbenzene-Divinylbenzene
		80/100		1002-11408				
		100/120		1002-11410				
R	250	50/80	24 g	1002-11505	450 ~ 600 m^2/g	0.3 g/cm^2	Moderate polarity Esters, Nitriles etc.	Vinylpyrollidone
		80/100		1002-11508				
		100/120		1002-11510				
S	250	50/80	26 g	1002-11605	300 ~ 450 m^2/g	0.35 g/cm^2	Alcohols, Carbonyl, Halogen compounds.	Vinylpyridine
		80/100		1002-11608				
		100/120		1002-11610				
N	190	50/80	29 g	1002-11705	225 ~ 350 m^2/g	0.38 g/cm^2	Hydrocarbons, Ammonia	DVB-EVB-Ethyleneglycol dimethacrylate
		80/100		1002-11708				
		100/120		1002-11710				
T	190	50/80	31 g	1002-11805	250 ~ 350 m^2/g	0.43 g/cm^2	Highest Polarity Amines	Ethyleneglycol dimethacrylate
		80/100		1002-11808				
		100/120		1002-11810				

Use of Column Switch

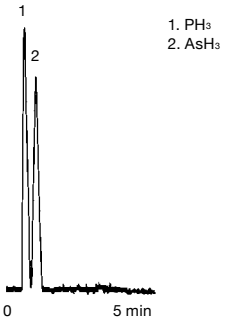
Analysis of O_2 , N_2 , CO_2





Column : Porapak N 50/80 SUS 2 m x 3 mm I.D.
+Molecular Sieve 5A 60/80 SUS 1 m x 3 mm I.D.
Col.Temp. : 40 °C

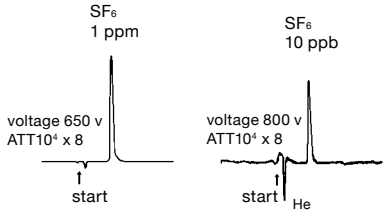
Analysis of PH_3, AsH_3



1. PH_3
2. AsH_3

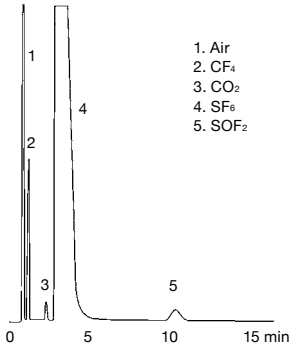
Column : Porapak QS 100/120 SUS 0.5 m x 2 mm I.D.
Col.Temp. : 30 °C
Carrier Gas : N_2 500 kPa
Detector : PID (10.2 eV) 10^2 x 2
Sample Size : 2 mL

Analysis of SF_6



Column : Porapak Q 50/80
PTFE 2 m x 3 mm I.D.
Col.Temp. : 50 °C
Carrier Gas : N_2 40 mL/min
Detector : FPD
Sample Size : 1 mL

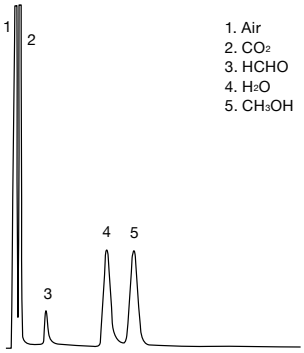
Analysis of CF_4, SF_6, SOF_2



1. Air
2. CF_4
3. CO_2
4. SF_6
5. SOF_2

Column : Porapak Q 50/80
SUS 3 m x 3 mm I.D.
Col.Temp. : 50 °C
Carrier Gas : He 32 mL/min
Detector : TCD 120 mA
Sample Size : 1 mL

Analysis of Formalin



1. Air
2. CO_2
3. HCHO
4. H_2O
5. CH_3OH

Column : Porapak T 50/80 SUS 2 m x 3 mm I.D.
Col.Temp. : 120 °C
Carrier Gas : He 24 mL/min
Detector : TCD 120 mA x 4 0.6 mL
(Head space gas)

Porapak Retention Time Table (Unit : Min.)

Analytical conditions : Stainless steel column 80/100 mesh 1 m x 2.3 mm I.D. 30 °C He 25 mL/min. TCD

Compounds	P	Q	R	S	N	T
Oxygen	0.23	0.24	0.24	0.24	0.24	0.24
Nitrogen	0.23	0.24	0.24	0.24	0.24	0.24
Argon	0.23	0.24	0.24	0.24	0.24	0.24
Carbon monooxide	0.23	0.24	0.27	0.24	0.24	0.24
Carbon dioxide	0.36	0.65	0.60	0.66	0.90	1.26
Carbonyl sulfide	1.15	3.33	2.83	3.47	4.05	4.71
Sulfur dioxide	2.52	5.87	10.84	23.80	16.50	22.48
Nitric oxide (NO)	0.27	0.30	0.28	0.26	0.28	0.28
Nitrous oxide (N_2O)	0.42	0.76	0.66	0.81	0.94	1.22
Methane	0.26	0.35	0.32	0.38	0.35	0.39
Ethylene	0.45	1.15	0.90	1.01	1.22	1.32
Acethylene	0.53	1.15	1.16	1.20	2.00	2.96
Ethane	0.54	1.60	1.16	1.36	1.50	1.54
Propylene	1.40	6.44	4.43	5.39	7.14	7.28
Propane	1.40	7.24	5.00	5.98	7.14	7.28
Ammonia	0.65	1.52	1.88	1.77	1.89	2.72
Ethylene oxide	4.45	12.70	12.51	14.82	24.78	34.05
Difluoroethane	1.16	3.90	3.97	4.63	9.00	11.92
Chlorodifluoromethane (Freon 22)	1.22	4.32	5.61	5.60	10.99	13.88
Methyl chloride	2.10	6.16	5.74	7.00	9.76	11.92
Dichlorodifluoromethane (Freon 12)	1.43	7.43	5.73	7.13	9.78	10.28
Chlorodifluoroethane	2.04	15.44	11.71	13.73	–	–
Dichlorotetrafluoroethane	10.40	25.75	19.51	20.32	–	–

Analytical conditions : Stainless steel column 80/100 mesh 1 m x 2.3 mm I.D. 175 °C N_2 25 mL/min. FID (*: He flow TCD)

Group	Compounds	P	Q	R	S	N	T
Acids	Acetic acid	0.39	1.08	2.14	3.68	4.18	5.21
	Propionic acid	0.65	2.42	4.75	9.05	9.11	10.68
	iso-Butyric acid	0.91	4.43	8.28	16.41	16.32	18.13
	Butyric acid	1.05	5.22	9.87	19.71	19.80	22.30
	iso-Valeric acid	1.52	9.69	16.85	36.81	36.79	39.50
	Valeric acid	1.89	12.12	21.70	45.70	45.30	48.90
Alcohols	Methanol	0.24	0.35	0.39	0.48	0.61	0.69
	Ethanol	0.30	0.60	0.63	0.76	1.21	1.20
	iso-Propanol	0.37	0.91	0.89	1.03	1.79	1.90
	tert-Butanol	0.38	1.40	1.35	1.69	2.56	2.67
	n-Propanol	0.43	1.22	1.24	1.53	2.52	2.60
	sec-Butanol	0.50	1.93	1.85	2.40	3.69	3.81
	iso-Butanol	0.61	2.18	2.16	2.72	4.63	4.74
	tert-Pentanol	0.62	3.17	2.90	3.78	5.87	5.84
	n-Butanol	0.69	2.58	2.68	3.39	5.78	5.71
	iso-Pentanol	1.07	4.87	4.75	6.14	10.82	10.76
	n-Pentanol	1.10	5.63	5.67	7.04	12.88	12.40
Aldehydes	Acetaldehyde	0.24	0.44	0.39	0.49	0.65	0.71
	Propionaldehyde	0.35	0.87	0.79	0.97	1.44	1.46
	Acrorein	0.35	0.81	0.77	0.91	1.44	1.52
	iso-Butylaldehyde	0.46	1.51	1.37	1.67	2.54	2.50
	Butylaldehyde	0.54	1.77	1.62	1.96	3.07	3.04
Alkanes	Pentane	0.34	1.24	1.02	1.19	1.39	1.10
	Hexane	0.48	2.56	2.03	2.46	3.00	2.20
	Heptane	0.73	5.26	4.27	5.03	6.22	4.39
	Octane	1.14	10.99	8.54	10.36	13.28	8.94
Aromatics	Benzene	0.87	2.76	2.56	3.00	4.00	3.74
	Toluene	1.33	5.72	5.31	6.41	8.54	7.61
	Ethyl Benzene	2.09	11.60	10.69	12.98	17.58	15.05
	o-Xylene	2.52	13.48	12.53	15.32	20.79	18.05
Chloroalkyls	Methylene Chloride	0.41	0.98	0.94	1.09	1.48	1.67
	Chloroform	0.59	1.89	1.76	2.15	2.91	3.04
	Carbon Tetrachloride	0.75	2.87	2.42	2.98	3.49	3.04
	1, 2-Dichloroethane	0.78	2.28	2.16	2.56	3.84	4.09
	1, 2-Dichloropropane	0.98	3.84	3.47	4.23	6.29	6.37
Esters	Methyl formate	0.27	0.51	0.53	0.57	0.91	0.94
	Methyl acetate	0.38	1.01	0.97	1.11	1.74	1.75
	Ethyl acetate	0.52	1.99	1.83	2.15	3.30	3.16
	Methyl propionate	0.57	1.99	1.83	2.15	3.30	3.16
	Butyl acetate	1.39	8.78	7.35	9.44	14.60	13.88
Ether	Diethyl ether	0.33	1.41	0.98	1.27	1.45	1.28
Ketone	Acetone	0.33	0.89	0.81	0.96	1.59	1.66
Inorganic	Water*	0.25	0.32	0.41	0.35	0.61	0.83

Porous Polymers

Tenax

Tenax TA

Tenax TA is composed of a weak acidic porous polymer based on 2,6-diphenyl-p-phenylene oxide. A major cause of ghost peaks would be aromatic hydrocarbons including toluene, xylene, ethylbenzene, etc., contained as impurities in the Tenax GC. In trace analysis, ghost peaks badly affect resultant data. Tenax TA is designed to minimize ghost peaks and it can be used both as a column packing material and as a trapping adsorbent for organic volatile and semi-volatile compounds.

Tenax GR

Tenax GR is made by adding 23 % graphite carbon at the polymerization of Tenax. It has higher breakthrough volumes than conventional due to the added graphite carbon.

Packing	Mesh	Weight (Capacity)	Cat.No.
Tenax TA	20/35	5 g (approx. 28 mL)	1002-31102
	35/60		1002-31103
	60/80		1002-31106
	80/100		1002-31108
	20/35	15 g (approx. 84 mL)	1002-31202
	35/60		1002-31203
	60/80		1002-31206
	80/100		1002-31208

Tenax TA property

Item	Physical property
Specific surface area (m^2/g)	: 35
Pore volume (cm^2/g)	: 2.4
Average pore size (nm)	: 200
Density (g/cm^2)	: 0.25

Packing	Mesh	Weight (Capacity)	Cat.No.
Tenax GR	20/35	10 g (33 mL approx.)	1050-25000
	35/60		1050-25010
	60/80		1050-25020
	80/100		1050-25030

Tenax GR property

Item	: Physical property
Specific surface area	: 25 m^2/g
Density	: 0.30 g/cm^2

Breakthrough Volumes at 20 °C mL/mL

Samples	Tenax TA	Tenax GR
HALOGENATED COMPOUNDS	–	–
Monochloromethane	44	121
Dichloromethane	275	890
Trichloromethane (Chloroform)	1,460	3,160
Tetrachloromethane	3,210	6,250
Monochloroethane	246	393
1, 1-Dichloroethane	664	2,350
1, 2-Dichloroethane	1,880	23,700
1, 1, 1-Trichloroethane	3,650	12,000
1, 1, 2-Trichloroethane	21,900	57,700
1, 1, 2, 2-Tetrachloroethane	185,000	932,000
Dibromomethane	4,020	15,300
Tribromomethane (Bromoform)	215	470
Tetrabromomethane	500,000	854,000
Monobromoethane	469	1,580
1, 2-Diboromoethane	27,200	113,000
1, 1, 2, 2-Tetrabromoethane	6,881,000	3,280,000
Vinyl chloride	69	278

Samples	Tenax TA	Tenax GR
HYDROCARBONS	–	–
Methane	1	1
Ethane	4	7
Propane	26	46
Butane	135	217
AROMATICS	–	–
Benzene	8,800	18,600
Toluene	34,800	127,000
INORGANIC	–	–
Water	11	26

HayeSep

HayeSep is a spherical high purity polymer. It supplies unique separation in Gas chromatograph.

Types	Polarity	Max. Temp.	Mesh	Cat.No.	Surface Area	Bulk Density	Polymer Type
D	Low	290 °C	60/80	1002-52006	803 m^2/g	0.331 g/cm^3	Divinylbenzene
			80/100	1002-52008			
			100/120	1002-52010			
Q		275 °C	60/80	1002-51206	582 m^2/g	0.351 g/cm^3	Divinylbenzene
			80/100	1002-51208			
			100/120	1002-51210			
P		250 °C	60/80	1002-51106	165 m^2/g	0.420 g/cm^3	Divinylbenzene-styrene
			80/100	1002-51108			
			100/120	1002-51110			
S		250 °C	60/80	1002-51406	583 m^2/g	0.334 g/cm^3	Divinylbenzene-4-Vinyl-pyridine
			80/100	1002-51408			
			100/120	1002-51410			
R		250 °C	60/80	1002-51306	344 m^2/g	0.324 g/cm^3	Divinylbenzene-N-Vinyl-2-Pyrollidinone
			80/100	1002-51308			
			100/120	1002-51310			
C		250 °C	60/80	1002-51906	442 m^2/g	0.322 g/cm^3	Divinylbenzene-Acrylonitrile
			80/100	1002-51908			
			100/120	1002-51910			
A		165 °C	60/80	1002-51706	526 m^2/g	0.356 g/cm^3	Divinylbenzene-Ethyleneglycol-dimethacrylate
			80/100	1002-51708			
			100/120	1002-51710			
B		190 °C	60/80	1002-51806	608 m^2/g	0.330 g/cm^3	Divinylbenzene-Polyethyleneimine
			80/100	1002-51808			
			100/120	1002-51810			
N		165 °C	60/80	1002-51506	405 m^2/g	0.355 g/cm^3	Divinylbenzene-Ethyleneglycol-dimethacrylate
			80/100	1002-51508			
			100/120	1002-51510			
T	High	165 °C	60/80	1002-51606	250 m^2/g	0.381 g/cm^3	Ethyleneglycol-dimethacrylate
			80/100	1002-51608			
			100/120	1002-51610			

Note: Please contact us about HayeSep DB. DIP.

HAYESEP RT'S RELATIVE TO C_2H_6

6 ft x 1/8 in. SUS Columns
HayeSep 80/100 mesh
60 °C 30 mL/min He

Compound	A	B	C	D	DB	DIP
CF_4	0.13	0.10	0.08	0.10	0.10	0.10
CH_4	0.09	0.12	0.11	0.11	0.11	0.12
CO_2	0.54	0.32	0.47	0.31	0.30	0.30
N_2O	0.62	0.44	0.59	0.42	0.42	0.43
F116	0.63	0.49	0.45	0.51	0.52	0.53
C_2H_2	1.29	0.65	1.03	0.64	0.62	0.64
SF_6	0.81	0.65	0.64	0.68	0.68	0.68
C_2H_4	0.81	0.71	0.75	0.70	0.70	0.70
NH_3	1.58	0.71	1.21	0.90	0.65	0.98
F13	1.10	0.90	0.84	0.87	0.88	0.90
C_2H_6	1.00	1.00	1.00	1.00	1.00	1.00
H_2O	7.06	1.14	5.31	1.08	0.95	1.10
H_2S	2.06	1.45	2.20	1.36	1.35	1.39
COS	3.02	2.59	3.10	2.56	2.58	2.59
F22	7.63	3.11	6.34	3.30	3.31	3.35
C_3H_6	4.70	3.75	4.41	4.01	4.11	4.10
C_3H_8	4.94	4.43	4.70	4.73	4.84	4.84
SO_2	10.23	3.84	5.31	3.67	3.82	3.68
PD	6.19	4.63	5.80	4.79	4.87	4.90
MA	8.09	4.70	7.03	4.92	4.96	5.00
CP	5.90	5.02	5.89	5.18	5.32	5.26
F12	7.83	5.71	6.79	6.38	6.47	6.46
IC_4	17.92	14.73	16.21	16.74	17.18	17.32
1,3BD	24.94	16.00	22.93	18.62	19.10	19.48
F114	27.35	18.35	21.46	21.48	22.11	22.88
NC_4	23.60	19.33	21.21	22.26	22.66	23.01

RELATIVE RETENTION TIMES

Ethane = 1.00
Columns 6 ft x 1/8 in. SUS 65 °C
He 30 mL/min

Compound	N	Q	R	S	T
Hydrogen	0.19	0.143	0.17	0.19	0.21
Air	0.23	0.186	0.20	0.21	0.25
Nitric oxide	0.25	0.217	0.21	0.23	0.33
Methane	0.30	0.256	0.28	0.30	0.35
Carbon dioxide	0.71	0.450	0.50	0.52	0.85
Nitrous oxide	0.80	0.570	0.59	0.59	–
Ethylene	0.83	0.74	0.78	0.78	0.90
Acetylene	1.41	0.74	1.00	0.87	2.11
Ethane	1.00	1.00	1.00	1.00	1.00
Water	10.10	1.45	6.80	4.12	19.10
Hydrogen sulphide	2.10	1.40	1.73	1.87	2.88
Hydrogen cyanide	19.30	2.31	15.60	8.26	28.80
Carbonyl sulphide	2.82	2.33	2.46	2.63	3.40
Sulphur dioxide	12.00	3.05	9.78	17.80	19.00
Propylene	4.66	3.20	3.45	3.65	4.91
Propane	4.66	3.67	3.88	4.10	4.63
Propadiene	6.50	4.12	4.39	4.70	7.55
Methylacetylene	9.50	4.12	4.84	5.14	11.30
Methyl chloride	7.43	3.93	4.67	4.92	9.20
Vinyl chloride	14.90	6.04	9.04	9.70	17.30
Ethylene oxide	17.70	6.06	8.78	9.70	23.30
Ethyl chloride	35.00	12.25	19.30	20.70	43.20
Carbon disulphide	–	32.40	–	–	40.70

APPLICATIONS INDEX

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	3	*β, β'*-ODPN 25 % Uniport HP 60/80	Odor of septic tank dirt	
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	2	Unisole 30T 10 % Uniport HP 80/100	Dicarbonic acid	
	3	Unisole 10T + H_3PO_4 (5 + 0.5) % Uniport HP 80/100	Benzoic acids	
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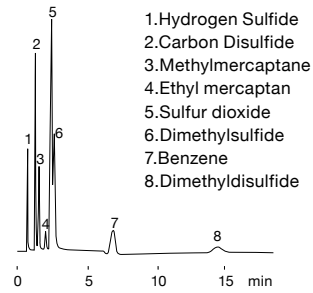
	8	Unisole F-200 30/60	Organic solvent mixed sample analysis in water	

Odor Controlled Substances

Fig.1 Sulfur Compounds

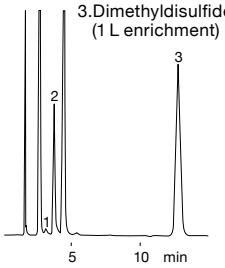


1.Hydrogen Sulfide
2.Carbon Disulfide
3.Methylmercaptane
4.Ethyl mercaptan
5.Sulfur dioxide
6.Dimethylsulfide
7.Benzene
8.Dimethyldisulfide

Column : β, β'-ODPN 25 % Uniport HP 60/80 Glass 3 m x 3 mm I.D.
Col. Temp. : 60 °C
Carrier Gas : N_2 70 mL/min
Detector : FPD High V.750 V 10^4 x 2^4
Sample Size : 1.0 µL (10 ppm)

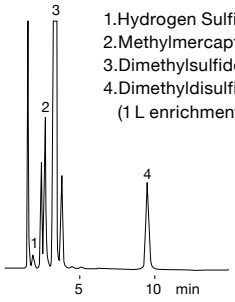
Fig.2 Odor of Refuse Dumps

1.Methylmercaptane (0.22 ppb)
2.Dimethylsulfide (1.06 ppb)
3.Dimethyldisulfide (1.85 ppb)
(1 L enrichment)



Column : β, β'-ODPN 25 % Uniport HP 60/80 Glass 3 m x 3 mm I.D.
Col. Temp. : 70 °C
Carrier Gas : He 55 mL/min
Detector : FPD Hight V.750 V 10^2 x 2^4

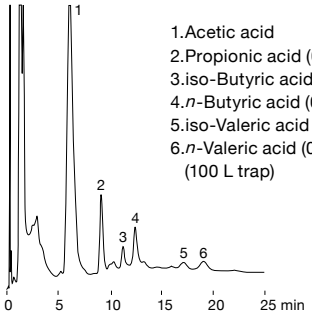
Fig.3 Odor of Septic Tank Dirt



1.Hydrogen Sulfide (0.92 ppb)
2.Methylmercaptane (1.35 ppb)
3.Dimethylsulfide (5.8 ppb)
4.Dimethyldisulfide (1.0 ppb)
(1 L enrichment)

Column : β, β'-ODPN 25 % Uniport HP 60/80 Glass 3 m x 3 mm I.D.
Col. Temp. : 70 °C
Carrier Gas : He 55 mL/min
Detector : FPD Hight V.750 V 10^2 x 2^4

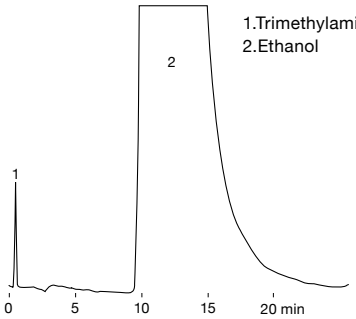
Fig.4 Low Fatty Acids of Drains



1.Acetic acid
2.Propionic acid (0.63 ppb)
3.iso-Butyric acid (0.29 ppb)
4.*n*-Butyric acid (0.06 ppb)
5.iso-Valeric acid (0.06 ppb)
6.*n*-Valeric acid (0.09 ppb)
(100 L trap)

Column : FFAP+H_3PO_4 (0.3+0.3) % Unicarbon B 60/80 Glass 1 m x 3 mm I.D.
Col. Temp. : 110 °C-210 °C (10 °C/min)
Carrier Gas : 50 mL/min
Detector : FID 10 x 2^4

Fig.5 Tri-methyl Amine (Standard sample)



1.Trimethylamine
2.Ethanol

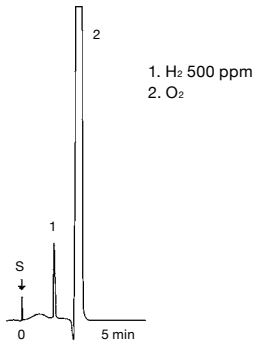
Column : Diglycerol+TEP+KOH (15+15+2) % Uniport HP 60/80 Glass 3 m x 3 mm I.D.
Col. Temp. : 70 °C
Carrier Gas : N_2 64 mL/min
Detector : FID 10 x 2

Applications

INORGANIC GASES

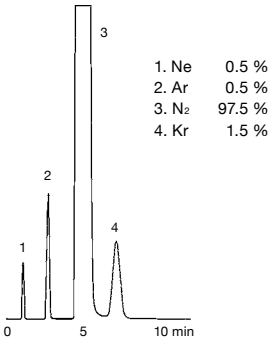
For analysis of inorganic gases, adsorbents such as molecular sieve, active alumina, active carbon and silica gel are used. For the analysis of H_2 with TCD, a quantitative determination cannot be made if He is used as the carrier gas, so it is necessary to use N_2 or Ar which has very different thermal conductivity (Fig.1). Molecular Sieve is the only packing capable of separating O_2 and N_2 at room temperature, and is suitable for the separation of permanent gases. It easily loses its resolution if it adsorbs H_2O, CO_2, H_2S, SO_2 and NH_3. Regeneration must be carried out at high temperature. For analysis of inert gases, Molecular Sieve 5A is used. For trace amount of CO analysis, consistently good results are obtained by Molecular Sieve 13X-S (Fig.3).

Fig.1 H_2 (Hydrogen)



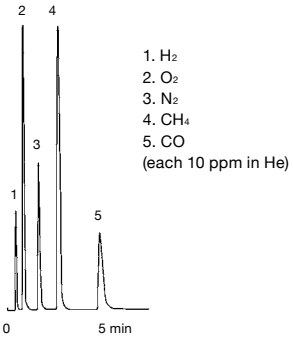
Column : Molecular Sieve 13X 30/60 SUS 4 m x 3 mm I.D.
Col.Temp. : 42 °C
Carrier Gas : N_2 30 mL/min
Detector : TCD 80 mA x 2
Sample Size : 2 mL

Fig.2 Inert Gases



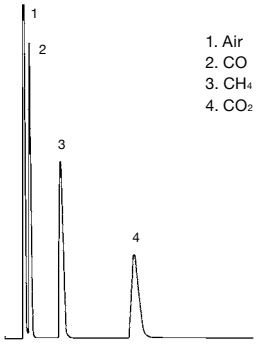
Column : Molecular Sieve 5A 60/80 SUS 3 m x 3 mm I.D.
Col.Temp. : 40 °C
Carrier Gas : He 21 mL/min
Detector : TCD 120 mA x 4
Sample Size : 1 mL

Fig.3 Trace CO



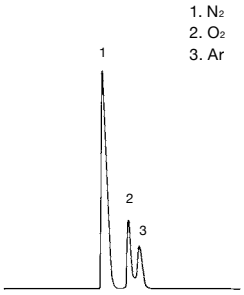
Column : Molecular Sieve 13X-S 60/80 SUS 2 m x 3 mm I.D.
Col.Temp. : 50 °C
Carrier Gas : He 50 mL/min
Detector : PID 750 V 10 x 32
Sample Size : 1 mL

Fig.4 CO, CH_4



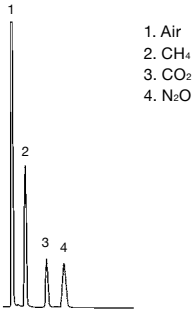
Column : Active Carbon 60/80 SUS 2 m x 3 mm I.D.
Col.Temp. : 50 °C
Carrier Gas : He 38 mL/min
Detector : TCD 120 mA x 16
Sample Size : 0.5 mL

Fig.5 Inert Gases



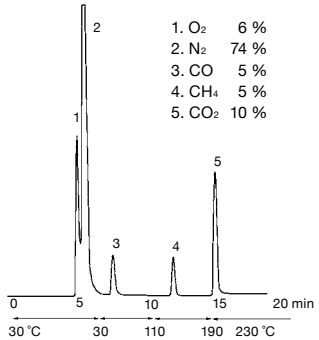
Column : Gaskuropack 54 60/80 SUS 6 m x 3 mm I.D.
Col.Temp. : -70 °C
Carrier Gas : He 31 mL/min
Detector : TCD 120 mA x 64
Sample Size : 1 mL

Fig.6 Inert Gases



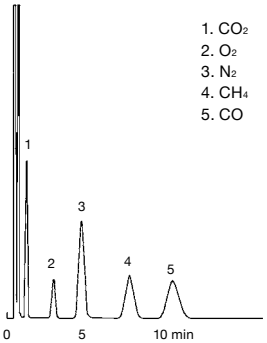
Column : Unibeads C 60/80 SUS 2 m x 3 mm I.D.
Col.Temp. : 130 °C
Carrier Gas : He 68 mL/min
Detector : TCD 120 mA x 32
Sample Size : 0.4 mL

Fig.7 Inorganic Gases by Temperature Programming



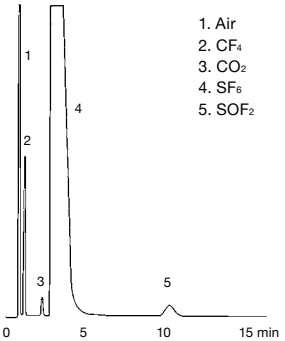
Column : Unibeads C 80/100 SUS 3 m x 3 mm I.D.
Col.Temp. : 30 °C (6 min) - 230 °C (20 °C/min)
Carrier Gas : He 30 mL/min
Detector : TCD 120 mA x 32
Sample Size : 0.3 mL

Fig.8 Inorganic Gases



Column : WG-100 SUS 1.8 m x 1/4 in. O.D.
Col.Temp. : 50 °C
Carrier Gas : He 33 mL/min
Detector : TCD 120 mA x 16
Sample Size : 0.3 mL

Fig.9 CF_4, SF_6, SOF_2

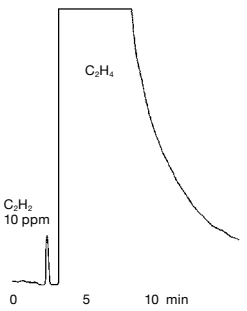


Column : Porapak Q 50/80 SUS 3 m x 3 mm I.D.
Col.Temp. : 50 °C
Carrier Gas : He 32 mL/min
Detector : TCD 120 mA
Sample Size : 1 mL

LOWER HYDROCARBONS

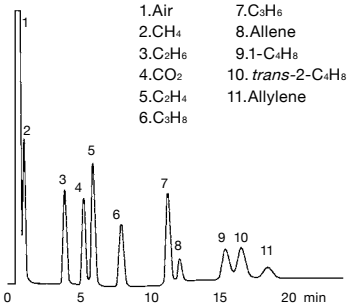
For analysis of lower hydrocarbons up to C3, packing materials for adsorption, liquid-gas partition are used. In addition, some packing materials are adsorbents coated with a liquid stationary phase for both interactions. Note the conditioning temperature and time when using these packing materials for analysis of lower hydrocarbons because the results are easily affected by these values. Characteristic separations of Unibeads is suitable for lower hydrocarbons of up to C3, especially when CO_2 is contained (Fig.2). If the sample contains water, adsorptive packings are not suitable as the water causes considerable tailing. However, Gaskuropack 54, a porous polymer-based packing material, can be used for the analysis of hydrocarbons up to C3 even when water is present (Fig.3).

Fig.1 Trace Acetylene in Ethylene



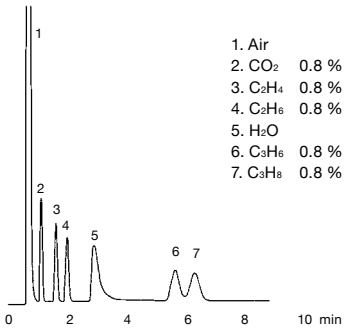
Column : Unibeads C 60/80
SUS 2 m x 3 mm I.D.
Col.Temp. : 140 °C
Carrier Gas : N_2 76 mL/min
Detector : FID 1 x 32
Sample Size : 1 mL

Fig.2 CO_2 in Hydrocarbons



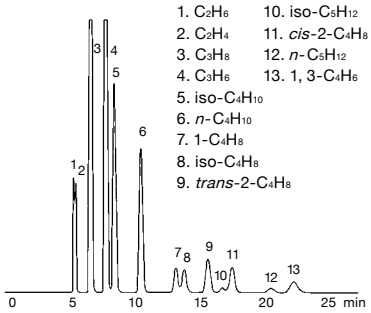
Column : Unibeads 1S 80/100
SUS 1 m x 3 mm I.D.
Col.Temp. : 40 -160 °C (10 °C/min)
Carrier Gas : He 20 mL/min
Detector : TCD 100 mA x 8
Sample Size : 1 mL

Fig.3 Hydrocarbons and Water



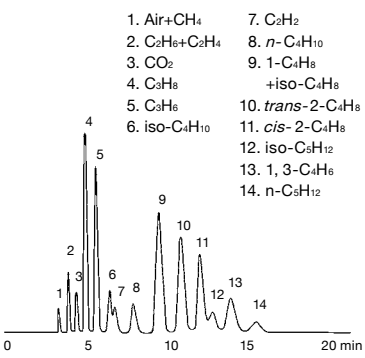
Column : Gaskuropack 54 60/80
SUS 2 m x 3 mm I.D.
Col.Temp. : 70 °C
Carrier Gas : He 24 mL/min
Detector : TCD 120 mA x 8
Sample Size : 0.5 mL

Fig.4 Hydrocarbons



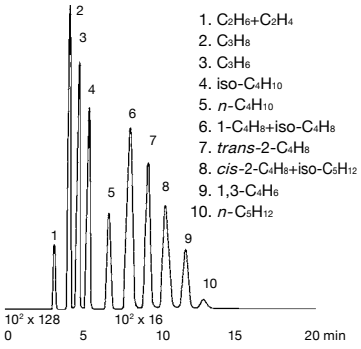
Column : Sebaconitrile 25 %
Uniport C 60/80
SUS 10 m x 3 mm I.D.
Col.Temp. : 30 °C
Carrier Gas : N_2 35.5 mL/min
Detector : FID 10^2 x 64
Sample Size : 0.1 mL

Fig.5 C-C5 Hydrocarbons



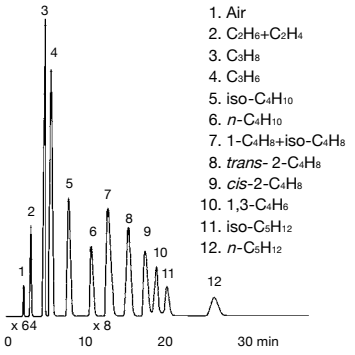
Column : VZ-7 60/80 SUS 6 m x 3 mm I.D.
Col.Temp. : 40 °C
Carrier Gas : He 15 mL/min
Detector : TCD 120 mA x 64
Sample Size : 0.5 mL

Fig.6 C1-C5 Hydrocarbons



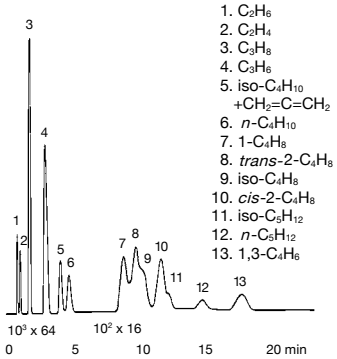
Column : VZ-8 60/80 SUS 6 m x 3 mm I.D.
Col.Temp. : 40 °C
Carrier Gas : He 20 mL/min
Detector : FID 10^2 x 128 x 16
Sample Size : 0.2 mL

Fig.7 C1-C5 Hydrocarbons



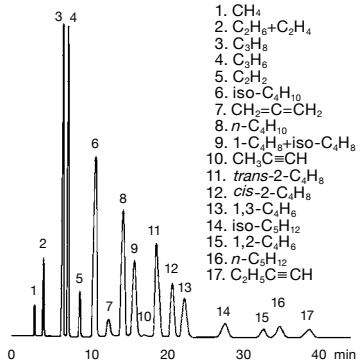
Column : VZ-9 60/80 Cu 6 m x 3 mm I.D.
Col.Temp. : 38 °C
Carrier Gas : He 25 mL/min
Detector : TCD 150 mA
Sample Size : 1 mL

Fig.8 C1-C5 Hydrocarbons



Column : VZ-10 60/80 SUS 2 m x 3 mm I.D.
Col.Temp. : 50 °C
Carrier Gas : He 35 mL/min
Detector : FID 10^3 x 64, 10^2 x 16
Sample Size : 0.2 mL

Fig.9 C-C5 Hydrocarbons Isomers



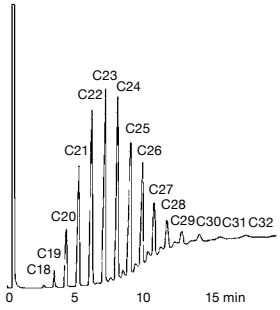
Column : VZN-1 60/80 SUS 7 m x 3 mm I.D.
Col.Temp. : 40 °C
Carrier Gas : N_2 20 mL/min
Detector : FID 10^3 x 16
Sample Size : 0.5 mL

Applications

HYDROCARBONS

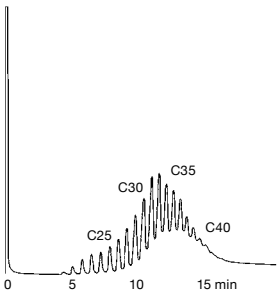
For simple hydrocarbon composites like paraffin wax, packed columns can be used for the analysis. 1 % OV-1 or Dexsil is generally used. To shorten the analysis time, a short and narrow column is employed with a time program. Fig. 1 and 2 show such examples.

Fig.1 Paraffin (m.p. 50~52 ˚C)



Column : Unisole 10T 5 %
Uniport HP 80/100
Glass 2 m x 3 mm I.D.
Col.Temp. : 160-260 °C (10 °C/min)
Carrier Gas : N_2 80 mL/min
Detector : FID 10^3 x 8
Sample Size : 1.0 µL

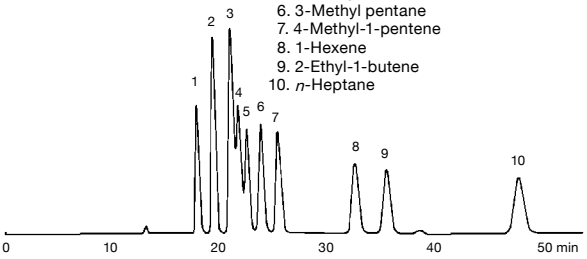
Fig.2 Paraffin (m.p. 68~70 ˚C)



Column : Silicone OV-1 1 %
Uniport HP 100/120
SUS 0.5 m x 2 mm I.D.
Col.Temp. : 150-300 °C
(10 °C/min)
Carrier Gas : N_2 20 mL/min
Detector : FID 10 x 128
Sample Size : 0.4 µL
(15 ppm in Chloroform)

Fig.3 C5 Hydrocarbons

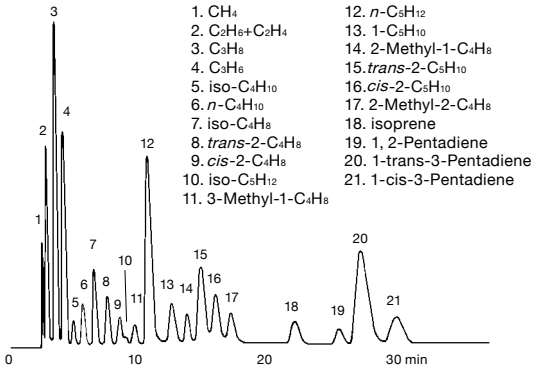
1. 1-Pentane
2. *trans*-2-Pentene+2-Methyl-1-butene
3. *cis*-2-Pentene+2-Methylpentane
4. 2,3-Dimethyl butane
5. 2-Methyl-2-butene
6. 3-Methyl pentane
7. 4-Methyl-1-pentene
8. 1-Hexene
9. 2-Ethyl-1-butene
10. *n*-Heptane



Column : Sebaconitrile 25 % Uniport C 60/80 SUS 10 m x 3 mm I.D.
Col.Temp. : 70 °C Carrier Gas : N_2 20 mL/min
Detector : FID 10^2 x 512 Sample Size : 0.4 µL

Fig.4 C5 Hydrocarbons

1. CH_4
2. C_2H_6+C_2H_4
3. C_3H_8
4. C_3H_6
5. iso-C_4H_{10}
6. *n*-C_4H_{10}
7. iso-C_4H_8
8. *trans*-2-C_4H_8
9. *cis*-2-C_4H_8
10. iso-C_5H_{12}
11. 3-Methyl-1-C_4H_8
12. *n*-C_5H_{12}
13. 1-C_5H_{10}
14. 2-Methyl-1-C_4H_8
15. *trans*-2-C_5H_{10}
16. *cis*-2-C_5H_{10}
17. 2-Methyl-2-C_4H_8
18. isoprene
19. 1, 2-Pentadiene
20. 1-trans-3-Pentadiene
21. 1-cis-3-Pentadiene

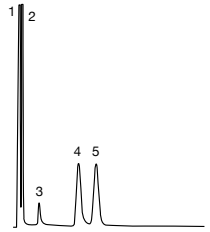


Column : VZ-7 60/80 SUS 6 m x 3 mm I.D.
Col.Temp. : 45 °C Carrier Gas : He 20 mL/min Detector : TCD

ALDEHYDES·KETONES

Porapak T and APS-201 yield good peak shapes for CO_2 and water, respectively. These packing materials are suitable for analysis of aldehydes and ketones when these components are included in the sample. The sensitivity will be low when analyzing formaldehyde with a FID. However, by methanizing or derivatizing the sample with 2,4-Dinitrophenylhydrazine, it can be analyzed at a low concentration level using FID or FTD.

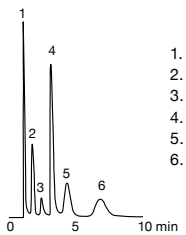
Fig.1 Formalin



1. Air
2. CO_2
3. HCHO
4. H_2O
5. CH_3OH

Column : Porapak T 50/80
SUS 2 m x 3 mm I.D.
Col.Temp. : 120 °C
Carrier Gas : He 24 mL/min
Detector : TCD 120 mA x 4 0.6 mL
(Headspace gas)

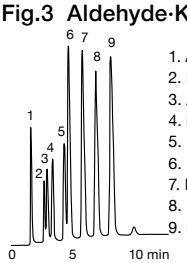
Fig.2 Aldehyde·Ketone



1. Formaldehyde
2. Acetaldehyde
3. Methanol
4. Water
5. Methyl ethyl ketone
6. Methyl iso-butyl ketone

Column : APS-201 20 % Flusin T 60/80
SUS 2 m x 3 mm I.D.
Col.Temp. : 90-130 °C (5 °C/min)
Carrier Gas : He 32 mL/min
Detector : TCD 110 mA x 128
Sample Size : 0.4 µL

Fig.3 Aldehyde·Ketone



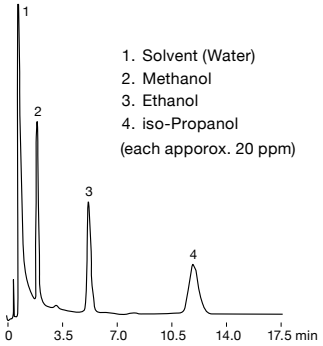
1. Acetaldehyde
2. Propion aldehyde
3. Acetone
4. iso-Butyraldehyde
5. *n*-Butyraldehyde
6. Methylethyl ketone
7. Methyl iso-propyl ketone
8. Methyl n-propyl ketone
9. Methyl iso-butyl ketone

Column : TCP 20 % Uniport R 60/80
SUS 3 m x 3 mm I.D.
Col.Temp. : 80-115 °C (5 °C/min)
Carrier Gas : He 35 mL/min
Detector : FID 10^2 x 256
Sample Size : 0.4 µL

ALCOHOLS · GLYCOLS

By using PEG or highly polar liquid phases, sharp peak shapes can be obtained for alcohol analysis. For trace analysis of multiple alcohols, derivatization of such alcohols is necessary by using a silylation reagent.
For trace analysis of methanol, PEG1000 is suitable. Gaskuropack 54, which is made of porous polymer beads, is often used for analysis of lower alcohols. It also can be used for analysis of residual solvents in pharmaceuticals, which are extracted with water (refer to Fig.1). Gaskuropack 55 can be used for glycol analysis. Symmetrical peaks can be obtained by combining Unisole 30T and Flusin P for higher alcohols. For trace analysis of multiple alcohols, derivatization of such alcohols is necessary by using a silylation reagent. For higher alcohol analysis, PEG-HT can be used. When the boiling point range of the sample is wide or isomers are included, we recommend using a capillary column. For analysis of impurities in methanol, sorbitol can be used as the stationary phase, which delays the elution of methanol.

Fig.1 Alcohol in Water

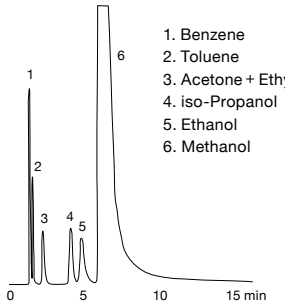


1. Solvent (Water)
2. Methanol
3. Ethanol
4. iso-Propanol

(each apporox. 20 ppm)

Column : Gaskuropack 54 60/80 Glass 2 m x 3 mm I.D.
Col.Temp. : 110 °C
Inj.Temp. : 250 °C
Carrier Gas : N_2 60 mL/min
Detector : FID 1 x 32
Sample Size : 2 µL

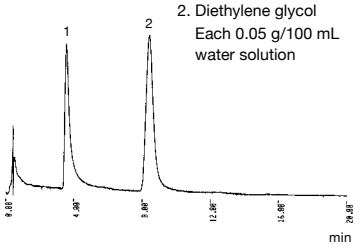
Fig.2 Impurities in Methanol



1. Benzene
2. Toluene
3. Acetone + Ethyl acetate
4. iso-Propanol
5. Ethanol
6. Methanol

Column : Sorbitol 25 % Gasport B 60/80 SUS 6 m x 3 mm I.D.
Col.Temp. : 100 °C
Carrier Gas : He 33 mL/min
Detector : FID 10 x 128
Sample Size : 0.4 µL

Fig.3 Ethylene Glycol· Diethylene Glycol



1. Ethylene glycol
2. Diethylene glycol

Each 0.05 g/100 mL water solution

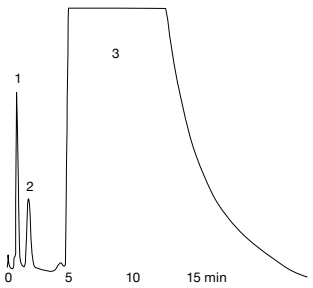
Column : Sorbitol 12 % Chromosorb W AW DMCS 80/100 Glass 1.5 m x 3 mm I.D.
Col.Temp. : 170 °C
Carrier Gas : N_2 64 mL/min
Detector : FID 10 x 32
Sample Size : 2 µL

AMINES

The Amipack 131 is our unique packing material for amine analysis. Generally the packing material, Diglycerol+TEP+KOH is used for the analysis of trace trimethyl amines. However, the Amipack 131 without addition of KOH is more stable (Fig.1). The Amipack 141 or Unicarbon B is useful for the analysis of mixture of lower amines (Fig. 2).
A variety of amines can be analyzed by using a relatively stable liquid stationary phase, Unisole 10T or adding KOH to PEG-HT (Fig. 3).

Fig.1 Trimethylamine

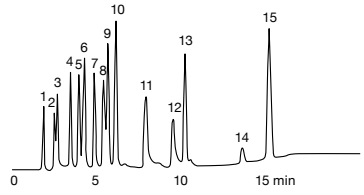
1. Trimethylamine 10 ppm
2. Diethylamine 10 ppm
3. Ethanol



Column : Amipack 131 80/100 Glass 3 m x 3 mm I.D.
Col.Temp. : 70 °C
Carrier Gas : N_2 40 mL/min
Detector : FID 10 x 8
Sample Size : 1 µL

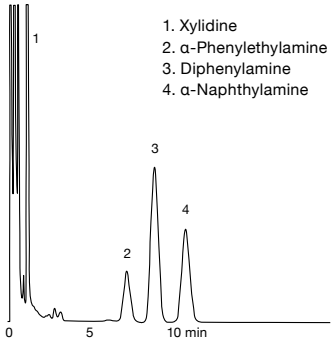
Fig.2 Amines by Amipack

1. Trimethylamine
2. Methylamine
3. Dimethylamine
4. Ethylamine
5. iso-Propylamine
6. *tert*-Butylamine
7. Diethylamine
8. *n*-Propylamine
9. Triethylamine
10. iso-Butylamine
11. *n*-Butylamine
12. Amylamine
13. Di-iso-butylamine
14. Unknown
15. Methyl cyclohexylamine



Column : Amipack 141 80/100 Glass 3 m x 3 mm I.D.
Col.Temp. : 70-180 °C (7.5 °C/min)
Detector : FID 10^3 x 16
Sample Size : 0.4 µL

Fig.3 Aromatic Amine



1. Xylidine
2. α-Phenylethylamine
3. Diphenylamine
4. α-Naphthylamine

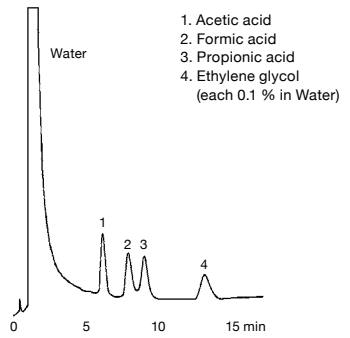
Column : PEG-HT+KOH (5+1) % Uniport HP 60/80 Glass 2 m x 3 mm I.D.
Col.Temp. : 180 °C
Carrier Gas : N_2 85 mL/min
Detector : FID 10 x 64
Sample Size : 1 µL

Applications

FATTY ACIDS

Unisole F-200 is the most suitable packing material for analysis of traces of lower fatty acids in water. Though there are few ghost peaks due to water, quantitative analyses can be performed at concentrations in the order of 10 ppm (Fig. 2). If a short column is used, lower fatty acids of up to about C14 can be analyzed. Sharp peaks can be obtained with the injection volume of 1 µL, at 200 °C of Inj.Temp. Formic acid and acetic acid are however eluted together. In order to separate them, the analysis must be carried out on a combination of PEG-6000 and Flusin P. (Fig. 1). Unisole 400 or FFAP is used for analysis of higher free fatty acids. (Fig. 3). To separate saturated from unstaturated fatty acids they must be esterified before analysis.

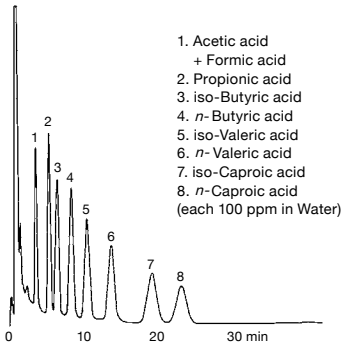
Fig.1 Formic acid·Acetic Acid



1. Acetic acid
2. Formic acid
3. Propionic acid
4. Ethylene glycol
(each 0.1 % in Water)

Column : PEG 6000 10 % Flusin P 30/60
Glass 2 m x 3 mm I.D.
Col.Temp. : 130 °C
Carrier Gas : He 40 mL/min
Detector : TCD 150 mA
Sample Size : 2 µL

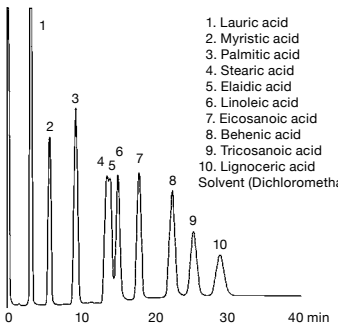
Fig.2 Free Fatty Acids in Water



1. Acetic acid
+ Formic acid
2. Propionic acid
3. iso-Butyric acid
4. *n*-Butyric acid
5. iso-Valeric acid
6. *n*-Valeric acid
7. iso-Caproic acid
8. *n*-Caproic acid
(each 100 ppm in Water)

Column : Unisole F-200 30/60
Galss 2 m x 3 mm I.D.
Col.Temp. : 140 °C
Carrier Gas : N_2 32 mL/min
Detector : FID 10 x 8
Sample Size : 1 µL

Fig.3 Higher Free Fatty Acids



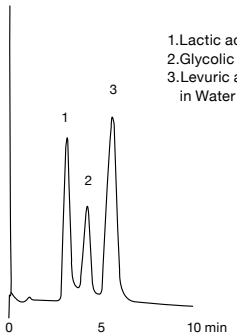
1. Lauric acid
2. Myristic acid
3. Palmitic acid
4. Stearic acid
5. Elaidic acid
6. Linoleic acid
7. Eicosanoic acid
8. Behenic acid
9. Tricosanoic acid
10. Lignoceric acid
Solvent (Dichloromethane)

Column : Unisole 400 5 %
Uniport S 60/80
Glass 1 m x 3 mm I.D.
Col.Temp. : 180-240 °C (3 °C/min)
Carrier Gas : N_2 68 mL/min
Detector : FID 10^3 x 4
Sample Size : 0.4 µL

ORGANIC ACIDS

Organic acids are more adsorptive than fatty acids, and the trace analysis is difficult without derivatization. Derivatized organic acids are often analyzed with polar polyester-based stationary phases. Hydroxylic acids or dicarboxylic acids can be analyzed by using Unisole 30T as the stationary phase (Fig. 1). However, at low concentrations, quantitative results cannot be inferred due to the unsymmetrical peaks. By adding phosphoric acid to Unisole 10T, symmetrical peaks can be obtained for organic acids (Fig. 3).

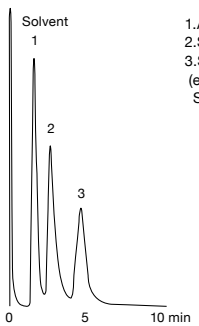
Fig.1 Hydroxy Acids



1.Lactic acid (3.6 %)
2.Glycolic acid (14.5 %)
3.Levuric acid (1.6 %)
in Water

Column : Unisole 30T 3 % Flusin P 60/80
Glass 1 m x 3 mm I.D.
Col.Temp. : 165 °C
Carrier Gas : N_2 45 mL/min
Detector : FID 10^3 x 4
Sample Size : 0.4 µL

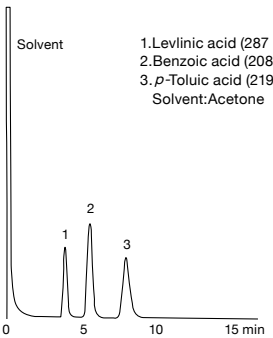
Fig.2 Dicarboxylic Acids



1.Adipic acid
2.Suberic acid
3.Sebacic acid
(each Apporox. 5 %)
Solvent : Methanol

Column : Unisole 30T 10 %
Uniport HP 80/100
Glass 0.5 m x 3 mm I.D.
Col.Temp. : 235 °C
Carrier Gas : N_2 27 mL/min
Detector : FID 10^3 x 4
Sample Size : 0.4 µL

Fig.3 Benzoic Acids



1.Levlinic acid (287 µg/mL)
2.Benzoic acid (208 µg/mL)
3.*p*-Toluic acid (219 µg/mL)
Solvent:Acetone

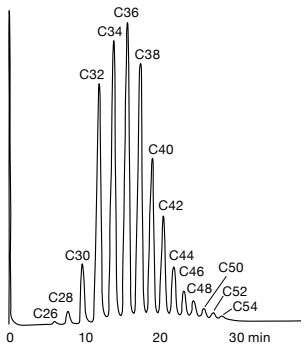
Column : Unisole 10T+H_3PO_4 (5+0.5) %
Uniport HP 80/100
Glass 1 m x 3 mm I.D.
Col.Temp. : 160 °C
Carrier Gas : N_2 63 mL/min
Detector : FID 10 x 64
Sample Size : 1 µL

ESTERS

Various kinds of ester determinations are associated with food analysis. Oils can be analyzed directly as triglycerides, or as methylesters of fatty acids by transesterification. For direct analysis as triglycerides, the sample is dissolved in a solvent such as hexane, and injected directly onto the gas chromatograph. In the case of samples containing a wide range of carbon chain lengths, such as fats in dairy products, the triglycerides are first classified into short, medium and long carbon chains by separation using TLC, then each class is extracted and analyzed separately for such analysis. A short column packed with a non-polar stationary phase with low loading, and high maximum operating temperature are chosen. Adsorption is unlikely and for analysis at high temperature, use of stailess steel column is highly recommened. Also in order to gain as many theoretical plates as possible, a fine mesh of support and columns of 2 mm ID are commonly used.

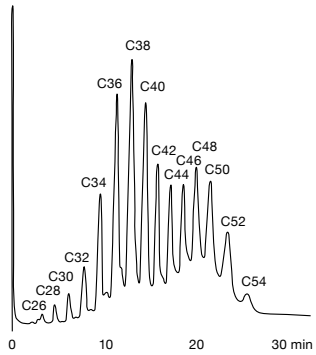
Figs. 1 and 2 are analysis of triglycerides in coconut oil and butter by GS-1 and OV-1, respectively. Alternatively, the oils can be esterified and analyzed as methyl esters of fatty acids. Three methods are generally used, i.e. boron trifluoride/methanol, sulfuric acid/methanol and sodium meth oxide. Here the boron trifluoride/methanol method is most common. In this method, the oil is first saponified by heating in a solution of sodium hydroxide/methanol, and the non-saponified residue is removed. To the saponified product, 14 % boron trifluoride/methanol solution is added, then conduct reaction mixture heated under refluxing in the water bath. When the reaction is completed, an ester layer is formed on methanol layer. After cooling, the ester is extracted by shaking vigorously with a mixture of petroleum ether and water, and the either layer is injected onto the gas chromatograph. In order to concentrate the methyl esters in the ether layer, unreacted compounds are completely removed by repeating the extraction several times until the aqueous layer shows no more acidity. Repeating the extraction also appears to be necessary to prolong the lifetime of the column. A fairly good separation of methyl esters of fatty acids of up to C22 can be obtained with Unisole-3000 (Fig. 4).

Fig.1 Triglycerides in Coconut Oil



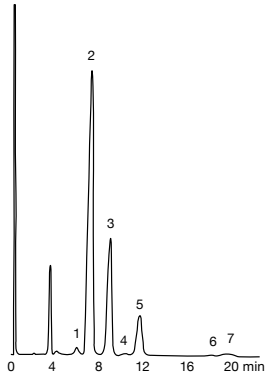
Column : Silicone GS-1 1 % Uniport HP 100/120 SUS 0.5 m x 2 mm I.D.
Col.Temp. : 180-320 °C (5 °C/min)
Carrier Gas : N_2 60 mL/min
Detector : FID 10^2 x 32
Sample Size : 1.0 µL

Fig.2 Triglycerides in Butter



Column : Silicone OV-1 1 % Uniport HP 100/120 SUS 0.5 m x 3 mm I.D.
Col.Temp. : 220-320 °C (5 °C/min)
Carrier Gas : N_2 16 mL/min
Detector : FID
Sample Size : 0.2 µL

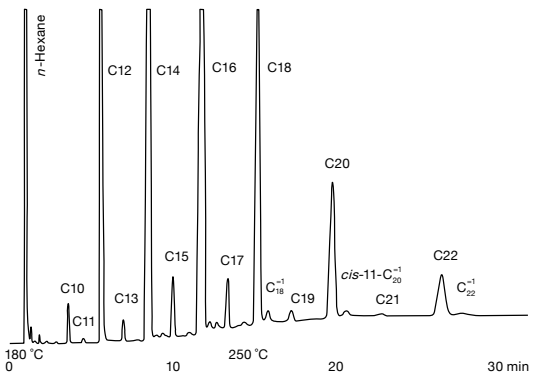
Fig.3 Rape Seed Oil Methyl Ester



1. Methyl stearate C18
2. Methyl oleate C18:1
3. Methyl linoleate C18:2
4. Methyl arachidate C20
5. Methyl linolenate C18:3
   +Methyl eicosenoate C20:1
6. Methyl docosanoate C22
7. Methyl erucate C22:1

Column : DEGS 15 % Uniport B 60/80 Glass 2 m x 3 mm I.D.
Col.Temp. : 190 °C
Carrier Gas : He 78 mL/min
Detector : FID 10^3 x 16
Sample Size : 0.3 µL

Fig.4 Methyl Esters of Whale Oil

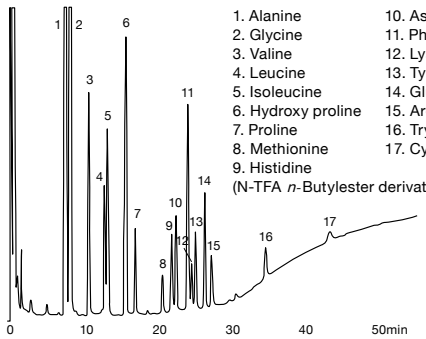


Column : Unisole 3000 Uniport C 80/100 Glass 3 m x 3 mm I.D.
Col.Temp. : 180-250 °C (5 °C/min)
Carrier Gas : N_2 29 mL/min
Detector : FID 10^2 x 32
Sample Size : 0.4 µL

BIO CHEMICALS

In the biochemical field, it is necessary to analyze a variety of samples, but direct sample analysis by GC is difficult since most analytes are non-volatile. These substances are converted to various derivatives before GC analysis.
Amino acids are the structural units of proteins. Amino acids have both amino and carboxyl groups, and as they are not volatile, they cannot be analyzed directly by GC. To convert them to volatile substances, the carboxyl groups are usually first esterified with a hydrochloric acid/butanol mixture or other reagents. The remaining amino groups are then converted to the TFA derivatives with TFAA, etc. Resultants, an N-acyl-alkyl esters, are then analyzed. Alternatively, amino acids may be converted to derivatives in one step with a silylating reagent such as BSTFA which silylates both functional groups. After that the derivatives can then be analyzed. Silylated derivatives may not give a single peak, depending on the reaction temperature, time and catalyst for reaction. Furthermore, as amino acids have an asymmetric carbon atom, optical isomers exist. Optical isomers can then be separated on capillary columns with the optically active stationary phases, such as InertCap CHIRAMIX, which are suitable for the analysis of ordinary derivatives of amino acids. They may also be combined with an optically active reagent such as TPC, and converted to diastereoisomers, and then analyzed on an ordinary capillary column.

Fig.1 Amino Acid · N-TFA · n-Butylester

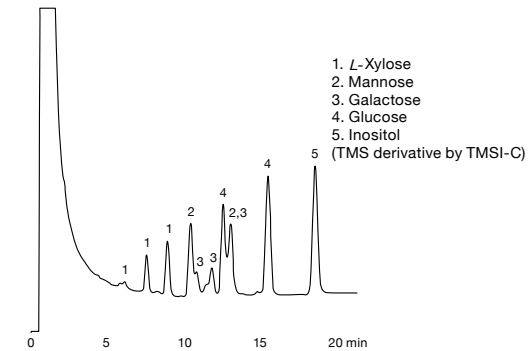


Column : Apiezon grease M 10 % Uniport HP 100/120
Glass 3 m x 2 mm I.D.
Col.Temp. : 100-260 °C (5 °C/min)
Carrier Gas : N_2 50 mL/min
Detector : FID 10^3 x 4
Sample Size : 3 µL

SUGARS

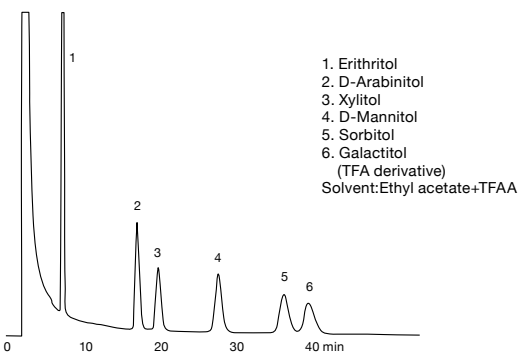
Sugars are found in almost every food. GC is widely used for its trace analysis due to its high resolution efficiency and ability of effective quantitation. Sugars, however, cannot be analyzed directly. Polysaccharides and large oligosaccharides must be decomposed into their component monosaccharides, and converted to derivatives before analysis.
Hydrolysis or methanolysis are used for the common decomposition. In methanolysis, the sugar is heated in a mixture of HCl/methanol so as to give the methyl glycosides of the component monomers. HCl concentration must be varied depending on the sample, and it is convenient to use a prepared HCl/methanol reagent which is adjusted to the desired concentration with anhydrous methanol. After neutralization, the sugar obtained is silylated and analyzed by GC. In the case of aminosaccharides, it is first necessary to acetylate the amino group.
As the silylation reagent, TMSI-H or TMSI-C can be used. TMSI-C, in particular, has the advantage that the reaction proceeds even when a small amount of water exists, and it is therefore suitable for analysis of monosaccharides in aqueous solution. After methanolysis, sugars exist as a mixture of α and β anomers in pyranose and furanose forms which give several peaks, resulting in difficult identification. In order to obtain a single peak from each sugar, the sugar should be first reduced with sodium borohydride and then the resultant sugar alcohol is acetylated prior to the analysis. Care should be taken as some sugars replaced to give the same sugar alcohol. The packing material have to be changed with the components to be separated; however, it is better to choose a stationary phase that can withstand high temperatures, and a silanized support such as Uniport HP.

Fig.1 TMS Derivatives of Sugar in Water



Column : Silicone OV-101 3 % Chromosorb W AW DMCS 80/100
Glass 2 m x 3 mm I.D.
Col.Temp. : 150-220 °C (3 °C/min)
Carrier Gas : N_2 42 mL/min
Detector : FID 10^2 x 8
Sample Size : 1 µL

Fig.2 TFA Derivatives of Sugar Alcohols



Column : Silicone OV-105 2 % Uniport HP 80/100
Glass 3 m x 3 mm I.D.
Col.Temp. : 130 °C
Carrier Gas : N_2 20 mL/min
Detector : FID 10^2 x 8
Sample Size : 1 µL

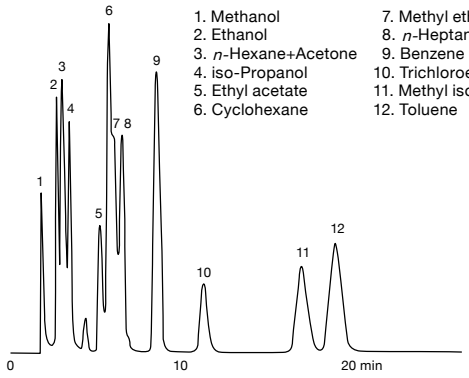
Solvents

Analysis of solvents is needed in environmental studies; however, choosing a packing material to be able to separate all organic components is difficult. It is recommended that selection may be made by consulting literature on the subject, e.g. “Gas Chromatographic Retention Data”, from which the figurers below taken.

GL Sciences supplies 2 types of packing for solvent analysis, BX-10 and BX-100.

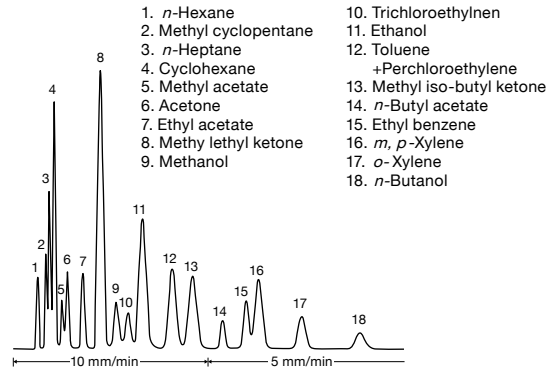
BX-10 gives the best separation for solvent analysis, and good peaks even for quantification of trace amounts of alcohols. However, it is not suitable for samples containing water or air (Fig. 2). BX-100 is suitable for trace analysis of solvents in air, and the analysis can be carried out without any risks of air causing oxidative decomposition. Its mechanical strength and maximum operating temperature are low (Fig. 4). Porous polymers are also often used in solvent analysis. Gaskuropack 54, for example, is suitable for analysis of organic solvents in water or air (Fig. 5). Gaskuropack 55 is suitable for trace analysis of polar substances, but not for injection of large quantities of water or air (Fig. 6). In addition, Unisole 30T with its wide field of applications can be used for solvents analysis (Fig. 7). Unisole F-200 is used for separation of low free fatty acids. It may also be suitable for analyzing solvent traces in water giving ghost peaks (Fig. 8).

Fig.1 Solvents



Column : DOP 30 % Uniport R 60/80 SUS 3 m x 3 mm I.D.
Col.Temp. : 100 °C
Carrier Gas : He 45 mL/min
Detector : FID 10^2 x 64
Sample Size : 0.2 µL

Fig.2 Solvents



Column : BX-10 60/80 SUS 3 m x 3 mm I.D.
Col.Temp. : 85 °C
Carrier Gas : N_2 30 mL/min
Detector : FID 10^2 x 256
Sample Size : 0.3 µL

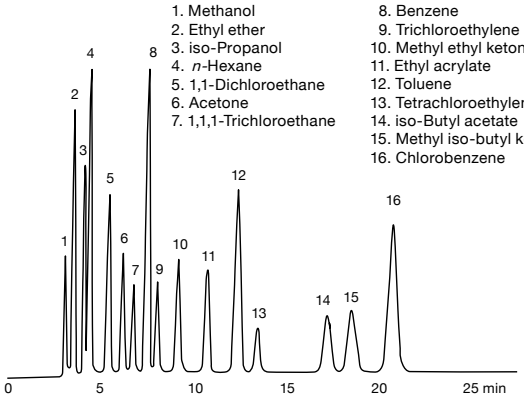
Retention Index (120 °C)

	Apiezon L	DOP	Silicone DC-550	PPE 5ring	PEG 600	PEG 1000	PEG 20M	TCP
Methanol	336	486	425	503	936	905	862	629
Ethanol	403	563	498	578	974	944	893	689
n-Propanol	513	672	610	703	1084	1048	1000	795
iso-Propanol	450	602	539	615	965	933	883	713
n-Butanol	620	782	720	816	1199	1160	1111	908
iso-Butanol	584	742	680	766	1136	1101	1055	861
Acetone	441	589	554	648	871	849	815	690
MEK	552	691	663	758	950	935	904	787
MIBK	703	829	802	889	1057	1040	1012	917
Methyl acetate	470	592	575	664	852	847	824	680
Ethyl acetate	551	668	663	741	910	903	879	754
n-Butylacetate	756	869	864	945	1108	1094	1066	954
iso-Butylacetate	712	823	818	890	1043	1033	1005	902
Methylcellosolve	591	763	715	843	1268	1222	1159	917
Ethylcellosolve	666	828	786	907	1308	1264	1203	–
n-Butylcellosolve	863	1031	981	1102	1489	1447	1392	1171
Methylcellosolveacetate	756	919	911	1038	1306	1275	1235	1057
Ethylcellosolveacetate	824	983	975	1100	1345	1314	1280	1181
n-Pentane	500	500	500	500	500	500	500	500
n-Hexane	600	600	600	600	600	600	600	600
Cyclohexane	691	693	699	729	746	753	756	718
Benzene	683	750	733	821	976	975	961	824
Toluene	796	860	839	928	1075	1075	1061	933
o-Xylene	926	991	970	1075	1227	1219	1213	1072
m-Xylene	901	963	940	1044	1176	1173	1173	1034
p-Xylene	899	964	938	1037	1172	1167	1166	1029
Ethylbenzene	884	947	933	1026	1165	1159	1152	1023
Methylchloride	526	636	603	671	924	932	914	715
Water	341	471	513	498	1120	1062	990	620

Applications

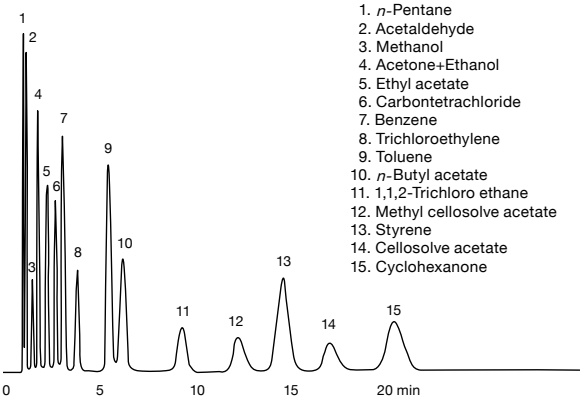
SOLVENTS

Fig.3 Solvents



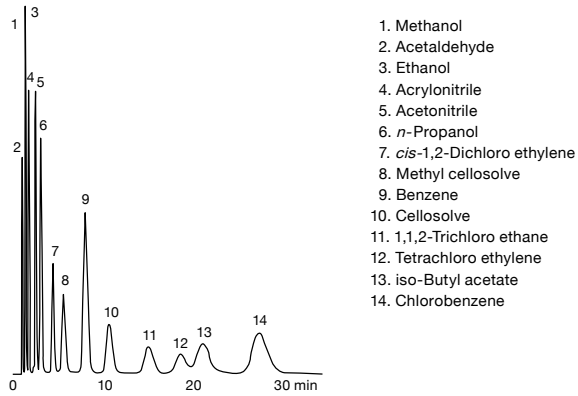
Column : BX-20 100/120
SUS 6 m x 2 mm I.D.
Col.Temp. : 90 °C
Carrier Gas : He 20 mL/min
Detector : FID 10^3 x 16
Sample Size : 0.4 µL

Fig.4 Solvents



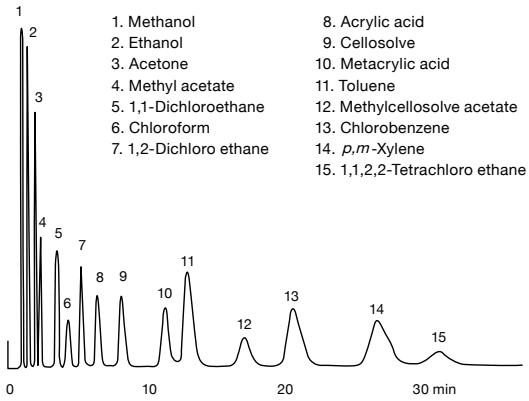
Column : BX-100 60/80
Glass Col. 3 m x 3 mm I.D.
Col.Temp. : 110 °C
Carrier Gas : N_2 35 mL/min
Detector : FID 10^3 x 16
Sample Size : 0.4 µL

Fig.5 Solvents



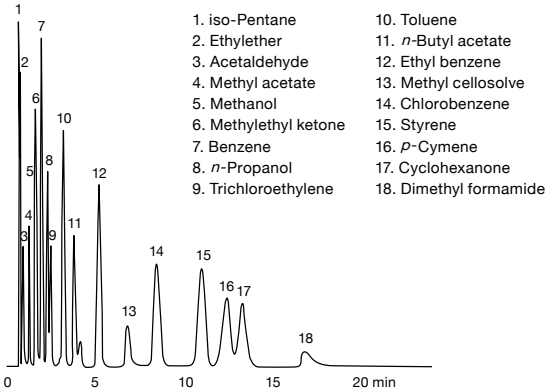
Column : Gaskuropack 54 60/80
Glass 2 m x 3 mm I.D.
Col.Temp. : 180 °C
Carrier Gas : N_2 35 mL/min
Detector : FID 10^3 x 32
Sample Size : 0.4 µL

Fig.6 Solvents



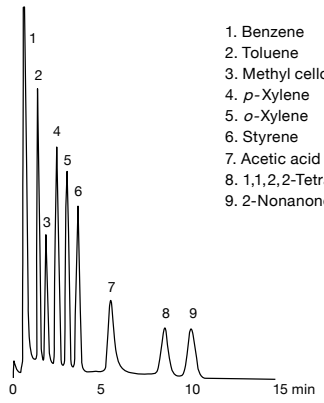
Column : Gaskuropack 55 60/80
Glass 2 m x 3 mm I.D.
Col.Temp. : 180 °C
Carrier Gas : N_2 35 mL/min
Detector : FID 10^3 x 32
Sample Size : 0.4 µL

Fig.7 Solvents



Column : Unisole 30T 5 % Uniport HP 80/100
Glass 2 m x 3 mm I.D.
Col.Temp. : 70 °C
Carrier Gas : N_2 30 mL/min
Detector : FID 10^3 x 64
Sample Size : 0.4 µL

Fig.8 Solvents in Water



Column : Unisole F-200 30/60
Glass 2 m x 3 mm I.D.
Col.Temp. : 110 °C
Carrier Gas : He 25 mL/min
Detector : FID 10 x 1
Sample Size : 1 µL

Retentions Time of Solvents

		Packing Material						
		①	②	③	④	⑤	⑥	⑦
Hydrocarbons	n-Pentane	0.97	0.88	1.01	4.16	2.36	0.67	0.80
	n-Hexane	1.21	1.20	1.33	8.48	4.38	0.72	0.92
	n-Heptane	1.66	1.79	1.97	18.10	8.40	0.84	1.15
	n-Octane	2.55	2.89	3.20	39.30	16.47	1.06	1.55
	n-Nonane	4.24	5.19	5.59	81.40	31.52	1.51	2.29
	n-Decane	7.47	9.15	10.20	–	65.50	2.41	3.63
	iso-Pentane	0.93	0.85	0.95	3.72	2.19	0.66	0.77
	iso-Octane	1.57	1.85	1.88	22.19	10.56	0.79	1.13
	Methyl cyclopentane	1.52	1.44	1.66	8.65	5.05	0.81	1.05
	Methyl cyclohexane	2.33	2.27	2.68	18.93	10.36	1.00	1.41
	Cyclohexane	1.85	1.69	1.98	9.69	5.71	0.90	1.19
Alcohols	Methanol	4.18	0.80*	1.44*	1.17	0.95	1.32*	1.15
	Ethanol	5.07	0.99*	1.83	1.89	1.41	1.54	1.25
	n-Propanol	9.28	1.48*	3.08	3.76	2.59	2.55	1.80
	n-Butanol	18.34	2.43*	5.67	8.07	5.17	4.66	2.87
	iso-Propanol	4.97	1.14*	1.99	2.85	2.04	1.49	1.28
	iso-Butanol	12.84	1.99*	4.39	6.64	4.45	3.38	2.29
	sec-Butanol	8.83	1.76*	3.40	6.05	3.85	2.40	1.84
	tert-Butanol	4.58	1.28*	2.06	4.37	2.73	1.36	1.28
	iso-Amylalcohol	33.15	9.23*	9.49	14.87	9.50	6.67	3.67
	Cyclohexanol	110.11	9.51*	27.58	37.29	24.19	23.17	9.03
Aromatic hydrocarbons	Benzene	3.59	2.09	3.23	9.57	6.01	1.77	1.69
	Toluene	6.31	3.52	5.89	20.76	12.19	2.85	2.59
	Ethylbenzene	10.49	5.97	10.31	39.99	21.29	4.61	3.96
	p-Xylene	11.42	6.22	11.04	42.53	23.52	4.80	4.20
	m-Xylene	11.42	6.28	11.04	42.53	23.52	5.00	4.20
	o-Xylene	14.55	7.65	13.58	48.83	27.75	6.32	5.05
	Styrene	19.16	7.77	16.37	46.52	27.05	9.65	6.07
	p-Cymene	–	13.94	27.39	–	62.29	11.38	8.79
	Chlorobenzene	15.26	6.37	12.71	31.19	19.45	7.70	4.84
	o-Dichlorobenzene	87.54	20.65	57.91	95.74	62.97	33.09	14.79
Esters	Methyl acetate	2.18	1.51	1.69	3.33	2.27	1.13	1.16
	Ethyl acetate	2.98	2.19	2.32	6.20	3.95	1.36	1.40
	n-Propyl acetate	4.93	3.66	3.78	13.09	7.64	2.01	1.95
	n-Butyl acetate	8.77	6.35	6.83	28.63	15.23	3.40	3.01
	iso-Propyl acetate	3.32	2.71	2.65	10.15	5.59	1.44	1.51
	iso-Butyl acetate	6.45	5.22	5.05	23.72	11.87	2.47	2.39
	iso-Amyl acetate	12.31	9.17	9.85	53.52	24.07	4.57	3.99
	Methyl methacrylate	5.29	3.27	4.10	11.76	7.09	2.37	2.05
	Methyl acrylate	3.53	2.16	2.64	5.99	3.93	1.70	1.52
	Ethyl acrylate	5.60	3.16	4.53	11.07	6.37	2.23	1.95
Chlorinated hydrocarbons	Dichloromethane	2.64	1.91	1.80	3.44	2.28	1.50	1.34
	Trichloroethylene	4.58	2.30	3.98	9.81	6.36	2.24	1.91
	1, 1, 1-Trichloroethane	2.78	1.88	2.67	8.24	5.05	1.39	1.41
	Tetrachloroethylene	6.33	4.02	6.58	20.52	11.64	2.85	2.65
	1, 2-Dichloroethane	5.68	2.30	4.03	6.89	4.77	3.08	2.05
	1, 1, 2-Trichloroethane	16.54	4.24	10.21	16.53	10.51	9.70	4.47
	1, 1, 2, 2-Tetrachloroethane	13.69	9.53	36.56	43.08	27.03	44.69	13.16
	Carbon tetrachloride	4.68	1.78	2.73	8.89	5.37	1.36	1.43
	Chloroform	4.80	1.53	3.20	5.73	3.92	2.45	1.68
	cis-1, 2-Dichloroethylene	3.97	1.65	2.93	5.12	3.31	2.05	1.66
	1, 1-Dichloroethane	2.60	1.47	2.15	4.92	3.28	1.34	1.28
	Freon 11	0.94	1.22	0.78	3.58	2.26	0.70	0.65
	Freon 12	0.92	0.91	0.75	1.44	1.29	0.78	0.52
	Freon 114	0.92	0.96	0.76	2.50	1.04	0.71	0.54
Cellosolves	Methyl cellosolve	25.59	2.85*	6.91	6.93	4.62	5.79*	3.12
	Cellosolve	26.66	3.88*	9.31	13.00	7.74	7.65*	4.01
	Butyl cellosolve	–	10.91*	29.17	58.67	29.00	23.26*	10.60
	Methyl cellosolve acetate	25.13	9.47	12.99	26.68	15.11	9.57	5.16
	Cellosolve acetate	27.53	12.46	19.04	50.31	25.40	12.55	6.80
Ether	Ethyl ether	1.17	0.95	1.16	3.45	2.05	0.71	0.85
Aldehydes	Acetaldehyde	1.43	0.99	1.09	1.32	1.03	0.78	0.83
	Acrolein	2.37	1.52	1.78	2.41	1.75	1.15	1.09
Oxides	Dioxane	7.68	3.57	5.19	9.79	6.64	3.21	2.41
	Tetrahydrofuran	3.36	2.03	2.67	5.63	3.99	1.31	1.40
Amides	Dimethylformamide	59.00*	17.23*	23.77*	12.76	9.33	13.89*	8.00*
	Acrylamide	–	–	–	24.49	23.83	–	–
Ketones	Acetone	2.31	1.74	1.76	2.73	1.89	1.07	1.09
	MEK	3.63	2.63	2.72	5.55	3.43	1.48	1.43
	MIBK	7.22	5.64	5.61	19.57	10.04	2.50	2.32
	Cyclohexanone	36.36	18.09	22.60	36.17	21.96	12.27	7.84
	2-Hexanone	12.06	7.41	8.85	24.35	13.99	3.14	2.85
	2-Methylcyclohexanone	47.54	20.65	30.89	64.70	38.38	11.45	7.91
Nitriles	Acrylonitrile	4.18	2.14	2.40	2.19	1.81	2.01	1.48
	Acetonitrile	4.44	2.24	2.58	3.04	2.29	2.16	1.47
Acids	Acrylic acid	–	2.14*	–	6.32	6.08	–	20.29
	Methacrylic acid	–	2.24*	–	12.72	10.64	–	32.33
	Acetic acid	–	3.31*	17.17*	3.48	3.78	22.83*	8.06
	n-Propionic acid	–	5.45*	32.36*	7.32	6.92	40.15*	14.46
	iso-Butyric acid	–	7.16*	42.18*	12.72	10.65	49.22*	18.51
	n-Butyric acid	–	9.02*	59.98*	14.84	12.66	72.74*	26.08
Inorganic	Water	10.41*	0.93*	1.23*	0.83	–	4.31*	1.51*

*: Tailing peak

Note: ① BX-10 60/80 Glass 3 m x 3 mm I.D. 85 °C N_2 35 mL/min ② BX-20 100/120 SUS 3 m x 2 mm I.D. 90 °C N_2 35 mL/min
③ BX-100 60/80 Glass 3 m x 3 mm I.D. 110 °C N_2 35 mL/min ④ Gaskuropack 54 60/80 Glass 2 m x 3 mm I.D. 180 °C N_2 35 mL/min
⑤ Gaskuropack 55 60/80 Glass 2 m x 3 mm I.D. 180 °C N_2 35 mL/min ⑥ Unisole 30T 5 % Uniport HP 80/100 Glass 2 m x 3 mm I.D. 70 °C N_2 29 mL/min
⑦ Unisole F-200 30/60 Glass 3 m x 3 mm I.D. 110 °C N_2 30 mL/min

Accessories for Shimadzu GCs

Shimadzu GC Glass Columns

GC-7A/9A/12A/14A/14B/15A/16A/2014

Length	5 mm O.D. x 3.2 mm I.D.	5 mm O.D. x 2.6 mm I.D.
	Cat.No.	Cat.No.
0.6 m	3003-34506	3003-34406
1.1 m	3003-34511	3003-34411
1.6 m	3003-34516	3003-34416
2.1 m	3003-34521	3003-34421
3.1 m	3003-34531	3003-34431
4.1 m	3003-34541	3003-34441
5.1 m	3003-34551	3003-34451

When 3 m or longer column is installed in the injection port at the same time, use the following column for 14G.

GC-14G

Length	5 mm O.D. x 3.2 mm I.D.
	Cat.No.
3.1 m	3003-38531
4.1 m	3003-38541
5.1 m	3003-38551

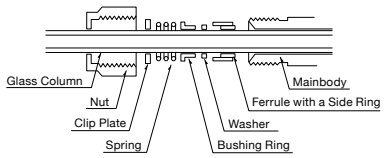
GC-17A/18A

Length	5 mm O.D. x 2.6 mm I.D.
	Cat.No.
1.0 m	3003-39510
2.0 m	3003-39520
3.0 m	3003-39530

GC-8A (2 pcs/set)

Length	5 mm O.D. x 3.2 mm I.D.	5 mm O.D. x 2.6 mm I.D.
	Cat.No.	Cat.No.
1.0 m	3003-37510	3003-37410
2.0 m	3003-37520	3003-37420
3.0 m	3003-37530	3003-37430

Ferrules with Side Ring



Ferrules with a Side Ring

Model	Description	Contents of	Cat.No.
GI-5SB	Shimadzu attachment lug	Nut, Holding ring, Spring, 2 pcs Washer (GI-5S, 10 pcs)	3001-21002
GI-5S	Graphite with a side ring	Graphite ferruel with a side ring and washer (10 pcs)	3007-14152

Liners

Liner for packed columns

Applications	Shimadzu No.(Ref.)	Inertness	Qty.	Cat.No.
7A, 9A-16A 3 mm I.D.	221-14093	No ne	2 pcs	3001-16115
7A, 9A-16A 2.6 mm I.D.	221-14094	No ne	2 pcs	3001-16117
17A Packed columns	221-41484	No ne	1 pc	3001-16119

SUS Column Adaptors & Packing

Description	Cat.No.
SUS Column Adaptor (INJ.)	3001-67002
SUS Column Adaptor (DET.)	3001-67001
Column Packing Aluminum (100 pcs)	3007-16201

Shimadzu GC SUS columns

Common Type

4 mm O.D. x 3 mm I.D. (exception 5A, 3B)

Length	Cat.No.	Length	Cat.No.
0.5 m	3003-81305	3.0 m	3003-81330
1.0 m	3003-81310	4.0 m	3003-81340
1.5 m	3003-81315	5.0 m	3003-81350
2.0 m	3003-81320	6.0 m	3003-81360

Accessories for GL Sciences GCs

Glass Columns for GL Sciences GCs

GC-4000/390B

For FID without insert.

6.2 mm O.D., box nut and ferrule are not included.

Length	6.2 mm O.D. x 3 mm I.D.	6.2 mm O.D. x 4 mm I.D.
	Cat.No.	Cat.No.
1.0 m	3003-56310	3003-56410
1.5 m	3003-56315	3003-56415
2.0 m	3003-56320	3003-56420
2.5 m	3003-56325	3003-56425
3.0 m	3003-56330	3003-56430

Note: 2 pcs x 3 m length glass column cannot be installed in the same oven.
Please contact us for inquired.

For FID with insert.

6.2 mm O.D., box nut and ferrule are not included.

Length	6.2 mm O.D. x 3 mm I.D.	6.2 mm O.D. x 4 mm I.D.
	Cat.No.	Cat.No.
1.0 m	3003-57410	3003-57510
1.5 m	3003-57415	3003-57515
2.0 m	3003-57420	3003-57520
2.5 m	3003-57425	3003-57525
3.0 m	3003-57430	3003-57530

Accessories

Nut and ferrule set.

Description	Qty.	Cat.No.
Glass Column Installation Set	1 set	2701-23530

GC-4000/390B TCD

Description	Cat.No.
Glass Column for TCD 6.2 x 3 x 1.0 m	3003-57310
Glass Column for TCD 6.2 x 3 x 2.0 m	3003-57320
Glass Column for TCD 6.2 x 3 x 3.0 m	3003-57330

Accessories

Description	Cat.No.
Lead Tube for Glass Column of GC-4000/390B TCD	3003-57000

GC-3200

6.2 mm O.D., box nut and ferrule are not included.

Column I.D.	6.2 mm O.D. x 3 mm
Length	Cat.No.
1.0 m	3003-57610
1.5 m	3003-57615
2.0 m	3003-57620
2.5 m	3003-57625
3.0 m	3003-57630

GL Sciences GC Glass Column Accessories

Glass Liner

Description	Qty.	Cat.No.
Glass Liner	2 pcs	2701-22753

Liner Spacer/Liner Ring

Description	Qty.	Cat.No.
SUS Column Adaptor 1/8 in. for Liner Injection Port	1 pc	2701-22751

Accessories for GL Sciences GCs

SUS Columns for GL Sciences GCs

GC-4000/390B/380

GC390B uses only 1/8 in. column with winding diameter approx. 15 cm with nut & ferrule.

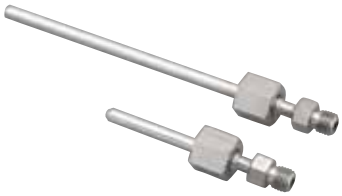
Column ID	1/8 in. x 2.2 mm	1/4 in. x 4.35 mm
Length	Cat.No.	Cat.No.
0.5 m	3003-61905	3003-61505
1.0 m	3003-61910	3003-61510
1.5 m	3003-61915	3003-61515
2.0 m	3003-61920	3003-61520
2.5 m	3003-61925	3003-61525
3.0 m	3003-61930	3003-61530
4.0 m	3003-61940	3003-61540
5.0 m	3003-61950	–

GC-3200/323

Winding diameter 10 cm. 1/8 in. O.D. x 2.2 mm I.D., with nut and ferrule.

Length	Cat.No.
0.5 m	3003-61405
1.0 m	3003-61410
1.5 m	3003-61415
2.0 m	3003-61420
2.5 m	3003-61425
3.0 m	3003-61430
4.0 m	3003-61440
5.0 m	3003-61450

GL Sciences GC SUS Column Adaptors



GL Sciences GC SUS Column Adaptors

GC-4000/390B/380

Description	Qty.	Cat.No.
SUS column adaptor 1/8 in. for injection port	1 pc	2701-26240
SUS column adaptor 1/4 in. for injection port	1 pc	2701-26241
SUS column adaptor 1/8 in. for FID	1 pc	2701-26250
SUS column adaptor 1/4 in. for FID	1 pc	2701-26251
SUS column adaptor set 1/8 in.	1 pc	2701-26260
SUS column adaptor set 1/4 in.	1 pc	2701-26261

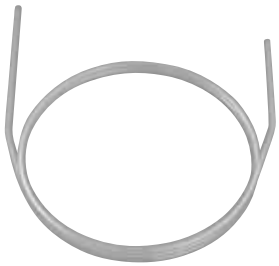
GC-3200

Description	Qty.	Cat.No.
SUS column adaptor 1/8 in. for injection port	1 pc	2701-22751
SUS column adaptor 4 mm for injection port	1 pc	3001-57000
SUS column adaptor 4 mm for TCD	1 pc	3001-57001
GC-3200 SUS column adaptor set 4 mm	1 pc	3001-57003
SUS column adaptor for injection port 1/4 in.	1 pc	3001-57004
GC-3200 SUS column adaptor set 1/4 in.	1 pc	3001-57006
Graphite ferrule GI-1/4	10 pcs	3007-14164

Accessories for Agilent GCs

Glass Columns/Accessories for Agilent GCs

6890 : FID/NPD/ECD/old type FPD
7890 : FID/NPD/ECD



I.D.	2 mm	I.D.	4 mm
Length	Cat.No.	Length	Cat.No.
3.0 feet	–	3.0 feet	3003-59403
4.0 feet	3003-59204	4.0 feet	3003-59404
6.0 feet	3003-59206	6.0 feet	3003-59406
8.0 feet	3003-59208	8.0 feet	3003-59408
10.0 feet	3003-59210	10.0 feet	3003-59410

Note: If an injection port and a detector are not at a parallel position, please contact us.

Length	Cat.No.
1.0 m	3003-59310
2.0 m	3003-59320
3.0 m	3003-59330

Note: If an injection port and a detector are not at a parallel position, please contact us.

Ferrules

Description	Qty.	Cat.No.
Graphite Ferrule GI-1/4	10 pcs	3007-14164
15 % Graphite/85 % Vespel Ferrule GV-1/4	10 pcs	3007-31135

SUS Columns for Agilent GCs

I.D.	1/8 in. x 2.2 mm
Length	Cat.No.
2.0 feet	3003-83202
4.0 feet	3003-83204
6.0 feet	3003-83206
8.0 feet	3003-83208

Wool (Quartz・Glass・PTFE)

The quartz wool is used for fixing GC packings.

Description	Treatment	Weight	Cat.No.
Quartz Wool Fine (1-6 µm)	–	5 g	3001-12401
	–	10 g	3001-12402
	–	100 g	3001-12403
	Silane treated	5 g	3001-12404
	H_3PO_4 treated	5 g	3001-12405
PTFE Wool		10 g	3001-12601

Note: Max. temp.: Quartz wool 800 °C. Silane treated 350 °C, H_3PO_4 Treated 250 °C
Glass wool 500 °C, PTFE wool 200 °C

Column Name Plates

The column name plates are used to indicate the contents of prepared column. Information such as column material, mesh range etc. can be written on the plates with a ball-point pen or iron pen.

Writing area : 50 x 18 mm
Max. temperature : 450 °C

Description	Qty.	Cat.No.
Column Name Plate	50 pcs	3001-13001

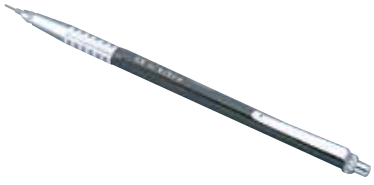
Column Tags

These tags are used to indicate the contents of GC columns. There are embossed and plain type.

Writing area : 53 x 27 mm

Description	Qty.	Cat.No.
Column Tag (Embossed)	30 pcs	3001-13103
Column Tag (Plain)	50 pcs	3001-13104

Iron Pen For Name Plates



This is used to write information on name plates or tags, and also can be used for marking on hard surface like metal.

Description	Cat.No.
Iron Pen for Name Plates/Tags	3001-13401

Notes:

CONSUMABLES AND SUPPLIES

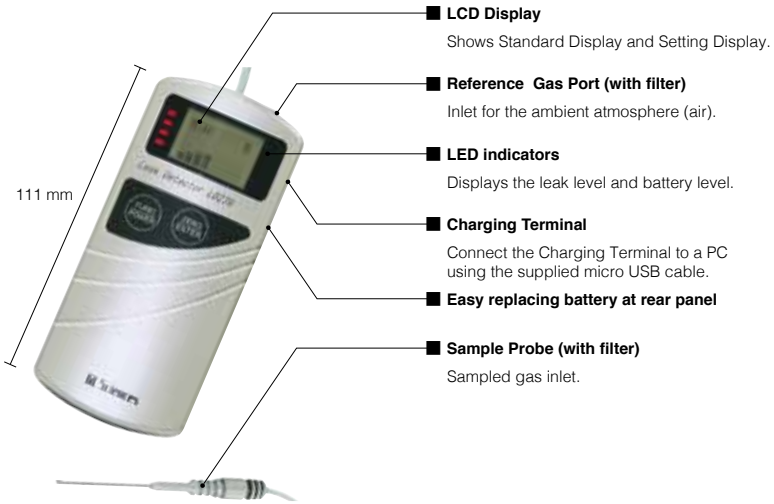
GC ACCESSORIES

Leak Detector LD239 (Not available in Taiwan, Australia or Russia)

Gas Leak Detector LD239

LD239

Gas leaks can cause detector noise and baseline instability, shorten column life and waste expensive carrier gas. GL Sciences' LD239 leak detector is an easy way to quickly identify leaks in your system.
LD239 provides the most sensitive He leak detection inexpensively. LD239 is compact, USB rechargeable and easy-to-use.



Specifications

Detector: Thermal Conductivity
Sensitivity: Selectable in two ranges
Standard Range: Helium 0.005 mL/min in atmosphere
High Range: Helium 0.0005 mL/min in atmosphere
Target Gases: Helium, CO_2, Ar, Ne, etc.
(gases that are largely different from referential gas)
※ Nonflammable and noncorrosive atmosphere is inevitable.
Display: LCD display with 8 bar graphs, 8 LED lamps,
LCD display for Parameter setting
Operating Temp. Range : 10 to 40 °C
Dimension: 50 (W) x 20 (D) x 111 (H) mm
Weights: Approx. 95 g
Battery and Recharger: Rechargeable lithium-ion battery, USB cable
Charging Time: Max. 2.5 hours
Continues Operation: Approx. 5 hours (with a new, fully charged batteries, Std. Range, Buzzer OFF, LED OFF, LCD Backlight OFF)

The lithium-ion battery used in the LD239 does not comply with battery regulations in Taiwan, Australia or Russia.

Description	Cat.No.
Gas Leak Detector LD239	2702-19340

Description	Details	Cat.No.
Battery for LD239		2702-19341
Sample Filter	For Replacing Sample Prove	2702-19333
Reference Filter	For Replacing Reference Port	2702-19334
USB Cable	For Battery Charging	2702-19331

Digital Flowmeter GF1010

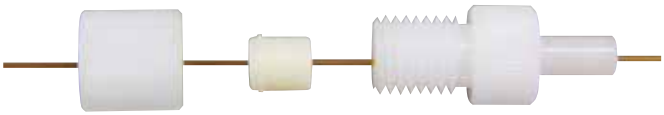
Silicone cover (Option)

Digital Flowmeter GF1010

The new compact portable GF1010 gas flow meter makes gas flow measurements easier and more accurate, helping to eliminate user errors. The GF1010 is an essential tool for troubleshooting and routine maintenance of your gas chromatograph. The LCD display with back light makes flow rate legible. Silicone cases are available to protect the flowmeter from shock.

Column Adaptors (Option)

It is used when the flow rate of a capillary column is measured. The tube is connected to GF1010 and tightened with a nut. 0.25 – 0.53 mm I.D. columns can be connected.



TCD Vent Adaptor (Option)

1/8 in. SL type TCD Vent Adaptor can be inserted to TCD vent to connect with GF 1010.

Specifications

Measurable Flow Range: 0.5 – 1200 mL/min (Display range: -0.1 – 1400 mL/min)
Accuracy: ± 3 % or ± 0.3 mL/min. whichever is greater (Calibration gas: N_2)
Operating Temp. Range: 10 – 40 ˚C (Operating Temp. range where the accuracy is guaranteed: 15 – 30 ˚C)
Tube: 3 mm I.D., 7 mm O.D. (Operating Temp.: up to 200 ˚C)
Measurable Gases: N_2, Air, He, Ar, H_2 or etc.
Caution) Do not use the flowmeter to measure corrosive and humid gas
Battery: 2 AA
Standard: WEEE, RoHS, CE
Dimensions: 76 (W) x 135 (D) x 35 (H) mm
Weight: Approx. 240 g (without battery)

Description	Cat.No.
Gas Flow Meter GF1010	2709-10100
GF1010 Silicone Tube (Replacement)	2709-10102
Silicone Case (Navy Blue)	2709-10110
TCD Vent Adaptor (1/8 in.)	2709-10103
Column Adaptor	2709-55015

Inlet Liners & O-rings

Inlet Liners for Agilent GCs

To avoid scratches and contamination from air, liners for Agilent are packed in blister packs used for the medical tablets. Due to the deactivation treatment under 420 °C, the liners avoid sample adsorption and degradation, and are effective for highly sensitive analyses.

Type		Details	Deactivated	Qty.	Agilent P/N	Cat.No.
Split		Single Tapered Quartz Wool (fixed) Focus Liner	Yes	5 pcs	5183-4712	3001-41237
				25 pcs	5183-4713	3001-41257
		Straight Quartz Wool	Yes	5 pcs	5183-4691	3001-41229
				25 pcs	5183-4692	3001-41233
Splitless		Single Tapered Quartz Wool	Yes	5 pcs	5183-4693	3001-41260
				25 pcs	5183-4694	3001-41261
		Single Tapered	Yes	5 pcs	5183-4695	3001-41248
				25 pcs	5183-4696	3001-41258
FocusLiner		Quartz Wool (fixed)	Yes	5 pcs	210-4004-5	3001-41235
				25 pcs	–	3001-41236

Graphite O-rings

O-Rings for Agilent Liners

Description	Material	Max. temp.	Qty.	Cat.No.
Graphite O-ring for Split Liners	Graphite	450 °C	10 pcs	3007-41505

Inlet Liners for Shimadzu GCs

These liners are treated under 420 °C for deactivation treatment and packed in the blister packs (except for some liners). It is effective for the analyses of adsorptive and degradable samples.

Type		GC Model	Deactivated	Shimadzu P/N	Qty.	Cat.No.
Split		GC-17A/2010/2014	–	221-41444-01	1 pc	3001-16138*
		GC-17A/2010/2014	–	221-41444	1 pc	3001-16320*
				221-41444-84	5 pcs	3001-16312*
		GC-14A・14B/2014	–	221-32544-01	1 pc	3001-16120*
Splitless		GC-17A/2010/2014	–	221-48355-01	1 pc	3001-16139*
				–	5 pcs	3001-16140*
				–	25 pcs	3001-16141*
		GC-17A/2010/2014	Yes	221-48876-05	5 pcs	3001-16327
		GC-17A/2010/2014 with Quartz Wool	Yes	221-48876-03	5 pcs	3001-16329
		GC-17A/2010/2014	–	221-41544	1 pc	3001-16321*
			–	221-41544-84	5 pcs	3001-16315*
		GC-14A/14B/2014	–	221-32544	1 pc	3001-16121*
Split/Splitless		GC-17A/2010/2014	Yes	20955	1 pc	3001-16400*
			Yes	20956	5 pcs	3001-16401*
			Yes	20957	25 pcs	3001-16402*
Direct		GC-17A	–	221-41599	1 pc	3001-16319*
		GC-9A/12A/15A/16A for WBC Attachment	–	221-38107	1 pc	3001-16129*
		GC-2010/2014 for Connectite Attachment	Yes	–	5 pcs	3001-16404
FocusLiner		GC-17A/2014 with Quartz Wool	Yes	–	5 pcs	3001-16322
		GC-2010 with Quartz Wool	Yes	–	5 pcs	3001-16324
			Yes	–	25 pcs	3001-16326
Tapered FocusLiner		GC-2010 with Quartz Wool	Yes	–	5 pcs	3001-16406

*: Not in blister pack

Inlet Liners & O-rings

Inlet Liners for Thermo Scientific GCs

To avoid scratches and contamination from air, liners for Thermo Scientific are packed in blister packs used for the medical tablets. Due to the deactivation treatment under 420 °C, the liners avoid sample adsorption and degradation, and are effective for highly sensitive analytes.

Type		Size	Deactivated	Thermo Scientific P/N	Qty.	Cat.No.
Splitless		5 × 8 × 105 mm	Yes	45350033	5 pcs	3001-41104

Inlet Liners for Bruker / Agilent GCs

Type		Details	Deactivated	Bruker P/N	Qty.	Cat.No.
Split/ Splitless		FocusLiner Single Tapered Quartz Wool (fixed)	Yes	SG092003	5 pcs	3001-41237
				SG092011	25 pcs	3001-41257
		FocusLiner Quartz Wool (fixed)	Yes	SG092002	5 pcs	3001-41235
				SG092219	25 pcs	3001-41236
Split		Straight Quartz Wool	Yes	392611937	5 pcs	3001-41229
				–	25 pcs	3001-41233
Split		Single Tapered Quartz Wool	Yes	392911928	5 pcs	3001-41260
				–	25 pcs	3001-41261
Splitless		Single Tapered	Yes	392611927	5 pcs	3001-41248
				–	25 pcs	3001-41258
		Double Tapered	Yes	SG092018	5 pcs	3001-41262
				SG092230	25 pcs	3001-41263
Direct		Connectite Liner	Yes	–	5 pcs	3001-41264

O-ring for Bruker / Agilent Liners

Description	Material	Size I.D. x Thickness	Qty.	Cat.No.
O-ring (High Temp.)	Fluoro-rubber	5.8 × 1.9 mm	5 pcs	2701-22703

Inlet Liners for GL Sciences GCs

Description	Shape	Deactivated	Qty.	Cat.No.
FocusLiner		Yes	5 pcs	3001-35353
Cup Splitter		Yes	1 pc	3001-35350
Splitless (2 mm I.D., Quartz)		Yes	1 pc	3001-35351
Liner for Auto Sampler (4 mm I.D.)		Yes	1 pc	3001-35352
Direct Injection Liner (wide bore)		–	1 pc	2701-26550

O-ring for GL Sciences Liners

Description	Material	I.D. x Thickness	Qty.	Cat.No.
O-ring (High Temp.)	Fluoro-rubber	5.8 x 1.9 mm	5 pcs	2701-22703

Inlet Liners for GL Sciences B.V (.OPTIC-4)

Description	Type	Deactivated	Qty.	Cat.No.
2414-1001 Fritted Liner frit on 15 mm		–	5 pcs	3001-25610
2414-1002 Silanized Fritted Liner frit on 15 mm		Yes	5 pcs	3001-25611
2414-1003 Single-necked Liner for Split Inj		–	5 pcs	3001-25616
2414-1005 Splitless Liner 1 mm I.D.		–	5 pcs	3001-25612
2414-1006 Splitless Liner 1 mm I.D., silanized		Yes	5 pcs	3001-25613
2414-1009 Baffled Liner for Splitless Injections		–	5 pcs	3001-25620
2414-1011 Fritted Liner with Taper, frit on 20 mm		–	5 pcs	3001-25625
2414-1027 Packed Liner with Tenax TA, 60/80		–	5 pcs	3001-25614
2414-1021 Packed Liner with Tenax GR, 80/100		–	5 pcs	3001-25623
2414-1007 Sintered Glass Liner with Taper		–	5 pcs	3001-25621
2414-1008 Sintered Glass Liner with Taper silanized		Yes	5 pcs	3001-25622
2414-1013 LINEX DMI Tapered Liner		–	5 pcs	3001-25627
2414-1014 LINEX DMI Tapered Liner, silanized		Yes	5 pcs	3001-25628
2414-1015 Glass needle guide for DMI		–	5 pcs	3001-25629
2406-1010 DMI micro vial 30 µL		–	100 pcs	3001-25630
MonoTrap TD Liner for OPTIC/LINEX		–	1 pc	1003-75001

Inlet Liners & O-rings

Accessories for GL Sciences B.V (.OPTIC-4)

O-ring

Ferrule

O-ring for GL Sciences B.V (.OPTIC-4) Liners

Description	Material	I.D. x Thickness	Qty.	Cat.No.
2406-1008 OPTIC O-ring	Fluoro-rubber (black)	4.5 x 2.0 mm	50 pcs	3001-25633

GL Sciences B.V (.OPTIC-4) Ferrule

Description	Qty.	Cat.No.
2406-1003 Graphite Ferrule for 0.53 mm I.D. column	10 pcs	3001-25631
2406-1004 Graphite Ferrule for 0.1-0.32 mm I.D. column	10 pcs	3001-25632
Ferrules G I -1/4-5 for connecting sampling tubing	10 pcs	3007-14001
Ferrules GV-1/4-5 for connecting sampling tubing	10 pcs	3007-31001

Accessories for DMI

Micro-Vial and Liner Block

Liner Cap Assembly

Micro-vial / Liner Block

Description	Qty.	Cat.No.
2406-2290 Microvial and Liner Block	1 pc	3001-25650

Liner Cap Assembly

Description	Details	Qty.	Cat.No.
2411-4107 CDCS Liner Cap Assembly	Liner Cap for CDC	50 pcs	3001-25649

Ferrules

It is important to select a proper material and GC connection ferrules depending on the analytical conditions. GL Sciences offers extensive line up of ferrules for various analytical scenes.

Graphite Ferrule

15 % Graphite / 85 % Vespel Ferrule

SilTite Metal Ferrule

SilTite FingerTite Ferrule

	Graphite	Super Graphite	15 % Graphite / 85 % Vespel	SilTite Metal	SilTite FingerTite
Mechanical Strength	Soft	Soft	Hard	Hard	Hard
Max. Operating Temp.	450 °C	450 °C	350 °C	450 °C and more	450 °C and more
Reuse	Possible	Possible	Not Possible	Not Possible	Not Possible
Strength of Tightening	Week	Week	Middle	Strong	Strong
Retighntening	No Need	No Need	Need	No Need	No Need
GC-MS	Not Available	Not Available	Available	Available	Available
Original Conditioning	–	Yes	–	Yes	–
Mechanical Strength	Soft	Soft	Hard	Hard	Hard
Max. Operating Temp.	450 °C	450 °C	350 °C	450 °C and more	450 °C and more
Reuse	Possible	Possible	Not Possible	Not Possible	Not Possible
Strength of Tightening	Week	Week	Middle	Strong	Strong

What is Blister pack?

It is widely used for packing of tablets to avoid getting scratched, damp and contamination.

Ferrules

Capillary Ferrules


GVL


GF


GVS

The graphite Vespel ferrule performs well under vacuum and the applicability to high pressure applications is suitable for GC/MS. The graphite ferrule is for general GC. Both types have excellent stability at high temperatures and chemical resistance. Blister pack is used for packing graphite Vespel ferrules in.

For Agilent GCs

Description	Model	Purpose	Column	Qty.	Agilent P/N	Cat.No.
15 % Graphite/ 85 % Vespel Ferrule (Short Ferrule)	GVS-0.4	GC Injector/Detector	0.10 – 0.25 mm	10 pcs	5181-3323	3007-41140
	GVS-0.5		0.32 mm	10 pcs	5062-3514	3007-41150
15 % Graphite/ 85 % Vespel Ferrule (Long Ferrule)	GVL-0.4	GC/MS Interface	0.10 – 0.25 mm	10 pcs	5062-3508	3007-31144
	GVL-0.5		0.32 mm	10 pcs	5062-3506	3007-31145
	GVL-0.8		0.53 mm	10 pcs	5062-3538	3007-31148
Graphite Ferrule GF-0.5 (Short Ferrule)	GF-0.5	GC Injector/Detector	0.1 – 0.32 mm	10 pcs	5062-8853	3007-31305
	GF-0.8		0.53 mm	10 pcs	5080-3538	3007-31308
Supper Graphite Ferrule	SGF-0.5	One Ring Ferrule	0.1 – 0.32 mm	6 pcs	500-2118	3007-31405

For Shimadzu GCs

Description	Model	Purpose	Column	Qty.	Cat.No.
15 % Graphite/ 85 % Vespel Ferrule	GVL-0.4	GCMS_QP2010 Injector· MS Interface QP5000/5050 Wide bore MS Interface	0.10 – 0.25 mm	10 pcs	3007-31144
	GVL-0.5		0.32 mm	10 pcs	3007-31145
	GVL-0.8		0.53 mm	10 pcs	3007-31148
Graphite Ferrule	G-0.5	GC 14A, GC 17A, GC2010, GC2014 Injector·Detector	0.10 – 0.25 mm	10 pcs	3007-14005*
	G-0.8		0.53 mm	10 pcs	3007-14008*
Supper Graphite Ferrule	SG-0.5	for 0.10 - 0.32 mmI.D. column, Special Type	0.1 – 0.32 mm	6 pcs	3007-14055
	SG-0.8	for 0.53 mmI.D. column, Special Type	0.53 mm	6 pcs	3007-14058

*: Not in the blister package

For Thermo Scientific GCs

Description	Model	Purpose	Column	Qty.	Cat.No.
15 % Graphite/ 85 % Vespel Ferrule	GVL-0.4	GC/MS Interface	0.10 – 0.25 mm	10 pcs	3007-31144
	GVL-0.5		0.32 mm	10 pcs	3007-31145
	GVL-0.8		0.53 mm	10 pcs	3007-31148
15 % Graphite/ 85 % Vespel Ferrule	Trace/Focus 0.5	Trace/Focus GC Injector/Detector	0.32 mm	10 pcs	3007-41155*
Special Bress Nut	–	Trace GC Injector/Detector	–	2 pcs	3001-24371

*: Please use with 3001-24371 Special brass nut

For Bruker GCs

Description	Model	Purpose	Column	Qty.	Cat.No.
15 % Graphite/ 85 % Vespel Ferrule	GVL-0.4	GC Injector/Detector GC/MS Interface	0.10 – 0.25 mm	10 pcs	3007-31144
	GVL-0.5		0.32 mm	10 pcs	3007-31145
	GVL-0.8		0.53 mm	10 pcs	3007-31148

For GL Sciences GCs

Description	Model	Purpose	Column	Qty.	Cat.No.
15 % Graphite/ 85 % Vespel Ferrule	GVL-0.4	GC Injector/Detector	0.10 – 0.25 mm	10 pcs	3007-31144
	GVL-0.5		0.32 mm	10 pcs	3007-31145
	GVL-0.8		0.53 mm	10 pcs	3007-31148
Graphite Ferrule	GF-0.5	GC Injector/Detector	0.10 – 0.32 mm	10 pcs	3007-31305
	GF-0.8		0.53 mm	10 pcs	3007-31308
Supper Graphite Ferrule	SGF-0.5	One Ring Ferrule	0.1 – 0.32 mm	6 pcs	3007-31405

Conventional Ferrules

GVL

- A GI-5S ferrule contains a side ring and a washer.
- Indicate GC model No. when ordering.

Type : A · One Ring Ferrule Type
B · Double Ring Front Type
C · 1/8 in. One Ring Ferrule Type
D · Special Type

Super Graphite Ferrules

Model	I.D.	Type	Used for	Qty.	Cat.No.
SGI-0.5	0.5 mm	A	0.10 – 0.32 mm I.D Capillary Column	6 pcs	3007-14205
Graphite-805	0.5 mm	C	G-3000, G-5000 0.10 – 0.32 mm I.D. Capillary Column	6 pcs	3007-15222
Graphite-808	0.8 mm	C	G-3000, G-5000 0.53 mm I.D. Capillary Column	6 pcs	3007-15223
Graphite-3	3.0 mm	C	G-3000 Packed Column	6 pcs	3007-15225
Graphite-6	6.0 mm	A	G-3000 Split/Splitless	6 pcs	3007-15224
SGI-1/4	1/4 in.	A		6 pcs	3007-14264
SGI-0.8	0.8 mm	D		6 pcs	3007-14208

Graphite Ferrules

Model	I.D.	Type	Used for	Qty.	Cat.No.
GF-0.5	0.5 mm	A	GLS/Agilent 0.10 – 0.32 mm I.D. Capillary Column	10 pcs	3007-31305
G-0.5	0.5 mm	D	Shimadzu 0.10 – 0.32 mm I.D. Capillary Column	10 pcs	3007-14005
GI-0.5	0.5 mm	A	0.10 – 0.32 mm I.D Capillary Column	10 pcs	3007-14105
Graphite-805	0.5 mm	C	G-3000, G-5000 0.10 – 0.32 mm I.D. Capillary Column	10 pcs	3007-15212
GF-0.8	0.8 mm	A	GLS/Agilent 0.53 mm I.D. Capillary Column	10 pcs	3007-31308
G-0.8	0.8 mm	D	Shimadzu 0.53 mm I.D. Capillary Column	10 pcs	3007-14008
GI-0.8	0.8 mm	A	0.53 mm I.D. Capillary Column	10 pcs	3007-14108
Graphite-808	0.8 mm	C	G-3000, G-5000 0.53 mm I.D. Capillary Column	10 pcs	3007-15213
GI-1.0	1.0 mm	A		10 pcs	3007-14110
GI-1/16	1/16 in.	A		10 pcs	3007-14116
GI-5S	5.0 mm	–	Inlet splitter	10 pcs	3007-14152
Graphite-3	3 mm	C	G-3000 Packed Column	10 pcs	3007-15215
GI-3.0	3 mm	A		10 pcs	3007-14130
GI-1/8	1/8 in.	A		10 pcs	3007-14132
Graphite-6	6 mm	A	G-3000 Split/Splitless	10 pcs	3007-15214
GI-6.0	6 mm	B		10 pcs	3007-14160
GI-1/4	1/4 in.	A		10 pcs	3007-14164

15 % Graphite / 85 % Vespel Ferrules

Model	I.D.	Type	Used for	Qty.	Cat.No.
GVL-0.4	0.4 mm	A	0.25 mm I.D. Capillary Column	10 pcs	3007-31144
GVL-0.5	0.5 mm	A	0.32 mm I.D. Capillary Column	10 pcs	3007-31145
GVL-0.8	0.8 mm	A	0.53 mm I.D. Capillary Column	10 pcs	3007-31148
GV-09	0.9 mm	A		10 pcs	3007-31109
GV-10	1.0 mm	A		10 pcs	3007-31110
GV-1/16	1/16 in.	A		10 pcs	3007-31116
GV-24	0.4 mm	A	2 hole type	10 pcs	3007-31124
GV-00	Holeless	A	Make a hole with a pin vice dollirle	10 pcs	3007-31100
GV-1/8	1/8 in.	A		10 pcs	2703-34100
GV-6	6.0 mm	A		10 pcs	3007-31134
GV-1/4	1/4 in.	A		10 pcs	3007-31135

Ferrules

SilTite Metal Ferrule

SilTite Metal Ferrule enables easy and leak-free installation of capillary columns without the use of any tools. It is packed in Blister Pack which is widely used for packing of tables to avoid getting scratched, damp and contamination.

Note) When using SilTite Metal Ferrule, please use the nut included in the SilTite Metal Ferrule Kit. It cannot be used for Agilent VF column because its O.D. is slightly different than other common columns. When using 0.25 mm I.D. of Ultra ALLOY manufactured by Frontier Laboratories, please use SilTite Metal Ferrule for 0.32 mm I.D. column.

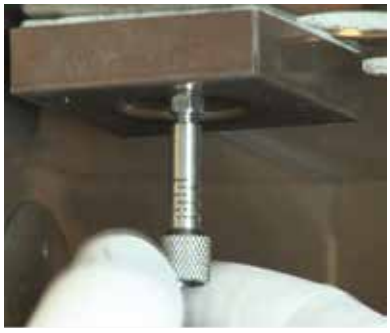
For Agilent

Description	Specification	Applicable Column's I.D.	Ferrule I.D.	Reference P/N	Qty.	Cat.No.
Starter Kit SilTite Metal Ferrule Kit	For Agilent MS Interface	0.1 – 0.25 mm	0.4 mm	–	2pcs x Nut, 10pcs x Ferrule	3007-19010
		0.32 mm	0.5 mm	–		3007-19011
SilTite Metal Ferrule		0.1 – 0.25 mm	0.4 mm	5188-5361	10 pcs	3007-19020
		0.32 mm	0.5 mm	5188-5362	10 pcs	3007-19021

For Shimadzu

Description	Specification	Applicable Column's I.D.	Ferrule I.D.	Reference P/N	Qty.	Cat.No.
Starter Kit SilTite Metal Ferrule Kit	For QP2010 Series Injection Port & MS Interface	0.1 – 0.25 mm	0.4 mm	073200	2pcs x Nut, 10pcs x Ferrule	3007-19010
		0.32 mm	0.5 mm	073201		3007-19011
SilTite Metal Ferrule		0.1 – 0.25 mm	0.4 mm	073220	10 pcs	3007-19020
		0.32 mm	0.5 mm	073221	10 pcs	3007-19021

SilTite FingerTite



SilTite Finter Tite enables easy and leak-free installation of capillary columns by finger tightening without any tools. It is composed of special nut and SilTite Metal Ferrule, and no need to re-tighten after any oven program.

For Agilent

Description	Applicable Column's I.D.	Ferrule I.D.	P/N	Qty.	Cat.No.
Kit for Split/splitless Injection & FID Detector	0.1 – 0.25 mm	0.4 mm	073610	1 pc	3015-14001
Kit for Split/splitless Injection & MS Detector			073612	1 pc	3015-14002
Split/splitless Injection Base Seal Adaptor	–	–	073640	2 pcs	3015-14003

For Shimadzu

Description	Specification	Applicable Column's I.D.	Ferrule I.D.	P/N	Qty.	Cat.No.
Kit for Split/splitless Injection & FID Detector	for GC2010	0.1 – 0.25 mm	0.4 mm	073620	1 pc	3015-14004
	for GC17A			073628		3015-14005
Kit for Split/splitless Injection & MS Detector	for QP2010			073621		3015-14006
	for QP5050			073629		3015-14007

Conventional Septa

Plug type

11 mm

The most versatile silicone septa. Indicate a GC model when ordering.

Size	Material	Color	Qty.	Cat.No.
Plug type	Silicon	Buff	20 pcs	3007-16101
			100 pcs	3007-16110
			1000 pcs	3007-16115
11 mm	Red Septa	Red	25 pcs	2701-25003

Inlet Septa

Septa

Selection Guide

Plug type

All Shimadzu GCs

10 mm

Hitachi
G-3000, G-5000

GL Sciences
GC-380

11 mm

Agilent
5880, 5890, 6850
6890,7890

GL Sciences
GC-4000,
GC-3200,GC-390,
GC-353, GC-323

17 mm

Thermo Scientific
Trace GC

GL Sciences provides with septa for various manufacturers' GCs, from conventional to low bleed types.

Premium Septa Selection Guide

Type	Features	Max. Operating Temp.	Center Guide	Hardness*	Application
BTO	Low Bleed Plasma Coating	400 °C	Yes	48	High Temp. Analysis High Sensitivity Analysis
Advanced Green	Plasma Coating	400 °C	Yes	51	General Analysis
Marathon Long Life	Long Life Plasma Coating	400 °C	Yes	46	For Auto Sampler Long Injection Life

*: Shore hardness Scales
Note: Max. Operating Temp. means Injection Temp.

Conventional Septa Selection Guide

Type	Features	Max. Operating Temp.	Center Guide	Low Bleed
Conventional	General (Silicone)	230 °C	No	No
	General (Red)	250 °C	No	No

Premium Septa

Premium septa are precision-molded with a recess on the injection side, to guide the syringe needle to the same point with every injection. The CenterGuide design requires less force for initial penetration for a smoother feel. Septum life may be enhanced in some applications by minimizing tearing and coring.

BTO Septa

BTO Septa

- Ultra Low-bleed
- Usable to 400 ˚C inlet temperature
- Preconditioned
- Ideal for demanding GC & GC-MS applications

Size	Max. Operating Temp.	Thickness	Qty.	Cat.No.
Plug type	400 °C	–	25 pcs	3007-16128
			50 pcs	3007-16129
11 mm	400 °C	3 mm	25 pcs	3007-41002
			50 pcs	3007-41003
17 mm	330 °C	3 mm	25 pcs	3007-41008
			50 pcs	3007-41009

Advanced Green 3 septa

Advanced Green 3 Septa

- Low-bleed
- Usable to 350 ˚C inlet temperature
- General analysis

Size	Max. Operating Temp.	Thickness	Qty.	Cat.No.
Plug type	350 °C	–	25 pcs	3007-16126
			50 pcs	3007-16127
11 mm	350 °C	3 mm	25 pcs	3007-41000
			50 pcs	3007-41001
17 mm	300 °C	3 mm	25 pcs	3007-41006
			50 pcs	3007-41007

Marathon Long Life Septa

Marathon Long Life Septa

- Low-bleed
- Usable to 350 ˚C inlet temperature
- Long Life
- Softer than the others, ideal for autosampler injection

Size	Max. Operating Temp.	Thickness	Qty.	Cat.No.
Plug type	350 °C	–	25 pcs	3007-16130
			50 pcs	3007-16131
11 mm	350 °C	3 mm	25 pcs	3007-41004
			50 pcs	3007-41005
17 mm	300 °C	3 mm	25 pcs	3007-41010
			50 pcs	3007-41011

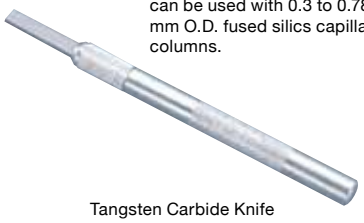
Cutter

Capillary Tubing Cutter

Ceramic Tube Cutter

Close up

Capillary Fine Cutter for GC/LC Note) Capillary Fine Cutter can be used with 0.3 to 0.78 mm O.D. fused silics capillary columns.



Tangsten Carbide Knife

CeramicTube Cutter

This ceramic tube cutter gives clean and safe cuts on fused silica capillary tubing.

Description	Qty.	Cat.No.
Ceramic Tube Cutter	4 pcs	1010-41100

Capillary Fine Cutter

A rotary type diamond blade consistently makes precise, clean, square cuts on fused silica capillary tubing. A magnifier is built-in to verify square cut the cut surface.

Description	Cat.No.
Capillary Fine Cutter for GC/LC (Black)	3001-31020
Replacement Cutting Wheels for Capillary Fine Cutter	3001-31021

Tungsten Carbide Knife

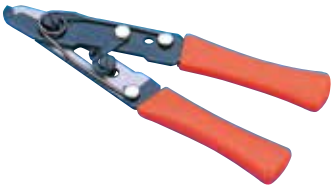
Designed for cutting fused silica capillary tubing with lightweight aluminum handle. The tungsten carbide blade has double-edged sides and is replaceable.

Description	Cat.No.
Tungsten Carbide Knife	3001-24622

Tubing Cutter

Mini Tubing Cutter

Tubing Cutter for SS



Plier-Type Tubing Cutter

Rotary Tubing Cutter

Mini Tubing Cutter

This small tubing cutter is designed for use in tight quarters and cuts 4 mm to 5/8 in. (15.875 mm) O.D. stainless steel, aluminum, nickel and copper tubing.

Description	Qty.	Cat.No.
Mini Tubing Cutter	1 pc	3001-31451
Replacement Cutting Wheels for Mini Tubing Cutter	3 pcs	3001-31312

Tubing Cutter for Stainless Steel

Works for cutting 4 mm to 9/8 in. (28.575 mm) O.D. stainless steel tubing.

Description	Qty.	Cat.No.
Tubing Cutter for SUS (with cutting wheel 1 pc)	1 set	3001-31501
Replacement Cutting Wheels for Tubing Cutter for SUS	3 pcs	3001-31513

Plier-Type Tubing Cutter

This tubing cutter makes clean cuts on 1/16 in. O.D. stainless steel tubing and ideal for cutting tubing in tight places.

Description	Qty.	Cat.No.
Plier Type Tubing Cutter	1 pc	6010-81230

Rotary Tubing Cutter

This tubing cutter cuts 1/16 in. and 1/8 in. O.D. tubing Burr-Free leaving tubing I.D. open and also works with Glass-Lined tubing.

Description	Qty.	Cat.No.
Rotary Tubing Cutter	1 pc	3001-31701
Replacement Cutting Wheels for Rotary Tubing Cutter	3 pcs	3001-31712

Inner Seal Connectors

Inner Seal Connectors

Inner Seal Connectors are most often used to connect a guard column to an analytical column and columns with different stationary phases. Fused silica capillary tubing has polyimide resin outside which makes an adequate seal. To achieve optimum performance from these connectors, begin with a square cut of the tubing.

Heating at 250 ˚C for 1 h melts the outer polyimide resin and improves the sealing of a connection.

Description	Column I.D.	Column O.D.	Qty.	Cat.No.
Inner Seal Connector	0.15-0.53 mm	0.35-0.7 mm	5 pcs	1010-45026
Y - Inner Seal Connector	0.15-0.53 mm	0.35-0.7 mm	1 pc	1010-45030

SilTite µ-Union

Specifications

- Chemically deactivated stainless steel ferrules enables inert connection.
- Easy connection by the attached tool.
- Excellent leak-tight for both high temperatures and pressures.
- Zero dead volume giving you optimized peak shapes.
- Small and light: 9 mm in length and 0.5 g in weight.

SilTite µ-Union Kits

Description		Column O.D.	Column I.D.	Qty.	Cat.No.
Union	Ferrule				
①	④	0.4 & 0.4 mm	0.10-0.25 mm & 0.10-0.25 mm	2 unions, 5 ferrules and the necessary tools	3001-26110
①	⑤	0.4 & 0.5 mm*	0.10-0.25 mm & 0.32 mm		3001-26111
①	⑥	0.5 & 0.5 mm	0.32 mm & 0.32 mm		3001-26112
②	⑦	0.4 & 0.8 mm*	0.10-0.25 mm & 0.53 mm		3001-26113
②	⑧	0.5 & 0.8 mm*	0.32 mm & 0.53 mm		3001-26114
③	⑨	0.8 & 0.8 mm	0.53 mm & 0.53 mm		3001-26115

*: Reducing union

Replacement SilTite µ-Union (no ferrules)

Column O.D.	Column I.D.	Qty.	Cat.No.
① 0.4-0.5 & 0.4-0.5 mm	0.10-0.32 mm & 0.10-0.32 mm	5 pcs	3001-26116
② 0.4-0.5 & 0.8 mm*	0.10-0.32 mm & 0.53 mm	5 pcs	3001-26117
③ 0.8 & 0.8 mm	0.53 mm & 0.53 mm	5 pcs	3001-26118

*: Reducing union

Replacement SilTite µ-Union Ferrules

Column O.D.	Column I.D.	Qty.	Cat.No.
④ 0.4 & 0.4 mm	0.10-0.25 mm & 0.10-0.25 mm	10 pcs	3001-26119
⑤ 0.4 & 0.5 mm	0.10-0.25 mm & 0.32 mm	10 pcs	3001-26120
⑥ 0.5 & 0.5 mm	0.32 mm & 0.32 mm	10 pcs	3001-26121
⑦ 0.4 & 0.8 mm	0.10-0.25 mm & 0.53 mm	10 pcs	3001-26122
⑧ 0.5 & 0.8 mm	0.32 mm & 0.53 mm	10 pcs	3001-26123
⑨ 0.8 & 0.8 mm	0.53 mm & 0.53 mm	10 pcs	3001-26124

Note: SILTite µ-Union is not compatible with VF columns.
For Ultra ALLOY of FRONTIER LABORATORIES LTD., please contact us.

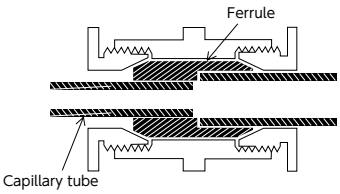
Capillary Unions

Micro-Unions·Micro-Reducing Unions

Zero dead volume unions are designed to connect a guard column to a fused silica capillary column and such columns with different stationary phases. Thermally and chemically stable ferrules made of polyimide do not cause sample desorption or degradation.

Cat.No.3001-25803 to 25858 sets contains 1 union, 2 fittings and 2 ferrules.

Cat.No.3001-25881 to 25896 Replacement Ferrule contains replacement 2 ferrules.



Structure of Micro-reducing union
Insert capillary tubes in both sides of a ferrule and then wrench to connect.

Micro-Unions

Column O.D.	Column I.D.	Cat.No.	Replacement Ferrule Cat.No.
0.2-0.3 mm	0.10 mm	3001-25803	3001-25881
0.3-0.4 mm	0.25 mm	3001-25804	3001-25882
0.4-0.5 mm	0.32 mm	3001-25805	3001-25883
0.7-0.8 mm	0.53 mm	3001-25808	3001-25884

Micro-Reducing Unions

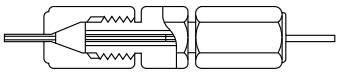
Column O.D.	Column I.D.	Cat.No.	Replacement Ferrule Cat.No.
0.3-0.4 mm	0.10-0.25 mm	3001-25834	3001-25891
0.3-0.5 mm	0.10-0.32 mm	3001-25835	3001-25892
0.3-0.8 mm	0.10-0.53 mm	3001-25838	3001-25893
0.4-0.5 mm	0.25-0.32 mm	3001-25845	3001-25894
0.4-0.8 mm	0.25-0.53 mm	3001-25848	3001-25895
0.5-0.8 mm	0.32-0.53 mm	3001-25858	3001-25896

Two open-end wrenches for Micro-unions & Micro-reducing unions

Open-end Wrenches for Micro-Unions & Micro-Reducing Unions

Description	For Screw Size	Qty.	Cat.No.
Open-end wrench Hex.6x Hex.7	6 mm x 7 mm	2 pcs	3001-25860

Capillary Unions



Structure of mini-unions

Capillary mini-Unions

These unions are used for connection of capillary columns with different stationary phases or film thicknesses. Glass lined inner surface is adopted for Capillary mini-Unions not to cause sample adsorption or degradation.

Mini-Unions

	Capillary Mini-Union		
Column Dimension	Model	Qty.	Cat.No.
I.D. 0.10 – O.D. 0.30 mm	MVSU/003	1 union and 5 Graphite ferrules	3001-25950
I.D. 0.25 – O.D. 0.40 mm	MVSU/004		3001-25951
I.D. 0.32 – O.D. 0.50 mm	MVSU/005		3001-25952
I.D. 0.53 – O.D. 0.80 mm	MVSU/008		3001-25953

Graphite ferrule: MOGF/005 can be used for < 0.5 mm O.D.(<0.32 mm I.D.) capillary tubing.

Replacement Ferrules

	Graphite Ferrule			Graphite Vespel Ferrule		
Column Dimension	Model	Qty.	Cat.No.	Model	Qty.	Cat.No.
I.D. 0.10 – O.D. 0.30 mm	MOGF/005	10 pcs	3001-25965	MGVF/003	10 pcs	3001-25973
I.D. 0.25 – O.D. 0.40 mm				MGVF/004	10 pcs	3001-25974
I.D. 0.32 – O.D. 0.50 mm				MGVF/005	10 pcs	3001-25975
I.D. 0.53 – O.D. 0.80 mm	MOGF/008	10 pcs	3001-25968	MGVF/008	10 pcs	3001-25978

Spare Ferrule

Spanner for mini-Union

Open-end Wrench for Mini-Union

Description	For Screw Size	Qty.	Cat.No.
Open-end wrench for mini-Union	3/16 in. x 1/4 in.	2 pcs	3001-25954

Bulkhead Unions

Glass Lined Unions

Ferrule I.D.	Nut I.D.	Available Tubing I.D.	Available Tubing O.D.	Qty.	Cat.No.
0.4 mm	1/16 in.	0.1-0.25 mm	0.32-0.36 mm	Ferrule x 2 pcs Nut x 2 pcs	3001-25903
0.5 mm		0.32 mm	0.43 mm		3001-25904
0.8 mm		0.53 mm	0.68 mm		3001-25905

Ferrule: Graphite/ Vespel ferrule (%) = 15 /85

Replacement Ferrules

Ferrule I.D.	Available Tubing I.D.	Model	Qty.	Cat.No.
0.4 mm	0.1-0.25 mm	GVL-0.4	10 pcs	3007-31144
0.5 mm	0.32 mm	GVL-0.5	10 pcs	3007-31145
0.8 mm	0.53 mm	GVL-0.8	10 pcs	3007-31148

Ferrule: Graphite/ Vespel ferrule (%) = 15 /85

Bulk Head Union

Replacement Nuts

Description	Available Tubing O.D.	Qty.	Cat.No.
Stainless-steel nut 1/16 in.	1/16 in.	5 pcs	3001-25940
Stainless-steel nut 1/16 in.	Less than 1.2 mm	5 pcs	3001-25941

Tools

Ferrule Removal Kits

Ferrule removal Kit

Ferrule Removal Kit

These tapered tools have teeth designed to grip and remove fused silica adaptor ferrules if they get stuck in a fitting. Each kit has two sizes of tools: one for removing 1/32 in. adapter ferrules and the other one for 1/16 in. adapter ferrules.

Description	Cat.No.
Ferrule Remover	3001-12740

GL Vespel Ferrule remover

GL Vespel Ferrule Remover

This tool easily removes a Vespel ferrule stuck in a nut.

Description	Cat.No.
GL Vespel Ferrule Remover	3001-12745

Pin Vice Drill Set

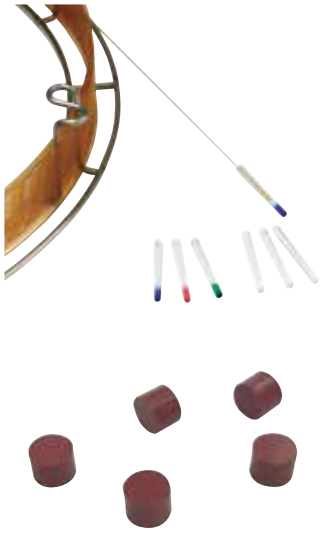
Pin Vice Drill Set

Pin Vice Drill Set

Pin Vice Drill is used for broadening ferrule I.D. narrowed by tightening especially for solid material like graphite Vespel. This set contains 3 sizes of drills: 0.4 mm, 0.5 mm and 0.8 mm.

Description	Cat.No.
Pin Vice Drill Set	3001-24625

Capillary Column Caps



Capillary Column Caps

Preventing moisture, airborne contaminants and air from entering the column during storage prolongs the column lifetime. Capillary Column Caps are made of fused silica, the same material as the capillary. These caps are highly inert and can be used repeatedly. Capillary columns can be easily distinguished by varying the cap color with the column I.D.

Description	Color	Qty.	Cat.No.
Fused Silica Capillary Column Cap for 0.15 mm - 0.53 mm I. D. (0.35 mm - 0.66 mm O. D.)	Red	5 pcs	1010-41140
	Green	5 pcs	1010-41141
	Blue	5 pcs	1010-41142

Silicon capillary column caps work with any type of capillary columns.

Description	Color	Qty.	Cat.No.
Silicon Capillary Column Cap	Red	20 pcs	3001-24624

Cleaning Tools for Injection Port

Septum Pick

By using this septum pick, the septum can be replaced easily without contamination by hands.

Description	Cat.No.
Septum Pick	3001-12720

Column Tag and Pen

Column Tag

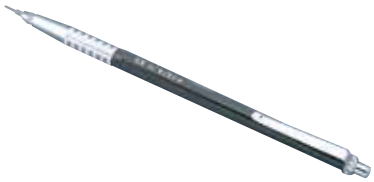
Column Tag

With GL Sciences' embossed aluminum tag, the column specs can be directly tagged to the column. Use a ion pen or an ballpoint pen to write on the tag.

Specifications

Write-in Space: 50 x 18 mm Max. Temp.: 450 ℃

Description	Qty.	Cat.No.
Column Tag	50 pcs	3001-13001



Ion Pen for Column Tag

Ion Pen for Column Tag

This is used to write on column tag, and also can be used for writing on a hard surface.

Description	Cat.No.
Iron Pen for Column Tag	3001-13401

Soapfilm Flow Meters

Soap film Flow Meters

Soapfilm Flow Meters

The soapfilm flow meter is designed to accurately measure gas flow rate. No unnecessary bubbling and no sticky liquid remain attached to the rubber. Bubble leaking is avoided due to the tray positioned on the top. There is no fear of spill soapfilm over the surroundings, due to the form tray at the upper part.

Full Scale	Min. Scale	Attachment	Cat.No.
1.5 mL	0.5 mL	Stand, Special Soap Solution, Clip	3001-11001
15 mL	5 mL	Stand, Special Soap Solution, Clip	3001-11002
50 mL	10 mL	Stand, Special Soap Solution, Clip	3001-11003

Soapfilm Muti-Flow Meter

Soapfilm Muti-Flow Meter

The soapfilm multi-flow meter provides 1, 10, 100 mL and it can be used for capillary, packed column and FID Air.

Description	Attachment	Cat.No.
Soapfilm Muti-Flow Meter	Stand, Special Soap Solution, Clip	3001-11004

Special Soap solution

Soap Solution for Soapfilm Flow Meter

The soap solution is designed to be used with the soapfilm flow meter. It does not absorb dust and does not remain attached inside the tube. It generates a good foam and it is not toxic. The color is green in order to facilitate the visibility. and produces no clouds in the measuring tube to disturb visibility. The solution creates foam well.

Description	Qty.	Cat.No.
Soap Solution for Soapfilm Flow Meter	50 mL x 2 pcs	3001-11102

Swagelok Type Fittings (SUS 316)

Swagelok type manufactured by GL Sciences are available worldwide. The screw thread of nuts are treated with silver plating.

Nuts

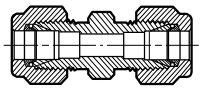
Inch Sizes

Model	Tubing O.D.	Qty.	Cat.No.
1/16N	1/16 in.	10 pcs	3006-42610
1/8N	1/8 in.	10 pcs	3006-42620
1/4N	1/4 in.	10 pcs	3006-42640
3/8N	3/8 in.	10 pcs	3006-42660

Millimeter Sizes

Model	Tubing O.D.	Qty.	Cat.No.
3N	3 mm	10 pcs	3006-41130
6N	6 mm	10 pcs	3006-41160

Unions



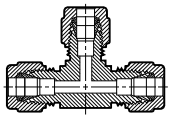
Inch Sizes

Model	Tubing O.D.	Qty.	Cat.No.
1/16U	1/16 in.	1 pc	3006-42911
1/8U	1/8 in.	1 pc	3006-42921
1/4U	1/4 in.	1 pc	3006-42941
3/8U	3/8 in.	1 pc	3006-42961

Millimeter Sizes

Model	Tubing O.D.	Qty.	Cat.No.
3U	3 mm	1 pc	3006-41431
4U	4 mm	1 pc	3006-41441
6U	6 mm	1 pc	3006-41461

Tees



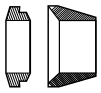
Inch Sizes

Model	Tubing O.D.	Qty.	Cat.No.
1/16TTT	1/16 in.	1 pc	3006-43310
1/8TTT	1/8 in.	1 pc	3006-43320
1/4TTT	1/4 in.	1 pc	3006-43340
3/8TTT	3/8 in.	1 pc	3006-43360

Millimeter Sizes

Model	Tubing O.D.	Qty.	Cat.No.
2TTT	2 mm	1 pc	3006-41820
3TTT	3 mm	1 pc	3006-41830
4TTT	4 mm	1 pc	3006-41840
6TTT	6 mm	1 pc	3006-41860
8TTT	8 mm	1 pc	3006-41880

Ferrules



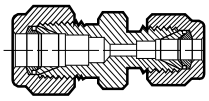
Inch Sizes

Model	Tubing O.D.	Qty.	Cat.No.
1/16F	1/16 in.	10 pcs	3006-42710
1/8F	1/8 in.	10 pcs	3006-42720
1/4F	1/4 in.	10 pcs	3006-42740
3/8F	3/8 in.	10 pcs	3006-42760

Millimeter Sizes

Model	Tubing O.D.	Qty.	Cat.No.
2F	2 mm	10 pcs	3006-41220
3F	3 mm	10 pcs	3006-41230
4F	4 mm	10 pcs	3006-41240
6F	6 mm	10 pcs	3006-41260
8F	8 mm	10 pcs	3006-41280

Reducing Unions



Inch Sizes

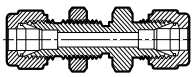
Model	Tubing O.D.	Qty.	Cat.No.
1/8RU1/16	1/8 in. x 1/16 in.	1 pc	3006-43222
1/4RU1/16	1/4 in. x 1/16 in.	1 pc	3006-43244
1/4RU1/8	1/4 in. x 1/8 in.	1 pc	3006-43245
3/8RU1/16	3/8 in. x 1/16 in.	1 pc	3006-43265
3/8RU1/8	3/8 in. x 1/8 in.	1 pc	3006-43266
3/8RU1/4	3/8 in. x 1/4 in.	1 pc	3006-43267

Millimeter Sizes

Model	Tubing O.D.	Qty.	Cat.No.
3RU2	3 x 2 mm	1 pc	3006-41733
4RU2	4 x 2 mm	1 pc	3006-41744
4RU3	4 x 3 mm	1 pc	3006-41745
6RU2	6 x 2 mm	1 pc	3006-41765
6RU3	6 x 3 mm	1 pc	3006-41766
6RU4	6 x 4 mm	1 pc	3006-41767
8RU3	8 x 3 mm	1 pc	3006-41787
8RU4	8 x 4 mm	1 pc	3006-41788
8RU6	8 x 6 mm	1 pc	3006-41789
10RU6	10 x 6 mm	1 pc	3006-41799

Swagelok Type Fittings (SUS 316)

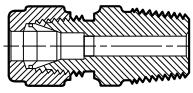
Bulkhead Unions

Inch Sizes

Model	Tubing O.D.	Panel Hole Diameter	Qty.	Cat.No.
1/16BU	1/16 in.	5.2 mm	1 pc	3006-43510
1/8BU	1/8 in.	8.4 mm	1 pc	3006-43520
1/4BU	1/4 in.	11.5 mm	1 pc	3006-43540

Male Connectors

ISO Type (PT Type)

Inch Sizes

Model	Tubing O.D.	Tapered Male	Qty.	Cat.No.
1/16CM2	1/16 in.	1/8 in.	1 pc	3006-43011
1/8CM2	1/8 in.	1/8 in.	1 pc	3006-43021
1/8CM4	1/8 in.	1/4 in.	1 pc	3006-43022
1/4CM2	1/4 in.	1/8 in.	1 pc	3006-43041
1/4CM4	1/4 in.	1/4 in.	1 pc	3006-43042
3/8CM4	3/8 in.	1/4 in.	1 pc	3006-43062

Millimeter Sizes

Model	Tubing O.D.	Tapered Male	Qty.	Cat.No.
2CM2	2 mm	1/8 in.	1 pc	3006-41521
3CM2	3 mm	1/8 in.	1 pc	3006-41531
3CM4	3 mm	1/4 in.	1 pc	3006-41532
4CM2	4 mm	1/8 in.	1 pc	3006-41541
4CM4	4 mm	1/4 in.	1 pc	3006-41542
6CM2	6 mm	1/8 in.	1 pc	3006-41561
6CM4	6 mm	1/4 in.	1 pc	3006-41562
8CM4	8 mm	1/4 in.	1 pc	3006-41582

NPT Threads (National pipe threads)

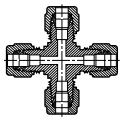
Inch Sizes

Model	Tubing O.D.	NTP Thread	Qty.	Cat.No.
1/16CM2N	1/16 in.	1/8 in.	1 pc	3006-43016
1/8CM2N	1/8 in.	1/8 in.	1 pc	3006-43026
1/8CM4N	1/8 in.	1/4 in.	1 pc	3006-43027
1/4CM2N	1/4 in.	1/8 in.	1 pc	3006-43046
1/4CM4N	1/4 in.	1/4 in.	1 pc	3006-43047

Millimeter Sizes

Model	Tubing O.D.	NTP Thread	Qty.	Cat.No.
3CM2N	3 mm	1/8 in.	1 pc	3006-41536
3CM4N	3 mm	1/4 in.	1 pc	3006-41537
6CM2N	6 mm	1/8 in.	1 pc	3006-41566
6CM4N	6 mm	1/4 in.	1 pc	3006-41567

Cross

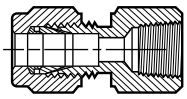
Inch Sizes

Model	Tubing O.D.	Qty.	Cat.No.
1/16C	1/16 in.	1 pc	3006-43410
1/8C	1/8 in.	1 pc	3006-43420
1/4C	1/4 in.	1 pc	3006-43440

Millimeter Sizes

Model	Tubing O.D.	Qty.	Cat.No.
3C	3 mm	1 pc	3006-41930
6C	6 mm	1 pc	3006-41960

Female Connectors

ISO Type (PT Type)

Inch Sizes

Model	Tubing O.D.	Tapered Male	Qty.	Cat.No.
1/16CF2	1/16 in.	1/8 in.	1 pc	3006-43111
1/8CF2	1/8 in.	1/8 in.	1 pc	3006-43121
1/8CF4	1/8 in.	1/4 in.	1 pc	3006-43122
1/4CF2	1/4 in.	1/8 in.	1 pc	3006-43141
1/4CF4	1/4 in.	1/4 in.	1 pc	3006-43142

Millimeter Sizes

Model	Tubing O.D.	Tapered Male	Qty.	Cat.No.
3CF2	3 mm	1/8 in.	1 pc	3006-41631
3CF4	3 mm	1/4 in.	1 pc	3006-41632
4CF2	4 mm	1/8 in.	1 pc	3006-41641
4CF4	4 mm	1/4 in.	1 pc	3006-41642
6CF2	6 mm	1/8 in.	1 pc	3006-41661
6CF4	6 mm	1/4 in.	1 pc	3006-41662

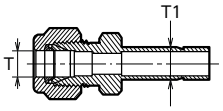
NPT Threads (National pipe threads)

Inch Sizes

Model	Tubing O.D.	Tapered Male	Qty.	Cat.No.
1/16CF2N	1/16 in.	1/8 in.	1 pc	3006-43116
1/8CF2N	1/8 in.	1/8 in.	1 pc	3006-43126
1/8CF4N	1/8 in.	1/4 in.	1 pc	3006-43127
1/4CF2N	1/4 in.	1/8 in.	1 pc	3006-43146
1/4CF4N	1/4 in.	1/4 in.	1 pc	3006-43147

Swagelok Type Fittings (SUS 316)

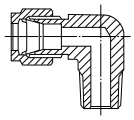
Tube End Reducers



Inch Sizes

Model	Tubing O.D.		Qty.	Cat.No.
	T	T1		
1/16RE1/8	1/16 in.	1/8 in.	1 pc	3006-43701
1/16RE1/4	1/16 in.	1/4 in.	1 pc	3006-43704
1/8RE1/16	1/8 in.	1/16 in.	1 pc	3006-43705
1/8RE1/4	1/8 in.	1/4 in.	1 pc	3006-43702
1/8RE3/8	1/8 in.	3/8 in.	1 pc	3006-43706
1/4RE1/8	1/4 in.	1/8 in.	1 pc	3006-43707
1/4RE3/8	1/4 in.	3/8 in.	1 pc	3006-43703
3/8RE1/4	3/8 in.	1/4 in.	1 pc	3006-43708

Male Elbows

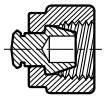


Inch Sizes

Model	Tubing O.D.	Tapered Male	Qty.	Cat.No.
1/8ME2	1/8 in.	1/8 in.	1 pc	3006-43921
1/4ME2	1/4 in.	1/8 in.	1 pc	3006-43941
1/4ME4	1/4 in.	1/4 in.	1 pc	3006-43942

Use seal tape for taper screw. Make sure to see P290.

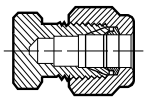
Plugs



Inch Sizes

Model	Tubing O.D.	Qty.	Cat.No.
1/16P	1/16 in.	5 pcs	3006-43750
1/8P	1/8 in.	5 pcs	3006-43751
1/4P	1/4 in.	5 pcs	3006-43752
3/8P	3/8 in.	5 pcs	3006-43753

Caps



Inch Sizes

Model	Tubing O.D.	Qty.	Cat.No.
1/16CP	1/16 in.	1 pc	3006-43611
1/8CP	1/8 in.	1 pc	3006-43621
1/4CP	1/4 in.	1 pc	3006-43641
3/8CP	3/8 in.	1 pc	3006-43661

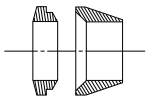
Millimeter Sizes

Model	Tubing O.D.	Qty.	Cat.No.
3CP	3 mm	1 pc	3006-42131
4CP	4 mm	1 pc	3006-42141
6CP	6 mm	1 pc	3006-42161
8CP	8 mm	1 pc	3006-42181

PTFE Ferrules for Swagelok Type Fittings

Use the following ferrules to connect PTFE and glass tubing.

Front and Back PTFE Ferrule Sets



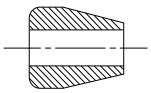
Inch Sizes

Tubing O.D.	Qty.	Cat.No.
1/8 in.	10 sets	3006-67720
1/4 in.	10 sets	3006-67740

Millimeter Sizes

Tubing O.D.	Qty.	Cat.No.
2 mm	10 sets	3006-66220
3 mm	10 sets	3006-66230
4 mm	10 sets	3006-66240
5 mm	10 sets	3006-66250
6 mm	10 sets	3006-66260

PTFE Ferrules



Inch Sizes

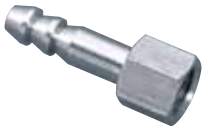
Tubing O.D.	Qty.	Cat.No.
1/16 in.	10 pcs	6010-41210
1/8 in.	10 pcs	3006-67725
1/4 in.	10 pcs	3006-67745

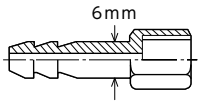
Millimeter Sizes

Tubing O.D.	Qty.	Cat.No.
2 mm	10 pcs	3006-66225
3 mm	10 pcs	3006-66235
4 mm	10 pcs	3006-66245
5 mm	10 pcs	3006-66255
6 mm	10 pcs	3006-66265

Other Fittings

Hose Connector in Female



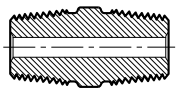


304 Stainless Steel

Model	Thread	Qty.	Cat.No.
GNH-1	8 mm	1 pc	3006-22465

Use O-ring as a seal.

Hexagon Nipples

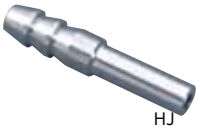


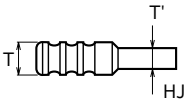
304 Stainless Steel

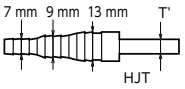
Description	Threads	Qty.	Cat.No.
Hexagon Nipples	R1/8-R1/8	1 pc	3006-33911
	R1/4-R1/4	1 pc	3006-33922
	R1/8-R1/4	1 pc	3006-33912
	1/8NPT-R1/8	1 pc	3006-33966
	1/4NPT-R1/8	1 pc	3006-33917

R: Tapered Male

Hose Connectors



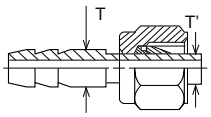




316 Stainless Steel

Model	Hose I.D.	T Dimension	T' Dimension	Qty.	Cat.No.
HJ1	6 mm	8 mm	1/4 in.	1 pc	3006-43801
HJ2	8 mm	10 mm	1/4 in.	1 pc	3006-43802
HJT	6 – 12 mm	7 – 13 mm	1/4 in.	1 pc	3006-43803
HJ3	6 mm	8 mm	6 mm	1 pc	3006-43804
HJ4	8 mm	10 mm	6 mm	1 pc	3006-43805

Hose Connectors in Female with a Ferrule

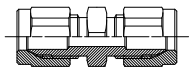


316 Stainless Steel

Model	Hose I.D.	T Dimension	T' Dimension	Qty.	Cat.No.
HJN1	6 mm	8 mm	1/4 in.	1 pc	3006-43806
HJN2	8 mm	10 mm	1/4 in.	1 pc	3006-43807
HJTN	6 – 12 mm	7 – 13 mm	1/4 in.	1 pc	3006-43808
GF-N1	6 mm	8 mm	6 mm	1 pc	3006-43809
GF-N2	8 mm	10 mm	6 mm	1 pc	3006-43810

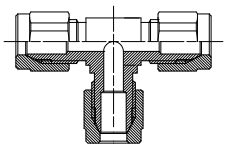
PTFE Connectors

Unions



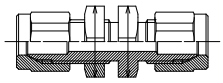
Model	Tubing O.D.	Qty.	Cat.No.
2UT	2 mm	1 pc	3006-28120
3UT	3 mm, 1/8 in.	1 pc	3006-28130
4UT	4 mm	1 pc	3006-28140
6UT	6 mm, 1/4 in.	1 pc	3006-28160
8UT	8 mm, 5/16 in.	1 pc	3006-28180

Tees



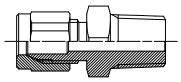
Model	Tubing O.D.	Qty.	Cat.No.
2TUT	2 mm	1 pc	3006-28420
3TUT	3 mm, 1/8 in.	1 pc	3006-28430
4TUT	4 mm	1 pc	3006-28440
6TUT	6 mm, 1/4 in.	1 pc	3006-28460
8TUT	8 mm, 5/16 in.	1 pc	3006-28480

Bulk Head Unions



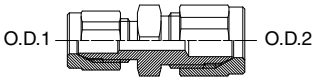
Model	Tubing O.D.	Panel Hole Diameter	Qty.	Cat.No.
3BUT	3 mm, 1/8 in.	7.0 mm	1 pc	3006-28630
6BUT	6 mm, 1/4 in.	11.5 mm	1 pc	3006-28660

Male Connectors



Model	Tubing O.D.	Tapered Male	Qty.	Cat.No.
3CM2T	3 mm, 1/8 in.	1/8	1 pc	3006-28231
3CM4T		1/4	1 pc	3006-28232
6CM2T	6 mm, 1/4 in.	1/8	1 pc	3006-28261
6CM4T		1/4	1 pc	3006-28262
8CM2T	8 mm, 5/16 in.	1/8	1 pc	3006-28281
8CM4T		1/4	1 pc	3006-28282

Reducing Unions

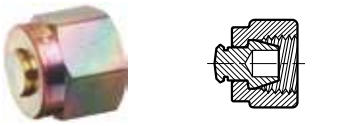


Model	Tubing O.D.1	Tubing O.D.2	Qty.	Cat.No.
2RU3T	2 mm	3 mm, 1/8 in.	1 pc	3006-28323
2RU4T		4 mm	1 pc	3006-28324
2RU6T		6 mm, 1/4 in.	1 pc	3006-28326
3RU4T	3 mm, 1/8 in.	4 mm	1 pc	3006-28334
3RU6T		6 mm, 1/4 in.	1 pc	3006-28336
4RU6T	4 mm	6 mm, 1/4 in.	1 pc	3006-28346
4RU8T		8 mm, 5/16 in.	1 pc	3006-28348
6RU8T	6 mm, 1/4 in.	8 mm, 5/16 in.	1 pc	3006-28368
6RU10T		10 mm, 3/8 in.	1 pc	3006-28370

Fittings & Connectors

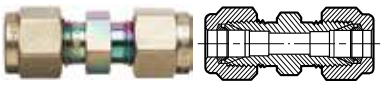
Sulfinert Fittings

The Sulfinert fittings are original fittings for which Silicosteel deactivation technology has been further improved.



Plugs

Model	Tubing O.D.	Qty.	Cat.No.
1/8PS	1/8 in.	1 pc	3006-50055
1/4PS	1/4 in.	1 pc	3006-50056

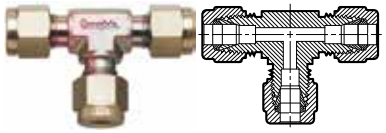


Unions

Model	Tubing O.D.	Qty.	Cat.No.
1/16US	1/16 in.	1 pc	3006-50040
1/8US	1/8 in.	1 pc	3006-50041
1/4US	1/4 in.	1 pc	3006-50042

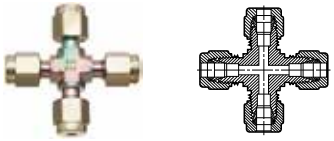
Reducing Unions

Model	Tubing O.D.	Qty.	Cat.No.
1/8RU1/16S	1/8 in. x 1/16 in.	1 pc	3006-50046
1/4RU1/16S	1/4 in. x 1/16 in.	1 pc	3006-50047
1/4RU1/8S	1/4 in. x 1/8 in.	1 pc	3006-50048



Tees

Model	Tubing O.D.	Qty.	Cat.No.
1/16TTTS	1/16 in.	1 pc	3006-50043
1/8TTTS	1/8 in.	1 pc	3006-50044
1/4TTTS	1/4 in.	1 pc	3006-50045

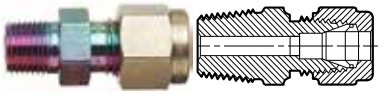


Crosses

Model	Tubing O.D.	Qty.	Cat.No.
1/8CS	1/8 in.	1 pc	3006-50057
1/4CS	1/4 in.	1 pc	3006-50058

Elbows

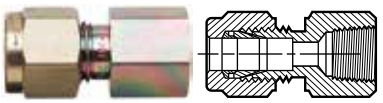
Model	Tubing O.D.	Qty.	Cat.No.
1/8LS	1/8 in.	1 pc	3006-50049
1/4LS	1/4 in.	1 pc	3006-50050



Male Connectors

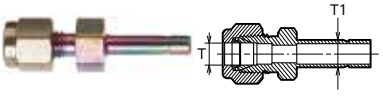
Model	Tubing O.D.	NPT Thread	Qty.	Cat.No.
1/16CM2NS	1/16 in.	1/8	1 pc	3006-50061
1/8CM2NS	1/8 in.	1/8	1 pc	3006-50059
1/8CM4NS	1/8 in.	1/4	1 pc	3006-50062
1/4CM2NS	1/4 in.	1/8	1 pc	3006-50063
1/4CM4NS	1/4 in.	1/4	1 pc	3006-50060

Use seal tape for taper screw. Make sure to see P290.



Female Connectors

Model	Tubing O.D.	NPT Tread	Qty.	Cat.No.
1/8CF2NS	1/8 in.	1/8	1 pc	3006-50064
1/8CF4NS	1/8 in.	1/4	1 pc	3006-50067
1/4CF2NS	1/4 in.	1/8	1 pc	3006-50066
1/4CF4NS	1/4 in.	1/4	1 pc	3006-50065



Reducers

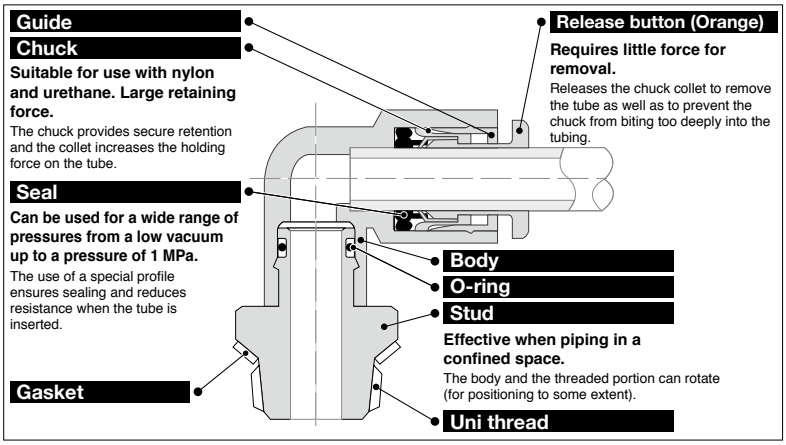
Model	Tubing O.D.		Qty.	Cat.No.
	T	T1		
1/16RE1/8S	1/16 in.	1/8 in.	1 pc	3006-50051
1/16RE1/4S	1/16 in.	1/4 in.	1 pc	3006-50052
1/4RE1/8S	1/4 in.	1/8 in.	1 pc	3006-50053
1/8RE1/4S	1/8 in.	1/4 in.	1 pc	3006-50054

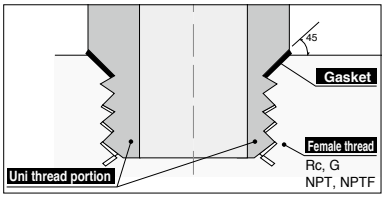
One-Touch Fittings

Specifications

Gasket design threads are used. Due to this design, the time to fix the pipe thread is reduced by 2/3.
Other standard threats (Rc, G, NPT, NPTF) are also used.

Available Tube: FEP, PFA, Nylon, Soft Niylon *1
Fluid: Air, Water *2
Maximum Pressure: 3 MPa (30 Bar)
Minimum Pressure: −0.1 MPa (−1 Bar)
Ambient & Fluid Temperature: −5 to 60 ℃ *3





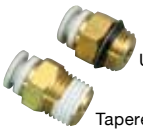
Uni thread ridge shape
A gasket made of a stainless sheet covered with laminated NBR on both sides is seated on the chamfer of a female thread for a perfect sealing construction irrespective of the difference in thread diameters due to the difference in the types of female threads, variation in tolerance, or difference in the size of chamfer. (It is applicable to any female thread with an ordinary chamfer.)

Parts Material

Body	: C3604, PBT
Stud	: C3604 (Thread portion)
Chuck	: SUS304
Guide 1	: SUS304, C3604, PBT
Guide 2	: POM
Release button	: POM
Seal, O-Ring	: NBR
Gasket	: SUS304, NBR

★1: In case of using Soft Nyron, do not use water.
★2: In case of flowing water, do not use under maximum pressure.
★3: In case of flowing water, available temperature is 0 to 40 °C without freezing.
Do not use the fittings with a leak tester or for vacuum retention.

Half Unions



Model	Tubing O.D.	Thread	Qty.	Cat.No.
KQ-4CM2Uni	4 mm	Uni 1/8	5 pcs	3006-81415
KQ-4CM4Uni		Uni 1/4	5 pcs	3006-81425
KQ-6CM2Uni	6 mm	Uni 1/8	5 pcs	3006-81615
KQ-6CM4Uni		Uni 1/4	5 pcs	3006-81625
KQ-8CM2Uni	8 mm	Uni 1/8	5 pcs	3006-81815
KQ-8CM4Uni		Uni 1/4	5 pcs	3006-81825
KQ-1/8CM2Uni	1/8 in.	Uni 1/8	5 pcs	3006-81115
KQ-1/8CM4Uni		Uni 1/4	5 pcs	3006-81125
KQ-1/4CM2Uni	1/4 in.	Uni 1/8	5 pcs	3006-81215
KQ-1/4CM4Uni		Uni 1/4	5 pcs	3006-81225
KQ-4CM2	4 mm	R 1/8	5 pcs	3006-82415
KQ-4CM4		R 1/4	5 pcs	3006-82425
KQ-6CM2	6 mm	R 1/8	5 pcs	3006-82615
KQ-6CM4		R 1/4	5 pcs	3006-82625
KQ-8CM2	8 mm	R 1/8	5 pcs	3006-82815
KQ-8CM4		R 1/4	5 pcs	3006-82825
KQ-1/8CM2	1/8 in.	R 1/8	5 pcs	3006-82115
KQ-1/8CM4		R 1/4	5 pcs	3006-82125
KQ-1/4CM2	1/4 in.	R 1/8	5 pcs	3006-82215
KQ-1/4CM4		R 1/4	5 pcs	3006-82225

Reducing Unions

Model	Tubing O.D.	Qty.	Cat.No.
KQ-4RU6	4 x 6 mm	5 pcs	3006-84465
KQ-6RU8	6 x 8 mm	5 pcs	3006-84685
KQ-8RU10	8 x 10 mm	5 pcs	3006-84805
KQ-1/8RU4	3.2 x 4 mm	5 pcs	3006-84145
KQ-1/8RU1/4	1/8 in. x 1/4 in.	5 pcs	3006-84125
KQ-1/4RU3/8	1/4 in. x 3/8 in.	5 pcs	3006-84235

Unions

Model	Tubing O.D.	Qty.	Cat.No.
KQ-4U	4 mm	5 pcs	3006-83445
KQ-6U	6 mm	5 pcs	3006-83665
KQ-8U	8 mm	5 pcs	3006-83885
KQ-1/8U	1/8 in.	5 pcs	3006-83115
KQ-1/4U	1/4 in.	5 pcs	3006-83225

Fittings & Connectors

One-Touch Fittings

Uni Thread

Tapered Male Thread: R

Elbows

Model	Tubing O.D.	Thread	Qty.	Cat.No.
KQ-4ME2Uni	4 mm	Uni 1/8	5 pcs	3006-85415
KQ-4ME4Uni		Uni 1/4	5 pcs	3006-85425
KQ-6ME2Uni	6 mm	Uni 1/8	5 pcs	3006-85615
KQ-6ME4Uni		Uni 1/4	5 pcs	3006-85625
KQ-8ME2Uni	8 mm	Uni 1/8	5 pcs	3006-85815
KQ-8ME4Uni		Uni 1/4	5 pcs	3006-85825
KQ-1/8ME2Uni	1/8 in.	Uni 1/8	5 pcs	3006-85115
KQ-1/8ME4Uni		Uni 1/4	5 pcs	3006-85125
KQ-1/4ME2Uni	1/4 in.	Uni 1/8	5 pcs	3006-85215
KQ-1/4ME4Uni		Uni 1/4	5 pcs	3006-85225
KQ-4ME2	4 mm	R 1/8	5 pcs	3006-86415
KQ-4ME4		R 1/4	5 pcs	3006-86425
KQ-6ME2	6 mm	R 1/8	5 pcs	3006-86615
KQ-6ME4		R 1/4	5 pcs	3006-86625
KQ 8ME2	8 mm	R 1/8	5 pcs	3006-86815
KQ-8ME4		R 1/4	5 pcs	3006-86825

Gaskets for Uni Threads

Model	Thread	Qty.	Cat.No.
KQ-Uni 1/8	Uni 1/8	10 pcs	3006-89119
KQ-Uni 1/4	Uni 1/4	10 pcs	3006-89219

Elbow Unions

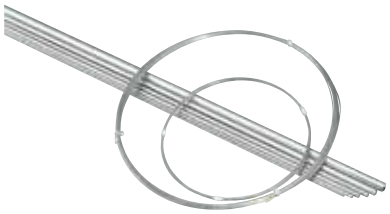
Model	Tubing O.D.	Qty.	Cat.No.
KQ-4EU	4 mm	5 pcs	3006-87445
KQ-6EU	6 mm	5 pcs	3006-87665
KQ-8EU	8 mm	5 pcs	3006-87885
KQ-1/8EU	1/8 in.	5 pcs	3006-87115
KQ-1/4EU	1/4 in.	5 pcs	3006-87225

Tees

Model	Tubing O.D.	Qty.	Cat.No.
KQ-4TTT	4 mm	5 pcs	3006-88445
KQ-6TTT	6 mm	5 pcs	3006-88665
KQ-8TTT	8 mm	5 pcs	3006-88885
KQ-1/8TTT	1/8 in.	5 pcs	3006-88115
KQ-1/4TTT	1/4 in.	5 pcs	3006-88225

Stainless Steel Tubing

Other dimensions available upon request.



316 Stainless Steel Tubing (Bright Annealed)

Millimeter Size Coiled Tubing

Tubing Dimension		5 m	10 m	20 m	50 m	100 m
O.D.	I.D.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
0.8 mm	0.25 mm	3004-21031	3004-21032	3004-21034	3004-21037	3004-21038
1.0 mm	0.5 mm	3004-21131	3004-21132	3004-21134	3004-21137	3004-21138
2.0 mm	1.0 mm	3004-21251	3004-21252	3004-21254	3004-21257	3004-21258
3.0 mm	2.0 mm	3004-21371	3004-21372	3004-21374	3004-21377	3004-21378
4.0 mm	3.0 mm	3004-21481	3004-21482	3004-21484	3004-21487	3004-21488

Millimeter Size Straight Tubing

Tubing Dimension			Length	1 – 10 pcs	11 – 49 pcs	50 pcs –
O.D.	I.D.	Thickness		Cat.No.	Cat.No.	Cat.No.
2.0 mm	1.0 mm	0.5 mm	2 m	3004-21243	3004-21244	3004-21245
3.0 mm	1.0 mm	1.0 mm	2 m	3004-21313	3004-21314	3004-21315
3.0 mm	2.0 mm	0.5 mm	2 m	3004-21323	3004-21324	3004-21325
3.0 mm	2.0 mm	0.5 mm	3 m	3004-21333	3004-21334	3004-21335
4.0 mm	3.0 mm	0.5 mm	1 m	3004-21413	3004-21414	3004-21415
4.0 mm	3.0 mm	0.5 mm	2 m	3004-21423	3004-21424	3004-21425
6.0 mm	3.0 mm	1.5 mm	2 m	3004-21633	3004-21634	3004-21635
6.0 mm	4.0 mm	1.0 mm	2 m	3004-21643	3004-21644	3004-21645
6.0 mm	4.0 mm	1.0 mm	4 m	3004-21683	3004-21684	3004-21685
8.0 mm	6.0 mm	1.0 mm	2 m	3004-21863	3004-21864	3004-21865
8.0 mm	6.0 mm	1.0 mm	4 m	3004-21875	3004-21876	3004-21877
10.0 mm	8.0 mm	1.0 mm	2 m	3004-22043	3004-22044	3004-22045
10.0 mm	8.0 mm	1.0 mm	4 m	3004-22083	3004-22084	3004-22085

Stainless Steel Tubing

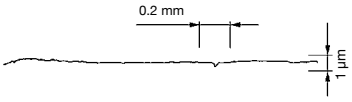
316 Stainless Steel Tubing (Bright Annealed)

Inch Size Coiled Tubing

Tubing Diameter		5 m	10 m	20 m	50 m	100 m
O.D.	I.D.	Cat.No.	Cat.No.	Cat.No.	Cat.No.	Cat.No.
1/16 in. (1.58 mm)	0.25 mm	3004-28021	3004-28022	3004-28024	3004-28027	3004-28028
1/16 in. (1.58 mm)	0.5 mm	3004-28041	3004-28042	3004-28044	3004-28047	3004-28048
1/16 in. (1.58 mm)	0.8 mm	3004-28061	3004-28062	3004-28064	3004-28067	3004-28068
1/16 in. (1.58 mm)	1.0 mm	3004-28081	3004-28082	3004-28084	3004-28087	3004-28088
1/8 in. (3.18 mm)	2.17 mm	3004-28181	3004-28182	3004-28184	3004-28187	3004-28188

Inch Size Straight Tubing

Tubing Diameter			Length	1 – 10 pcs	11 – 49 pcs	50 pcs –
O.D.	I.D.	Thickness		Cat.No.	Cat.No.	Cat.No.
1/8 in. (3.18 mm)	2.17 mm	0.5 mm	2 m	3004-28136	3004-28137	3004-28138
1/4 in. (6.35 mm)	2.09 mm	2.13 mm	2 m	3004-28343	3004-28344	3004-28345
1/4 in. (6.35 mm)	4.35 mm	1.0 mm	2 m	3004-28423	3004-28424	3004-28425
1/4 in. (6.35 mm)	4.35 mm	1.0 mm	4 m	3004-28443	3004-28444	3004-28445
3/8 in. (9.53 mm)	7.53 mm	1.0 mm	2 m	3004-28523	3004-28524	3004-28525
3/8 in. (9.53 mm)	7.53 mm	1.0 mm	4 m	3004-28543	3004-28544	3004-28545



Surface roughness of electrolytically polished 316 stainless steel tubing.

316L Stainless Steel Tubing (Electrolytically Polished)

Compatible with clean gas piping for ultrahigh sensitivity analyses.

Rmax. Less than 0.7 µm.

Tubing Diameter			Length	Cat.No.
O.D.	I.D.	Thickness		
1/8 in. (3.18 mm)	1.73 mm	0.72 mm	2 m	3004-32342
1/4 in. (6.35 mm)	4.35 mm	1.0 mm	2 m	3004-32352
1/4 in. (6.35 mm)	4.35 mm	1.0 mm	4 m	3004-32354
3/8 in. (9.53 mm)	7.53 mm	1.0 mm	2 m	3004-32562
3/8 in. (9.53 mm)	7.53 mm	1.0 mm	4 m	3004-32564

304 Stainless Steel Tubing (Bright Annealed)

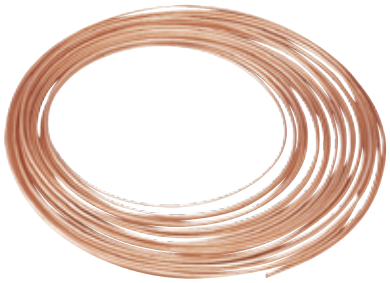
Millimeter Size Straight Tubing

Tubing Diameter			Length	1 – 10 pcs	11 – 49 pcs	50 pcs –
O.D.	I.D.	Thickness		Cat.No.	Cat.No.	Cat.No.
6.0 mm	4.0 mm	1.0 mm	2 m	3004-11673	3004-11674	3004-11675
6.0 mm	4.0 mm	1.0 mm	4 m	3004-11683	3004-11684	3004-11685
8.0 mm	6.0 mm	1.0 mm	2 m	3004-11863	3004-11864	3004-11865
8.0 mm	6.0 mm	1.0 mm	4 m	3004-11883	3004-11884	3004-11885
10.0 mm	8.0 mm	1.0 mm	2 m	3004-12043	3004-12044	3004-12045
10.0 mm	8.0 mm	1.0 mm	4 m	3004-12083	3004-12084	3004-12085

Inch Size Straight Tubing

Tubing Diameter			Length	1 – 10 pcs	11 – 49 pcs	50 pcs –
O.D.	I.D.	Thickness		Cat.No.	Cat.No.	Cat.No.
1/4 in. (6.35 mm)	4.35 mm	1.0 mm	2 m	3004-18383	3004-18384	3004-18385
1/4 in. (6.35 mm)	4.35 mm	1.0 mm	4 m	3004-18393	3004-18394	3004-18395
3/8 in. (9.53 mm)	7.53 mm	1.0 mm	2 m	3004-19203	3004-19204	3004-19205
3/8 in. (9.53 mm)	7.53 mm	1.0 mm	4 m	3004-19213	3004-19214	3004-19215

Copper Tubing



Tubing Diameter			10 m coil	20 m Coil
O.D.	I.D.	Thickness	Cat.No.	Cat.No.
3.0 mm	2.0 mm	0.5 mm	3004-35362	3004-35364
4.0 mm	3.0 mm	0.5 mm	3004-35472	3004-35474
6.0 mm	4.0 mm	1.0 mm	3004-35672	3004-35674
8.0 mm	6.0 mm	1.0 mm	3004-35862	3004-35864
1/8 in. (3.18 mm)	1.57 mm	0.8 mm	3004-38112	3004-38114
1/4 in. (6.35 mm)	4.75 mm	0.8 mm	3004-38312	3004-38314

Treated Tubing for Inert

Sulfinert Treated 304 Stainless Steel Tubing

The ultimate passivation of treated surfaces, from glass to high nickel alloy of steel which is ideal for sulfurs, automotive exhaust testing, or stack gas sampling is adopted. Sulfinert is a required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds.

304 Stainless Steel Sulfinert-Treated (Coiled)

Tubing Diameter		Length	Cat.No.
O.D.	I.D.		
0.029 in. (0.74 mm)	0.021 in. (0.53 mm)	7.5 m	3004-50041
1/16 in. (1.59 mm)	0.020 in. (0.51 mm)	7.5 m	3004-50043
1/16 in. (1.59 mm)	0.030 in. (0.76 mm)	7.5 m	3004-50044
1/16 in. (1.59 mm)	0.040 in. (1.02 mm)	7.5 m	3004-50045
1/8 in. (3.18 mm)	0.085 in. (2.16 mm)	7.5 m	3004-50046
1/4 in. (6.35 mm)	0.210 in. (5.33 mm)	1.8 m (straight)	3004-50047

Tubing

PFA Tubing (Tetrafluoroethylene-perfluoroalkyl vinyl ether)

PFA has similar chemical resistance like Teflon but is harder than Teflon, resulting in tight sealing. Because it is translucent, the liquid flow is visible.

Maximum Operating Temp.: 260 °C

Millimeter Size Tubing (Coiled)

Tubing Dimension		Length	Cat.No.
O.D.	I.D.		
2.0 mm	1.0 mm	10 m	3004-32121
3.0 mm	2.0 mm	10 m	3004-32132
4.0 mm	2.0 mm	10 m	3004-32142
4.0 mm	3.0 mm	10 m	3004-32143
6.0 mm	4.0 mm	10 m	3004-32164

Inch Size Tubing (Coiled)

Tubing Diameter		Length	Cat.No.
O.D.	I.D.		
1/8 in. (3.18 mm)	1.58 mm	10 m	3004-32231
1/4 in. (6.35 mm)	3.18 mm	10 m	3004-32263
1/4 in. (6.35 mm)	4.35 mm	10 m	3004-32264

PTFE Tubing (Polytetrafluoroethylen)

PTFE is chemically inert and ideal for mobile phase inlet lines.

Millimeter Size Tubing (Coiled)

Tubing Diameter		5 m	10 m
O.D.	I.D.	Cat.No.	Cat.No.
1.0 mm	0.5 mm	3004-31131	3004-31132
1.5 mm	0.25 mm	3004-31151	3004-31152
1.5 mm	0.5 mm	3004-31171	3004-31172
2.0 mm	0.5 mm	3004-31231	3004-31232
2.0 mm	1.0 mm	3004-31251	3004-31252
3.0 mm	1.0 mm	3004-31341	3004-31342
3.0 mm	2.0 mm	3004-31371	3004-31372
4.0 mm	2.0 mm	3004-31441	3004-31442
4.0 mm	3.0 mm	3004-31451	3004-31452
5.0 mm	3.0 mm	3004-31541	3004-31542
5.0 mm	4.0 mm	3004-31561	3004-31562
6.0 mm	4.0 mm	3004-31661	3004-31662
8.0 mm	6.0 mm	3004-31861	3004-31862
10.0 mm	8.0 mm	3004-32061	3004-32062

Inch Size Tubing (Coiled)

Tubing Diameter		5 m	10 m
O.D.	I.D.	Cat.No.	Cat.No.
1/16 in. (1.58 mm)	1.00 mm	6010-35609	6010-35610
1/8 in. (3.18 mm)	1.58 mm	6010-35701	6010-35702
1/4 in. (6.35 mm)	3.17 mm	3004-31000	3004-31001
1/4 in. (6.35 mm)	4.35 mm	3004-31002	3004-31003
3/8 in. (9.52 mm)	7.52 mm	3004-31006	3004-31007

Nylon Tubing

Nylon has mechanical and bending strength and is superior in oil resistance and chemical resistance (Particularly, Alkali resistance). There are 2 types of Nylon, hard and soft.

Operation Temp. Range :

Hard Nylon	Air : −20 – 70°C	Water : 0 – 60°C
Soft Nylon	Air : −20 – 60°C	Water : 0 – 60°C

Hard Tubing

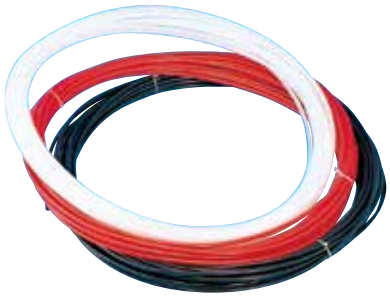
Model	O.D. x I.D.	Max Operating Pressure (23 °C)	Minimum Bending Radius	Color	10 m	20 m
					Cat.No.	Cat.No.
HNY-4	4 x 2.5 mm	2.4 MPa	12 mm	Black	3004-71441	3004-71451
				White	3004-71442	3004-71452
				Red	3004-71444	3004-71454
HNY-6	6 x 4 mm	2.1 MPa	24 mm	Black	3004-71651	3004-71661
				White	3004-71652	3004-71662
				Red	3004-71654	3004-71664
HNY-8	8 x 6 mm	1.4 MPa	48 mm	Black	3004-71851	3004-71861
				White	3004-71852	3004-71862
				Red	3004-71854	3004-71864
HNY-1/8	3.18 x 2.36 mm	1.5 MPa	12 mm	Black	3004-71011	3004-71021
				White	3004-71012	3004-71022
HNY-1/4	6.35 x 4.57 mm	1.7 MPa	22 mm	Black	3004-71111	3004-71121
				White	3004-71112	3004-71122

Soft Tubing

Model	O.D. x I.D.	Max Operating Pressure (20 °C)	Minimum Bending Radius	Color	10 m	20 m
					Cat.No.	Cat.No.
SNY-4	4 x 2.5 mm	1.0 MPa	12 mm	Black	3004-72441	3004-72451
				White	3004-72442	3004-72452
				Red	3004-72444	3004-72454
SNY-6	6 x 4 mm	1.0 MPa	15 mm	Black	3004-72651	3004-72661
				White	3004-72652	3004-72662
				Red	3004-72654	3004-72664
SNY-8	8 x 6 mm	1.0 MPa	23 mm	Black	3004-72851	3004-72861
				White	3004-72852	3004-72862
SNY-1/8	3.18 x 2.18 mm	1.0 MPa	12 mm	Black	3004-72011	3004-72021
				White	3004-72012	3004-72022
SNY-1/4	6.35 x 4.57 mm	1.0 MPa	23 mm	Black	3004-72111	3004-72121
				White	3004-72112	3004-72122

Tubing

Polyurethane Tubing



This Polyurethane tube is softer than nylon tube, and offers smaller minimumbending radius. As O.D. accuracy is – 0.2 mm, + 0.05 mm, it can be used without any leak with One-Touch Fittings. It can also be used as vacuum tubing.

Application

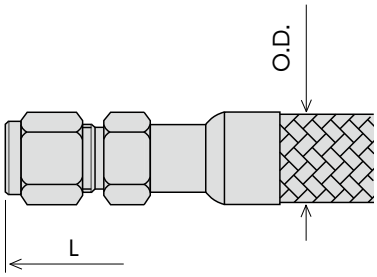
Air pressure piping used in Machines

Vacuum Instrument

Piping for Cooling Water

Model	O.D. x I.D.	Minimu Bending Radius	Color	10 m	20 m
				Cat.No.	Cat.No.
PU-4	4 x 2 mm	5 mm	Black	3004-73431	3004-73441
			White	3004-73432	3004-73442
			Red	3004-73434	3004-73444
PU-6	6 x 4 mm	12 mm	Black	3004-73651	3004-73661
			White	3004-73652	3004-73662
			Red	3004-73654	3004-73664
PU-8	8 x 5 mm	15 mm	Black	3004-73841	3004-73851
			White	3004-73842	3004-73852
			Red	3004-73844	3004-73854

Flexible Stainless Steel Tubing



Flexible tubing

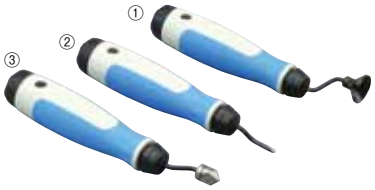
This is a flexible tube of 100 mm in Minimum bending radius and can be used for taking out the liquid nitrogen from the reservoir or as a flexible tubes which absorbs vibration.

Specifications

Both connection size: 1/4 in. Swagelok or 1/8 in. Swagelok.

Hose O.D.	Model	Flexiible Tubing O.D.	Length	Max Operating Pressure (20 °C)	Cat.No.
1/4 in.	MHM4-4D4D-1-L1000	10.7 mm	1 m	12.6 MPa	3004-40000
1/4 in.	MHM4-4D4D-1-L2000	10.7 mm	2 m	12.6 MPa	3004-40001
3/8 in.	MHM6-6D6D-1-L1000	16.5 mm	1 m	10.9 MPa	3004-40002
3/8 in.	MHM6-6D6D-1-L2000	16.5 mm	2 m	10.9 MPa	3004-40003

Reamers for Stainless Steel Tubing



Inner and Outer Reamers

Reamers for fast, clean, inner reaming and outer deburring/beveling.

Outer Reamer for Stainless Steel

Description	Applicable tubing I.D.	Qty.	Cat.No.
Outer Reamer	6 – 16 mm	1 pc	3001-32260

Inner Reamer for Stainless Steel

Description	Applicable tubing I.D.	Qty.	Cat.No.
Inner Reamer	0.5 – 3 mm	1 pc	3001-32270
	1 – 10 mm	1 pc	3001-32280

Tool for Finish After Cuts

This is a tool for beautiful finish after cuts of stainless steel.

Description	Qty.	Cat.No.
Tool for Finish after Cuts 1/16 in. Stainless Steel	1 pc	3001-31704
Tool for Finish after Cuts 1/8 in. Stainless Steel	1 pc	3001-31705

Tubing Benders

These benders can be used to bend stainless steel and copper tubes without any kink and crush.

Description	Qty.	Cat.No.
Tubing Bender for 3 mm & 1/8 in. O.D. Tubing	1 pc	3001-32001
Tubing Bender for 4 mm & 3/16 in. O.D.Tubing	1 pc	3001-32002
Tubing Bender for 6 mm O.D. Tubing	1 pc	3001-32003
Tubing Bender for 8 mm O.D. Tubing	1 pc	3001-32004
Tubing Bender for 1/4 in. O.D. Tubing	1 pc	3001-32007
Tubing Bender for 3/8 in. O.D. Tubing	1 pc	3001-32008

PTFE Tape

It is useful to seal pipe threads.

Description	Thickness	Width	Length	Qty.	Cat.No.
Seal Tape	0.1 mm	13 mm	5 m	10 pcs	3001-33501

Gas Filters

Gas Purifiers

Maxium concentration of impurities in carrier gas should contain less than 1 ppm of oxygen, moisture, or other trace contaminants, to prevent column degradation, increase column lifetime, and decrease stationary phase bleed. The expense of using high-purity gases in combination with carrier gas line purifiers will be offset by longer column lifetime and less GC maintenance.

Contaminants cause ghost peaks to appear during temperature programming and degrade the validity of analytical data. Make-up gas also should be contaminant-free, or baseline fluctuations and excessive detector noise can occur. Detector gases should be free of water and hydrocarbons, or excessive baseline noise can result. Gas purifiers remove these contaminants from gas sources, thereby improving system performance.

Super Clean Gas Filters

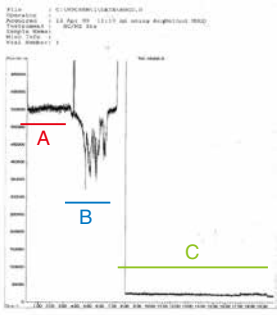
Cartridge systems make changing gas filters quick and easy. A base plate allows cartridges to be exchanged without introducing oxygen. Spring-loaded check valves seal when a filter is removed and open only when a new filter has been locked in place. There is no longer a need for loosening and tightening fittings every time a trap is changed and your system will not become contaminated during the process.

Click-on Super Clean Trap

Click-On Super-Clean Traps are inline traps designed with Click-On adaptor connectors which allows inline cartridges to be exchanged without introducing oxygen. Spring loaded check valves seal when a filter is removed and open only when a new filter has been locked in place. There is no need for loosening and tightening fittings every time a trap is changed and your system will not become contaminated during the process.

Super Clean Gas Filters

Super Clean Gas Filters ensure >99.9999 % outlet pure gas.
Connecting unit with inlet and outlet connectors for the gas line and two spring-loaded check valves that automatically start the flow of gas once filter is installed. The filter cartridges are made of glass to prevent diffusion, and protected by a plastic housing for safety. The PTFE seals at the base of the filter will only be punctured during installation on the base plate.



A : Without super clean gas filters
B : Just after super clean gas filters installed
(Oxygen/Moisture/Hydrocarbon filters)
C : After installation of gas filters

Super Clean Replacement filters

Specifications:

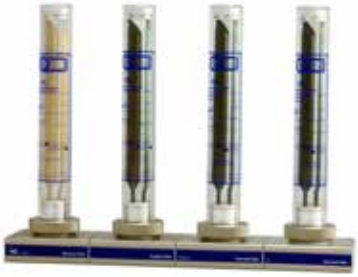
Outlet Gas Quality	: >99.9999 % (Flow Rate <2 L/min)
Maximum Pressure	: 1 Mpa
Maximum Flow	: 7 L/min
Dimensions	: 38.5 x 258 mm
Weight	: 0.26 kg

Description	Usable For	Moisture filter*	Oxygen Filter*	Hydrocarbon Filter	Cat.No.
		H_2O Capacity	O_2 Capacity	Hydrocarbon (n-butane) Capacity	
① Moisture Filter	He, H_2, N_2, Ar, Air	7.2 g	–	–	3001-18350
② Oxygen Filter	He, H_2, N_2, Ar	–	150 mL	–	3001-18351
③ Hydrocarbon Filter	He, H_2, N_2, Ar	–	–	12 g	3001-18352
④ Moisture / Hydrocarbon Filter	He, H_2, N_2, Ar, Air	3.5 g	–	6 g	3001-18353
⑤ Oxygen / Moisture / Hydrocarbon Filter	He, H_2, N_2, Ar	1.8 g	75 mL	4 g	3001-18354
⑥ Oxygen / Moisture / Hydrocarbon Filter (has been purged with Helium)	Carrier gas (for GC/MS) He	1.8 g	75 mL	4 g	3001-18355
3 pcs unit ④ Moisture / Hydrocarbon Filter x 2, ⑤ Oxygen / Moisture / Hydrocarbon Filter x 1	④ He, H_2, N_2, Ar, Air	3.5 g	–	6 g /pc	3001-18359
	⑤ He, H_2, N_2, Ar	1.8 g	75 mL	4 g	
4 pcs unit ① Moisture Filter x 1, ② Oxygen Filter x 1, ③ Hydrocarbon Filter x 2	① He, H_2, N_2, Ar, Air	7.2 g	–	–	3001-18360
	② He, H_2, N_2, Ar	–	150 mL	–	
	③ He, H_2, N_2, Ar	–	–	12 g /pc	

★: Moisture filter and Oxygen filter include Indicator . Base plat is not included.

Gas Filters

Super Clean Gas Filter Kit



Description	Moisture filter*	Oxygen Filter*	Hydrocarbon Filter	Base Plate Qty.	P/N	Cat.No.
	H_2O Capacity	O_2 Capacity	Hydrocarbon (n-butane) Capacity			
Oxygen / Moisture / Hydrocarbon Filter Kit	1.8 g	75 mL	4 g	1 pc	B1010	3001-18313
Oxygen / Moisture / Hydrocarbon Filter Kit (has been purged with Helium)	1.8 g	75 mL	4 g	1 pc	B1011	3001-18314
For GC-FID Fuel Gas Filter Kit Moisture / Hydrocarbon Filter x 2	3.5 g/ pc	–	6 g /pc	2 pcs	B1020	3001-18315
For GC-FID Filter Kit Moisture / Hydrocarbon Filter x 2, Oxygen / Moisture / Hydrocarbon Filter x 1 pc	3.5 g/ pc	–	6 g /pc	3 pcs	B1030	3001-18318
	1.8 g	75 mL	4 g			
For GC-FID Filter Kit, Moisture Filter x 1 pc	7.2 g	–	–	4 pcs	B1040	3001-18319
Oxygen Filter x 1	–	150 mL	–			
Hydrocarbon Filter x 2	–	–	12 g /pc			

*: Moisture filter and Oxygen filter include indicator. Each kit includes 1/8 inch connection brass base plate.

Base Plate / Other Accessories

Base Plate

Stainless Steel Tube End Connector

Description	Application	P/N	Qty.	Cat.No.
Super Clean GC Base Plate 1/8 in. brass	1 position	B0010	1 set	3001-18300
	2 position	B0020	1 set	3001-18301
	3 position	B0030	1 set	3001-18303
	4 position	B0040	1 set	3001-18304
Base Plate O-ring Replacement Set for Super Clean Filter (two types)	–	B0110	20 pcs	3001-18306
Stainless Steel Tube End Connector 1/8 in. - Shimadzu (Length 30 mm, SMM type)	–	–	2 pcs	3001-17971
Stainless Steel Tube End Connector 1/4 in. - Shimadzu (Length 30 mm, SMM type)	–	–	2 pcs	3001-17970
Brass Tube End Connector 1/8RE1/4	–	–	2 pcs	3001-17950
Brass Tube End Connector 1/4RE1/8	–	–	2 pcs	3001-17951

Click-On Super Clean Traps

With Indicator

Click-On Super Clean Filter

A Click-on Super Clean Trap is designed to purify carrier gas and offers >99.9999 % purity. As a precaution, we highly recommend installing a moisture trap before hydrocarbon and oxygen traps in every carrier gas line. Spring loaded check valves seal when a filter is removed and open only when a new filter has been locked in place. There is no need for loosening and tightening fittings every time a trap is changed and your system will not become contaminated during the process.

Specifications

Outlet Gas Quality : >99.9999 %
Maximum Pressure: 1 MPa (11 Bar, 160 psi)
Maximum Flow : 25 L/min
Dimensions : 32 x 200 mm
Weight : 0.6 kg
Weight of the taps with an indicator are 0.25 kg.

Description	Usable for	Moisture Filter	Oxygen Filter	Hydrocarbon Filter	P/N	Cat.No.
		H_2O capacity	O_2 capacity	Hydrocarbon (n-butane) capacity		
Moisture Trap	He, H_2, N_2, Ar, Air	21 g	–	–	CO1001	3001-18331
Oxygen Trap	He, H_2, N_2, Ar	–	450 mL	–	CO1002	3001-18332
Hydrocarbon Trap*	He, H_2, N_2, Ar, Air	–	–	36 g	CO1003	3001-18333
Oxygen / Moisture Trap	He, H_2, N_2, Ar	10 g	225 mL	–	CO1004	3001-18334
Moisture / Hydrocarbon Trap	He, H_2, N_2, Ar, Air	10 g	–	18 g	CO1007	3001-18336
Oxygen / Moisture / Hydrocarbon Trap	He, H_2, N_2, Ar	6 g	150 mL	12 g	CO1005	3001-18335
Oxygen / Moisture / Hydrocarbon Trap (Has been purged with He)	He (for GC-MS)	6 g	150 mL	12 g	CO1006	3001-18338
Oxygen / Moisture / Hydrocarbon Trap With an indicator (Has been purged with He)	He (for GC-MS)	2 g	32 mL	1.5 g	CO1051	3001-18337

*: The above Trap products do not include Click-On Connectors. Select suitable Click-On Connectors for the tubing size.

Click-On Connectors


①


②


③


④


⑤

Description	Material	P/N	Qty.	Cat.No.
① Click-On Connector 1/4 in.	Brass	CO2001	2 pcs	3001-18339
	Stainless Steel	CO2010	2 pcs	3001-18341
② Click-On Connector 1/8 in.	Brass	CO2002	2 pcs	3001-18340
	Stainless Steel	CO2011	2 pcs	3001-18342
③ Click-On Direct Connector	Stainless Steel	CO2020	1 pc	3001-18343
④ Click-On Wall-mounting Clamp Set	–	CO3002	4 pcs	3001-18345
⑤ Stainless Steel Tube End Connector 1/8 in.- Shimadzu (Length 30 mm, SMM Type)	Stainless Steel	–	2 pcs	3001-17971
O- Ring	fluorine resin	CO3001	10 sets	3001-18344

Gas Filters

High Performance Indicator Kit

Hydrocarbon Trap 2

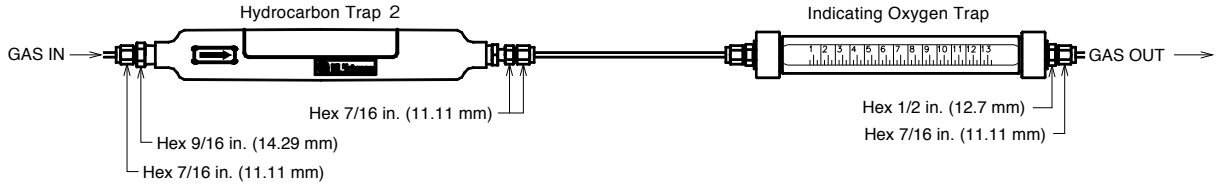
Indicating Oxygen Trap

High Performance Indicator Kit consists of a Hydrocarbon Trap 2 and Indicating Oxygen Trap and is used for purification of carrier gas. Connector size of the High performance Indicator Kit which is adopted to AquaPT 6000 is 1/8 in.

Description	Indicating Oxygen Trap*2	Hydrocarbon Trap 2
Maximum Pressure	0.68 MPa (6.8 bar, 100 psi)	1.7 MPa (17 bar, 247 psi)
Usable Temperature	to 100°C	
Dimensions	35 x 288 mm	31.5 x 241 mm
Packed materials	Mixture of Oxidized metals	Activated Carbon
Usable Volume	50 mL	100 mL
Connector Size	1/8 in. SWL	

Description	Cat.No.
High Performance Indicator Kit *1	3001-17919
Indicating Oxygen Trap*2	3001-17921
Hydrocarbon Trap 2	3001-17922

★1: The kit includes 1 Indicating Oxygen Trap, 1 Hydrocarbon Trap 2, 4 brass ferrules and a copper tubing (1/8 x 200 mm).
★2: Indicating Oxygen Trap should be changed when the color of indicator changes from green to brown.



Common Connection

Big Trap Gas Filters

Oxygen Big Trap

Oxygen Big Trap / Indicating Oxygen Trap

Oxygen is column killer. It is present even in UHP gases, as minutes leaks at fittings allow oxygen to influx a gas line at any fitting or during gas bottle exchange, the oxygen trap should be the last connection before the gas line enters the chromatograph.

Description	Oxygen Big Trap	Indicating Oxygen Trap
Bottle material	Ni	Body : Glass (attached with polymer cover)
Packed Material	Activated Al mixture	–
Connection Size	1/8 in.	1/8 in.
Oxygen Adsorption Capacity	2.5 L	40 mL
Maximum Pressure	6.8 MPa (68 bar, 1,000 psi)	0.68 MPa (6.8 bar, 100 psi)

Description	Cat.No.
Indicating Oxygen Big Trap Set	3001-17901
Oxygen Big Trap	3001-17905
Indicating Oxygen Big Tap	3001-17928

Hydrocarbon Big Trap

Hydrocarbon Big Trap

When observing gas ghost peaks, remove a potential source of hydrocarbon contaminants as oil and hydrocarbon. Connection size is 1/8 in.

Description	Cat.No.
Hydrocarbon Big Trap 1/8 in.	3001-17915

Gas Filters

Carrier Gas Drier for High Sensitivity Analysis

Carrier Gas Drier (for High Sensitivity Analysis)

This Carrier Gas Drier is designed to remove moisture from carrier gas for high sensitivity analysis with ECD/ MSD.

Specifications

Packed Material : Molecular Sieve 4A 100 g
Maximum Pressure : 0.9 MPa (9 bar, 130 psi) Maximum Flow : 4 L/min
Material : Stainless Steel 304
Dimensions : 34 x 266 mm (1/8 in.) ; 34 x 303 mm (1/4 in.)
Connection size : 1/8 in. SWL; 1/4 in. SWL

Description	Connection Size	Cat.No.
Carrier Gas Drier (for high sensitivity analysis)	1/8 in.	3001-17002
	1/4 in.	3001-17003

Carrier Gas Drier for General Analysis

Carrier Gas Drier (for General Analysis)

This Carrier Gas Drier is designed to remove moisture from carrier gas for general analysis and dry up 10 cylinders' ($7\ m^3$, $150\ kg/cm^3$) carrier gas with dew point −40°C to that of −70°C. PTFE seal tape is used for sealing of connection.

Specifications

Packed Material : Molecular Sieve 5A (1/16 pellet 100 g)
Maximum Pressure : 0.9 MPa (9 bar, 130 psi) Maximum Flow : 4 L/min
Material : Stainless Steel 304 Outlet gas dew point : < −70 °C
Dimensions : 34 x 210 mm
Connection size : Rc1/4 (1/4PT female)

Description	Qty.	Cat.No.
Carrier Gas Drier for General analysis	1 pc	3001-17001
Replacement Molecular Sieve 5A	500 g	3001-17080

Air Drier Packed with Cobalt Free Silica Gel

Air Drier (Packed with Cobalt Free Silica Gel)

This Air Drier is designed to dry air for FID analysis and packed with cobalt free silica gel which is not subject to PRTR (Pollutant Release and Transfer Register) regulation. When the color has changed, replace the silica gel.

Specifications

Packed Material : Cobalt Free Silica Gel
Body Material : Polyvinyl Chloride, Stainless Steel 304
Maximum Pressure : 0.8 MPa (8 bar, 116 psi) Maximum Flow : 4 L/min
Dimensions : 48 x 212 mm Connection size : Rc1/4 (1/4PT female)
Usable Temperature. : 5 °C – 40 °C

Description	Qty.	Cat.No.
Air Drier	1 pc	3001-17111
Replacement Cobalt Free Silica Gel	1 kg	3001-17190

Organic Remover

Organic Remover (Packed with Activated Carbon)

This Organic Remover is designed to remove organic substances from gasses.
PTFE seal tape is used for sealing of connection.
Use seal tape for tightening.

Specifications

Packed Material : Activated Carbon
Body Material : Polyvinyl Chloride, Stainless Steel 304
Maximum Pressure : 0.8 MPa (8 bar, 116 psi) Maximum Flow : 4 L/min
Dimensions : 48 x 212 mm Connection size : Rc1/4 (1/4PT female)
Usable Temperature. : 5 °C – 40 °C

Description	Qty.	Cat.No.
Organic Remover	1 pc	3001-17201
Activated Carbon (for replacement)	200 g	3001-17280

Gas Filters

Connectors for Gas Filter

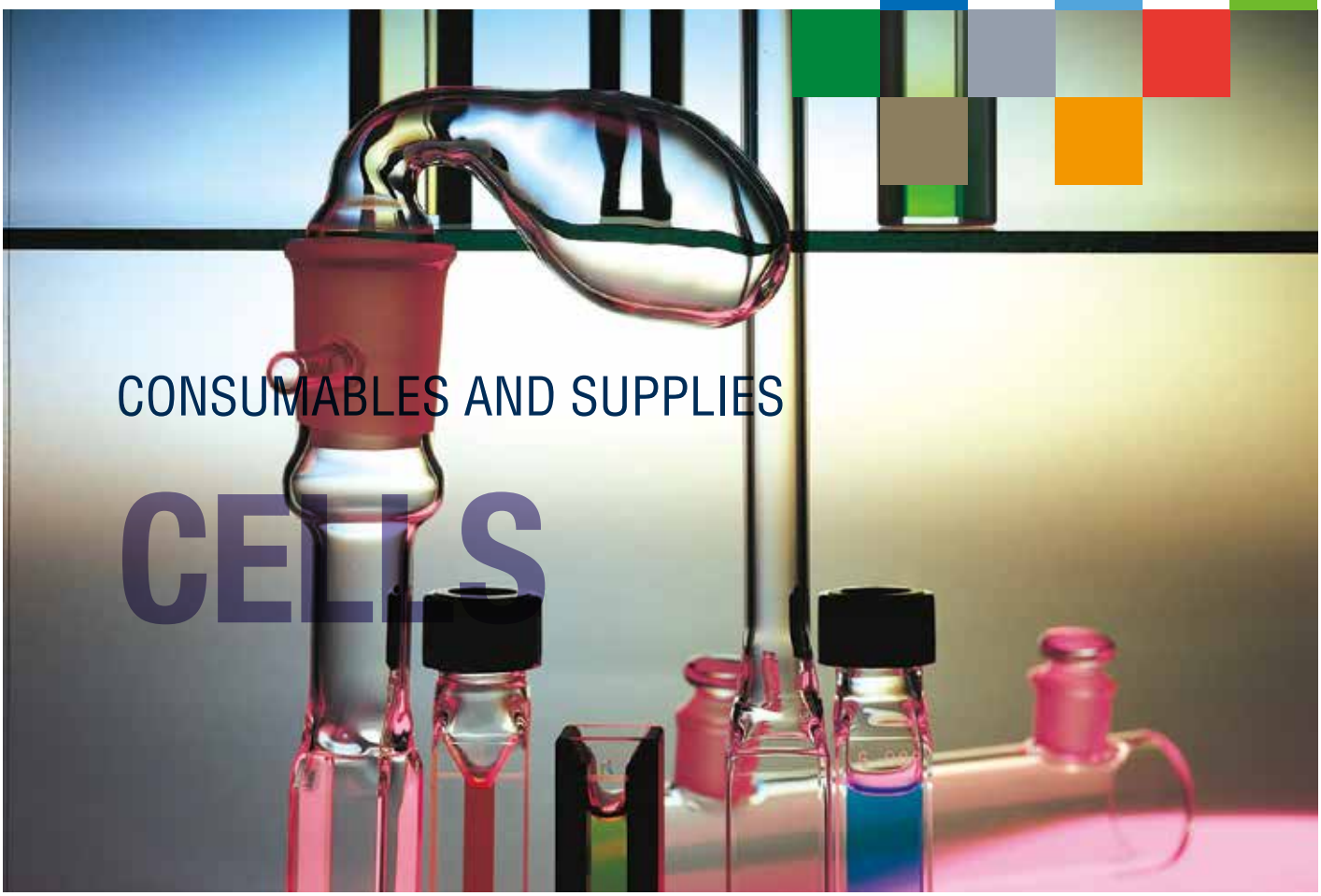
1/8CM4

1/4CM4

R1/4-SMM

Connectors

Model	Available Size	Qty.	Cat.No.
1/8CM4	1/8SWL Type of Tapered Male	1 pc	3006-43022
1/4CM4	1/4SWL Type of Tapered Male	1 pc	3006-43042
R1/4-SMM	R1/4 Half Union for Shimadzu Tubing	2 pcs	3001-66902



CONSUMABLES AND SUPPLIES

CELLS

Cell's Features

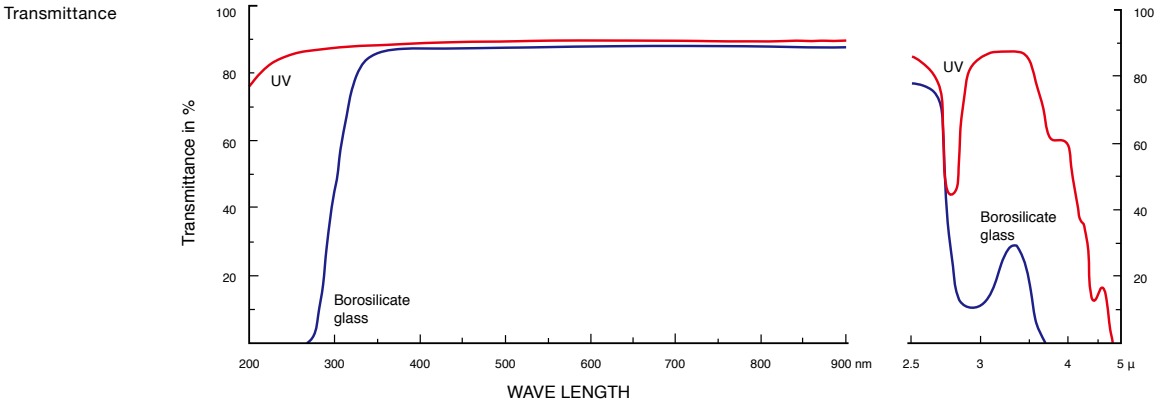
Features

① The majority of cells are produced using a welding process. Adhesive is not used for the seam, so it offers excellent chemical resistance and mechanical strength; there is no peeling or leakage when cleaning with ultrasonic cleaner.
② Cells on the market are compatible with nearly all spectrophotometer manufacturers. Check your instrument's specifications prior to purchase.
③ There is a wide range of materials and cell types for a variety of analytical applications.
④ High quality materials with superior transmittance are used and cells are manufactured using the latest technology and equipment. The optical path length error is less than ± 0.03 mm; the parallelism error of the transparent surfaces is ± 0.05 or less. The transparent surfaces are polished within 4 fringes.
⑤ The range of cells is manufactured and inspected under strict quality control to guarantee high performances.
⑥ Most cells have cell number for identification and a line indicating the direction of transmission at their top.
⑦ The screw cap cell type is suitable for measurement of volatile samples and monitoring change over time.

Instructions

① In order to perform accurate and reproducible analysis, wash the cell sufficiently before use. We recommend a cleaning solvent for washing contaminated cells (Cat. No. 6220-33021, cell washing liquid DCN 90). We also recommend to use an ultrasonic washer as the most efficient washing method. Use with 2 – 10 % cell cleaning solvent. Caution: do not put the cell directly into any metal washing tank and do not use with a high frequency ultrasonic cleaner as this may break the cell. Wash only in a cell washing basket and use an ultrasonic cleaner with less than 80W power output.
② The cell surface adsorbs gases from the air so it is recommended to use the cell immediately after cleaning. If the cells are not used for a long period of time, soak in distilled water or keep them in the dedicated storage case.
③ Do not touch the transparent surface directly with your fingers. Grease from the fingers can be transferred to the cell and adversely affects the analysis.
④ Always use the cell in its respective cell position and use with the same transmitted light direction in the cell holder for repeatable measurement with little error.
⑤ Avoid measurement of hydrofluoric acid, strong phosphoric acid or alkaline solutions. It is possible to measure weak aqueous alkaline solution. However, make the measurement as quickly as possible and wash the cell immediately after measurement.
⑥ Do not use any screw cap cell or other capped cell for heating or freezing etc., because this will result in increased pressure inside the cell causing it to break.
⑦ Do not lift the long optical path length cells by holding just at the center; it may break with risk of injury. Hold with both hands at each end.

Cell Materials and Transmittance



G	Borosilicate Glass	It can be used within the range 320 nm to 2.0 μm, and is used primarily in the visible range.
UV	Quartz Glass	This is optical quartz glass, and can be used between 200 nm (ultraviolet range) and 2.5 μm (near-infrared range.)

Material\Wave Length	200 nm	220 nm	240 nm	340 nm	400 nm	800 nm
G (Borosilicate Glass)	–	–	–	80 % or higher	84 % or higher	86 % or higher
UV (Quartz Glass)	70 % or higher	80 % or higher	83 % or higher	–	–	88 % or higher

Matching

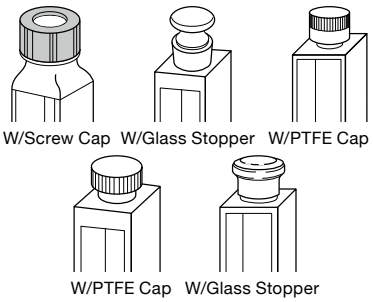
Matching means using two or more cells with the same transmittance. To classify the cells, transmission measurement is made at the wavelengths described below by using blank (air), distilled water and organic solvent (normal n-Hexane). It is also possible to match measurements at a specific wavelength.

Matching Name	Matching Qty.	Cat.No.	Matching Qty.	Cat.No.
Blank (air)	2-4 pcs	6210-91001	5 pcs or more	6210-91002
Distilled water		6210-91011		6210-91012
Organic solvent		6210-91021		6210-91022
Specific wavelength	20% extra per wavelength			

Material	Measurement Wavelength	Matching Precision
UV	240 nm	within 1 %
G	400 nm	

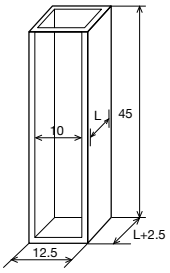
Note: ① The matching of synthetic quartz cells at infrared wavelengths is not available.
② The matching of microcells with optical path width of 1mm is not available.
③ Depending on the cell format, matching is made during the production process.
④ Contact us regarding matching for organic solvents other than normal hexane.

Air Tight Test Classified by Cell type (Decreased Quantity and Decreased Ratio after 120 hours)



Solvent Name	Acetone		Methanol		Diethyl Ether	
Cell type (optical path length 10mm)	Decrease Quantity (g)	Decrease Ratio (%)	Decrease Quantity (g)	Decrease Ratio (%)	Decrease Quantity (g)	Decrease Ratio (%)
Cell with screw cap	0.0055	0.27	0.0036	0.18	0.0402	2.11
Cell with glass plug	0.1300	5.94	0.0554	2.52	0.5111	26.15
Cell with PTFE cap	0.0768	3.42	0.0373	1.67	0.4471	21.85
Cell with PTFE plug	0.3164	14.82	0.1286	5.70	1.1264	56.99
Cell with glass cap	0.2800	12.48	0.0996	4.52	0.9875	48.32

Spectrophotometer Standard Cells



S10
L=Path length

Type 1 Standard Cells

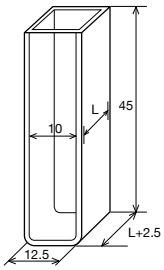
Specifications:

Polished windows 2, path width 10 mm, bottom thickness 1.5 mm, round bottom.

Manufactured by TechnoQuartz

Cell Type	Path Length	Capacity	Cat. No.
1-S-1	1 mm	0.4 mL	6210-81001
1-S-2	2 mm	0.7 mL	6210-81002
1-S-5	5 mm	1.7 mL	6210-81005
1-S-10	10 mm	3.5 mL	6210-81006
1-S-20	20 mm	7.0 mL	6210-81008
1-S-30	30 mm	10.5 mL	6210-81009
1-S-40	40 mm	14.0 mL	6210-81010
1-S-50	50 mm	17.5 mL	6210-81011
1-S-100	100 mm	35.0 mL	6210-81012
1-G-2	2 mm	0.7 mL	6210-86002
1-G-20	20 mm	7.0 mL	6210-86008
1-G-30	30 mm	10.5 mL	6210-86009
1-G-40	40 mm	14.0 mL	6210-86010
1-G-50	50 mm	17.5 mL	6210-86011
1-G-100	100 mm	35.0 mL	6210-86012

Note: S=Quartz glass G=Borosilicate glass



L=Path length

Type 1U Standard Cells with Round Corner Bottom

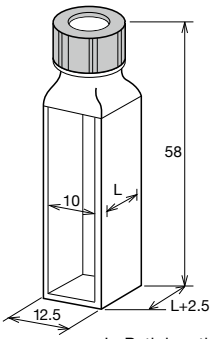
Specifications:

Polished windows 2, path width 10 mm, round bottom.

Manufactured by TechnoQuartz

Cell Type	Path Length	Capacity	Cat. No.
1U-S-10	10 mm	3.5 mL	6210-81106
1U-S-50	50 mm	17.5 mL	6210-81111

Note: S=Quartz glass



L=Path length

Type 15 Standard Cells with a Screw Cap

Specifications:

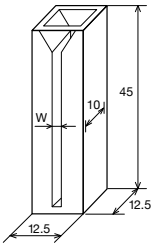
Polished windows 2, path width 10 mm, bottom thickness 1.5 mm with an open top cap / a PTFE silicone septum.

Manufactured by TechnoQuartz

Cell Type	Path Length	Capacity	Cat. No.
15-S-1	1 mm	0.35 mL	6210-81251
15-S-2	2 mm	0.7 mL	6210-81252
15-S-5	5 mm	1.4 mL	6210-81255
15-S-10	10 mm	1.7 mL	6210-81256
15-S-20	20 mm	3.5 mL	6210-81258

Note: S=Quartz glass

Spectrophotometer Micro Cells



W=Path width

Type 9W Special Micro Cells

Specifications:

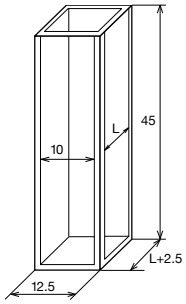
Polished windows 2, path Length 10 mm, bottom plate thickness: 1.5 mm. Dimentions: 12.5 x 12.5 x 45 mm

Manufactured by TechnoQuartz

Cell Type	Path Length	Capacity	Cat. No.
9W-S-10X1	1 mm	0.35 mL	6210-81321
9W-S-10X2	2 mm	0.7 mL	6210-81322
9W-S-10X3	3 mm	1.0 mL	6210-81323
9W-S-10X4	4 mm	1.4 mL	6210-81324
9W-S-10X5	5 mm	1.7 mL	6210-81325

Note: S=Quartz glass

Fluorimeter Standard Cells



L=Path length

Type 3 Standard Fluorimeter Cells

Specifications:

Polished window all, path width 10 mm, bottom thickness 1.5 mm.

Manufactured by TechnoQuartz

Cell Type	Path Length	Capacity	Cat. No.
3-S-10	10 mm	3.5 mL	6210-81706
3-S-20	20 mm	7 mL	6210-81708

Note: S=Quartz glass

Notes:

CONSUMABLES AND SUPPLIES

VIALS

Vials for Autosamplers

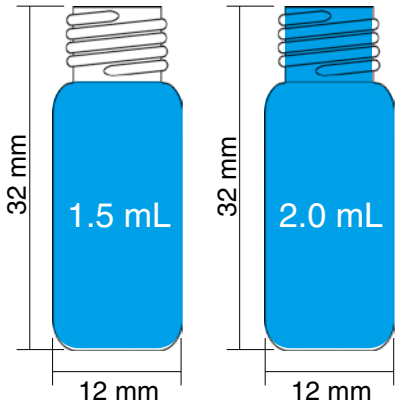
Vials

As auto-samplers and other automatic instruments have come into wide use all over the world in chromatography, strict obedience of vial dimensions is crucial for trouble-free operation. Besides this requirement, inertness and cleanliness of vials is also required to obtain correct analysis results. To meet these requests, the use of the highest-quality hydrolytic glass is essential because it has high rigidity, low expansion coefficient even at high temperature variations and excellent chemical resistance to acidic, neutral and even to alkaline solutions.

Glass	Expansion	USP	Light Blocking
Clear	51	Type 1	No
Amber	52	Type 2	Yes

Description of Vial Volume

Screw Neck Vial 32 x11.6mm



Description of the vial volume differs between companies.
National Scientific and Chromacol volume capacity is up to the vial top. La-Pha-Pack volume capacity is up to the vial shoulders. However, both vials have the same volume.

Septa

The right choice of septa depends on the application as described in the table below. Almost all septa are laminated on one side with PTFE which has a high chemical resistance and forms an inert barrier between sample and carrier material of the septa.

Septa Material	Operating Temp. Range	Compatible Solvents	Incompatible Solvents
Rubber/PTFE	-40°C up to 110°C	Acetone, Acetonitrile, Methanol, Methyl ethyl ketone	Benzene, Organochlorine Solvents, Cyclohexane, Carbon disulfide, Hexane, Toluene
Silicone/PTFE	-60°C up to 200°C	Acetone, Acetonitrile, Alcohol, Carbon disulfide, Methyl ethyl ketone, Dimethyl sulfoxide	Benzene, Organochlorine Solvents, Dioxane, Hexane, Toluene

GL Sciences' Vials for Autosamplers

Screw Neck Vials and Screw Caps with Ultra Bond Seals

1030-10002
1.5 mL
32 x 11.6 mm
Clear Glass
9-425 Thread

1030-10003
1.5 mL
32 x 11.6 mm
Amber Glass
9-425 Thread

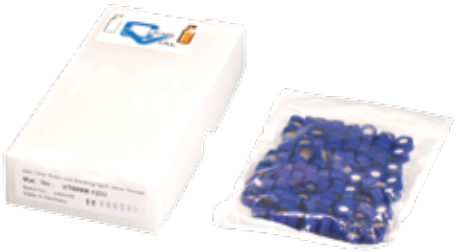
1030-10004
PP Screw Cap Blue
With 9-425 Thread
Ultra Bond Seal
With Silicone/PTFE
Without Slit

1030-10005
PP Screw Cap Blue
With 9-425 Thread
Ultra Bond Seal
With Silicone/PTFE
With Slit

UltraBond Seals

Cap and Septa form an inseparable unit, so that the septa cannot be pushed into the vial. The new septa material is made up of a special pure silicone which is ideal for the products safety. PTFE layer is modified for even easier penetration by the needle.

Delivery Notice



GL Sciences' vials for autosampler can be used on all common autosamplers due to their technical geometry. Using these universally compatible vials, rationalization of other 2 mL vials, as for instance 11 mm crimp neck vials, screw neck vials 8-425 and 10-425, is possible.
GL Science has developed these products that meet today's requirements of convenience and price-performance ratio for big customers and inventory in distributor sides.

Ordering Information

Description	Qty.	Cat. No.
2 mL Clean with L 8-425 100/pk	40 units	1030-10001
2 mL Clean with L 9-425 100/pk	40 units	1030-10002
2 mL Amber with L 9-425 100/pk	40 units	1030-10003
UltraBond without Slit 100/pk	40 units	1030-10004
UltraBond with Slit 100/pk	40 units	1030-10005

Cat.No. Index

Cat.No. Index

1030

1050

1065

2701

2702

2703

2709

3001

Cat.No. Index

3003

3004

Cat.No. Index

3006

Cat.No. Index

3007

3008

Cat.No. Index

Cat.No. Index

5020

5040

6010

Cat.No. Index

6020

6210

7510

7820

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  - InertSep
  - FastRemover
  - MonoCap
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  - MonoTrap
  - Titansphere
  - Tough Connectors

- E.I.du Pont de Nemours and Company
  - Tedlar
  - VESPEL

- IDEX Health & Science LLC
  - MarvelXact

- MITSUBISHI CHEMICAL
  - ANALYTIC-BARRIER

- T. HASEGAWA CO.,LTD.
  - CHIRAMIX

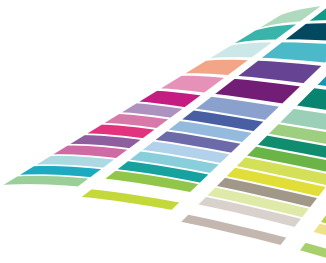
- Trajan Scientific and Medical
  - PEEKsil
  - SilTite

- Waters Technologies Corp.
  - Porapak

- Scientific Glass Technology Exploitatie B.V
  - Super Clean

GL Sciences

Everything you need for your critical separation



•We reserve the right to change specifications to make improvements without notice.

International Distributors

Visit our Website at
www.glsciences.com/distributors

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