

GS-Tek

CHROMATOGRAPHY SUPPLIES CATALOG 2010-2011



General Separation Technologies, Inc.

A Message to Our Customers

Dear Valued Customer,

Here at our GS-Tek Delaware, USA manufacturing facility, we are working hard to maintain our product quality and performance without any compromise. The focus is not just selling products; it is on YOU, our valued and loyal customers, to supply solutions in your daily tasks while offering our separation expertise. Only with our consistent pursuit of excellence can we win your trust and loyalty.

GS-Tek acknowledges our customers, as this is our most important aspect of our job. We want to collaborate in application development, troubleshooting, tech support, custom made columns, to build cost effectiveness in supply chain that is both beneficial to you and GS-Tek. In this new catalog, there are applications used and developed by many of our customers that has helped them and now can benefit you.

Over the years we have significantly improved our service, delivery and lead times. We know your time is important and we will almost always meet your urgent needs within 48 hours upon confirming your order. This is our goal and a key measurement of our business progress.

Our production capacity and development capabilities are improving and our product lines expanding. More products that meet your increasing chromatographic needs were introduced. In the new 2010-2011 catalog, a variety of products were added such as packed columns, HPLC columns, SPE and other supplies to meet a broad spectrum of needs in both a timely and one-stop shopping manner.

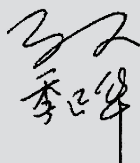
This catalog reflects our social awareness in our expertise in column technologies and our ability to identify and capture opportunity. More challenging separations in the go-green and food safety areas were added. We promoted more low bleed or MS columns across a variety of stationary phases to meet the challenging needs of environmentally friendly applications such, VOC separations and detection.

The 2010-11 catalogs will hopefully benefit you in referencing technical information, ease of order, and application support. Our team looks forward to hearing your feedback, and possibly using your ideas and suggestions for applications and improvements in future catalogs as one important aspect of our customer centric business.

GS-Tek sincerely thanks YOU, both our valued and loyal customers and distributors all over the world who have supported us, and helped us by providing valuable feedback and comments, and by continuing to do business with us. GS-Tek looks forward to serving YOU with our products, expertise, attention and respect: **performance, quality, delivery, technical support and cost effectiveness.** we will continue to build our capabilities and increase our brand visibility.

WE CAN!

Sincerely,



Zhenghua "Zack" Ji, PhD

President

General Separation Technologies, Inc.

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Quality
Performance
Cost Effectiveness

How to Order

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Email Us: info@gs-tek.com

Third Party

- Worldwide distributors: www.gs-tek.com
- VWR Scientific: www.vwr.com for non-catalog order
- Thermo-Fisher Scientific: www.thermo-fisher.com for non-catalog order

Order Process

- Order confirmation is sent with the price and delivery date within 48 hours of order submittal
- Partial delivery confirmation as needed
- Prepayment execution as needed
- Shipment with a hard-copy of the invoice on or before the release date
- Invoice is issued on the order release date by email or fax
- Carrier or freight info and tracking numbers are provided by email or fax

Customer Info

- Name and billing address
- Company name and address
- Shipping address
- Email address
- Phone number
- Fax number

Purchase Information

- PO number
- Order item with category number or description
- Quantity
- Desired delivery date
- Payment method
- Shipment method

Payments Options

- Payment currency in US Dollar (USD)
- Prepaid, COD, credit card or approved open account, net 30 days
- Orders less than 100 USD are subject to an additional 10 USD processing fee
- COD: Money Order, cashier check, or company check. No personal checks are accepted.
- CREDIT CARDS: MasterCard, VISA
- OPEN ACCOUNTS: An approved credit application must be on file prior to any shipment of open account orders. Normal

credit approval takes two weeks

- INTERNATIONAL PAYMENTS: We reserve the right to ask for 100% prepayment for all international orders. International buyers may use credit card or wire transfer. International buyers must also open an Irrevocable Letter of Credit for orders of US \$10,000 or more
- Late payment is subjected to extra charges (A minimum US \$40.00 or 1.5% per month service charge will be added to person's or business' account).

Terms and Conditions

Please read the following terms and conditions before placing an order. Please contact us if you have any questions or need clarification.

Availability and Acceptance

All orders placed are subjected to final acceptance by General Separation Technologies, Inc. Please contact General Separation Technologies, Inc. for stock availability before placing an order. General Separation Technologies, Inc. will advise the customer on any discontinued or back-ordered products. General Separation Technologies, Inc. reserves the right to not honor your order for any business related reason.

Prices

Prices are ex-work or F.O.B. Newark, DE U.S.A in US dollars. Applicable local, state and federal taxes, custom duty, or other foreign taxes are extra and are fully paid by buyers. The shipping and handling fee will be added to the purchase order. The final purchase price will be show on the invoice.

Quotations

All written quotations made by General Separation Technologies, Inc. are valid for 30 days, unless otherwise stated.

Volume Discounts

Volume discounts are available for single bulk purchase orders or annually accumulated multiple purchase orders, as negotiated through your designated sales contact. OEM discount are available on a contract basis. Large order volumes may be limited to certain products. Please contact General Separation Technologies, Inc. for more information.

Order Cancellation or Rescheduling

All orders made with General Separation Technologies, Inc. are binding and may incur a cancellation charge if cancelled. Requests for rescheduling a delivery may be treated the same as an order cancellation, and in such event, cancellation charges may apply. A cancellation prior to an order acknowledgement being issued does not subject a customer to any extra charge.

Shipping

Products will be delivered F.O.B. Newark, DE U.S.A. Our standard shipping method is FedEx 2 days within the United States and Canada. For all other regions, the mailing service used is EMS (Express Mail Service). General Separation Technologies also honors requests for special shipping, such overnight shipping or the use of other carriers. The buyer is fully responsible for the shipping and handling fees, as well as all taxes.

In the case of a damaged shipment, the receiving customer should follow the instructions below:

For a visually damaged package shipment on arrival, the customer should not accept the shipment and should ask the deliverer to endorse the bill of lading with a description of the damages.

For damaged unpacked shipment, the customer should save all packing materials including the carton at the receiving location. The customer should also immediately request the carrier for a package inspection.

Also, the customer should immediately notify General Separation Technologies, Inc. about the damaged shipment. General

Separation Technologies, Inc. will make any sales adjustments or provide the customer with the return policy information. The customer will have to provide General Separation Technologies, Inc. with the purchase order number (PO number), part number (P/N) and the quantity of damaged products.

In case of returning damaged products to General Separation Technologies, Inc., the customer must return the damaged products in the packing cartons along with copies of the bill of lading with the carrier's damage statement, inspection report, and RAN.

Return

If the customer is not satisfied with General Separation Technologies, Inc.'s product(s) within 30 days of receipt, the customer may return his or her purchase in its original condition for a full refund or credit. If the customer placed an order in error, they must return the good in a new and unused condition and may be charged a restocking fee. If General Separation Technologies, Inc. ships the wrong products to the customer, the customer must contact General Separation Technologies, Inc. and the correct products will be shipped within 10 days after the company's receipt of the products. The customer is solely responsible for any fee associated with the return of a product, such as shipping and handling or any other fee.

All products returned to General Separation Technologies, Inc. are subject to approval and will not be accepted without a Return Authorization Number (RAN). The customer's RAN should appear on the return packaging slip. To get a RAN, please call 1-302-533-5646 or e-mail General Separation Technologies, Inc. at info@gs-tek.com. The customer is required to provide information such as the model or part number, customer purchase order number, product description, quantity, and a short description of the product that they are returning. Products that need to be returned should be sent to the address above.

Replacement

The replacement of a returned product is subjected to be on credit-hold. After the returned product is received, the credit is refunded in full. A replacement product is sent out within four weeks after the replacement confirmation is issued by General Separation Technologies, Inc.

Changes

General Separation Technologies, Inc. reserves the right to change product specifications, designs, or prices without prior notice and without liability for such changes.

Warranty

All products from General Separation Technologies, Inc. are under warranty to be free of defects in the materials and the workmanship. General Separation Technologies, Inc. warrants performances of all of its products for certain periods from 30 days to one year, beginning on the shipment date, under normal working conditions on the customer side. General Separation Technologies, Inc. does not warrant any defect, failure or damage of its products caused by improper, careless or inadequate use. The customer should contact General Separation Technologies, Inc. for specific warranty terms before placing an order. Column care, use, and selection guides from General Separation Technologies, Inc., either orally or written, do not substitute as warranty terms for the columns.

The warranty terms are exclusively for purchased products and no other warranty is expressed or implied. General Separation Technologies, Inc. disclaims any implied warranty or fitness for any particular purpose. Under any circumstance, General Separation Technologies, Inc. shall not be liable for any direct, indirect, special incidental, consequential or compensatory damage, or any other legal claim in conjunction to using its products. The maximum liability shall not exceed the product's invoice price.

Applications

All products from General Separation Technologies, Inc. should ONLY be used in laboratory applications. No other application is implied.

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GsBP GC Columns

GS-Tek has manufactured high quality and high performance GC columns under brand name General separation Bonded Phase (GsBP) for a few years. Our comprehensive GsBP Column product comprises of polysiloxane phases, polyethylene glycol phases, porous-layer-open tubular (PLOT) phases, low column bleed or MS (Mass Spec) grade columns across all stationary phases, and custom-made columns. GS-Tek develops its own proprietary column technologies, manufacturing process, and high standard quality control. Each GsBP column is carefully prepared and signature made for quality and performance excellence to deliver to our customers worldwide.

Mission, Passion and Capability

GS-Tek is striving to exceed performance expectations through our GC columns for each chromatographer customer in the world. Our mission is to satisfy customers with quality products and trusted performances without the extra efforts from brand name switching.

We are strongly passionate and committed to developing and delivering the best valued chromatography solutions to our customer in a timely manner. We have been this since our humble beginning. We will continue to do so in our everyday business practices.

Most GC column end users have used brand name GC columns for years, thus are reluctant to newcomer column products. In response, our aim is to ease the transition effort of column switching from a brand name to GsBP. In order to achieve this, GS-Tek fine tunes its GsBP stationary phases to yield similar or identical chromatographic performances to brand ones. GS-Tek carefully controls its manufacturing process. GS-Tek tests 100% all GsBP columns with the industry's highest standard to ensure quality and performance of products delivery to our customers.

GS-Tek's manufacturing capabilities consist of:

- Carefully selective quality raw material and suppliers
- Team of highly regarded tech gurus, production master technicians, and sophisticated production planner/schedulers that are committed to meeting customer needs with quality, efficiency and in a timely manner.
- Proprietary manufacturing process for producing quality columns
- Industry's high quality standards that we adhere by to deliver consistently performing columns to our customers
- Continuous process improvements within our business to meet new or challenging application needs
- Passion to make challenging custom-made columns used for push-limit applications through research and development collaborations

Through GS-Tek's mission, passion and capabilities, we deliver GsBP columns with the utmost quality and performance to many global customers throughout different industries. For the very short time we have been on the market, our customers are pleased with their decision to switch to GsBP columns for improved results and virtually minimal impact transitioning from another column brand.

As an innovative column manufacturer, we are always striving to improve performance and delivery. From the cumulative years of experience in column technology, manufacturing and sales and marketing, we realize there are unlimited opportunities to improve column performance in order to meet increasing customers' expectations. Our efforts up until now clearly demonstrate the following features and benefits in each GsBP column.

Excellent Column Inertness

Our columns are designed and manufactured to achieve the highest level of inertness by a novel and proprietary surface deactivation technique. The column inertness is tested with probes of acid, bases and alcohol in our column test sample mix. GsBP columns' excellent degree of inertness results in improved quantification accuracy and reliability for many challenging analyses. One example of such challenging analyses is EPA 8270. Fig 1 A and B demonstrate the advantage and benefits of excellent column inertness of GsBP-5MS column on which both benzidine and pentachloropenol show very symmetric and sharp peak shapes even at low levels of 1ppm sample introduction. Because of the high degree of column inertness, there is no need to use 0.5um film thickness column to shield surface activity, as some brand suppliers are recommending. The analysis on 0.25um film thickness column can be done quickly without sacrificing lower accurate results.

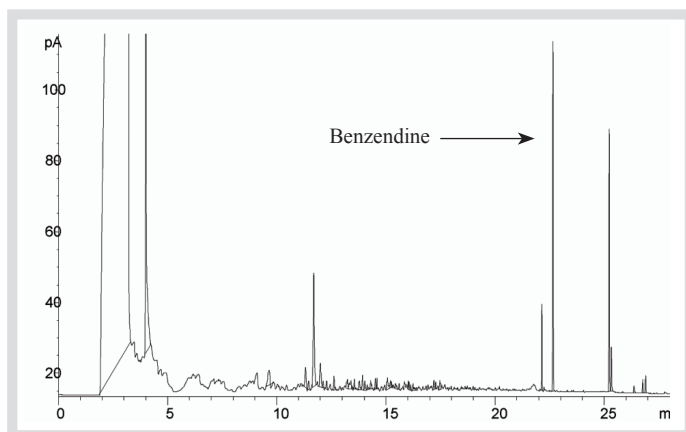


Figure 1A EPA method 8270 on GSBP-5MS column 30m x 0.25mm x 0.25um. Benzidine

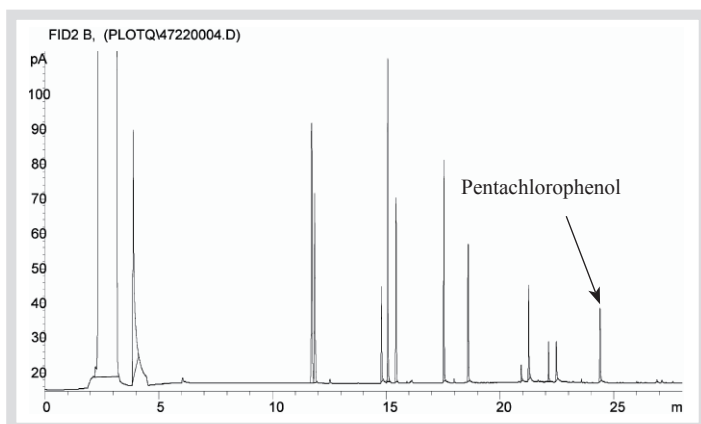


Figure 1B EPA method 625 on GsBP-5MS column, 30m x 0.25mm x 0.25um. Pentachlorophenol

Low Bleed Columns

The current industry trend is to push column detection limits and prolong column lifespans that demand lower column bleed and higher temperature limits. GsBP low bleed columns are engineered with our rigorous process control and innovative cross-link technology. Almost all GsBP columns are rigorously tested for column bleed. Figure 2 shows the production data distribution of GsBP-5MS column bleeds as a demonstration of its product quality control and consistency. Table I demonstrates the equivalent performance of GsBP-5MS column batch compared to other competitor columns.

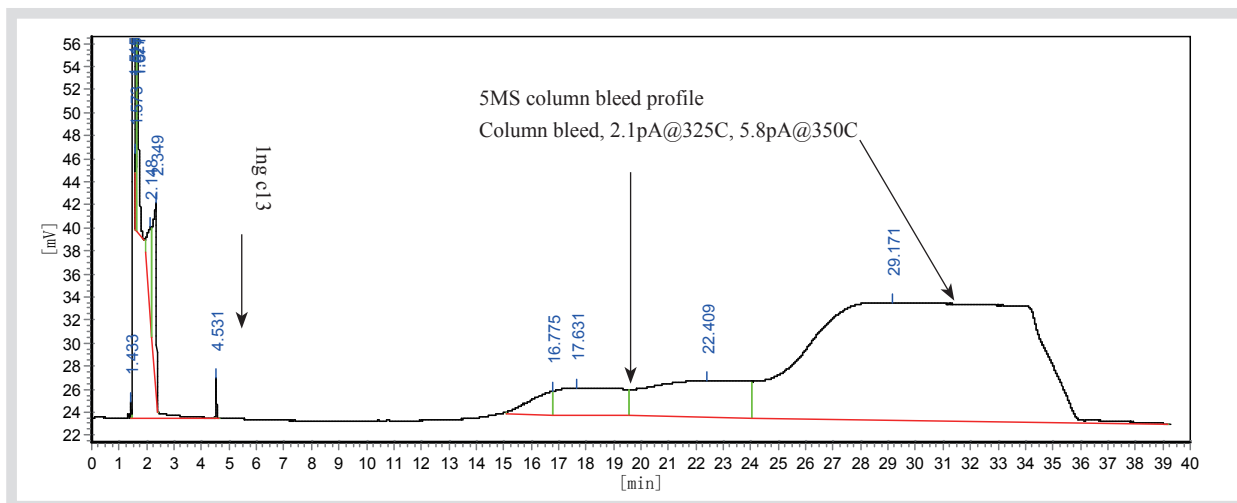
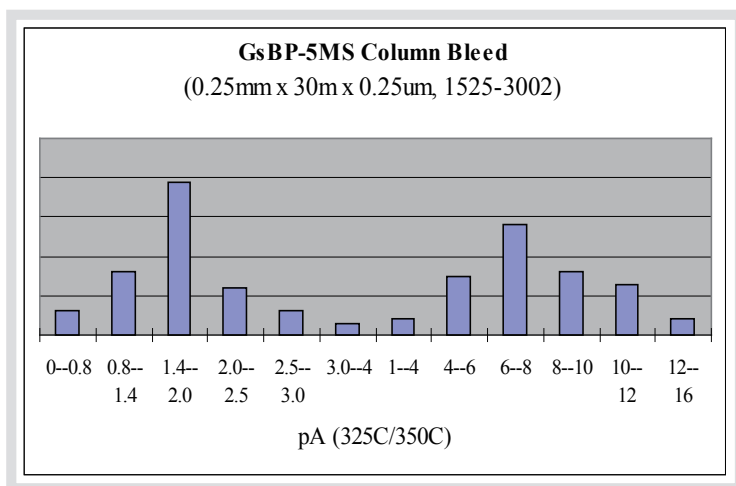


Figure 2 (A) Production data distribution of GsBP-5MS column bleed. Column: 0.25mm x 30m x 0.25um. (B) Typical column bleed test profile.

Table 1 Column Bleed Comparison

Brand	GsBP-5MS	Brand H-5MS	Brand D-5MS
Bleed Specifications	<4pA @325°C	<4pA @325°C	<4pA@325°C
Temperature Limit (°C)	-60-325/350	-60-325/350	-60-325/350

GsBP low bleed columns are not limited to conventional 5% phenyl polysiloxane phases, but are also offered in all other stationary phases, from non-polar polysiloxane, mid polar polysiloxane, PEG to PLOT columns. One of our exceptional low bleed column families, GsBP -VMS as shown in Fig 3A, benefit GC-MSD instrumentation analysis for complex samples such as VOC samples for many go-green applications. Another example of a low column bleed is our GsBP PLOT-Q columns as shown in Fig 3B.

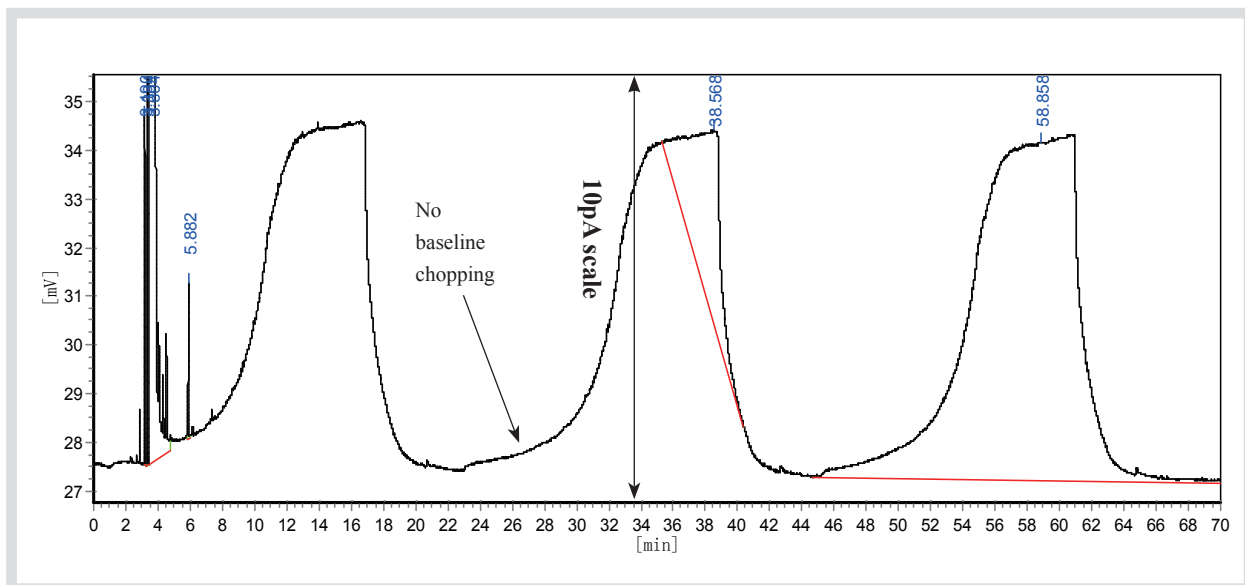


Figure 3A GsBP-VMS column bleed profile. Column: GsBP-VMS, 0.32mm x 60m x 1.8um. Oven: 65°C (1min) 20°C/min to 260°C (5min), 3 times of consequent runs.

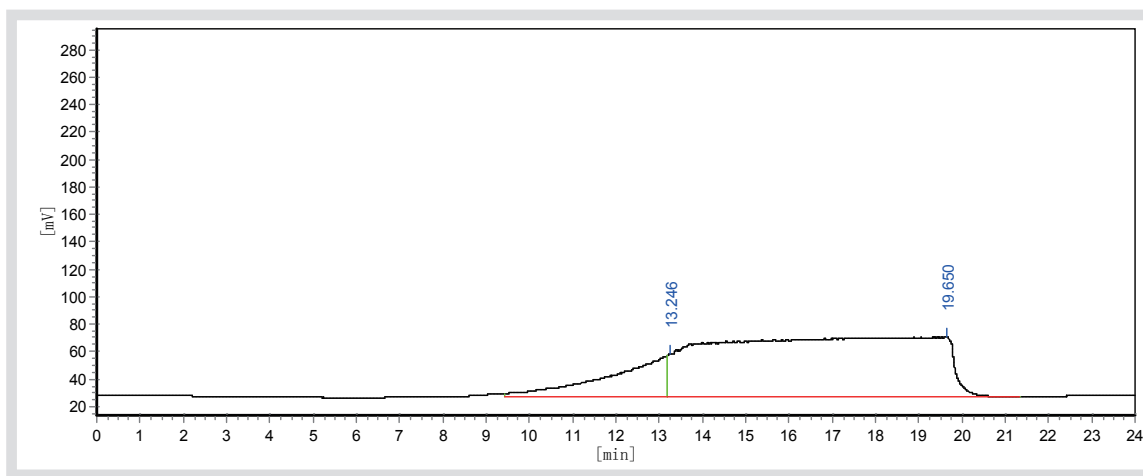


Figure 3B GsBP PLOT-Q Column bleed profile. Column, GsBP-PLOT Q, 0.53mm x 30m x 30um, Bleed temperature at 280°C

High Plate Number

High column plate numbers improve many separations by increasing resolution and the detection limits. This is very important for applications of complex samples, such as EPA-8260 test gas mix, DHA of petroleum products such as gasoline, and environmental sample such as PAH.

With our controllable process, we produce all GsBP columns with high plate numbers. GS-Tek routinely produces 100 meter x 0.25mm x 0.5um columns with more than 400,000 plate numbers. Such columns are widely used for DHA, PONA and VOC sample analyses. Another example of high plate number columns is GsBP- 624/ GsBP-VMS columns that are used for EPA 8260, a complex separation application demanding high plate numbers. Also, our signature PLOT columns with high plate numbers exhibit improved separation results, as one of the many column benefits that many of our customers are recognizing and enjoying.

Stable Stationary Phases

We strive to achieve the highest quality GC column which, in turn, has led us to produce stable stationary phases to withstand extended temperature limits. GsBP columns are proprietary cross-linked and bonded, solvent rinseable, and have an extended lifetime. They have better oxidation resistance for many robust and challenging applications. Furthermore, GsBP columns have increased upper temperature limits, such as our PEG family columns, PLOT columns, and cyano-base VMS columns. We do not special label our column as 'High Temp', but our customers are enjoying our columns for application that requires oven temperature to 400°C or above.

Adequately Tuned Column Selectivity

In addition to all the GsBP column attributes, our column selectivity is adequately tuned to meet a variety of application needs. Figure 4 shows the separation of residue solvents, isopropyl alcohol peak elutes before the dichloromethane peak in a pharmaceutical quality control. The MOH requires such an elution order for further reason. This separation can be easily improved on a GsBP 624 column from adequate column selectivity, with the same elution order.

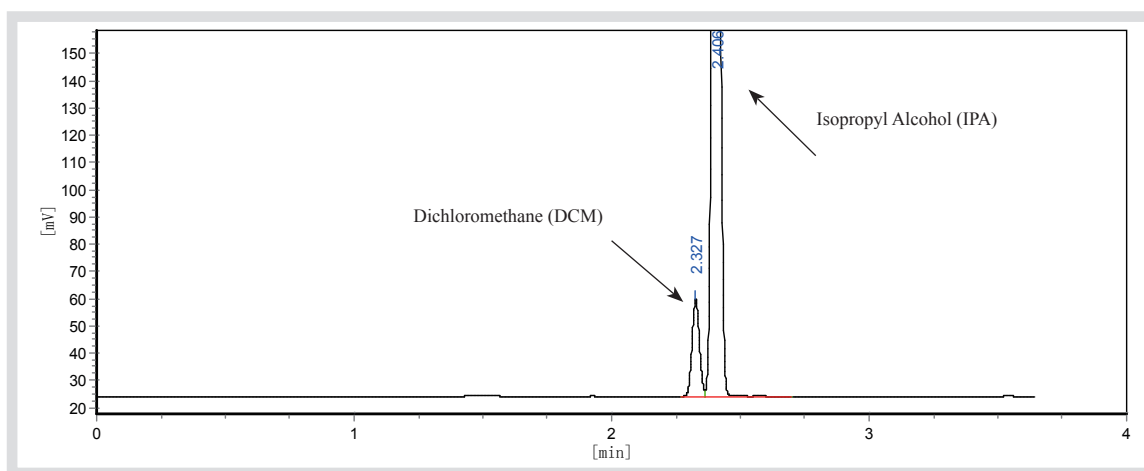


Figure 4 Separation of IPA/DCM on a GsBP Inowax column. Column: 0.53mm x 30m x 1.0um.

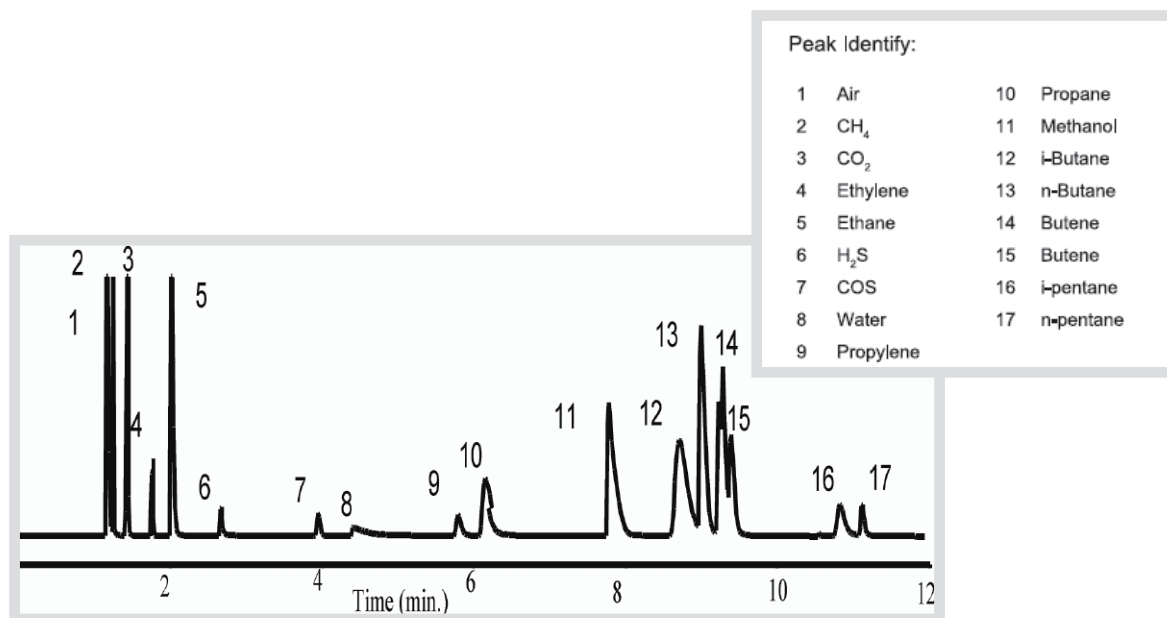
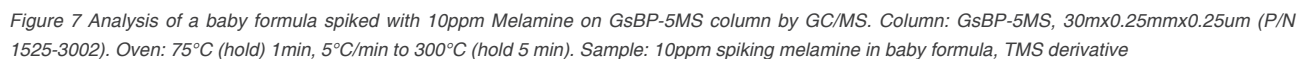


Figure 5 shows a GsBP PLOT Q column performance whose fine-tuned column selectivity plus adequate separation of Air/CO₂/CH₄ makes this type of column ideally suitable for the separation of a refinery gas samples.

Figure 6 demonstrates another benefit of column selectivity. The application was an analysis of 5 ppm acetone spiked in a reagent alcohol. Because of the tuned column selectivity of GsBP-Inowax, 30m x 0.53mm x 1.0um, a low level concentration of acetone was eluted earlier than methanol with baseline separation resolution achieved above 50°C.



In combination with the a high degree of inertness, low bleed, high efficiency, and extended temperature range, GsBP columns can improve results for many challenging applications. For example, GsBP-5MS column worked well for an application to detect low levels of melamine that was blended in baby formula as shown in Figure 7.



GS-Tek offers Custom made columns for research and development collaborations at a nominal fee and very quick turnaround time. Our mission, passion and capabilities enable us to keenly search for opportunities and never say NO to our customers. Your time is valuable so we work around the clock to deliver custom-made column as fast as possible. Please contact us if you are interested in this service.

Best Value

With our proprietary manufacturing technology, we produce GC columns with great success. This increases production efficiency and in turn, transfers our production cost savings to our customer. Customers enjoy for cost efficiency, speedy delivery along with quality, stable, and low bleed products.

Here at GS-Tek, our expertise combined with innovative manufacturing knowledge lead to quality GC columns that meet a variety of applications on the market without the typical hassle of lengthy revalidation from another brand. Not only are GsBP columns held under rigorous standards, they are priced competitively making them the best value GC columns in the market today.

Throughout our years in business, we have collected an impressive amount of feedback from our customers worldwide that our GC columns perform similar or better than the leading brand. This feedback fuels our commitment to continue our mission to provide superior columns at the best value.

We believe that...

with your support, GsBP will become the premier column brand you can trust!

GC Column by Applications

Life Sciences/Pharmaceutical

GC is a common tool for quality control in drug production, small molecule study in medicine chemistry and discovery, metabolism research and other areas. The complexity of application demands special columns to provide separation with a high degree of column inertness and low column bleed for advanced GC, HS-GC, HS-GC-MSD and other instrumentation. Based on the expertise and knowledge of both our customers and us, GS-Tek makes the following column selection recommendations.

Residual Solvents

Suggested Column Description	P/N
GsBP-VMS, 20m x 0.18mm x 1.0um	6418-2010
GsBP-VMS, 30m x 0.25mm x 1.4um	6425-3014
GsBP-624, 30m x 0.32mm x 1.8um	6232-3018
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
GsBP-5, 30m x 0.53mm x 5.0um	0553-3050
GsBP-Inowax, 30m x 0.25mm x 0.5um	2025-3005
GsBP-Inowax, 30m x 0.53mm x 1.0um	2053-3010
GsBP-Carbowax, 30m x 0.53mm x 1.3um	2253-3013
GsBP-1701, 30m x 0.25mm x 0.25um	6125-3002

Longer lengths and thicker films may improve separation as needed. Contact GS-Tek for details.



Intermediate Drug Compounds

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002
GsBP-50MS, 30m x 0.25mm x 0.25um	5025-3002
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002

Packaging Protection Gas

Suggested Column Description	P/N
GsBP-PLOT Molesieve 5A, 30m x 0.53mm x 50um	8453-3050
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030

Alcohols

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-Inowax, 60m x 0.32mm x 0.5um	2032-6005
GsBP-Blood alcohol, 7.5m x 0.32mm x 10um	8832-0710
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030

DMSO, DMO, Pyridines

Suggested Column Description	P/N
GsBP-624, 25m x 0.18mm x 1.0um	6218-2510
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010

Drugs of Abuse

Suggested Column Description	P/N
GsBP-50+MS, 30m x 0.25mm x 0.25um	5025-3002
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002

Blood Alcohol, Breath Gases

Suggested Column Description	P/N
GsBP-1, 30m x 0.53mm x 5.0um	0153-3050
GsBP-Blood alcohol, 7.5m x 0.32mm x 10um	8832-0710

Anesthetic Gas

Suggested Column Description	P/N
GsBP-Gaspro, 30m x 0.32mm x 5um	8532-3005

Lipid Panel

Suggested Column Description	P/N
GsBP-FFAP, 30m x 0.25mm x 0.25um	2125-3002
GsBP-Inowax, 30m x 0.25mm x 0.15um	2025-3001

Metabolism

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002

Petroleum and Petrochemical

Using a GC for analysis is a critical and important tool for these two industries. Reliable and consistent separations of complex samples for most applications in the industry are determined by the type of column used. With the environmental concerns of going-green and increasing quality control needs, the industry demands quality columns with a high level of inertness. As a result GS-Tek has taken its experience and expertise to recommend the best suited column for your compound separation needs.



Natural Gas

Suggested Column Description	P/N	Separations
GsBP-PLOT Al2O3, S, 30m x 0.53mm x 15um	8253-3015	HC to C5
GsBP-1, 0.53mm x 30m x 2.65um	0153-3026	HCS to C6+
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030	CO2, Water, Sulfur, Mercaptans
GsBP-PLOT Molesieve, 30m x 0.53mm x 25um	8453-3025	CO, N2, and C1
GsBP-GasPro, 30m x 0.32mm x 5um	8532-3005	Low Level Sulfurs

Refinery Gas

Suggested Column Description	P/N	Separations
GsBP-PLOT Al2O3, S, 15m x 0.53mm x 15um	8253-1515	Fast Separation of C1 to C6
GsBP-PLOT Al2O3, S, 50m x 0.53mm x 15um	8253-5015	Extended Separation of C1 to C5
GsBP-PLOT Molesieve, 30m x 0.53mm x 50um	8453-3050	CO, C1, N2, O2, H2
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030	CO2, H2O, Sulfurs
GsBP-1, 30m x 0.25mm x 1.0um	0125-3010	C6+

Liquefied Petroleum Gas

Suggested Column Description	P/N	Separations
GsBP-PLOT Al2O3, S, 30m x 0.53mm x 15um	8253-3015	C1 to C6
GsBP-PLOT Al2O3, S, 50m x 0.53mm x 15um	8253-5015	C1 to C5
GsBP-1, 60m x 0.53mm x 5um	0153-6050	Oxygenates in HC
GsBP-PLOT Molesieve, 30m x 0.53mm x 50um	8453-3050	CO, C1, N2, O2, H2
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030	CO2, H2O, Sulfurs

Phone (302)533-5646
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Quality
Performance
Cost Effectiveness

PhH3/AsH3 in Petroleum Streams

Suggested Column Description	P/N	Separations
GsBP-PLOT U, 50m x 0.53mm x 20um	8753-5020	Low level of PhH3/AsH3
GsBP-PLOT Al2O3, KCl, 50m x 0.53mm x 15um	8153-5015	Elution after C3s

Sulfurs in Petroleum Streams

Suggested Column Description	P/N	Separations
GsBP-PONA, 100m x 0.25mm x 0.5um	9006-PONA	Sulfurs from HCs
GsBP-1, 100m x 0.25mm x 1.0um	0125-A010	Sulfurs from HCs
GsBP-GasPro, 60m x 0.32mm x 5um	8532-6010	Sulfurs from C1 to C4s
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010	Fast screening

Hydrocarbon/Nitrogen/Zero Air

Suggested Column Description	P/N
GsBP-PLOT Molesieve, 30m x 0.53mm x 50um	8453-3050
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030
GsBP-PLOT Al2O3, S, 30m x 0.53mm x 15um	8253-3015

Butadienes

Suggested Column Description	P/N
GsBP-PLOT Al2O3, M, 30m x 0.53mm x 15um	8353-3015
GsBP-PLOT Al2O3, M, 50m x 0.53mm x 15um	8353-5015
GsBP-1, 60m x 0.32mm x 4um	0132-6040
GsBP-624, 60m x 0.53mm x 3.0um	6253-6030

Cracking gases

Suggested Column Description	P/N	Separations
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030	CO2/Water from N2
GsBP-PLOT U, 30m x 0.53mm x 20um	8753-3020	Improved separation CO2/H2O from N2
GsBP-PLOT Molesieve, 30m x 0.53mm x 50um	8453-3050	H2, CO/from N2
GsBP-PLOT Al2O3, S, 15m x 0.53mm x 15um	8253-1515	Total Hydrocarbons
GsBP-GasPro, 60m x 0.32mm x 5um	8532-6010	Sulfurs

Ethylene/Propylene

Suggested Column Description	P/N	Separations
GsBP-PLOT Al2O3, S, 50m x 0.53mm x 15um	8253-5015	C1 to C5s
GsBP-PLOT Al2O3, KCl, 50m x 0.53mm x 15um	8153-5015	C1 to C5s
GsBP-PLOT Carbons, 30m x 0.53mm x 3.0um	8853-3003	acetylene
GsBP-GasPro, 60m x 0.32mm x 5um	8532-6005	Sulfurs
GsBP-Inowax, 30m x 0.53mm x 1.0um	2053-3010	low level of oxygenates

Sim-Dis

Suggested Column Description	P/N	Separations
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002	C4 to C40
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010	C1 to C20
GsBP-1MS, 10m x 0.10mm x 0.33um	1110-1003	C4 to C70
GsBP-1, 5m x 0.53mm x 0.15um	0153-0501	C4 to C70/100
GsBP-1, 5m x 0.53mm x 2.65um	0153-0526	C5 to C40
GsBP-1, 10m x 0.53mm x 0.88um	0153-1008	C5 to C80
GsBP-1, 10m x 0.53mm x 3um	0132-1030	ASTM-2887
GsBP-1, 5m x 0.53mm x 0.15um, metal tubing	90153-0501	C5 to C120

Gasoline

Suggested Column Description	P/N	Separations
GsBP -PONA, 100m x 0.25mm x 0.5um	9006-PONA	
GsBP -PONA, 50m x 0.20mm x 0.5um	9002-PONA	
GsBP-1, 10m x 0.53mm x 3um	0132-1030	ASTM-2887
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010	Alcohols in Gasoline
GsBP-PLOT-OX 10m x 0.53mm x 5um	8953-1005	Low level oxygenates in Gasoline

BioDiesel

Suggested Column Description	P/N	Separations
GsBP-1 15m x 0.32mm x 0.1um	1132-1501-BD	Glycerin, ASTM D6584
GsBP-I, 10m x 0.32mm x 0.1um	1132-1001-BD	Total Glycerin, EP 14105
GsBP-Inowax, 30m x 0.32mm x 0.25um	2032-3002-BD	FAME, 14103
GsBP-624, 30m x 0.32mm x 1.8um	6232-3018-BD	Methanol, EN14110

Diesel

Suggested Column Description	P/N
GsBP -PONA, 100m x 0.25mm x 0.5um	9006-PONA
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-1MS, 15m x 0.25mm x 1.0um	1125-1510
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002

Butenes

Suggested Column Description	P/N
GsBP-PLOT Al ₂ O ₃ , S, 50m x 0.53mm x 15um	8253-5015
GsBP-PLOT Al ₂ O ₃ , S, 30m x 0.53mm x 15um	8253-3015

MAPP

Suggested Column Description	P/N
GsBP-PLOT Al ₂ O ₃ , M, 30m x 0.53mm x 15um	8353-3015
GsBP-PLOT Al ₂ O ₃ , M, 50m x 0.53mm x 15um	8353-5015

Propane

Suggested Column Description	P/N
GsBP-PLOT Al ₂ O ₃ , S, 30m x 0.53mm x 15um	8253-3015
GsBP-PLOT Al ₂ O ₃ , KCl, 30m x 0.53mm x 15um	8153-3015

DHA

Suggested Column Description	P/N
GsBP-PONA, 100m x 0.25mm x 0.5um	9006-PONA
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010

Aromatics, styrene

Suggested Column Description	P/N
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002
GsBP-Inowax, 60m x 0.32mm x 0.5um	2032-6005

Aromatics, solvents

Suggested Column Description	P/N
GsBP-Inowax, 60m x 0.25mm x 0.25um	2025-6002

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Suggested Column Description	P/N
GsBP-Inowax, 60m x 0.25mm x 0.5um	2025-6005
GsBP-Inowax, 60m x 0.32mm x 0.5um	2032-6005
GsBP-Inowax, 30m x 0.53mm x 1.0um	2053-3010

BTEX

Suggested Column Description	P/N
GsBP-Inowax, 30m x 0.25mm x 0.5um	2025-3005
GsBP-Inowax, 60m x 0.32mm x 0.5um	2032-6005

VOCs, underground waters

Suggested Column Description	P/N
GsBP-624, 30m x 0.53mm x3.0um	6253-3030
GsBP-624, 60m x 0.32mm x1.8um	6232-6018
GsBP-624,105m x 0.53mm x3.0um	6253-0530
GsBP-624, 20m x 0.18mm x1.0um	6218-2010
GsBP-624, 60m x 0.25mm x 1.4um	6225-6014

VOCs in Air

Suggested Column Description	P/N
GsBP-624, 30m x 0.53mm x3.0um	6253-3030
GsBP-5, 30m x 0.53mm x 5.0um	0553-3050

Volatile amines

Suggested Column Description	P/N
GsBP-PLOT U, 30m x 0.53mm x 20um	8753-3020
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-Carbowax, 60m x 0.53mm x 1.3um	2253-6013
GsBP-PONA, 100m x 0.25mm x 0.5um	9006-PONA

Oxygenate

Suggested Column Description	P/N
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002
GsBP-1, 30m x 0.53mm x 5.0um	0153-3050
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010

Pyridines

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010

Alcohols

Suggested Column Description	P/N
GsBP-Inowax, 30m x 0.53mm x 2.0um	2053-3020
GsBP-Inowax, 60m x 0.32mm x 0.5um	2032-6005
GsBP-624, 30m x 0.53mm x3.0um	6253-3030
GsBP-1, 30m x 0.53mm x 5.0um	0153-3050
GsBP-PONA, 100m x 0.25mm x 0.5um	9006-PONA

Ethylene oxides

Suggested Column Description	P/N
GsBP-PLOT Q, 30m x 0.32mm x 15um	8632-3015

CFCs

Suggested Column Description	P/N
GsBP-PLOT Al ₂ O ₃ , KCl, 50m x 0.53mm x 15um	8153-5015
GsBP-PLOT Al ₂ O ₃ , S, 50m x 0.53mm x 15um	8253-5015
GsBP-GasPro, 30m x 0.32mm x 5um	8532-3005
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030

Vinyl Chloride

Suggested Column Description	P/N
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030
GsBP-PLOT Al ₂ O ₃ , "M", 50m x 0.53mm x 15um	8353-5015

Benzene Contamination

Suggested Column Description	P/N
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
GsBP-Inowax, 30m x 0.25mm x 0.5um	2025-3005
GsBP-1, 60m x 0.32mm x 1.0um	0132-6010

Halogenated Compounds

Suggested Column Description	P/N
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
GsBP-624, 60m x 0.32mm x 1.8um	6232-6018

Total Petroleum Hydrocarbons

Suggested Column Description	P/N
GsBP-1, 30m x 0.32mm x 0.25um	0132-3002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002

MTBE

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-1, 30m x 0.53mm x 5.0um	0153-3050

Nitrous, NO, N₂O, NO₂

Suggested Column Description	P/N
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030
GsBP-PLOT Q, 50m x 0.53mm x 50um	8653-5050
GsBP-PLOT Molesieve, 30m x 0.53mm x 25um	8453-3025

Permanent Gases

Suggested Column Description	P/N
GsBP-PLOT Molesieve, 30m x 0.53mm x 25um	8453-3025
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030
GsBP-PLOT Molesieve, 30m x 0.53mm x 50um	8453-3050

CO₂, water in a gaseous sample

Suggested Column Description	P/N
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030
GsBP-PLOT Q, 50m x 0.53mm x 20um	8653-5020

Noble Gases

Suggested Column Description	P/N
GsBP-PLOT Molesieve, 30m x 0.53mm x 50um	8453-3050

Environmental

Going green social consciousness and recent economic developments has renewed the need for GC applications in the environmental protection industry. So whether it is tracking organic pollutants or analyzing pesticides, GS-Tek has recommendations for your analysis that demands a high degree of inertness, low bleed and separation performance criteria.



VOCs

Suggested Column Description	P/N	Separations
GsBP-VMS 60m x 0.25mm x 1.4um	6425-6014	EPA 8260
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030	Fast VOCs separations
GsBP-624, 20m x 0.18mm x 1.0um	6218-2010	Fast VOCs separations
GsBP-624, 60m x 0.32mm x 1.8um	6232-6018	VOCs separations
GsBP-624, 105m x 0.53mm x 3.0um	6253-A530	VOCs separations
GsBP-5, 60m x 0.53mm x 5um	0553-6050	VOCs separations

Semi VOCs

Suggested Column Description	P/N	Separations
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002	EPA 625, 1625, 8270
GsBP-5MS, 30m x 0.25mm x 0.5um	1525-3005	EPA 625, 1625, 8270
GsBP-5MS, 30m x 0.25mm x 1.0um	1525-3010	EPA 625, 1625, 8270
GsBP-5MS, 30m x 0.32mm x 0.25um	1532-3002	Fast Screen

Pesticides/herbicides

Suggested Column Description	P/N	Separations
GsBP-5MS, 30m x 0.53mm x 1.5um	1553-3015	Large sample loading
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002	Fast separation
GsBP-5MS, 60m x 0.25mm x 0.25um	1525-6002	Comprehensive separation
GsBP-5MS, 30m x 0.32mm x 0.25um	1532-3002	Fast separation
GsBP-50MS, 30m x 0.25mm x 0.25um	5025-3002	Confirmation
GsBP-35MS, 30m x 0.25mm x 0.25um	3525-3002	Confirmation
GsBP-1701, 30m x 0.25mm x 0.25um	6125-3002	Confirmation
GsBP-50MS, 30m x 0.25mm x 0.25um w/ 5m guard column	5025-3002-5	Wide boiling point compounds

Purgeable Halogenated Organics

Suggested Column Description	P/N	Separations
GsBP-624, 30m x 0.32mm x 1.8um	6232-3018	601, 8010
GsBP-624, 60m x 0.32mm x 1.8um	6232-6018	601, 8010

PCBs

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-5MS, 30m x 0.25mm x 0.25um w/ 5m guard column	1525-3502
GsBP-XLB, 30m x 0.25mm x 0.25um	1625-3002

PAHs

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002
GsBP-5MS, 30m x 0.25mm x 0.25um w/ 5m guard column	1525-3502
GsBP-XLB, 30m x 0.25mm x 0.25um	1625-3002

Explosives

Suggested Column Description	P/N
GsBP-1, 5m x 0.53mm x 1.5um	0153-0515

Drugs

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002

EPA 8270

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-5MS, 30m x 0.25mm x 0.5um	1525-3005

EPA 502.2

Suggested Column Description	P/N
GsBP-502.2, 20m x 0.18mm x 1.0um	6318-2010
GsBP-502.2, 60m x 0.25mm x 1.4um	6325-6014
GsBP-502.2, 60m x 0.32mm x 1.8um	6332-6018
GsBP-502.2, 105m x 0.53mm x 3.0um	6353-A530

EPA 1614, PBDE

Suggested Column Description	P/N
GsBP-5MS, 15m x 0.25mm x 0.1um	1525-1501
GsBP-5MS, 30m x 0.25mm x 0.1um	1525-3001

CFCs

Suggested Column Description	P/N
GsBP-PLOT Al ₂ O ₃ , "S", 30m x 0.53mm x 15um	8253-3015
GsBP-PLOT Q, 30m x 0.53mm x 30um	8653-3030
GsBP-GasPro 30m x 0.32mm x 5um	8532-3005

Organ Mercury

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002

Water analysis

Suggested Column Description	P/N
GsBP-624, 60m x 0.32mm x 1.8um	6232-6018
GsBP-VMS, 20m x 0.18mm x 1.0um	6418-2010
GsBP-VMS, 60m x 0.25mm x 1.4um	6425-6014

NOISH methods

Suggested Column Description	P/N
GsBP-624, 25m x 0.18mm x 1.0um	6218-2510
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
GsBP-5, 30m x 0.53mm x 5um	0553-3050
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002
GsBP-Inowax, 30m x 0.53mm x 1.0um	2053-3010

Food and Beverage Industry

Due to food and beverage processes, contamination is always possible at certain critical control points (CCP). Contamination from a quality standpoint poses a health risk for the public consumer. Under these growing concerns of food safety, chemists are feeling the pressure more and more to improve the Quality standards. So, using the right GC column in the lab for the right application is detrimental in achieving top-notch performance in separation and low bleed. GS-Tek has listed recommended columns for selected applications. If you are unsure, please call our technical support team so we can provide the best method.



Beverages

Suggested Column Description	P/N
GsBP-FFAP, 25m x 0.20mm x 0.3um	2120-2503
GsBP-FFAP, 50m x 0.20mm x 0.3um	2120-5003

Flavor/Fragrance

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002
GsBP-1MS, 30m x 0.32mm x 0.5um	1132-3005
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002
GsBP-Inowax, 60m x 0.25mm x 0.25um	2025-6002

FAMEs

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002
GsBP-Carbowax, 60m x 0.25mm x 0.25um	2225-6002
GsBP-50MS, 30m x 0.25mm x 0.25um	5025-3002

Wine/Liqueur

Suggested Column Description	P/N
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002

Perfume

Suggested Column Description	P/N
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002
GsBP-Inowax, 60m x 0.25mm x 0.25um	2025-6002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002

Essential Oil

Suggested Column Description	P/N
GsBP-Inowax, 60m x 0.25mm x 0.25um	2025-6002

Chiral compounds

Suggested Column Description	P/N
Please inquiry	

Natural Product Extracts

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-50MS, 30m x 0.25mm x 0.25um	5025-3002
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002

Syrup

Suggested Column Description	P/N
GsBP-Inowax, 30m x 0.32mm x 0.5um	2032-3005

Aspirin and Ibuprofen

Suggested Column Description	P/N
GsBP-FFAP, 30m x 0.25mm x 0.25um	2125-3002
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002

Steroids

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 0.1um	1125-3001
GsBP-50MS, 30m x 0.25mm x 0.15um	5025-3001

VOCs in Consumables Products

Suggested Column Description	P/N
GsBP-624, 30m x 0.32mm x 1.8m	6232-3018

Alcohols

Suggested Column Description	P/N
GsBP-Inowax, 30m x 0.32mm x 0.5um	2032-3005
GsBP-Blood Alcohol, 7m x 0.32mm x 10um	8832-0710

Sulfurs/Benzene in Beverage grade CO2

Suggested Column Description	P/N
GsBP-1, 60m x 0.32mm x 1.0um	0132-6010
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010

Moisture in Tobacco

Suggested Column Description	P/N
GsBP-PLOT Q, 30m x 0.53mm x 20um	8653-3020

Tobacco

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-1MS, 15m x 0.25mm x 0.1um	1125-1501

Lotions

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002

VOCs in Package Materials

Suggested Column Description	P/N
GsBP-624, 30m x 0.32mm x 1.8m	6232-3018

Melamine in Dairy and other foods

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002

Food Additive/Preservatives

Suggested Column Description	P/N
GsBP-1, 10m x 0.53mm x 1.5um	0153-1515
GsBP-1, 15m x 0.53mm x 0.88um	0153-1008

Legal and Forensics Applications

Now a days GC has become one of the most important analytical instrument used in forensic laboratories. It is used in the analysis of body fluids for the presence of illegal substances, to test blood or any small suspect or any residues from the crime scene. Therefore to analyze such samples, GS-Tek columns are recommended as they are very good at separation and provide you with accurate results.

Forensics

Suggested Column Description	P/N
GsBP-624, 20m x 0.18mm x 1.0um	6218-2010
GsBP-Inowax, 30m x 0.25mm x 0.5um	2025-3005
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-1701, 30m x 0.25mm x 0.25um	6125-3002

Alcohols

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-Inowax, 60m x 0.32mm x 0.5um	2032-6005
GsBP-Blood alcohol, 7.5m x 0.32mm x 10um	8832-0710
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030

Drugs of Abuse

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002

Blood Alcohol, Breath Gases

Suggested Column Description	P/N
GsBP-Blood alcohol, 7.5m x 0.32mm x 10um	8832-0710

Anesthetic Gas

Suggested Column Description	P/N
GsBP-Gaspro, 30m x 0.32mm x 5um	8532-3005



Lipid Panel

Suggested Column Description	P/N
GsBP-FFAP, 30m x 0.25mm x 0.25um	2125-3002
GsBP-Inowax, 30m x 0.25mm x 0.15um	2025-3001

Steroids

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 0.1um	1125-3001
GsBP-50MS, 30m x 0.25mm x 0.15um	5025-3001

Anti-Doping

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-5MS, 17m x 0.20mm x 0.33um	1520-1703

Unconventional Weapon Media

Suggested Column Description	P/N
GsBP-1701, 30m x 0.25mm x 0.25um	6125-3002
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-1701, 30m x 0.53mm x 1.0um	6153-3010
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
GsBP-Gaspro, 30m x 0.32mm x 5um	8532-3005
GsBP-PLOT Al2O3, 30m x 0.25mm x 5um	8225-3005

Explosives

Suggested Column Description	P/N
GsBP-1, 10m x 0.53mm x 0.15um	0153-1001

Fire Cause Investigation

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-FFAP, 30m x 0.25mm x 0.25um	2125-3002
GsBP-5, 30m x 0.53mm x 5.0um	0553-3050

Poison /Toxins

Suggested Column Description	P/N
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002

Breathing Gases, protection gases

Suggested Column Description	P/N
GsBP-PLOT Molesieve, 5A, 30m x 0.53mm x 50um	8453-3050
GsBP-GasPro, 30m x 0.32mm x 5um	8532-3005

Commodity Inspection, Insurance Investigation Labs

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 1.0um	1125-3010
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-1701, 30m x 0.25mm x 0.25um	6125-3002

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Suggested Column Description	P/N
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030

NOISH Methods

Suggested Column Description	P/N
GsBP-624, 25m x 0.18mm x 1.0um	6218-2510
GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
GsBP-5, 30m x 0.53mm x 5um	0553-3050
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002
GsBP-Inowax, 30m x 0.53mm x 1.0um	2053-3010

Collaborative Research Columns

GS-Tek offers columns to be used in your research studies. Please contact GS-Tek for collaborations inquiries.

Suggested Column Description	P/N
GsBP-1MS, 30m x 0.25mm x 0.25um	1125-3002
GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
GsBP-Inowax, 30m x 0.25mm x 0.25um	2025-3002
GsBP-50MS, 30m x 0.25mm x 0.25um	5025-3002
GsBP-624, 30m x 0.25mm x 1.4um	6225-3014



GC Column Catalog Number Guide

Example: GsBP-5 column 30m x 0.32mm x 0.25um

Internal Diameter 0.32mm

Film Thicknesses 0.25um

0532-3002

Type of Phase Length 30m

Phase	Code	Internal Diameter	Code	Film Thickness	Code
GsBP-1	01	0.1mm	10	0.1um	01
GsBP-1MS	11	0.18mm	18	0.15um	01
GsBP-5	05	0.20mm	20	0.25um	02
GsBP-5MS	15	0.25mm	25	0.33um	03
GsBP-XLB	16	0.32mm	32	0.5um	05
GsBP-35MS	35	0.53mm	53	1.0um	10
GsBP-50+MS	50			1.5um	15
GsBP-1301	60			2.65um	26
GsBP-1701	61			3.0um	30
GsBP-624	62			5.0um	50
GsBP-502.2	63				
GsBP-VMS	64				
GsBP-FVOC	65				
GsBP-225	66				
GsBP-FAME	68				
GsBP-Inowax	20				
GsBP-FFAP	21				
GsBP-Carbowax 20M	22				
GsBP-Inowax-MS	24				
GsBP PLOT Al ₂ O ₃ , KCl	81				
GsBP PLOT Al ₂ O ₃ , S	82				
GsBP PLOT Al ₂ O ₃ , M	83				
GsBP PLOT Molesieve	84				
GsBP PLOT GasPro	85				
GsBP PLOT Q	86				
GsBP PLOT U	87				
GsBP-Blood Alcohol	88				
Guard Tubing	91				
Customization	99				
		Length	Code	PLOT Column Only	
				Coating Thickness	Code
		5m	05	5 um	05
		10m	10	8 um	08
		15m	15	10 um	10
		25m	25	15 um	15
		30m	30	20 um	20
		50m	50	25 um	25
		60m	60	30 um	30
		75m	75	40 um	40
		100m	A0	50 um	50
		105m	A5		
		150m	5A		

GC Columns by Stationary Phases

GS-Tek offers wide ranges of GC columns coated with the stationary phases equivalent or similar to commercially available phases. All stationary phases are carefully prepared to control its purity, polarity and thermal stability. Table I lists out general information for all stationary phases GS-Tek offers.

Table 1 Overview of GsBP Stationary Phases

Stationary phase	Composite	Temperature limit °C
GsBP-1, GsBP-1MS	100% dimethyl polysiloxane	-60 to 325/350
GsBP-5, GsBP-5MS	95% dimethyl/ 5% diphenyl polysiloxane	-60 to 325/350
GsBP-XLB	Proprietary phase	-60 to 325/350
GsBP-35MS	65% dimethyl/ 35% diphenyl polysiloxane	-20 to 320/340
GsBP-50+MS	Poly(50% diphenyl, 50%dimethylsiloxane)	-20 to 320/340
GsBP-1301, GsBP-624, GsBP-VMS	Approximately 6% cyanopropylphenol/ 94% dimethyl polysiloxane	-20 to 260/280
GsBP-1701, GsBP-1701-MS	14% cyanopropylphenol/ 86% dimethyl polysiloxane	-20 to 280/300
GsBP-Inowax, GsBP-Inowax-MS	Crosslinked Polyethylene glycol (PEG)	40 to 260/280
GsBP-FFAP	PEG modified w/ acids	40 to 260/280
GsBP-225	50%cyanopropylmethyl 50% phenylmethylpolysiloxane	40 to 240/260
GsBP-FAME	High content of cyanopropylphenyl polysiloxane	20 to 260
GsBP-PLOT Al ₂ O ₃ / "KCl", "S", "M"	Aluminum oxide, modified with KCL, Na ₂ SO ₄ or Na ₂ MoO ₄	-60 to 200/250
GsBP-PLOT Molesieve 5A	Molecular Sieve zeolite, 5A	-60 to 300
GsBP-PLOT Q	Crosslinked divinylbenzene polymer	-60 to 260/280
GsBP-PLOT U	Crosslinked divinylbenzene ethylene glycol dimethacrylate copolymer	-60 to 200/210
GsBP-PLOT GasPro	Modified porous silica layer	-60 to 300
GsBP-PLOT Carbon	Porous carbon	-60 to 350

Polysiloxane Based Stationary Phases

Polysiloxanes are the most common stationary phases for general separations. They are relatively stable, robust and versatile to a wide range of applications. Different functional groups that substitute to the methyl group on the silicon atom characterize the polarity of polysiloxane. Carefully controlling the polymer synthesis, capillary tubing surface treatment and other manufacturing processes can control column characteristics, such as polarity, retention, efficiency and inertness, and replication of column performance with very small variation margins.

GS-Tek offers non-polar and mid-polar polysiloxane phase columns. GsBP-1 and GsBP-5 are examples of non-polar phases, GsBP-35MS, GsBP-50+MS, GsBP-1301, and GsBP-1701 are examples of mid-polar phases. Some examples of specially designed mid-polar phases for environmental applications are GsBP-624, GsBP-VMS and GsBP-XLB. GS-Tek offers a broad line of low bleed columns for GS-MSD, GC and other instrument applications.

GsBP-1

General column for most popular applications, particularly for petroleum and petrochemical industries

100% Poly(dimethylsiloxane), cross-linked and bonded

- Solvent rinse-able and high temperature limit
- Low column bleed, inert and neutral surface, high plate number
- Wide range of column dimensions and stationary phase film thicknesses
- Non-polar, equivalent to USP G1, G2, G38

Similar Phases: DB-1, HP-1, Ultra-1, SPB-1, RTX-1, CP-Sil 5CB, BP-1, ZB-1, AT-1, MDN-1, OV-1, OV101, Optima-1

Typical Applications:

Aldehyde and Ketone	EPA TO-14 Compounds	Inorganic Hydride Gases	Pyrethrins
Anabolic Steroids	Esters I	Kerosine	Pyrolysates of Polystyrene
Anticonvulsants	Ethylene Glycol Mixture	Massachusetts APH Mix	Pyrolysis of High density Polyethylene
Aromatics I	Eucalyptus Oil, Camphor, Menthol	Methanol in ethanol	Regular Unleaded Gasoline
Aromatics in Gasoline - ASTM Method 5769	Fatty Acids (Free)	Mineral Spirits	Solvents IV
Citronella Java Oil	Flavor Volatiles	Nitrogen Based Solvent II	Steroids: Sex Hormones
Common Industrial Solvents	Fragrance Reference Standard I	Organotin Compounds	Sulfur in Gasoline
Denatured Fuel Ethanol-ASTM D5501	Freon® 12 & Ethylene Oxide	Oxygenates in Gasoline ASTM D5599	Sulfur in Naphtha

Aldehyde and Ketone	EPA TO-14 Compounds	Inorganic Hydride Gases	Pyrethrins
Diesel Fuel	Glycols III	Ozone Precursors- C2-C9 Gas Standard	Sulfur Compounds in Natural Gas
DNPH Derivative	Glycols/Diols	PFBHA Derivative	Synthetic Essential Oil Mixture
Drug Screen	Halogenated Hydrocarbons II	Polyethylene	Triethylene Glycol and Impurities
EPA Method 551	Hydrocarbons Sim-Dis	Inorganic Hydride Gases	Volatile Amines

GsBP-1 Ordering Info

ID (mm)	Length (m)	Film (µm)	Temperature Limit (°C)	P/N
0.20	12	0.33	-60 to 325/350	0120-1203
	25	0.11	-60 to 325/350	0120-2501
	25	0.33	-60 to 325/350	0120-2503
	25	0.50	-60 to 325/350	0120-2505
	50	0.11	-60 to 325/350	0120-5001
	50	0.33	-60 to 325/350	0120-5003
0.25	15	0.10	-60 to 325/350	0125-1501
	15	0.25	-60 to 325/350	0125-1502
	15	1.00	-60 to 325/350	0125-1510
	30	0.10	-60 to 325/350	0125-3001
	30	0.25	-60 to 325/350	0125-3002
	30	0.50	-60 to 325/350	0125-3005
	60	0.25	-60 to 325/350	0125-6002
	60	0.50	-60 to 325/350	0125-6005
	60	1.00	-60 to 325/350	0125-6010
	60	1.00	-60 to 325/350	0125-6010
0.32	15	0.10	-60 to 325/350	0132-1501
	15	0.25	-60 to 325/350	0132-1502
	15	1.00	-60 to 325/350	0132-1510
	25	0.17	-60 to 325/350	0132-2501
	25	0.52	-60 to 325/350	0132-2505
	25	1.05	-60 to 325/350	0132-2510
	30	0.10	-60 to 325/350	0132-3001
	30	0.25	-60 to 325/350	0132-3002
	30	0.50	-60 to 325/350	0132-3005
	30	1.00	-60 to 325/350	0132-3010
	30	3.00	-60 to 260/280	0132-3030
	30	4.00	-60 to 260/280	0132-3040
	30	5.00	-60 to 260/280	0132-3050
	50	0.17	-60 to 325/350	0132-5001
	50	0.52	-60 to 325/350	0132-5005
	50	1.05	-60 to 325/350	0132-5010
	60	0.10	-60 to 325/350	0132-6001
	60	0.25	-60 to 325/350	0132-6002
	60	0.50	-60 to 325/350	0132-6005
	60	1.00	-60 to 325/350	0132-6010
	60	3.00	-60 to 260/280	0132-6030
	60	5.00	-60 to 260/280	0132-6050
0.53	5	0.15	-60 to 320/350	0153-0501
	5	0.88	-60 to 300/320	0153-0508
	5	2.65	-60 to 260/280	0153-0526
	5	5.00	-60 to 260/280	0153-0550
	7.5	1.50	-60 to 280/300	0153-0715
	7.5	5.00	-60 to 260/280	0153-0750
	10	0.88	-60 to 300/320	0153-1008
	10	2.65	-60 to 260/280	0153-1026
	10	5.00	-60 to 260/280	0153-1050
	15	0.15	-60 to 320/350	0153-1501

ID (mm)	Length (m)	Film (μm)	Temperature Limit (°C)	P/N
15	15	0.25	-60 to 320/350	0153-1502
15	15	0.50	-60 to 300/320	0153-1505
15	15	1.00	-60 to 300/320	0153-1510
15	15	1.50	-60 to 300/320	0153-1515
15	15	3.00	-60 to 260/280	0153-1530
15	15	5.00	-60 to 260/280	0153-1550
30	30	0.10	-60 to 300/320	0153-3001
30	30	0.25	-60 to 300/320	0153-3002
30	30	0.50	-60 to 300/320	0153-3005
30	30	0.88	-60 to 300/320	0153-3008
30	30	1.00	-60 to 300/320	0153-3010
30	30	1.50	-60 to 300/320	0153-3015
30	30	2.65	-60 to 260/280	0153-3026
30	30	3.00	-60 to 260/280	0153-3030
30	30	5.00	-60 to 260/280	0153-3050
50	50	3.00	-60 to 260/280	0153-5030
50	50	5.00	-60 to 260/280	0153-5050
60	60	1.00	-60 to 300/320	0153-6010
60	60	3.00	-60 to 260/280	0153-6030
60	60	5.00	-60 to 260/280	0153-6050

TIP: Use premium septum to minimize 'Baseline' increases.

GsBP-5

General column for most popular applications, particularly for environmental, chemical, pharmaceutical, agriculture, food, drug and others. Good start columns for method development

- Poly(5% diphenyl, 95%dimethylsiloxane), crosslinked and bonded
- Solvent rinseable, high temperature limit
- Low column bleed, inert and neutral surface, high plate numbers
- Wide range of column dimensions and stationary phase film thicknesses
- Non-polar, equivalent to USP G27, G66, G41

Similar Phases: DB-5, HP-5, Ultra-5, SPB-5, RTX-5, Rxi-5sil, CP-Sil 8CB, BP-5, ZB-5, AT-5, MDN-5, OV-5, Optima-5

Typical Applications:

Amines & Phenols	Chlorinated hydrocarbons	Garlic Oil	Organomercury Compounds
Amphetamines and Precursors - TMS Derivative	CLP Pesticides	Herbicides	Organotin Compounds II
Antihistamines	Cocaine & Metabolites (TMS Derivatives)	Lemon Oil	Pain Killers - TMS Derivatives
Aroclors 1016-1268 (without 1221)	Cold Medication	Marijuana - TMS Derivatives	PBDEs
Bacterial Fatty Acid Methyl Esters	Cold-Pressed Orange Oil	Major Metabolites - TMS Derivatives	PCBs by EPA Method 8083
Basic Drugs (Underivatized)	Common Drug Screen	Motor Oil	Phencyclidine (PCP)
Benzodiazepines (Basic Drugs-Underivatized)	Congeners in DIN Method PCBs	Narcotics and Adulterants	Phytosterols (Saw Palmetto)
Bergamot Oil	Ethanolamines	Opiates (TMS Derivatives)	Steroids: Anabolic (Underivatized)
Butter Triglycerides	Ethyleneamines	Organic Volatile Impurities	Sympathomimetic Amines Derivatives
Cannabinoids (TMS Derivatives)	European Red List Volatiles	Organochlorine Pesticides	Ylang Ylang Oil

GsBP-5 Ordering Info

ID (mm)	Length (m)	Film (μm)	Temperature Limit (°C)	P/N
0.20	12	0.33	-60 to 325/350	0520-1203
	17	0.33	-60 to 325/350	0520-1703
	25	0.11	-60 to 325/350	0520-2501
	25	0.33	-60 to 325/350	0520-2503
	25	0.50	-60 to 325/350	0520-2505
	50	0.11	-60 to 325/350	0520-5001
	50	0.33	-60 to 325/350	0520-5003
	50	0.50	-60 to 325/350	0520-5005
0.25	15	0.10	-60 to 325/350	0525-1501
	15	0.25	-60 to 325/350	0525-1502
	15	0.50	-60 to 325/350	0525-1505
	15	1.0	-60 to 325/350	0525-1510
	30	0.10	-60 to 325/350	0525-3001
	30	0.25	-60 to 325/350	0525-3002
	30	0.50	-60 to 325/350	0525-3005
	30	1.00	-60 to 325/350	0525-3010
	60	0.10	-60 to 325/350	0525-6001
	60	0.25	-60 to 325/350	0525-6002
	60	0.50	-60 to 325/350	0525-6005
	60	1.00	-60 to 325/350	0525-6010
0.32	15	0.10	-60 to 325/350	0532-1501
	15	0.25	-60 to 325/350	0532-1502
	15	0.50	-60 to 325/350	0532-1505
	15	1.00	-60 to 325/350	0532-1510
	25	0.17	-60 to 325/350	0532-2501
	25	0.52	-60 to 325/350	0532-2505
	25	1.05	-60 to 325/350	0532-2510
	30	0.10	-60 to 325/350	0532-3001
	30	0.25	-60 to 325/350	0532-3002
	30	0.50	-60 to 325/350	0532-3005
	30	1.00	-60 to 300/320	0532-3010
	50	0.17	-60 to 325/350	0532-5001
	50	0.25	-60 to 325/350	0532-5002
	50	0.52	-60 to 325/350	0532-5005
	50	1.05	-60 to 300/320	0532-5010
	60	0.10	-60 to 325/350	0532-6001
	60	0.25	-60 to 325/350	0532-6002
	60	1.00	-60 to 325/350	0532-6010
0.53	10	2.65	-60 to 260/280	0553-1026
	10	5.00	-60 to 260/280	0553-1050
	15	1.50	-60 to 300/320	0553-1515
	15	3.00	-60 to 260/280	0553-1530
	15	5.00	-60 to 260/280	0553-1550
	30	0.25	-60 to 300/320	0553-3002
	30	0.88	-60 to 300/320	0553-3008
	30	1.00	-60 to 300/320	0553-3010
	30	1.50	-60 to 300/320	0553-3015
	30	2.65	-60 to 260/280	0553-3026
	30	3.00	-60 to 260/280	0553-3030
	30	5.00	-60 to 260/280	0553-3050
	60	3.00	-60 to 260/280	0553-6030
	60	5.00	-60 to 260/280	0553-6050

GsBP-1MS

General column for most popular applications, particularly petroleum and petrochemical industries

- 100% Poly(dimethylsiloxane), crosslinked and bonded
- Solvent rinseable and high temperature limit
- Exceptionally low column bleed, inert surface and neutral surface, high plate numbers
- Wide range of column dimensions and stationary phase film thicknesses for GCs and GC/MS
- Non-polar, equivalent to USP G1, G2, G38

Similar Phases: DB-1MS, HP-1MS, SPB-1, Equity-1, Rxi-1MS, VF-1MS, CP-Sil 5CB, ZB-1MS, AT-1, MDN-1, OV-1, Optima-1MS

Typical Applications:

Amines, volatile	Drug Screen	Hydrocarbons Sim-Dis	Steroids: Sex Hormones
Diesel / Gasoline	Ethylene Glycol Mixture	Pyrolysates of Polystyrene	Sulfur Compounds

GsBP-1MS Ordering Info

ID (mm)	Length (m)	Film (µm)	Temperature Limit (°C)	P/N
0.20	15	0.33	-60 to 325/350	1120-1503
	17	0.33	-60 to 325/350	1120-1703
	25	0.33	-60 to 325/350	1120-2503
0.25	15	0.10	-60 to 325/350	1125-1501
	15	0.25	-60 to 325/350	1125-1502
	15	1.00	-60 to 325/350	1125-1510
	30	0.10	-60 to 325/350	1125-3001
	30	0.25	-60 to 325/350	1125-3002
	30	0.50	-60 to 325/350	1125-3005
	30	1.00	-60 to 325/350	1125-3010
	60	0.25	-60 to 325/350	1125-6002
0.32	15	0.25	-60 to 325/350	1132-1502
	25	0.52	-60 to 325/350	1132-2505
	30	0.10	-60 to 325/350	1132-3001
	30	0.25	-60 to 325/350	1132-3002
	30	1.00	-60 to 325/350	1132-3010
	60	0.25	-60 to 325/350	1132-6002

GsBP-5MS

General column for most popular applications, particularly environmental, chemical, pharmaceutical, agriculture, food, drug and others; ideal column for new method development

- Poly(5% diphenyl, 95%dimethylsiloxane), crosslinked and bonded
- Solvent rinseable, high temperature limit
- Exceptionally low column bleed, inert and neutral surface, high plate numbers
- Wide range of column dimensions and stationary phase film thicknesses for GC and GC/MS
- Non-polar, equivalent to USP G27, G66, G41

Similar Phases: DB-5MS, HP-5MS, Ultra-5, SLB-5, Rxi-5MS, Rxi-5HT, VF-5MS, CP-Sil 8CB low bleed MS, BPX-5, ZB-5MS, ZB-5HT, AT-5MS, Optima-5MS

Typical Applications:

Acidic/Neutral Drugs	Endocrine Disruptors: Phthalate Esters	Formaldehyde, 50ppb	Polybrominated Diphenyl Esters (PBDE)
Alkaloids	EPA 608.1	Fragrance Allergens	Polyethyleneamines
Amines and Nitriles	EPA Air Analysis Method TO-15	Gasoline	Polynuclear Aromatic Hydrocarbons (PAHs)
Amphetamine and Methamphetamine	EPA Method 525.2	Halogenated Compounds	Semivolatile Compounds
Antiepileptic	EPA Method 551.1	Local Anesthetics	Semivolatile Organics
Basic Drugs	EPA Method 610	Nitrogen/Phosphorus Containing Pesticides, EPA 507	Substituted Anilines

Acidic/Neutral Drugs	Endocrine Disruptors: Phthalate Esters	Formaldehyde, 50ppb	Polybrominated Diphenyl Esters (PBDE)
Chlorinated Pesticides, EPA Method 508	EPA Method 8061 (Phthalate Ester)	Organochlorine Pesticides	Sulfur in air
CLP Standard, Semivolatile Organics	EPA method 8270	Organochlorine Pesticides II EPA Method 8081A	Trace Active Amines, 10 ng on-column
Diesel Fuel	EPA-625 Phenols	Organohalide Pesticides in water, EPA 505	Tricyclic Antipsychotics
Drug of abuse	Flavor Mixture	Organophosphorus Pesticides I EPA 8141A	Urine Drug Screen
Endocrine Disruptors: Alkyl Phenols	Food Packaging Volatiles	Phenols, I and II	US EOA Method 8270D mix

GsBP-5MS Ordering Info

ID (mm)	Length (m)	Film (μm)	Temperature Limit (°C)	P/N
0.20	12	0.33	-60 to 325/350	1520-1203
	17	0.33	-60 to 325/350	1520-1703
	25	0.33	-60 to 325/350	1520-2503
	50	0.33	-60 to 325/350	1520-5003
0.25	15	0.10	-60 to 325/350	1525-1501
	15	0.25	-60 to 325/350	1525-1502
	15	0.50	-60 to 325/350	1525-1505
	15	1.00	-60 to 325/350	1525-1510
	30	0.10	-60 to 325/350	1525-3001
	30	0.25	-60 to 325/350	1525-3002
	30	0.50	-60 to 325/350	1525-3005
	30	1.00	-60 to 325/350	1525-3010
	60	0.10	-60 to 325/350	1525-6001
	60	0.25	-60 to 325/350	1525-6002
	60	0.50	-60 to 325/350	1525-6005
	60	1.00	-60 to 320/340	1525-6010
0.32	15	0.10	-60 to 325/350	1532-1501
	15	0.25	-60 to 325/350	1532-1502
	15	0.50	-60 to 325/350	1532-1505
	15	1.00	-60 to 325/350	1532-1510
	25	0.52	-60 to 325/350	1532-2505
	30	0.10	-60 to 325/350	1532-3001
	30	0.25	-60 to 325/350	1532-3002
	30	0.50	-60 to 325/350	1532-3005
	30	1.00	-60 to 325/350	1532-3010
	60	0.10	-60 to 325/350	1532-6001
	60	0.25	-60 to 325/350	1532-6002
	60	0.50	-60 to 325/350	1532-6005
	60	1.00	-60 to 300/325	1532-6010
	60	1.00	-60 to 300/325	1532-6010
0.53	30	0.50	-60 to 300/320	1553-3005
	30	0.88	-60 to 300/320	1553-3008
	30	1.50	-60 to 300/320	1553-3015

GsBP-5MS with Integrated Guard Column

In addition to all features of GsBP-5MS columns, the integrated guard columns provide:

- Extended column life
- Improved sample applications
- Same inertness as regular 5-MS columns
- Improved peak shapes for low boiling point compounds with presence of high boiling point compounds

Similar Phases: DB-5MS, HP-5MS, Ultra-5, SLB-5, Rxi-5MS, Rxi-5sil MS, Rxi-5HT, VF-5MS, CP-Sil 8CB low bleed MS, BPX-5, ZB-5MS, ZB-5HT, AT-5MS, Optima-5MS

GsBP-5MS with Integrated Guard Column Ordering Info

ID (mm)	Description	Length (m)	Film (um)	Temperature Limit (C)	P/N
0.25	GsBP-5MS, 30m x 0.25mm x 0.25um	30	0.25	-60 to 325/350	
	w/ 5m guard column	5			1525-3502
	w/ 10m guard column	10			1525-4002
0.25	GsBP-5MS, 30m x 0.25mm x 0.50um	30	0.5	-60 to 325/350	
	w/ 5m guard column	5			1525-3505
	w/ 10m guard column	10			1525-4005

GsBP-XLB

General purpose column for environmental, pharmaceutical and other applications. Great separations for PCB, PAH congeners. Low bleed column idea for GC/MSD instrumentation.

- Proprietary stationary phase, crosslinked and bonded
- Solvent rinseable, high temperature limit
- Low column bleed, inert and neutral surface, high plate numbers
- Non-polar

Similar Phases: DB-XLB, Rtx-XLB

Typical Applications:

PAH	PCB	Benzene	Dioxane
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GsBP-XLB Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.25	15	0.25	-60 to 325/350	1625-1502
	30	0.10	-60 to 325/350	1625-3001
	30	0.25	-60 to 325/350	1625-3002
	60	0.25	-60 to 325/350	1625-6002
	30	0.50	-60 to 325/350	1625-3005
	30	1.00	-60 to 320/340	1625-3010
0.32	15	0.25	-60 to 325/350	1632-1502
	30	0.10	-60 to 325/350	1632-3001
	30	0.25	-60 to 325/350	1632-3002
	60	0.25	-60 to 325/350	1632-6002
	30	0.50	-60 to 325/350	1632-3005
	30	1.00	-60 to 300/320	1632-3010
0.53	15	0.50	-60 to 300/320	1653-1505
	30	0.50	-60 to 300/320	1653-3005
	30	1.50	-60 to 300/320	1653-3015

GsBP-35MS

General column for environmental, pharmaceutical, agriculture, food, drug and others; good confirmation columns to GsBP-5MS applications

- Poly(35% diphenyl, 65%dimethylsiloxane), crosslinked and bonded
- Solvent rinseable, high temperature limit
- Low column bleed, inert and neutral surface, high plate numbers
- Wide range of column dimensions and stationary phase film thicknesses for GC and GC/MS
- Mid-polar, equivalent to USP G28, G32 and G42

Similar Phases: DB-35, DB-35MS, HP-35MS, SPB-35, Rtx-35, Rxi-35sil MS, VF-35MS, BPX-35, BPX-608, ZB-35, MR-2, AT-35

Typical Applications:

Amytriptyline and Nortriptyline	CLP Pesticides	Fentanyl	PCBs by EPA Method 8082
Anilines	Cold Medication (Basic Drugs- Underivatized)	Organo Tins	Phenols
Barbiturates (Acidic/Neutral Drugs)	Endocrine Disruptors: Butyl Tins (hexyl derivatives)	Organochlorine Pesticides I EPA Method 8081A	Phenoxy Acid Herbicides - Methyl Derivative, EPA 8151A

Amytriptyline and Nortriptyline	CLP Pesticides	Fentanyl	PCBs by EPA Method 8082
Basic Drugs (Underivatized)	EPA Method 552.2	Organochlorine Pesticides IV	Primary Amines
Benzodiazepines	EPA Method 615- Chlorophenoxyacid Herbicides	Pesticides, EPA 508.1	Sympathomimetic Amines (Basic Drugs- Underivatized)
Chlordane	Ethanolamines	Organophosphorus Pesticides II EPA 8141A	Toxaphene

GsBP-35MS Ordering Info

ID (mm)	Length (m)	Film (µm)	Temperature Limit (°C)	P/N
0.20	15	0.33	40 to 320/340	3520-1503
	25	0.33	40 to 320/340	3520-2503
0.25	15	0.25	40 to 320/340	3525-1502
	30	0.15	40 to 320/340	3525-3001
	30	0.25	40 to 320/340	3525-3002
	60	0.25	40 to 320/340	3525-6002
0.32	15	0.25	40 to 320/340	3532-1502
	30	0.25	40 to 320/340	3532-3002
	60	0.25	40 to 320/340	3532-6002
0.53	15	1.00	40 to 300/320	3553-1510
	30	0.50	40 to 300/320	3553-3005
	30	1.00	40 to 300/320	3553-3010

GsBP-50+MS

General column for environmental, pharmaceutical, agriculture, food, drug, toppings, PAHs, Pesticides and herbicides. Good confirmation columns to GsBP-5MS or GsBP-35MS applications

- Poly(50% diphenyl, 50%dimethylsiloxane), crosslinked and bonded
- Solvent rinseable, high temperature limit
- Low column bleed, inert and neutral surface, high plate numbers
- Wide range of column dimensions and stationary phase film thicknesses for GC and GC/MS
- Mid-polar, equivalent to USP G3 and G17

Similar Phases: DB-17, DB-17MS, HP-50MS, SPB-50, Rtx-50, Rxi-17, VF-17MS, CP-Sil 24CB, BPX-50, ZB-50, AT-50, Optima-17

Typical Applications:

Antidepressant and anticonvulsant drug	EPA 625, Phenols	Hallucinogens	Phenols
BHA and BHT	EPA 8081 Organochlorine Pesticides	PAHs	Tocopherols
Butter Triglycerides	Free Steroids	PCBs	Triazine Herbicides II

GsBP-50+MS Ordering Info

ID (mm)	Length (m)	Film (µm)	Temperature Limit (°C)	P/N
0.20	12	0.16	40 to 325	5020-1201
	12	0.31	40 to 325	5020-1203
	25	0.16	40 to 325	5020-2501
	25	0.31	40 to 325	5020-2503
0.25	50	0.31	40 to 325	5020-5003
	15	0.15	40 to 325	5025-1501
	15	0.25	40 to 325	5025-1502
	15	0.50	40 to 325	5025-1505
	30	0.15	40 to 325	5025-3001
	30	0.25	40 to 325	5025-3002
	30	0.50	40 to 325	5025-3005
	60	0.25	40 to 325	5025-6002
0.32	15	0.15	40 to 325	5032-1501
	15	0.25	40 to 325	5032-1502

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ID (mm)	Length (m)	Film (μm)	Temperature Limit ($^{\circ}\text{C}$)	P/N
	15	0.50	40 to 325	5032-1505
	30	0.15	40 to 325	5032-3001
	30	0.25	40 to 325	5032-3002
	30	0.50	40 to 325	5032-3005
	60	0.25	40 to 325	5032-6002
	60	0.50	40 to 325	5032-6005
0.53	10	2.00	40 to 280	5053-1020
	15	1.00	40 to 300	5053-1510
	30	0.50	40 to 300	5053-3005
	30	1.00	40 to 300	5053-3010

TIP: Check for indications of inlet leaks occasionally, when peaks begin to decrease.

Columns for VOCs

GsBP-624, GsBP-VMS, GsBP-FVOC and GsBP-502.2

Great columns for EPA methods, pharmaceutical QC, petrochemicals, petroleum, VOC's, residue solvents, halogenated, and others. Popular column choices for go-green applications

- Proprietary phase, close to 6% cyanopropyl phenyl and 94% dimethyl polysiloxane
- Solvent rinseable, highest temperature limits
- Exceptionally low column bleed, inert and neutral surface, consistent column selectivity, very high plate numbers
- Fine tuned column selectivity to resolve 97 components of EPA 8260 mix
- Wide range of column dimensions and stationary phase film thicknesses for Purge/trap GC, GC/ECD and GC/MSD and old methods/latest updates
- Special version for fast VOC separations (FVOC), 1/3 conventional analysis times
- Mid-polar
- Close to USP G43

Similar Phases: DB-624, DB-502.2, DB-VRX, Rtx-624, Rtx-VRX, Rtx-VMS, Rtx-502.2, VF-624MS, CP-1301, SPB-624, VOCOL, BP-624, ZB-624, AT-624, Optima-624

Typical Applications:

Samples	General Chemicals	Solvents	EPA method
Air	Alcohols	Alcohols	524.2
water-drinking	FAME	DMA	601
water-underground	Halogenated Hydrocarbons	DMSO	602
water-waste	Gasoline	Esters	624
Packaging	Nitrogen Based Solvents II	Ethers	8010
Cosmetics	Residual Solvents, USP 467	Glycols II	8015
Healthcare	Residue Solvents	EPA method	8020
Drinking	Volatile Amines	501.3	8021
Tobacco	Volatile Petroleum Hydrocarbons (VPH)	503.1	8240
Nutrition	Volatile Sulfurs	504	8260

GsBP-624 Ordering Info

ID(mm)	Length (m)	Film (μm)	Temperature Limit (°C)	P/N
0.20	25	1.12	-20 to 260/280	6220-2511
0.25	30	1.40	-20 to 260/280	6225-3014
	60	1.40	-20 to 260/280	6225-6014
0.32	30	1.80	-20 to 260/280	6232-3018
	60	1.80	-20 to 260	6232-6018
0.53	30	3.00	-20 to 260	6253-3030
	60	3.00	-20 to 260	6253-6030
	75	3.00	-20 to 260	6253-7530
	105	3.00	-20 to 260	6253-A530

GsBP-502.2 Ordering Info

ID (mm)	Length (m)	Film (μm)	Temperature Limit (°C)	P/N
0.25	60	1.40	-20 to 260/280	6325-6014
0.32	60	1.80	-20 to 260/280	6332-6018
0.53	60	3.00	-20 to 260/280	6353-6030

Low Bleed GsBP-VMS Ordering Info

ID (mm)	Length (m)	Film (μm)	Temperature Limit (°C)	P/N
0.10	10	0.55	-20 to 260/280	6410-1005
0.18	20	1.00	-20 to 260/280	6418-2010
0.25	30	1.40	-20 to 260/280	6425-3014
0.25	60	1.40	-20 to 260/280	6425-6014

Fast VOC analysis: GsBP-FVOC Ordering Info

ID (mm)	Length (m)	Film (μm)	Temperature Limit (°C)	P/N
0.1	10	0.18	-20 to 260/280	6510-1001
0.18	25	0.33	-20 to 260/280	6518-2503
0.25	30	0.47	-20 to 260/280	6525-3004
0.32	30	0.60	-20 to 260/280	6532-3006
0.53	30	1.00	-20 to 260	6553-3010

GsBP-1301

Great column for VOC's, residue solvents, halogenates, oxygenates, USP467, EPA methods

- 6% cyanopropyl phenyl and 94% dimethyl polysiloxane
- Solvent rinseable, highest temperature limit
- Low column bleed, inert and neutral surface, consistent column selectivity
- Wide range of column dimensions and stationary phase film thicknesses
- Mid-polar
- Equivalent to USP G43

Similar Phases: DB1301, DB-VRX, Rtx-1301, Rtx-VRX, CP-1301, VF-1301MS, SPB-1301, BP-624, ZB-1301, AT-624, Optima-624

Typical Applications

1,4-Dioxane	Organic Volatile Impurities
EPA Method 551.1	Residual Solvents- European Pharmacopoeia Class I, II
EPA 8010	Spirit drinking, Rum, Scotch

GsBP-1301 Ordering Info

id (mm)	Length (m)	Film (μm)	Temperature Limit (°C)	P/N
0.25	15	0.25	-20 to 280/300	6025-1502
	15	1.00	-20 to 280/300	6025-1510
	30	0.25	-20 to 280/300	6025-3002
	30	1.00	-20 to 280/300	6025-3010
	60	0.25	-20 to 280/300	6025-6002
	60	1.00	-20 to 280/300	6025-6010
0.32	15	0.25	-20 to 280/300	6032-1502
	15	1.00	-20 to 280/300	6032-1510
	30	0.25	-20 to 280/300	6032-3002
	30	1.00	-20 to 280/300	6032-3010
	60	0.25	-20 to 280/300	6032-6002
	60	1.00	-20 to 280/300	6032-6010
0.53	15	1.00	-20 to 260/280	6053-1510
	30	1.00	-20 to 260/280	6053-3010
	30	1.50	-20 to 260/280	6053-3015

GsBP-1701

Great column for residue solvents, halogenates, acrylates, pesticides and herbicides, environmental, agriculture, pharmaceutical

- 14% cyanopropyl phenyl and 86% dimethyl polysiloxane
- Solvent rinseable, highest temperature limit
- Low column bleed, inert and neutral surface
- Wide range of column dimensions and stationary phase film thicknesses
- Mid-polar
- Equivalent to USP G46

Similar Phases: DB1701, Rtx-1701, VF-1701MS, CP-Sil 19 CB, SPB-1701, BP-10, ZB-1701, AT-1701, Optima-1701

Typical Applications:

Acrylate Impurities II	Barbiturates (Acidic/Neutral Drugs- Underivatized)	Organochlorine Pesticides III	TMS derivatized Sugars
Antidepressants (Basic Drugs- Uncategorized)	Fentanyl	Phenoxy Acid Herbicides	Triazine Herbicides I
Antiepileptics (Uncategorized)	5% Fragrance Materials Association Mix	Styrene Impurities	VOCs in Packaging materials

GsBP-1701 Ordering Info

ID (mm)	Length (m)	Film (μm)	Temperature Limit ($^{\circ}\text{C}$)	P/N
0.20	25	0.20	-20 to 280/300	6120-2502
0.25	15	0.15	-20 to 280/300	6125-1501
	15	0.25	-20 to 280/300	6125-1502
	15	1.00	-20 to 280/300	6125-1510
	30	0.15	-20 to 280/300	6125-3001
	30	0.25	-20 to 280/300	6125-3002
	30	1.00	-20 to 280/300	6125-3010
	60	0.15	-20 to 280/300	6125-6001
	60	0.25	-20 to 280/300	6125-6002
	60	1.00	-20 to 280/300	6125-6010
0.32	15	0.15	-20 to 280/300	6132-1501
	15	0.25	-20 to 280/300	6132-1502
	15	1.00	-20 to 280/300	6132-1510
	30	0.15	-20 to 280/300	6132-3001
	30	0.25	-20 to 280/300	6132-3002
	30	1.00	-20 to 280/300	6132-3010
	50	1.00	-20 to 280/300	6132-5010
	60	0.15	-20 to 280/300	6132-6001
	60	0.25	-20 to 280/300	6132-6002
	60	1.00	-20 to 280/300	6132-6010
0.53	15	0.25	-20 to 260/280	6153-1502
	15	0.50	-20 to 260/280	6153-1505
	15	1.00	-20 to 260/280	6153-1510
	30	0.25	-20 to 260/280	6153-3002
	30	0.50	-20 to 260/280	6153-3005
	30	1.00	-20 to 260/280	6153-3010
	30	1.50	-20 to 260/280	6153-3015
	60	1.00	-20 to 260/280	6153-6010
	60	1.50	-20 to 260/280	6153-6015

Polyethylene Glycol (PEG) Phases

GS-Tek offers three types of PEG columns: GsBP-INOWAX and its low bleed family GsBP-Inowax-MS, GsBP-FFAP, and GsBP-CarboWax 20M based on the characteristics of the PEG stationary phases, for wide ranges of applications across all over industries and researches

GsBP-Inowax and Low Bleed GsBP-Inowax-MS

General columns for most popular applications, particularly chemical, pharmaceutical, agriculture, food, drinking, oil, cosmetics, flavor and fragrance, and others; ideal column for new method development

- Polyethylene Glycol, crosslinked and bonded
- Solvent rinseable with virtually all solvents, highest temperature limit
- Exceptionally low column bleed, inert and near neutral surface, high plate numbers
- Wide range of column dimensions and stationary phase film thicknesses for GC and GC/MS
- Polar Equivalent or close to USP G14, G15, G16, G20, G39

Similar Phases: DB-Wax, DB-WAXetr, DB-WaxFF, HP-Innowax, Supelco-wax 10, Omega-Wax, Rtx-Wax, Rxt-Stabilwax, CP-Wax 52 CB, BP-20, ZB-Wax, AT-Wax, Optima-wax

Typical Applications

Acrylamide (Potato Chip Extract)	EPA 602 Aromatics	Glycols, Glycols I	Peppermint Oil
Alcohols II and III	EPA-609 NitroAromatics	Hexamethylenediamine	Perfume
Aldehydes and Acids	Esters III	Impurities in Ethylbenzene	Phenols III
Amines (low MW)	Ethylene Oxide	Impurities in Mixed Xylenes	Polyunsaturated Fatty Acid Methyl Esters
Amines/Alcohols/Chlorides	FAME Standard I	Impurities in p-Xylene-ASTM D3798	Rapeseed oil
Aromatics Analysis: ASTM D16 Analytes	FAMEs (Cocoa Butter)	Impurities in Styrene	Rapid Analysis of Water in Organic Solvents
Aromatics II	Fast Styrene Analysis	Industrial Solvent	Solvents I, II
Blood Alcohol	Flavor Volatiles	Lavender Oil Spiked with Camphor	Spearmint oil
Bourbon	Formaldehyde Underivatized	Monomers in Latex Paint by Headspace	Strawberry Syrup
Branched alcohols	Fragrance Reference Standard II	Mushroom Aroma (Synthetic)	Sulfur and Selenium in Garlic by Headspace
BTEX	Frangnace Allergens	Nitrosamines	Tramanian Lavander Oil
Chlorinated Isooctane	Free Fatty Acids	Nutmeg Oil	Volatile Organics
Citronella Java Oil	Free Organic Acids/C4-C5 Isomers	Organic Acids	Volatile Sulfurs

GsBP-Inowax Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.20	25	0.20	40 to 260/280	2020-2502
	25	0.40	40 to 260/280	2020-2504
	50	0.20	40 to 260/280	2020-5002
	50	0.40	40 to 260/280	2020-5004
0.25	15	0.25	40 to 260/280	2025-1502
	15	0.50	40 to 260/280	2025-1505
	30	0.15	40 to 260/280	2025-3001
	30	0.25	40 to 260/280	2025-3002
	30	0.50	40 to 260/280	2025-3005
	60	0.15	40 to 260/280	2025-6001
	60	0.25	40 to 260/280	2025-6002
	60	0.50	40 to 260/280	2025-6005
0.32	15	0.25	40 to 260/280	2032-1502
	15	0.50	40 to 260/280	2032-1505
	30	0.15	40 to 260/280	2032-3001
	30	0.25	40 to 260/280	2032-3002
	30	0.50	40 to 260/280	2032-3005
	60	0.15	40 to 260/280	2032-6001

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.53	60	0.25	40 to 260/280	2032-6002
	60	0.50	40 to 260/280	2032-6005
	15	1.00	40 to 240/250	2053-1510
	30	1.00	40 to 240/250	2053-3010
	60	1.00	40 to 240/250	2053-6010

GsBP-Inowax-MS Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.25	30	0.25	40 to 260/280	2425-3002
	60	0.25	40 to 260/280	2425-6002
	60	0.50	40 to 260/280	2425-6005
0.32	30	0.25	40 to 260/280	2432-3002
	30	0.50	40 to 260/280	2432-3005

TIP: Cut column ends with a ceramic wafer and check the cut edges with a magnifier.

GsBP-FFAP

Ideal column for oxygenate solvents, volatile fatty acids or phenols in food, beverage, drugs, and others

- Polyethylene Glycol, nitroterephthalic acid modified, crosslinked and bonded
- Solvent rinseable with virtually all solvents, highest temperature limit
- Exceptionally low column bleed and high plate numbers
- Wide range of column dimensions and stationary phase film thicknesses for GC and GC/MS
- Polar. Equivalent to USP G25 and G35

Similar Phases: DB-FFAP, HP-FFAP, Rtx-Stabilwax-DA, OV-351, CP-Wax 58 CB, BP-21, AT-100

Typical Applications:

Acrylates	Asprin and Ibuprofen in Methanol	Ethoxyethanol	Malt Whiskey
Alcoholic Beverage Standard: Acids & Esters	Cresylic Acids	Fatty Acids (Free)	Organic Acids

GsBP-FFAP Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.20	25	0.30	50 to 260	2120-2503
	50	0.30	50 to 260	2120-5003
0.25	15	0.25	50 to 260	2125-1502
	30	0.25	50 to 260	2125-3002
0.32	15	0.25	50 to 260	2132-1502
	25	0.50	50 to 260	2132-2505
	30	0.25	50 to 260	2132-3002
	30	0.50	50 to 260	2132-3005
	50	0.50	50 to 260	2132-5005
0.53	10	1.00	50 to 250	2153-1010
	15	1.00	50 to 250	2153-1510
	30	1.00	50 to 250	2153-3010

TIP: Use gas traps to improve gas quality.

GsBP-CarboWax20M

General column for most popular applications, particularly chemical, pharmaceutical, agriculture, food, drinks, oil, cosmetics, flavor and fragrance, and others; ideal column for new method development

- Polyethylene Glycol
- True PEG selectivity
- Inert and near neutral surface, high plate numbers
- Polar, Equivalent to USP G14, G15, G16, G20, G39

Similar Phases: DB-CAM, HP-CarboWax 20M, Rtx-Wax

Typical Applications:

Acids

Amines

Alcohols

Wine/Liqueur

GsBP-CarboWax20M Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.20	25	0.10	40 to 220	2220-2501
	50	0.10	40 to 220	2220-5001
0.25	30	0.25	40 to 220	2225-3002
0.32	30	0.25	40 to 220	2232-3002
	30	1.00	40 to 220	2232-3010
0.53	10	1.33	40 to 210	2253-1013
	30	1.33	40 to 210	2253-3013
	60	1.33	40 to 210	2253-6013

TIP: Before installing columns, cut 1-2 inches at both ends evenly.

GsBP-PLOT Columns

- Porous Layer Open Tubular (PLOT) formed by various particle absorbents
- Truly immobilized particle coating on the capillary tubing wall. The use of a trap column is not necessary.
- Very high specific surface areas to provide high capacities needed for separations
- Different "polarities" (high column selectivity) leading to more specific separations
- Ideal columns for separating volatile and gaseous compounds
- A great replacement of packed columns
- Column customization – a similar column with an additional 75 USD and a 3 – 5 week lead time

Common Practices and Tips:

- Avoid using the column at a temperature higher than the given temperature limit. This changes the selectivity.
- Avoid direct aqueous sample introduction to the Alumina and Molesieve PLOT columns.
- Avoid dirty sample introduction into all PLOT columns. With the introduction of dirty samples, the column takes a longer time to regain its peak performance. If a dirty sample is introduced, back flushing is the best method to clean the column.
- Performance regeneration can take a long time (10-24 hours) when the column is at its highest temperature in accordance with the temperature limits.

- Avoid rinsing the column to regenerate column performance. Instead, use higher temperature (but not higher than the temperature limit).
- Seal the column with a new septum when the column is stored outside of the GC oven.
- Cut the column gently and neatly to avoid particle dislodging. Do NOT tap or vibrate the column. Avoid too much tubing bending. These actions will destroy the coating binding and generate particles that can cause detector blockage or baseline spiking.
- Use helium as a carrier gas if possible. When hydrogen gas is used as a carrier, avoid using the instrument and high temperatures.
- Keep the column at 100°C -150°C when idling inside of a GC oven. Maintain the column gas flow.
- For a GC equipped with EPC, slowly ramp pressure for constant flow mode. Avoid pressure pulse injections.
- PLOT columns can be used in GC-MS instruments but great care must be used in order to avoid particle dislodging. In the case of the particles get into the ion source, clean them out as soon as possible to avoid the particles moving into the detector or the turbo pump.
- Use a shorter length column at first. Use a 50 or 60m column if the retention needs to be increased.
- Use a 0.53mm column for large sample loading capacity. Use a 0.32mm column for improving baseline separations or for use with a GC-MS application.
- The elution orders of working compounds are not completely defined. For this problem you should try to use your own knowledge, literature, expert consultation, or other resources to identify the peak(s). Internal Standards should be used for GC-MS as aid for peak identification.
- There is no totally "inert" PLOT column. Quantify your analysis result with care. Calibrate the result time by time because the column performance may decrease over time.
- Bare spots over the column length are normal for PLOT column. These spots do NOT affect column efficiency, retention time, or coating immobilization.

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GsBP-PLOT Column Selection

General Property	GsBP-PLOT Al ₂ O ₃ / "KCl", "S", "M"	AB-PLOT MoleSieves 5A	GsBP-PLOT Q	GsBP-PLOT U	GsBP-PLOT GasPro
Stationary Phase	Aluminum oxide, modified with KCl, Na ₂ SO ₄ , or Na ₂ MoO ₄	Molecular Sieve, zeolite, 5A	Crosslinked Divinylbenzene polymer	Crosslinked divinylbenzene ethylene glycol Dimethacrylate copolymer	Modified porous silica layer
Withstand Water	No	No	Good to Excellent	Excellent	Modest
Withstand acid/base	No	No/Yes	Excellent	Excellent	Yes/No
Withstand non-aqueous liquid	Yes	No	Yes	Yes	Yes
Thermal Stability	200°C	300°C	280°C	190°C	260°C
Rinse-able with solvent	No	Yes, w/water	Yes	Yes	Yes, w/ acetone
Fix gas separation at ambient temperature	No	Yes	Air/CO, CO ₂ , Water, sulfur gases, ammonia	Air/CO, CO ₂ , water. Sulfur gases, ammonia	Air, CO ₂ , inorganic gases
C1 to C5 separation	Excellent Baseline	No (C1 and C2)	Most, poor isomer baseline separation	Most, poor isomer baseline separation	Most
Hydrocarbons	C1 to C6 (C10 for short columns)	C1, C2	C1 to C12	C1 to C10	C1 to C12
Separation of polar/oxygenated compounds	Minimal	No	Good to excellent	Good to excellent	Good
Known surface adsorption	Oxygenated, acid/base, CO ₂ , water	CO ₂ , Water, Acid/base, hydrocarbons, halocarbons	Modest sulfur gases adsorption	Less adsorption of sulfur gases	N/A
Elution Order	Air, C1, Mostly carbon No. and aromatics	He/H ₂ /Ne/Ar/O ₂ /N ₂ /C1/CO	Air, C1, C2, CO ₂ , water, Mostly carbon No. or polarity aromatics	Air, C1, C2, CO ₂ , C3, water. Mostly carbon No. or polarity and aromatics	Air, C1, CO ₂ , Mostly carbon No.
Known Applications	Hydrocarbons, halocarbons, some chemical weapon gases (cyanous gases), BTEX	Fixed gases and fixed gases from hydrocarbon stream, hydrogen isotopes at 80°C	Hydrocarbon stream oxygenated compounds, inorganic gases, halocarbons	Hydrocarbon stream, oxygenated compounds, inorganic gases	Impurities (sulfur compound) from hydrocarbon stream or air, halocarbons
Similar Phases	HP-PLOT Al ₂ O ₃ , "KCl", "S", "M", CP-Al ₂ O ₃ , PLOT KCl, Na ₂ SO ₄ , GS-Alumina, Rt-Alumina, ZB-Alumina	HP-PLOT Molsieve, CP-Molsieve, Rt-Molesieve, ZB-Molesieve	HP-PLOT Q, GS-Q, CP PoraPLOT Q, CP PoraPLOT Q HT, Rt-Q, Supel Q PLOT ZB-PLOT Q	HP-PLOT U, CP PoraPLOT U	GS-GasPro, CP-PLOT silica

G S -

Tek offers six types to PLOT columns: GsBP-PLOT Al₂O₃, GsBP-PLOT Molesieve, GsBP-PLOT GasPro, and GsBP-PLOT Q, GsBP-PLOT U, and GsBP-PLOT Carbon. These different stationary phase columns can be used for various small molecule applications in petrochemical, environment, and pharmaceutical industries.

GsBP-PLOT Al₂O₃ Columns

Ideal column for light hydrocarbons C1 to C5 separations, CFCs

- Porous Al₂O₃, modified with KCl, Sodium sulfate, or "M" salts
- Immobilized, rinseable with water or methanol
- Wide range of column dimensions and stationary phase film thicknesses, high plate numbers
- Complete separations of C1 to C5 isomers at above ambient temperatures
- Minimize column selectivity variety/retention time shift from moisture effect
- Higher retention than other commercial brand

Typical Applications

Natural gas	LPG	Ethylene	MAPP
Refineral gas	Propane	Propylene	Butadienes
CFCs	C1 to C5	Extended C1 to C10	Nitrogen oxides

GsBP-PLOT Al₂O₃ "KCl"

Porous Al₂O₃, modified by KCl salt

- Good separations of olefins C2 to C5, least activity for propadiene
- Significant moisture effect on acetylene/propadiene retention time shifting

Similar Phases: HP-PLOT/Al₂O₃ "KCL", CP-Al₂O₃/KCL-PLOT

GsBP-PLOT Al₂O₃ "KCl" Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.25	25	5	-60 to 200/250	8125-2505
	30	5	-60 to 200/250	8125-3005
0.32	15	8	-60 to 200/250	8132-1508
	30	8	-60 to 200	8132-3008
	50	8	-60 to 200	8132-5008
0.53	15	15	-60 to 200/250	8153-1515
	30	15	-60 to 200	8153-3015
	50	15	-60 to 200	8153-5015
	60	15	-60 to 200	8153-6015

GsBP-PLOT Al₂O₃ "S"

- Porous Al₂O₃, modified by Na₂SO₄ salt
- Excellent separations of olefins C2 to C5, slight absorption of propadiene
- Least moisture effect on acetylene/propadiene retention time shifting

Similar Phases: HP-PLOT/Al₂O₃ "S", CP-Al₂O₃/Na₂SO₄-PLOT

GsBP-PLOT Al₂O₃ "S" Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.25	25	5	-60 to 200/250	8225-2505
	30	5	-60 to 200/250	8225-3005
0.32	15	8	-60 to 200/250	8232-1508
	30	8	-60 to 200	8232-3008
	50	8	-60 to 200	8232-5008
0.53	15	15	-60 to 200/250	8253-1515
	30	15	-60 to 200	8253-3015
	50	15	-60 to 200	8253-5015
	60	15	-60 to 200	8253-6015

GsBP-PLOT Al₂O₃ "M"

Ideal column for complete separations of C1 to C5 light hydrocarbons, CFCs

- Porous Al₂O₃, modified by Na₂MoO₄ salt
- Good separations of olefins C2 to C5, less absorption of propadiene
- Modest moisture effect on acetylene/propadiene retention time shifting

Similar Phases: HP-PLOT/Al₂O₃ "M", GS-Alumina

GsBP-PLOT Al₂O₃ "M" Ordering Info

Id (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.25	25	5	-60 to 200/250	8325-2505
	30	5	-60 to 200/250	8325-3005
0.32	15	8	-60 to 200/250	8332-1508
	30	8	-60 to 200	8332-3008
	50	8	-60 to 200	8332-5008
0.53	15	15	-60 to 200/250	8353-1515
	30	15	-60 to 200	8353-3015
	50	15	-60 to 200	8353-5015
	60	15	-60 to 200	8353-6015

GsBP-PLOT MoleSieve

Special columns for fixed gas separations.

- Molecular Sieves, zeolite, 5A
- Immobilized, rinseable with water or methanol
- Wide range of column dimensions and stationary phase film thicknesses
- High plate numbers
- Argon/Oxygen separation at ambient temperature

Similar Phases: HP-PLOT/MoleSieve, CP-MoleSieve PLOT, GS-MoleSieve

Typical Applications

Air	Hydrogen	Argon
Nobel gases	Nitrogen oxides	Natural gas
CO	SF ₆	Refinery gas

GsBP-PLOT MoleSieve Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.32	5	12	-80 to 300	8432-0512
	15	12	-80 to 300	8432-1512
	30	12	-80 to 300	8432-3012
	15	25	-80 to 300	8432-1525
	30	25	-80 to 300	8432-3025
	50	25	-80 to 300	8432-5025
0.53	60	25	-80 to 300	8432-6025
	5	25	-80 to 300	8453-0525
	15	25	-80 to 300	8453-1525
	30	25	-80 to 300	8453-3025
	15	50	-80 to 300	8453-1550
	30	50	-80 to 300	8453-3050
	50	50	-80 to 300	8453-5050
	60	50	-80 to 300	8453-6050

GsBP-PLOT GasPro

Ideal column for sulfur analysis, CFCs, light hydrocarbons and solvents

- Proprietary porous silica layer

- Immobilized, rinseable with methanol, acetone, pentane
- 0.32mm ID column only
- High plate numbers
- Good separations of volatile sulfurs, CO₂, solvents, light hydrocarbon C1 to C5

Similar Phases: GS-GasPro, CP-Silica PLOT

Typical Applications

C1 and C2 Halocarbons (Freons)	Halothane	Residue Solvents
Extended Hydrocarbon Analysis	Inorganic Gases	Sulfur Compounds in Propylene (1 ppm)
Halocarbons	Mercaptans	Sulfur Gas Analysis in Light HydroCarbon Streams I

GsBP-PLOT GasPro Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.32	5	5	-80 to 260/300	8532-0505
	15	5	-80 to 260/300	8532-1505
	30	5	-80 to 260/300	8532-3005
	60	5	-80 to 260/300	8532-6005

GsBP-PLOT Q

Good column for natural gas, refinery gases, chemical weapon gas, CFCs, sulfurs, amines

- Porous Divinylbenzene polymer
- Excellent immobilized, rinseable with volatile solvents
- Complete dimensions and film thicknesses
- Highest temperature limit and lowest column bleed
- Good separations of volatile sulfurs, CO₂, oxygenate solvent vapors from light hydrocarbon C1 to C4 stream

Similar Phases: HP-PLOT Q, GS-Q, CP-PoraPLOT Q, Rtx-Q, Rtx-QS

Typical Applications

Air, Carbon Monoxide, Methane, Carbon Dioxide	Hydrocarbon Gases	Oxygenates
Alcohols	N ₂ OI	Refinery Gas I
Fatty Acids (Free)	Natural Gas	Solvents
Gases(Air, Carbon Monoxide, Methane, Carbon Dioxide)	Nitrogen, Oxygen, Argon	Sulfur Gas Analysis in Light HydroCarbon Streams

GsBP-PLOT Q Ordering Info

id (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.32	15	15	-80 to 280/290	8632-1515
	30	15	-80 to 280/290	8632-3015
0.53	15	30	-80 to 280/290	8653-1530
	30	30	-80 to 280/290	8653-3030
	60	30	-80 to 260/280	8653-6030

GsBP-PLOT U

Good column for natural gas, refinery gases, chemical weapon gas, CFCs, sulfurs, amines

- Porous Divinylbenzene, ethylene glycol dimethacrylate co-polymer
- Excellent immobilized, rinseable with volatile solvents
- Complete dimensions and film thicknesses
- Highest temperature limit and lowest column bleed
- Good separations of volatile sulfurs, amines, acids, CO₂, oxygenate solvent vapors from light hydrocarbon C1 to C4 stream

Similar Phases: HP-PLOT U, CP-PoroPLOT U, Rtx-U

Typical Applications

Amines in Water	Primary Amines	CO ₂ in air	Moisture
Hydrocarbon Gases	Solvents	N ₂ /CO	Sulfurs

Phone (302)533-5646
Fax (302)737-4547

GsBP-PLOT U Ordering Info

id (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.32	15	10	-80 to 190/200	8732-1510
	30	10	-80 to 190	8732-3010
	30	20	-80 to 190	8732-3020
0.53	15	20	-80 to 190/200	8753-1520
	30	20	-80 to 190	8753-3020

TIP: Purge PLOT Column without connecting to the detector side to prevent baseline spiking and jet clogging.

Specialty Columns

GsBP-PONA

Excellent column for gasoline, natural gas, petroleum gases, sulfurs, amines, alcohols and other oxygenates

- 100% Poly(dimethylsiloxane), crosslinked and bonded
- Solvent rinseable, high temperature limit
- Low column bleed, inert and neutral surface, very high plate numbers
- 50m and 100m versions
- Non-polar

Similar Phases: HP-PONA, DB-Petro, Rtx-PONA

Typical Applications

PONA Mix as Specified by AFNOR Method #2	Refinery gas III	Gasoline II	Residual Solvents
Propylene, Butene-1 and Ethylene	Sulfurs in Naphtha	FCC Gasoline	DHA

GsBP-PONA Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.2	50	0.50	-60 to 325/350	9002-PONA
0.25	100	0.50	-60 to 325/350	9006-PONA

Micro-GC Applications

GsBP-PLOT Q Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.25	30	10	-60 to 280C	8625-3010
0.32	30	15	-60 to 280C	8632-3015

GsBP-PLOT U Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.25	30	10	-60 to 200C	8725-3010
0.32	30	20	-60 to 200C	8732-3020

GsBP-PLOT Molesieve Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.32	30	25	-60 to 300C	8432-3025

GsBP-1 Ordering Info

ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
0.25	30	1.0	-60 to 325C	1125-3010

GsBP-Low Bleed/MS Columns

Exceptionally low column bleed with high performances:

- Crosslinked and bonded, high temperature stable phases
- Resistant to virtually all solvents
- Total truly inert
- High efficiency
- Reproducible column selectivity
- Across most stationary phases

GsBP-Low Bleed/MS Columns Ordering Info

Phase	ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
GsBP-1MS	0.20	17	0.33	-60 to 325/350	1120-1703
GsBP-1MS	0.25	30	0.10	-60 to 325/350	1125-3001
GsBP-1MS	0.25	30	0.25	-60 to 325/350	1125-3025
GsBP-1MS	0.25	30	1.00	-60 to 325/350	1125-3010
GsBP-5MS	0.20	17	0.33	-60 to 325/350	1520-1703
GsBP-5MS	0.25	30	0.10	-60 to 325/350	1525-3001
GsBP-5MS	0.25	30	0.25	-60 to 325/350	1525-3002
GsBP-5MS	0.25	30	1.00	-60 to 320/340	1525-3010
GsBP-5MS	0.25	60	0.25	-60 to 325/350	1525-6025
GsBP-5MS	0.25	60	1.0	-60 to 320/340	1525-6010
GsBP-35MS	0.25	30	0.25	-60 to 325/350	3525-3002
GsBP-XLB	0.25	30	0.25	-60 to 325/350	1625-3002
GsBP-50MS	0.25	30	0.25	-60 to 320/340	5025-3002
GsBP-1701MS	0.25	30	0.25	-20 to 280/300	6125-3002
GsBP-InowaxMS	0.25	30	0.25	40 to 260/280	2425-3002
GsBP-FFAPMS	0.20	50	0.33	40 to 260/280	2520-5003
GsBP-50MS	0.25	30	0.25	-60 to 320/340	5025-3002
GsBP-VMS	0.18	20	1.00	-20 to 260/280	6418-2010
GsBP-VMS	0.25	30	1.40	-20 to 260/280	6425-3014
GsBP-PLOT Al2O3, "S"	0.25	30	5.0	-60 to 200/250	8225-3005
GsBP-PLOT Q	0.25	30	10.0	-60 to 280/300	8625-3010
GsBP-PLOT U	0.25	30	10.0	-60 to 200/210	8725-3010

For customer-made MS columns, please inquiry with specifications of stationary phase, column ID, length and film thickness

High Efficient and Fast Separation Columns

The columns utilizing narrow internal diameters to produce high plate numbers for critical separations

Phase	ID (mm)	Length (m)	Film (um)	Temperature Limit (°C)	P/N
GsBP-1MS	0.10	10	0.04	-60 to 325/350	1110-1004
GsBP-1MS	0.10	10	0.10	-60 to 325/350	1110-1010
GsBP-1MS	0.18	10	0.07	-60 to 325/350	1118-1007
GsBP-1MS	0.18	10	0.18	-60 to 325/350	1118-1018
GsBP-1MS	0.18	20	0.07	-60 to 325/350	1118-2007
GsBP-1MS	0.18	20	0.18	-60 to 325/350	1118-2018
GsBP-5MS	0.10	10	0.04	-60 to 325/350	1510-1004
GsBP-5MS	0.10	10	0.10	-60 to 325/350	1510-1010
GsBP-5MS	0.18	10	0.07	-60 to 325/350	1518-1007
GsBP-5MS	0.18	10	0.18	-60 to 325/350	1518-1018
GsBP-5MS	0.18	20	0.07	-60 to 325/350	1518-2007
GsBP-5MS	0.18	20	0.18	-60 to 325/350	1518-2018
GsBP-Inowax MS	0.10	10	0.04	40 to 260/280	2410-1004
GsBP-Inowax MS	0.10	10	0.10	40 to 260/280	2410-1010
GsBP-Inowax MS	0.18	10	0.07	40 to 260/280	2418-1007
GsBP-Inowax MS	0.18	10	0.18	40 to 260/280	2418-1018
GsBP-Inowax MS	0.18	20	0.07	40 to 260/280	2418-2007
GsBP-Inowax MS	0.18	20	0.18	40 to 260/280	2418-2018
GsBP-1701 MS	0.10	10	0.04	-20 to 280/300	6110-1004
GsBP-1701 MS	0.10	10	0.10	-20 to 280/300	6110-1010
GsBP-1701 MS	0.18	10	0.07	-20 to 280/300	6118-1007
GsBP-1701 MS	0.18	10	0.18	-20 to 280/300	6118-1018
GsBP-1701 MS	0.18	20	0.07	-20 to 280/300	6118-2007
GsBP-1701 MS	0.18	20	0.18	-20 to 280/300	6118-2018

Deactivated Fused Silica Tubing

Deactivated fused silica tubing is commonly used as a retention gap and guard column or sample transfer line. They can prolong analytical column life, as they trap the most "dirty" or undesired compounds. We offer two types of deactivated tubing: non-polar with methylsilane and PEG. We can also offer other deactivation methods upon requesting.

- Modified surface with methylsilane or PEG
- Inert and near neutral surface
- Used for protecting analytical columns from dirty sample introduction

MethylSilane Deactivated Tubing

ID (mm)	Length (m)	OD (mm)	Temperature Limit (°C)	P/N
0.2	1	0.34	350	9120-0100
	5	0.34	350	9120-0500
	10	0.34	350	9120-1000
0.25	1	0.35	350	9125-0100
	5	0.35	350	9125-0500
	10	0.35	350	9125-1000
0.32	1	0.43	350	9132-0100
	5	0.43	350	9132-0500
	10	0.43	350	9132-1000
0.53	1	0.67	325	9153-0100
	5	0.67	325	9153-0500
	10	0.67	325	9153-1000

PEG Deactivated Tubing

ID (mm)	Length (m)	OD (mm)	Temperature Limit (°C)	P/N
0.2	1	0.34	300	9220-0100
	5	0.34	300	9220-0500
	10	0.34	300	9220-1000
0.25	1	0.35	300	9225-0100
	5	0.35	300	9225-0500
	10	0.35	300	9225-1000
0.32	1	0.43	300	9232-0100
	5	0.43	300	9232-0500
	10	0.43	300	9232-1000
0.53	1	0.67	300	9253-0100
	5	0.67	300	9253-0500
	10	0.67	300	9253-1000

Packed Columns

Packed columns are traditional tools used for separation but are still prevailing in the industry. They are used in many gas chromatograph applications such as petroleum industries, food, chemicals, and others. GS-Tek offers packed columns in stainless steel tubing format, with complete well-known packing materials. GS-Tek also offers micropack columns for separation improvement and custom-made columns.

HELPFUL TIPS:

- Most packed columns are not preconditioned. End user should precondition column at manufacturers specified maximum temperature prior to use
- Packed columns historically have different coil and connection configurations from various Gas Chromatograph brand.
- Packed columns are not manufacture-tested. Batch variation may exist

To Order

Almost all packed columns are custom-made. A complete description of packed column configuration should be used to place an order.

Packed Column Configuration Description

Tubing material	Length, foot or meter	OD inch/mm	Packing material	Instrument configuration	Connection
Stainless steel	Customer Specified	1/16 inch	Solid support	General	Brass nut fitting (standard)
Glass	Customer Specified	1/8 inch	Coating liquid phase and loading amount (if any) Support Mesh	HP/Agilent	Weldment VCR
Custom-specified	Customer Specified	1/4 inch		Varian P-E P-E auto system Shimadzu	

For any other special custom-made configuration, please contact GS-Tek by email: info@gs-tek.com or phone: (302) 533-5646.

TIP:

- 1)Thoroughly condition packed columns prior to use
- 2)Specify the loading amount of stationary phase (w/w) when ordering.

Popular Packed Column Ordering Info

Stainless Steel (SS) Metal Packed Columns	
P/N	Description
9533-600	6' X 1/8" SS 10% Apiezon L Chrom W-HP 80/100
9533-602	6' X 1/8" SS 10% CWAX 400 Chrom W-HP 80/100
9533-604	6' X 1/8" SS 10% CWAX 1500 Chrom W-HP 80/100
9533-606	6' X 1/8" SS 10% CWAX 20M Chrom W-HP 80/100
9533-607	6' X 1/8" SS 10% CWAX 20M Chrom W-AW 80/100
9533-608	6' X 1/8" SS 10% CWAX 20M-TPA Chrom W-AW 80/100
9533-610	6' X 1/8" SS Chromosorb 101 80/100
9533-612	6' X 1/8" SS Chromosorb 102 80/100
9533-614	6' X 1/8" SS Chromosorb 103 80/100
9533-618	6' X 1/8" SS Chromosorb 105 80/100
9533-620	6' X 1/8" SS Chromosorb 106 80/100
9533-622	6' X 1/8" SS Chromosorb 107 80/100
9533-624	6' X 1/8" SS Chromosorb 108 80/100

Stainless Steel (SS) Metal Packed Columns

9533-626	6' X 1/8" SS 10% DEGS Chrom W-AW 80/100
9533-628	6' X 1/8" SS 15% DEGS Chrom W-AW 80/100
9533-630	6' X 1/8" SS 5% FFAP Chrom W-HP 80/100
9533-632	6' X 1/8" SS 5% FFAP Chrom W-AW 80/100
9533-634	6' X 1/8" SS 3% OV-1 Chrom W-HP 80/100
9533-636	6' X 1/8" SS 3% OV-1 Chrom W-HP 100/120
9533-638	6' X 1/8" SS 10% OV-1 Chrom W-HP 80/100
9533-640	6' X 1/8" SS 3% OV-17 Chrom W-HP 80/100
9533-642	6' X 1/8" SS 3% OV-17 Chrom W-HP 100/120
9533-646	6' X 1/8" SS 10% OV-17 Chrom W-HP 80/100
9533-648	6' X 1/8" SS 10% OV-17 Chrom W-HP 100/120
9533-650	6' X 1/8" SS 3% OV-101 Chrom W-HP 80/100
9533-652	6' X 1/8" SS 3% OV-101 Chrom W-HP 100/120
9533-654	6' X 1/8" SS 10% OV-101 Chrom W-HP 80/100
9533-656	6' X 1/8" SS 3% OV-210 Chrom W-HP 80/100
9533-658	6' X 1/8" SS 3% OV-225 Chrom W-HP 100/120
9533-659	6' X 1/8" SS 3% OV-225 Chrom W-HP 80/100
9533-660	6' X 1/8" SS 3% OV-275 Chrom W-AW 80/100
9533-661	6' X 1/8" SS 3% SE-30GC Chrom W-HP 80/100
9533-680	6' X 1/8" SS 1.5% OV-17 + 1.95% QF-1 Chrom W-HP 80/100
9533-682	6' X 1/8" SS 4% SE-30GC + 6% OV-210 Chrom W-HP 80/100
9533-684	6' X 1/8" SS 10% OV-225 Chrom W-HP 80/100
9533-686	6' X 1/8" SS 10% TCEP on Chromosorb PAW, 80/100

Molecular Sieves

P/N	Description
9533-690	6' X 1/8" SS Molesieve, 5A 80/100
9533-691	3' X 1/8" SS Molesieve, 5A 80/100
9533-692	12' X 1/8" SS Molesieve, 5A 80/100
9533-696	6' X 1/8" SS Molesieve, 13X 80/100
9533-697	3' X 1/8" SS Molesieve, 13X 80/100
9533-698	12' X 1/8" SS Molesieve, 13X 80/100

Polymer Base

P/N	Description
9533-662	6' X 1/8" SS Porapak Q 80/100
9533-664	6' X 1/8" SS Porapak P 80/100
9533-666	6' X 1/8" SS Porapak R 80/100
9533-668	6' X 1/8" SS Porapak S 80/100
9533-670	6' X 1/8" SS Porapak T 80/100
9533-672	6' X 1/8" SS Porapak T 100/120
9533-674	6' X 1/8" SS Porapak N 80/100
9533-676	6' X 1/8" SS Porapak QS 80/100
9533-678	6' X 1/8" SS Porapak PS 80/100

TIP: Check the condition of liners, ferrules and septa on a regular basis to ensure optimum performance.

Packing Media Solid Supports

Name	Description	Applications
Chromosorb PAW	C22 Firebrick acid washed mesh 80/100	Hydrocarbons
Chromosorb PAW DMCS	C22 Firebrick acid washed, treated with dimethyl-dichlorosilane mesh 80/100	Hydrocarbons/oxygenates
Chromosorb WAW	Diatomite support, acid washed, mesh 80/100	Oxygenates
Chromosorb WHP	Diatomite support, acid washed, silanized mesh 80/100	Steroids, bile acids, alkaloids, drugs

Stationary Phases

Name	Description	Temperature Limit, (°C)
Squalane	Squalane	20/100
OV-1, SE-30	100% methyl silicone gum	50/300
OV-5, SE-52/54	5% phenyl 95% methyl silicone gum	50/300
UCW-982	100% methyl silicone gum, 1% vinyl	0/300
OV-101, SP-2100, DC-200	100% methyl silicone fluid	0/250
Dexsil 300, PS-300	Carbonate methyl silicone	50/450
OV-17, SP2250	50% methyl 50% phenyl silicone	0/375
OV-25	25% methyl 75% phenyl silicone	0/350
OV-210, SP2401	50% trifluoropropyl 50% methyl silicone	0/250
OV-225, XE-60	25% cyanopropyl silicone	0/265
Carbowax 20M	Polyethylene glycol	60/225
Carbowax 20M, TPA	Polyethylene glycol, acid modified	60/250
OV-351, SP-1000, FFAP-2	carbowax, acid modified	50/250
DEGS	diethylene glycol succinate	40/200
EGS	ethylene glycol succinate	20/200
Silar 10C, SP2340	100% cyanopropyl silicone	0/250
TCEP	1,2,3-tris(2-cyanoethoxyl)propane	0/125

Solid Adsorbents Inorganic

Name	Description	Temperature Limit, (°C)
Molecular Sieve 5A	60/80, 80/100	350
Molecular Sieve 13X	60/80, 80/100	350
Tenax	35/60, 60/80, 80/100	350
Activated Charcoal	40/60	350
Activated Alumina	40/60, 80/100, 100/120	250
Silica Gel	40/60, 80/100, 100/120	200

Porous Polymers

Chromosorb™ "Century Series"

Name	Description	Temperature Limit, (°C)
Chromosorb 101	60/80, 80/100, 100/120	275
Chromosorb 102	60/80, 80/100, 100/120	250
Chromosorb 103	60/80, 80/100, 100/120	275
Chromosorb 105	60/80, 80/100, 100/120	250
Chromosorb 106	60/80, 80/100, 100/120	225
Chromosorb 107	60/80, 80/100, 100/120	225
Chromosorb 108	60/80, 80/100, 100/120	225
Porapak®		
Porapak-N	80/100	190
Porapak-P	80/100	250
Porapak-Q	80/100	250

Name	Description	Temperature Limit, (°C)
Porapak-QS	80/100	250
Porapak-R	80/100	250
Porapak-S	80/100	250
Porapak-T	80/100	190
HayeSep®		
HayeSep A	80/100	165
HayeSep B	80/100	195
HayeSep C	80/100	250
HayeSep D	80/100	290
HayeSep N	80/100	165
HayeSep P	80/100	250
HayeSep Q	80/100	275
HayeSep R	80/100	250
HayeSep S	80/100	250
HayeSep T	80/100	165
Ohio Valley Specialty Chemical Porasil™		
equivalent to durapak, poracil		
Carbowax 400/Porous-Sil C	80/100	200
N-Octane / Porous-Sil C	80/100	175
OPN/Porous-Sil C	80/100	150
C-18/Porous-Sil C	80/100	200
Phenyl Isocyanate / Porous-Sil C	80/100	60
Porous-Sil B 80/100	80/100	400
Porous-Sil C	80/100	400
Tenax	35/60, 60/80, 80/100	350

Stationary Phase Cross-References

GS-Tek	Phase Composition	Restek	Agilent	Supelco
GsBP-1 GsBP-1MS	100% dimethyl polysiloxane	Rxi-1ms, Rtx-1, Rtx-1MS	HP-1, HP-101, HP-1MS, Ultra-1, DB-1, DB-1MS, DB-1ht, SE-30	Equity-1, SPB-1, SP-2100, SPB-1 Sulfur, SE-30, MDN-1
GsBP-5 GsBP-5MS	95% dimethyl/ 5% diphenyl polysiloxane	Rxi-5ms, Rtx-5, Rtx-5MS	HP-5, HP-5MS, PAS-5, DB-5, DB-5.625, DB-5ht, SE-54	Equity-5, SPB-5, PTE-5, SE-54, SAC-5, PTE-5 QTM, MDN-5
GsBP-XLB	Proprietary phase	Rtx-XLB	DB-XLB	MDN-12
GsBP-35MS	65% dimethyl/ 35% diphenyl polysiloxane	Rtx-35, Rtx-35MS	HP-35, HP-35MS, DB-35	SPB-35, SPB-608, MDN-35
GsBP-50+MS	100% methyl phenyl polysiloxane	Rxi-50	HP-17, HP-50+	SPB-17
GsBP-1301	8% cyanopropylphenol/ 92% dimethyl polysiloxane	Rtx-1301	DB-1301	SPB-1301
GsBP-1701	14% cyanopropylphenol/ 86% dimethyl polysiloxane	Rtx-1701	HP-1701, PAS-1701, DB-1701	SPB-1701
GsBP-624, GsBP-VM5	Proprietary phase	Rtx-VRX Rtx-624, Rtx-VM5	HP-624, HP-VOC, DB-624, DB-502.2, DB-VRX	SPB-VOCCOL, SPB-624
GsBP-Inowax	Polyethylene glycol (PEG)	Stabilwax, Rtx-WAX	HP-20M, Inno Wax, DB-Wax, Carbowax 20M, HP Wax, DB-Waxetr	Supelcowax-10, Carbowax PEG 20M
GsBP-FFAP	Acid modified PEG	Stabilwax-DA	HP-FFAP, DB-FFAP, OV-351	Nukol, SP-1000
GsBP-PLOT Al2O3/ "KCl", "S", "M"	Aluminum oxide, modified with KCL, Na2SO4 or Na2MoO4	Rtx-Alumina	HP-PLOT Al2O3 "KCl", "S", "M"	Alumina Sulfate PLOT, Alumina Chloride PLOT
GsBP-PLOT MoleSieves 5A	Molecular Sieve zeolite, 5A	Rt-MSieve 5A	GS-Molesieve, HP-PLOT/Molesieve	Molesieve 5A
GsBP-PLOT Q	Crosslinked divinylbenzene polymer	Rt-QPLOT Rt-QSPLOT	HP-PLOT Q, GS-Q	Supel-Q PLOT
GsBP-PLOT U	Crosslinked divinylbenzene ethylene glycol dimethacrylate copolymer	Rt-UPLOT	HP-PLOT U	
GsBP-PLOT GasPro	Modified porous silica layer		GS-GasPro	
GsBP-PLOT Carbon	Activated Carbon		GS-Carbon PLOT	Carboxen-1006 PLOT

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Alltech	Macherey-Nagel	SGE	Varian/Chrom-pack	Phenomenex	Quadrex	USP
AT-1, SE-30, AT-1MS, EC-1	Optima 1, Optima-1ms	BP-1	VF-1MS, CP Sil 5 CB, CP Sil 5 CB MS, SolGel-1MS	ZB-1	007-1	G1, G2, G38
AT-5, SE-54, AT-5MS, EC-5	Optima 5, Optima-5ms	BP-5	VF-5MS, CP Sil 8 CB, CP Sil 8 CB MS	ZB-5	007-2	G27, G36
AT-35, AT-35MS, EC-35		BPX-35, BPX-608	VF-35MS	ZB-35	007-11	G42
AT-50, AT-50MS	Optima 17	BPX-50	VF-17MS, CP Sil 24 CB	ZB-50	007-17	G3
AT-1301	Optima 1301			ZB-1301		G43
AT-1701	Optima 1701	BP-10	CP Sil 19 CB	ZB-1701	007-1701	G46
AT-624			CP Sil 13 CB	OV-624	007-624, 007-502	G43
AT-Wax, Carbowax, AT-WAXMS	Permabond CW 20M, Optima WAX	BP-20	CP Wax 52 CB	ZB-WAX	007-CW	G14, G15, G16, G20, G39
AT-1000, FFAP	Permabond FFAP, Optima FFAP	BP-21	CP Wax 58 CB		007-FFAP	G25, G30
Alumina-PLOT			CP-Al ₂ O ₃ /Na ₂ SO ₄ , CP-Al ₂ O ₃ /KCl			
AT-Molesieve			CP-Molsieve 5A		PLT-5A	
AT-Q			CP-PoraPLOT Q, CP-PoroBond Q			
			CP-PoraPLOT U			
			CP-SilicaPLOT			
			CP-Carbon PLOT P7			

United States Pharmacopoeia (USP) GC Phases

USP Code	USP Composition	Equivalent GsBP Column
G1	Dimethylpolysiloxane, oil	GsBP-1, GsBP-1MS
G2	Dimethylpolysiloxane gum	GsBP-1, GsBP-1MS
G3	50% phenyl, 50% methylpolysiloxane	GsBP-50+ MS
G5	3-cyanopropylmethylpolysiloxane	GsBP-23
G7	50% 3-cyanopropyl-50% phenylmethylsiloxane	GsBP-225
G8	80% Bis(3-cyanopropyl)20% 3-cyanopropylphenylpolysiloxane or 90% 3-cyanopropyl 10% phenylmethylsiloxane	GsbP-FAME
G14	Polyethylene glycol, average MW 950--1,050	GsBP-InoWax
G15	Polyethylene glycol, average MW 3,000--3,700	GsBP-Inowax, GsBP-CarboWax20M
G16	Polyethylene glycol, average MW 15,000 GsBP-InoWax	GsBP-CarboWax20M
G17	75% phenyl 25% methylpolysiloxane	GsBP-50+ MS
G20	Polyethylene glycol, average MW 380-420	GsBP-InoWax
G25	Polyethylene glycol, TPA (Carbowax 20M, Terephthalic acid)	GsBP-FFAP
G27	5% phenyl 95% methylpolysiloxane	GsBP-5, GsBP-5MS
G28	25% phenyl 75% methylpolysiloxane	GsBP-35MS
G32	20% phenylmethyl 80% Dimethylpolysiloxane	GsBP-35MS
G35	Polyethylene glycol & diepoxide esterified with nitroterephthalic acid	GsBP-FFAP
G36	1% vinyl 5% phenylmethylpolysiloxane	GsBP-5, GsBP-5MS
G38	Phase G1 plus tailing inhibitor	GsBP-1, GsBP-1MS
G39	Polyethylene glycol average MW 1500	GsBP-InoWax
G41	Phenylmethyldimethylsilicone (10% phenyl substituted)	GsBP-5MS
G42	35% diphenyl 65% Dimethylvinylsiloxane	GsBP-35MS
G43	6% Cyanopropylphenyl-94% dimethylpolysiloxane	GsBP-1301
G45	Divinylbenzene ethylene glycol dimethacrylate	GsBP-PLOT U
G46	14% Cyanopropylphenyl-86% methylpolysiloxane	GsBP-1701

Application Focus and Solution Provider

Based on its strength and expertise in gas chromatographic separations and column technologies, GS-Tek offers a variety of solution-base products to serve customers in specific industry applications.

PONA Software Package

PONA Software Package is a DOS version software that work and is portable for any PC operation system. It has an interface with HP Chemstation to read Chemstation .D files. Based on internal calibration, standard retention data and the retention times from PONA columns (both 50m and 100m version), it automatically identifies 75-90% of 300 to 600 peaks from a gasoline sample. Once peaks are identified, the software calculates physical properties and Iso-octane values of a gasoline sample and generates printable reports as QC record. The following is an example of FCC gasoline sample results on a GsBP-PONA, 50m x 0.20mm x 0.5um (9002-PONA).

Example of FCC Gasoline Sample on GsBP-PONA column

Column	GsBP-PONA
Number of peaks identified by the software	300
Calculated RON	87.26
Calculated MON	78.18
C:H	7.33
Specific density	0.8064

Table 1 Overview of Phase

Types	Wt%	V%
P (Normal Paraffin)	3.29	3.68
I (Iso Paraffin)	25.81	28.37
O (Olefin)	9.14	10.08
N (Naphtha)	15.74	16.20
A (Aromatic)	46.02	41.67

PONA Software Ordering Info

Description	P/N
PONA DOS version Software	9003-PONA-100m
	9001-PONA-50m
	9002-PONA, 50m x 0.20mm x 0.5um
Column	9006-PONA, 100m x 0.25mm x 0.5um
Gasoline standard	9005-PONA

NGA Software Package

Similar to our PONA software, NGA software package is also a DOS version package for natural gas analysis. It reads HP-Chemstation data files from an analysis based on our configuration. It calculates all physical properties of a natural gas sample, such as BTU, dew point, specific density, and others.

NGA Package Ordering Info

Description	P/N
NGA software	9005-NGA
Configuration of columns	9007-NGA-Col
Valves	9007-NGA-Valves

High Temperature Sim-Dis Package

The HT Sim-Dis package includes software, calibration standard, and column and supply kit for Sim-Dis analysis. It analyzes compounds and generates boiling point plot up to 700C.



HT Sim-Dis Package Ordering Info

Description	P/N
Sim-Dis package	9007-SIMDIS
Calibration standard	9007-SIMDIS-Std
One year supply kit	9007-SIMDIS-kit

Analyzers

GS-Tek offers industry focused analyzers listed in the following:

- * Natural gas analyzer (NGA, C1 to C12)
- * Fast Refinery gas analyzer (FRGA, C1 to C6)
- * Detail Hydrocarbon Analysis (DHA, C1 to C12)
- * Trace level sulfur analyzer (TLSA)
- * Gasoline analyzer (D2887, D2887X, D7169)
- * Oxygenates in Gasoline

Please contact GS-Tek for details and order info.



Instrument Components

GS-Tek offers spare/repair instrument components for various brand names, such as Agilent 6890, HP-5890 GCs, Thermo Focus and Trace, and others.

Common parts include: injector, detector and jet, sensor and heater, fan, electronics, valve, sampling valves, gas sampling system.

Please contact GS-Tek for details and order info.



Separation Services

GS-Tek provides professional service for separation and analysis consultation on a project base. Such services include:

- Instrument configuration
- Sample preparation for analysis
- Columns and method
- Data analysis and software
- Contracting installation or maintenance on-site
- On-site training

Please contact GS-Tek for details and order info.

Column Selection Guideline

A column is of course, the starting and central piece of a chromatograph. An appropriately selected column can produce a good chromatographic separation which provides an accurate and reliable analysis. An improperly used column can often generate confusing, inadequate, and poor separations which can lead to results that are invalid or complex to interpret.

There are over 10,000 compounds that can be analyzed by GC and over 400 GC capillary columns. It is a challenge for a column manufacturer to give detailed column selection guidelines to meet such a wide variety of applications. In spite of this challenge, we would like to offer our many years experience and expertise to help you choose the proper column for your application.

Column Characteristics

A column is characterized by its stationary phase and dimensions: column ID, length, and film thickness (or more precisely, phase ratio). All of these variables directly affect separation to different degrees in elution order, retention time, peak resolution, and peak shape/height. Additionally, column performance is largely characterized by column inertness, plate numbers and column bleed in a chromatographic application. Therefore, indirectly or directly impacting how accurate and reliable the analysis performs. Among these variables, stationary phase is the most influential and effective variable that leads to a good separation on a properly maintained column.

Stationary phase

When selecting a column, first determine the samples characteristics to match the columns stationary phase. Stationary phases are in general divided into 3 categories: 1) non-polar, 2) mid-polar and 3) polar. Stationary phases are further categorized by siloxane (non-polar and mid-polar) and polyethylene glycol (PEG or polar), based on the stationary chemical composition and WCOT (Gas-liquid partition chromatograph) and PLOT (Gas Solid absorption chromatograph) based on the separation mechanisms. Table I lists the common stationary phases.

	Separated compounds	Comment
Non-Polar phases		
GsBP-1, GsBP-5, GsBP-1MS, GsBP-5MS	Most compounds, elution order by boiling point order, primary C-C or C-H bonds compounds	Different elution orders of polar or polarized compounds, such as alcohol, from polar columns
Mid-polar phase		
GsBP-35, GsBP-50, GsBP-1301, GsBP-1701, GsBP-624	Most polar C-C or C-H bond compounds containing Br, Cl, F, N, O, P, S atoms.	Improved separation of polar compounds from non-polar compounds over non-polar columns
Polar phase		
GsBP-Inowax, GsBP-FFAP, GsBP-Carbowax	Most polar C-H or polarized compounds, such as aromatic rings	Different elution orders of polar compounds from non-polar/mid-polar columns
PLOTs		
Al2O3	Light hydrocarbons C1 to C6/C10, alkanes, alkenes, alkynes and benzene rings, or C-Halogenic bonded gases	Improved separations over non-polar columns
Molesieve	Fixed gas separation: H2, noble gases, sulfur gases, nitrous gases, oxygen, nitrogen, SF6, methane, ethane and ethylene, CO	Just gaseous state compounds below ambient temperatures
Porous Polymers	Light hydrocarbons C1 to C3/C6, CO2, CO, water, C1 to C4 alcohols, acids, amines, sulfurs, C1 to C3	Very versatile separations with not satisfactory resolution, inertness issues
PLOT Q, U, GasPro	Light sulfur compounds, CFCs, from light hydrocarbons	Elution order interference with hydrocarbons

The commonly used separation principle associated with stationary phases is: non-polar columns retain non-polar compounds and polar columns retain polar compounds. However, this principle can be improperly cited leading to the use of improper columns. Most complex and difficult samples to analyze contain non-polar and polar compounds for example gasoline blended with denatured ethanol.

Over the past few decades, statistics of GC applications shows a popularity of non-polar phase columns compared to polar or mid-polar phase columns. Typically, non-polar columns, such as the 5MS column, can capture over 50% of applications and analyses. While polar or mid-polar columns e.g. PEG phase columns may capture about 25% of applications. There is an increasing trend of non-polar columns to be used for volatile chemicals including solvents and drugs.

As a general rule, non-polar columns should be selected first, and polar columns should be used for less complicated samples (less varied in chemical structure). For separation confirmation purposes, polar and non-polar stationary phase columns should be used for the same sample.

Table II lists the stationary phase recommendations for some compound separations

Sample Compounds of Interest	Recommended stationary phases	Comment
Air pollution	GsBP-1, GsBP-GasPro, GsBP-PLOT Q, GsBP-5	
Alcohol as major compounds	GsBP-1 or GsBP-5,	Good separation in C1 to C3 alcohols
Alcohols	GsBP-Inowax, Carbowax, FFAP	Limited separation of ethanol with isopropyl alcohol
Anesthetic gas or breath gas	GsBP-GasPro GsBP-5MS	

Sample Compounds of Interest	Recommended stationary phases	Comment
Aromatics	GsBP-Inowax / FFAP, GsBP-AL2O3 PLOT	
Biodiesel	GsBP-Inowax, GsBP-5MS, GsBP-624	
Dioxines	GsBP-5MS	Some critical separation issues
Drug abuse	GsBP-5, GsBP-Inowax, GsBP-1	
Drugs, natural product extract	GsBP-5, GsBP-1, GsBP-50MS	
FAMEs	GsBP-5MS, GsBP-Inowax, GsBP-624	Limited separations of isomers in C22-C24s. lifetime issues
Food preserve additives	GsBP-5, GsBP-FFAP	
Gasoline	GsBP-1, GsBP-Inowax	DHA or oxygenates
Life science research	GsBP-5MS, GsBP-FFAP	Metabolism study
PCBs, PBDEs	GsBP-5MS	Some congener separation resolution issue
Pesticides	GsBP-5MS GsBP-1701	
Petroleum streams	GsBP-AL2O3 PLOT, GsBP-5, GsBP-1	
Volatiles	GsBP-5, GsBP-1, GsBP-624	Co-elution or limited resolution issue for some volatiles
Water analysis, Volatiles	GsBP-624, GsBP-5	
Wine/Liquor	GsBP-FFAP, GsBP-Inowax, GsBP-1	

Stationary phase selection should also include the instrument/instrumentation conditions, such as the detector, carrier gas, and sample size. If both selection and detection are not main concerns, a stationary phase with low response to the detector should be used. For example, a cyano phase such as a 1301, 1701, 624, or fame column should not be used on a GC-NPD. A lower bleed column phase such as -1MS or -5MS should be used as much as possible to minimize the effect of a baseline rise on low detection limit. If the purity of the carrier gas is in question or the instrument has gas leaking issues, high temperature limit stationary phase should be considered first to minimize early phase damage. Finally, unless necessary, the bonded phase should always be used over non-bonded and non-crosslinked phases to avoid column performance degradation caused by the sample and the sample size.

When the separation or the peak identification is very complex, a non-polar phase column should be used as often as possible; the elution order on this type column is relatively simpler than the elution order on a polar phase column.

Finally, for applications that require validation, both polar and non-polar phase columns should be used to confirm peak identification or verify separation. Common pairs of columns are -5MS and -1701 or -35 for pesticides, --5MS and -624 or -VMS for residue solvents, PEG and Cyano phase for alcohol separations, and FAME analysis, -1, and PEG for oxygenates in gasoline.

Column ID

Column Internal Diameters (ID) standard sizes are 0.20mm, 0.25mm, 0.32mm, and 0.53mm. Less popular IDs are 0.1mm and 0.8mm. 0.25mm. ID columns are often referred to as capillary columns and are able to separate many critical compounds, while 0.53mm columns are referred as replacements of packed columns for large sample size applications.

Column ID plays two contradicting roles in separation. With decreasing column ID, there are increased plate numbers (increased efficiency) and decreased sample loading capacities. When a column is overloaded with sample, the plate number is decreased greatly. Often times we have to make compromises. In most cases, there is no optimum column ID for an application.

As a general rule, a column with a larger column ID (e.g., 0.53mm ID) should be used for trace level impurity analysis or used with the Head Space (HS) application. If the separation needs to be improved or a critical separation needed, a column with a smaller column ID (0.25mm or 0.20mm) should be used. Each industry or demography has its own preference or internal standard of column ID. A column with a 0.32mm column ID is a popular choice because of its compromise in sample loading capacity and efficiency.

Columns with a 0.25mm column ID have become very popular in modern GC applications. The 0.25mm column ID has been estimated to account for over 50% of applications. It provides an excellent balance in separation efficiency and sample loading capacity. It is used widely in the environmental, food, and legal industries. In most cases, 0.25mm columns exhibit synergies of MS columns and are suitable for most GC-MS applications.

Columns with smaller column IDs such as 0.10mm and 0.20mm often are used for fast separations. Additionally, they can improve analysis by the column features relating to column inertness, efficiency, and column bleed. Relatively speaking, columns with 0.32mm and 0.53mm column IDs are more inert than columns with 0.20mm and 0.25mm column IDs. Whenever there is a need for column inertness, columns with larger column IDs should be considered. When the instrument is limited in inlet pressure control, columns with larger column IDs are the first choice. When the column carrier gas quality is in question or instrument condition is poorly kept, columns with larger column IDs (0.32mm or 0.53mm) should be considered to prolong the column lifetime. When the column bleed is a concern, columns with smaller column IDs along with columns that have thin film thicknesses should be used.

Column Length

Column length increases retention times (analysis time) and, to a lesser degree, separation efficiency (by doubling plate number). Industry standardized lengths are 5m, 7.5m, 10m, 12.5m, 15m, 25m, 30m, 50m, 60m, 75, 100m, and 105m. The most popular column length is 30m.

For fast analysis, it is necessary that the column have a proper column ID and short column length (e.g. 5—15m x 0.25mm). With these specs, it is very possible to

generate excellent separation and results with adequate analysis times.

When there is a need to improve a separation by increasing resolution, longer length columns, such as 60m or 100m, can be used. The resolution is improved by the square root of the length; a 60m column only increases the resolution by 40% over a 30m column, while the analysis time is doubled.

Columns with longer lengths like 50m, 60m and 100m columns are often used for volatile applications in attempting to improve separations. This becomes prevailing in gaseous sample applications or detailed hydrocarbon analysis.

Columns with longer lengths often have issues with column inertness, column bleed, and column efficiency. These columns also require high carrier gas pressures or different carrier gases altogether (varying from nitrogen to hydrogen/helium).

Film Thickness

Industry standardized film thicknesses are 0.1 μ m, 0.15 μ m, 0.25 μ m, 0.5 μ m, 1.0 μ m, 1.5 μ m, 3 μ m, 5 μ m. Some odd film thicknesses such as 0.33 μ m, 0.88 μ m, 2.65 μ m are historical convention. 0.25 μ m, 0.5 μ m and 1 μ m film thickness are the most popular ones.

Film thickness plays two roles, increasing the retention time, and increasing the sample loading capacity. Film thickness also affects the column operation temperature, analysis time, and result accuracy/reliability. A column with thin film thickness such as 0.25mm x 0.1 μ m gives a very fast separation, and sometimes may increase separation resolution, and decrease the column bleed at very high operation temperatures. Sometimes column inertness also becomes a noticeable issue. Column sample loading capacity can also be decreased greatly, weakening the benefits of a quicker and improved resolution.

0.25mm x 0.25mm ID, 0.5mm x 0.32mm ID, 1mm or 1.5mm x 0.53mm ID columns often give a better balance in separations and analyses requiring retention, resolution, separation, inertness, and column bleed.

Film thickness is related to column ID by the phase ratio (β). On two columns of the same phase ratio and the same stationary phase, but different IDs, the separation or retentions would be the same or similar under the same temperature conditions. For an example, 0.25mm x 30m x 0.25 μ m GsBP-5MS (β =250) will have similar retention times and separations to a 0.53mm x 30m x 0.5 μ m column (β =265). Hence, this provides an alternate solution to a column that is not readily available.

Customer-made columns

When you cannot find an existing column that meets your needs, you may inquire about a customer-made column. Except for the column's stationary phase, all column dimensions (column ID, length, and film thickness) can be specifically designed by you or with our collaboration. Additionally, two columns can be connected or a guard column to an analytical column. For details, please contact us.

Sample Characteristics

The sample used for analysis is an important factor in column selections. A sample can be characterized in many ways. The following table lists a few general guidelines.

Physical property	ID (mm)	Length (M)	Film thickness, (μ m)	Comment
Solid	0.53	30		
Liquid	Any			
Gas	0.53	30, 60	1.5 to 5	
Clean sample after preparation	0.25, 0.32	30	0.25	
Dirty sample or raw sample	0.53, 0.32	30	0.25 to 1.5	Guard column, 0.53mm ID
High boiling point compound	0.25, 0.32 and 0.53	15, 30	0.1, 0.25	Guard column, 0.53mm ID
Complicate sample, non-polar/polar compounds	0.20, 0.25	15 30, 60, 100	0.1, 0.25	
Unstable or reactive compounds, such as TNT	0.25, 0.53	5, 10, 15	0.1, 0.25, 1	
Aqueous sample	0.25, 0.53	15, 30, 60	1, 1.5, 3	Guard column

Conventional Wisdom for Column Selection

- Make use of any available information on methods, regulations, and experimental results, that can be acquired from public domains and column manufacturers
- Know your sample and your application requirements
- Start with a simple column such as a non-polar phase 30m standard length and 0.25mm column ID
- Most known separations can be achieved, either completely or partially, with any popular columns
- If having trouble, use a trial and error approach and collaborate with the column manufacturer to save time and money
- Accumulate your experience and knowledge and share it with others.
- Optimization of separations including column separation is not an easy process, as variation from brand names and batches affect separation. So, keep in mind there is no perfect fit.
- There are differences between various GC name brands which yield varying results, such as elution order, separation/resolution, number of peaks, and often result accuracy.

ASTM Methods

ASTM Designation	Testing Method	Method Title	GS-Tek Column Recommendations	P/N
D 1945	GC	Standard test method for the analysis of natural gas	GsBP-PLOT MoleSieve, 15m x 0.53mm x 50um GsBP-PLOT Q, 15m x 0.53mm x 30um	8453-1550 8653-1530
D 1946	GC	Standard test method for the analysis of reformed gas	GsBP-PLOT MoleSieve, 15m x 0.53mm x 50um GsBP-PLOT Q, 15m x 0.53mm x 30um	8453-1550 8653-1530
D 1983	GLC of methyl ether	Standard test method for the analysis of fatty acid compositions	GsBP-InoWax, 30m x 0.25mm x 0.25um	2025-3002
D 2163	GC	Standard test method for the analysis of liquified petroleum gases and propene concentration	GsBP-PLOT Al2O3 KCl, 30m x 0.53mm GsBP-PLOT Al2O3 Na2SO4, 30m x 0.53mm	8153-3015 8253-3015
D 2268	Capillary GC	Standard test method for the analysis of high purity n-heptane and iso-octane	GsBP-1, 60m x 0.25mm x 0.50um	0125-6005
D 2306	GC	Standard test method for C8 aromatic hydrocarbons	GsBP-InoWax, 60m x 0.25mm x 0.25um	2025-6002
D 2426	GC	Standard test method for the butadiene dimer and styrene in butadiene concentration	GsBP-1, 30m x 0.53mm x 5.0um	0153-3050
D 2427	GC	Standard test method for determination of C2 through C5 hydrocarbons in gasoline	GsBP-1, 30m x 0.53mm x 5.0um GsBP-PLOT Al2O3 M, 30m x 0.53mm	0153-3050 8353-3015
D 2504	GC	Standard test method for non-condensable gases in C2 and for lighter hydrocarbon products	GsBP-PLOT MoleSieve, 30m x 0.53mm x 50um	8453-3050
D 2505	GC	Standard test method for other hydrocarbons and carbon dioxide in high-purity ethylene	GsBP-PLOT GasPro, 60m x 0.32mm	8532-6005
D 2593	GC	Standard test method for butadiene purity and hydrocarbon impurities	GsBP-PLOT Al2O3 M, 30m x 0.53mm	8353-3015
D 2712	GC	Standard test method for hydrocarbon traces in concentrated propylene	GsBP-PLOT Al2O3 M, 50m x 0.53mm	8353-5015
D 2804	GC	Standard test method for the purity of methyl ethyl ketone	GsBP-InoWax, 30m x 0.53mm x 1.0um	2053-3010
Extended D 2887	GC	Standard test method for analysis of the boiling range distribution of petroleum fractions to C60	GsBP-1, 10m x 0.53mm x 0.88um GsBP-1, 5m x 0.53mm x 0.88um	0153-1008 0153-0508
D 2908	Aqueous-injection GC	Standard practice for measuring volatile organic matter in water	Contact GS-Tek for recommended VOC columns	
D 3054	GC	Standard test method for analysis of cyclohexane	GsBP-1, 60m x 0.32mm x 0.50um	0132-6005
D 3257	GC	Standard test method for the analysis of aromatics in mineral spirits	GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
D 3329	GC	Standard test method for the purity of methyl isobutyl ketone	GsBP-InoWax, 30m x 0.53mm x 1.0um GsBP-624, 30m x 0.53mm x 3.0um	2053-3010 6253-3030
D 3432	GC	Standard test method for the analysis of unreacted toluene diisocyanates in urethane prepolymers and coating solutions	GsBP-1MS, 30m x 0.32mm x 1.00um	1132-3010
D 3447	GC	Standard test method for the purity of halogenated organic solvents	GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
D 3534		Standard test method for the analysis of PCB's in water	GsBP-1MS, 30m x 0.32mm x 1.00um	1132-3010
D 3545	GC	Standard test method for the analysis of alcohol content and the purity of acetate esters	GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
D 3687	The activated charcoal tube adsorption method	Standard practice for the analysis of collected organic vapors	GsBP-InoWax, 30m x 0.53mm x 1.0um	2053-3010
D 3695	Direct aqueous injection GC	Standard test method for the analysis of volatile alcohols in water	GsBP-InoWax, 30m x 0.53mm x 1.0um	2053-3010
D 3760	GC	Standard test method for the analysis of isopropylbenzene (Cumene)	GsBP-InoWax, 60m x 0.32mm x 0.25um (Column A) GsBP-1, 50m x 0.32mm x 0.52um (ColumnB)	2032-6002 0132-5005
D 3797	GC	Standard test method for the analysis of o-xylene	GsBP-InoWax, 60m x 0.32mm x 0.50um	2032-6005

ASTM Designation	Testing Method	Method Title	GS-Tek Column Recommendations	P/N
D 3798	GC	Standard test method for the analysis of p-xylene	GsBP-InoWax, 60m x 0.32mm x 0.50um	2032-6005
D 3871	Headspace sampling	Standard test method for the analysis of purgeable organic compounds in water	GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
D 3893	GC	Standard test method for the purity of methyl amyl ketone and methyl isoamyl ketone	GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
D 3973		Standard test method for the analysis of hydrocarbons with low molecular weights in water	GsBP-1, 30m x 0.53mm x 2.65um	0153-3026
D 4415		Standard test method for the determination of dimers in acrylic acid	GsBP-FFAP, 30m x 0.32mm x 0.25um	2132-3002
D 4424	GC	Standard test method for butylene analyses	GsBP-PLOT Al2O3 "S", 50m x 0.53mm	8253-5015
D 4443	Headspace GC	Standard test method for the residual vinyl chloride monomer content in PPB in vinyl chloride homo- and co-polymers	GsBP-1, 30m x 0.53mm x 2.65um	0153-3026
D 4864	GC	Standard test method for the determination of traces of methanol in propylene concentrates	GsBP-InoWax, 30m x 0.53mm x 1.0um GsBP-PLOT Q, 30m x 0.53mm x 30um	2053-3010 8653-3030
D 4947		Standard test method for the analysis of chlordane and heptachlor residues in indoor air	GsBP-5, 30m x 0.53mm x 1.5um	0553-3015
D 4961	GC	Standard test method for the analysis of major organic impurities in phenol produced by the cumene process	GsBP-PLOT Q, 15m x 0.53mm x 30um (Method B)	8653-1530
D 4983	Direct aqueous injection GC	Standard test method for the analysis of cyclohexylamine, morpholine, and diethylaminoethanol in water and condensed steam	GsBP-5MS, 30m x 0.32mm x 1.00um	1532-3010
D 5008	GC	Standard test method for ethyl methyl pentonal content and the purity value of 2-ethylhexanol	GsBP-1, 15m x 0.53mm x 5.0um GsBP-InoWax, 30m x 0.32mm x 0.25um	0153-1550 2032-3002
D 5060	GC	Standard test method for determining the impurities in high-purity ethylbenzene	GsBP-InoWax, 60m x 0.32mm x 0.5um	2032-6005
D 5075	GC	Standard test method for the analysis of nicotine in indoor air	GsBP-5, 30m x 0.53mm x 1.5um GsBP-5, 30m x 0.32mm x 1.0um	0553-3015 0532-3010
D 5135	Capillary GC	Standard test method for the analysis of sryreme	GsBP-InoWax, 60m x 0.32mm x 0.5um	2032-6005
D 5303	GC	Standard test method for the analysis of carbonyl sulfide in propylene	GsBP-PLOT GasPro, 30m x 0.32mm	8532-3005
D 5307	GC	Standard test method the determination of the boiling range distribution of crude petroleum	GsBP-1, 7.5m x 0.53mm x 5.0um	0153-0750
D 5310	Capillary GC	Standard test method for the analysis of tar acid composition	GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
D 5316	Microextraction and GC	Standard test method for 1, 2-dibromoethane and 1,2-dibromo-3-chloropropane in water	GsBP-1MS, 30m x 0.32mm x 1.00um (Column B) GsBP-PLOT Q, 30m x 0.53mm x 30um	1132-3010 8653-3030
D 5317	GC with an electron capture detector	Standard test method for the determination of chlorinated organic acid compounds in water	GsBP-5MS, 30m x 0.25mm x 0.25um (Column 1) GsBP-1701, 30m x 0.25mm x 0.25um (Column 2) GsBP-35MS, 30m x 0.25mm x 0.25um	1525-3002 6125-3002 3525-3002
D 5320		Standard test method for the determination of 1,1-trichloroethane and methylene chloride in stabilized trichloroethylene and tetrachloroethylene	GsBP-1, 30m x 0.53mm x 3.0um GsBP-624, 30m x 0.32mm x 1.8um	0153-3030 6232-3018
D 5441	GC	Standard test method for the analysis of methyl tert-butyl ether (MTBE)	GsBP-PLOT Q, 30m x 0.53mm	8653-3030
D 5442	GC	Standard test method for the analysis of petroleum waxes	GsBP-5, 15m x 0.25mm x 0.25um	0525-1502

ASTM Designation	Testing Method	Method Title	GS-Tek Column Recommendations	P/N
D 5475	GC with a nitrogen phosphorus detector	Standard test method for the analysis of nitrogen and phosphorus-containing pesticides in water	GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
			GsBP-35MS, 30m x 0.25mm x 0.25um	3525-3002
			GsBP-1701, 30m x 0.25mm x 0.25um	6125-3002
D 5501	GC	Standard test method for the determination of ethanol content in denatured fuel ethanol	GsBP-1, 100m x 0.25mm x 0.50um	0125-A005
D 5507	Capillary column/ multi-dimensional GC	Standard test method for the determination of trace organic impurities in monomer grade vinyl chloride	GsBP-PLOT Q, 15m x 0.53mm	8653-1530
			GsBP-PLOT U, 30m x 0.53mm	8753-3020
D 5508	Headspace-capillary GC	Standard test method for the determination of residual acrylonitrile monomers in styrene-acrylonitrile co-polymer resins and nitrile-butadiene rubbers	GsBP-PLOT Q, 30m x 0.53mm	8653-3030
D 5580	GC	Standard test method for the determination of benzene, toluene, ethylbenzene, p/m-xylene, C9, and heavier aromatics, and total aromatics in finished gasoline	GsBP-1, 30m x 0.53 mm x 5.0um	0153-3050
D 5599	GC and oxygen selective flame ionization detection	Standard test method for the determination of oxygenates in gasoline	GsBP-1, 60m x 0.25mm x 1.0um	0125-6010
D 5623	GC and sulfur selective detection	Standard test method for analysis of sulfur compounds in light petroleum liquids	GsBP-1, 30m x 0.32mm x 4.0um	0132-3040
D 5739	GC and positive ion electron impact low resolution mass spectrometry	Standard practice for oil spill source identification	GsBP-5, 30m x 0.25mm x 0.25um	0525-3002
D 5769	GC/MS	Standard test method for the determination of benzene, toluene, and total aromatics in finished gasoline	GsBP-1, 60m x 0.25mm x 1.0um	0125-6010
D 5790	Capillary column GC/MS	Standard practice for the measurement of purgeable organic compounds in water		
D 5812	Capillary column GC	Standard test method the determination of organochlorine pesticides in water	GsBP-5MS, 30m x 0.25mm x 0.25um	1525-3002
			GsBP-35MS, 30m x 0.25mm x 0.25um	3525-3002
			GsBP-1701, 30m x 0.25mm x 0.25um	6125-3002
D 5917	GC and external calibration	Standard test method for the analysis of trace impurities in monocyclic aromatic hydrocarbons	GsBP-InoWax, 60m x 0.32mm x 0.25um	2032-6002
D 5986	GC/FTIR	Standard test method for the determination of oxygenates benzene, toluene, C8-C12 aromatics, and total aromatics in finished gasoline	GsBP-1, 60m x 0.53mm x 5.0um	0153-6050
D 6144	Capillary GC	Standard test method for the analysis of trace impurities in alpha-methylstyrene	GsBP-1, 60m x 0.25mm x 1.0um	0125-6010
D 6159	GC	Standard test method for the determination of hydrocarbon impurities in ethylene	GsBP-PLOT Al2O3/KCl, 50m x 0.53mm (Column 1)	8153-5015
			GsBP-PLOT Al2O3 M, 50m x 0.53mm (Column 1)	8353-5015
			GsBP-1, 30m x 0.53mm x 5.0um (Column 2)	0153-3050
D 6160	GC	Standard test method for the determination of PCB's in waste materials	GsBP-5MS, 30m x 0.32mm x 0.25um	1532-3002
D 2360	GC	Standard test method for the analysis of trace impurities in monocyclic aromatic hydrocarbons	GsBP-InoWax, 60m x 0.32mm x 0.25um	2032-6002
E 1616	GC	Standard test method for the analysis of acetic anhydride	GsBP-1, 50m x 0.32mm x 0.52um	0132-5005
E 1863	GC	Standard test method for the analysis of acrylonitrile	GsBP-InoWax, 30m x 0.32mm x 1.0um	2032-3010
			GsBP-PLOT Q, 30m x 0.32mm x 15.0um	8632-3015
E 202		Standard test method for the analysis of ethylene glycols and propylene glycols	GsBP-624, 30m x 0.53mm x 3.0um	6253-3030
E 475	GC	Standard test method for the assay of di-tert-butyl peroxide	GsBP-5, 30m x 0.53mm x 5.0um	0553-3050

Environmental/EPA Methods

Analyte Type	Common Sample Preparation	Sample Matrix	Detector Type	EPA Method Reference	GS-Tek Column Recommendations (P/N)
Semivolatiles					
Benzidines	Liquid extraction	Waste water	MSD	605, 8270	GsBP-5MS, 30m x 0.25mm x 0.25um (1525-3002) GsBP-5MS, 30m x 0.25mm x 0.5um (1525-3005) GsBP-5, 30m x 0.53mm x 1.5um (0553-3015)
Chlorinated Disinfection Byproducts	Liquid extraction derivatization	Drinking water	ECD	551, 551.1A	GsBP-5MS, 30m x 0.25mm x 1.0um (1525-3010) GsBP-1MS, 30m x 0.25mm x 1.0um (1125-3010)
Chlorinated Hydrocarbons	Liquid extraction sonication, solvent extraction, SPE	Waste water solid waste	ECD	612, 8120, 8121	GsBP-5MS, 30m x 0.32mm x 0.5um (1532-3005) GsBP-1MS, 30m x 0.32mm x 0.5um (1132-3005)
Halogenated Acetic Acids	Liquid extraction derivatization	Drinking water	ECD	552, 552.1, 552.2	GsBP-35MS, 30m x 0.32mm x 0.25um (3532-3002)
Nitroaromatics and Isophorone	Liquid extraction sonication, solvent extraction, SPE	Waste water, solid waste	ECD, FID	609, 8090	GsBP-5MS, 30m x 0.25mm x 0.25um (1525-3002) GsBP-5, 30m x 0.53mm x 1.5um (0553-3015)
Nitrosamines	Liquid extraction sonication, solvent extraction, SPE	Waste water, solid waste	NPD	607, 8070	GsBP-5MS, 30m x 0.25mm x 0.25um (1525-3002) GsBP-5, 30m x 0.53mm x 1.5um (0553-3015)
Phenols	Liquid extraction sonication, solvent extraction, derivatization	Waste water, solid waste	ECD, FID	528, 604, 8040, 8041	GsBP-5MS, 30m x 0.25mm x 0.25um (1525-3002) GsBP-5, 30m x 0.53mm x 1.5um (0553-3015)
Phthalate Esters	Liquid extraction sonication, solvent extraction, SPE	Drinking water, waste water, solid waste	ECD, FID	506, 606, 8060, 8061	GsBP-5MS, 30m x 0.25mm x 0.25um (1525-3002) GsBP-5, 30m x 0.53mm x 1.5um (0553-3015)
Polynuclear Aromatic Hydrocarbons (PAHs)	Liquid extraction sonication, solvent extraction, SPE	Waste water solid waste	FID	610, 8100	GsBP-5MS, 30m x 0.25mm x 0.25um (1525-3002) GsBP-5MS, 30m x 0.32mm x 0.25um (1532-3002) GsBP-1MS, 30m x 0.25mm x 0.25um (1125-3002)
Volatiles	Purge/Trap, SPE	Water, Air/ Solid wastes, Solid	MSD	EPA 8260	GsBP-VMS, 60m x 0.25mm x 1.4um (6425-6014) GsBP-1MS, 30m x 0.25mm x 1.0um (1125-3010)
Semivolatile Organic Compounds	Liquid extraction sonication, solvent extraction, SPE	Drinking water, waste water, solid waste	MSD	525, 625, 8270	GsBP-5MS, 30m x 0.25mm x 0.5um (1525-3005)
Volatiles					
Acrylonitrile and Acrolein	Purge and trap, liquid extraction, sonication	Waste water, solid waste	FID, NPD	603, 8015, 8031	GsBP-624, 30m x 0.53mm x 3um (6253-3030)
EDB and DBCP	Microextraction with Hexane	Drinking water, solid waste	ECD	504.1, 8011	GsBP-VMS, 60m x 0.25mm x 1.4um, (6425-6014) GsBP-624, 30m x 0.53mm x 3um (6253-3030)
Purgeable Aromatic Organics	Purge and headspace for screening	Drinking water, tap water, waste water, solid waste	PID	503 .1, 602, 8020	GsBP-624, 30m x 0.53mm x 3um (6253-3030) GsBP-624, 30m x 0.25mm x 1.4um(6225-3014)
Purgeable Halogenated Organics	Purge and trap headspace for screening	waste water, solid waste	PID, ELCD	601, 8010	GsBP-VMS, 60m x 0.25mm x 1.4um (6425-6014) GsBP-624, 75m x 0.53mm x 3um (6253-7530)
Trihalomethanes	Purge and trap, direct injection, headspace	Drinking water	ELCD, ECD	501	GsBP-624, 30m x 0.53mm x 3um (6253-3030) GsBP-VMS, 60m x 0.25mm x 1.4um (6425-6014)
Volatile Organic Compounds (VOCs)	Purge and trap, direct injection, headspace	Drinking water, waste water, solid waste	PID, ELCD	502.2, 8021, CLP-Volatiles	GsBP-502.2 105m x 0.53mm x 3.0um (6353-A530) GsBP-624, 75m x 0.53mm x 3um (6253-7530)

Analyte Type	Common Sample Preparation	Sample Matrix	Detector Type	EPA Method Reference	GS-Tek Column Recommendations (P/N)
Volatile Organic Compounds (VOCs) using 5973 MSD	Purge and trap, direct injection, headspace	Drinking water, waste water, solid waste	MSD (5973)	524.2, 624, 82, 408, 260, CLP-VOCs	GsBP-VMS, 20m x 0.18mm x 1.0um (6418-2010) GsBP-624, 25m x 0.20mm x 1.12um (6220-2510)
Volatile Organic Compounds (VOCs) using MSD	Purge and trap, direct injection, headspace	Drinking water, waste water, solid waste	MSD	524.2, 624, 82, 408, 260, CLP-VOCs	GsBP-VMS, 60m x 0.25mm x 1.4um (6425-6014) GsBP-624, 60m x 0.32mm x 1.8um (6232-6018)
Pesticides, Herbicides and PCBs					
N- and P- Containing Pesticides and Herbicides	Liquid extraction sonication, solvent extraction, SPE	Drinking water, waste water, solid waste	NPD, ELCD, FPD	507, 614, 619, 622, 8140, 8141A	GsBP-35MS, 30m x 0.25mm x 0.25um (3525-3002) GsBP-5MS, 30m x 0.25mm x 0.25um (1525-3002)
Organochlorine Pesticides and PCBs	Liquid extraction sonication, solvent extraction, SPE	Drinking water, waste water, solid waste	ECD	508.0, 608 8081A, 8082, CLP-Pesticides	GsBP-35MS, 30m x 0.32mm x 0.25um (3532-3002)
Phenoxy Acid Herbicides	Liquid extraction sonication, solvent extraction, SPE	Drinking water, waste water, solid waste	ECD	515, 615, 8150, 8151	GsBP-35MS, 30m x 0.32mm x 0.25um (3532-3002)

Column Care

GC column is the central piece for a successful analytical separation using GC instrumentation. A prolonged life and application success of column are often achieved by proper column care and use. Column care includes how to install it, maintenance including storage and regeneration of performance, in some cases.

Column Installation

Pre-Installation

A key element in care is understanding GC instrument basics and its usage history. Since most GC analysis problems are not caused by the column itself, knowledge of the instrument or instrumentation is emphasized. Some listed items that one should know are:

- GC condition: brand new or well used
- GC location change
- GC idling time
- Recent maintenance of GC system including gas line
- Abnormal GC column degradation
- Previous GC column performance record/logbook
- Carrier gas quality

This hints to instrument system performance for future use. Particularly, if previous GC columns exhibited shortened life due to high bleed, ghost peak, peaking tailing, no signal or high baseline signal, it more likely points to problems such as gas leakage, dirty inlet, gas flow or blockage of the detector jet.

If the GC exhibits some of the above symptoms, fix the problem following GC manufacturer's recommendations. Some of common recommendations are:

- Use high purity gases including carrier gas and makeup gas
- Change seals, septum and liner
- Change column ferrules
- Clear jet(s)
- Condition GC inlet and detector at high temperature for hours

Installation

After checking out these practices, the GC instrument is ready for the installation of the GC column. It is vital to understand and know the history of the GC instrumentation since it is usually the cause of poor performance. Once the GC instrumentation parameters are reviewed, proper installation of the GC column is the next step. The recommended step-by-step GC column installation is as follows:

1. Carefully uncoil the column one half coil on both ends
2. Loosely hang the column inside the oven
3. Cut the column on each end 3-5cm with a column cutter as evenly and neatly as possible. Do not hand break column end tip without a cutter
4. Thoroughly examine the cut. Re-cut if the cut across appears uneven.
5. Use ferrules and column nuts that are in good condition
6. Install the column nuts and ferrules to both the column ends
7. Attach column end to the inlet or detector. Follow the instrument manufacturer's specification on column end tip length required, typically 2-3cm for split/split inlet or 1-2mm gap length for the FID jet. Ensure the column end does not touch the metal wall multiple times, as repetitive touching may damage the column tips which impacts sample introduction.
8. Finger-tighten the column nut with another hand holding the column end position for proper insertion, then use the proper size wrench to completely tighten the nuts. Do not over tighten as it may smash the column. Make sure the column tip insert length is within the range of the GC manufacturer's recommendation or specification.
9. Stepwise setup the column pressure to establish column flow
10. Repeat connection to the detector
11. Securely hang the column inside GC oven. Do not over uncoil GC column at each end as it may become broken after thermal cycling
12. Adjust the column flow to the manufacturer's specification. A general flow setting recommendation is as follows:

Column ID (mm)	Column flow range (ml/min)
0.53	5—8
0.32	1.0—2.5
0.25	0.8—1.5
0.2	0.4—1.0

13. Check for any leak signs, avoid bubble testing
14. Set the proper inlet and detector temperatures
15. Set the oven temperature around 50-100°C
16. Turn on the detector
17. Check for a stabilized signal level. If the signal is too low or too high, it may indicate a leaky column connection. Re-install the column and re-slice as needed.
Note: Be careful of hot surfaces.

18. Condition columns at its upper temperature limit - (10-20°C) for minimum 30 min. Overnight conditioning is preferred.
19. Check for detector signal. If it is too high, there may be a leaking problem, dirty inlet/detector, or bad column. Find the source of leak, re-install the column, clean the inlet/detector or change another column.
20. Adjust column flow to analysis conditions

Proper column installation will produce consistent and successful analysis results. Taking careful steps in installing will enable the user to become familiar, as well as become effective in troubleshooting steps. However, column storage is also important and must not be overlooked to ensure storage conditions are not a factor in poor testing performance.

Column Storage

Idling inside GC oven

Maintain proper oven temperature, typically 100-150°C under column gas flow.

Outside GC oven

Seal both ends of the column with septa, store the column in the original box. Avoid moisture, particulate/dust or chemical vapor invasion. Minimize any long term vibration from storage environment.

Column Regeneration

Recommended GC Column Conditioning

Condition or bake column at isothermal temperature close to the column upper temperature limit with 2x column working flow for 2 to 24 hours. This regeneration can be effective for sample contamination. Do not exceed the temperature limit because it may cause accelerated degradation of the column if oxygen is present in the carrier gas stream. The surfaces may become too active for many polar compounds.

Multiple Solvent Injections

Injecting solvent multiple times at 50-100°C oven temperature may regenerate column performance. Avoid setting oven temperature below the solvent boiling point as solvent condensation will wash out the stationary phase. The column surface may become less inert after multiple injections.

Trim Column Ends

Trim both ends of column by 0.1-1m is an easy and effective way to regenerate column performance. Trim longer lengths at the detector end than at inlet end. Adjust instrument conditions accordingly to maintain retention time locking. Condition the column for 30-120 mins after trimming. Be careful not to trim an excessive amount.

Solvent Rinse

Offline solvent rinse is an old fashion to regenerate column performance. As column becomes commodity product, we do not recommend this technique. Instead, we recommend solvent injection as an alternative.

In extreme cases, use high grade solvents compatible to stationary phase, such as non-aqueous solvent for wax column or hexane/toluene solvents for polysiloxane column. Columns should only be rinsed with 2 to 3 the column volume solvent at low pressure. Avoid rapid pressure changes to minimize potential column breakage. Gas purge dry column for 30-60 min after rinse and follow up with proper column conditioning.

Recommended MS Grade Column Conditioning

MS grade columns are specially made by manufacturer to minimize column bleed at its maximum isothermal temperature. Because of the time consuming MSD operation, column manufacturers usually do not test MS column by GC-MSD. Column bleeds are often measured by GC-FID. As MSD is operated at ultra-high vacuum pressures, new MS columns are more likely to exhibit high column bleed initially after installation. This requires that newly installed MS column be carefully conditioned prior to use.

1. Before installing new MS columns, check for the latest working condition of MSD, such as auto tune, background, noise, vacuum, ion source cleanliness, helium line trap, etc. For more details, refer to the MSD manufacturer's instruction.
2. Properly pump-down the MSD, power off the instrument as needed before column installation. If the instrument is equipped with a non-vent connector, maintain adequate helium flow at all times. Maintain MSD cleanliness as much as possible.
3. Install the MS column with ferrules and fittings that are in good condition. Cut column MSD end about 3 to 5cm to have a clean 10 to 15 cm section of the column. Insert the column to the GC-MSD transfer line to the manufacturer specified length.
4. Setup proper column gas flow
5. Set the oven temperature to 50-60°C
6. Power on the instrument and pump up the MSD

7. Wait for complete MSD pump up. Check for any signs of leak by following the manufacturer's guideline.
8. Setup the proper MSD parameters in accordance with the manufacturer's specification.
Steps 9 to 12 can be substituted with MSD manufacturer's procedure.
9. Once MSD vacuum is established, increase the oven temperature to 100°C. Maintain this temperature for minimum 30min.
10. Manual Baking-out: (for 5MS column only) Program the GC oven temperature for column baking: 60°C (30min) 10°C/min to 280°C (10min) 10°C/min to 300°C (15min), 10°C/min to 325°C (30min). If it is an offline MSD, cut off one coil of the column at detector end and connect this end of the column to the MSD.
11. Manual Baking-out: (for other MS columns) Program the GC oven temperature: 60°C (30min) 10°C/min to the column upper temperature limit-20°C (30min), 10°C/min to the column upper temperature limit (30min).
12. Do not run the background check, noise check, autotune or other MSD methods during this manual baking-out period.
13. After completion of the manual baking out, run autotune to see check spectra readings: 18 (water), 28(nitrogen), 32 (oxygen), 79, 207 and 281 are high. If the air peak is high, check for gas leak signs.
14. If the spectrum 207 is less than 5% of the tune spectra (such as PFTBA), e.g. 219, run a background check. Otherwise, repeat column baking-out as described in step 10.
15. If a longer backing time is not possible or if column exhibits high bleed, repeat solvent injection. Solvents such as hexane, toluene, and dichloromethane can be used. Injection amount ranges from 2 to 5ul. Injection times should be 3-6mins. Time intervals between two solvent injections should be 5—10min. Oven temperature should be set around the column upper temperature limit.
16. If the high column bleed still persists, manually decrease the temperature of the transfer line from 320/280°C to 250°C to see if the column bleed decreases accordingly. If the column bleed decreases, use the 250°C transfer line temperature temporarily.
17. After solvent injection and the column bleed is still persistently high, the column may be defective or damaged by oxidation.
18. Occasionally check for gas line leaks from the gas supply to the injector, including septum leaks. Use new ferrules or ferrules in fairly good condition. Do not over tighten. Follow the instrument manufacturer's troubleshooting /maintenance guidance.

MS columns do not require a long conditioning period prior to use. If high column bleed is persistent, it is recommended to change to a new MS column. Extensive periods of MS column conditioning time will result in contamination of the MSD and may damage column from leak in gas path or oxygen in carrier gas stream.

Practical Tips:

- Check carrier gas, supply pressure, trap, and gas valve
- Always run the carrier gas through the MS column
- Check leaks at septum or inlet. Use new septum if possible.
- Check for proper ferrule use for MSD
- Check for column breakage
- Do not over-tighten column nuts to MSD transfer line
- Make sure MSD is functioning properly
- Keep MSD ion source as clean as possible
- Run oven temperature at application maximum temperature, not the column maximum temperature to minimize column "bleed"

PLOT Column Installation and Conditioning Recommendations

1. Carefully loosen a comfortable working length of column from cage at each end. Avoid excessive vibration at column tips.
2. Cut 1 to 5cm from each column end
3. Install column to the GC inlet per GC manufacturer's suggestion
4. Do not connect the PLOT column to GC detector
5. Setup proper column flow, check for any breakage during column flow buildup. Use bubbling technique for a quick flow check.
 - a. Recommended column flow of 6 - 10ml/min for 0.53mm ID column and 2-4ml/min for 0.32mm ID column. Measure flow with a flowmeter as needed
6. Recommended column flow of 6 - 10ml/min for 0.53mm ID column and 2-4ml/min for 0.32mm ID column. Measure flow with a flowmeter as needed
7. Leave the column detector end either inside oven or outside oven
8. Program a brief condition temperature profile. Lower temperatures for 2-5 mins, 150°C for 10min, higher temperatures for 10-30 mins.
9. Decrease oven temperature, recheck column flow as necessary, install the column to the GC detector while avoiding excessive vibration.
10. Light the detector and check for unusually high signal noise. If noise appears too high, cutoff 1 - 5cm of the column tip and reconnect the column detector side connection.
11. Repeat the brief column condition temperature profile to establish a stable baseline with less noise
12. Condition column as needed to activate PLOT column and decrease signal level

Troubleshooting

GC is a complicated system and basic knowledge of troubleshooting technique in the following areas is deemed useful: method, sample, instrument, column and software. These components are closely correlated and affect each others performance. When a problem is arises, there is often is no single root-cause. Hurrying to solve problems may be a temporary fix due to time constraints such as changing a column, but often leads to overlooking the real root-cause and the problem may manifest itself again. However, a planned and systematic approach to troubleshooting tends to yield a faster and more accurate way to solve an issue.

Causes of Column Degradation

There are various root causes for column performance degradation. Most root causes are related to oxygen present in the carrier gas stream (oxidation), thermal damage, and sample contamination. Check for obvious instrumentation issues as dictated above before attempting more time-consuming troubleshooting actions. The following table gives lays out general troubleshooting process and some remedies. It is important to follow proper column installation step and to maintain

decent maintenance of instrument to prevent column performance degradation.

Table 1 – Troubleshooting General Guide for Column Degradation

Degradation Symptoms	Root cause	From	Recommended Corrective Actions
-High column bleed -Column selectivity change/ shift -Retention time shift -Chopping baseline profile -Peak tailing -Blockage of detector jet and abnormal signal level	-Oxygen in carrier gas flow path -Bad column	- Low grade carrier gas used - Leak in gas line connection - Instrument leak: inlet, pressure regulator, valve - Home gas plumb connection with dead/void volume in the flow path	-Change carrier gas grade -Use traps -Properly plumbing -Fix instrument leaks -Purge column for a long period of time at low temperatures -Avoid high temperature chromatography -Change column
-Peak tailing -Unstable or noisy detector signal - Retention time shift	-Moisture present in gas stream line -Sample contamination -Thermal damage at temperature over column upper limit	-System off for long time -Low grade carrier gas -Large dirty sample introduction	-Use trap in carrier gas line -Bake instrument -Do not turn off instrument unless necessary -Good sample preparation -Trim contaminated column ends by 0.1-0.5m
-Accelerated column bleed -Significant column selectivity change -Severely peak tailing -Peak broadening	-Thermal damage	-Oven temperature exceeding the column upper temperature limit -Too high inlet/detector temperatures -Combination of oxidation, duration time and column temperature	-Almost irreversible degradation -Trim column each end by 0.5-1m -Reduce used temperatures -Switch high grade carrier gas
-Column breakage	-Human error -Instrumentation error -Bad column	-Bad column -Gas pressure pulse -Fast temperature ramping up/down - Over tightening column nut	-Slowly setup carrier gas pressure with EPC -Reduce temperature ramping -Butt-connect the broken column -Re-install column

Troubleshooting problems is a vast subject and covering every possible problem and its solution is challenging. However, we offer some basic troubleshooting techniques based on our column expertise.

1. **Define and clearly state the problem**
2. **Check for obvious mistakes and avoid overlooking simple steps**

Document logs of events will provide internal guidance and will help maintain a good working condition for your GC system and prolonged column lifetime. The following list covers simple and easy related causes:

- Instrument conditions: any power outage, temperature setting of injector, detector, oven and aux, EPC/EFC setting, valve on/off, cable connection, oven heater/sensor, etc.
- Instrument maintaining and repair log. Is it a time to maintain instrument?
- Software: Does software function properly and correctly?
- Sample: sample shelf time, sample drain from solvent evaporation thru the punched cap, inlet septum leak
- Gases: Supply gas drain or insufficient pressure, valve on/off, gas line leak, log grade gas used, gas cylinder changeover, wrong gas connection, etc

3. Troubleshooting based on Performance

- Baseline
 - a. Wandering: inlet leaking, loose connections at inlet or detector side, carrier gas contamination, detector contamination, column contamination, inlet/detector heating zone temperature varying
 - b. Drafting: downward: column not thoroughly conditioned, instrument not stabilized; upward: column bleed from oxidation, instrument contamination
 - c. Spiking: dirty detector: dust inside inlet/detector/column, electrical noise
 - d. Noise: dust in detector, detector gas and gas flow, column contamination or oxidation, PCB issue
 - e. Offset: chip in inlet, column installation at detector side, unstable carrier gas flow (clogging or inconsistent leaking)
- Peak
 - a. No peak at all: column broken, column not properly installed, non carrier gas, detector off, syringe needle clogged, no sample introduction, valve off/on, wrong signal channel
 - b. Missing peak: column improper installation at inlet/detector, column contamination, inlet contamination, column selectivity change over time, column oxidized, solvent effect, aged sample, improper syringe/liner used
 - c. Peak shape broadening: too much sample loading, very low split flow, split valve off, sample becomes concentrated over time, column is oxidized, low oven temperature, part of column outside oven, heating zone is not properly setup
 - d. Peak(s) is too small: inlet septum leak, syringe needle clogging, improper column installation including loose connection, split flow change, liner contamination (for active compounds), column contamination, column inertness, vial/syringe quality issue, gold seal contamination, lower oven temperature
 - e. Peak tailing: column inertness or column contamination, improper column installation (mostly at inlet), dirty inlet/detector, active butt-connector

for column-column connection, effect of solvent-stationary phase match, increased column activity from high temperature run, unknown active compounds, sample overloading, column performance decreased, column oxidized

- f. Peak fronting: too much sample loading, sample is too concentrated, column performance decreased, split flow decreased from error or clogging
- g. Split peak: poor sample injection technique, dual sample injections, cool inlet, improper column installation, column not neat cut, dirty liner, column selectivity change over time, oven temperature changed

- Elution and retention time

- a. Elution order change: column selectivity change over time, solvent effect, mismatch of column (stationary phase and solutes), oven temperature change, carrier gas flow change, ghost peak from contaminations or carry over contamination, wrong peak identifications
- b. Retention time shifting: leak in inlet, carrier gas flow shifting/change, oven temperature shifting, column contamination, solvent effect, column performance decreased (phase stripping by solvent, phase oxidizing)

- Separation

- a. Resolution decreased: improper column installation, column selectivity change overtime, column contamination, oven temperature change, too much sample introduction, carrier gas flow change, column performance decreased

4. Practical Tips

- a. Good column installation techniques and periodic checks for proper installation should be practiced
- b. Identify problem, state and analyze problem logically and systematically
- c. Check and fix obvious errors or mistakes
- d. Look for available expertise to fix problem efficiently and effectively
- e. Perform corrective and preventative maintenance on instrumentation
- f. Develop your troubleshooting skills from educational sources and from knowledgeable peers
- g. Quick fixes: re-install column, cut column both ends off, baking column at high temperatures, solvent injection and changing to a different solvent

5. Column Performance Degradation

Columns from a manufacturer should have good performance initially. Under careful control and minimal error conditions, column should perform well for a long time. But in reality, many columns lose their performance earlier than their typical lifetime. Column performance loss is usually caused by:

- Oxidation from leaking, impurity in carrier gas
- Improper instrumentation conditions
 - * temperature is higher than column upper temperature limit
 - * too fast temperature program run for fast analysis
 - * installation
 - * improper precondition and post run
 - * too much sample loading
- Column contamination
 - * sample containing high boiling point compounds
 - * reaction of active compounds to stationary phase
 - * carry-over contamination from instrument and sample
 - * accumulating moisture effect
- Incompatible /mismatched solvent to column stationary phase

Symptoms of column performance degradation:

- Loss or decrease retention
- Loss of sample loading capacity
- Peak tailing
- Peak size reduced
- Peak broadening
- Peak missing
- Resolution decreased

Take care of the column, because it is critical tool that determines the analysis success.

General Chromatography Supplies

GS-Tek offers a variety of ferrules for many GC brands. Ferrule materials include graphite, vespel and PTFE. Graphite ferrules are commonly used in GC instrumentation. Vespel/graphite ferrules are typically used for GC-MSD. PTFE ferrules are typically used for gas connections at ambient temperatures.

Ferrules

Short Ferrule for Agilent Inlet Systems

P/N	Description
C022001	0.4mm ID Graphite Ferrule (10/pk)
C022002	0.5mm ID Graphite Ferrule (10/pk)
C022003	0.8mm ID Graphite Ferrule (10/pk)
C022004	1.0mm ID Graphite Ferrule (10/pk)



For 1/16" Standard Swagelok®/Parker® Type Fittings

P/N	Description
C022102	1/16" to 0.4mm ID Graphite Ferrule (10/pk)
C022103	1/16" to 0.5mm ID Graphite Ferrule (10/pk)
C022104	1/16" to 0.8mm ID Graphite Ferrule (10/pk)
C022105	1/16" to 1.0mm ID Graphite Ferrule (10/pk)
C022106	1/16" to 1.2mm ID Graphite Ferrule (10/pk)

Quick Conversion Table

Inches	mm
1/16	1.6
1/8	3.2
1/4	6.2

For Standard Swagelok®/Parker® Type Fittings

P/N	Description
C022101	1/16" ID Graphite Ferrule (10/pk)
C022109	1/8" ID Graphite Ferrule (10/pk)
C022116	1/4" ID Graphite Ferrule (10/pk)

Reducing Ferrule For Standard Swagelok®/Parker® Type Fittings

P/N	Description
C022111	1/8" to 0.5 mm ID Graphite Ferrule (10/pk)
C022112	1/8" to 0.8 mm ID Graphite Ferrule (10/pk)
C022113	1/8" to 1/16" Graphite Ferrule (10/pk)
C022118	1/4" to 0.4 mm ID Graphite Ferrule (10/pk)
C022119	1/4" to 0.5 mm ID Graphite Ferrule (10/pk)
C022120	1/4" to 0.8 mm ID Graphite Ferrule (10/pk)
C022117	1/4" to 1.0 mm ID Graphite Ferrule (10/pk)
C022121	1/4" to 1/16" ID Graphite Ferrule (10/pk)
C022122	1/4" to 1/8" ID Graphite Ferrule (10/pk)

60% Vespel/40%Graphite Ferrule (V/G) Temperature Limit 400°C

Short Ferrule for Agilent Inlet Systems

P/N	Description
C022006	0.5mm ID V/G Ferrule (10/pk)
C022007	0.8mm ID V/G Ferrule (10/pk)

Capillary Column Ferrule for Standard 1/16" Swagelok®/Parker® Type Fittings

P/N	Description
C022147	1/16" to 0.5mm V/G Ferrule (10/pk)
C022148	1/16" to 0.8mm V/G Ferrule (10/pk)
C022149	1/16" to 1.0mm V/G Ferrule (10/pk)

For Standard Swagelok®/Parker® Type Fittings

P/N	Description
C022153	1/8" ID V/G Ferrule (10/pk)
C022160	1/4" ID V/G Ferrule (10/pk)



Reducing Ferrule for Standard Swagelok® /Parker® Type Fittings

P/N	Description
C022155	1/8" to 0.5mm ID V/G Ferrule (10/pk)
C022156	1/8" to 0.8mm ID V/G Ferrule (10/pk)
C022157	1/8" to 1/16" ID V/G Ferrule (10/pk)
C022161	1/4" to 0.4mm ID V/G Ferrule (10/pk)
C022162	1/4" to 0.5mm ID V/G Ferrule (10/pk)
C022164	1/4" to 0.8mm ID V/G Ferrule (10/pk)
C022166	1/4" to 1/16" V/G Ferrule (10/pk)
C022167	1/4" to 1/8" V/G Ferrule (10/pk)

Vespel Ferrule Temperature Limit 350°C

Short Ferrule for Agilent Inlet Systems

P/N	Description
C022013	1/16" to 0.5mm ID -Agilent style (10/pk)
C022014	1/16" to 0.8mm ID -Agilent style (10/pk)

Capillary Column Ferrule for Standard 1/16" Swagelok® /Parker® Fittings

P/N	Description
C022127	1/16" to 0.4mm ID Vespel Ferrule (10/pk)
C022128	1/16" to 0.5mm ID Vespel Ferrule (10/pk)
C022129	1/16" to 0.8mm ID Vespel Ferrule (10/pk)
C022130	1/16" to 1.0mm ID Vespel Ferrule (10/pk)
C022131	1/16" to 1.2mm ID Vespel Ferrule (10/pk)

Straight Ferrule for tubing with ODs for Standard Swagelok® /Parker® Type Fittings

P/N	Description
C022133	1/8" Vespel Ferrule (10/pk)
C022141	1/4" Vespel Ferrule (10/pk)

Reducing Ferrule for Standard Swagelok® /Parker® Type Fittings

P/N	Description
C022136	1/8" to 0.5mm ID Vespel Ferrule (10/pk)
C022137	1/8" to 0.8mm ID Vespel Ferrule (10/pk)
C022138	1/8" to 1/16" ID Vespel Ferrule (10/pk)
C022143	1/4" to 1/16" ID Vespel Ferrule (10/pk)
C022144	1/4" To 1/8" ID Vespel Ferrule (10/pk)

Capillary Column Ferrule for Standard 1/16" Swagelok® /Parker® Type Fittings

P/N	Description
C022171	1/16" to 0.4mm ID PTFE Ferrule (10/pk)
C022172	1/16" to 0.5mm ID PTFE Ferrule (10/pk)
C022173	1/16" to 0.8mm ID PTFE Ferrule (10/pk)
C022174	1/16" to 1.0mm ID PTFE Ferrule (10/pk)
C022175	1/16" to 1.2mm ID PTFE Ferrule (10/pk)

Straight Ferrules for Tubing ODs for Standard Swagelok® /Parker® Type Fittings

P/N	Description
C022176	1/8" ID PTFE Ferrule (10/pk)
C022182	1/4" ID PTFE Ferrule (10/pk)

Reducing Ferrule for Standard Swagelok® /Parker® Type Fittings

P/N	Description
C022178	1/8" to 0.5mm ID PTFE Ferrule (10/pk)
C022179	1/8" to 0.8mm ID PTFE Ferrule (10/pk)



General Recommendations for Ferrule ID

Column ID	Ferrule ID	Column OD
0.1 mm	0.4 mm	0.25 mm
0.2 mm	0.4 mm	0.36 mm
0.25 mm	0.4 mm	0.36 mm
0.32 mm	0.5 mm	0.44 mm
0.45 mm	0.8 mm	0.67 mm
0.53 mm	0.8 mm	0.68 mm

Reducing Ferrule for Standard Swagelok® /Parker® Type Fittings

C022180	1/8" to 1/16" ID PTFE Ferrule (10/pk)
C022185	1/4" to 1/16" ID PTFE Ferrule (10/pk)
C022186	1/4" To 1/8" ID PTFE Ferrule (10/pk)

Septa

Silicone-based septa are typically used for both GC inlet seals and sample introduction. They have a centered hole for guiding the syringe needle. Quality and performance of septa have a direct effect on application results (reliability and accuracy), column lifetime and instrument condition. A good practice is to check and change septa as often as needed. Packaged in a glass jar.

- Septa are made of two different processed silicone material: Advance Green (AG) and Bleed and Temperature Optimized (BTO). BTO temperature limit is 400°C, and AG temperature limit is 350°C. Both are preconditioned and ready to use.
- Septa are offered in different sizes depending on the GC instrument configurations. Check the GC instrumentation specifications for details.



P/N	Description
5mm Diameter for on-column injection	
C0239587	Septa Marathon 5mm CenterGuide (25/pk)
C0239597	Septa Marathon 5mm CenterGuide (50/pk)
C0246525	Septa AG3 5mm CenterGuide (50/pk)
C0298787	Septa BTO 5mm CenterGuide (50/pk)
9mm Diameter	
C0239778	Septa Marathon 9mm CenterGuide (25/pk)
C0239779	Septa Marathon 9mm CenterGuide (50/pk)
C0246713	Septa AG3 9mm CenterGuide (50/pk)
C0298713	Septa BTO 9mm CenterGuide (50/pk)
9.5mm (3/8") Diameter	
C0239188	Septa Marathon 3/8" (9.5mm) (25/pk)
C0239198	Septa Marathon 3/8" (9.5mm) (50/pk)
C0246124	Septa AG3 3/8" (9.5mm) (50/pk)
C0298705	Septa BTO 3/8" (9.5mm) (50/pk)
11mm (7/16") Diameter (Popular for Agilent/HP GCs)	
C0239287	Septa Marathon 11mm (7/16") CenterGuide (25/pk)
C0239297	Septa Marathon 11mm (7/16") CenterGuide (50/pk)
C0246225	Septa AG3 11mm (7/16") Centerguide (50/pk)
C0298717	Septa BTO 11mm (7/16") Centerguide (50/pk)
11.5mm Diameter	
C0239787	Septa Marathon 11.5mm CenterGuide (25/pk)
C0239798	Septa Marathon 11.5mm CenterGuide (50/pk)
C0246725	Septa AG3 11.5mm CenterGuide (50/pk)
C0298777	Septa BTO 11.5mm CenterGuide (50/pk)
12.7mm (1/2") Diameter	
C0220120	Microsep F-138 Septa ½", 12.7mm (50/pk)
C0230125	Microsep F-174 Septa 1/2" (12.7mm) (50/pk)
C0230660	Septa Puresep P 1/2" (12.7mm) (50/pk)
Description	
C0230695	Septa Puresep T 1/2" (12.7mm) (50/pk)
C0230698	Septa Puresep T 13 mm (50/pk)
C0234125	Economy Blue Septa 1/2" 12.7 mm (100/pk)
C0236125	Ultrasep R Septa 1/2", (12.7mm) (50/pk)
17mm Diameter	
C0239688	Septa Marathon 17mm (25/pk)
C0239698	Septa Marathon 17mm (50/pk)
C0246624	Septa AG3 17mm (50/pk)
C0298817	Septa BTO 17mm CenterGuide (50/pk)
Septa for Shimadzu GC	
C0239488	Septa Marathon for Shimadzu (25/pk)
C0239498	Septa Marathon for Shimadzu (50/pk)

P/N	Description
C0246424	Septa AG3 for Shimadzu (50/pk)
C0298735	Septa BTO Shimadzu (50/pk)
Septa for cylinder gas sample seal	
C0236524	Cylindrical Septa Half-Hole (25/pk)
C0236526	Cylinder Septa Half-Hole (100/pk)
C0296027	Microsep F-145 Cylindrical Septa Half-Hole (50/pk)

Liners

Liners provide chambers sample evaporizing and sample introduction into the column. Liners are the center pieces of the inlet system and have direct impact on application reliability and accuracy. It is recommended to change liner as often as needed.

Liners come in different lengths, diameters(OD/IDs), shapes, and surface deactivation for different instruments, sampling and applications. Choose your liner carefully to fitting both your instrument and application. In most cases, liners with silanized glass wool insert should be used as much as possible to improve application result.

Sample Injection Volume (ul)	Recommended Liner ID (mm)
More (>) than 1 ul	4 mm (vol~800ul)
Less (<) than 1 ul	2 mm (vol~200ul)



The liner is packed into a plastic tube holder. A volume pack of 5 or more are packed into a carton box. Liner-seal O-ring sold separately.

Agilent Instruments Capillary GCs	
P/N	Description
C0208112-10	Liner, 4 mm ID Glass for Agilent GC (10/pk)
C0208112-5	Liner, 4 mm ID Glass for Agilent GC (5/pk)
C0208113	Liner, 4mm with Silanized Wool for Agilent GC (ea)
C0208113-10	Liner, 4mm with Silanized Wool for Agilent GC (10/pk)
C0208113-5	Liner, 4mm with Silanized Wool for Agilent GC (5/pk)
P/N	Description
C0208114	Liner, 4mm with Cup for Agilent GC (ea)
C0208114-10	Liner, 4mm with Cup for Agilent GC (10/pk)
C0208114-5	Liner, 4mm with Cup for Agilent GC (5/pk)
C0208116	Liner, 4 mm Double Taper for Agilent GC (ea)
C0208116-10	Liner, 4 mm Double Taper for Agilent GC (10/pk)
C0208116-5	Liner, 4 mm Double Taper for Agilent GC (5/pk)
C0208119	Liner, 4 mm Single Taper for Agilent GC (ea)
C0208119-10	Liner, 4 mm Single Taper for Agilent GC (10/pk)
C0208119-5	Liner, 4 mm Single Taper for Agilent GC (5/pk)
C0208120	Liner, 4 mm Single Taper w/ Sil Wool For Agilent GC (ea)
C0208120-10	Liner, 4 mm Single Taper w/ Sil Wool For Agilent GC(10/pk)
C0208120-5	Liner, 4 mm Single Taper w/ Sil Wool For Agilent GC(5/pk)
C0208122	Liner, 4 mm Quartz for Agilent GC (ea)
C0208122-10	Liner, 4 mm Quartz for Agilent GC (10/pk)
C0208122-5	Liner, 4 mm Quartz for Agilent GC (5/pk)
C0208124	Liner, 4mm w/ Cup & Sil Wool for Agilent GC (ea)
C0208124-10	Liner, 4mm w/ Cup & Sil Wool for Agilent GC (10/pk)
C0208124-5	Liner, 4mm w/ Cup & Sil Wool for Agilent GC (5/pk)
C0208110	Liner, 2 mm Splitless, Glass for Agilent GC (ea)
C0208110-10	Liner, 2 mm Splitless, Glass for Agilent GC (10/pk)
C0208110-5	Liner, 2 mm Splitless, Glass for Agilent GC (5/pk)
C0208111	Liner, 2 mm Splitless, Quartz for Agilent GC (ea)
C0208111-10	Liner, 2 mm Splitless, Quartz for Agilent GC (10/pk)
C0208111-5	Liner, 2 mm Splitless, Quartz for Agilent GC (5/pk)
C0208129	Liner, 2mm Single Taper for Agilent GC (ea)
C0208129-10	Liner, 2mm Single Taper for Agilent GC (10/pk)
C0208129-5	Liner, 2mm Single Taper for Agilent GC (5/pk)
C0208130	Liner, Packed Columns Deact. for Agilent GC (ea)
C0208130-25	Liner, Packed Columns Deact. for Agilent GC (25/pk)
C0208132	Liner, Packed Col. Not Deact. for Agilent GC (ea)
C0208132-25	Liner, Packed Col. Not Deact. for Agilent GC (25/pk)

Agilent Parts

P/N	Description
C05181-3316	Splitless liner, single taper, deactivated, 4mm ID, 1/pk
C05183-4695	Splitless liner, single taper, deactivated, 4mm ID, 5/pk
C05183-4696	Splitless liner, single taper, deactivated, 4mm ID, 25/pk
C05062-3587	Splitless liner, single taper, glass wool insert, deactivated, 4mm ID, 1/pk
C05183-4693	Splitless liner, single taper, deactivated, 4mm ID, 5/pk
C05183-4694	Splitless liner, single taper, deactivated, 4mm ID, 25/pk
C05181-8818	Splitless Liner, straight, deactivated, 2mm ID, 1/pk
C05183-4703	Splitless Liner, straight, deactivated, 2mm ID, 5/pk
C05183-4704	Splitless Liner, straight, deactivated, 2mm ID, 25/pk
C05183-4711	Splitl liner, single taper, deactivated, glass wool insert, 4mm ID, 1/pk
C05183-4712	Splitl liner, single taper, deactivated, glass wool insert, 4mm ID, 5/pk
C05183-4713	Splitl liner, single taper, deactivated, glass wool insert, 4mm ID, 25/pk
C019251-60540	Split Liner, straight, non-deactivated, 4mm ID, 1/pk
C05183-4691	Split Liner, straight, non-deactivated, 4mm ID, 5/pk
C05183-4692	Split Liner, straight, non-deactivated, 4mm ID, 25/pk

PerkinElmer Capillary GCs

P/N	Description
C0208212-10	Liner, Dimple Splitter for PerkinElmer GC (10/pk)
C0208212-5	Liner, Dimple Splitter for PerkinElmer GC (5/pk)
C0208214	Liner, Splitless for PerkinElmer GC (ea)
C0208214-10	Liner, Splitless for PerkinElmer GC (10/pk)
C0208214-5	Liner, Splitless for PerkinElmer GC (5/pk)
C0208232	Liner, 4 mm Split, Autosystem for PerkinElmer GC (ea)
C0208232-10	Liner, 4 mm Split, Autosystem for PerkinElmer GC (10/pk)
C0208232-5	Liner, 4 mm Split, Autosystem for PerkinElmer GC (5/pk)
C0208233	Liner, 4 mm Split, Autosystem w/ Wool for PerkinElmer (ea)
C0208233-10	Liner, 4 mm Split, Autosystem w/ Wool for PerkinElmer(10/pk)
C0208233-5	Liner, 4 mm Split, Autosystem w/ Wool for PerkinElmer (5/pk)
C0208234	Liner, 2mm Splitless Autosystem for PerkinElmer GC (ea)
C0208234-10	Liner, 2mm Splitless Autosystem for PerkinElmer GC (10/pk)
C0208234-5	Liner, 2mm Splitless Autosystem for PerkinElmer GC (5/pk)
C0208240	Liner, Packed Col., Autosystem for PerkinElmer GC (ea)
C0208240-10	Liner, Packed Col., Autosystem for PerkinElmer GC (10/pk)
C0208240-5	Liner, Packed Col., Autosystem for PerkinElmer GC (5/pk)
C0208242	Liner, Packed Col., Sigma C02000 8000 for PerkinElmer GC (ea)
C0208242-10	Liner, Packed Col., Sigma C02000 8000 for PerkinElmer GC(10/pk)
C0208242-5	Liner, Packed Col., Sigma C02000 8000 for PerkinElmer GC (5/pk)

Varian Capillary GCs

P/N	Description
C0208311-10	Liner, 4 mm Open Split for Varian 1075/1077 (10/pk)
C0208311-5	Liner, 4 mm Open Split for Varian 1075/1077 (5/pk)
C0208312	Liner, Frit Split for Varian 1075/1077 (ea)
C0208312-10	Liner, Frit Split for Varian 1075/1077 (10/pk)
C0208312-5	Liner, Frit Split for Varian 1075/1077 (5/pk)
C0208313	Liner, 4 mm Open Split w/ Sil. Wool for Varian 1075/1077 (ea)
C0208313-10	Liner, 4 mm Open Split w/ Sil. Wool for Varian 1075/77(10/pk)
C0208313-5	Liner, 4 mm Open Split w/ Sil. Wool for Varian 1075/77 (5/pk)
C0208314	Liner, Splitless, Glass for Varian 1075/1077 (ea)
C0208314-10	Liner, Splitless, Glass for Varian 1075/1077 (10/pk)
C0208314-5	Liner, Splitless, Glass for Varian 1075/1077 (5/pk)
C0208315	Liner, Splitless, Quartz for Varian 1075/1077 (ea)
C0208315-10	Liner, Splitless, Quartz for Varian 1075/1077 (10/pk)
C0208315-5	Liner, Splitless, Quartz for Varian 1075/1077 (5/pk)
C0208316	Liner, 0.5mm SPI for Varian 1093/1094 (ea)

PerkinElmer Capillary GCs	
C0208316-10	Liner, 0.5mm SPI for Varian 1093/1094 (10/pk)
C0208316-5	Liner, 0.5mm SPI for Varian 1093/1094 (5/pk)
C0208318	Liner, 0.8mm SPI for Varian 1093/1094 (ea)
C0208318-10	Liner, 0.8mm SPI for Varian 1093/1094 (10/pk)
C0208318-5	Liner, 0.8mm SPI for Varian 1093/1094 (5/pk)
C0208346	Liner, 3.4 mm Double Taper for Varian 1078/1079 (ea)
C0208346-10	Liner, 3.4 mm Double Taper for Varian 1078/1079 (10/pk)
C0208346-5	Liner, 3.4 mm Double Taper for Varian 1078/1079 (5/pk)

Shimadzu GCs	
P/N	Description
C0208414-10	Liner, Split 14a for Shimadzu GC (10/pk)
C0208414-5	Liner, Split 14a for Shimadzu GC (5/pk)
C0208416	Liner, Splitless 14a for Shimadzu GC (ea)
C0208416-10	Liner, Splitless 14a for Shimadzu GC (10/pk)
C0208416-5	Liner, Splitless 14a for Shimadzu GC (5/pk)

Thermo Trace/Focus GCs	
P/N	Description
C0208612	Liner, Split 5mm ID for Thermo-Finnigan GC (ea)
C0208612-10	Liner, Split 5mm for Thermo-Finnigan GC (10/pk)
C0208612-5	Liner, Split 5mm for Thermo-Finnigan GC (5/pk)
C020809-R	Liner, 4mm(ID) x 5.4mm(OD) x 79.5mm for Thermo GCs IP Deact., ea
C020810-R	Liner, 4mm(ID) x 5.4mm(OD) x 79.5mm for Thermo GCs IP Deact., 5pk
C020948-R	Liner, 4mm(ID) x 8.0mm(OD) x 105mm for Thermo GCs IP Deact., ea
C020948-214.1-R	Liner, 4mm(ID)x 8.0mm (OD) x 105mm for Thermo GCs Siltek Deact., ea
C020949-R	Liner, 4mm(ID) x 8.0mm(OD) x 105mm for Thermo GCs IP Deact., 5pk
C020949-214.5-R	Liner, 4mm(ID) x 8.0mm(OD) x 105mm for Thermo GCs Siltek Deact., 5pk

O-Ring Seal	
P/N	Description
C05188-5365	Fluorocarbon O-ring, for Agilent liner, 10/pk
C05180-4168	Graphite O-ring, for split liner, Agilent 10/pk
C05180-4173	Graphite O-ring, for splitless liner, Agilent 10/pk
Graphite O-ring L temperature limit > 350°C	
Fluorocarbon O-ring: temperature limit < 350°C	

Syringes

HP/Agilent

These autosamplers use standard size 10µL syringes with cemented needle syringes. Needles are cemented into the glass syringe barrel at a point corresponding to the zero graduation mark. Syringes are not autoclavable. Removable needle syringes. These are autoclaveable when disassembled.



P/N	Description
C080000	Hamilton 10 ul 1701N Syringe 26s Gauge Cemented Needle
C080011	Hamilton 10 ul 1701RN Syringe 26s Gauge Removable Needle
C080135	Hamilton 1 ul 7001KH Syringe 26s Gauge Knurled Hub Needle
C080300	Hamilton 10 ul 701N Syringe 26s Gauge Cemented Needle
C080338	Hamilton 10 ul 701RN Syringe 26s Gauge Removable Needle
C080366	Hamilton 10 ul 701N Syringe Cemented Needle (6/pk)

Agilent / HP 7673 and 7683 Autosampler

These syringes are designed for the Agilent / HP 7673 and 7683 autosampler. The 700 series is the standard Microliter® syringe, with an all-metal plunger. N-style syringes have a cemented needle.



P/N	Description
C080387	Hamilton 10 ul 701ASN Syringe 23s Gauge Point Style
C080388	Hamilton 10 ul 701ASN Syringe 26s Gauge Point Style
C080389	Hamilton 10 ul 701ASN Syringe (26S/1.71"/HP) (6/pk)
C080390	Hamilton 10 ul 701ASN Syringe (23S/1.71"/HP) (6/pk)
C087987	Hamilton 5 ul 75ASN Syringe 23s Gauge Point Style
C087988	Hamilton 5 ul 75ASN Syringe 26s Gauge Point Style
C087989	Hamilton 5 ul 75ASN Syringe (26s/1.71"/HP) (6/pk)
C087990	Hamilton 5 ul 75ASN Syringe (23s/1.71"/HP) (6/pk)

700 Series Replaceable Needle

These syringes are designed for the Agilent / HP 7673 and 7683 autosampler. The 700 series is the standard Microliter® syringe, with an all-metal plunger. RN-style syringes use the Hamilton-standard RN-type removable needles.



P/N	Description
C087957	Hamilton 5 ul 75ASRN Syringe 23s Gauge Point Style
C087958	Hamilton 5 ul 75ASRN Syringe 26s Gauge Point Style
C080357	Hamilton 10 ul 701ASRN Syringe 23s Gauge Point Style
C080358	Hamilton 10 ul 701ASRN Syringe 26s Gauge Point Style

The Type N series Microliter® syringes have a metal plunger with no PTFE tip. Cemented needle syringes are needles cemented into the glass syringe barrel at a point corresponding to the zero graduation mark. Syringes are not autoclavable.

P/N	Description
C080300	Hamilton 10 ul 701N Syringe 26s Gauge Cemented Needle
C080366	Hamilton 10 ul 701N Syringe Cemented Needle (6/pk)
C080400	Hamilton 25 ul 702N Syringe
C080500	Hamilton 50 ul 705N Syringe
C080600	Hamilton 100 ul 710N Syringe
C080700	Hamilton 250 ul 725N Syringe
C080800	Hamilton 500 ul 750N Syringe
C087900	Hamilton 5 ul 75N Syringe

The RN type Microliter® syringes has a metal plunger with no PTFE tip. Removable needle syringes. These are autoclavable when disassembled

P/N	Description
C087930	Hamilton 5 ul 75RN Syringe
C080830	Hamilton 500 ul 750RN Syringe
C080730	Hamilton 250 ul 725RN Syringe
C080630	Hamilton 100 ul 710RN Syringe
C080530	Hamilton 50 ul 705RN Syringe
C080430	Hamilton 25 ul 702RN Syringe
C080330	Hamilton 10 ul 701RN Syringe
C080336	Hamilton 10 ul 701RN Syringe Removable Needle (6/pk)

800 Series Needle

The 800 N series features Microliter® syringes with a handle and replaceable parts. Cemented needle syringes: Needles are cemented into the glass syringe barrel at a point corresponding to the zero graduation mark. Syringes are not autoclavable.

P/N	Description
C084850	Hamilton 5 ul 85N Syringe 26s w/ Handle Point Style
C084852	Hamilton 10 ul 801N Syringe 26s w/ Handle Point Style
C084854	Hamilton 25 ul 802N Syringe 22s w/ Handle Point Style
C084856	Hamilton 50 ul 805N Syringe 22s w/ Handle Point Style
C084858	Hamilton 100 ul 810N Syringe 22s w/ Handle Point Style

The 800 RN series features Microliter® syringes with a handle and replaceable parts. RN - removable needle syringes. These are autoclaveable when disassembled

P/N	Description
C084859	Hamilton 100 ul 810RN Syringe 22s w/ Handle Point
C084861	Hamilton 250 ul 825RN Syringe 22s Point Style 2
C084857	Hamilton 50 ul 805RN Syringe 22s w/ Handle Point Style
C084855	Hamilton 25 ul 802RN Syringe 22s w/ Handle Point Style
C084853	Hamilton 10 ul 801RN Syringe 26s w/ Handle Point Style
C084851	Hamilton 5 ul 85RN Syringe 26s w/ Handle Point Style

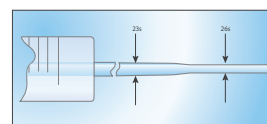
1700 Series Removable Needle

These syringes are designed for the Agilent / HP 7673 and 7683 autosampler. The plungers have a PTFE tip to seal both liquids and gases.

P/N	Description
C080087	Hamilton 10 ul 1701ASRN Syr. 23s Gauge Point Style
C080088	Hamilton 10 ul 1701ASRN Syr. 26s Gauge Point Style

Cemented Needle

Syringes have a unique dual-gauge design. The needle provides the durability of a 23s gauge needle with the ability of a 26s gauge needle to perform split/splitless and on-column injections. Needles are cemented into the glass syringe barrel at a point corresponding to the zero graduation mark. Syringes are not autoclavable.



P/N	Description
C087993	Hamilton 5 ul 75ASN Syringe 23s-26s Gauge Point Style
C087994	Hamilton 5 ul 75ASN Syringe 23s-26s Point Style HP
C080391	Hamilton 10 ul 701ASN Syringe 23s-26s Point Style
C080393	Hamilton 701ASN Syringe 10 ul 23s-26s Gauge Point
C080076	Hamilton 5 ul 175ASN Syringe 23s-26s Gauge Point S
C080079	Hamilton 10 ul 1701ASN Syringe 23s-26s Gauge Point
C080092	Hamilton 5 ul 175ASN Syringe 23s-26s Point Style H
C080096	Hamilton 10 ul 1701ASN Syringe 23s-26s Point Style

Gastight® Syringe

RN

Gastight® syringes have a large capacity of 1mL and above. The plungers have a PTFE tip to seal both liquids and gases. RN-style syringes use the Hamilton-standard removable needle.

P/N	Description
C081330	Hamilton 1 ml 1001RN Syringe
C081430	Hamilton 2.5 ml 1002RN Syringe
C081530	Hamilton 5 ml 1005RN Syringe
C081630	Hamilton 10 ml 1010RN Syringe

LT

These are large Gastight® syringes with capacities of 1mL and above. The plungers have a PTFE tip to seal both liquids and gases. LT - Luer tip syringes have a ground-glass barrel with a male luer taper, to accept most hypodermic needles. Syringes are autoclavable when disassembled.

P/N	Description
C081601	Hamilton 10 ml 1010 LT Syringe
C081501	Hamilton 5 ml 1005 LT Syringe
C081401	Hamilton 2.5 ml 1002 LT Syringe
C081301	Hamilton 1 ml 1001 LT Syringe
C082001	Hamilton 1.25 ml 1001.25 LT Syringe

LTN

These are larger Gastight® syringes, with capacities of 1mL and above. The plungers have a PTFE tip to seal both liquids and gases. LTN - Luer tip / cemented needle syringes have a needle cemented into the barrel to a point corresponding to the zero graduation. Not autoclavable.

P/N	Description
C082017	Hamilton 1.25 ml 1001.25 LTN Syringe
C081317	Hamilton 1 ml 1001 LTN Syringe
C081417	Hamilton 2.5 ml 1002 LTN Syringe
C081517	Hamilton 5 ml 1005 LTN Syringe
C081617	Hamilton 10 ml 1010 LTN Syringe

TLL

These are larger Gastight® syringes, with capacities of 1mL and above. The plungers have a PTFE tip to seal both liquids and gases. TLL syringes have a PTFE luer lock. The male luer taper accepts all luer-hub needles and connectors and locks luer hubs in place. Syringes are autoclaveable when disassembled.

P/N	Description
C081620	Hamilton 10 ml 1010TLL Syringe
C081520	Hamilton 5 ml 1005TLL Syringe
C081420	Hamilton 2.5 ml 1002TLL Syringe
C081320	Hamilton 1 ml 1001TLL Syringe
C082520	Hamilton 25 ml 1025TLL Syringe
C085020	Hamilton 50 ml 1050TLL Syringe
C086020	Hamilton 100 ml 1100TLL Syringe

Gas Sampling Syringe

The Gastight® Sampling Syringe incorporates an on/off valve that is threaded into a Gastight housing. RN - Removable needle syringe uses the Hamilton-standard removable needle design. GS-Tek also carries other brand syringes including VICI, SGE and Agilent. Please contact us for availability.

P/N	Description
C081556	5 ml Sample Lock Syringe
C081656	10 ml Sample Lock Syringe

Economic buy of 6/pk

P/N	Description
C080092	Hamilton 5 ul 175ASN Syringe 23s-26s Point Style HP (6/pk)
C080094	Hamilton 10 ul 1701 ASN HP Syringe 6/PK, 23S GA
C080096	Hamilton 10 ul 1701ASN Syringe 23s-26s Point Style HP (6/pk)
C080336	Hamilton 10 ul 701RN Syringe Removable Needle (6/pk)
C080366	Hamilton 10 ul 701N Syringe Cemented Needle (6/pk)
C080389	Hamilton 10 ul 701ASN Syringe (26S/1.71"/HP) (6/pk)
C080390	Hamilton 10 ul 701ASN Syringe (23S/1.71"/HP) (6/pk)
C080391	Hamilton 10 ul 701ASN Syringe 23s-26s Point Style HP (6/pk)
C087989	Hamilton 5 ul 75ASN Syringe (26s/1.71"/HP) (6/pk)
C087990	Hamilton 5 ul 75ASN Syringe (23s/1.71"/HP) (6/pk)
C087994	Hamilton 5 ul 75ASN Syringe 23s-26s Point Style HP (6/pk)

Vials, Caps and Septa

GS-Tek offers a wide selection of vials, caps, and septa for many GC sampling introduction. All vials, caps and septa are precleaned to minimize any sample contamination and to ensure reliable analysis result. 2ml vial are compatible with many instrument autosamplers.



Vials

P/N	Description
COV30010	100ul Glass Snap-Lock Vials (12/pk)
C0123344	250uL Clr Snap Top Vial 12x32 Pre-inserted w/ Label (100/pk)
C084261	1 ml PP Tapered Vial For Waters 96 Tray w/ Cap (100/pk)
C084051	1.0 ml 8 X 40 mm Tapered Crimp Top Vial (100/pk)
C084071	1.0 ml 8 X 40 mm Crimp Top Vial, Seal Combo-Pack (100/pk)
C084091	1.0 ml 8 X 40 mm Vial w/ Poly Plug Combo-Pack (100/pk)
C084001	1.2 ml 8 X 40 mm Crimp Top Vial (100/pk)
C084021	1.2 ml 8 X 40 mm Crimp Top Vial, Seal Combo-Pack (100/pk)
C084041	1.2 ml 8 X 40 mm Vial w/ Plug Cap Combo-Pack P (100/pk)
C084201	1.2 ml Insert For 15 X 45 Vial 8X42 mm (100/pk)

Phone (302)533-5646
Fax (302)737-4547

**Quality
Performance
Cost Effectiveness**

Vials	
C084242	1.2 ml Waters 96 Shell Vial Combo Pack (100/pk)
C0123340	1.8 ml/2ml Clear Screw w/Graduated Marking Spot Std Mth (100/pk)
C0123341	1.8 ml/2ml Clear Snap/Crimp Top Vial (100/pk)
C0123342	1.8 ml/2ml Amber Screw Graduated Vial Std. Mouth (100/pk)
C0123343	1.8 ml/2ml Amber Snap/Crimp Top Vial (100/pk)
C0123385	1.8 ml/2ml Screw Top Vial w/ Label Combo-Pack L (100/pk)
C0123405	1.8 ml/2ml Wide Mouth Screw Vial 12 X 32 mm (100/pk)
C0123406	1.8 ml/2ml Amber Wide Mouth Screw Vial (100/pk)
C0123408	1.8 ml/2ml Clear Screw Graduated Wide Mouth Vial (100/pk)
C0123409	1.8 ml/2ml Amber Screw Graduated Vial Wide Mouth (100/pk)
C0123411	1.8 ml/2ml Labeled Crimp Top Std. Mouth Vial (100/pk)
C0123415	1.8 ml/2ml Wide Mouth Screw Vial Combo-Pack (100/pk)
C0123425	1.8 ml/2ml Preassembled Vial Cap w/ Seal ST (100/pk)
C0223801	6 ml Flat Bottom, Beveled Top Headspace Vial (100/pk)
C0223821	6 ml Headspace Vial Combo- Pack (100/pk)
C0223821A	6 ml Headspace Vial Combo Pack, Pre-cleaned w/press release seals
C0224601	10 ml Round Bottom, Beveled Top Headspace Vial (100/pk)
C0224604	10 ml Flat Bottom, Beveled Top Headspace Vial (100/pk)
C0224608	10ml Headspace Vial Clear Screw Top (100/pk)
C0224609	10ml Headspace Vial Amber Screw Top (100/pk)
C0224621	10 ml Headspace Vial Combo- Pack (100/pk)
C0237501	20 ml Round Bottom, Beveled Top Headspace Vial (100/pk)
C0237504	20 ml Headspace Vial Flat Bottom, Beveled Top (100/pk)
C0237506	20 ml Headspace Vial Flat Top/Flat Bottom (100/pk)
C0237508	20ml Headspace Vial Clear Screw Top (100/pk)
C0237509	20ml Headspace Vial Amber Screw Top (100/pk)
C0237511	20ml Headspace Screw Vial Combo-Pack (100/pk)
C0237521	20 ml Headspace Vial Combo- Pack (100/pk)
C0237531	20ml Headspace Vial Septum 2 Combo-Pack (100/pk)
C0275705	24 ml Clear EPA Vials (100/pk)
C0275725	24 ml EPA Vial Combo-Pack (100/pk)
C0275745	Pre-Assembled 24 ml EPA Vials (100/pk)
C0275805	24ml Amber EPA Vial (100/pk)
C0275825	Precleaned Clear 24 MI EPA Vials (72/pk)
C0275835	Precleaned Amber 24 ml EPA Vials (72/pk)
C0275905	24 ml Amber EPA Vial Combo- Pack (100/pk)
C0306001	27 ml Headspace Vial For Shimadzu (100/pk)
C0279505	40 ml Clear EPA Vial (100/pk)
C0279515	40 ml Amber EPA Vial (100/pk)
C0279525	40 ml EPA Vial Combo-Pack (100/pk)
C0279535	40 ml EPA Amber Vial Combo- Pack (100/pk)
C0279545	Pre-Assembled 40 ml EPA Vial (100/pk)
C0279555	40 ml EPA Combo-Pack (100/pk) Preassembled / Clr,Cap,PTFE
C0279575	40 ml EPA Vial Combo-Pack White Cap/PTFE/Sil (100/pk)
C0279577	40 ml EPA Vial Combo-Pack White Cap/Economy PTFE/Sil (100/pk)
C0279578	40 ml EPA Vial w/Economy PTFE/Sil Septa (100/pk)
C0279580	40ml Clear EPA Vial Combo Pack with Bonded Level 3 Cap (100/pk)
C0279585	40ml EPA Vial Combo-Pack White Cap/PTFE/Sil (100/pk)
C0279590	40ml Clear EPA Vial Combo-Pack Black Cap/PTFE/Sil (100/pk)
C0279815	Precleaned 40 ml EPA Vial (72/pk) w/ Level 3 Certificate
C0279825	Precleaned 40 ml EPA Vial (72/pk)
C0279825A	40 ml Precleaned EPA Vial w/ QC Analysis (72/pk)
C0279835	Precleaned Amber 40 ml EPA Vials (72/pk)
C0279836	40mL Amber Precleaned EPA Vial with Solid Cap 72/pk
C0271406	60 ml Clear EPA Vial (144/pk)
C0271425	Clear 60 ml EPA Vials, Precleaned (72/pk)
C0271435	Amber 60 mL EPA Vials, Precleaned (72/pk)

Vial Insert, Glass or PP

P/N	Description
C053101	250 ul Insert For 1.8 ml Std. Vial Flat Bottom (100/pk)
C053151	100 ul Tapered Insert(Mandrel) For 1.8 ml Std. Vial (100/pk)
C053159	100 ul Tapered Insert (Pulled) For 1.8 ml Std. Vial (100/pk)
C053161	100 ul Trispring Insert For 1.8 ml Std. Vial (100/pk)
C053171	100 ul PP Trispring Insert For 1.8 ml Std. Vial (100/pk)
C053852	200 ul Tapered Insert for Waters New Style Vial (200/pk)
C063011	250 ul Tapered Insert (Pulled) For 1.8 ml Wide Vial (100/pk)
C063101	350 ul Insert For 1.8 ml Wide Mth. Vial Flat Bottom (100/pk)
C063151	250 ul Tapered Insert(Mandrel) For 1.8 ml Wide Vial (100/pk)
C063161	250 ul Trispring Insert For 1.8 ml Wide Vial (100/pk)
C063171	250 ul PP Trispring Insert For 1.8 ml Wide Vial (100/pk)
C063181	250 ul Hanging Insert For 1.8 ml Wide Vial (100/pk)
C063551	250 ul Polyethylene Inserts (100/pk)
C063951	300 ul Tapered Insert(Mandrel) For 4 ml Waters Vial (100/pk)
C063961	300 ul 6x39 mm Spring Insert For 4 ml Vial (100/pk)
C063971	300 ul PP Trispring Insert For WISP Vials (100/pk)
C084201	1.2 ml Insert For 15 X 45 Vial 8X42 mm (100/pk)



Headspace Vials

P/N	Description
C0223801	6 ml Flat Bottom, Beveled Top Headspace Vial (100/pk)
C0223821	6 ml Headspace Vial Combo- Pack (100/pk)
C0223821A	6 ml Headspace Vial Combo Pack, Pre-cleaned w/press release seals
C0224601	10 ml Round Bottom, Beveled Top Headspace Vial (100/pk)
C0224604	10 ml Flat Bottom, Beveled Top Headspace Vial (100/pk)
C0224608	10ml Headspace Vial Clear Screw Top (100/pk)
C0224609	10ml Headspace Vial Amber Screw Top (100/pk)
C0224621	10 ml Headspace Vial Combo- Pack (100/pk)
C0237501	20 ml Round Bottom, Beveled Top Headspace Vial (100/pk)
C0237504	20 ml Headspace Vial Flat Bottom, Beveled Top(100/pk)
C0237506	20 ml Headspace Vial Flat Top/Flat Bottom (100/pk)
C0237508	20ml Headspace Vial Clear Screw Top (100/pk)
C0237509	20ml Headspace Vial Amber Screw Top (100/pk)
C0237511	20ml Headspace Screw Vial Combo-Pack (100/pk)
C0237521	20 ml Headspace Vial Combo- Pack (100/pk)
C0237531	20ml Headspace Vial Septum 2 Combo-Pack (100/pk)
C0306001	27 ml Headspace Vial For Shimadzu (100/pk)



Derivatization/Reaction Vials

GS-Tek also supplies brand name vials, such as Microanalytical, Agilent, and others. Please inquiry for product availability.

P/N	Description
C099400	0.1 ml Mini Reaction Vials Caps and Liners (12/pk)
C099410	0.3 ml Mini Reaction Vials w/ Caps and Liners (12/pk)
C099420	1.0 ml Mini Reaction Vials w/ Caps and Liners (12/pk)
C099430	3.0 ml Mini Reaction Vials w/ Caps and Liners (12/pk)
C099440	5.0 ml Mini Reaction Vials w/ Caps and Liners (12/pk)
C099450	10.0 ml Mini Reaction Vials w/ Caps and Liners (12/pk)
C099451	10.0 ml Kimble Mini Reaction Vial W/Cap & Liner (12/pk)

Caps and Septa

Crimping Cap	
P/N	Description
C0308201	8 mm Crimp Cap & Seal S (100/pk)
C0308231	8 mm Crimp Cap & TruSeal (100/pk)
C0308401	8 mm Crimp Cap & Seal TT (100/pk)
C0308501	8 mm Blank Crimp Cap Open-hole .156 (100/pk)
C0311001Y	11 mm Yellow Crimp Cap & Standard Seal (100/pk)
C0311001	11 mm Crimp Cap & Standard Seal (100/pk)
C0311001B	11 mm Blue Crimp Cap & Standard Seal (100/pk)
C0311001G	11 mm ID Green Crimp Cap and Standard Seal (100/pk)
C0311001GO	11 mm ID Gold Crimp Cap and Standard Seal (100/pk)
C0311001O	11 mm Orange Crimp Cap & Standard Seal (100/pk)
C0311001PU	11 mm Purple Crimp Cap & Standard Seal (100/pk)
C0311001R	11 mm Red Crimp Cap and Standard Seal (100/pk)
C0311001Y	11 mm Yellow Crimp Cap & Standard Seal (100/pk)
C0311201	11 mm Crimp Cap & Seal S (100/pk)
C0311231	11 mm Crimp Cap & TruSeal (100/pk)
C0311231L	11mm Crimp Cap & TruSeal Long (100/pk)
C0311401	11 mm Crimp Cap & Seal TT (100/pk)
C0311501	11 mm Blank Crimp Cap Open-hole .220 (100/pk)
C0313001	13 mm Crimp Cap & Standard Seal (100/pk)
C0320001	20 mm Crimp Cap (100/pk)
C0320121	20 mm Aluminum Crimp Cap and Septum 3 (100/pk)
C0320122	20 mm Safety Crimp Cap w/ Septum 3 (100/pk)
C0320130	20 mm Aluminum Crimp Cap with Blue/White Silicone Septa (100/pk)
C0320221	20 mm Aluminum Crimp Cap w/ Septum 2 (100/pk)
C0320222	20 mm Safety Crimp Cap w/ Septum 2 (100/pk)
C0320301	20 mm Safety Crimp Caps For Headspace Vials (100/pk)
C0320321	20 mm Safety Crimp Cap With Silicone/PTFE Seal (100/pk)
C0320421	20 mm Aluminum Crimp Cap & Black Butyl Septum (100/pk)
C0320521	20 mm Aluminum Crimp Cap & Bellows Seal (100/pk)
C0320545	20 mm ID GC Grade Soil Septum For Headspace (100/pk)

Screw Caps

Cap by mouth diameter	
P/N	Description
C0308115	8 mm Black Screw Cap (100/pk)
C0309115	8 mm Wide-Lip Black Screw Cap (100/pk)
C0309415	8 mm White Wide-Lip Screw Cap (100/pk)
C0309525	8 mm Preassembled Screwcap w/ PTFE/Silicone Seal (100/pk)
C0309585	8 mm Preassembled Screw Cap w/ Seal TT (100/pk)
C0309915	8 mm Pierceable Screw Cap w/ Seal (100/pk)
C0309925	8 mm Solid Screw Cap w/ PTFE Liner (100/pk)
C0309425	9mm Yellow Screw Cap PTFE/Silicone 9-425 (100/pk)
C0310115	10 mm Wide Mouth Black Screw Cap (100/pk)
C0309935	12 mm Solid Screw Cap w/ PTFE Liner (100/pk)
C0312115	12 mm Black Screw Cap (100/pk)
C0312415	12 mm White Screw Cap (100/pk)
C0312815	12mm Pierceable Screw Cap w/ Seal (100/pk)
C0313115	13mm Poly/Pro Rubber Lined Screw Cap (100/pk)
C0320124	18mm Pre-Assm Silver Screw Cap W/Sil White/PTFE Red Septa (100/pk)
C0320125	18mm Pre-Assm Silver Screw Cap W/Sil Blue/PTFE White Septa (100/pk)
C0320126	18mm Pre-Assm Silver Screw Cap W/Sil White/PTFE Blue Septa (100/pk)

Cap by mouth diameter

C0320128	18mm Pre-Assm Silver Screw Cap W/Butyl Red/PTFE Gray Septa (100/pk)
C0324115	24 mm Screw Cap 24-400 (100/pk)
C0324115B	24 mm Screw Cap 24-400 Blue (1000/pk)
C0324415	24mm Pre-Assembled White Screw (24-414) Cap w/ PTFE/Sil Septa

Cap by thread

P/N	Description
C0312585	13-425 Open Hole Black Caps Pre-Stuffed W/ Seal TT
C0520110	15-425 Solid Screw Cap w/ PTFE Liner (100/pk)
C0520310	18-400 Solid Screw Cap w/ PTFE Liner (100/pk)
C0520210	20-400 (20mm) Solid Screw Cap w/ TFE Liner (100/pk)
C0520410	22-400 Green Screw Cap PTFE Liner (100/pk)
C0520510	24-400 Solid Screw Cap w/ PTFE Liner (100/pk)
C0324114	24-414 Open Hole Screw Cap Black (100/pk)
C0324425	24-414 Cap with Bonded Teflon/Silicone Seal, Level 3 (100/pk)
C0520810	38-400 Solid Screw Cap w/ PTFE Liner (100/pk)

Snapping Caps

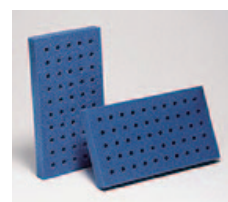
P/N	Description
C0308051	8 mm Snap Plug Cap for Waters 96 Vial (100/pk)
C0311251	Snap Cap For Snap/Crimp Top Vial w/ PTFE Seal (100/pk)
C0311261	Snap Cap For Snap/Crimp Top Vial PTFE/Rubber Seal (100/pk)
C0311271	Snap Cap For Snap/Crimp Top Vial w/ PTFE/Sil. Seal(100/pk)
C0311281	Snap Cap For Snap/Crimp Top Vial w/ Poly. Seal (100/pk)

Magnetic Caps

P/N	Description
C0311002	11 mm Magnetic Crimp Cap (100/pk)
C0311603	11 mm Magnetic Crimp Cap and Seal TT (100/pk)
C0320123	20 mm Magnetic Crimp Cap w/ Septum 3 (100/pk)
C0320223	20 mm Magnetic Crimp Cap w/ Septum 2 (100/pk)
C0320605	20mm Magnetic Crimp Caps For Headspace Vials(100/pk) (Gold)
C0320607	20mm Magnetic Ring Crimp Cap 100/pk
C0320608	20mm Magnetic. Crimp Caps(8mm hole) for Headspace Vials (100/pk)
C0320610	20mm Magnetic Ring Crimp Cap w/Septum 3 (100/pk)

Vial Racks

P/N	Description
C0868804	Vial Rack 48 Position (5)
C0868805	Wheaton 36 Position Vial Rack For Headspace Vials (5/pk)
C0868806	Wheaton 50 Position Vial Rack For EPA Vials (5/pk)
C0868850	50 Position Vial Rack For 1.8 ml Vials PE (5/pk)
C0868880	Autosampler Vial Rack Lid, Transparent (10/pk)
C0868880AS	Autosampler Vial Rack, Assorted (10/pk) (Blue, Green, Orange, Pin
C0868880B	Autosampler Vial Rack, Blue (10/pk)
C0868880G	Autosampler Vial Rack, Green (10/pk)
C0868880O	Autosampler Vial Rack, Orange (10/pk)
C0868880P	Autosampler Vial Rack, Pink (10/pk)
C0868880R	Autosampler Vial Rack, Red (10/pk)
C0868880Y	Autosampler Vial Rack, Yellow (10/pk)



Crimper/Decapper

P/N	Description
C0328040	28 mm Precision Decapper
C0320010	20 mm Plier Decapper
C0320000	20 mm Crimper
C0320040	20 mm Precision Decapper
C0313000	13 mm Crimper
C0313010	13 mm Plier Decapper
C0313040	13 mm Precision Decapper
C0311010	11 mm Plier Decapper
C0311040	11 mm Precision Decapper
C0308010	8 mm Plier Decapper
C0308040	8 mm Precision Decapper

Electronic Decapper

P/N	Description
C0308950	CRS Electronic Crimper 8mm
C0311950	CRS Electronic Crimper 11mm
C0311960	CRS Electronic Decapper 11mm
C0313950	CRS Electronic Crimper 13mm
C0313960	CRS Electronic Decapper 13mm
C0320950	CRS Electronic Crimper 20mm
C0320960	CRS Electronic Decapper 20mm



Derivatization Vials

GS-Tek offers common silanes in closed vial for sample derivatization suitable for GC analysis. Some shipping restriction may apply for international shipping.

P/N	Description
C0140-100V	Trimethylsilylimidazole (TMSI-Vial) *UN1993*
C0140-10V	Trimethylsilylimidazole (TMSI-Vial) *UN1993*
C0140-1V	Trimethylsilylimidazole (TMSI-Vial), 10 x 1ml *UN1993*
C0140-25V	Trimethylsilylimidazole (TMSI-Vial) *UN1993*
C0203-100V	N,O-Bis(trimethylsilyl) acetamide (BSA-Vial) *RESTRICTED* UN2920
C0203-10V	N,O-Bis(trimethylsilyl) acetamide (BSA-Vial) *RESTRICTED* UN2920
C0203-1V	N,O-Bis(trimethylsilyl) acetamide (BSA-Vial), 10 X 1ml *RESTRICTED* UN2920
C0203-25V	N,O-Bis(trimethylsilyl) acetamide (BSA-Vial) *RESTRICTED* UN2920
C0257-100V	N,O-Bis(trimethylsilyl) trifluoroacetamide (BSTFA-Vial) UN1993
C0257-10V	N,O-Bis(trimethylsilyl) trifluoroacetamide (BSTFA-Vial) UN1993
C0257-1V	N,O-Bis(trimethylsilyl) trifluoroacetamide (BSTFA-Vial), 10 X 1 ml UN1993
C0257-25V	N,O-Bis(trimethylsilyl) trifluoroacetamide (BSTFA-Vial) UN1993

Tubing

GS-Tek offers a variety of pre-cleaned tubing for gas line connections. Tubing materials are aluminum, copper, stainless steel and PTFE.

P/N	Description
C0430001	1/16" 316 SS Tubing .010" ID (per ft, continuous)
C0430002	1/16" 316 SS Tubing .010" ID (50 ft/roll)
C0430003	1/16" 316 SS Tubing .010" ID (200 ft/roll)
C0430004	1/16" 316 SS Tubing .020" ID (per ft, continuous)
C0430005	1/16" 316 SS Tubing .020" ID (50 ft/roll)
C0430006	1/16" 316 SS Tubing .020" ID (200 ft/roll)
C0430008	1/16" 316 SS Tubing .030" ID (per ft, continuous)
C0430010	1/16" 316 SS Tubing .030" ID (50 ft/roll)
C0430011	1/16" 316 SS Tubing .030" ID (200 ft/roll)
C0430012	1/16" 316 SS Tubing .040" ID (per ft, continuous)

P/N	Description
C0430013	1/16" 316 SS Tubing .040" ID (50 ft/roll)
C0430014	1/8" 304 SS Tubing .085" ID (per ft, continuous)
C0430015	1/8" 304 SS Tubing .085" ID (50 ft/roll)
C0430016	1/4" 304 SS Tubing .210" ID (per ft, continuous)
C0430018	1/4" 304 SS Tubing .210" ID (50 ft/roll)
C0430020	1/8" 316 SS Tubing .085" ID (per ft, continuous)
C0430021	1/8" 316 SS Tubing .085" ID (50 ft/roll)
C0430022	1/4" 316 SS Tubing .210" ID (per ft, continuous)
C0430023	1/4" 316 SS Tubing .210" ID (50 ft/roll)
C0430025	1/16" X 1/32" PTFE Tubing (10 ft/roll)
C0430026	1/16" X 1/32" PTFE Tubing (50 ft/roll)
C0430027	1/16" X 1/32" PTFE Tubing (100 Ft/roll) /10 roll minimum
C0430035	1/8" X 1/16" PTFE Tubing (10 ft/roll)
C0430036	1/8" X 1/16" PTFE Tubing (50 ft/roll)
C0430045	1/4" X 3/16" PTFE Tubing (10 ft/roll)
C0430046	1/4" X 3/16" PTFE Tubing (50 ft/roll)
C0431001	1/8" Aluminum Tubing .075" ID (50 ft/roll)
C0431002	3/16" Aluminum Tubing (50 ft/roll)
C0431003	1/4" Aluminum Tubing .190" ID (50 ft/roll)
C0432001	1/8" Copper Tubing .065" ID (50 ft/roll)
C0432002	1/8" Copper Tubing .065" ID Precleaned (50 ft/roll)
C0432003	1/4" Copper Tubing 0.190" ID (50 ft/roll)
C0432005	1/4" Copper Tubing .190" ID Precleaned (50 ft/roll)
C0433001	1/8" Aluminum Tubing .063" ID PTFE Lined (per ft, cont.)
C0433002	1/8" Aluminum Tubing .075" ID PTFE Lined (50 ft/roll)
C0433003	1/4" Aluminum Tubing .188" ID PTFE Lined (per ft, cont.)
C0433004	1/4" Aluminum Tubing .188" ID PTFE Lined (50 ft/roll)

Tubing Miscellaneous

P/N	Description
C0436003	Tubing Cutter, Heavy Duty
C0436011	Cutting Jig File
C0436020	Tubing Bender - 1/4"
C0436021	Tubing Bender - 1/8"
C0436022	Tubing Bender - 3/16"

Fittings

Union	
P/N	Description
B100-61	Brass Swagelok Tube Fitting, Bulkhead Union, 1/16 in. Tube OD
SS100-6	SS Swagelok Tube Fitting, Union, 1/16 in. Tube OD
SS100-61	SS Swagelok Tube Fitting, Bulkhead Union, 1/16 in. Tube OD
B200-6	Brass Swagelok Tube Fitting, Union, 1/8 in. Tube OD
B200-61	Brass Swagelok Tube Fitting, Bulkhead Union, 1/8 in. Tube OD
SS200-6	SS Swagelok Tube Fitting, Union, 1/8 in. Tube OD
SS200-61	SS Swagelok Tube Fitting, Bulkhead Union, 1/8 in. Tube OD
B400-6	Brass Swagelok Tube Fitting, Union, 1/4 in. Tube OD
B400-61	Brass Swagelok Tube Fitting, Bulkhead Union, 1/4 in. Tube OD
SS400-6	SS Swagelok Tube Fitting, Union, 1/4 in. Tube OD
SS400-61	SS Swagelok Tube Fitting, Bulkhead Union, 1/4 in. Tube OD
Tee	
P/N	Description
SS100-3	SS Swagelok Tube Fitting, Union Tee, 1/16 in. Tube OD
B200-3	Brass Swagelok Tube Fitting, Union Tee, 1/8 in. Tube OD



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SS200-3	SS Swagelok Tube Fitting, Union Tee, 1/8 in. Tube OD
B400-3	Brass Swagelok Tube Fitting, Union Tee, 1/4 in. Tube OD
SS400-3	SS Swagelok Tube Fitting, Union Tee, 1/4 in. Tube OD
Cross	
P/N	Description
B200-4	Brass Swagelok Tube Fitting, Union Cross, 1/8 in. Tube OD
SS200-4	SS Swagelok Tube Fitting, Union Cross, 1/8 in. Tube OD
B400-4	Brass Swagelok Tube Fitting, Union Cross, 1/4 in. Tube OD
SS400-4	SS Swagelok Tube Fitting, Union Cross, 1/4 in. Tube OD



Swagelok Tubing Adaptors

P/N	Description
SS100-R-2BT	SS Swagelok Tube Fitting, Bored-Through Reducer, 1/16 in. x 1/8 in. Tube OD
B100-R-4	Brass Swagelok Tube Fitting, Reducer, 1/16 in. x 1/4 in. Tube OD
SS100-R-4	SS Swagelok Tube Fitting, Reducer, 1/16 in. x 1/4 in. Tube OD
B200-R-2	Brass Swagelok Tube Fitting, Reducer, 1/8 in. Tube OD x 1/8 in.
SS200-R-4BT	SS Swagelok Tube Fitting, Bored-Through Reducer, 1/8 in. x 1/4 in. Tube OD
B200-R-4	Brass Swagelok Tube Fitting, Reducer, 1/8 in. x 1/4 in. Tube OD
SS200-R-1	1/8 Tubing adaptor to 1/16 Swagelok reduce union, 316 SS
SS200-R-4	SS Swagelok Tube Fitting, Reducer, 1/8 in. x 1/4 in. Tube OD
B100-1-2	Brass Swagelok Tube Fitting, Male Connector, 1/16 in. Tube OD x 1/8 in. Male NPT
B100-1-2BT	Brass Swagelok Tube Fitting, Bored-Through Male Connector, 1/16 in. Tube OD x 1/8 in. Male NPT
B100-1-4	Brass Swagelok Tube Fitting, Male Connector, 1/16 in. Tube OD x 1/4 in. Male NPT
B200-1-2	Brass Swagelok Tube Fitting, Male Connector, 1/8 in. Tube OD x 1/8 in. Male NPT
B200-1-2BT	Brass Swagelok Tube Fitting, Bored-Through Male Connector, 1/8 in. Tube OD x 1/8 in. Male NPT
B200-1-4	Brass Swagelok Tube Fitting, Male Connector, 1/8 in. Tube OD x 1/4 in. Male NPT
B200-1-4BT	Brass Swagelok Tube Fitting, Bored-Through Male Connector, 1/8 in. Tube OD x 1/4 in. Male NPT
B200-1-8	Brass Swagelok Tube Fitting, Male Connector, 1/8 in. Tube OD x 1/2 in. Male NPT
B200-6-1	Brass Swagelok Tube Fitting, Reducing Union, 1/8 in. x 1/16 in. Tube OD
B200-7-2	Brass Swagelok Tube Fitting, Female Connector, 1/8 in. Tube OD x 1/8 in. Female NPT
B200-7-4	Brass Swagelok Tube Fitting, Female Connector, 1/8 in. Tube OD x 1/4 in. Female NPT



P/N	Description
B2-TA-1-2	Brass Swagelok Tube Fitting, Male Tube Adapter, 1/8 in. Tube OD x 1/8 in. Male NPT
B2-TA-1-4	Brass Swagelok Tube Fitting, Male Tube Adapter, 1/8 in. Tube OD x 1/4 in. Male NPT
B2-TA-7-2	Brass Swagelok Tube Fitting, Female Tube Adapter, 1/8 in. Tube OD x 1/8 in. Female NPT
B2-TA-7-4	Brass Swagelok Tube Fitting, Female Tube Adapter, 1/8 in. Tube OD x 1/4 in. Female NPT
B400-1-2	Brass Swagelok Tube Fitting, Male Connector, 1/4 in. Tube OD x 1/8 in. Male NPT
B400-1-2BT	Brass Swagelok Tube Fitting, Bored-Through Male Connector, 1/4 in. Tube OD x 1/8 in. Male NP
B400-1-4	Brass Swagelok Tube Fitting, Male Connector, 1/4 in. Tube OD x 1/4 in. Male NPT
B400-1-4BT	Brass Swagelok Tube Fitting, Bored-Through Male Connector, 1/4 in. Tube OD x 1/4 in. Male NPT



P/N	Description
B400-6-1	Brass Swagelok Tube Fitting, Reducing Union, 1/4 in. x 1/16 in. Tube OD
B400-6-2	Brass Swagelok Tube Fitting, Reducing Union, 1/4 in. x 1/8 in. Tube OD
B400-7-2	Brass Swagelok Tube Fitting, Female Connector, 1/4 in. Tube OD x 1/8 in. Female NPT
B400-7-4	Brass Swagelok Tube Fitting, Female Connector, 1/4 in. Tube OD x 1/4 in. Female NPT
B400-R-2	Brass Swagelok Tube Fitting, Reducer, 1/4 in. x 1/8 in. Tube OD
B400-R-4	Brass Swagelok Tube Fitting, Reducer, 1/4 in. x 1/4 in. Tube OD

P/N	Description
B4-TA-1-2	Brass Swagelok Tube Fitting, Male Tube Adapter, 1/4 in. Tube OD x 1/8 in. Male NPT
B4-TA-1-4	Brass Swagelok Tube Fitting, Male Tube Adapter, 1/4 in. Tube OD x 1/4 in. Male NPT
B4-TA-7-2	Brass Swagelok Tube Fitting, Female Tube Adapter, 1/4 in. Tube OD x 1/8 in. Female NPT
B4-TA-7-4	Brass Swagelok Tube Fitting, Female Tube Adapter, 1/4 in. Tube OD x 1/4 in. Female NPT
SS-1F0-3GC	SS Swagelok Tube Fitting, Low Dead Volume Union Tee, 1/16 in. Tube OD
SS-1F0-6GC	SS Swagelok Tube Fitting, Low Dead Volume Union, 1/16 in. Tube OD
SS-200-6-1ZV	SS Swagelok Tube Fitting, Zero Volume Reducing Union, 1/8 x 1/16 in. Tube OD
SS-400-6-1FGC	SS Swagelok Tube Fitting, Female Swagelok Union, 1/4 in. Tube OD x 1/16 in. Female Swagelok Tube Fitting
SS-400-6-1ZV	SS Swagelok Tube Fitting, Zero Volume Reducing Union, 1/4 x 1/16 in. Tube OD
SS100-1-2BT	SS Swagelok Tube Fitting, Bored-Through Male Connector, 1/16 in. Tube OD x 1/8 in. Male NPT
SS100-1-4	SS Swagelok Tube Fitting, Male Connector, 1/16 in. Tube OD x 1/4 in. Male NPT
SS100-1-4BT	SS Swagelok Tube Fitting, Bored-Through Male Connector, 1/16 in. Tube OD x 1/4 in. Male NPT
SS100-4	SS Swagelok Tube Fitting, Union Cross, 1/16 in. Tube OD
P/N	Description
SS100-R-2BT	SS Swagelok Tube Fitting, Bored-Through Reducer, 1/16 in. x 1/8 in. Tube OD
SS100-R-4BT	SS Swagelok Tube Fitting, Bored-Through Reducer, 1/16 in. x 1/4 in. Tube OD
SS200-1-4BT	SS Swagelok Tube Fitting, Bored-Through Male Connector, 1/8 in. Tube OD x 1/4 in. Male NPT
SS200-6-1	SS Swagelok Tube Fitting, Reducing Union, 1/8 in. x 1/16 in. Tube OD
SS200-7-4	SS Swagelok Tube Fitting, Female Connector, 1/8 in. Tube OD x 1/4 in. Female NPT
SS2-TA-1-4	SS Swagelok Tube Fitting, Male Tube Adapter, 1/8 in. Tube OD x 1/4 in. Male NPT
SS400-1-2	SS Swagelok Tube Fitting, Male Connector, 1/4 in. Tube OD x 1/8 in. Male NPT
SS400-1-2BT	SS Swagelok Tube Fitting, Bored-Through Male Connector, 1/4 in. Tube OD x 1/8 in. Male NPT
SS400-1-4	SS Swagelok Tube Fitting, Male Connector, 1/4 in. Tube OD x 1/4 in. Male NPT
SS400-6-1	SS Swagelok Tube Fitting, Reducing Union, 1/4 in. x 1/16 in. Tube OD
SS400-6-2	SS Swagelok Tube Fitting, Reducing Union, 1/4 in. x 1/8 in. Tube OD
SS400-6-2BT	SS Swagelok Tube Fitting, Bored-Through Reducing Union, 1/4 in. x 1/8 in. Tube OD
SS400-6BT	SS Swagelok Tube Fitting, Bored-Through Union, 1/4 in. Tube OD
SS400-7-2	SS Swagelok Tube Fitting, Female Connector, 1/4 in. Tube OD x 1/8 in. Female NPT
SS400-7-4	SS Swagelok Tube Fitting, Female Connector, 1/4 in. Tube OD x 1/4 in. Female NPT
SS400-R-2	SS Swagelok Tube Fitting, Reducer, 1/4 in. x 1/8 in. Tube OD
SS400-R-4	SS Swagelok Tube Fitting, Reducer, 1/4 in. x 1/4 in. Tube OD
SS4-TA-1-2	SS Swagelok Tube Fitting, Male Tube Adapter, 1/4 in. Tube OD x 1/8 in. Male NPT
SS4-TA-1-4	SS Swagelok Tube Fitting, Male Tube Adapter, 1/4 in. Tube OD x 1/4 in. Male NPT
SS4-TA-7-2	SS Swagelok Tube Fitting, Female Tube Adapter, 1/4 in. Tube OD x 1/8 in. Female NPT
SS4-TA-7-2RP	SS Swagelok Tube Fitting, Female Tube Adapter, 1/4 in. Tube OD x 1/8 in. Female ISO Parallel Thread
SS4-TA-7-2RT	SS Swagelok Tube Fitting, Female Tube Adapter, 1/4 in. Tube OD x 1/8 in. Female ISO Tapered
SS4-TA-7-4	SS Swagelok Tube Fitting, Female Tube Adapter, 1/4 in. Tube OD x 1/4 in. Female NPT
SS4-TA-7-8	SS Swagelok Tube Fitting, Female Tube Adapter, 1/4 in. Tube OD x 1/2 in. Female NPT
SS600-1-2	SS Swagelok Tube Fitting, Male Connector, 3/8 in. Tube OD x 1/8 in. Male NPT

Gas Management

One of important parts in GC instrument is gas management. Good gas management will ensure application result correct, accurate, repeatable and reproducibility. Good gas management will also prolong column lifetime and improve analysis limits. Gas management consists of tubing, fitting, valve, regulator, and traps. AirGas smart indicating brass single-stage regulator start kit is one example of integrated gas management system. It minimizes gas leak with factory connection, indicating gas trap will help when the trap needs to be replaced.



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Ordering Information

Product Number	Material	Block and Purge Assembly	Max Inlet Pressure (psig)	Max Outlet Pressure (psig)	Capacity (lpm @ Max Del. Pressure)	Inlet Gauge Range (psig)	Delivery Gauge Range (psig)
CY11-SR145A(CGA)	Brass	Yes	3,500	25	12	0-4,000	30" Hg-0-30
CY11-SR145B(CGA)	Brass	Yes	3,500	50	12	0-4,000	0-60
CY11-SR145D(CGA)	Brass	Yes	3,500	100	12	0-4,000	0-200

Cylinder Gas Pressure Regulator

Brass Body, Dural Stainless Steel Diaphragms 1/8 Inch tubing	
P/N	Description
CG5183-4641	CGA 346, 125 psig max air
CG5183-4642	CGA 350, 125 psig max, H ₂ , Ar/Me
CG5183-4643	CGA 540, 125 psig max, O ₂
CG5183-4644	CGA 580, 125 psig max, He, AR, N ₂
CG5183-4645	CGA 590, 125 psig max, Air



Valves

P/N	Description
B-2JN	Brass Screwed-Bonnet Needle Valve, 1/8 in. Swagelok Tube Fitting
B-2/4JN1	Brass Screwed-Bonnet Needle Valve, 1/8 in. MNPT x 1/4 in. Swagelok Tube Fitting
B-2/4JNA1	Brass Screwed-Bonnet Angle-Pattern Needle Valve, 1/8 in. MNPT x 1/4 in. Swagelok Tube Fitting
B-2/4JNAR1	Brass Screwed-Bonnet Angle-Pattern Needle Valve, 1/8 in. MNPT x 1/4 in. Swagelok Tube Fitting, Regulating Stem



Fittings

P/N	Description
B200-6	Brass Swagelok Tube Fitting, Union, 1/8 in. Tube OD
SS200-6	SS Swagelok Tube Fitting, Union, 1/8 in. Tube OD
B400-R-2	Brass Swagelok Tube Fitting, Reducer, 1/4 in. x 1/8 in. Tube OD
B400-6	Brass Swagelok Tube Fitting, Union, 1/4 in. Tube OD
B200-7-2	Brass Swagelok Tube Fitting, Female Connector, 1/8 in. Tube OD x 1/8 in. Female NPT
B200-7-4	Brass Swagelok Tube Fitting, Female Connector, 1/8 in. Tube OD x 1/4 in. Female NPT
B200-1-2	Brass Swagelok Tube Fitting, Male Connector, 1/8 in. Tube OD x 1/8 in. Male NPT
B200-1-4	Brass Swagelok Tube Fitting, Male Connector, 1/8 in. Tube OD x 1/4 in. Male NPT

Tubing

P/N	Description
C0432002	Copper tubing, 1/8in 50ft roll
C0430036	1/8" X 1/16" PTFE Tubing (50 ft/roll)
C0436003	Pro Tubing cutter

Flow Meter

P/N	Description
CAADM1000	ADM 1000 flow meter 0.5 to 1000ml/min digital display, 9V battery NIST traceable
CFM261239	GFM Flowmeter for Helium 0 - 500 ml/min

Leak Detector

P/N	Description
C021-070	Gow-Mac mini gas leak detector, 10 ⁻⁵ cc/sec helium, 10 ⁻⁴ cc/s argon

Traps

P/N	Description
CARMSH-2	Big universal trap, RMS series 1/8 inch connector Helium
CARMSN-2	Big universal trap, RMS series 1/8 inch connector N2
CABOT-2	Big Oxygen Trap, BOT series, 1/8 inch connector, 750 cc, 250psig max
CABMT-2	Big Moisture Trap, BMT series, 1/8 inch connector, 750 cc, 250psig max
C0202200	1/8" Model 1000 Oxygen Trap
C0202202	1/4" Model 1000 Oxygen Trap
C0202204	Regenerate 1/8" Model 1000 Oxygen Trap
C0202205	Regenerate 1/4" Model 1000 Oxygen Trap
C0202220	1/8" Indicating Oxygen Trap
C0202223	1/4" Indicating Oxygen Trap
C0202224	Regenerate 1/8" Indicating Oxygen Trap
C0202225	Regenerate 1/4" Indicating Oxygen Trap
C0202240	1/8" 120cc Gas Dry Filter Trap
C0202242	1/4" 120cc Gas Dry Filter Trap
C0202244	Refill Kit-Gas Dry Trap // 500cc Mol Sieve & 500 Drierite
C0202248	1/8" 120cc Gas-Dry Filter Trap Bench Mount
C0202249	1/4" 120cc Gas-Dry Filter Trap Bench Mount
C0202258	1/8" 400cc Bench Mount Big Trap
C0202259	1/4" 400cc Bench Mount Big Trap
C0202260	1/8" 400cc Big Trap
C0202262	1/4" 400cc Big Trap
C0202266	1/8" Safe Glass Moisture Trap
C0202268	1/4" Safe Glass Moisture Trap
C0202270	1/8" Model 500 Mol. Sieve Drying Trap
C0202272	1/4" Model 500 Mol. Sieve Drying Trap
C0202280	1/8" 120cc Gas Dry Filter Trap with CoFree Indicator
C0202282	1/4" 120cc Gas Dry Filter Trap with CoFree Indicator
C0202290	1/8" 400cc Big Trap with CoFree Indicator
C0202292	1/4" 400cc Big Trap with CoFree Indicator
C0202294	1/8" 400cc Bench Mount Big Trap with CoFree Indicator
C0202296	1/4" 400cc Bench Mount Big Trap with CoFree Indicator
C0202330	1/8" Model 300 Hydrocarbon Trap
C0202332	1/4" Model 300 Hydrocarbon Trap
C0202340	1/8" Model 100 Safe Glass Hydrocarbon Trap
C0202342	1/4" Model 100 Safe Glass Hydrocarbon Trap

Gas Sampling Bags

P/N	Description
C0410306-4	Metal Film Bag w/ Halkey Robts & Septa/Tube 20.3 L 18" x 18"
C0410308-4	Metal Film Bag w/ Halkey Robts & Septa/Tube 37.7 L 24" x 24"
C0410309-4	Metal Film Bag w/ Halkey Robts & Septa/Tube 53 L 18" x 34"
C0410310-4	Metal Film Bag w/ Halkey Robts & Septa/Tube 24" x 34"

Shut Off Valves

P/N	Description
B-OGS2	Brass Toggle Valve, 1/8 in. Swagelok Tube Fitting
B-2JN	Brass Screwed-Bonnet Needle Valve, 1/8 in. Swagelok Tube Fitting

Wrenches

P/N	Description
CW916508	9/16 and 5/8 inch open
CW716916	7/16 and 9/16 open

Column Supplies Miscellaneous

Column nut

P/N	Description
CA5181-8830	Column nut, 1/16in hex 2/pk, Agilent style
CA05988-20066	MS Interface column nut, female
CA5188-4732	High temp SimDis PTV Inlet 4mm hex

Column scribe

P/N	Description
C021006	Column Scribe, 10/pk

Column cage and Metal Tag

P/N	Description
CO50001	Column metal tag
CO50001-10	Column metal tag, 10/pk
CO50002	Column cage, 17.5cm diameter x 4cm height
CO50002-10	Column cage, 17.5cm diameter x 4cm height, 10/pk

Wrench

P/N	Description
CA8710-0510	Column nut wrench, 1/4 and 5/16 open end

Column butt-connector, fused silica/quartz

P/N	Description
CA705-0905	Fused Silica union, press fit, universal, 2-way, 5/pk
CA705-0903	Fused Silica union, press fit, universal, 3-way
CA5181-3398	Quartz Deactivated splitter
C0204002	Polyimide Sealing Resin (10g)

Syringe Filters and Supplies

Syringe Filters are used for processing small amount (< 1000ml) samples. Typical applications include HPLC mobile phase filtration and desalting, solution filtration in synthesis, particulate filtration of analytical sample, biological sample filtration and quick separation (DNA, plasma, protein, cell cultures, and others). Syringe filters are made of inert plastic house, membrane, and luer lock fit. It is used with disposal syringes or filtration device with luer fit. Syringe filters are often one-time use only.



Features:

- Polypropylene syringe filter house with Luer lock
- 13mm, 25mm and 30mm filtration diameter
- Variety of membrane media and pore sizes
- Plastic box package to prevent from contamination
- Extremely competitive price

Ordering Info

P/N	Description	Qty
SN01322	13mm 0.22um Nylon Syringe filters with Luer lock (Color Coded: Yellow)	100/pk
SN01345	13mm 0.45um Nylon Syringe filters with Luer lock (Color Coded: Pink)	100/pk
SN02522	25mm 0.22um Nylon Syringe filters with Luer lock (Color Coded: Yellow)	100/pk
SN02545	25mm 0.45um Nylon Syringe filters with Luer lock (Color Coded: Pink)	100/pk
SN03045	30mm 0.45um Nylon Syringe filters with Luer lock (Color Coded: Pink)	100/pk
SM01322	13mm 0.22um Mixed cellulose(CA-CN) Syringe filters with Luer lock (Color Coded: Green)	100/pk
SM01345	13mm 0.45um Mixed cellulose(CA-CN) Syringe filters with Luer lock (Color Coded:Blue)	100/pk
SM02522	25mm 0.22um Mixed cellulose(CA-CN) Syringe filters with Luer lock (Color Coded :Green)	100/pk
SM02545	25mm 0.45um Mixed cellulose(CA-CN) Syringe filters with Luer lock (Color Coded:Blue)	100/pk
SM03045	30mm 0.45um Mixed cellulose(CA-CN) Syringe filters with Luer lock (Color Coded:Blue)	100/pk
SP01322	13mm 0.22um PTFE Syringe filters with Luer lock (Color Coded: Purple)	100/pk
SP01345	13mm 0.45um PTFE Syringe filters with Luer lock (Color Coded: Orange)	100/pk
SP02522	25mm 0.22um PTFE Syringe filters with Luer lock (Color Coded: Purple)	100/pk
SP02545	25mm 0.45um PTFE Syringe filters with Luer lock (Color Coded: Orange)	100/pk
SP03045	30mm 0.45um PTFE Syringe filters with Luer lock (Color Coded: Orange)	100/pk
SP03010	30mm 1.0um PTFE Syringe filters with Luer lock (Color Coded: Purple)	100/pk
SPV1322	13mm 0.22um PVDF Syringe filters with Luer lock (Color Coded: Coffee)	100/pk
SPV1345	13mm 0.45um PVDF Syringe filters with Luer lock (Color Coded: Red)	100/pk
SPV2522	25mm 0.22um PVDF Syringe filters with Luer lock (Color Coded: Coffee)	100/pk
SPV2545	25mm 0.45um PVDF Syringe filters with Luer lock (Color Coded: Red)	100/pk
SPE1322	13mm 0.22um PES Syringe filters with Luer lock (Color Coded: White)	100/pk
SPE1345	13mm 0.45um PES Syringe filters with Luer lock (Color Coded: Azury)	100/pk
SPE2522	25mm 0.22um PES Syringe filters with Luer lock (Color Coded: White)	100/pk
SPE2545	25mm 0.45um PES Syringe filters with Luer lock (Color Coded: Azury)	100/pk
SPE3045	30mm 0.45um PES Syringe filters with Luer lock (Color Coded: Azury)	100/pk
SGF1310	13mm 1.0um Glassfiber Syringe filters with Luer lock (Color Coded: TBD)	100/pk
SGF2510	25mm 1.0um Glassfiber Syringe filters with Luer lock (Color Coded: TBD)	100/pk
SGF3010	30mm 1.0um Glassfiber Syringe filters with Luer lock (Color Coded: Darkgreen)	100/pk
Economy Packs		
SN01322-1K	13mm 0.22um Nylon Syringe filters with Luer lock (Color Coded: Yellow)	1000/pk
SN01345-1K	13mm 0.45um Nylon Syringe filters with Luer lock (Color Coded: Pink)	1000/pk
SN02522-0.5K	25mm 0.22um Nylon Syringe filters with Luer lock (Color Coded: Yellow)	500/pk
SN02545-0.5K	25mm 0.45um Nylon Syringe filters with Luer lock (Color Coded: Pink)	500/pk
SN03045-0.5K	30mm 0.45um Nylon Syringe filters with Luer lock (Color Coded: Pink)	500/pk
SM01322-1K	13mm 0.22um Mixed cellulose (CA-CN) Syringe filters with Luer lock (Color Coded:Green)	1000/pk
SM01345-1K	13mm 0.45um Mixed cellulose (CA-CN) Syringe filters with Luer lock (Color Coded:Blue)	1000/pk
SM02522-0.5K	25mm 0.22um Mixed cellulose (CA-CN) Syringe filters with Luer lock (Color Coded:Green)	500/pk
SM02545-0.5K	25mm 0.45um Mixed cellulose (CA-CN) Syringe filters with Luer lock (Color Coded:Blue)	500/pk

P/N	Description	Qty
SM03045-0.5K	30mm 0.45um Mixed cellulose(CA-CN) Syringe filters with Luer lock (Color Coded:Blue)	500/pk
SP01322-1K	13mm 0.22um PTFE Syringe filters with Luer lock (Color Coded: Purple)	1000/pk
SP01345-1K	13mm 0.45um PTFE Syringe filters with Luer lock (Color Coded: Orange)	1000/pk
SP02522-0.5K	25mm 0.22um PTFE Syringe filters with Luer lock (Color Coded: Purple)	500/pk
SP02545-0.5K	25mm 0.45um PTFE Syringe filters with Luer lock (Color Coded: Orange)	500/pk
SP03045-0.5K	30mm 0.45um PTFE Syringe filters with Luer lock (Color Coded: Orange)	500/pk
SP03010-0.5K	30mm 1.0um PTFE Syringe filters with Luer lock (Color Coded: Purple)	500/pk
SPV1322-1K	13mm 0.22um PVDF Syringe filters with Luer lock (Color Coded: Coffee)	1000/pk
SPV1345-1K	13mm 0.45um PVDF Syringe filters with Luer lock (Color Coded: Red)	1000/pk
SPV2522-0.5K	25mm 0.22um PVDF Syringe filters with Luer lock (Color Coded: Coffee)	500/pk
SPV2545-0.5K	25mm 0.45um PVDF Syringe filters with Luer lock (Color Coded: Red)	500/pk
SPE1322-1K	13mm 0.22um PES Syringe filters with Luer lock (Color Coded: White)	1000/pk
SPE1345-1K	13mm 0.45um PES Syringe filters with Luer lock (Color Coded: Azury)	1000/pk
SPE2522-0.5K	25mm 0.22um PES Syringe filters with Luer lock (Color Coded: White)	500/pk
SPE2545-0.5K	25mm 0.45um PES Syringe filters with Luer lock (Color Coded: Azury)	500/pk
SPE3045-0.5K	30mm 0.45um PES Syringe filters with Luer lock (Color Coded: Azury)	500/pk
SGF1310-1K	13mm 1.0um Glassfiber Syringe filters with Luer lock (Color Coded: TBD)	1000/pk
SGF2510-0.5K	25mm 1.0um Glassfiber Syringe filters with Luer lock (Color Coded: TBD)	500/pk
SGF3010-0.5K	30mm 1.0um Glassfiber Syringe filters with Luer lock (Color Coded: Darkgreen)	500/pk

Membrane Discs

Typically used in sample preparation processes including GC and HPLC analysis to separate salts, cell tissues, peptides, DNA and other proteineous matter.



P/N	Description	Qty
G14710	47mm 1.0um Glass fiber Membrane Disc	100/PK
M14722	47mm 0.22um Mixed cellulose(CA-CN) Membrane Disc	100/PK
M14745	47mm 0.45um Mixed cellulose(CA-CN) Membrane Disc	100/PK
N14722	47mm 0.22um Nylon Membrane Disc	100/PK
N14745	47mm 0.45um Nylon Membrane Disc	100/PK
P14722	47mm 0.22um PTFE Membrane Disc	100/PK
P14745	47mm 0.45um PTFE Membrane Disc	100/PK
P24722	47mm 0.22um PVDF Membrane Disc	100/PK
P24745	47mm 0.45um PVDF Membrane Disc	100/PK
G11310	13mm 1.0um Glass fiber Membrane Disc	100/PK
M11322	13mm 0.22um Mixed cellulose(CA-CN) Membrane Disc	100/PK
M11345	13mm 0.45um Mixed cellulose(CA-CN) Membrane Disc	100/PK
N11322	13mm 0.22um Nylon Membrane Disc	100/PK
N11345	13mm 0.45um Nylon Membrane Disc	100/PK
P11322	13mm 0.22um PTFE Membrane Disc	100/PK
P11345	13mm 0.45um PTFE Membrane Disc	100/PK
P21322	13mm 0.22um PVDF Membrane Disc	100/PK
P21345	13mm 0.45um PVDF Membrane Disc	100/PK
G12510	25mm 1.0um Glass fiber Membrane Disc	100/PK
M12522	25mm 0.22um Mixed cellulose(CA-CN) Membrane Disc	100/PK
M12545	25mm 0.45um Mixed cellulose(CA-CN) Membrane Disc	100/PK
N12522	25mm 0.22um Nylon Membrane Disc	100/PK
N12545	25mm 0.45um Nylon Membrane Disc	100/PK
P12522	25mm 0.22um PTFE Membrane Disc	100/PK
P12545	25mm 0.45um PTFE Membrane Disc	100/PK
P22522	25mm 0.22um PVDF Membrane Disc	100/PK
P22545	25mm 0.45um PVDF Membrane Disc	100/PK
Others	Please contact us at info@gs-tek.com for more information.	
	Fritz, HDPE, PTFE, cut to specified diameter	100/pk
	Filtration tube with fritz	50/pk

Chemical Resistance Guide for Membranes

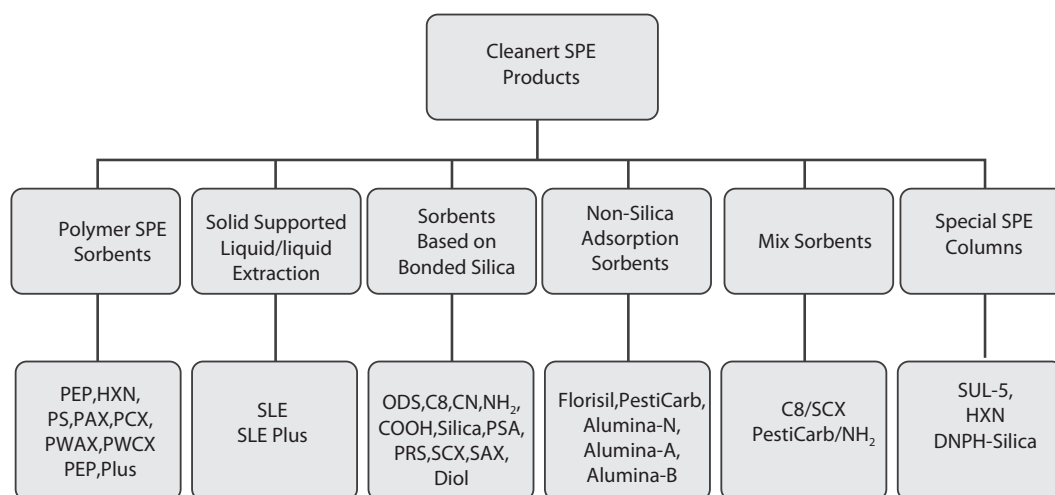
Chemical	Mixed Cellulose Acetate/Nitrate	Regenerate Cellulose	Nylon	PTFE
1-hexanol	+	+	+	+
Acetic acid, 10%&25%	0	+	—	+
Acetone	—	+	+	+
Acetonitrile	—	+	+	—
Aliphatic hydrocarbon	+	+	+	+
Ammonia, 1M	+	+	+	+
Aromatic hydrocarbon	+	+	N/A	+
Benzene	+	+	+	+
Boric acid	+	+	0	+
CTC	0	+	—	+
Carboxylic acid	+	+	—	+
Chloroacetic acid	—	0	—	+
Chloroform	—	+	+	0
Cyclohexane	0	+	+	+
Cyclohexanol	+	+	+	+
Diethyl ether	0	+	+	0
Dimethyl formamide	—	0	+	+
DMSO	—	0	N/A	+
Alcohol = < 98%	+	+	+	+
Acetic ether	—	+	+	+
Vinyl chloride	0	+	+	+
Ethylene glycol	+	+	+	+
Formic acid, 25%	0	+	—	+
N-hexane	+	+	+	+
Hydrochloric acid, 25%	—	+	—	+
Isopropyl alcohol	+	+	+	+
Methanol	+	+	0	+
Nitrous acid, 25%	0	+	—	+
Pentane	+	+	+	+
Phosphoric acid, 25%	+	+	0	+
Phosphoric acid, 45%	0	0	0	+
KOH, 1M	—	0	—	+
Water solution of inorganic salt	+	+	+	+
NaOH, 1M	0	—	—	+
Acetylene tetrachloride	0	+	0	+
THF	—	+	+	0
Toluene	+	+	+	+
TCA, 10%	—	—	0	+
Trichloro ethane	0	+	0	+
Trichloroethylene	0	+	0	+
Dimethyl benzene	+	+	+	+

The mark represent: “+” = chemical resistance; “0” = limited chemical resistance; “—” = no chemical resistance ; N/A= no data.

Solid Phase Extraction (SPE)

Cleanert SPE Columns, Wellplates and Media

GS-Tek has expanded our offerings to a full line of SPE sorbents, columns and wellplates for your sampling preparation needs. Preparation of samples is an integral part of a successful analysis. Thus, the more efficient, reproducible and selective the sample prep step, the more reliable results you can trust.



Cross Reference Table

	GS-Tek	Waters	Supelco	Aglient	Varian
ODS C18	Cleanert C18	Sep-pak C18	ENVI-18 LC-C18	—	Bond Elut C18
ODS C18-N(Non-endcapped)	Cleanert C18-N	—	—	AccuBOND C18	Bond Elut C18-OH
C8	Cleanert C8	Sep-pak C8	ENVI-8	AccuBOND C8	Bond Elut C8
CN Cyanopropyl	Cleanert CN	Sep-pak CN	LC-CN	AccuBOND CN	Bond Elut CN
NH2 Aminopropyl	Cleanert NH2	Sep-pak NH2	LC-NH2	AccuBOND NH2	Bond Elut NH2
PSA(N-aminoethyl Aminopropyl)	Cleanert PSA	—	—	—	Bond Elut PSA
SAX(Strong anion exchanger)	Cleanert SAX	—	LC-SAX	AccuBOND SAX	Bond Elut SAX
COOH(Weak cation exchanger)	Cleanert COOH	—	LC-WCX	—	Bond Elut CBA
PRS(Propane sulfonic acid)	Cleanert PRS	—	—	—	Bond Elut PRS
SCX(Strong cation exchanger)	Cleanert SCX	—	LC-SCX	AccuBOND SCX	Bond Elut SCX
Silica	Cleanert Silica	Sep-pak Silica	LC-Silica	AccuBOND Silica	Bond Elut Silica
Diol	Cleanert Diol	Sep-pak Diol	LC-Diol	AccuBOND Diol	Bond Elut Diol
PS	Cleanert PS	—	ENVI-Chrom P	AccuBOND ENV PS-DVB	—
PEP(Polar polymers)	Cleanert PEP	Oasis HLB	—	—	Bond Elut Plexa
PAX	Cleanert PAX	Oasis MAX	—	—	—
PCX	Cleanert PCX	Oasis MCX	—	—	—
HXN	Cleanert HXN	—	—	—	—

Cleanert Plus SPE Columns and 96 Wellplates

Cleanert Plus SPE products use the particles with narrowly controlled size distribution, a novel frit material & design, unique pre-activation process on reverse phase, and a pre-drying on normal phase columns.

Benefits

- Stable flow rate, clog free
- No activation step is needed, saving 1/3 of work load and time
- More consistent performance from normal phase by pre-drying
- Faster and reliable alternative to liquid/liquid extraction

Application Example: SPE-HPLC Analysis of Terramycin in Serum of Mouse using Cleanert PEP Plus

Method and the Result of Cleanert PEP 60mg/3mL	Method and the Result of Cleanert PEP Plus 60 mg/3mL
Wash with 2mL methanol, 2mL water 12 mins by gravity	Preconditioned 0 mins
Load 2mL sample solution(the mouse serum which contains 10ppm terramycin); 15 mins by gravity	Load 2mL sample solution(the mouse serum which contains 10ppm terramycin); 4 mins by gravity
Wash with 3mL water, then drying the column fully	Wash with 3mL water, then drying the column fully
Elute terramycin with 3mL methanol	Elute terramycin with 3mL methanol
Evaporate the elution by nitrogen at room temperature; dissolve the residue with 2mL mobile phase	Evaporate the elution by nitrogen at room temperature; dissolve the residue with 2mL mobile phase
Recovery: 83.2%	Recovery: 81.4%

Cleanert PEP Plus

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
A hydrophilic and lipophilic balanced material, made of polydivinyl benzene functionalized with a polar group	30mg	1mL	100	PE0301-P
	50mg	1mL	100	PE0501-P
	60mg	3mL	50	PE0603-P
	100mg	3mL	50	PE1003-P
	200mg	6mL	30	PE2006-P
	500mg	6mL	30	PE5006-P
	15mg/well	2mL	96-wellplate	PE0152-WP
	30mg/well	2mL	96-wellplate	PE0302-WP
	50mg/well	2mL	96-wellplate	PE0502-WP

Cleanert Florisil Plus

The new Cleanert Florisil Plus SPE products feature a special frit design making the columns clog-free. The SPE columns also offer a unique “pre-drying” function by removing water that is contained in the samples. These columns have unprecedented consist and reliable performance.

Characteristics

Average particle diameter: 80-100µm; **Pore size:** 80Å; **Specific surface area:** 250-300m²/g

Cleanert Florisil Plus Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Sodium sulfate/Florisil	100mg	1mL	100	FS1001-P
	200mg	3mL	100	FS2003-P
	500mg	3mL	50	FS5003-P
	500mg	6mL	50	FS5006-P
	1g	6mL	30	FS0003-P
	2g	10mL	15	FS2000-P
	100mg/well	2mL	96-wellplate	FS1002-WP

Cleanert Silica Plus

The new Cleanert Silical Plus SPE products feature a special frit design making the columns clog-free. The SPE columns also offer a unique “pre-drying” function by removing water that is contained in the samples. These columns have unprecedented consist and reliable performance.

Characteristics

Average particle diameter: 40-60µm; **Pore size:** 60Å; **Specific surface area:** 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Sodium sulfate/Silica	100mg	1mL	100	SI1001-P
	200mg	3mL	100	SI2003-P
	500mg	3mL	50	SI5003-P
	500mg	6mL	50	SI5006-P
	1g	6mL	30	SI0006-P
	50mg/well	2mL	96-wellplate	SI0502-WP
	100mg/well	2mL	96-wellplate	SI1002-WP

PEP (Polar Polymers) Alternative to Oasis HLB

PEP is made of polydivinylbenzene functionalized with vinyl prolidone. The material has a balanced hydrophilic and hydrophobic property and can be used in the entire pH range of 1-14.

PEP can be used to extract a variety of polar and non-polar compounds. Some highly hydrophilic compounds which have little retention on C18 columns, such as chlorinated phenols, phosphate esters and drug metabolites, can be effectively retained on PEP.

Particle Characteristics

Functionalized polymer sorbents; Average particle size: 35µm. Average pore size: 80Å; Surface area: 600m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PEP	30mg	1mL	100	PE0301
	60mg	3mL	50	PE0603
	100mg	3mL	50	PE1003
	200mg	6mL	30	PE2006
	500mg	6mL	30	PE5006
	30mg/well	2mL	96-wellplate	PE0302-W
	50mg/well	2mL	96-wellplate	PE0502-W
	10g			PE0010
	100g			PE0100

PEP Plus (Pre-conditioned and Clog Resistant)

The PEP Plus columns are packed with high quality PEP sorbents. The sorbents contain high surface area polydivinylbenzene spherical particles that are modified with polar groups to offer a balanced hydrophilicity and hydrophobicity. The characteristics of the sorbent are water-wettable (undesirable drying effects are minimized), wide pH range (1-14), optimized retention for polar compounds and high capacity.

PEP Plus has a novel frit material & design and it has undergone a pre-activation process step during manufacturing. The pre-activation step during manufacturing eliminates the end user's need for an activation step prior to use thus reducing working load by ~30% which is more than 1/3 saved work load!

Particle Characteristics

Polar and spherical particles; Average particle size: 40µm; Average pore size: 70Å; Special surface area: 600m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PEP Plus	30mg	1mL	100	PE0301-P
	60mg	3mL	50	PE0603-P
	100mg	3mL	50	PE1003-P
	200mg	6mL	30	PE2006-P
	500mg	6mL	30	PE5006-P
	30mg/well	2mL	96-wellplate	PE0302-WP
	50mg/well	2mL	96-wellplate	PE0502-WP
	10g			PE0010-P
	100g			PE0100-P

PAX (RP/Strong Anion Exchange)

It is designed to overcome the limitations of traditional silica based mixed-mode SPE sorbents such as C18/SAX. It is a RP/strong anion exchange mixed mode polystyrene/divinylbenzene sorbent, stable from pH 0-14.

Particle Characteristics

Based on functionalized polystyrene/divinylbenzene

Average particle diameter: 40µm; Average pore size: 70Å; Volume of pore: 1.2cm²/g; Specific surface area: 600m²/g.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PAX	30mg	1mL	100	AX0301
	60mg	3mL	50	AX0603
	100mg	3mL	50	AX1003
	200mg	6mL	30	AX2006
	500mg	6mL	30	AX5006
	30mg/well	2mL	96-wellplate	AX0302-W
	50mg/well	2mL	96-wellplate	AX0502-W
	10g			AX0010
	100g			AX0100

PCX (RP/Strong Cation Exchange)

PCX is a mixed-mode, strong cation exchange sorbent. It has reverse-phase and anion-exchange dual functionality. Its high surface area has wide usable pH range of 0-14.

Particle Characteristics

Based on Functionalized polystyrene/divinylbenzene

Average particle diameter: 40µm; Average pore size: 70Å; Volume of pore: 1.2cm²/g; Specific surface area: 600m²/g.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PCX	30mg	1mL	100	CX0301
	60mg	3mL	50	CX0603
	100mg	3mL	50	CX1003
	200mg	6mL	30	CX2006
	500mg	6mL	30	CX5006
	30mg/well	2mL	96-wellplate	CX0302-W
	50mg/well	2mL	96-wellplate	CX0502-W
	10g			CX0010
	100g			CX0100

PWAX (RP/Weak Anion Exchange)

Cleanert PWAX provides the dual modes of retention, weak anion exchange and reverse phase on a stable polymer sorbent, which improves the retention for acidic analytes.

Particle Characteristics

Based on partially functionalized aminopolystyrene/divinylbenzene; Average particle diameter: 40µm; Average pore size: 70Å; Volume of pore: 1.2cm²/g; Specific surface area: 600m²/g.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PWAX	30mg	1mL	100	WAX0301
	60mg	3mL	50	WAX0603
	100mg	3mL	50	WAX1003
	200mg	6mL	30	WAX2006
	500mg	6mL	30	WAX5006
	30mg/well	2mL	96-wellplate	WAX0302-W
	50mg/well	2mL	96-wellplate	WAX0502-W
	10g			WAX0010
	100g			WAX0100

PWCX (RP/Weak Cation Exchange)

Cleanert PWCX provides the dual modes of retention, weak cation exchange and reverse phase on a stable polymer sorbent, which improves the retention for basic analytes.

Particle Characteristics

Based on partially functionalized polystyrene/divinylbenzene; Average particle diameter: 40µm; Average pore size: 70Å; Volume of pore: 1.2cm³/g; Specific surface area: 600m²/g.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PWCX	30mg	1mL	100	WCX0301
	60mg	3mL	50	WCX0603
	100mg	3mL	50	WCX1003
	200mg	6mL	30	WCX2006
	500mg	6mL	30	WCX5006
	30mg/well	2mL	96-wellplate	WCX0302-W
	50mg/well	2mL	96-wellplate	WCX0502-W
	10g			WCX0010
	100g			WCX0100

PEP-ED

PEP-ED is made of the polydivinylbenzene having a surface functionalized with an electron donating group. They can be used in the entire pH 1-14. The surface has a balanced hydrophilic and hydrophobic property and can extract a variety of polar and non-polar compounds, especially with electron-deficient structures.

Particle Characteristics

Adsorption sorbents; Average particle size: 35µm. Average pore size: 80Å; Surface area: 600m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PEP ED	30mg	1mL	100	PE0301-E
	60mg	3mL	50	PE0603-E
	100mg	3mL	50	PE1003-E
	200mg	6mL	30	PE2006-E
	500mg	6mL	30	PE5006-E
	30mg/well	2mL	96-wellplate	PE0302-WE
	50mg/well	2mL	96-wellplate	PE0502-WE
	10g			PE0010-E
	100g			PE0100-E

PEP-ER

PEP-ER is made of the polydivinylbenzene having a surface functionalized with an electron withdrawing group. They can be used in the entire pH 1-14. The surface has a balanced hydrophilic and hydrophobic property and can extract a variety of polar and non-polar compounds, especially having an electron-rich structure

Particle Characteristics

Adsorption sorbents; Average particle size: 35µm. Average pore size: 80Å; Surface area: 600m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PEP ER	30mg	1mL	100	PE0301-R
	60mg	3mL	50	PE0603-R
	100mg	3mL	50	PE1003-R
	200mg	6mL	30	PE2006-R
	500mg	6mL	30	PE5006-R
	30mg/well	2mL	96-wellplate	PE0302-WR
	50mg/well	2mL	96-wellplate	PE0502-WR
	10g			PE0010-R
	100g			PE0100-R

PS

PS is made of non-substituted polydivinylbenzene. It has larger surface areas (>600m²/g.) and thus greater capacity than reverse phase bonded silica. PS can be used for the extraction of non-polar and polar compounds.

Particle Characteristics

Based on polystyrene/divinylbenzene; Average particle diameter: 40µm;

Average pore size: 70Å; Volume of pore: 1.2cm³/g; Specific surface area: 600m²/g.

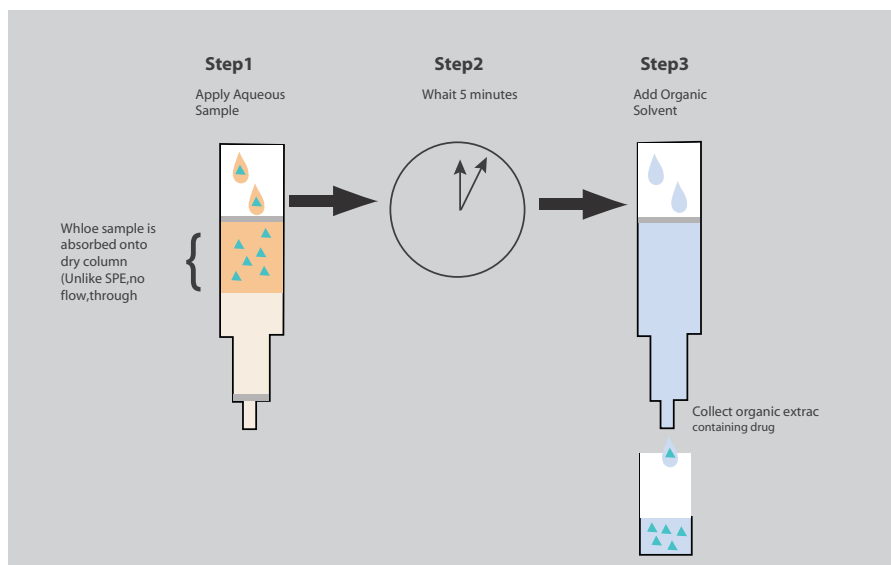
Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PS	30mg	1mL	100	PS0301
	60mg	3mL	50	PS0603
	100mg	3mL	50	PS1003
	200mg	6mL	30	PS2006
	500mg	6mL	30	PS5006
	30mg/well	2mL	96-wellplate	PS0302-W
	50mg/well	2mL	96-wellplate	PS0502-W
	10g			PS0010
	100g			PS0100

SLE (Solid Supported Liquid/Liquid Extraction) Technique

Procedure

- A modified form of diatomaceous earth is packed in a cartridge.
- Biological fluid can be applied to the cartridge using gravity flow.
- The aqueous sample is deposited as a thin film on the hydrophilic surface.
- The analytes are extracted with a water immiscible organic solvent



SLE

Solid supported liquid/liquid Extraction columns and plates use specially treated diatomaceous materials as a solid support for liquid/liquid extractions. The SPE procedures can be easily automated.

The General Method Includes:

1. Load an aqueous sample into the column by gravity or a soft vacuum
2. Apply one or a multiple organic solvents by gravity or well-controlled vacuum
3. Vacuum the organic solution which contains the analyte out from bottom of the columns or plates, collect the solution
4. Concentrate the collected solution

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Special treated diatomite	200mg	3mL	100	SL2003
	500mg	3mL	50	SL5003
	500mg	6mL	50	SL5006
	1g	6mL	30	SL0006
	14g	40mL	10	SL1400
	300mg/well	2mL	96-wellplate	SL3002-W
	500mg/well	2mL	96-wellplate	SL5002-W

SLE Plus

Solid Supported Liquid/Liquid Extraction columns and plates use the specially treated diatomite materials to run liquid/liquid extractions on the solid supports, which are easily automated in parallel to save significant time.

Compared with SLE, the SLE Plus has a special frit design which keeps the columns clog-free for very nasty samples.

The General Method Includes:

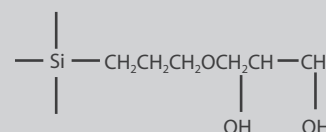
1. Load an aqueous sample into the column by gravity or a soft vacuum
2. Apply one or a multiple organic solvents by gravity or well-controlled vacuum
3. Vacuum the organic solution which contains the analyte out from bottom of the columns or plates, collect the solution
4. Concentrate the collected solution

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Special treated diatomite	200mg	3mL	100	SL2003-P
	500mg	3mL	50	SL5003-P
	500mg	3mL	50	SL5006-P
	1g	6mL	30	SL0006-P
	14g	40mL	10	SL1400-P
	300mg/well	2mL	96-wellplate	SL3002-WP
	500mg/well	2mL	96-wellplate	SL5002-WP

Bonded Silica SPE ODS C18 (End-capped)

ODS C18 products columns and plates are packed with reverse phase, octadecylsilane bonded silica sorbents. The sorbent is double endcapped and has a high bonding density (%C>17). These columns can be used as a replacement for BondElute C18 and Super clean ENVI C18. These products can be used for desalting biomolecules, such as proteins and DNAs.



Particle Characteristics

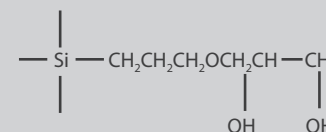
Based on silica; C%: 18-19%; Average particle diameter: 50µm
Average pore size: 60Å; Volume of pore: 0.8cm²/g; Specific surface area: 4802/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert ODS(C18,end-capped)	100mg	1mL	100	181001
	200mg	3mL	50	182003
	500mg	3mL	50	185003
	500mg	6mL	30	185006
	1g	6mL	30	180006
	50mg/well	2mL	96-wellplate	180502-W
	100mg/well	2mL	96-wellplate	181002-W
	10g			180010
	100g			18010

ODS C18-N (Non-end-capped)

ODS C18-N products have silica based reverse phase sorbents bonded with octadecylsilane without endcapping. The extra silanol residue of the sorbent provides additional polar interactions associated with surface silanol groups which enhance the retention of basic compounds. These columns are similar to Agilent AccuBond C18 and BondElute C18 OH.



Particle Characteristics

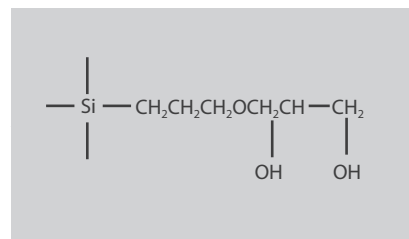
Based on silica; C%: 17-18%; Average particle diameter: 50µm;
Average pore size: 60Å; Volume of pore: 0.8cm²/g; Specific surface area: 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert (C18,Non-end-capped)	100mg	1mL	100	181001-N
	200mg	3mL	50	182003-N
	500mg	3mL	50	185003-N
	500mg	6mL	30	185006-N
	1g	6mL	30	180006-N
	50mg/well	2mL	96-wellplate	180502-N-W
	100mg/well	2mL	96-wellplate	181002-N-W
	10g			180010-N
	100g			180100-N

C8 (Octyl)

The property of C8 products is similar to ODS C18 products. However, this sorbent is slightly less retentive than C18, which facilitates the elution of more hydrophobic substance. C8 is successfully used for the extraction of both water-soluble and fat-soluble vitamins from serum, as well as the desalting of biological macromolecules.



Particle Characteristics

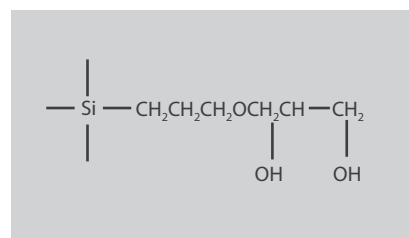
Based on silica; C%: 9-10%; Average particle diameter: 50µm;
Average pore size: 60Å; Volume of pore: 0.8cm³/g; Specific surface area: 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert C8	100mg	1mL	100	81001
	200mg	3mL	50	82003
	500mg	3mL	50	85003
	500mg	6mL	30	85006
	1g	6mL	30	80006
	50mg/well	2mL	96-wellplate	080502-W
	100mg/well	2mL	96-wellplate	081002-W
	10g			80010
	100g			80100

CN (Cyanopropyl)

Cyano(CN) SPE have silica based sorbents bonded with cyanopropyl functional group. This polar sorbent exhibits both polar and non-polar interactions. It can be used for extraction of both polar and non-polar molecules in either normal phase reverse phase mode.



Particle Characteristics

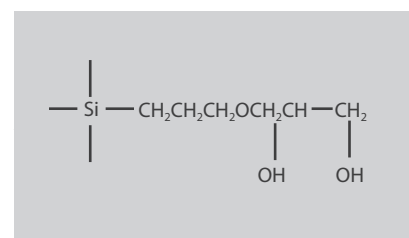
Based on silica; C%: 5-6%; Average particle diameter: 50µm;
Average pore size: 60Å; Volume of pore: 0.8cm³/g; Specific surface area: 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert CN	100mg	1mL	100	CN1001
	200mg	3mL	50	CN2003
	500mg	3mL	50	CN5003
	500mg	6mL	30	CN5006
	1g	6mL	30	CN0006
	50mg/well	2mL	96-wellplate	CN0502-W
	100mg/well	2mL	96-wellplate	CN1002-W
	10g			CN0010
	100g			CN0100

NH2 (Aminopropyl)

NH2 SPE products have silica based sorbents bonded with aminopropyl functional group. This sorbent can be used in either normal phase or reverse phase mode. It retains the analytes either by a polar adsorption (from non-polar solution) or by weak anion exchange (from aqueous solution). pKa=9.8.



Particle Characteristics

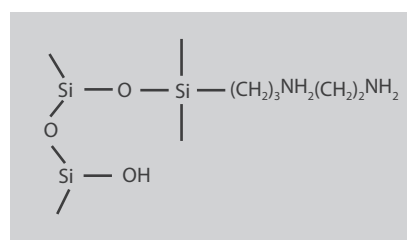
Based on silica; Average particle diameter: 50µm;
Average pore size: 60Å; Volume of pore: 0.8cm³/g; Specific surface area: 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert NH2	100mg	1mL	100	NH1001
	200mg	3mL	50	NH2003
	500mg	3mL	50	NH5003
	500mg	6mL	30	NH5006
	1g	6mL	30	NH0006
	50mg/well	2mL	96-wellplate	NH0502-W
	100mg/well	2mL	96-wellplate	NH1002-W
	10g			NH0010
	100g			NH0100

PSA [(N-aminoethyl) Aminopropyl]

PSA SPE is similar to Cleanert-NH2. PSA has two amino groups with pKa=10.1 and 10.9 respectively. This sorbent is an anion exchanger slightly stronger than NH2. It can be used for the extraction of metal ions by chelating interactions. It is also commonly used to remove organic acids, pigments and metal ions from organic samples such as vegetables and fruits.



Particle Characteristics

Based on silica; Average particle diameter: 50µm;

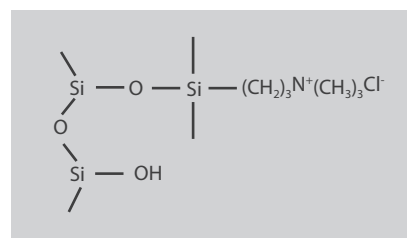
Average pore size: 60Å; Volume of pore: 0.8cm³/g; Specific surface area: 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PSA	100mg	1mL	100	PA1001
	200mg	3mL	50	PA2003
	500mg	3mL	50	PA5003
	500mg	6mL	30	PA5006
	1g	6mL	30	PA0006
	50mg/well	2mL	96-wellplate	PA0502-W
	100mg/well	2mL	96-wellplate	PA1002-W
	10g			PA0010
	100g			PA0100

SAX (Strong Anion Exchanger)

SAX SPE products have silica based sorbents bonded with a quaternary amine. This strong anion exchanger is used to extract compounds capable of carrying a negative charge from both aqueous and non-aqueous solutions. They are ideally suit to extraction of weak acids and desalting of biological macromolecules, like BondElute-SAX.



Particle Characteristics

Based on silica; C%: 9-10%; Average particle diameter: 50µm; Average pore size: 60Å;

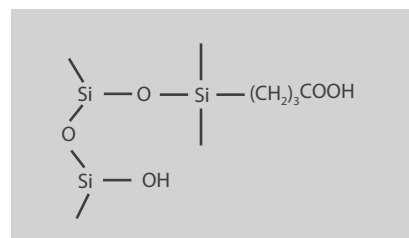
Volume of pore: 0.8cm³/g Specific surface area: 480m²/g The ion exchange degree: 0.5meq/g.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert SAX	100mg	1mL	100	SA1001
	200mg	3mL	50	SA2003
	500mg	3mL	50	SA5003
	500mg	6mL	30	SA5006
	1g	6mL	30	SA0006
	50mg/well	2mL	96-wellplate	SA0502-W
	100mg/well	2mL	96-wellplate	SA1002-W
	10g			SA0010
	100g			SA0100

COOH (Weak Cation Exchanger)

COOH SPE products consist of a propane carboxylic acid on the inner silica surface. The pKa of the carboxylic acid group is approximately 3.8. It is a useful sorbent for quaternary ammonium salt and other strong cations.



Particle Characteristics

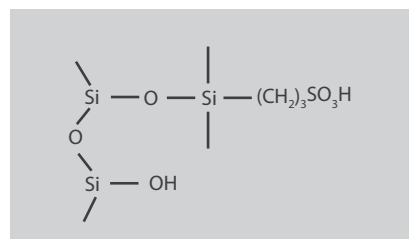
Based on silica; C%: 5-6%; Average particle diameter: 50µm; Average pore size: 60Å; Volume of pore: 0.8cm²/g; Specific surface area: 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert COOH	100mg	1mL	100	CH1001
	200mg	3mL	50	CH2003
	500mg	3mL	50	CH5003
	500mg	6mL	30	CH5006
	1g	6mL	30	CH0006
	50mg/well	2mL	96-wellplate	CH0502-W
	100mg/well	2mL	96-wellplate	CH1002-W
	10g			CH0010
	100g			CH0100

PRS (Propane Sulfonic Acid)

RS SPE sorbent is a silica gel based strong cation exchanger. This sorbent, consisting of a propane sulfonic acid, has slightly less exchange capability than SCX. It can be applied to the extraction of weak cations, such as pyridine, with high recovery.



Particle Characteristics

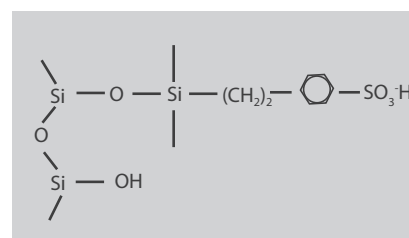
Based on silica; Average particle diameter: 50µm; Average pore size: 60Å; Volume of pore: 0.8cm²/g; Specific surface area: 480m²/g The ion exchange degree: 0.3meq/g.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PRS	100mg	1mL	100	PR1001
	200mg	3mL	50	PR2003
	500mg	3mL	50	PR5003
	500mg	6mL	30	PR5006
	1g	6mL	30	PR0006
	50mg/well	2mL	96-wellplate	PR0502-W
	100mg/well	2mL	96-wellplate	PR1002-W
	10g			PR0010
	100g			PR0100

SCX (Strong Cation Exchanger)

SCX products are strong cation exchangers based on silica gel, with benzene sulfonic acid. The sorbent is used to extract positively charged basic compounds or remove the salt from biological samples. It can also be mixed with C18 sorbent to extract the organic bases.



Particle Characteristics

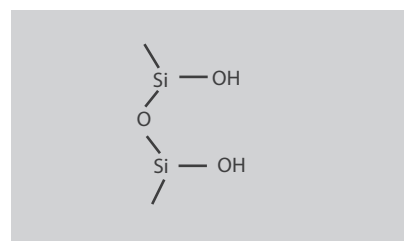
Based on silica; Average particle diameter: 50µm; Average pore size: 60Å; Volume of pore: 0.8cm²/g; Specific surface area: 480m²/g The ion exchange degree: 0.5meq/g.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert SCX	100mg	1mL	100	SC1001
	200mg	3mL	50	SC2003
	500mg	3mL	50	SC5003
	500mg	6mL	30	SC5006
	1g	6mL	30	SC0006
	50mg/well	2mL	96-wellplate	SC0502-W
	100mg/well	2mL	96-wellplate	SC1002-W
	10g			SC0010
	100g			SC0100

Silica

Silica SPE product has unbonded, activated irregular silica as the sorbent. This sorbent exhibits high polar interaction and is used for the extraction of weak-polar or non-polar compound, such as oil. In addition, the silanol groups are ionizable at intermediate pH, so it can be used as a weak cation exchanger.



Particle Characteristics

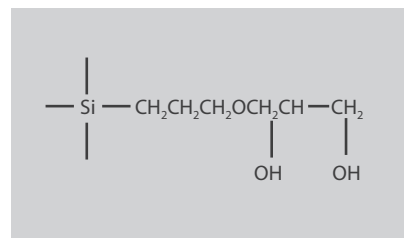
Based on silica; Average particle diameter: 50µm; Average pore size: 60Å; Volume of pore: 0.8cm³/g; Specific surface area: 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert Silica	100mg	1mL	100	SI1001
	200mg	3mL	50	SI2003
	500mg	3mL	50	SI5003
	500mg	6mL	30	SI5006
	1g	6mL	30	SI0006
	50mg/well	2mL	96-wellplate	SI0502-W
	100mg/well	2mL	96-wellplate	SI1002-W
	10g			SI0010
	100g			SI0100

Diol

Silica based dihydroxy SPE. It is used to extract polar analytes from non-polar solutions. It is a neutral sorbent and extracts compounds by forming hydrogen bonding or polar-polar interaction. As an example, it can be used to extract THC.



Particle Characteristics

Based on silica; C%: 5-6%; Average particle diameter: 50µm;
Average pore size: 60Å; Volume of pore: 0.8cm³/g; Specific surface area: 480m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert Diol	100mg	1mL	100	DI1001
	200mg	3mL	50	DI2003
	500mg	3mL	50	DI5003
	500mg	6mL	30	DI5006
	1g	6mL	30	DI0006
	50mg/well	2mL	96-wellplate	DI0502-W
	100mg/well	2mL	96-wellplate	DI1002-W
	10g			DI0010
	100g			DI0100

Non-Silica Adsorption Sorbent Florisil (Magnesia Silica)

PestiCarb is made of graphitized carbon by a distinct surface modification process and has been used for sample cleanup in pesticide residues in plant or animal tissues. This sorbent can effectively reduce the background noise and increase the sensitivity, the functions of which are similar to Supelco Envicarb.

Particle Characteristics

Adsorption sorbents; Average particle diameter: 80-100 μ m (40-60 μ m optional);
Average pore size: 80Å; Specific surface area: 291m²/g

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert Florisil	100mg	1mL	100	FS1001
	200mg	3mL	50	FS2003
	500mg	3mL	50	FS5003
	500mg	6mL	30	FS5006
	1g	6mL	30	FS0006
	50mg/well	2mL	96-wellplate	FS0502-W
	100mg/well	2mL	96-wellplate	FS1002-W
	10g			FS0010
	100g			FS0100

PestiCarb (Graphitized Carbon)

PestiCarb is made of graphitized carbon by a distinct surface modification process, and has been used for sample cleanup in pesticide residues in plants or animal tissues. This sorbent can effectively reduce the background noise and increase the sensitivity, the functions of which are similar to Supelco Envicarb.

Particle Characteristics

Adsorption sorbents; Average particle size: 120-400 mesh.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PestiCarb	100mg	1mL	100	PC1001
	200mg	3mL	50	PC2003
	500mg	3mL	50	PC5003
	500mg	6mL	30	PC5006
	1g	6mL	30	PC0006
	50mg/well	2mL	96-wellplate	PC0502-W
	100mg/well	2mL	96-wellplate	PC1002-W
	10g			PC0010
	100g			PC0100

Alumina N (Aluminium Oxide;Neutral)

Alumina N sorbents(pH=7.5) can adsorb molecules by interaction with the aluminum metal center. The neutralized surface allows interaction with compounds whose heteroatoms are electronegative (e.g.N,S,P) or with an electron-rich ,highly aromatic structure.

Particle Characteristics

Adsorption sorbents;
Average particle size: 150 mesh; Average pore size: 58Å

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert Alumina N	100mg	1mL	100	AL1001-N
	200mg	3mL	50	AL2003-N
	500mg	3mL	50	AL5003-N
	500mg	6mL	30	AL5006-N
	1g	6mL	30	AL0006-N
	50mg/well	2mL	96-wellplate	AL0502-N-W
	100mg/well	2mL	96-wellplate	AL1002-N-W
	10g			AL0010-N
	100g			AL0100-N

Alumina A (Aluminium Oxide; Acidic)

Alumina A sorbents(pH=4.5) can be used as strong polar absorbents or mild cation exchangers. This sorbent is processed with a special deactivation procedure which ensures high analyte recovery.

Particle Characteristics

Adsorption sorbents; Average particle size: 150 mesh; Average pore size: 58Å

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert Alumina A	100mg	1mL	100	AL1001-A
	200mg	3mL	50	AL2003-A
	500mg	3mL	50	AL5003-A
	500mg	6mL	30	AL5006-A
	1g	6mL	30	AL0006-A
	50mg/well	2mL	96-wellplate	AL0502-A-W
	100mg/well	2mL	96-wellplate	AL1002-A-W
	10g			AL0010-A
	100g			AL0100-A

Alumina B (Aluminium Oxide; Basic)

Alumina B products(pH=10) can be used to remove organic acids and phenols in the sample matrix. They have been pre-treated by special deactivation to ensure high analyte recovery.

Particle Characteristics

Adsorption sorbents; Average particle size: 150 mesh; Average pore size: 58Å.

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert Alumina B	100mg	1mL	100	AL1001-B
	200mg	3mL	50	AL2003-B
	500mg	3mL	50	AL5003-B
	500mg	6mL	30	AL5006-B
	1g	6mL	30	AL0006-B
	50mg/well	2mL	96-wellplate	AL0502-B-W
	100mg/well	2mL	96-wellplate	AL1002-B-W
	10g			AL0010-B
	100g			AL0100-B

Mixed and Layered Phases PestiCarb/NH2

PestiCarb/NH2 SPE column is packed with 500mg PestiCarb and 500mg NH2. It has been widely used in analysis of pesticides residue, especially for the Japanese Positive List System. It can be used in pesticide residue analysis, coloring matter, fatty acid and hydroxybenzene.

Particle Characteristics

See Pesticarb and Cleanert NH₂

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert PestiCarb/NH ₂	500mg/500mg	6ml	30	PN0006

C8/SCX

Mixed mode SPE based on silica of C8 and strong cation-exchange. It is usually used for the extraction of basic drugs from urine or blood

Particle Characteristics

See C8 and SCX

Ordering Info

Material	Sorbent	Vol	Tubes/box	P/N
Cleanert C8/SCX	50mg	3mL	50	CS0503
	130mg	3mL	50	CS1303
	300mg	3mL	50	CS3003
	500mg	6mL	30	CS5006
	1g	6mL	30	CS0006
	50mg/well	2mL	96-wellplate	CS0502-W
	100mg/well	2mL	96-wellplate	CS1002-W
	10g			CS0010
	100g			CS0100

Cleanert Pre-IC:

Sample Clean-up Cartridges for Ion Chromatography

The sample preparation is necessary not only for HPLC but also for IC. The demands for sample preparation of IC led to a development of a new SPE product family, which was named "Cleanert Pre-IC". Cleaner Pre-IC can perform superior sample preparation for IC analysis thanks to their high capacity sorbent and a excellent flow characteristics.

Part No.	Resin Type	Average particle size	Capacity	Application
IC-RP	divinylbenzene resin	40µm	300mg/ 1cc cartridge	To remove substances such as aromatic dyes, some aromatic carboxylic acids, hydrocarbons, and surfactants from sample matrices
IC-P	polyvinylpyrrolidone(PVP) polymer resin	40µm	350mg/ 1cc cartridge	To remove the phenolic fraction of humic acids, tannic acids, lignins, anthocyanins, and azodyes from samples.
IC-A	16% cross-linked,styrene-based,anion-exchangeresin in thebicarbonate form.	40µm	0.7meq/ 1cc cartridge	To remove anion contaminant and neutralize the strongly acidic sample solution.
IC-H	16% cross-linked,sulfonic acid ,sulfonic acid ,styrene-based,sulfonic acid ,cation-exchangeresin in thehydrogen form	40µm	2.0-2.2meq/ 1cc cartridge	To remove high levels of alkaline earths and transition metals from sample matrices and in the neutralization of highly alkaline samples such as sodium hydroxide or sodium carbonate.
IC-Na	16% cross-linked,sulfonic acid ,sulfonic acid ,styrene-based,sulfonic acid ,cation-exchangeresin in the sodium form.	40µm	2.0-2.2meq/1cc cartridge	To remove high levels of alkaline earths and transition metals from sample matrices without acidifying the sample. This ensures good recovery of acid labile analytes such as nitrite.
IC-Ag	16% cross-linked,styrene-based,sulfonic acid,cation-exchangeresin in the silverstyrene-based,styrene-based,form.	40µm	2.0-2.2meq/ 1cc cartridge	To remove chloride, bromide, and iodide from sample matrices. An IC- H cartridge should be used after the IC- Ag cartridge to remove dissolved Ag.
IC-Ba	styrene-based,sulfonic acid ,cation-exchangeresin in thebarium form.	40µm	2.0-2.2meq/ 1cc cartridge	To remove SO ₄ ²⁻ For reproducible, quantitative determinations in low-ionic-strength samples, these cartridges should be activated with a chloride-based activating solution. Then the added chloride need to be removed.

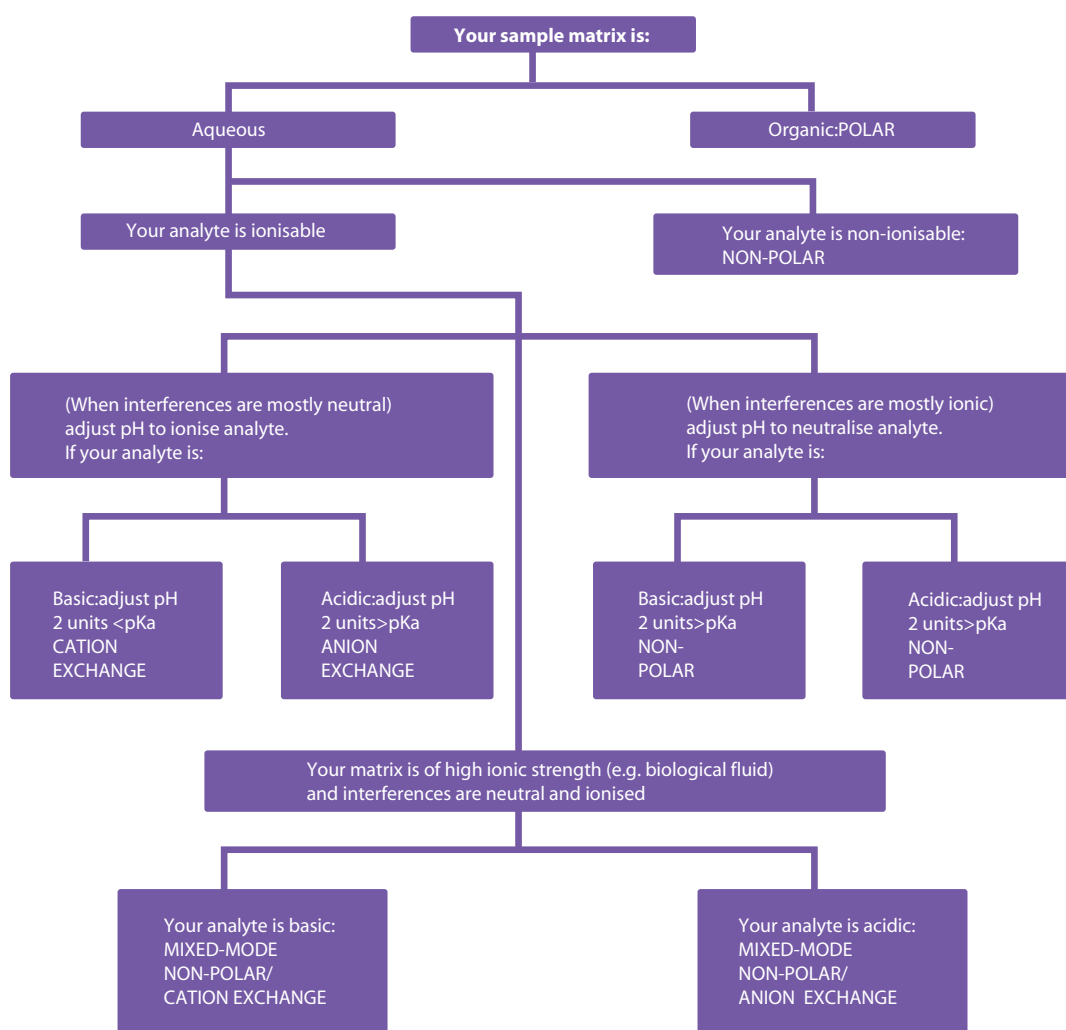
Part No.	Resin Type	Average particle size	Capacity	Application
IC-M	iminodiacetateresin in the ammonium form	40µm	0.4meqmg/1cc cartridge	To remove transition metals and matrix elimination of alkali and alkaline earth metals.
IC-Ag/H	It is a layered cartridge that contains IC- Ag resin and IC- H resin.			
IC-Ba/Ag/H	It is a layered cartridge that contains IC-Ba resin, IC- Ag resin and IC- H resin.			

SPE Method Guideline

There are many factors influencing the method for SPE, and the following are the four main ones which must be considered:

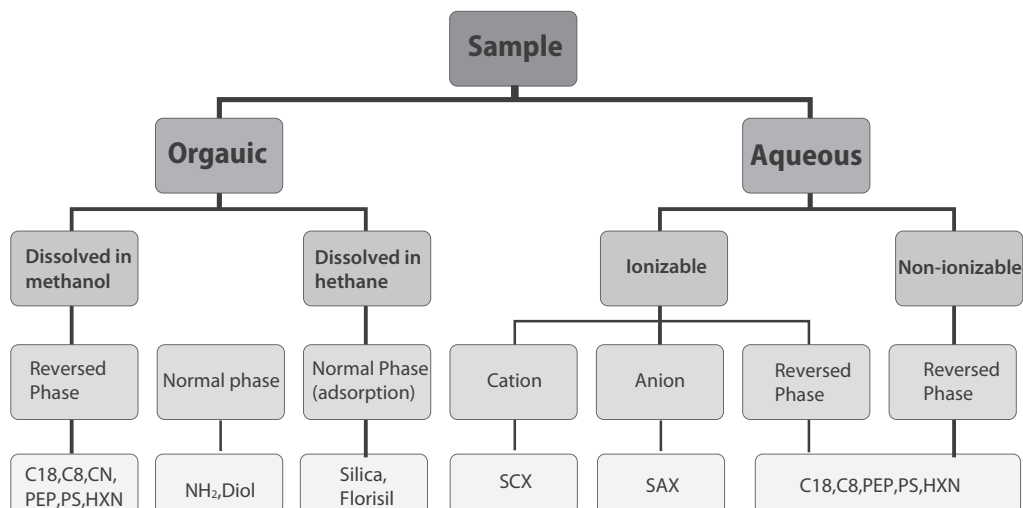
1. The Selection of Sorbent Retention Mechanism

The guide briefly outlines the decision making process required to choose a suitable extraction mechanism starting with understanding the sample matrix properties.



2. The Selection of SPE Columns

The guide page briefly outlines the decision making process required to choose a suitable sorbent.



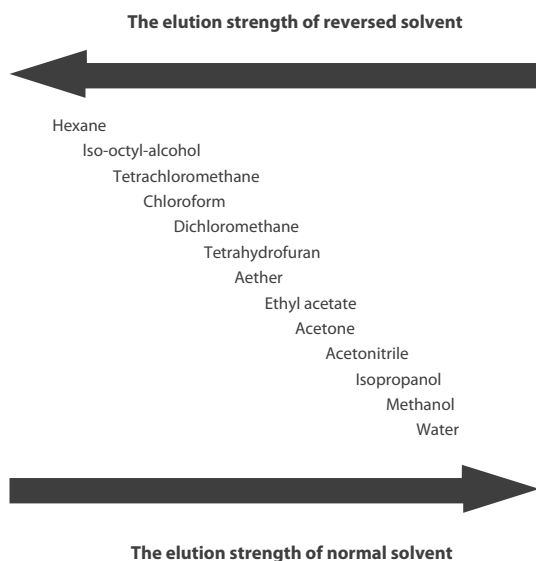
The selection of column packaging and the parameter of sample loading and elution

For the normal phase and reversed phase SPE cartridges, the weight of the sample can not exceed 5% of cartridges load capacity. For the ion-exchange mode, the capacity of the ion-exchange must be considered.

Table below shows the capacity and elution parameters of SPE:

Specification	Loading Sample	The Minimum Volume of Elution
50mg/1mL	2.5mg	125µL
100mg/1 mL	5mg	250µL
200mg/3mL	10mg	500µL
500mg/6mL	25mg	1.2mL
1g/6mL	50mg	2.4mL

3. The Selection of Ideal Elution Solvent



Applications

Application*	Recommended SPE	Instrument
Oleic Acid in Human Plasma	Cleanert PAX, 30mg/mL	HPLC-MS
Pseudoephedrine Hydrochloride in Human Plasma	Cleanert PCX, 100mg/mL	HPLC-MS
Evodiamine and Rutecarpine in Human Serum	Cleanert C18, 200mg/3mL	LC-MS
Malachite Green in Salmon	Cleanert Alumina B; Cleanert SCX	HPLC
Clenbuterol in Urine	Mixed Phase SPE Cleanert C18/SCX 500mg/3mL	LC-MS
Chloramphenicol	Cleanert Florisil 1000mg/6mL	LC-MS
Seven Hydroxybenzenes in Water	Cleanert PEP, 4 nitrophenol	HPLC
Nitroanilines	Cleanert PEP	HPLC (Venusil AQ-C18)
Aniline	Cleanert PEP	HPLC (Venusil AQ-C18)
N,N-dimethylaniline	Cleanert PEP	HPLC (Venusil AQ-C18)
Praziquantel	Cleanert PEP	HPLC (Venusil AQ C18)
Gliclazide	Cleanert PEP	HPLC (Promosil C18)

*Please contact GS-Tek for specifics

HPLC Venusil HPLC Column Family

Venusil HPLC columns are manufactured from the highest purity spherical silica particles on the market. The outstanding properties of the HPLC phases are results of subjecting high quality silica to an innovative surface modification and unique bonding processes. The proprietary nanosurface modification generates a very smooth and even surface reducing the interaction between the silica surface and polar compounds, resulting in symmetric peak shape even for very basic compounds. Based on this technology, a series of unique columns have been developed to meet the tough requirements for the analysis of highly polar compounds. Lot-to-lot reproducibility is ensured by a stable bonding/end-capping process. The uniform, spherical particles have a nominal surface area of 380m²/g, 200 m²/g or 45m²/g, with a controlled pore size of 100Å, 150Å or 300Å, respectively. All columns are packed using a consistent slurry packing process to achieve uniform and stable beds for maximum column efficiency, lifetime and column-to-column reproducibility.

Features:

- Perfect peak symmetry-independent of pH and mobile phase
- Broad pH range (1 – 10.5)
- Compatible with 100% aqueous mobile phase
- Highest surface coverage
- Wide variety of chemistries
- Minimum buffer concentration req'd
- Tightest specification
- Excellent column efficiency
- Great column lifetime
- confidence in results
- Flexibility for method development
- Maximum versatility
- Tolerance of large volume and mass injection
- Broad selection of polarity and maximum versatility
- Better sensitivity for LCMS and extended column life
- Better reproducibility
- Faster separation and reproducibility
- Lower cost and convenience

Benefits:

- Flexibility for any application with better sensitivity and greater

Performance

Best Peak Symmetry and Efficiency

- The Venusil columns generate symmetric peaks with high efficiency over their entire applicable pH range, outperforming competitors' columns.
- The pH-independent high performance feature of Venusil columns allows scientists to establish rugged methods with flexible choice of pH.

Tightest Specification

- All our columns have tighter specification (see below table) than other brand-name columns. This ensures that all columns have great performance and identical selectivity

Comparison of HPLC Specifications			
	Waters Symmetry-C18 4.6x150mm, 5µm	Zorbax XDB-C18 4.6x150mm, 5µm	Venusil XBP C18 (2) 4.6x150mm ,5µm
Spec. on efficiency	N/A	8000	12000
Spec. on tailing factor(toluene)	N/A	0.98-1.25	0.98-1.12
Spec. on tailing factor-amitriptyline	1.8	N/A(typically 1.5-2.0)	1.4
Spec. on selectivity(amitriptyline/acenaphthene)	+/- 10%	N/A	+/- 7%
pH range	2-8	2-9	1.5-9
Specific Surface	300	180	380
Carbon%	16%	12%	19%

Venusil C18 Column Product Line

GS-Tek offers a series of high quality C18 stationary phases to meet a wide range of application needs. These columns contain ultra pure silica subjected to our patented surface deactivation process. By altering the column chemistry, we are able to tune the surface properties of the silica particles and alter selectivity to meet a variety of application needs.

Our columns have very unique properties to meet your special needs.

Venusil XBP-C18 (2): This is phase designed for balanced adsorption to avoid excessive retention of hydrophobic compounds:

- Great peak symmetry for all types of compounds,
- Improved separation of stereo isomers

- Extremely narrow specification during manufacture to offer high column-to-column reproducibility
- Non-excessive retention for hydrophobic peaks (less peak broadening of later eluting compounds compared to other columns)

Venusil ASB C18: This phase is designed for low pH, low bleed (high sensitivity perfect for LC-MS) and strong separation power for polar compounds:

- Extremely low pH stability: pH limit = 0.8 at 70 °C
- Extremely low bleed offering high sensitivity for LC-MS under acidic conditions
- Compatible with 100% aqueous to 100% organic mobile phases
- Non-encapped but with low surface acidity/activity compared to other non-encapped stationary phases

Venusil AQ C18: This phase is designed for polar and semi-polar compounds, to be compatible with 100% water:

- Compatible with 100% aqueous to 100% organic mobile phases
- Applicable to a variety of analytes from very polar to non-polar
- Operates over a wide pH range: 1.0-9.0
- Applicable to a wide range of sample types: plasma, urine, drug formulation, food extraction
- Available in a range of column diameters suitable for LC-MS, conventional analytical, and preparative scale

Venusil XBP-C18: This phase is designed for maximum hydrophobicity and high pH tolerance:

- The highest carbon loading and the most hydrophobic column on the market.
- High pH tolerance
- Not suggested for samples containing highly hydrophobic compounds

Venusil XBP-C18 (L): This phase is designed for larger molecules and highly hydrophobic compounds:

- Larger pore size and lower surface area
- Accelerated elution for highly hydrophobic compounds
- Easier column clean-up for samples containing hydrophobic impurities or samples extracted by non-polar solvents
- Better choice for molecules > 500 Dalton

Properties of Venusil Particles

Stationary Phase	Specific Surface Area (m ² /g)	Pore Size (Å)	Carbon Loading	Particle Size Available (µm)	pH Range	Characteristics
Venusil XBP-C18(2)	380	100	19%	3, 5, 10	1.5	Balanced adsorption to avoid excessive retention; a wider range of suitability; perfect peak symmetry for acidic, basic and neutral compounds; greater separation power for isomers.
Venusil XBP-C18	380	100	22%	3, 5, 10	1.5	The most hydrophobic adsorption; better high pH tolerance; not suggested for samples which contain highly hydrophobic compounds.
Venusil XBP-C18(L)	200	150	15%	3, 5, 10	1.5	Larger pore size and lower surface area; a better choice for the analysis of large molecule and strong hydrophobic compounds.
Venusil AQ C18	380	100	18%	3, 5, 10	1	Slightly polar C18 and enhanced retention for polar compounds; 100% water compatible; good peak shape for acidic, basic and neutral compounds.
Venusil ASB-C18	200	150	12%	3, 5, 10	0.8	Polar C18; extremely low bleed at low pH; great for LC-MS and peptide separation; stable at pH as low as 0.8 at 70 °C.

Venusil XBP C18 (2) Columns

Venusil XBP C18 (2) column packing material is made with ultra pure silica. The silica surface is processed with a patented surface deactivation technology, followed by a unique bonding process that can reduce the carbon content while maintaining a high bonding coverage. The Venusil XBP C18 column does not have excessive retention for highly hydrophobic compounds, and it is great for the separation of acidic, basic, and neutral compounds. Moreover, this column also has superb resolution power for isomers. The perfect peak symmetry offered by this RP column makes it a great first-choice for HPLC method development.

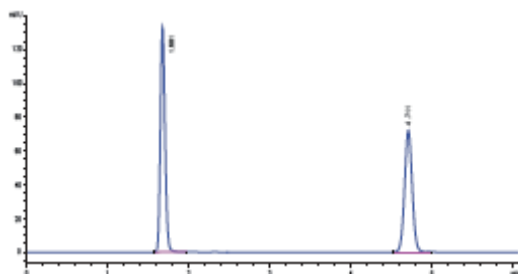
Universal, Highly Inert C18 Columns

- Balanced hydrophobic adsorption which results in a broader suitability
- Stronger separation power for isomers
- Great column-to-column and batch-to-batch reproducibility
- Perfect symmetry for basic, acidic and neutral compounds
- A good replacement for Luna C18 (2) columns!

Technical Parameters

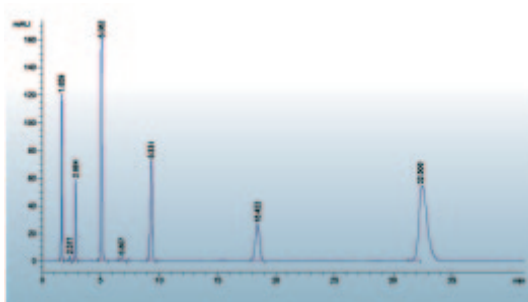
- Metal Impurity < 10ppm
- Particle Size: 5 µm, 3 µm, 10 µm
- Specific Surface: 380m²/g
- Pore Size: 100Å
- Carbon Loading: 19%
- Double End-cap
- pH Range: 1.5-9.0
- Performance: Efficiency > 80,000/m (5 µm)
- TF: 0.98-1.12
- Hydrophobicity Test

Hydrophobicity Test



Column: Venusil XBP C18 (2), 4.6 × 150mm, 5 μm
Sample: Uracil, Toluene
Mobile phase: MeOH: 25 mM KH₂PO₄/K₂HPO₄ (pH 6.0) = 80 : 20
Detection: UV 254 nm
Flow rate: 1mL/min

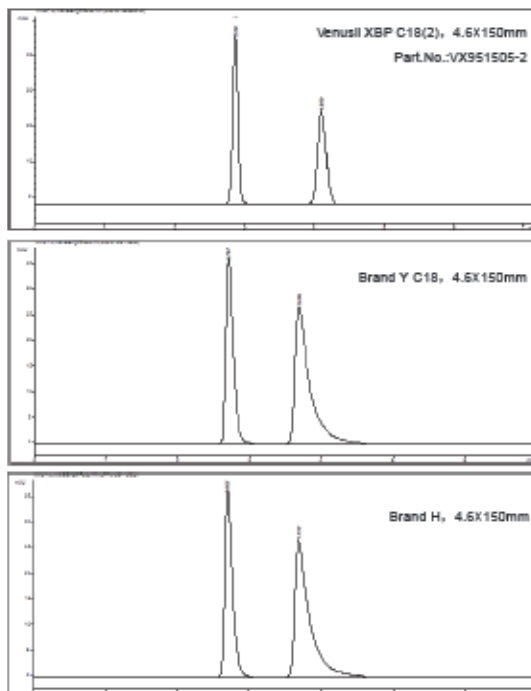
Inertness Test



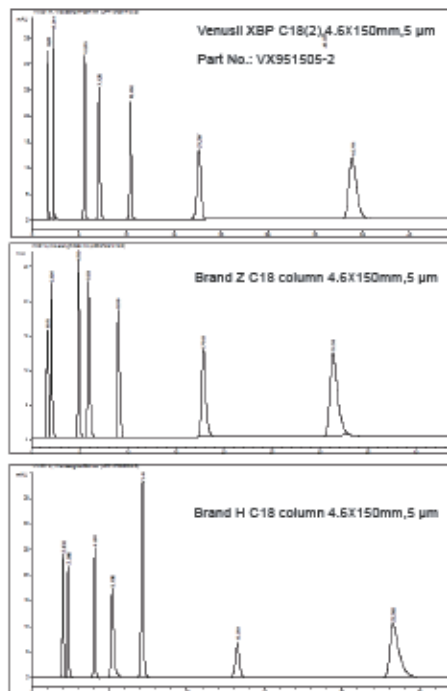
Column: Venusil XBP C18 (2), 4.6 × 150mm, 5 μm
Sample: Amitriptyline
Mobile phase: NaH₂PO₄/Na₂HPO₄ (20mM, pH 6.9) :
MeOH = 29 : 71
Detection: UV 254 nm
Flow rate: 1mL/min

Amitriptyline is a strong basic antidepressant. It is recognized as a compound difficult to obtain good peak shape; But the XBP C18 (2) column performed outstandingly and gave a great peak symmetry (TF = 1.12) .

Extremely Low Metal Effects



Selectivity of Basic Compounds



Mobile Phase: Water :Methanol=65:35
 Flow Rate: 1 mL/min
 Temperature: 35 °C
 Detection: UV 230 nm
 Sample: 2,3-Dihydroxynaphthalene + 2,7-Dihydroxynaphthalene

Mobile Phase: MeOH: Acetic Acid/ sodium acetate aq.
 (pH 5.0) =60: 40
 Flow Rate: 1 mL/min
 Temperature: 30 °C
 Detection: UV 254 nm
 Sample: p-Methyl benzoic acid, Pyridine, Phenol,
 Acetophenone, Amino-dimethyl
 benzene, Toluene

Venusil XBP C18 (2) Ordering Information

Surface Area: 380m²/g, Pore Size: 100Å

Particle size(μm)	Type	Dimension (mm)	Venusil XBP-C18 (2)
5	Analytical	2.1×30	VX950302-2
	Analytical	2.1×50	VX950502-2
	Analytical	2.1×100	VX951002-2
	Analytical	2.1×150	VX951502-2
	Analytical	4.6×50	VX950505-2
	Analytical	4.6×100	VX951005-2
	Analytical	4.6×150	VX951505-2
	Analytical	4.6×250	VX952505-2
	Guard cartridge	4.6×10 4/pk	VX950105-2

Venusil XBP C18 Columns

Venusil XBP C18 columns have the maximum bonding density therefore the highest hydrophobicity (the lowest polarity). This allows for the least interaction between the analytes and the silanol groups. Venusil XBP columns have extraordinary column stability at high pHs.

Pore size: 100Å, 300 Å; Specific surface: 380 m²/g, 45m²/g; Purity > 99.999%;

- Inertness: one of most base-friendly columns.
- Efficiency: excellent at any applicable pH.
- Large volume injection: maintain very high efficiency with very large injection volumes.
- Broad pH range (1.5 – 10.0): low pH, 0.2 % TFA; high pH, 0.010 M triethylamine.
- Other Venusil XBP Columns: A complete line of stationary phases include C8, C4, C1, NH2, Phenyl, CN, Silica, SCX, SAX

Venusil XBP C18 Ordering Information

Surface Area: 380m²/g, Pore Size: 100Å

Particle(μm)	Type	Dimension (mm)	Venusil XBP-C18	Venusil XBP-C8	Venusil XBP-C4	Venusil XBP-C1
5	Analytical	2.1×30	VX950302-0	VX850302-0	VX450302-0	VX150302-0
	Analytical	2.1×50	VX950502-0	VX850502-0	VX450502-0	VX150502-0
	Analytical	2.1×100	VX951002-0	VX851002-0	VX451002-0	VX151002-0
	Analytical	2.1×150	VX951502-0	VX851502-0	VX451502-0	VX151502-0
	Analytical	4.6×50	VX950505-0	VX850505-0	VX450505-0	VX150505-0
	Analytical	4.6×100	VX951005-0	VX851005-0	VX451005-0	VX151005-0
	Analytical	4.6×150	VX951505-0	VX851505-0	VX451505-0	VX151505-0
	Analytical	4.6×200	VX952005-0	VX852005-0	VX452005-0	VX152005-0
	Analytical	4.6×250	VX952505-0	VX852505-0	VX452505-0	VX152505-0
3	Guard cartridge	4.6×10 4/pk	VX950105-0	VX850105-0	VX450105-0	VX150105-0
	Fast analysis	2.1×30	VX930302-0	VX830302-0		
	Fast analysis	2.1×50	VX930502-0	VX830502-0		
	Fast analysis	2.1×100	VX931002-0	VX831002-0		
	Fast analysis	2.1×150	VX931502-0	VX831502-0		
	Fast analysis	4.6×50	VX930505-0	VX830505-0		
	Fast analysis	4.6×100	VX931005-0	VX831005-0		
	Fast analysis	4.6×150	VX931505-0	VX831505-0		
5	Guard cartridge	4.6×10 4/pk	VX930105-0	VX830105-0		
	Semi-preparative	10×150	VX951510-0	VX851510-0		
	Semi-preparative	10×250	VX952510-0	VX852510-0		

Particle(μm)	Type	Dimension (mm)	Venusil XBP-C18	Venusil XBP-C8	Venusil XBP-C4	Venusil XBP-C1
10	Preparative	20×50	VX950520-0	VX850520-0		
	Preparative	20×150	VX951520-0	VX851520-0		
	Preparative	20×250	VX952520-0	VX852520-0		
	Preparative	30×100	VX951030-0	VX851030-0		
	Preparative	30×150	VX951530-0	VX851530-0		
	Preparative	30×250	VX952530-0	VX852530-0		
	Guard cartridge	20×10	VX950120-0	VX850120-0		
	Semi-preparative	10×150	VX901510-0	VX801510-0		
	Semi-preparative	10×250	VX902510-0	VX802510-0		
	Preparative	20×50	VX900520-0	VX800520-0		
	Preparative	20×150	VX901520-0	VX801520-0		
	Preparative	20×250	VX902520-0	VX802520-0		
	Preparative	30×100	VX901030-0	VX801030-0		
	Preparative	30×150	VX901530-0	VX801530-0		
	Preparative	30×250	VX902530-0	VX802530-0		
	Preparative	50×150	VX901550-0	VX801550-0		
	Preparative	50×250	VX902550-0	VX802550-0		
	Guard cartridge	20×10	VX900120-0	VX800120-0		

Surface Area: 380m²/g, Pore Size: 100Å

Particle (μm)	Type	Dimension (mm)	Venusil XBP-NH2	Venusil XBP-Phenyl	Venusil XBP-CN	Venusil Type Silica
5	Analytical	2.1×30	VN850302-0	VX650302-0	VC950302-0	VS950302-0
	Analytical	2.1×50	VN850502-0	VX650502-0	VC950502-0	VS950502-0
	Analytical	2.1×100	VN851002-0	VX651002-0	VC951002-0	VS951002-0
	Analytical	2.1×150	VN851502-0	VX651502-0	VC951502-0	VS951502-0
	Analytical	4.6×50	VN850505-0	VX650505-0	VC950505-0	VS950505-0
	Analytical	4.6×100	VN851005-0	VX651005-0	VC951005-0	VS951005-0
	Analytical	4.6×150	VN851505-0	VX651505-0	VC951505-0	VS951505-0
	Analytical	4.6×200	VN852005-0	VX652005-0	VC952005-0	VS952005-0
	Analytical	4.6×250	VN852505-0	VX652505-0	VC952505-0	VS952505-0
	Guard cartridge	4.6×10 4/pk	VN850105-0	VX650105-0	VC950105-0	VS950105-0

Surface Area: 45m²/g, Pore Size: 300Å

Particle (μm)	Type	Dimension (mm)	Venusil XBP-C18	Venusil XBP-C8	Venusil XBP-C4	Venusil XBP-C1
5	Analytical	2.1×30	VX950302-T	VX850302-T	VX450302-T	VX150302-T
	Analytical	2.1×50	VX950502-T	VX850502-T	VX450502-T	VX150502-T
	Analytical	2.1×100	VX951002-T	VX851002-T	VX451002-T	VX151002-T
	Analytical	2.1×150	VX951502-T	VX851502-T	VX451502-T	VX151502-T
	Analytical	4.6×50	VX950505-T	VX850505-T	VX450505-T	VX150505-T
	Analytical	4.6×100	VX951005-T	VX851005-T	VX451005-T	VX151005-T
	Analytical	4.6×150	VX951505-T	VX851505-T	VX451505-T	VX151505-T
	Analytical	4.6×200	VX952005-T	VX852005-T	VX452005-T	VX152005-T
	Analytical	4.6×250	VX952505-T	VX852505-T	VX452505-T	VX152505-T
	Guard cartridge	4.6×10 4/pk	VX950105-T	VX850105-T	VX450105-T	VX150105-T
	Semi-preparative	10×150	VX951510-T	VX851510-T		
	Semi-preparative	10×250	VX952510-T	VX852510-T		
	Preparative	20×50	VX950520-T	VX850520-T		
	Preparative	20×150	VX951520-T	VX851520-T		
	Preparative	20×250	VX952520-T	VX852520-T		
	Guard cartridge	20×10	VX950120-T	VX850120-T		

Surface Area: 45m²/g, Pore Size: 300Å

Particle (μm)	Type	Dimension (mm)	Venutil XBP-NH2	Venutil XBP-Phenyl	Venutil XBP-CN	Venutil Type Silica
5	Analytical	2.1×30	VN850302-T	VX650302-T	VC950302-T	VSi950302-T
	Analytical	2.1×50	VN850502-T	VX650502-T	VC950502-T	VSi950502-T
	Analytical	2.1×100	VN851002-T	VX651002-T	VC951002-T	VSi951002-T
	Analytical	2.1×150	VN851502-T	VX651502-T	VC951502-T	VSi951502-T
	Analytical	4.6×50	VN850505-T	VX650505-T	VC950505-T	VSi950505-T
	Analytical	4.6×100	VN851005-T	VX651005-T	VC951005-T	VSi951005-T
	Analytical	4.6×150	VN851505-T	VX651505-T	VC951505-T	VSi951505-T
	Analytical	4.6×200	VN852005-T	VX652005-T	VC952005-T	VSi952005-T
	Analytical	4.6×250	VN852505-T	VX652505-T	VC952505-T	VSi952505-T
	Guard cartridge	4.6×10 4/pk	VN850105-T	VX650105-T	VC950105-T	VSi950105-T

Venutil XBP (L) Series Columns

XBP (L) C18 has an identical bonded phase as XBP C18. However, XBP (L) C18 has relatively low surface area which allows compounds to have shorter retention times. These columns are an excellent alternative to Hypersil BDS-C18, Hypersil BDS-C8; Zorbax XDB-C18, Zorbax XDB-C8 which comparatively could have too much retention.

XBP (L) C18 has relatively larger pore size (150Å) suitable for the separation of large molecules.

Venutil XBP (L) Series Ordering Information

Surface Area: 200m²/g, Pore Size: 150Å

Particle (μm)	Type	Dimension (mm)	Venutil XBP(L) C18	Venutil XBP(L) C8	Venutil XBP(L) Silica
5	Analytical	2.1×30	VX950302-L	VX850302-L	VSi950302-L
	Analytical	2.1×50	VX950502-L	VX850502-L	VSi950502-L
	Analytical	2.1×100	VX951002-L	VX851002-L	VSi951002-L
	Analytical	2.1×150	VX951502-L	VX851502-L	VSi951502-L
	Analytical	4.6×50	VX950505-L	VX850505-L	VSi950505-L
	Analytical	4.6×100	VX951005-L	VX851005-L	VSi951005-L
	Analytical	4.6×150	VX951505-L	VX851505-L	VSi951505-L
	Analytical	4.6×250	VX952505-L	VX852505-L	VSi952505-L

Venutil AQ-C18 Columns

The Venutil AQ-C18 column is designed for the separation of polar, semi-polar and non-polar compounds at low to medium pH. This column is more polar than XBP-C18, but less polar than ASB-C18. With a special surface treatment, Venutil AQ-C18 is made to be compatible with 100% aqueous mobile phases and it can be used to replace Waters Symmetry, Inertsil C18, Zorbax SB, Atlantis dC18, and other AQ columns. This column has a pH range of 1.5-9.0.

Pore size: 100 Å; Specific surface: 380 m²/g; Purity > 99.999%;

- Inertness: one of most base-friendly columns, excellent peak symmetry of basic compounds.
- Efficiency: The best column for polar compounds at any pH.
- Large volume injection: maintains very high efficiency even if the injection volume is exceptionally large.
- 100% water compatible: very unique for a universal C18 column; much better peak shape, retention, and efficiency than other brand AQ columns.
- Low pH stability (pH=1.5): better stability than most of the popular brand columns (including other brand AQ columns) on the market.

Venutil AQ-C18 Ordering Information

Surface Area: 380m²/g, Pore Size: 100Å

Particle (μm)	Type	Dimension (mm)	Venutil AQ-C18
5	Analytical	2.1×30	VA950302-0
	Analytical	2.1×50	VA950502-0
	Analytical	2.1×100	VA951002-0
	Analytical	2.1×150	VA951502-0
	Analytical	4.6×50	VA950505-0
	Analytical	4.6×100	VA951005-0
	Analytical	4.6×150	VA951505-0
	Analytical	4.6×250	VA952505-0

Particle (μm)	Type	Dimension (mm)	Venusil AQ-C18
	Guard cartridge	4.6×10 4/pk	VA950105-0
	Fast analysis	2.1×30	VA930302-3
	Fast analysis	2.1×50	VA930502-0
	Fast analysis	2.1×100	VA931002-0
	Fast analysis	2.1×150	VA931502-0
	Fast analysis	4.6×50	VA930505-0
	Fast analysis	4.6×100	VA931005-0
	Fast analysis	4.6×150	VA931505-0
	Guard cartridge	4.6×10 4/pk	VA930105-0
	Semi-preparative	10×150	VA951510-0
	Semi-preparative	10×250	VA952510-0
	Preparative	20×50	VA950520-0
	Preparative	20×150	VA951520-0
	Preparative	20×250	VA952520-0
	Preparative	30×100	VA951030-0
	Preparative	30×150	VA951530-0
	Preparative	30×250	VA952530-0
	Guard cartridge	20×10	VA950120-0

Venusil ASB Columns

The Venusil ASB column is specially designed for the separation of polar compounds from low (extremely stable at pH=1) to medium pH. The stationary phase is end-capped with polar groups and thus has the highest polarity among all Venusil family columns. This column can be used to replace Water Atlantis, Zorbax SB, and other brand AQ columns.

Pore size: 150Å; Specific surface: 200m²/g; Purity > 99.999%

- Low pH stability: great stability even at pH=1
- Peak shape and efficiency: Excellent peak symmetry for basic compounds comparing to other brand polar phase columns
- Polar C18 phase: Very strong separation power for polar compounds
- 100% aqueous compatible: Much better peak shape, retention, and efficiency comparing to other brand "AQ" columns.

Venusil ASB Ordering Information

Surface: 200m²/g, Pore size: 150Å

Particle (μm)	Type	Dimension (mm)	Venusil ASB-C18	Venusil ASB-C8	Venusil ASB-Phenyl
5	Analytical	2.1×30	VS950302-0	VS850302-0	VS650302-0
	Analytical	2.1×50	VS950502-0	VS850502-0	VS650502-0
	Analytical	2.1×100	VS951002-0	VS851002-0	VS651002-0
	Analytical	2.1×150	VS951502-0	VS851502-0	VS651502-0
	Analytical	4.6×50	VS950505-0	VS850505-0	VS650505-0
	Analytical	4.6×100	VS951005-0	VS851005-0	VS651005-0
	Analytical	4.6×150	VS951505-0	VS851505-0	VS651505-0
	Analytical	4.6×250	VS952505-0	VS852505-0	VS652505-0
	Guard cartridge	4.6×10 4/pk	VS950105-0	VS850105-0	VS650105-0
	Semi-preparative	10×150	VS951510-0	VS851510-0	
	Semi-preparative	10×250	VS952510-0	VS852510-0	
	Preparative	20×50	VS950520-0	VS850520-0	
	Preparative	20×150	VS951520-0	VS851520-0	
	Preparative	20×250	VS952520-0	VS852520-0	
	Guard cartridge	20×10	VS950120-0	VS850120-0	

Surface Area: 45m²/g, Pore Size: 300Å

Particle (μm)	Type	Dimension (mm)	Venusil ASB-C18	Venusil ASB-C8
5	Analytical	2.1×30	VS950302-T	VS850302-T
	Analytical	2.1×50	VS950502-T	VS850502-T
	Analytical	2.1×100	VS951002-T	VS851002-T
	Analytical	2.1×150	VS951502-T	VS851502-T

Particle (µm)	Type	Dimension (mm)	Venusil ASB-C18	Venusil ASB-C8
	Analytical	4.6×50	VS950505-T	VS850505-T
	Analytical	4.6×100	VS951005-T	VS851005-T
	Analytical	4.6×150	VS951505-T	VS851505-T
	Analytical	4.6×250	VS952505-T	VS852505-T
	Guard cartridge	4.6×10 4/pk	VS950105-T	VS850105-T

Venusil SCX Columns

SCX HPLC Column is made of spherical silica particles of the highest purity (>99.999%), bonded with aromatic sulfonic acid group. They can be used for the separation of basic, water-soluble compounds and bio-molecules.

Venusil SCX Ordering Information

Surface Area: 200m²/g, Pore Size: 150Å

Particle (µm)	Type	Dimension (mm)	Venusil SCX
5	Analytical	4.6×100	VSc951005-0
	Analytical	4.6×150	VSc951505-0
	Analytical	4.6×250	VSc952505-0
	Guard cartridge	4.6×10 4/pk	VSc950105-0

Surface Area: 50m²/g, Pore Size: 300Å

Particle (µm)	Type	Dimension (mm)	Venusil SCX
5	Analytical	4.6×100	VSc951005-T
	Analytical	4.6×150	VSc951505-T
	Analytical	4.6×250	VSc952505-T
	Guard cartridge	4.6×10 4/pk	VSc950105-T

Venusil SAX Columns

SAX HPLC Column stationary phase is made with high purity spherical silica particles and bonded with quaternary amine groups. The column can be used for the separation of acidic, water-soluble compounds and bio-molecules

Venusil SAX Ordering Information

Surface Area: 200m²/g, Pore Size: 150Å

Particle (µm)	Type	Dimension (mm)	Venusil SAX
5	Analytical	4.6×100	VSa951005-0
	Analytical	4.6×150	VSa951505-0
	Analytical	4.6×250	VSa952505-0
	Guard cartridge	4.6×10 4/pk	VSa950105-0

Surface Area: 50m²/g, Pore Size: 300Å

Particle (µm)	Type	Dimension (mm)	Venusil SAX
5	Analytical	4.6×100	VSa951005-T
	Analytical	4.6×150	VSa951505-T
	Analytical	4.6×250	VSa952505-T
	Guard cartridge	4.6×10 4/pk	VSa950105-T

TIP: The use of non-polar solvents blocks the adsorption sites in the column and may result in peak splitting.

Separation of Bio-molecules

GS-Tek offers a broad line of HPLC columns for Bio-molecules, including reverse phase, normal phase, ion-exchange, HILIC and size exclusion columns. All column packing materials are made of ultra pure silica, bonded with pure silanes to ensure the surface inertness.

General consideration for the column selection:

- Small peptide: C18, C8, C4; 100Å or 150 Å
- Large peptide and proteins: C8, C4, 300 Å; ion-exchange; HILIC; size exclusion
- Mono- and oligo-saccharides: ion-exchange; NH2; HILIC
- Polysaccharides: ion-exchange; size exclusion
- Oligo-nuclei: ion-exchange; reverse phase
- Nuclei acids: ion-exchange; size exclusion

Reverse Phase Columns for Small Molecules

Ordering Information by Type of Stationary Phases

Analytical Columns, Particle Size: 5µm

Dimension (mm)	Venusil XBP Phenyl	Venusil XBP C4	Venusil XBP C1	Venusil XBP CN
	100Å, 380	100Å, 380	100Å, 380	100Å, 380
	M2/g, C%=12	m2/g, C%=7	m2/g, C%= 3	m2/g, C%=7
2.1×20	VX650202-0	VX450202-0	VX150202-0	VC950202-0
2.1×30	VX650302-0	VX450302-0	VX150302-0	VC950302-0
2.1×50	VX650502-0	VX450502-0	VX150502-0	VC950502-0
2.1×100	VX651002-0	VX451002-0	VX151002-0	VC951002-0
2.1×150	VX651502-0	VX451502-0	VX151502-0	VC951502-0
3.0×30	VX650303-0	VX450303-0	VX150303-0	VC950303-0
3.0×50	VX650503-0	VX450503-0	VX150503-0	VC950503-0
3.0×100	VX651003-0	VX451003-0	VX151003-0	VC951003-0
3.0×150	VX651503-0	VX451503-0	VX151503-0	VC951503-0
4.6×50	VX650505-0	VX450505-0	VX150505-0	VC950505-0
4.6×100	VX651005-0	VX451005-0	VX151005-0	VC951005-0
4.6×150	VX651505-0	VX451505-0	VX151505-0	VC951505-0
4.6×200	VX652005-0	VX452005-0	VX152005-0	VC952005-0
4.6×250	VX652505-0	VX452505-0	VX152505-0	VC952505-0
4.6×10	VX650105-0	VX450105-0	VX150105-0	VC950105-0
ID: 2.1, 3.0, 4.6	CH-100	CH-100	CH-100	CH-100

Column Type	Dimension (mm)	Particle Size (µm)	Venusil XBP C18 (2)	Venusil XBP C18 (L)
			ultra surface inertness and reproducibility; balanced retention; 100Å, 380 m2/g, C%=19	same as XBP C18 with larger pore size; 150Å, 200 m2/g, C%=15
Analytical	2.1×30	5	VX950302-2	VX950302-L
Analytical	2.1×50	5	VX950502-2	VX950502-L
Analytical	2.1×100	5	VX951002-2	VX951002-L
Analytical	2.1×150	5	VX951502-2	VX951502-L
Analytical	3.0×30	5	VX950303-2	VX950303-L
Analytical	3.0×50	5	VX950503-2	VX950503-L
Analytical	3.0×100	5	VX951003-2	VX951003-L
Analytical	3.0×150	5	VX951503-2	VX951503-L
Analytical	4.6×50	5	VX950505-2	VX950505-L
Analytical	4.6×100	5	VX951005-2	VX951005-L
Analytical	4.6×150	5	VX951505-2	VX951505-L
Analytical	4.6×200	5	VX952005-2	VX952005-L
Analytical	4.6×250	5	VX952505-2	VX952505-L
Guard Cartridge	4.6×10, 4/pk	5	VX950105-2	VX950105-L
Cartridge Holder	20×10		CH-200	CH-200

Dimension (mm)	Particle Size (µm)	Venusil ASB C18	Venusil ASB C8	Venusil AQ C18	Venusil XBP-C18	Venusil XBP-C8
		extreme low pH tolerance (0.8-7.5), low bleed; 150 Å, 200m2/g; C%=12	C8 for low pH and low bleed; 150 Å, 200m2/g, C%=7	for high aqueous applications; compatible with 100% water; 100Å, 380 m2/g, C%=18	highest hydrophobicity; 100Å, 380m2/g, C%=22	general RP; 100Å, 380 m2/g; C%=14
2.1×30	5	VS950302-0	VS850302-0	VA950302-0	VX950302-0	VX850302-0
2.1×50	5	VS950502-0	VS850502-0	VA950502-0	VX950502-0	VX850502-0
2.1×100	5	VS951002-0	VS851002-0	VA951002-0	VX951002-0	VX851002-0
2.1×150	5	VS951502-0	VS851502-0	VA951502-0	VX951502-0	VX851502-0
3.0×30	5	VS950303-0	VS850303-0	VA950303-0	VX950303-0	VX850303-0
3.0×50	5	VS950503-0	VS850503-0	VA950503-0	VX950503-0	VX850503-0
3.0×100	5	VS951003-0	VS851003-0	VA951003-0	VX951003-0	VX851003-0
3.0×150	5	VS951503-0	VS851503-0	VA951503-0	VX951503-0	VX851503-0
4.6×50	5	VS950505-0	VS850505-0	VA950505-0	VX950505-0	VX850505-0
4.6×100	5	VS951005-0	VS851005-0	VA951005-0	VX951005-0	VX851005-0
4.6×150	5	VS951505-0	VS851505-0	VA951505-0	VX951505-0	VX851505-0
4.6×200	5	VS952005-0	VS852005-0	VA952005-0	VX952005-0	VX852005-0
4.6×250	5	VS952505-0	VS852505-0	VA952505-0	VX952505-0	VX852505-0
G 4.6×10, 4/pk	5	VS950105-0	VS850105-0	VA950105-0	VX950105-0	VX850105-0
2.1×20	3	VS930202-0	VS830202-0	VA930202-0	VX930202-0	VX830202-0
2.1×30	3	VS930302-0	VS830302-0	VA930302-0	VX930302-0	VX830302-0
2.1×50	3	VS930502-0	VS830502-0	VA930502-0	VX930502-0	VX830502-0
2.1×100	3	VS931002-0	VS831002-0	VA931002-0	VX931002-0	VX831002-0
2.1×150	3	VS931502-0	VS831502-0	VA931502-0	VX931502-0	VX831502-0
3.0×30	3	VS930303-0	VS830303-0	VA930303-0	VX930303-0	VX830303-0
3.0×50	3	VS930503-0	VS830503-0	VA930503-0	VX930503-0	VX830503-0
3.0×100	3	VS931003-0	VS831003-0	VA931003-0	VX931003-0	VX831003-0
3.0×150	3	VS931503-0	VS831503-0	VA931503-0	VX931503-0	VX831503-0
G 3.0×10	3	VS930103-0	VS830103-0	VA930103-0	VX930103-0	VX830103-0
4.6×50	3	VS930505-0	VS830502-0	VA930505-0	VX930505-0	VX830502-0
4.6×100	3	VS931005-0	VS831002-0	VA930505-0	VX931005-0	VX831002-0
4.6×150	3	VS931505-0	VS831505-0	VA931505-0	VX931505-0	VX831505-0
G4.6×10	3	VS930105-0	VS830105-0	VA930105-0	VX930105-0	VX830105-0
GCH 2.1, 3.0, 4.6		CH-100		CH-100	CH-100	CH-100
10×150	5	VS951510-0		VA951510-0	VX951510-0	VX851510-0
10×250	5	VS952510-0		VA952510-0	VX952510-0	VX852510-0
20×50	5	VS950520-0		VA950520-0	VX950520-0	VX850520-0
20×150	5	VS951520-0		VA951520-0	VX951520-0	VX851520-0
20×250	5	VS952520-0		VA952520-0	VX952520-0	VX852520-0
30×100	5	VS951030-0		VA951030-0	VX951030-0	VX851030-0
30×150	5	VS951530-0		VA951530-0	VX951530-0	VX851530-0
30×250	5	VS952530-0		VA952530-0	VX952530-0	VX852530-0
G 20×10	5	VS950120-0		VA950120-0	VX950120-0	VX850120-0
10×150	10	VS901510-0			VX901510-0	VX801510-0
10×250	10	VS902510-0			VX902510-0	VX802510-0
20×50	10	VS900520-0			VX900520-0	VX800520-0
20×150	10	VS901520-0			VX901520-0	VX801520-0
20×250	10	VS902520-0			VX902520-0	VX802520-0
30×100	10	VS901030-0			VX901030-0	VX801030-0
30×150	10	VS901530-0			VX901530-0	VX801530-0
30×250	10	VS902530-0			VX902530-0	VX802530-0
50×150	10	VS901550-0			VX901550-0	VX801550-0
50×250	10	VS902550-0			VX902550-0	VX802550-0
G 20×10	10	VS90120-0			VX900120-0	VX800120-0
GCH 20x10		CH-200	CH-200	CH-200	CH-200	CH-200

G=Guard Cartridge; GCH= Guard Cartridge Holder

Reverse Phase Columns for Large Molecules

Particle Size: 5µm; Pore Size: 300Å; Surface Area: 45 m²/g

Column Type	Dimension (mm)	Venustil XBP Phenyl	Venustil XBP C4	Venustil XBP C1	Venustil XBP CN
Analytical	2.1×30	VX650302-T	VX450302-T	VX150302-T	VC950302-T
Analytical	2.1×50	VX650502-T	VX450502-T	VX150502-T	VC950502-T
Analytical	2.1×100	VX651002-T	VX451002-T	VX151002-T	VC951002-T
Analytical	2.1×150	VX651502-T	VX451502-T	VX151502-T	VC951502-T
Analytical	3.0×30	VX650303-T	VX450303-T	VX150303-T	VC950303-T
Analytical	3.0×50	VX650503-T	VX450503-T	VX150503-T	VC950503-T
Analytical	3.0×100	VX651003-T	VX451003-T	VX151003-T	VC951003-T
Analytical	3.0×150	VX651503-T	VX451503-T	VX151503-T	VC951503-T
Analytical	4.6×50	VX650505-T	VX450505-T	VX150505-T	VC950505-T
Analytical	4.6×100	VX651005-T	VX451005-T	VX151005-T	VC951005-T
Analytical	4.6×150	VX651505-T	VX451505-T	VX151505-T	VC951505-T
Analytical	4.6×200	VX652005-T	VX452005-T	VX152005-T	VC952005-T
Analytical	4.6×250	VX652505-T	VX452505-T	VX152505-T	VC952505-T
Guard Cartridge	4.6×10, 4/pk	VX650105-T	VX450105-T	VX150105-T	VC950105-T
Cartridge Holder	2.1, 3.0, 4.6	CH-100	CH-100	CH-100	CH-100
Semi-prep	10×150	VX651510-T	VX451510-T	VX151510-T	VC951510-T
Semi-prep	10×250	VX652510-T	VX452510-T	VX152510-T	VC952510-T
Semi-prep	20×50	VX650520-T	VX450520-T	VX150520-T	VC950520-T
Semi-prep	20×150	VX651520-T	VX451520-T	VX151520-T	VC951520-T
Semi-prep	20×250	VX652520-T	VX452520-T	VX152520-T	VC952520-T
Guard Cartridge	20×10	VX650120-T	VX450120-T	VX150120-T	VC950120-T
Cartridge Holder	20×10	CH-200	CH-200	CH-200	CH-200

Reverse Phase Columns for Large Molecules

Particle Size: 5µm; Pore Size: 300Å; Surface Area: 45 m²/g

Type	Dimension (mm)	Venustil ASB C18 extreme low pH tolerance (0.8-7.5), low bleed	Venustil ASB C8 C8 for low pH and low bleed	Venustil XBP C18 highest hydrophobicity	Venustil XBP C8 General RP
Analytical	2.1×30	VS950302-T	VS850302-T	VX950302-T	VX850302-T
Analytical	2.1×50	VS950502-T	VS850502-T	VX950502-T	VX850502-T
Analytical	2.1×100	VS951002-T	VS851002-T	VX951002-T	VX851002-T
Analytical	2.1×150	VS951502-T	VS851502-T	VX951502-T	VX851502-T
Analytical	3.0×30	VS950303-T	VS850303-T	VX950303-T	VX850303-T
Analytical	3.0×50	VS950503-T	VS850503-T	VX950503-T	VX850503-T
Analytical	3.0×100	VS951003-T	VS851003-T	VX951003-T	VX851003-T
Analytical	3.0×150	VS951503-T	VS851503-T	VX951503-T	VX851503-T
Analytical	4.6×50	VS950505-T	VS850505-T	VX950505-T	VX850505-T
Analytical	4.6×100	VS951005-T	VS851005-T	VX951005-T	VX851005-T
Analytical	4.6×150	VS951505-T	VS851505-T	VX951505-T	VX851505-T
Analytical	4.6×200	VS952005-T	VS852005-T	VX952005-T	VX852005-T
Analytical	4.6×250	VS952505-T	VS852505-T	VX952505-T	VX852505-T
Guard Cartridge	4.6×10, 4/pk	VS950105-T	VS850105-T	VX950105-T	VX850105-T
Cartridge Holder	ID: 2.1, 3.0, 4.6	CH-100	CH-100	CH-100	CH-100
Semi-Prep	10×150	VS951510-T	VS851510-T	VX951510-T	VX851510-T
Semi-Prep	10×250	VS952510-T	VS852510-T	VX952510-T	VX852510-T
Semi-Prep	20×50	VS950520-T	VS850520-T	VX950520-T	VX850520-T
Semi-Prep	20×150	VS951520-T	VS851520-T	VX951520-T	VX851520-T
Semi-Prep	20×250	VS952520-T	VS852520-T	VX952520-T	VX852520-T
Guard Cartridge	20×10	VS950120-T	VS850120-T	VX950120-T	VX850120-T
Cartridge Holder	20×10	CH-200	CH-200	CH-200	CH-200

Normal Phase Columns for Small Molecules

Particle Size: 5µm

Type	Dimension (mm)	Particle Size (µm)	Unisol Amide (HILIC)	Venusil Silica (HILIC II)	Venusil XBP-NH ₂ (HILIC III)	Venusil XBP-Diol	Venusil XBP CN
			unique selectivity; 100Å, 410 m ² /g,	ultra pure ; 100Å, 380m ² /g,	ultra pure: 100 Å,380m ² /g;	ultra pure: 100Å, 380 m ² /g	ultra pure:100Å,380 m ² /g
Analytical	2.1×30	5	VH950302-0	VSi950302-0	VN850302-0	VC950302-0	VD950302-0
Analytical	2.1×50	5	VH950502-0	VSi950502-0	VN850502-0	VC950502-0	VD950502-0
Analytical	2.1×100	5	VH951002-0	VSi951002-0	VN851002-0	VC951002-0	VD951002-0
Analytical	2.1×150	5	VH951502-0	VSi951502-0	VN851502-0	VC951502-0	VD951502-0
Analytical	3.0×30	5	VH950303-0	VSi950303-0	VN850303-0	VC950303-0	VD950303-0
Analytical	3.0×50	5	VH950503-0	VSi950503-0	VN850503-0	VC950503-0	VD950503-0
Analytical	3.0×100	5	VH951003-0	VSi951003-0	VN851003-0	VC951003-0	VD951003-0
Analytical	3.0×150	5	VH951503-0	VSi951503-0	VN851503-0	VC951503-0	VD951503-0
Analytical	4.6×50	5	VH950505-0	VSi950505-0	VN850505-0	VC950505-0	VD950505-0
Analytical	4.6×100	5	VH951005-0	VSi951005-0	VN851005-0	VC951005-0	VD951005-0
Analytical	4.6×150	5	VH951505-0	VSi951505-0	VN851505-0	VC951505-0	VD951505-0
Analytical	4.6×200	5	VH952005-0	VSi952005-0	VN852005-0	VC952005-0	VD952005-0
Analytical	4.6×250	5	VH952505-0	VSi952505-0	VN852505-0	VC952505-0	VD952505-0
Guard cartridge	4.6×10 , 4/ pk	5	VH950105-0	VSi950105-0	VN850105-0	VC950105-0	VD950105-0
GCH	2.1,3.0,4.6		CH-100	CH-100	CH-100	CH-100	CH-100
Semi-preparative	10×150	5	VH951510-0	VSi951510-0	VN851510-0		VC951510-0
Semi-preparative	10×250	5	VH952510-0	VSi952510-0	VN852510-0		VC952510-0
Preparative	20×50	5	VH950520-0	VSi950520-0	VN850520-0		VC950520-0
Preparative	20×150	5	VH951520-0	VSi951520-0	VN851520-0		VC951520-0
Preparative	20×250	5	VH952520-0	VSi952520-0	VN852520-0		VC952520-0
Preparative	30×100	5	VH951030-0	VSi951030-0	VN851030-0		VC951030-0
Preparative	30×150	5	VH951530-0	VSi951530-0	VN851530-0		VC951530-0
Preparative	30×250	5	VH952530-0	VSi952530-0	VN852530-0		VC952530-0
Guard Cartridge	20×10		VH950220-0	VSi950220-0	VN850220-0		VC950220-0
Semi-preparative	10×150	10	VH901510-0	VSi901510-0	VN801510-0		VC901510-0
Semi-preparative	10×250	10	VH902510-0	VSi902510-0	VN802510-0		VC902510-0
Preparative	20×50	10	VH900520-0	VSi900520-0	VN800520-0		VC900520-0
Preparative	20×150	10	VH901520-0	VSi901520-0	VN801520-0		VC901520-0
Preparative	20×250	10	VH902520-0	VSi902520-0	VN802520-0		VC902520-0
Preparative	30×100	10	VH901030-0	VSi901030-0	VN801030-0		VC901030-0
Preparative	30×150	10	VH901530-0	VSi901530-0	VN801530-0		VC901530-0
Preparative	30×250	10	VH902530-0	VSi902530-0	VN802530-0		VC902530-0
Preparative	50×150	10	VH901550-0	VSi901550-0	VN801550-0		VC901550-0
Preparative	50×250	10	VH902550-0	VSi902550-0	VN802550-0		VC902550-0
Guard Cartridge	20×10	10	VH900120-0	VSi900120-0	VN800120-0		VC900120-0
GCH	2.1,3.0,4.6		CH-200	CH-200	CH-200		CH-200

GCH=Guard Cartridge Holder

Ion-exchange Columns

Surface Area: 200m²/g,Pore Size: 150Å

Type	Dimension (mm)	Particle Size (µm)	Venusil SAX	Venusil SCX
Analytical	4.6×100	5	VSa951005-0	VSc951005-0
Analytical	4.6×150	5	VSa951505-0	VSc951505-0

Phone (302)533-5646
Fax (302)737-4547

**Quality
Performance
Cost Effectiveness**

Type	Dimension (mm)	Particle Size (μm)	Venutil SAX	Venutil SCX
Analytical	4.6×250	5	VSa952505-0	VSc952505-0
Guard cartridge	4.6×10 4/pk	5	VSa950105-0	VSc950105-0

Surface Area: 50m²/g, Pore Size: 300Å

Type	Dimension (mm)	Particle Size (μm)	Venutil SAX	Venutil SCX
Analytical	4.6×100	5	VSa951005-T	VSc951005-T
Analytical	4.6×150	5	VSa951505-T	VSc951505-T
Analytical	4.6×250	5	VSa952505-T	VSc952505-T
Guard cartridge	4.6×10 4/pk	5	VSa950105-T	VSc950105-T

Normal Phase Columns for Large Molecules

Ultra Pure Silica; Pore Size: 300 Å; Surface Area: 45m²/g

Type	Dimension (mm)	Particle Size (μm)	Venutil XBP NH2	Venutil XBP Diol	Venutil XBP CN	Unisol Amide (HILIC)	Venutil XBP Silica
Analytical	2.1×30	5	VN850302-T	VD950302-T	VC950302-T	VH950302-T	VSi950302-T
Analytical	2.1×50	5	VN850502-T	VD950502-T	VC950502-T	VH950502-T	VSi950502-T
Analytical	2.1×100	5	VN851002-T	VD951002-T	VC951002-T	VH951002-T	VSi951002-T
Analytical	2.1×150	5	VN851502-T	VD951502-T	VC951502-T	VH951502-T	VSi951502-T
Analytical	3.0×30	5	VN850303-T	VD950303-T	VC950303-T	VH950303-T	VSi950303-T
Analytical	3.0×50	5	VN850503-T	VD950503-T	VC950503-T	VH950503-T	VSi950503-T
Analytical	3.0×100	5	VN851003-T	VD951003-T	VC951003-T	VH951003-T	VSi951003-T
Analytical	3.0×150	5	VN851503-T	VD951503-T	VC951503-T	VH951503-T	VSi951503-T
Analytical	4.6×50	5	VN850505-T	VD950505-T	VC950505-T	VH950505-T	VSi950505-T
Analytical	4.6×100	5	VN851005-T	VD951005-T	VC951005-T	VH951005-T	VSi951005-T
Analytical	4.6×150	5	VN851505-T	VD951505-T	VC951505-T	VH951505-T	VSi951505-T
Analytical	4.6×200	5	VN852005-T	VD952005-T	VC952005-T	VH952005-T	VSi952005-T
Analytical	4.6×250	5	VN852505-T	VD952505-T	VC952505-T	VH952505-T	VSi952505-T
Guard Cartridge	4.6×10, 4/pk	5	VN850105-T	VD950105-T	VC950105-T	VH950105-T	VSi950105-T
GCH	ID: 2.1, 3.0, 4.6		CH-100	CH-100	CH-100	CH-100	CH-100
Semi-preparative	10×150	5	VN851510-T		VC951510-T		VSi951510-T
Semi-preparative	10×250	5	VN852510-T		VC952510-T		VSi952510-T
Preparative	20×50	5	VN850520-T		VC950520-T		VSi950520-T
Preparative	20×150	5	VN851520-T		VC951520-T		VSi951520-T
Preparative	20×250	5	VN852520-T		VC952520-T		VSi952520-T
Preparative	30×100	5	VN851030-T		VC951030-T		VSi951030-T
Preparative	30×150	5	VN851530-T		VC951530-T		VSi951530-T
Preparative	30×250	5	VN852530-T		VC952530-T		VSi952530-T
Guard Cartridge	20×10	5	VN850120-T		VC950120-T		VSi950120-T
GCH	20x10		CH-200		CH-200		CH-200

GCH=Guard cartridge Holder

Polymer Phase Columns

RPC-Analytical Prepacked Columns

Matrix	Dimension (mm)	Particle Size (μm)
AKF-RP-M-154607	4.6×150	7
AKF-RP-M-154610	4.6×150	10
AKF-RP-M-154620	4.6×150	20
AKF-RP-H-254605	4.6×250	5
AKF-RP-H-254607	4.6×250	7
AKF-RP-H-254610	4.6×250	10
AKF-RP-H-254620	4.6×250	20

RPC-Preparative Prepacked Columns

Matrix	Dimension (mm)	Particle Size (µm)
AKF-RP-M-052007	20×50	5
AKF-RP-M-102007	20×100	5
AKF-RP-M-251007	10×250	7
AKF-RP-M-252007	20×250	7
AKF-RP-M-151010	10×150	10
AKF-RP-M-152010	20×150	10
AKF-RP-H-151010	10×150	10
AKF-RP-H-152010	20×150	10
AKF-RP-M-251010	10×250	10
AKF-RP-M-252010	20×250	10
AKF-RP-H-251010	10×250	10
AKF-RP-H-252010	20×250	10
AKF-RP-H-152020	20×150	20
AKF-RP-H-252020	20×250	20
AKF-RP-H-105020	50×100	20
AKF-RP-H-255020	50×250	20
AKF-RP-H-2510020	100×250	20

HPLC Applications

Analyte by Industry	Recommended Column Description	Mobile phase
Pharmaceutical-Antibiotics		
Antibiotics: Sulbactam Sodium +Cefoperazone Sodium	Venusil C18, 4.6mm x 250mm x 5µm	5mmol/L TABOH (pH5.0 w/ H3PO4): ACN 70:30
Antibiotics: Meleumycin	Venusil C8, 4.6mm x 150mm x 5µm	0.2mol/L ammonium formate (pH7.3 w/ TEA):CAN 62:38
Benzylpenicillin Sodium	Venusil AQ-C18, 4.6mm x 150mm x 5µm	0.1mol/L potassium dihydrogen phosphate (pH2.5):acetonitrile=70:30
Amoxicillin Sodium	Venusil AQ-C18, 4.6mm x 150mm x 5µm	0.05mol/L phosphas buffer (pH5.0):acetonitrile=97.5:2.5
Cefotaxime Sodium	Venusil AQ-C18, 4.6mm x 150mm x 5µm	Phosphate buffer (0.4mM KH2PO4+8mMK2HPO4): MeOH=89:11
Cefalexine	Venusil AQ-C18, 4.6mm x 150mm x 5µm	Water/MeOH/3.86% sodium acetate solution/4% acetic acid solution = 742:240:15:3
Cefadroxil	Venusil AQ-C18, 4.6mm x 150mm x 5µm	0.05mol/L phosphate buffer (pH 3.4) :ACN = 92:8
Cefaclor	Venusil AQ-C18, 4.6mm x 150mm x 5µm	Water/MeOH/3.86% sodium acetate solution/4% acetic acid solution = 742:240:15:3
Meleumycin	Venusil XBP-C8, 4.6mm x 150mm x 5µm	Ammonium formate (0.2mol/L adjust to pH 7.3 with TEA) :ACN=62:38
Synthetic Antimicrobial Agents		
Norfloxacin	Venusil XBP C18, 4.6mm x 250mm x 5µm	H3PO4 (0.025 mol/L, adjust to pH 3.0 with TEA):ACN = 87:13
Ofloxacin	Venusil XBP C18, 4.6mm x 250mm x 5µm	NH4AC/ KClO4 (40mM, pH 2.0):ACN=85:15
Ciprofloxacin Lactate	Venusil XBP C18, 4.6mm x 150mm x 5µm	citric acid buffer (0.05 mol/L, adjust to pH 3.5 with TFA):ACN=82:28
Gatifloxacin HCl	Venusil XBP C18(L), 4.6mm x 150mm x 5µm	1%TEA (pH 4.5) :ACN=87:13
Fluconazole	Venusil XBP C18, 4.6mm x 150mm x 5µm	KH2PO4 buffer(adjust to pH7.0 with NaOH):MeOH = 55:45
Steroid Hormones		
Ethinylestradiol	Venusil AQ-C18, 4.6mm x 150mm x 5µm	MeOH:Water = 70:30
Triamcinolone Acetonide	Venusil AQ-C18, 4.6mm x 150mm x 5µm	MeOH:Water = 21:19
Hydrocortisone	Venusil AQ-C18, 4.6mm x 150mm x 5µm	MeOH:Water = 70:30
Dexamethasone	Venusil XBP C18, 4.6 x 150mm x 5µm	Citric acid buffer (0.05 mol/L, adjust to pH 3.5 with TFA):ACN=82:28
Levonorgestrel	Venusil AQ-C18, 4.6mm x 150mm x 5µm	MeOH:Water = 70:30
Prednisone	Venusil AQ-C18, 4.6mm x 150mm x 5µm	Water :THF :MeOH = 668:250:62
Clobetasol Propionate	Venusil AQ-C18, 4.6mm x 150mm x 5µm	Phosphate buffer (0.05 mol/L, pH 2.5) /ACN/MeOH = 425:475:100
Fluocinonide	Venusil XBP C18 4.6 × 150mm x 5 µ m	MeOH :ACN :Water=60:10:30
Alkaloids		
Ganciclovir	Venusil AQ-C18, 4.6mm x 150mm x 5µm	MeOH::water = 5:95

Analyte by Industry	Recommended Column Description	Mobile phase
Nimodipine	Venusil XBP-C18, 4.6mm x 150mm x 5um	MeOH:water = 5:95
Matrine	Venusil XBP-NH2 4.6mm x 250mm x 5um	ACN:Ethanol:3% H3PO4 aq. = 80:10:10
Kakkonein	Venusil XBP-C18, 4.6mm x 150mm x 5um	MeOH:0.1% citric acid=25:75
Omeprazole	Venusil C8, 4.6mm x 150mm x 5um	0.01mol/L phosphate buffer (pH7.6):acetonitrile=75:25
Terfenadine	Venusil AQ-C18, 4.6mm x 150mm x 5um	MeOH:0.1mol/L phosphate buffer=80:20
Arilin related substance	Venusil AQ-C18, 4.6mm x 150mm x 5um	MeOH:water=20:80
Analysis of Aconite, Mesonitine, Hypaconitine	Venusil XBP C18 (2), 4.6mm x 250mm x 5um	ACN:2% acetic acid adjusted pH 6.5 w/ triethylamine=15:85
Agricultural		
Haloxifop-P-methyl	Venusil XBP C18, 4.6mm x 150mm x 5um	ACN:Water=70:30
Fluazifop-p-butyl	Venusil XBP C18, 4.6mm x 150mm x 5um	ACN:Water=70:30
1,2-Dibenzoyl-1-tert-butylhydrazine	Venusil XBP C18, 4.6mm x 150mm x 5um	Water:MeOH =25:75
Others		
Glipizide	Venusil AQ-C18, 4.6mm x 150mm x 5um	phosphate Buffer (0.1 mol/L, pH6.0) :MeOH=55:45
Terfenadine	Venusil AQ-C18, 4.6mm x 150mm x 5um	MeOH: H3PO4/Triethylamine(0.1mol/L) = 80:20
organic acids in Fermentation Broth	Venusil AQ-C18, 4.6mm x 150mm x 5um	0.02M NH4AC Aq.:MeOH=95:5
Catechins in Tea Extract	Venusil AQ-C18, 4.6mm x 250mm x 5um	0.02% H3PO4: MeOH=81:19
Saccharin Sodium in Milk Powder	Venusil AQ-C18, 4.6mm x 250mm x 5um	MeOH:CH3COONH4 (0.02 M) =5:95
DHA in the Health Food	Venusil AQ-C18, 4.6mm x 250mm x 5um	MeOH:Water =80:20
Melamine in Feed	Venusil ASB C18 4.6mm x 250mm x 5um	10mM Citric acid+10mM Perfluorooctane sulfonate(pH 3.0) :ACN=85:15
Tetrodotoxin (TTX)	Venusil ASB C18 4.6mm x 250mm x 5um	0.02% H3PO4:MeOH=40:60
Baicalin	Venusil ASB C18, 4.6mm x 150mm x 5um	MeOH : 1% acetic acid =50:50
Tartrazine in Food	Venusil AQ-C18, 4.6mm x 250mm x 5um	A: Ammonium acetate buffer (pH 4.0) ;B: MeOH

TIP: For long term storage of HPLC column, it is recommended treatment with acetonitrile. Before treating with acetonitrile make sure that the buffers present in the column are washed out completely, because buffers present are potentially soluble in acetonitrile that results in blockage of the capillaries and the column.

Column Performance Regeneration & Care

Due to interactions between the stationary phase and sample components, HPLC columns may occasionally require cleaning or regeneration. The following conditions apply to silica-based columns. Flow rates should be 1/5 - 1/2 of the typical flow rate.

To estimate the column volume, use the following equation:

$$V = \pi r^2 L$$

V = column volume in mL
 r = column radius in cm
 L = column length in cm

PHASE TYPE	RECOMMENDED ACTIONS
UNBONDED SILICA COLUMNS (SILICA)	Rinse with 10 column volumes each of: Hexane, Methylene Chloride, Isopropanol, Methylene Chloride. Mobile phase: Flush column with 30mL 2.5% 2,2-dimethoxy- propane and 2.5% glacial acetic acid in hexane
REVERSED PHASE COLUMNS (C18, C8, C4, C2, C1, PHENYL, CN, NH2)	Rinse with 10 column volumes of: 95% Water/5% Acetonitrile (for buffer removal) followed by 95% Acetonitrile/5% Water mobile phase
REVERSED PHASE PROTEIN/PEPTIDE COLUMNS (C18, C8, C5, C4, PHENYL)	Rinse with 20 column volumes of mobile phase with buffer removed run gradient (2x): A) 0.1% Aqueous TFA in Water B) 0.1% TFA in Acetonitrile/Isopropanol (1:2) 25% B 100% B for 30 minutes Equilibrate with 10 column volumes of mobile phase.
BONDED NORMAL PHASE COLUMNS (CN, NH2, DIOL)	Rinse with 10 column vol umes each of : Chloroform,Isopropanol, Methylene chloride, mobile phase. Exception: Recommended for cleaning Luna Amino when used in reversed phase mode: 1. Wash with at least 30 column volumes of Sodium Hydroxide (pH 11.0) 2. Flush with at least 30 column volumes of Water (HPLC grade) 3. Re-equilibrate to Mobile phase conditions.
GFC/SEC COLUMNS FOR PROTEINS	(300 x 7.8mm size columns) Rinse with 5 column volumes of: 0.1M Phosphate buffer pH 3.0. For strongly retained proteins: Run 100% Water to 100% Acetonitrile to 100% Water over 60 minutes or wash with 5 column volumes of SDS or 6M Guanidine Thiocyanate or 10% DMSO
ION-EXCHANGE COLUMNS (SAX, SCX, NH2, DEAE)	Rinse with 10 column volumes of: 500mM Phosphate buffer pH 7 10% Acetic acid (Aq) 5 Column Volumes of Water 10 Column Volumes of Phosphate buffer pH 7 5 Column Volumes of Water 10 Column Volumes of Methanol 10 Column Volumes of Water For protein removal Follow the above procedure with this exception: Substitute 10 column volumes of Methanol with 10 column volumes of 5M Urea or 5M Guanidine Thiocyanate

Column Care

- Inject only well-prepared (filtration, liquid/liquid extraction, SPE) clean samples
- Minimize pressure surge; avoid mechanical and thermo shock.
- Use guard columns or on-line filtration.
- Flush columns frequently using an appropriate program
- Remove unstable and strongly retained components of no-interest from samples
- Use low pH (1-6) mobile phase if possible.
- Use organic buffer when operating at medium to high pH (6-10)
- Avoid elevated temperature unless it is necessary
- Add 200 ppm sodium azide in aqueous mobile phase to suppress the growth of the bacteria
- Wash out all buffer salts and store the columns in high organic solution for overnight or long time storage
- Hydrophobic Interaction Chromatography Columns

Matrix	Dimension (mm)	Particle Size (µm)
AKF-PHEMM-154607	4.6x150	7
AKF-PHEMM-154610	4.6x150	10
AKF-PHEMM-154620	4.6x150	20
AKF-PHEMH-254607	4.6x250	7
AKF-PHEMH-254610	4.6x250	10
AKF-PHEMH-254620	4.6x250	20
AKF-PHEMH-036410	6.4x30	10
AKF-C4-MM-154607	4.6x150	7
AKF-C4-MM-154610	4.6x150	10
AKF-C4-MM-154620	4.6x150	20
AKF-C4-MH-254607	4.6x250	7
AKF-C4-MH-254610	4.6x250	10
AKF-C4-MH-254620	4.6x250	20
AKF-C4-MH-036410	6.4x30	10
AKF-C8-MM-154607	4.6x150	7
AKF-C8-MM-154610	4.6x150	10
AKF-C8-MM-154620	4.6x150	20
AKF-C8-MH-254607	4.6x250	7
AKF-C8-MH-254610	4.6x250	10
AKF-C8-MH-254620	4.6x250	20
AKF-C8-MH-036410	6.4x30	10
AKF-ETHMM-154607	4.6x150	7
AKF-ETHMM-154610	4.6x150	10

Matrix	Dimension (mm)	Particle Size (μm)
AKF-ETHMM-154620	4.6×150	20
AKF-ETHMH-254607	4.6×250	7
AKF-ETHMH-254610	4.6×250	10
AKF-ETHMH-254620	4.6×250	20
AKF-ETHMH-036410	6.4×30	10

Ion Exchange Chromatography Columns (strong cation)

Matrix	Dimension (mm)	Particle Size (μm)
AKF-CISLM-050207	2.0×50	5
AKF-CISLM-150207	2.0×150	5
AKF-CISLM-154607	4.6×150	7
AKF-CISLM-154610	4.6×150	10
AKF-CISLM-154620	4.6×150	20
AKF-CISLH-154607	4.6×150	7
AKF-CISLH-154610	4.6×150	10
AKF-CISLH-154620	4.6×150	20
AKF-CISLM-254610	4.6×250	10
AKF-CISLH-254610	4.6×250	10
AKF-CISLH-251010	10×250	10
AKF-CISLH-101010	10×100	10

Ion Exchange Chromatography Columns (Weak Cation)

Matrix	Dimension (mm)	Particle Size (μm)
AKF-CLV-050207	2.0×50	5
AKF-CLV-150207	2.0×150	5
AKF-CLV-154607	4.6×150	7
AKF-CLV-154610	4.6×150	10
AKF-CLV-154620	4.6×150	20
AKF-CHV-154607	4.6×150	7
AKF-CHV-154610	4.6×150	10
AKF-CHV-154620	4.6×150	20
AKF-CLV-254610	4.6×250	10
AKF-CHV-254610	4.6×250	10
AKF-CHV-251010	10×250	10
AKF-CHV-101010	10×100	10

Ion Exchange Chromatography Columns (Strong Anion)

Matrix	Dimension (mm)	Particle Size (μm)
AKF-QLV-050207	2.0×50	5
AKF-QLV-150207	2.0×150	5
AKF-QLV-154607	4.6×150	7
AKF-QLV-154610	4.6×150	10
AKF-QLV-154620	4.6×150	20
AKF-QHV-154607	4.6×150	7
AKF-QHV-154610	4.6×150	10
AKF-QHV-154620	4.6×150	20
AKF-QLV-254610	4.6×250	10
AKF-QHV-254610	4.6×250	10
AKF-QHV-251010	10×250	10
AKF-QHV-101010	10×100	10

TIP: Always use HPLC grade solvents to prolong column lifetime.

Ion Exchange Chromatography Columns (Weak Anion)

Matrix	Dimension (mm)	Particle Size (µm)
AKF-DEAL-050207	2.0×50	5
AKF-DEAL-150207	2.0×150	5
AKF-DEAL-154607	4.6×150	7
AKF-DEAL-154610	4.6×150	10
AKF-DEAL-154620	4.6×150	20
AKF-DEAH-154607	4.6×150	7
AKF-DEAH-154610	4.6×150	10
AKF-DEAH-154620	4.6×150	20
AKF-DEAL-254610	4.6×250	10
AKF-DEAH-254610	4.6×250	10
AKF-DEAH-251010	10×250	10
AKF-DEAH-101010	10×100	10

TIP: Before using HPLC, pay attention to the product information and the required pH range. If you are not familiar, typical pH stability while working with silica based HPLC columns are stable within 2 to 6 range.

HPLC Column Selection

Column Selection Parameters

Stationary Phases

- Reverse Phase [C18 (XBP, AQ, ASB), C8 (XBP, ASB), C4, Phenyl]: most HPLC analytical and preparative separations; use shorter chain if the retention is too high on C18 columns; use shorter chain (C8, C4) for proteins and larger peptides.
- Normal Phase [Silica, Amino, SAX, SCX]: for those not applicable on reverse phase; polysaccharides (amino), ion-exchange chromatography, some preparative needs.
- Bi-mode [Cyano, Venusil HILIC]: can be used in both reverse and normal phase modes, alternative selectivity to hydrocarbon-based reverse phases, inert and better reproducibility than silica columns.

Particle Size

- 3 µm: fast analysis, high throughput analytical applications, micro/nano HPLC
- 5 µm: analytical and semi-preparative separation
- 10 µm: preparative separation

Pore Size

- Narrow pore (100-150 Å): MW <3000
- Large pore (300-500 Å): 3000 < MW <50000
- Mega pore (1000 Å): MW >50000

Column Length

- Short (30 mm, 50 mm): high throughput analysis and purification, pre-separation
- Regular (100 mm, 150 mm, 250 mm): more complex sample, larger injection volume

Column Diameter

- Capillary (0.5 mm, 1.0 mm): LC-MS, micro-HPLC, very small sample volume
- Analytical (2.1 mm, 4.6 mm, 10 mm): standard HPLC, analytical and mini-prep
- Preparative (21 mm, 30 mm, 50 mm): preparative HPLC

Basic Considerations in Choosing HPLC Columns

Analyte

- **Molecular Weight** – small molecule (<3000), narrow pore; medium molecule(3000- 50000), large pore; large molecule(>50000), mega pore.
- **Solubility in aqueous solutions** – very hydrophilic, use AQ-C18, ASB-C18 or Venusil HILIC; very hydrophobic, use shorter chain phases (C8, C4, Phenyl, CN); in between, use AQ-C18, ASP-C18, XBP-C18 or Phenyl .
- **Difference between the compounds to be separated** – by polarity, use AQ C18, ASB-C18, cyano, HILIC; by shape or regio-isomer, use XBP-C18, phenyl.

Mobile Phase

- **Solution solvent:** 97-100% aqueous solution, AQ-C18 or ASB-C18; normal phase mode with aqueous mobile phase, Venusil HILIC
- **pH:** pH < 2, C18 phases; pH > 9, XBP-C18; pH= 2-9, most phases; (check the pH range for each column before use!)
- **Salt concentration:** high salt concentration >0.1 M (should be avoided if possible), XBP-C18, SCX, SAX.

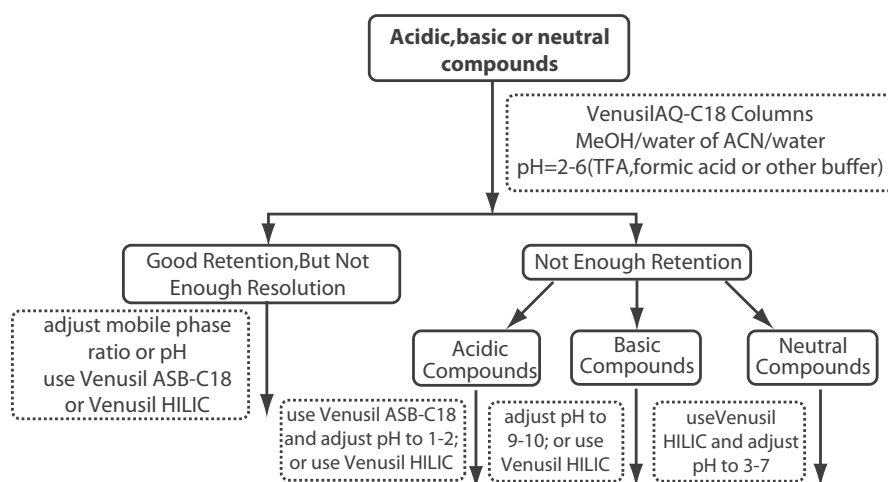
Sample

- Analyte mass/concentration: high mass load, larger diameter column (>10 for preparative).
- Sample volume: small volume, small diameter; large volume, large diameter and length.
- Sample complexity: simple separation, short column; complex separation, long column.

Instrument and Application

- Traditional HPLC analysis: 3μm, 5μm; 4.6 x 100 mm, 4.6 x 150 mm, 4.6 x 250 mm
- High throughput analysis: 3μm, 5μm; 2.1 x 30 mm, 2.1 x 50 mm, 4.6 x 50 mm.
- LC-MS application: 3μm, 5μm; 1.0 x 30 mm, 1.0 x 50 mm, 2.1 x 30 mm, 2.1 x 50 mm, 2.1 x 100 mm.
- Micro HPLC: 3μm, 5μm; 0.5 x 30 mm, 0.5 x 50 mm, 0.5 x 100 mm.
- Preparative HPLC: 5μm, 10μm; 21 x 50 mm, 21 x 150 mm, 21 x 250 mm, 30 x 150 mm, 30 x 250 mm, 50 x 250 mm.

Column Selection Diagram



Cross-reference for GS-Tek Venusil Series Columns

	XBP C18	XBP C18 (2)	XBP C8	XBP(L) C18	XBP(L) C8	ASB C18	ASB C8	AQ C18	HILIC
Agilent									
SB-C18						R			
SB-C8							R		
XDB-C18				R					
XDB-C8					R				
SB-Aq								R	
Waters									
Sunfire-C18	R	R							
Sunfire C8			R						
Atlantis-C18 (AQ)								E	
Atlantis-HILIC									R

	XBP C18	XBP C18 (2)	XBP C8	XBP(L) C18	XBP(L) C8	ASB C18	ASB C8	AQ C18	HILIC
Phenomenex									
Luna-C18	E								
Luna-C8			E						
Luna-C18 (2)		E							
Supelco									
Discovery-C18				E					
Discovery-C8					E				
Asentics-C18	E								
Asentics-C8			E						
GL Science									
Inertsil ODS-3								R	

Comparison of Particle Characteristics of Typical HPLC Stationary Phases

Stationary Phase	Particle um	Pore(A)	Surface(m ² /g)	C%	End Capping	High Purity Silica
Venusil XBP-C18 (2)	5	100	380	19	double	Yes
Venusil XBP-C18	5	100	380	22	double	yes
Venusil AQ-C18	5	100	380	18	yes	yes
Venusil ASB-C18	5	150	200	11	no	yse
Venusil XBP-C18(L)	5	150	200	14	double	yes
ZORBAX SB-C18	5	80	180	10	no	yes
ZORBAX XDB-C18	5	80	180	12	yes	yes
Waters SunFire C18	5	100	340	16	yes	yes
Waters Symmetry C18	5	100	335	19	yes	yes
Waters XTerra MS C18	5	125	—	15.5	yes	—
Hypersil BDS C18	5	130	170	11	yes	no
Hypersil ODS	5	120	170	10	yes	no
Inertsil ODS	5	100	350	14	yes	no
Inertsil ODS3	5	100	450	15	yes	yes
Kromasil C18	5	100	340	19	yes	special
Supelco Discovery C18	5	180	200	12	yes	yes
Luna C18(2)	5	100	400	17.5	yes	yes

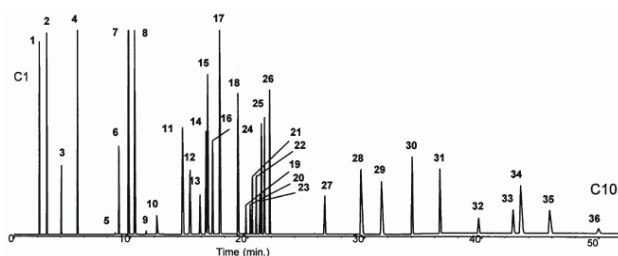
USP Column Selection Guide

USP	Specifications	Column	Particle Shape
L01	Octadecyl silane bonded to porous silica or ceramic microparticles, 3 to 10µm in diameter.	Venusil C18	Spherical
L02	Octadecyl silane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50µm in diameter	Please call	
L03	Porous silica microparticles, 5 to 10 µm in diameter	Venusil silica	Spherical
L04	Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50µm in diameter.	Please call	
L05	Alumina of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.	Please call	
L06	Strong cation-exchange packing: sulfonated fluorocarbon polymer coated on a solid spherical core, 30 to 50 µm in diameter.	Please call	
L07	Octylsilane bonded to totally porous microsilica particles, 3 to 10 µm in diameter.	Venusil C8	Spherical
L08	An essentially monomolecular layer of aminopropyl-silane chemically bonded to totally porous silica gel support, 10 µm in diameter.	Venusil NH ₂	Spherical
L09	10 µm irregular totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating.	Please call	Irregular
L10	Nitrile groups chemically bonded to porous silica microparticles, 3 to 10 µm in diameter.	Venusil CN	Spherical
L11	Phenyl groups chemically bonded to porous silica micro-particles, 3 to 10 µm in diameter.	Venusil Phenyl	Spherical
L12	Strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter	Please call	
L13	Trimethylsilane chemically bonded to porous silica microparticles, 3 to 10 µm in diameter.	Please call	Spherical
L14	Silica gel, 10 µm in diameter, having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating.	Please call	Spherical
L15	Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter.	Please call	
L16	Dimethyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter.	Please call	Spherical

USP	Specifications	Column	Particle Shape
L17	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 to 11 µm in diameter.	AKF CISLH columns	Spherical
L18	Amino and cyano groups chemically bonded to porous silica particles, 5 to 10 µm in diameter.	Please call	Irregular
L19	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 9 µm in diameter.	AKF CISLM columns	Spherical
L20	Dihydroxypropane groups chemically bonded to	Please call	Spherical
L21	A rigid, spherical styrene-divinylbenzene copolymer, 5 to 10 µm in diameter.	AKF RP columns	Spherical
L22	A cation exchange resin made of porous polystyrene gel with sulfonic acid groups, about 10 µm in size.	AKF CISLH columns	Spherical
L23	An ion exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, about 10 µm in size.	Please call	Spherical
L24	A semi-rigid hydrophilic gel consisting of vinyl polymers with numerous hydroxyl groups on the matrix surface, 32 to 63 µm in diameter.	Please call	
L25	Packing having the capacity to separate compounds with a MW range from 100 to 5000 daltons (as determined by polyethylene oxide), applied to neutral	Please call	Spherical
L26	Butyl silane chemically bonded to totally porous silica particles, 5 to 10 µm in diameter.	Venusil C4	Spherical
L27	Porous silica particles, 30 to 50 µm in diameter.	Please call	
L28	A multifunctional support, which consists of a high purity, 100 Å spherical silica substrate that has been bonded with anionic (amine) functionality.	Please call	
L29	Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm diameter w/a pore diameter of 80 Å	Please call	
L30	Ethyl silane chemically bonded to a totally porous silica particle, 3 to 10 µm in diameter.	Please call	Irregular
L31	A strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000 Å.	Please call	
L32	A chiral ligand-exchange packing- L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter.	Please call	Spherical
L33	Packing having the capacity to separate proteins of 4,000 to 400,000 daltons. It is spherical, silicabased and processed to provide pH stability.	Please call	Spherical
L34	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 9 µm in diameter.	Please call	Spherical
L35	A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase having a pore size of 150 Å.	Please call	Spherical
L36	L-Phenylglycine-3,5-dinitrobenzoyl on 5 µm aminopropyl silica	Nucleosil Chiral-3	Spherical
L37	Polymethacrylate gel for proteins 2000~40,000 MW	Please call	Spherical
L38	Methacrylate-based SEC column for water-solubles	Please call	Spherical
L39	Hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin	Please call	Spherical
L40	Cellulose tris-3,5 dimethylphenylcarbamate coated	Please call	

Applications

Petroleum and Petrochemical Hydrocarbons, C1 - C10



Peak Identification:

1. Methane
2. Ethane
3. Ethylene
4. Propane
5. Cyclopropane
6. Propylene
7. iso-Butane
8. n-Butane
9. Propadiene
10. Acetylene
11. t-2-Butene

12. Butene-1
13. Isobutylene
14. c-2 Butene
15. Cyclopentane
16. iso-Pentane
17. n-Pentane
18. 1,3-Butadiene
19. t-2 Pentane
20. 2-Methyl-2 Butene
21. Pentene-1
22. c-2-Pentene
23. Unknown
24. Cyclohexane

25. 2-Methyl-Pentane
26. n-Hexane
27. n-Heptane
28. Benzene
29. iso-Octane
30. n-Octane
31. Toluene
32. Nonane
33. Ethylbenzene
34. o- and m- Xylene
35. o- Xylene
36. Decane

Column : GsBP-PLOT Al₂O₃ "S", 0.53mm x 50m x 15um

Part No : 8253-5015

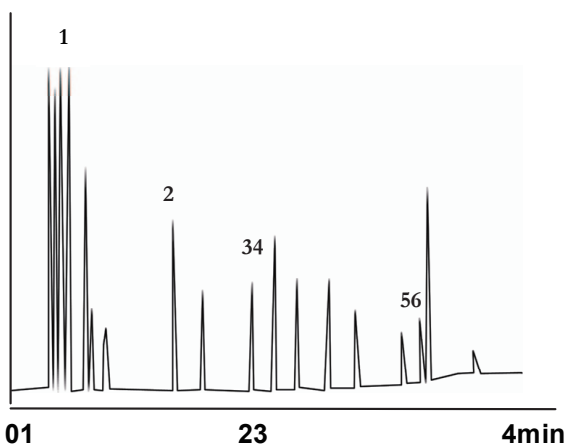
Oven : 40°C (2 min) 7.5°C/min to 100°C 5 min 12.5°C/min
to 180°C (10 min) 15°C/min to 225°C (20 min)

Detector : FID

Injection : 5μL splitless

Carrier : Hydrogen

Fast C 1 to C 10 Hydrocarbon Separations



Column : GsBP-PLOT Al₂O₃ "KCL", 0.25mm x 30m x 5um

Part No : 8125-3005

Oven : 110°C (0.5min) 25°C/min to 250°C (2min)

Detector : FID 250

Inlet : 250C split flow 120ml/min

Carrier : Hydrogen P=28psi @ 100°C

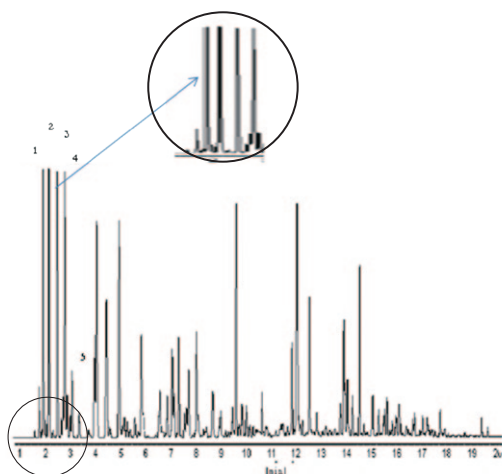
Sample : 5ul headspace gases

Peak Identification

1. C1 to C5
2. C6
3. C7

4. C8
5. C9
6. C10

10% Ethanol in Gasoline

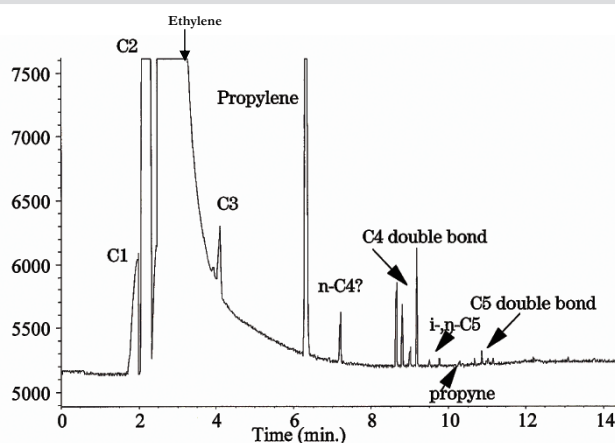


Column : GsBP-1, 0.25mm x 30 m x 1.0 um
Part No : 1125-3010
Oven : 40°C(5min) 100°C/min to 280°C (5min)
Detector : FID, 350C
Inlet : 275C Split flow 120 min/min
Carrier : Hydrogen P = 9psi @ 40°C
Sample : 0.2ul 87#gasoline with ethanol

Peak identification 5. Pentane

1. Methanol
2. Ethanol
3. Acetaldehyde
4. MTBE

Ethylene

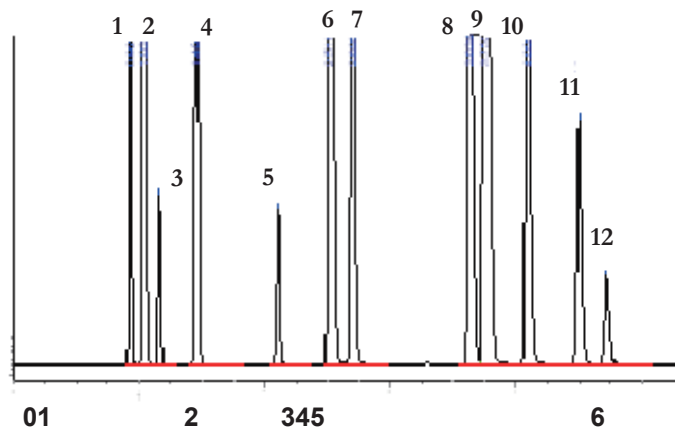


Column : GsBP-PLOT Al2O3 "S", 0.53mm x 50m x 15um
Part No : 8253-5015
Oven : 40°C (3 min) 15°C/min to 180°C (2 min)
Detector : FID, 250C
Injection : 0.25cc sample loop, splitless, 250C
Carrier : Hydrogen, P=6.2psi @40C, const flow
Sample : 99.5% ethylene

NOTES

C1 : <20ppm, C2<0.15%
C3: <5ppm, Propylene<150ppm
Rest<10ppm

Fast Separation of Refinery Gas

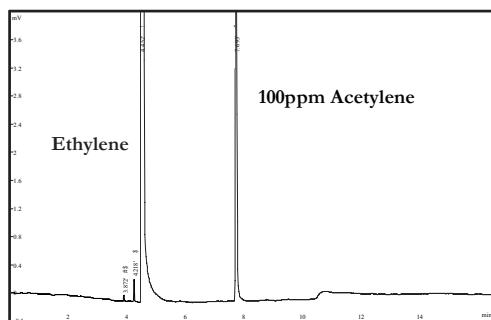


Column : GsBP-Al2O3 PLOT "S", 0.53mm x 15m x 15um
Part No : 8253-1515
Oven : 90°C 1min 15°C/min to 140°C 2min
Detector : FID, 250°C
Carrier : Hydrogen,
Inlet : S/S 250°C
Sample : 10ul Refinery gas sample

Peak identification

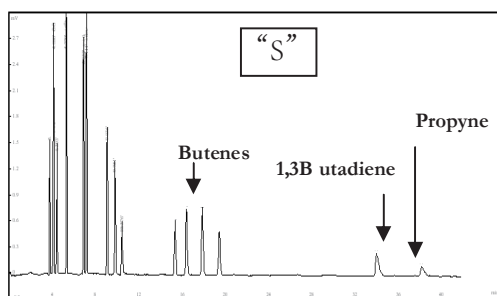
- | | |
|--------------|---------------|
| 1. Methane | 6. i-Butane |
| 2. Ethane | 7. n-Butane |
| 3. Ethylene | 8. t-Butene |
| 4. Propane | 9. Butene-1 |
| 5. Propylene | 10. c-Butene |
| | 11. i-Pentane |
| | 12. n-Pentane |

Polymer Grade Ethylene

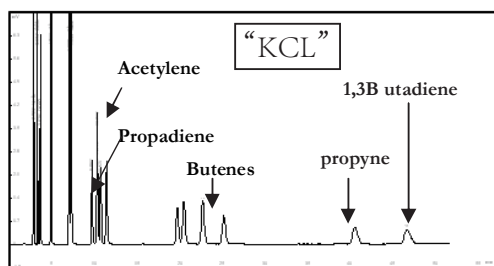


Column : GsBP-AI2O3 PLOT "S",
0.53mm x 15m x 15um
Part No : 8253-1515
Oven : 90°C 1min 15°C/min to 140°C 2min
Detector : FID, 250°C
Carrier : Hydrogen,
Inlet : S/S 250C
Sample : 10ul Refinery gas sample

Unsaturated Hydrocarbons

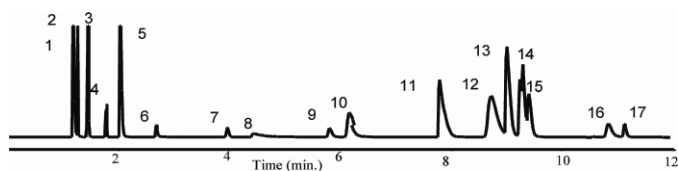


Column : GsBP- PLOT "S",
0.53mm x 50m x 1.5um
Part No : 8253-5015
Oven : 100C
Detector : FID, 250°C
Carrier : Hydrogen,
Inlet : S/S 250C
Sample : 10ul Refinery gas sample



Column : GsBP- PLOT "KCL",
0.53mm x 50m x 15um
Part No : 8153-1515
Oven : 80C
Detector : FID, 250°C
Carrier : Hydrogen,
Inlet : S/S 250C
Sample : 10ul Refinery gas sample

Refinery Gas

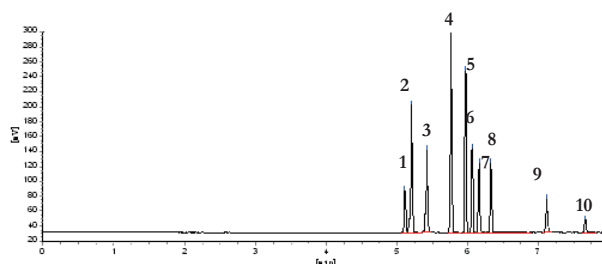


Peak identification

1.Air	6.H2S	13.n-Butane
2.CH4	7. COS	14.Butene
3.CO2	8.Water	15.Butene
4.ethylene	9.Propylene	16.i-pentane
5.ethane	10.Propane	17.n-pentane
	11.Methanol	
	12.i-Butane	

Column : GsBP- PLOT "Q",
0.53mm x 30m x 30um
Oven : 60°C (5min)20°C/min to 200°C(1min)
Detector : TCD, 250C
Carrier : Hydrogen,
Inlet : S/S 250C
Sample : 10ul Refinery gas sample

Refinery Gas Separation on PONA Column

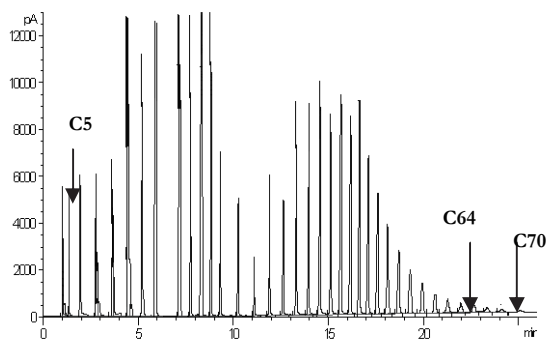


Column : GsBP-PONA, 100m x 0.25mm x 0.5um,
Part No : 9006-PONA
Oven : 35°C (6min) 5°C/min to 100°C
Detector : FID, 325C
Carrier : Hydrogen, 0.8ml/min
Inlet : S/S 250C
Sample : Refinery gas sample, 20ul

Peak Identification

- | | |
|----------------------|----------------|
| 1. Methane | 6. Butene-1 |
| 2. Ethane/Ethylene | 7. t-Butene |
| 3. Propane/Propylene | 8. c-Butene |
| 4. iso-Butane | 9. iso-Pentane |
| 5. n-Butane | 10. n-Pentane |

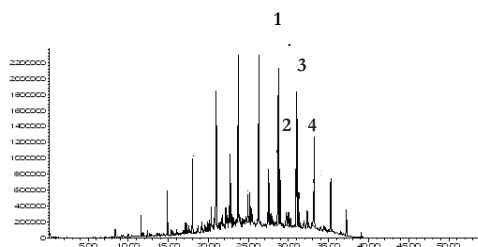
HT Sim-Dis



Column : GsBP-HT-SimDis, 0.32mm x 12m x 0.5um,
Part No : 9932-1205
Oven : 35°C (1min) 10°C/min to 350°C 5C/min to 400°C(5min)
Detector : FID, 400°C
Carrier : Hydrogen, 0.8ml/min
Inlet : PTV, 50°C to 400°C
Sample : Boiling point standard, nC5 to nC70

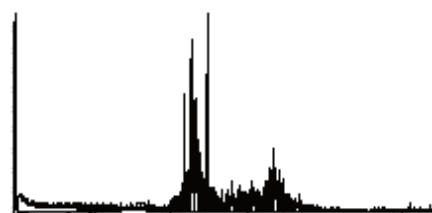
Diesel:

Diesel Fuel Standard



Column : GsBP-1MS, 0.25mm x 30m x 0.25um,
Part No : 1125-3002
Oven : 100°C (2min) 5°C/min to 320°C (5min)
Detector : MSD, Ion Source, 250C
Carrier : Hydrogen, p=15psi
Inlet : S/S 350C, Split ratio 50:1
Sample : 0.1ul diesel

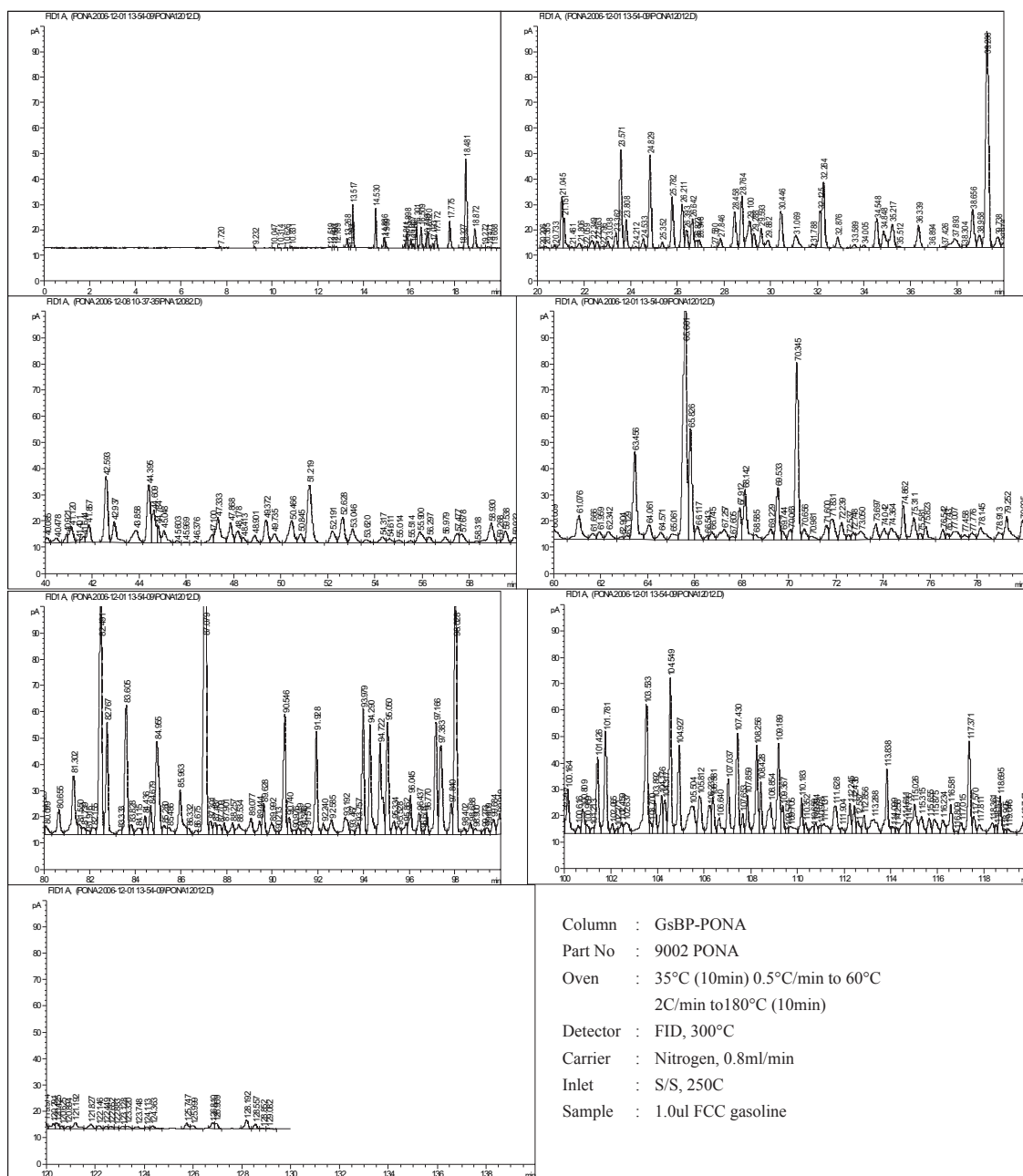
Diesel Fuel



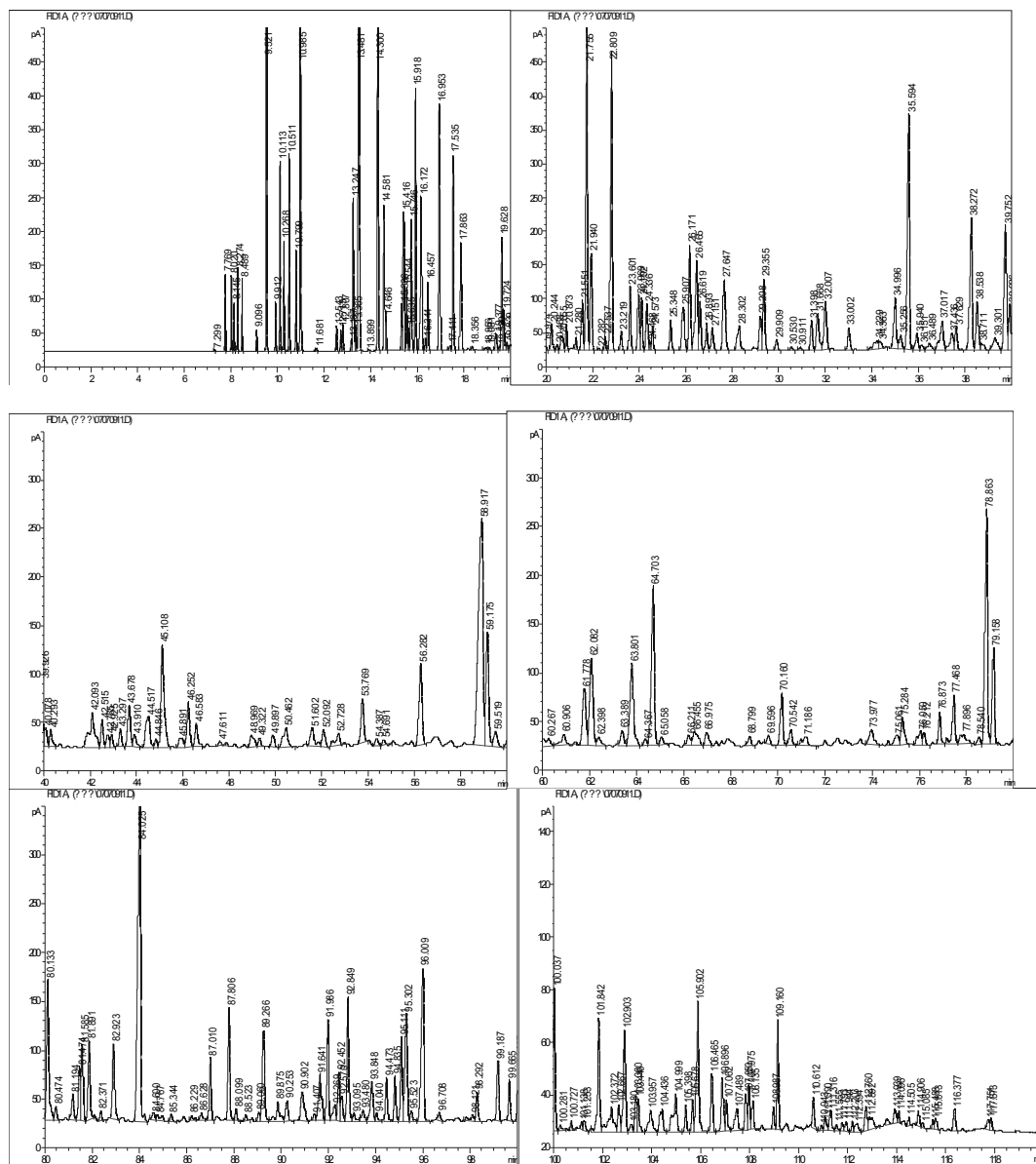
Peak Identification

1. C17
2. 姥姣烷
3. 18
4. 植烷

FCC Gasoline on PONA 50m

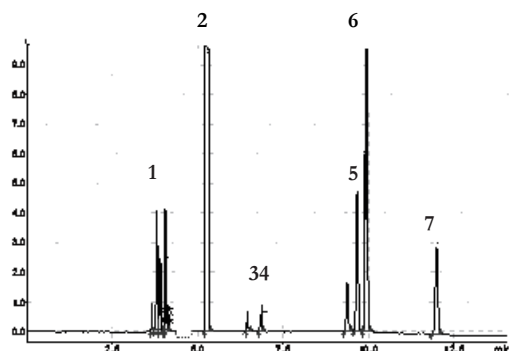


DHA, FCC Gasoline on PONA Column 100m



Column : GSBP-PONA column 100m x 0.25mm x 0.5um
Part No : 9006-PONA
Oven : 35°C (1min) 10°C/min to 350°C 5°C/min to 400°C (5min)
Detector : FID, 300°C
Carrier : Hydrogen, 0.8ml/min
Sample : FCC Reference Sample

Aromatics: BTEX

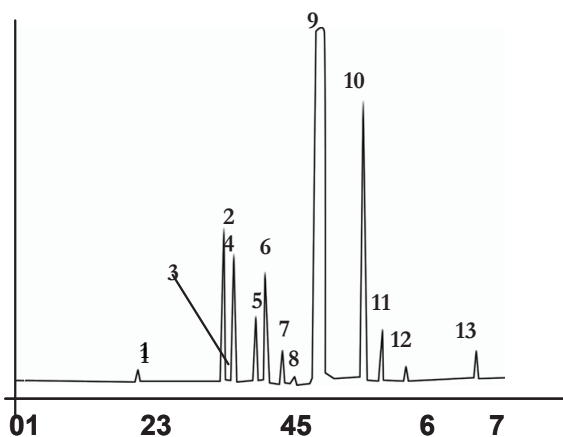


Column : GsBP-Inowax, 60m x 0.32mm x 0.5um
 Part No : 2032-6005
 Oven : 50°C 1min 5°C/min to 100°C, 10C/min to 150C
 Detector : FID, 260C
 Carrier : Hydrogen,
 Inlet : S/S 250C

Peak identification

- | | |
|------------------|------------------|
| 1. Non aromatics | 4. Ethyl benzene |
| 2. Benzene | 5. p-Xylene |
| 3. Toluene | 6. m-Xylene |
| | 7. o-Xylene |

Polymer Grade Styrene

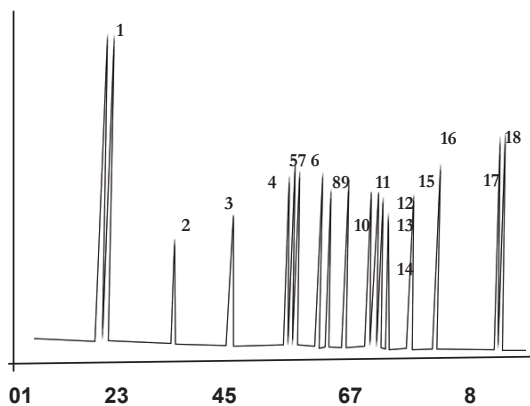


Column : GsBP-Inowax, 30m x 0.32mm x 0.5um,
 Part No : 2032-3005
 Oven : 80°C (5min) 10°C/min to 150°C (2min)
 Detector : FID, 240C
 Carrier : Helium 1.5ml/min,
 Sample : 0.5ul

Peak Identification

- | | |
|---------------------|----------------------------|
| 1. Nonaromatics | 7. n-Propylbenzene |
| 2. Ethylbenzene | 8. p/m-Ethyltoluene |
| 3. p-Xylene | 9. Styrene |
| 4. m-Xylene | 10. a-Methylstyrene |
| 5. Isopropylbenzene | 11. Phenylacetylene(58ppm) |
| 6. o-Xylene | 12. B-Methylstyrene |
| | 13. Benzaldehyde |

Substituted Aromatics

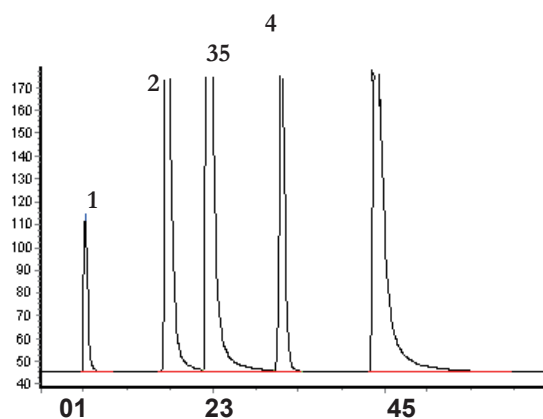


Column : GsBP-Inowax, 60m x 0.32mm x 0.5um,
 Part No : 2032-6005
 Injection : Split, 250:1, 0.5ul injection, 250C
 Oven : 50°C for 1min: 50-75 at 4°C/min, 75-100°C at 10C/
 min, (hold 4 min) 100-150°C at 10°C/min
 Detector : FID, 300C
 Carrier : Hydrogen at 40cm/sec constant pressure

Peak Identification

- | | |
|----------------|----------------------------|
| 1. Hexane | 9. benzene |
| 2. Benzene | 10. tert-Butylbenzene |
| 3. Toluene | 11. iso-Butylbenzene |
| 4. Ethbenzene | 12. Mesitylene |
| 5. 1,4-Xylene | 13. sec-Butylbenzene |
| 6. 1,3-Xylene | 14. Styrene |
| 7. Cumene | 15. 1,2,4-trimethylbenzene |
| 8. 1,2- Xylene | 16. Butylbenzene |
| | 17. 1,4-diisopropylbenzene |
| | 18. trans-b-Methylstyrene |

Alcohols

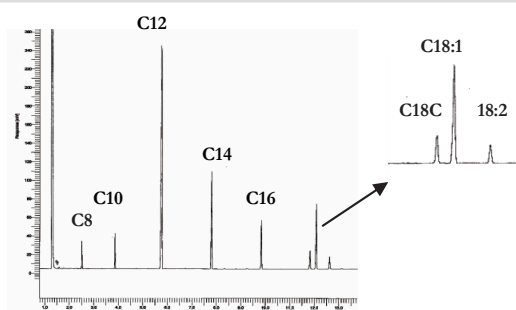


Column : GsBP-Blood alcohol, 7.0m x 0.32mm x 10um
Part No : 8932-0710
Oven : 130°C(0.5 min) 20 to 250 °C (5 min)
Detector : FID, 260°C
Carrier : Hydrogen at 40cm/sec constant pressure
Injector : S/S, 250C
Sample : HS 10ul

Peak identification

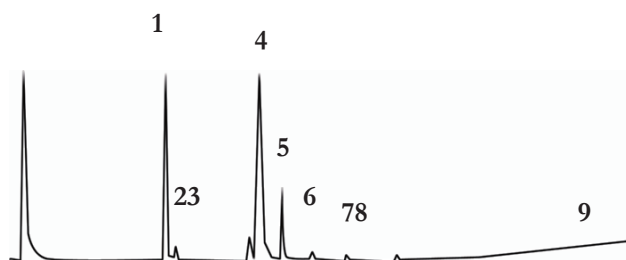
1. Methanol
2. Ethanol
3. 2-Propanol
4. 1-Propanol
5. 1-Butanol

Biofuel, Fame



Column : GsBP-Inowax, 30.0m x 0.25mm x 0.25um
Part no : 2025-3002
Sample : refined palm oil in hexane

Derivatized Olive Oil

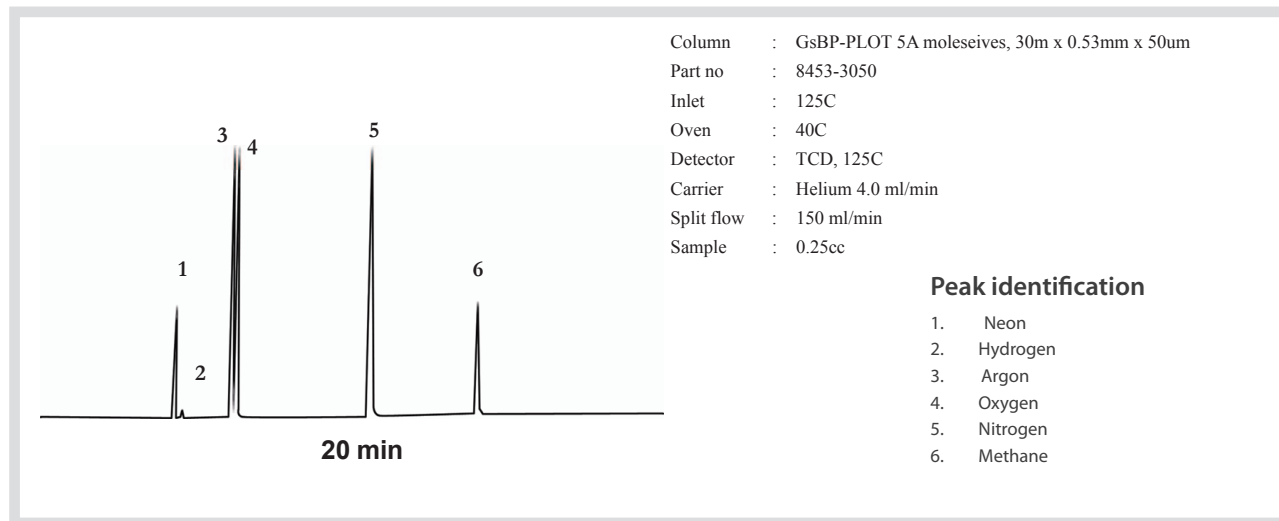


Column : GsBP-FFAP 25m x 0.32mm x 0.5um
Part No : 2132-2505,
Oven : 150°C 1min 205°C (1min) to 230°C(1min)

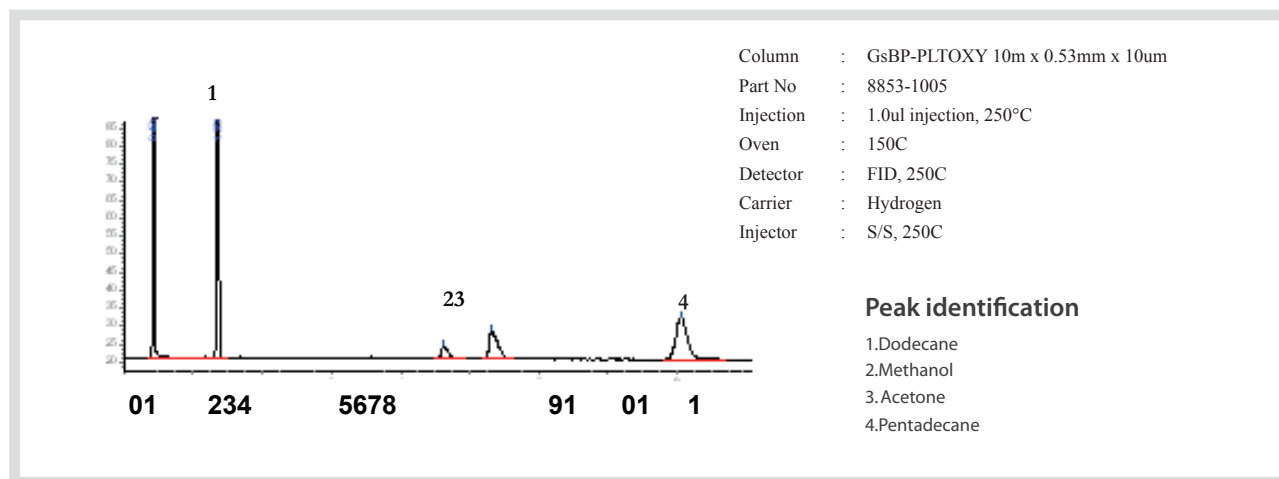
Peak Identification

- | | |
|-----------|-----------|
| 1. C 16:0 | 5. C 18:2 |
| 2. C 16:1 | 6. C 18:3 |
| 3. C 18:0 | 7. C 20:0 |
| 4. C 18:1 | 8. C 22:0 |
| | 9. C24:0 |

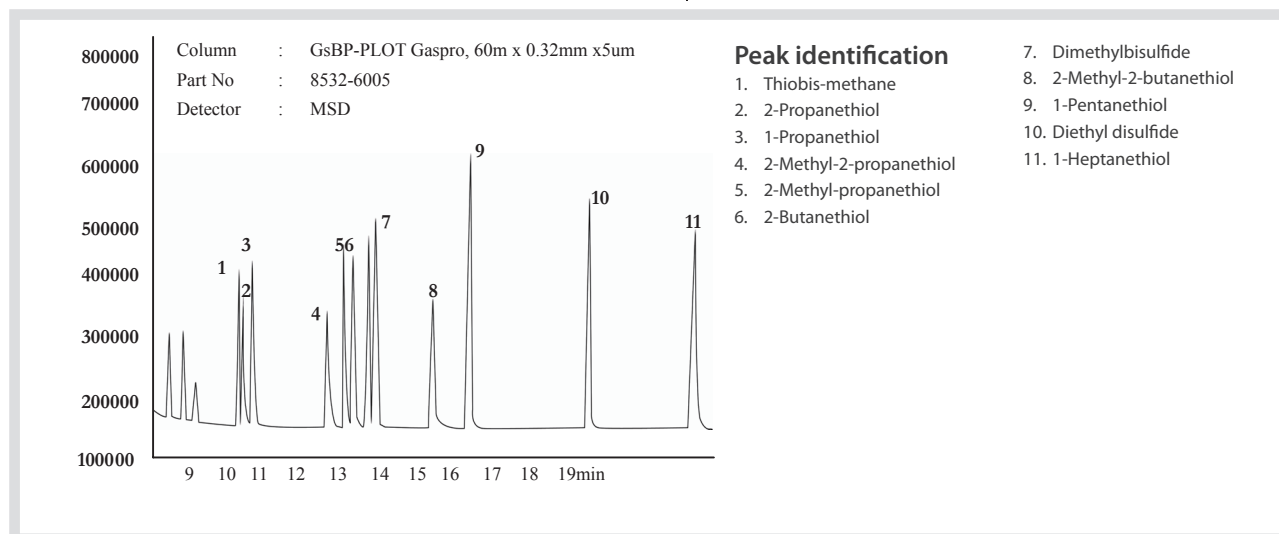
Fixed Gases



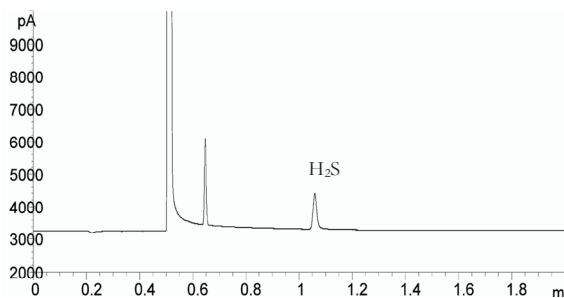
Oxygenates



Sulfurs

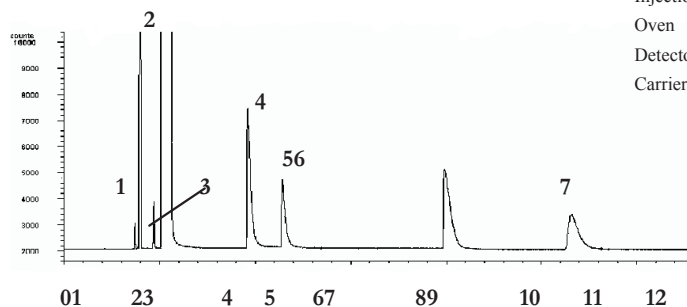


Hydrogen Sulfide



Column : GsBP-PLOT U, 8m x 0.32mm x20um
Part No : 8732-0820
Injection : 1.0ul injection, 250°C
Oven : 70C
Detector : PDD
Injector : 200ppm H2S in nitrogen, 1.5ul

Volatile Amines



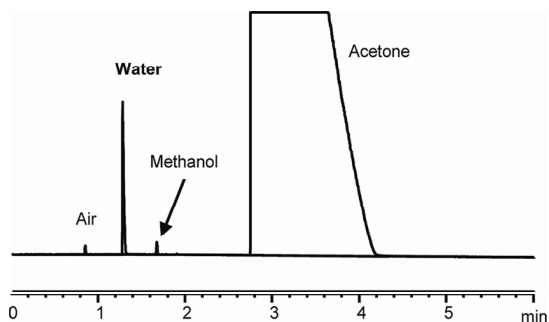
Column : GsBP-PLOT U, 30m x 0.53mm x 20um,
Part No : 8753-3020
Injection : 1.0ul injection, 250°C
Oven : 150C(1min) 10C/min to 190C(5min)
Detector : TCD 200C
Carrier : Hydrogen at 40cm/sec constant pressure

Peak identification

1. Air
2. Ammonia
3. Water
4. Isopropyl amine
5. Triethyl amine
6. Propylamine
7. Butylamine

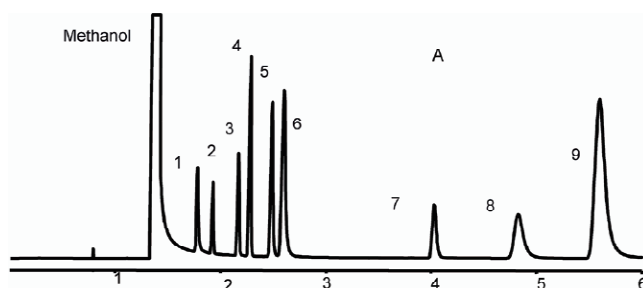
Chemicals

Acetone



Column : GsBP-PLOT U, 30m x 0.32mm x 10um,
Part No : 8732-3010
Injection : 150°C, split ratio 50:1
Oven : 150C(1min) 10C/min to 190C(4min)
Detector : TCD 200°C
Sample : 10 µL

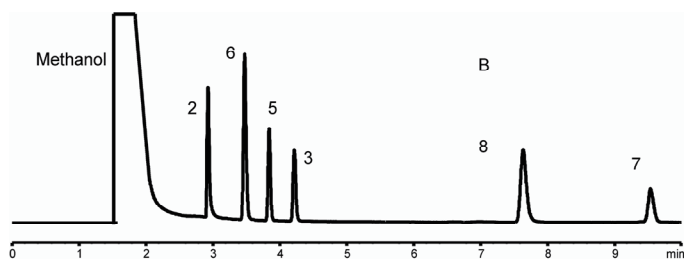
Volatile Solvents



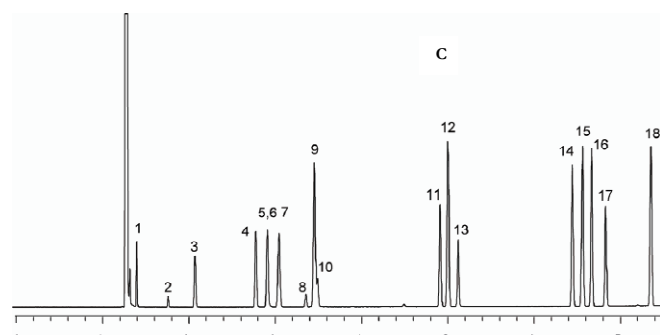
Column : GsBP-PLOT Q, 30m x 0.53mm x 30um
 Part No : 8653-3030
 Oven : 150C
 Detector : FID 300°C
 Sample : 1 µL, Split Injection

Peak Identification

- | | |
|-------------------|-----------------|
| 1. Atrile | 5. Diethylether |
| 2. Ethanol | 6. Pentane |
| 3. Acetone | 7. Ethylacetate |
| 4. ichloromethane | 8. Hexane |
| | 9. Benzene |



Column : GsBP-PLOT U, 30m x 0.32mm x 10um,
 Oven : 150°C
 Detector : FID 200°C
 Sample : 1 µL, Split Injection

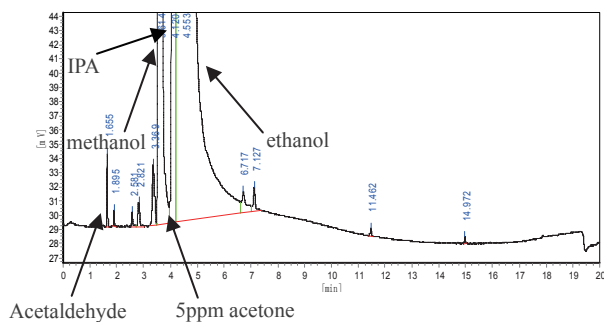


Column : GsBP-Inowax , 30m x 0.25mm x 0.25um,
 Oven : 35C(2.5min), 10C/min to 85C
 Detector : FID 300°C

Peak identification

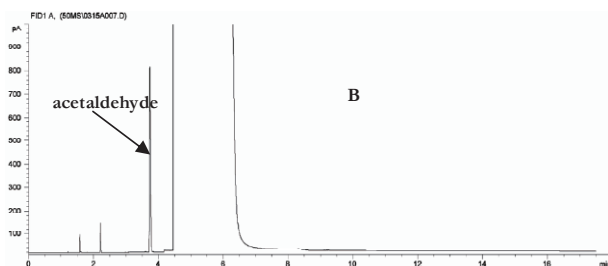
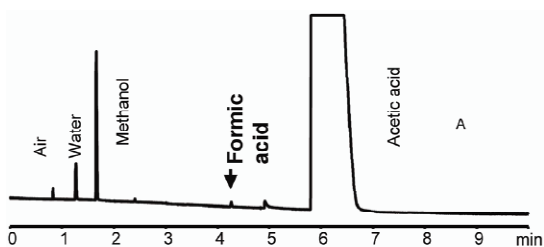
- | | |
|-------------------------|-------------------|
| 1. pentane | 9. benzene |
| 2. methyl formate | 10. ethanol |
| 3. acetone | 11. 2-butanol |
| 4. ethyl acetate | 12. toluene |
| 5. methyl ethyl acetate | 13. n-propanol |
| 6. methanol | 14. ethyl benzene |
| 7. 2-methyl 2-propanol | 15. p-Xylene |
| 8. dichloromethane | 16. m-Xylene |
| | 17. 1-butanol |
| | 18. o-Xylene |

Acetone Impurity in Alcohol on Inowax



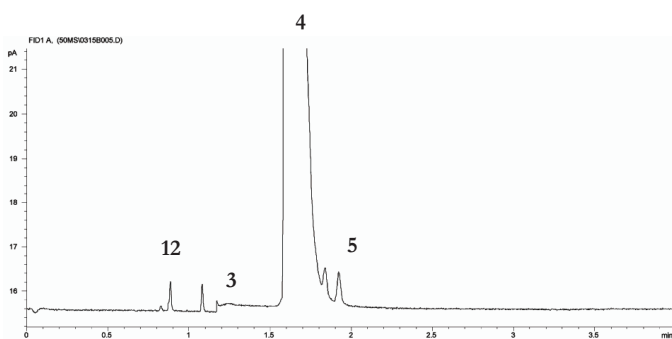
Column : GsBP-Inowax, 30m x 0.53mm x 1.0um,
 Part No : 2053-3010
 Injection : 250°C, split/splitless
 Oven : 50C(5min) 10C/min to 200C
 Detector : FID 260
 Carrier : Helium
 Sample : 2µL denaturated alcohol spiking with 5ppm acetone

Formic Acid



Column : GsBP-PLOT U, 30m x 0.32mm x 10um,
Part No : 8732-3010
Oven : 125°C(1min) 10C/min to 190C(5min)
Detector : A.TCD B. FID
Carrier : Helium
Inlet : 150C, split ratio 50:1
Sample : 5µL acetic acid, 99.8%

Ethylene Oxide

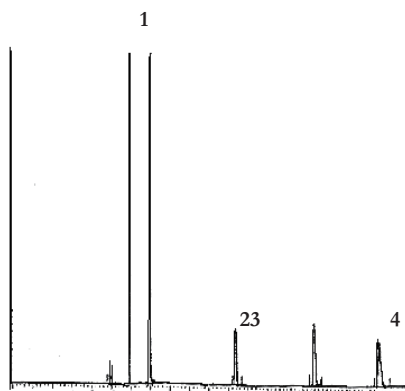


Column : GsBP-PLOT U, 30m x 0.32mm x 10um,
Part No : 8732-3010
Oven : 125C
Injection : 180°C, split ratio 30:1
Oven : 150°C(1min) 10C/min to 190C(4min)
Detector : TCD, 200C
Carrier : Hydrogen 1.5ml/min
Sample : 1µL

Peak identification

1. C2
2. C3
3. water
4. ethylene oxide

Ketones

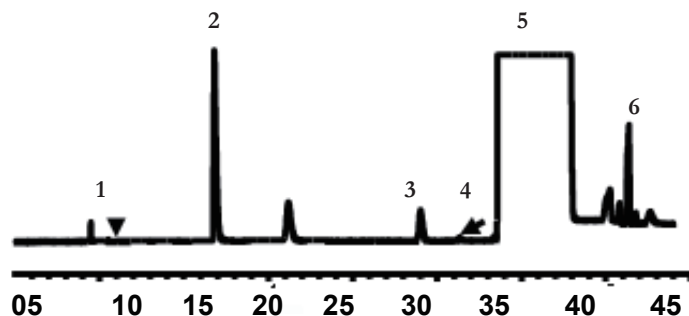


Column : GsBP-PLOT Q, 30m x 0.32mm
Part No : 8632-3030
Inlet : splitless, 145C
Oven : 40C (3min), 20°C/min to 180°C,
4.5°C/min to 230C, 20°C/min to 250°C
Detector : FID, 200C
Carrier : Hydrogen 1.0ml/min
Sample : 0.5µL 1% ketones in ethanol

Peak identification

1. ethanol
2. methylethylketone
3. diethylketone
4. methylisobutylketone

Ethylacetate

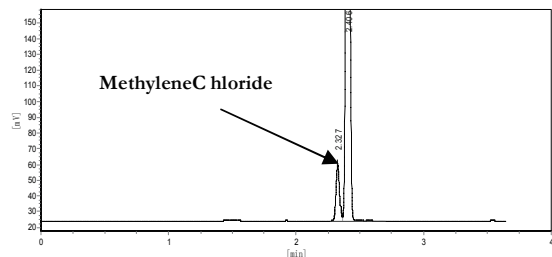


Column : GsBP- HP-PLOT U0.32mmx30mx10um
 Part No : 8732-3010
 Inlet : 180°C, Split ratio 30:1
 Oven : 100 °C(25min) 10°C/min to 190°C (5min).
 Detector : FID, 200C
 Carrier : Hydrogen 1.5ml/min
 Sample : 5ul HPLC grade Et acetate

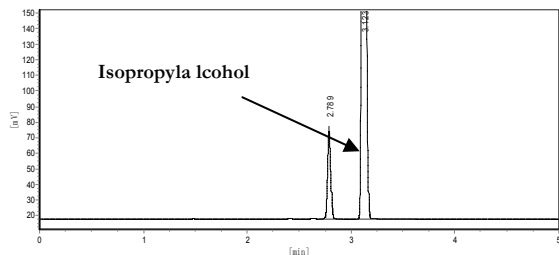
Peak identification

1. methanol
2. ethanol
3. acetic acid
4. methyl acetate
5. ethyl acetate
6. unknown impurities

Methylene chloride/Isopropylalcohol Separation

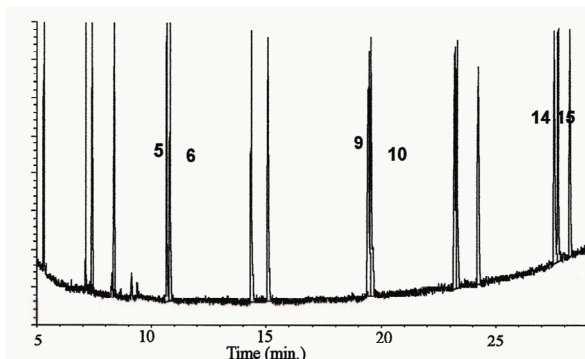


Column : GsBP- Inowax 0.53mmx30mx1um
 Part No : 2025-3002
 Inlet : 250°C, split
 Oven : 50C
 Detector : FID, 260C
 Carrier : Hydrogen 1.5ml/min
 Sample : HS 5ul



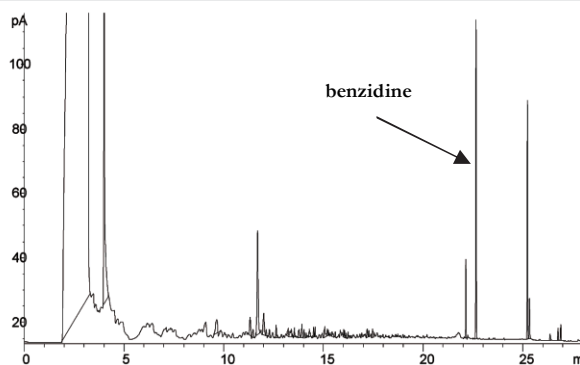
Column : GsBP- 624 0.53mmx30mx3um
 Part No : 6253-3030
 Inlet : 250°C, split
 Oven : 60C
 Detector : FID, 280C
 Sample : HS 5ul

Environmental PAHS



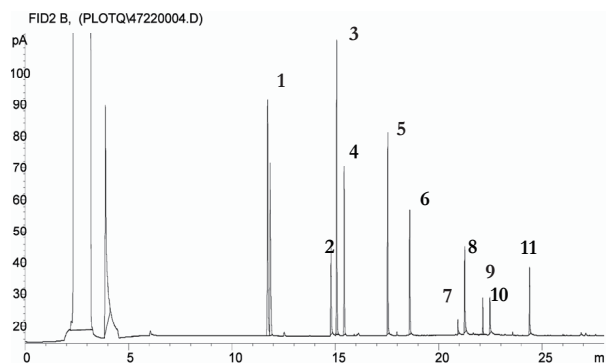
Column : GsBP- 5MS,
0.25mmx30mx0.25um,
Part no : 1525-3002,
Inlet : splitless, 300C
Oven : 45°C (1min) 30°C/min to 130°C
(3min), 4.5°C/min to 240°C
(2min), 15°C/min to 325°C
Detector : MSD
Carrier : Helium 40cm/sec,
Sample : 16 PAHs std, 1ul

Benzidine EPA 8270



Column : GsBP- 5MS, 30mx0.25um,
Part no : 1525-3002,
Inlet : pulse injection, 300C
Oven : 35°C (5min), 8°C/min to 220C
Detector : FID 300C
Carrier : Helium 40cm/sec,
Sample : 1ul pulse (0.7min)

EPA 625 Phenol

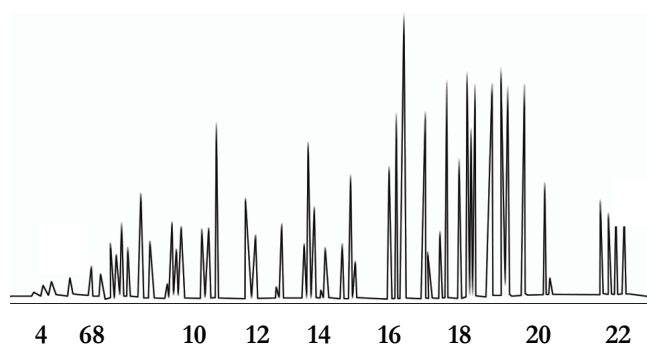


Column : GsBP- 5MS, 0.25mmx30mx0.25um,
Part No : 1525-3002,
Inlet : splitless, 300C
Oven : 35°C (5min), 8C/min to 230C
Detector : FID 300C
Carrier : Helium 0.8ml/min,
Sample : 1ul diluted standard

Peak identification

- | | |
|---------------------------|---------------------------|
| 1. Phenol | 7. 2,4,6-Trichlorophenol |
| 2. 2-Chlorophenol | 8. 2,4-Dinitrophenol |
| 3. 2-Nitrophenol | 9. 4-Nitrophenol |
| 4. 2,4-Dimethylphenol | 10. 2-Mehtyl6-nitrophenol |
| 5. 2,4-Dichlorophenol | 11. Pentachlorophenol |
| 6. 4-Chloro3-methylphenol | |

VOCs EPA 8260



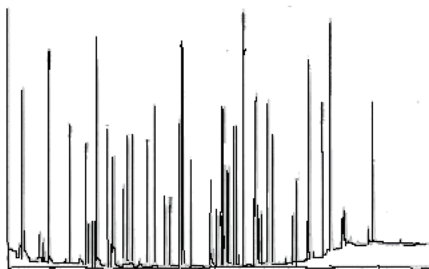
Column : GsBP- VOC, 60m x 0.2mm x 1.1um
 Part No : 5120-6011
 Inlet : 150C
 Oven : 35°C (2min), 15°C/min to 80°C, 6°C/min to 140°C,
 20°C/min to 220°C (5min)
 Detector : MSD
 Carrier : Helium 1ml/min,
 Sample : 84VOCs, 5ppb in 5ml water

Peak Identification

1. Dichlorodifluoromethane	44. Chloroacetonitrile	89. Hexachloro butadiene
2. Chloromethane	45. cis-1,3-Dichloropropene	90. Naphthalene
3. Vinyl Chloride	46. 4-Methyl-2-pentanone	91. 1,2,3-Trichlorobenzene
4. Bromomethane	47. 1,1-Dichloro-2-propanone	
5. Chloroethane	48. Toulene	
6. trichlorofuoromethane	49. trans-1,3-Dichloropropene	
7. diethyl ether	50. Ethyl methacrylate	
8. 1,1-Dichloroethene	51. 1,1,2-Trichloroethane	
9. Acetone	52. tetrachloroethene	
10. iodomethane	53. 1,3-Dichloropropane	
11. carbon disulfide	54. 2-Hexanone	
12. Allyl chloride	55. Dibromochloromethane	
13. Methylene chloride	56. 1,2-Dibromoethane	
14. Acrylonitrile	57. 1-Chloro-3-fluorobenzene	
15. methyl-tert-butyl ether	58. Chlorobenzene	
16. trans-1,2-Dichloroethane	59. 1,1,1,2-tetrachloroethane	
17. hexane	60. Ethylbenzene	
18. 1,1-Dichloroethene	61. m-Xylene	
19. 2-Butanone	62. p-Xylene	
20. cis-1,2-Dichloroethene	63. o-Xylene	
21. 2,2-Dichloropropane	64. Styrene	
22. Propionitrile	65. Bromoform	
23. Methyl Acrylate	66. Isopropylbenzene	
24. Methacrylonitrile	67. 4-Bromofluorobenzene	
25. Bromochloromethane	68. 1,1,2,2-Tetrachloroethane	
26. tetrahydrofuran	69. bromobenzene	
27. chloroform	70. 1,2,3-Trichloropropane	
28. Pentafluorobenzene	71. trans-1,4-Dichloro-2-butene	
29. 1,1,1-trichloroethane	72. n-Propylbenzene	
30. 1-chlorobutane	73. 2-Chlorotoulene	
31. 1,1-dichloropropene	74. 1,3,5-Trimethylbenzene	
32. Carbon tetrachloride	75. 4-Chlorotoulene	
33. Benzene	76. tert-Butylbenzene	
34. 1,2-Dichloroethane	77. Pentachloroethane	
35. 2,2-Dimethylhexane	78. 1,2,4-trimethylbenzene	
36. Fluorobenzene	79. sec-Butylbenzene	
37. 1,4-Difluorobenzene	80. 1,3-Dichlorobenzene	
38. Trichloroethene	81. p-Isopropyltoulene	
39. 1,2-Dichloropropane	82. 1,4-Dichlorobenzene	
40. Methyl methacrylate	83. n-Butylbenzene	
41. Dibromomethane	84. 1,2-Dichlorobenzene	
42. Bromodichloromethane	85. Hexachloroethane	
43. 2-Nitropropane	86. 1,2-Dibromo-3-chloropropane	
	87. Nitrobenzene	
	88. 1,2,4-Trichlorobenzene	

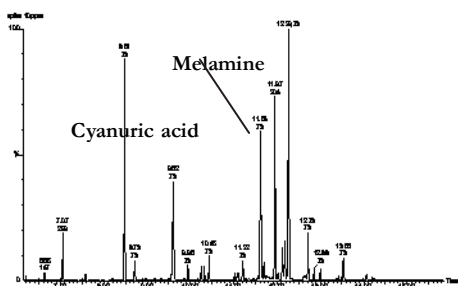
Food and flavor

Pesticides in Spinach Extract



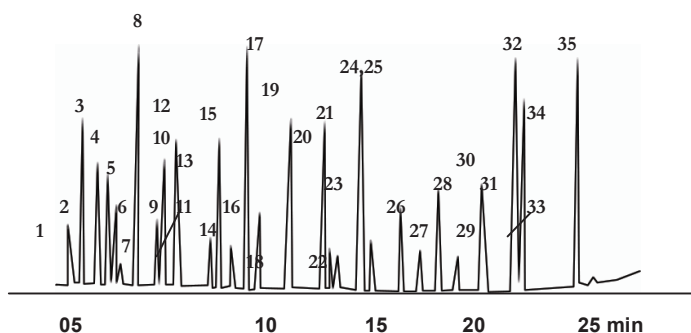
Column : GsBP- 1701, 0.25mmx30mx0.25um
P/N : 6125- 3002,
Inlet : splitless, 280°C
Oven : -20 to 280/300
Detector : MSD 300C
Carrier : Helium 1ml/min,
Sample : extract pesticides from spinach

Melamine



Column : GsBP- 5MS, 0.25mmx30mx0.25um
P/N : 1525- 3002,
Inlet : splitless, 280C
Oven : 75°C (hold) 1min ramp 15°C/min
to 300°C (hold 5 min)
Detector : MSD 230C Ion source
Carrier : Helium 1ml/min,
Sample : 1ul 10ppm melamine spiking infant
formula, TMS derivative

Flavors and Fragrance Standards

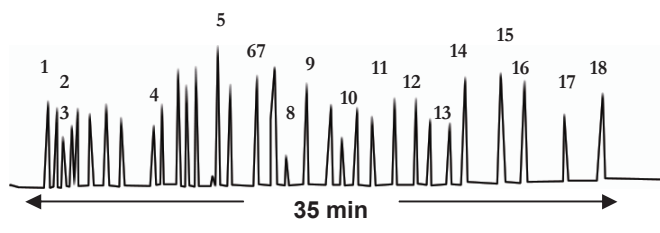


Column : GsBP- INOWAX,0.25mmx30mx0.25um
Part No : 2025-3002,
Inlet : 0.2ul, on-column
Oven : 80°C (1min), 5°C/min to 250° C (2min)
Detector : MSD, 280°C
Carrier : Helium 30cm/sec, 0.9ml/min
Sample : 500ppm in ethanol

Peak Identification

- | | | | |
|--------------------------|--------------------------|---------------------------|----------------------------|
| 1. 1-limonene | 10. Camphor | 22. maltol | 33. methyl naphthyl ketone |
| 2. cis-3-hexenal | 12. benzaldehyde | 23. cyclamen aldehyde | 34. musk xylol |
| 3. prenyl acetate | 13. linalool | 24. cinnamyl aldehyde | 35. vanillin |
| 4. cis-3-Hexenyl acetate | 14. octanol | 25. isopropyl myristate | 36. ethylene brassylate |
| 5. Rose oxide | 15. menthol | 26. unknown | |
| 6. hexenol | 16. citronellyl acetate | 27. dimethyl anthranilate | |
| 7. Nonanal | 17. alpha-terpineol | 28. p-cresol | |
| 8. p-Methyl cresol | 18. benzyl acetate | 29. eugenol | |
| 9. Decanal | 19. citronellol | 30. heliotropine | |
| | 20. geraniol | 31. helional | |
| | 21. phenylpropyl acetate | 32. idole | |

Perfume Calibration Mix

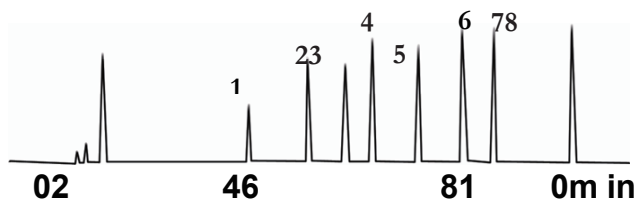


Column : GsBP-20M 50m x 0.32mm x 0.3um
 Part No : 2232-5003,
 Injection : split, 210C
 Oven : 75°C 5min 5°C/min to 210°C 10min
 Detector : FID, 230C
 Carrier : Hydrogen, 64 cm/sec
 Sample : 500ppm in ethanol

Peak Identification

- | | | |
|------------------------|-------------------------|---------------------|
| 1. a-pinene | 8. geraniol | 16. coumarin |
| 2. b-Pinene | 9. hydroxyl citronellal | 17. vanillin |
| 3. limonene | 10. anisaldehyde | 18. benzyl benzoate |
| 4. citronellal | 11. methyl cinnamate | |
| 5. menthol | 12. ethyl cinnamate | |
| 6. benzyl acetate | 13. eugenol | |
| 7. citronellyl acetate | 14. jasmonal | |
| | 15. diethyl phthalate | |

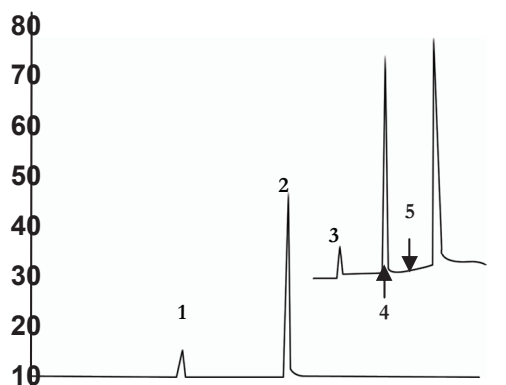
Free fatty acids (C2-C7)



Column : GsBP-FFAP, 25m x 0.32mm x 0.35um
 Part No : 2132-2025,
 Injection : 0.5ul, split 20/1, 260C
 Oven : 80C (1min), to 120C (20min), then to 205C (6.13C/min), 205C (2min)
 Detector : FID, 260C
 Carrier : Helium @ 10.8 psi (42 cm/sec)

Life Sciences

Blood Alcohol

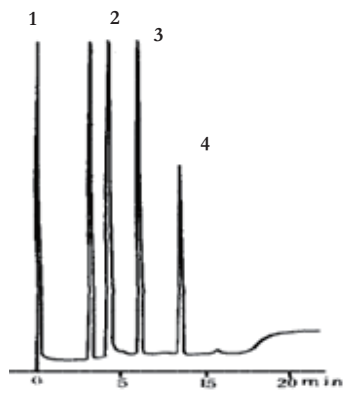


Column : GsBP-Blood, 7.5m x 0.32mm x 10um
 Part No : 8932-0710
 Inlet : headspace
 Oven : 120°C 35C/min to 180°C
 Detector : FID, 260C
 Carrier : Helium, 2.3ml/min

Peak identification

1. Ethanol
2. 1std
3. Methanol
4. Acetaldehyde
5. Acetone

Caffeine

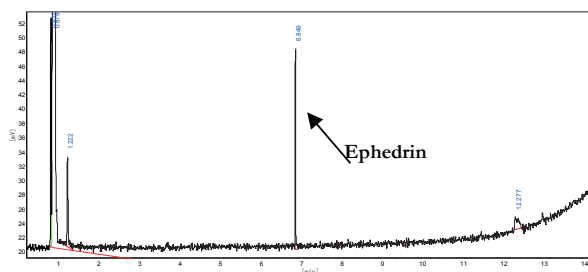


Column : GsBP-5, 10m x 0.53mm x 2.65um
Part No : 0553-1026,
Inlet : headspace
Oven : 180°C 8c/min to 230C (6min)
10C/min to 260C (10min)
Detector : FID, 260C
Carrier : Helium, 2.3ml/min

Peak identification

1. C16
2. paracetamol
3. caffeine
4. chlorpheniramine maleate

Drug Abuse:



Column : GsBP-5MS, 17m x 0.20mm x 0.30um
Part No : 1520-1703,
Inlet : 260C Splitless
Detector : FID, 325C

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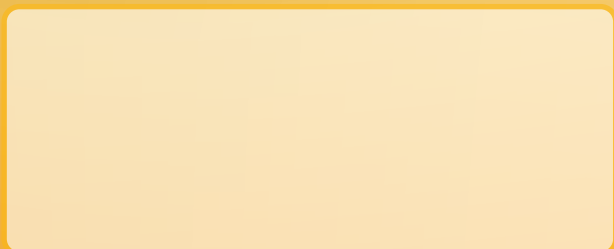
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*In USD	Total Order Amount			

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