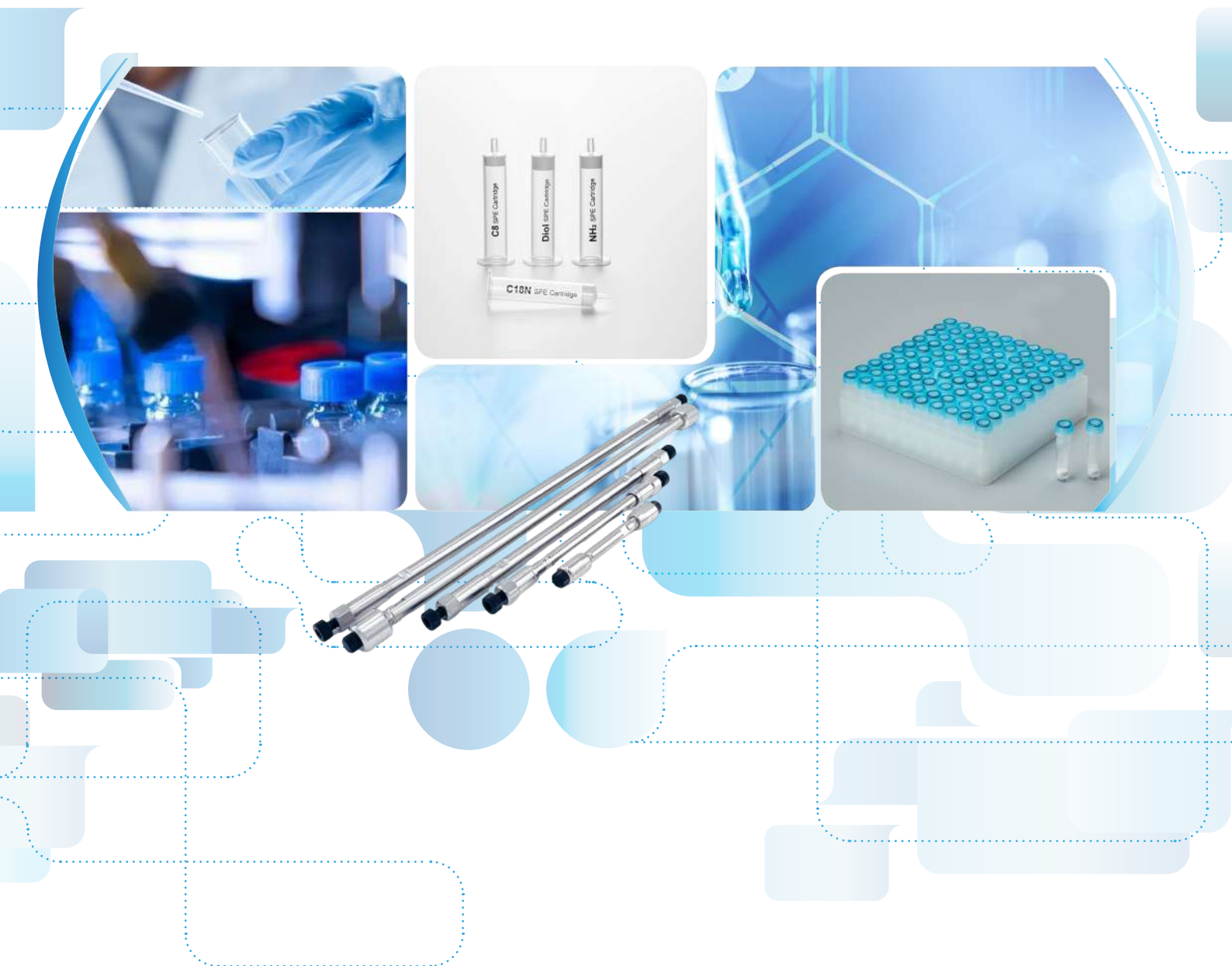
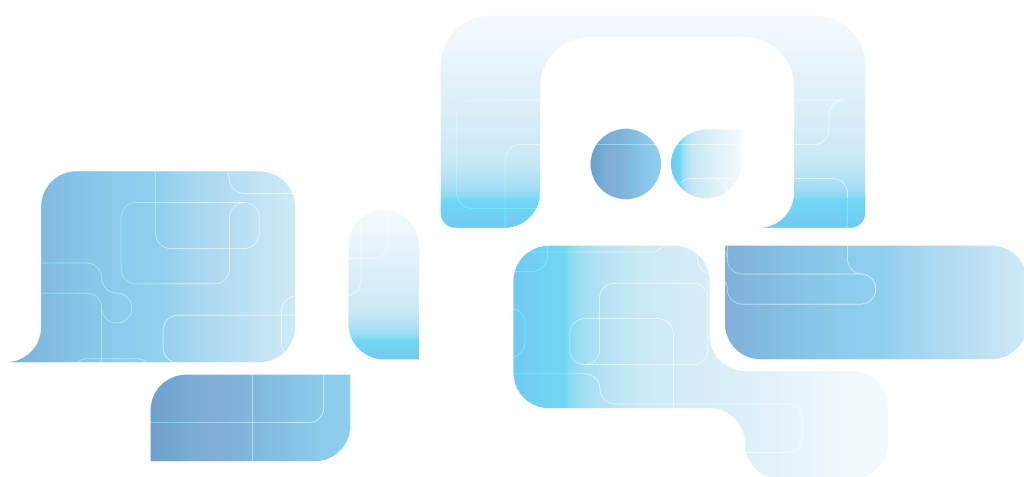




# AFFINITY CHROMATOGRAPHY PRODUCT COLLECTION





# The GVS Group

In over 45 years of history, GVS has evolved from a supplier of components for the healthcare sector to a global group that produces highly technological diversified filtration solutions.

## Wide range of products and custom design expertise

GVS produces a wide range of filter materials, filters and off-the-shelf components in all its divisions, enabling its customers to reduce the design time for new product launches.

All the GVS divisions work in highly regulated environments and the Group therefore operates with extremely high-quality standards. Thanks to its research and development centres located all over the world, GVS is also able to offer an extremely efficient and personalized service to meet its customers' needs: from product conception and design to testing and mass production.

## Dynamic and flexible structure

GVS has developed a streamlined, dynamic and technologically advanced structure that has made it possible to achieve constant and balanced growth. The Group currently employs a total of 4869 people who work in automated assembly departments, in lines for the production and processing of filter membranes and in class 10,000 and 100,000 cleanrooms.

## Global growth

The GVS Group has always paid great attention to research, development and innovation of its products and processes and has shown a strong trend towards development in global markets since its foundation.

In addition to the corporate headquarters in Bologna, GVS currently has 19 plants in Italy, United Kingdom, Brazil, United States, China, Mexico, Romania e Puerto Rico, and 29 commercial offices located all over the world. GVS has always adopted a "glocal" approach: it operates locally in contact with its customers, but relies on the strength of a global network.

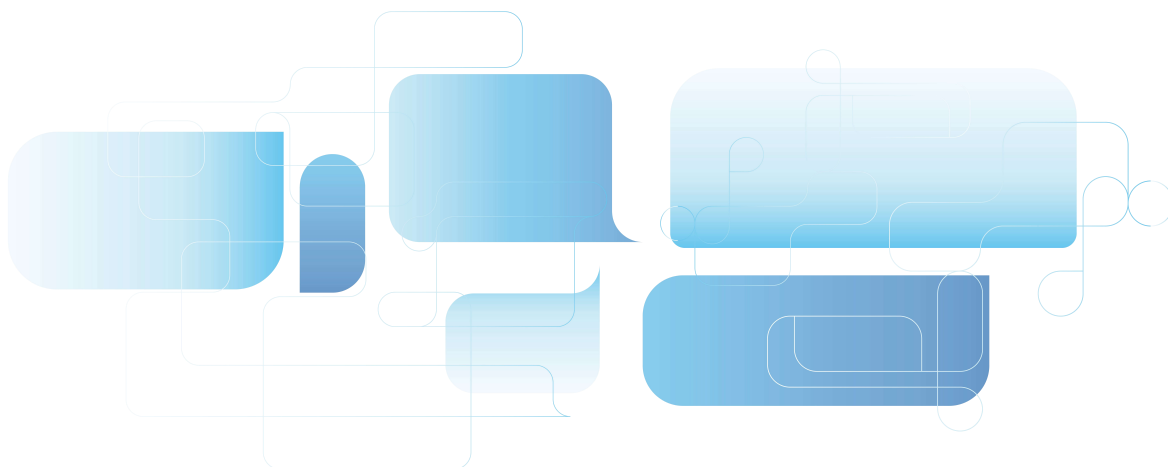
For more information, visit [www.gvs.com](http://www.gvs.com)



# Chromatography

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# HPLC Column

## Affinity HPLC Column Selection and Handling Precautions

### The choice of column tubes

The materials of HPLC column tubes include SS316 (stainless steel), PTFE, and PMMA etc., determined by characteristics of mobile phase, pressure degree of column and sample. SS316 is used when mobile phase is organic solvents with pressure between 5 to 30 Mpa. When the mobile phase is 100% water or buffer solution with pressure less than 4 Mpa, PMMA or PTFE is chosen for less impact on activity of biological sample.

### Inner diameter

A. 1-2mm ID column, is specific used for micro LC(MLC), such as LC -Mass spectrometry. But for routine analysis, it's not easy to use. Although the solvent consumption is small, the requirement is too rigid. It need the instrument only have a very small dead volume. Besides, this kind of columns is short-life.

B. 4-6mm (3.9, 4.0, 4.6, 5.0, 6.0mm) ID columns are analytical scale and suitable for routine analysis. 4.6mm ID columns are the most usual type. Best flow rate is 1ml/min which general instruments can match with. They have high column efficiency, stable performance, and longer life time.

C. 7.8-10.0mm ID columns are semi-preparative column. Chromatographic conditions can be transplanted from analytical column. They can be equipped on normal LC instruments to collect small amount of high purity components to quality and research.

D. 20-100mm ID columns are preparative column, which can prepare a large number of pure components with commercial value. At present, although the price is higher, it is must equipped for the pharmaceutical industry.

### The length of the column tube

Length of HPLC columns is between 50 and 500mm. For general analysis 150-250mm is most commonly used. Columns longer than 250mm though have high column efficiency, have much higher pressure. So it is not economic just for better efficiency to increase the column length.

### The choice of packing

#### Particle size

particle size of commonly used packing is 3 - 10µm. Small particle size can achieve high column efficiency, but column pressure is also high. Column pressure is an important factor that cannot be ignored. High column pressure may lead to packing collapse and reduce columns' life time. Especially when mobile phase is methanol with larger water content, hydrogen reaction formed between water and methanol makes the viscosity to increase. If high column efficiency is pursued, water-acetonitrile system is recommended.

For preparative column, main pursuit is preparation volume, and separation is secondary. Generally packing with larger size than 10 µm is chosen with low cost and low column pressure.

For UHPLC which has higher column efficiency, better separation and shorter separation time, particle size is so small that the pressure is much higher than HPLC. We offer two specifications: 1.8µm and 2.2µm. UHPLC columns can withstand pressures up to 10000psi, and have good reproducibility.

### The specifications of packings

#### Molecular weight smaller than 2000

|                          |                                                   |                                               |                                                                    |
|--------------------------|---------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|
| Aqueous samples          | Non-ionic                                         | Reverse phase chromatography                  | C30,C18,C18-WP, C8                                                 |
|                          | Ionic                                             | Reverse phase chromatography                  | C30,C18,C18-WP, C8                                                 |
|                          |                                                   | Ion exchange chromatography                   | SAX,SCX, Transgenomic ICSep AN, ICSep CN                           |
|                          | Amino acids                                       | Reverse phase chromatography                  | C18                                                                |
|                          |                                                   | Aqueous samples                               | Transgenomic AMINOSep amino acid column                            |
|                          | Organic acids                                     | Ion exclusion chromatography                  | Transgenomic ICSep organic acid column;Shodex SUGAR SH1821, KC-811 |
|                          | Monosaccharides, disaccharides, oligosaccharides, | Reverse phase chromatography                  | NH2                                                                |
|                          |                                                   | Ion exclusion chromatography                  | Shodex SUGAR SH1821                                                |
| Inverting chromatography |                                                   | Transgenomic CARBOSep resin type sugar column |                                                                    |
| Peptide                  | Reverse phase chromatography                      | C18                                           |                                                                    |
| Oil-soluble              | Non-polar                                         | Reversed-phase chromatography                 | C18                                                                |
|                          |                                                   | Normal phase chromatography                   | NH2, CN, SIL                                                       |
|                          | Polar                                             | Normal phase chromatography                   | NH2, CN, SIL                                                       |
| Chiral sample            |                                                   | Chiral chromatography                         | Regis Wheelk-O, RegisPack, RegisCell                               |

# Chromatography

## Molecular weight smaller than 2000

|                             |                        |                                     |                                        |
|-----------------------------|------------------------|-------------------------------------|----------------------------------------|
| Aqueous samples             | Non-ionic              | Reversed-phase chromatography       | C18-BIO                                |
|                             | Proteins, polypeptides | Gel filtration chromatography (GFC) | Shodex KW-800, SB-800 HQ; Gel X series |
|                             |                        | Ion-exchange chromatography         | SAX, SCX; Sep series                   |
|                             |                        | Reversed-phase chromatography       | C18-BIO                                |
|                             |                        | Affinity chromatography             | Shodex AFpak,                          |
|                             | Nucleic acid           | Ion-exchange chromatography         | SAX, SCX; Sep series                   |
|                             | Polysaccharide         | Gel filtration chromatography (GFC) | Shodex KW-800, SB-800 HQ; Gel X series |
| Ion-exchange chromatography |                        | SAX, SCX; Sep series                |                                        |
| Oil-soluble Samples         |                        | Gel filtration chromatography (GFC) | Shodex SB-800 HQ; Gel-S Series         |
|                             |                        | Reversed-phase chromatography       | C18-BIO                                |

## Precautions for use of columns

### Column Equilibration

When preparing to introduce your desired mobile phase into a new column, be aware of the miscibility of the solvents being introduced to the column and the solvent inside the column. If they are not, it is necessary to pump one or more miscible intermediate solvents through the column to avoid high pressure. Equilibrate the column with a minimum of 10 column volumes of mobile phase to be used.

#### Reversed-phase columns equilibration method

Reversed-phase columns equilibrate in as little as 20 column volumes of mobile phase. If the new eluent being introduced contains buffer salts, it is recommended that the column is flushed with a highly aqueous eluent (such as 90:10 Water: MeCN) before introducing buffer, to avoid precipitation of salts on the column. For extra precaution, introduce new buffered eluents WITHOUT the buffer component for 5-10 column volumes, and then switch to the fully buffered eluent composition. Precipitation of buffer salts on the columns is essentially irreversible and destroys the column. When switching between solvents with vastly different polarities, it may be necessary to first purge the column with a mutually miscible solvent such as Isopropyl Alcohol or Dioxane at a reduced flow rate (approximately 50% of normal). Flushing with a minimum of 5 column volumes is recommended (e.g. 10mL for a 150 x 4.6mm I.D. column).

#### Normal phase column equilibration method

Normal-phase columns require longer equilibration times (at least 50 column volumes). To ensure good reproducibility and faster equilibration of normal-phase columns, a small, constant percentage of water can be added to the mobile phase.

### Column maintenance

**Eluent pH:** At pH above 8, silica gels begin to dissolve; at acidic pH below 2.0 certain bonded phases (particularly CN) become hydrolyzed and gradual loss of bonded phase can occur. While many customers use the columns outside both sides of the pH spectrum with excellent results and good column lifetime, the best lifetimes are usually obtained at intermediate pH conditions.

**Pressure:** To maximize column life operate at pressures up to 20 MPa (~ 3000 psi) for standard HPLC phases (UHPLC columns can be used at higher pressures, as indicated on the test chromatogram).

**Sample Dissolution:** Samples should be dissolved in the eluent or solvent weaker than the eluent, which helps avoid sample precipitation at the column head and inconsistent retention values. Filter sample with 0.45µ membrane to remove particulate matter before injection.

**Solvents:** Use HPLC or spectroscopy grade solvents that have been filtered through a 0.45µ filter. Filter all buffer solutions before use. Avoid introduction of particulates onto the column at all costs.

**Guard Columns:** Use a guard column of matching chemistry and particle size between the injector and main column. Guard columns need to be replaced at regular intervals as determined by sample contamination. When system backpressure limit, it is usually an indication that the guard column should be replaced. A sudden appearance of split peaks is also indicative of a need to replace the guard column.

### Clean of Columns

#### Clean of reverse phase silica bonded phase columns

20 column volumes should be used for each wash stage:

95:5 water: ACN( Removal of buffer) → 100% ACN → 50:50 water: ACN

#### Clean of normal phase silica bonded phase column

20 column volumes should be used for each wash stage:

THF → Chloroform → Methylene Chloride → Hexane

## Common Troubleshooting

| Problem                        | Possible cause                                                                                 | Solution                                                                                                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No peaks or very small peaks   | Detector off                                                                                   | Check detector                                                                                                                                                                    |
|                                | Broken connections to recorder                                                                 | Check connections                                                                                                                                                                 |
|                                | No sample/Wrong sample                                                                         | Check sample. Be sure it is not deteriorated. Check for bubbles in the vials                                                                                                      |
|                                | Wrong settings on recorder or detector                                                         | Check attenuation. Check gain                                                                                                                                                     |
| No Flow                        | Pump off                                                                                       | Start Pump                                                                                                                                                                        |
|                                | Flow interrupted                                                                               | "Check reservoirs. Check position of the inlet tubing. Check loop for obstruction or air.<br>Check degasing of mobile phase. Check compatibility of the mobile phase components." |
|                                | Leak                                                                                           | Check fittings. Check pump for leaks and precipitates. Check pump seals.                                                                                                          |
|                                | Air trapped in the system                                                                      | Disconnect column and prime pump. Flush system with 100% methanol or isopropanol. Contact servicing if necessary.                                                                 |
| Column end leaks               | Loose fitting                                                                                  | Tighten or replace fitting                                                                                                                                                        |
|                                | White powder at loose fitting                                                                  | Cut tubing and replace ferrule; disassemble fitting, rinse and reassemble.                                                                                                        |
| Leak at detector               | Detector-seal failure                                                                          | Replace detector seal or gaskets.                                                                                                                                                 |
| Leak at injection valve        | Worn or scratched valve rotor                                                                  | Replace valve rotor                                                                                                                                                               |
| Leak at pump                   | Pump seal failure                                                                              | Replace pump seal; check piston for scratches and, if necessary, replace                                                                                                          |
| Changing Retention Times       | Buffer retention times                                                                         | Use buffer with concentration greater than 20 mM.                                                                                                                                 |
|                                | Contamination buildup                                                                          | Flush column occasionally with strong solvent                                                                                                                                     |
|                                | Equilibration time insufficient for gradient run or changes in isocratic mobile phase          | Pass at least 10 column volumes through the column for gradient regeneration or after solvent changes                                                                             |
|                                | First few injections - active sites                                                            | Condition column by injecting concentrated sample                                                                                                                                 |
|                                | Inconsistent on-line mobile-phase mixing                                                       | Ensure gradient system is delivering a constant composition; compare with manually prepared mobile phase; partially premix mobile phase                                           |
|                                | Selective evaporation of mobile-phase component                                                | Cover solvent reservoirs; use less-vigorous helium purging; prepare fresh mobile phase                                                                                            |
|                                | Varying column temperature                                                                     | Thermostat or insulate column; ensure laboratory temperature is constant.                                                                                                         |
|                                | Active sites on column packing                                                                 | Use mobil-phase modifier, competing base (basic compounds), or increase buffer strength; use higher coverage column packing.                                                      |
|                                | Column overloaded with sample                                                                  | Decrease sample amount or use larger-diameter column.                                                                                                                             |
|                                | Increasing flow rate                                                                           | Check and reset pump flow rate.                                                                                                                                                   |
|                                | Loss of bonded stationary phase or base silica                                                 | Use mobile-phase pH between pH 2 and pH 8                                                                                                                                         |
|                                | Varying column temperature                                                                     | Thermostat or insulate column; ensure laboratory temperature is constant                                                                                                          |
| Increasing Retention Times     | Decreasing flow rate                                                                           | Check and reset pump flow rate; check for pump cavitation; check for leaking pump seals and other leaks in system                                                                 |
|                                | Changing mobile-phase composition                                                              | Cover solvent reservoirs; ensure that gradient system is delivering correct composition.                                                                                          |
|                                | Loss of bonded stationary phase                                                                | Use mobile-phase pH between pH 2 and pH 8                                                                                                                                         |
| Slow column equilibration time | Reversed phase ion pairing - long chain ion pairing reagents require longer equilibration time | Use ion-pairing reagent with shorter alkyl chain length                                                                                                                           |
| Void Time noise                | Air bubbles in mobile phase                                                                    | Degas or use back pressure restrictor on detector                                                                                                                                 |
|                                | Positive-negative - difference in refractive index of injection solvent and mobile phase       | Normal with many samples; use mobile phase as sample solvent                                                                                                                      |
| Drifting baseline              | Negative direction (gradient elution) - absorbance of mobile-phase A                           | Use non-UV absorbing mobile phase solvents; use HPLC grade mobile phase solvents; add UV absorbing compound to mobile phase B.                                                    |
|                                | Positive direction (gradient elution) - absorbance of mobile phase B                           | Use higher UV absorbance detector wavelength; use non-UV absorbing mobile phase solvents; use HPLC grade mobile phase solvents; add UV absorbing compound to mobile phase A.      |
|                                | Positive direction - contamination buildup and elution                                         | Flush column with strong solvent; clean up sample; use HPLC grade solvents                                                                                                        |
|                                | Wavy or undulating - temperature changes in room                                               | Monitor and control changes in room temperature; insulate column or use column oven; cover refractive index detector and keep it out of air currents.                             |
| Baseline noise                 | Continuous - detector lamp problem or dirty cell                                               | Replace UV lamp( each should last 2000 h; clean and flush flow cell.                                                                                                              |
|                                | Gradient or isocratic proportioning- lack of solvent mixing                                    | Use proper mixing device; check proportioning precision by spiking one solvent with UV absorbing compound and monitor UV absorbance detector output.                              |
|                                | Gradient or isocratic proportioning - malfunctioning proportioning valves                      | Clean or replace proportioning precision valves; partially remix solvents.                                                                                                        |
|                                | Occasional sharp spikes - external electrical interference                                     | Use voltage stabilizer for LC system; use independent electrical circuit.                                                                                                         |
|                                | Periodic - pump pulses                                                                         | Service or replace pulse damper; purge air from pump; clean or replace check valves.                                                                                              |
|                                | Random - contamination buildup                                                                 | Flush column with strong solvent; clean up sample; use HPLC grade solvent                                                                                                         |
|                                | Spikes - bubble in detector                                                                    | Degas mobile phase; use back pressure restrictor at detector outlet.                                                                                                              |
|                                | Spikes - column temperature higher than boiling point of solvent                               | Use lower column temperature.                                                                                                                                                     |

## Common Troubleshooting

| Problem              | Possible cause                                                                                                                                                               | Solution                                                                                                                                                                                                                           |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Decreasing Pressure  | Insufficient flow from pump                                                                                                                                                  | Loosen cap on mobile phase reservoir                                                                                                                                                                                               |
|                      | Leak in hydraulic lines from pump to column                                                                                                                                  | Tighten or replace fittings; tighten rotor in injection valve                                                                                                                                                                      |
|                      | Leaking pump check valve or seals                                                                                                                                            | Replace or clean check valves; replace pump seals.                                                                                                                                                                                 |
|                      | Pump cavitation                                                                                                                                                              | Degas solvent; check for obstruction in line from solvent reservoir to pump; replace inlet-line frit                                                                                                                               |
| Fluctuating pressure | Bubble in pump                                                                                                                                                               | Degas solvent; purge solvent with helium                                                                                                                                                                                           |
|                      | Leaking pump check valve or seals                                                                                                                                            | Replace or clean check valves; replace pump seals                                                                                                                                                                                  |
| High Back Pressure   | Column blocked with irreversibly adsorbed sample                                                                                                                             | Improve sample cleanup; use guard column; reverse-flush column with strong solvent to dissolve blockage                                                                                                                            |
|                      | "Column particle size too small (for example 3 micrometers)"                                                                                                                 | Use larger particle size (for example 5 micrometer)                                                                                                                                                                                |
|                      | Microbial growth on column                                                                                                                                                   | "Use at least 10% organic modifier in mobile phase; use fresh buffer daily; add 0.02% sodium azide to aqueous mobile phase; store column in at least 25% organic solvent without buffer"                                           |
|                      | Mobile phase viscosity too high                                                                                                                                              | Use lower viscosity solvents or higher temperature                                                                                                                                                                                 |
|                      | Plugged frit in in-line filter or guard column                                                                                                                               | Replace frit or guard column                                                                                                                                                                                                       |
|                      | Plugged inlet frit                                                                                                                                                           | Replace endfritting or frit assembly                                                                                                                                                                                               |
|                      | Polymetric columns - solvent change causes swelling of packing                                                                                                               | Use correct solvent with column; change to proper solvent composition; consult manufacturer's solvent-compatibility chart; use a column with a higher percentage of cross-linking                                                  |
|                      | Salt precipitation (especially in reversed-phase chromatography with high concentration of organic solvent in mobile phase) concentration of organic solvent in mobile phase | Ensure mobile phase compatibility with buffer concentration; decrease ionic strength and water-organic solvent ratio; premix mobile phase                                                                                          |
| Increasing Pressure  | When injector disconnected from column - blockage in injector                                                                                                                | Clean injector or replace rotor                                                                                                                                                                                                    |
|                      | Blocked flow lines                                                                                                                                                           | Systematically disconnect components from detector end to column end to find blockage; replace or clean blocked component                                                                                                          |
|                      | Particulate buildup at head of column                                                                                                                                        | "Filter sample; use .5 micrometer in-line filter; disconnect and backflush column; replace inlet frit"                                                                                                                             |
| Broad peaks          | Water-organic solvent systems - buffer precipitation                                                                                                                         | "Ensure mobile phase compatibility with buffer concentration; decrease ionic strength or water organic solvent ratio"                                                                                                              |
|                      | Analytes eluted early due to sample overload                                                                                                                                 | Dilute sample 1:10 and reinject                                                                                                                                                                                                    |
|                      | Detector-cell volume too large                                                                                                                                               | Use smallest possible cell volume consistent with sensitivity needs; use detector with no heat exchanger in system                                                                                                                 |
|                      | Injection volume too large                                                                                                                                                   | Decrease solvent strength of injection solvent to focus solute; inject smaller volume                                                                                                                                              |
|                      | Large extra column volume                                                                                                                                                    | Use low- or zero-dead-volume endfittings and connectors; use smallest possible diameter of connecting tubing (<0.10 in. i.d.); connect tubing with matched fittings                                                                |
|                      | Mobile-phase solvent viscosity too high                                                                                                                                      | Increase column temperature; change to lower viscosity solvent                                                                                                                                                                     |
|                      | Peak dispersion in injector valve                                                                                                                                            | Decrease injector sample loop size; introduce air bubble in front and back of sample in loop                                                                                                                                       |
|                      | Poor column efficiency                                                                                                                                                       | Use smaller-particle-diameter packing, lower-viscosity mobile phase, higher column temperature, or lower flow rate                                                                                                                 |
|                      | Retention time too long                                                                                                                                                      | Use gradient elution or stronger isocratic mobile phase                                                                                                                                                                            |
|                      | Sampling rate of data system too low                                                                                                                                         | Increase sampling frequency.                                                                                                                                                                                                       |
| Ghost peaks          | Slow detector time constant                                                                                                                                                  | Adjust time constant to match peak width                                                                                                                                                                                           |
|                      | Some peaks broad - late elution of analytes retained from previous injection                                                                                                 | Flush column with strong solvent at end of run; end gradient at higher solvent concentration                                                                                                                                       |
|                      | Contamination                                                                                                                                                                | Flush column to remove contaminant; use HPLC-grade solvent                                                                                                                                                                         |
|                      | Elution of analytes retained from previous injection                                                                                                                         | Flush column with strong solvent at end of run; end gradient at higher solvent concentration                                                                                                                                       |
|                      | Ion-pair chromatography - upset equilibrium                                                                                                                                  | Prepare sample in mobile phase; reduce injection volume                                                                                                                                                                            |
|                      | Oxidation of trifluoroacetic acid in peptide mapping                                                                                                                         | Prepare trifluoroacetic acid solutions fresh daily; use antioxidant                                                                                                                                                                |
| Negative peaks       | Reversed-phase chromatography - contaminated water                                                                                                                           | Check suitability of water by running different amounts through column and measure peak height of interferences as function of enrichment time; clean water by running it through old reversed-phase column; use HPLC-grade water. |
|                      | Unknown interferences in sample                                                                                                                                              | Use sample cleanup or prefractionation before injection.                                                                                                                                                                           |
|                      | Refractive index detection - refractive index of solute less than that of mobile phase                                                                                       | Reverse polarity to make peak positive                                                                                                                                                                                             |
| Negative peaks       | UV-absorbance detection - absorbance of solute less than that of mobile phase                                                                                                | Use mobile phase with lower UV absorbance; if recycling solvent, stop recycling when recycled solvent affects detection                                                                                                            |

# Chromatography

| Problem       | Possible cause                                              | Solution                                                                                                                                                                                                                 |
|---------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Peak Doubling | Blocked Frit                                                | Replace or clean frit; install 0.5-um porosity in-line filter between pump and injector to eliminate mobile-phase contaminants or between injector and column to eliminate sample contaminants                           |
|               | Coelution of interfering compound                           | Use sample cleanup or prefractionation; adjust selectivity by changing mobile or stationary phase                                                                                                                        |
|               | "Coelution of interfering compound from previous injection" | Flush column with strong solvent at end of run; end gradient at higher solvent concentration                                                                                                                             |
|               | Column overloaded                                           | Use higher-capacity stationary phase; increase column diameter; decrease sample amount                                                                                                                                   |
|               | Column void or channeling                                   | Replace column, or, if possible, open top endfitting and clean and fill void with glass beads or same column packing; repack column                                                                                      |
|               | Injection solvent too strong                                | Use weaker injection solvent or stronger mobile phase                                                                                                                                                                    |
|               | Sample volume too large                                     | Use injection volume equal to one-sixth of column volume when sample prepared in mobile phase for injection                                                                                                              |
|               | Unswept injector flow path                                  | Replace injector rotor                                                                                                                                                                                                   |
| Peak Fronting | Channeling in column                                        | Replace or repack column                                                                                                                                                                                                 |
|               | Column overloaded                                           | Use higher-capacity stationary phase; increase column diameter; decrease sample amount                                                                                                                                   |
| Tailing Peaks | Basic solutes - silanol interactions                        | Use competing base such as triethylamine; use a stronger mobile phase; use base-deactivated silica-based reversed-phase column; use polymeric column                                                                     |
|               | Beginning of peak doubling                                  | See peak doubling                                                                                                                                                                                                        |
|               | Chelating solutes - trace metals in base silica             | Use high purity silica-based column with low trace-metal content; add EDTA or chelating compound to mobile phase; use polymeric column                                                                                   |
|               | Silica-based column - degradation at high pH                | Use polymeric, sterically protected, or high-coverage reversed-phase column; install silica gel saturator column between pump and injector                                                                               |
|               | Silica-based column - degradation at high temperature       | Reduce temperature to less than 50°C                                                                                                                                                                                     |
|               | Silica-based column - silanol interactions                  | Decrease mobile-phase pH to suppress silanol ionization; increase buffer concentration; derivatize solute to change polar interactions                                                                                   |
|               | Unswept dead volume                                         | Minimize number of connections; ensure injector rotor seal is tight; ensure all compression fittings are correctly seated                                                                                                |
|               | Void formation at head of column                            | Replace column, or, if possible, open top end fitting and clean and fill in void with glass beads or same column packing; rotate injection valve quickly; use injection valve with pressure bypass; avoid pressure shock |
| Spikes        | Bubbles in mobile phase                                     | Degas mobile phase; use back-pressure restrictor at detector outlet; ensure that all fittings are tight                                                                                                                  |
|               | Column stored without caps                                  | Store column tightly capped; flush reversed-phase columns with degassed methanol                                                                                                                                         |
|               |                                                             |                                                                                                                                                                                                                          |

## Correspond with other brand columns

| Column  | Supelco                        | Kromasil           | Agilent                  | GL                 |
|---------|--------------------------------|--------------------|--------------------------|--------------------|
| C18-WP  | Discovery RP-Amide C16         |                    | ZORBAX Rx C18            | Inertsil ODS-EP    |
| C18     | SUPELCOSIL LC-18 Discovery C18 | Kromasil C-18      | ZORBAX Eclipse XDB-C18   | Inertsil ODS-2     |
| C18-BIO | Discovery BIO Wide Pore C18    | Kromasil 300A C-18 | ZORBAX 300SB-C18         | Inertsil WP300 c18 |
| C8      | DISCOVERY C8                   | Kromasil C-8       | ZORBAX Eclipse XDB-C8    | Inertsil C8        |
| C4      |                                | Kromasil C4        |                          | Inertsil C4        |
| Phenyl  | SUPELCOSIL LC-DP               | Kromasil Phenyl    | ZORBAX Eclipse XDBPhenyl |                    |
| Silica  | SUPELCOSIL LC-Si               | Kromasil SIL       | ZORBAX Silica            | Inertsil Sil       |
| NH2     | SUPELCOSIL LC-NH2              | Kromasil NH2       | ZORBAX NH2               | Inertsil NH2       |
| CN      | SUPELCOSIL LC-CN               | Kromasil CN        | ZORBAX Eclipse XDB-CN    | Inertsil CN-3      |

| Column  | Merck                         | Waters                | Thermo              |
|---------|-------------------------------|-----------------------|---------------------|
| C18-WP  |                               | SymmetryShield C18    |                     |
| C18     | Puropher STAR RP-18 endcapped | Symmetry C18          | Hypersil ODS C18    |
| C18-BIO | Lichrospher wp 300 RP-18e     | Symmetry 300          | Hypersil 300A C18   |
| C8      | Puropher STAR RP-8 endcapped  | Symmetry C8           | Hypersil C8         |
| C4      |                               | Spherisorb® C4        | Hypersil GOLD C4    |
| Phenyl  |                               | Spherisorb® Phenyl    | Hypersil Phenyl-2   |
| Silica  | Lichrospher si 100            | Spherisorb® W(Silica) | Hypersil Silica     |
| NH2     | Puropher STAR NH2             | Spherisorb® NH2       | Hypersil NH2        |
| CN      | Lichrospher CN                | Spherisorb® CN        | Hypersil CN (CPS-2) |

## The USP liquid phase column summary

USP is United States Pharmacopoeia, provides a number of indicators for HPLC column packing:

| USP | Packing Description                                                                                                                                                                                                                                                                                                                                           | Recommend HPLC columns                                   |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| L1  | Octadecyl silane chemically bonded to porous silica or ceramic particles, 1.5 to 10µm in diameter, or a monolithic rod                                                                                                                                                                                                                                        | C18, C18-WP, C18-BIO                                     |
| L2  | Octadecyl silane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50µ in diameter                                                                                                                                                                                                       | C18 Packing                                              |
| L3  | Porous silica microparticles, 5 to 10µ in diameter                                                                                                                                                                                                                                                                                                            | Silica                                                   |
| L4  | Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50µ in diameter                                                                                                                                                                                                                                                             | Silicycle packing                                        |
| L7  | Octyl silane chemically bonded to totally porous microsilica particles, 3 to 10µ in diameter                                                                                                                                                                                                                                                                  | C8                                                       |
| L8  | An essentially monomolecular layer of aminopropyl-silane chemically bonded to totally porous silica gel support, 10µ in diameter                                                                                                                                                                                                                              | NH2                                                      |
| L9  | Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic ation-exchange coating, 3 to 10 µm in diameter                                                                                                                                                                                                                  | SCX                                                      |
| L10 | Nitrile groups chemically bonded to porous silica microparticles, 3 to 10µ in diameter                                                                                                                                                                                                                                                                        | CN, Shodex Silica 5CN                                    |
| L11 | Phenyl groups chemically bonded to porous silica microparticles, 3 to 10µ in diameter                                                                                                                                                                                                                                                                         | Phenyl, Shodex Silica 5NPE                               |
| L12 | Strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter"                                                                                                                                                                                                                        |                                                          |
| L13 | Trimethylsilane chemically bonded to porous silica microparticles, 3 to 10µ in diameter                                                                                                                                                                                                                                                                       | Shodex Silica 5TMS                                       |
| L14 | Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5 to 10 µm in diameter.                                                                                                                                                                                                                                     | SAX                                                      |
| L15 | Hexyl silane chemically bonded to totally porous silica particles, 3 to 10µ in diameter                                                                                                                                                                                                                                                                       | Spherisorb S5 C6                                         |
| L16 | Dimethyl silane chemically bonded to totally porous silica particles, 5 to 10 µm in diameter                                                                                                                                                                                                                                                                  |                                                          |
| L17 | Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 to 11µ in diameter                                                                                                                                                                                                                | Sep H-L, H-M, H-H                                        |
| L18 | Dimethyl silane chemically bonded to totally porous silica particles, 5 to 10 µm in diameter                                                                                                                                                                                                                                                                  |                                                          |
| L19 | Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 9µ in diameter.                                                                                                                                                                                                                      | Sep Ca-L, Ca-M, Ca-H                                     |
| L20 | Dihydroxypropane groups chemically bonded to porous silica particles, 3 to 10µ in diameter.                                                                                                                                                                                                                                                                   | Shodex PROTEIN KW-800                                    |
| L21 | A rigid, spherical styrene-divinylbenzene copolymer, 5 to 10µ in diameter.                                                                                                                                                                                                                                                                                    | Transgenomic PRX-1, Shodex GPC KF-800, K-800, KD-800     |
| L22 | A cation exchange resin made of porous polystyrene gel with sulfonic acid groups, about 10µ in size                                                                                                                                                                                                                                                           | Shodex ICY-521, SUGAR KS-800 series                      |
| L23 | An ion exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, about 10µ in size                                                                                                                                                                                                                                  | Shodex IEC QA-825                                        |
| L24 | A semi-rigid hydrophilic gel consisting of vinyl polymers with numerous hydroxyl groups on the matrix surface, 32 to 63 µm in diameter                                                                                                                                                                                                                        |                                                          |
| 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, anionic, and cationic water- soluble polymers. A polymethacrylate resin base, crosslinked with poly-hydroxylated ether (surface contained some residual carboxyl functional groups) was found suitable. | Shodex OHpak SB-802 HQ Shodex OHpak SB-802.5 HQ, SB402.5 |
| L26 | Butyl silane chemically bonded to totally porous silica particles, 5 to 10µ in diameter                                                                                                                                                                                                                                                                       | C4                                                       |
| L27 | Porous silica particles, 30 to 50µ in diameter                                                                                                                                                                                                                                                                                                                | Silicycle packing                                        |
| L28 | A multifunctional support, which consists of a high purity, 100 , spherical silica substrate that has been bonded with anionic (amine) functionality in addition to a conventional reversed phase C8 functionality"                                                                                                                                           |                                                          |
| L29 | Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm diameter with a pore diameter of 80"                                                                                                                                                                                                    |                                                          |
| L30 | Ethyl silane chemically bonded to a totally porous silica particle, 3 to 10 µm in diameter                                                                                                                                                                                                                                                                    |                                                          |
| 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 and consisting of ethylvinylbenzene cross-linked with 55 % divinyl benzene                                                                                                                           |                                                          |
| L32 | A chiral ligand-exchange packing- L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter                                                                                                                                                                                                                   |                                                          |
| L33 | Packing having the capacity to separate proteins of 4,000 to 400,000 daltons. It is spherical, silica-based and processed to provide pH stability                                                                                                                                                                                                             | Shodex PROTEIN KW-800 series Shodex KW400 series         |
| L34 | Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, about 9µ in diameter                                                                                                                                                                                                                    | Sep Pb-L, Pb-M, Pb-H                                     |
| L35 | A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase having a pore size of 150Å.                                                                                                                                                                                                                   | Agilent Zorbax GF-250                                    |
| L36 | 3,5-dinitrobenzoyl derivative of L-phenylglycine covalently bonded to 5 µm aminopropyl silica                                                                                                                                                                                                                                                                 |                                                          |
| L37 | Packing having the capacity to separate proteins by molecular size over a range of 2,000 to 40,000 Da. It is a polymethacrylate gel                                                                                                                                                                                                                           | Shodex OHpak SB-803 HQ, SB403                            |
| L38 | Methacrylate-based size-exclusion packing for water-soluble samples                                                                                                                                                                                                                                                                                           | Shodex OHpak SB-802HQ                                    |
| L39 | Hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin                                                                                                                                                                                                                                                                                     | Shodex Ohpak SB-800HQ, Shodex Rspak DM-614               |
| L40 | Cellulose tri-3,5-dimethylphenylcarbamate coated porous silica particles, 5µ to 20µ in diameter                                                                                                                                                                                                                                                               | Regis Cell®                                              |
| L41 | Immobilized α1-acid glycoprotein on spherical silica particles                                                                                                                                                                                                                                                                                                |                                                          |
| L42 | Octylsilane and octadecylsilane groups chemically bonded to porous silica particles, 5 µm in diameter                                                                                                                                                                                                                                                         |                                                          |
| L43 | Pentafluorophenyl groups chemically bonded to silica particles, 5 to 10 µm in diameter[ 5-10µm]                                                                                                                                                                                                                                                               | Supelco Discovery HSF5                                   |
| L44 | A multifunctional support, which consists of a high purity, 60 , spherical silica substrate that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a conventional reversed phase C8 functionality.                                                                                                                        |                                                          |
| L45 | Beta cyclodextrin bonded to porous silica particles, 5 to 10 µm in diameter                                                                                                                                                                                                                                                                                   | Shodex ORpak CDBS-453                                    |

# Chromatography

| USP | Packing Description                                                                                                                                                                                                                                                                                                                                                                                           | Recommence HPLC columns                           |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| L46 | Polystyrene/divinylbenzene substrate agglomerated with quaternary amine functionalized latex beads, 10 µm in diameter.                                                                                                                                                                                                                                                                                        |                                                   |
| L47 | High capacity anion-exchange microporous substrate, fully functionalized with a trimethylamine group, 8 µm in diameter.                                                                                                                                                                                                                                                                                       |                                                   |
| L48 | Sulfonated, cross-linked polystyrene with an outer layer of submicron, porous, anion-exchange microbeads, 15 µm in diameter.                                                                                                                                                                                                                                                                                  |                                                   |
| L49 | A reversed-phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter.                                                                                                                                                                                                                                                                     | Discovery Zr-PBD                                  |
| L50 | Multifunction resin with reversed-phase retention and strong anion-exchange functionalities. The resin consists of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 3 to 15 µm in diameter, and a surface area of not less than 350 m <sup>2</sup> /g, substrate is coated with quaternary ammonium functionalized latex particles consisting of styrene cross-linked with divinylbenzene. |                                                   |
| L51 | Amylose tris-3,5-dimethylphenylcarbamate-coated, porous, spherical, silica particles, 5 to 10 µm in diameter.                                                                                                                                                                                                                                                                                                 | ®                                                 |
| L52 | A strong cation exchange resin made of porous silica with sulfopropyl groups, 5 to 10 µm in diameter.                                                                                                                                                                                                                                                                                                         | SCX                                               |
| L53 | Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 3 to 15 µm diameter. Substrate is surface grafted with carboxylic acid and/or phosphoric acid functionalized monomers. Capacity not less than 500 µm in diameter.                                                                                                                                |                                                   |
| L54 | "A size exclusion medium made of covalent bonding of dextran to highly cross-linked porous agarose beads, about 13 µm in diameter."                                                                                                                                                                                                                                                                           |                                                   |
| L55 | A strong cation exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer, about 5 µm in diameter.                                                                                                                                                                                                                                                                                 |                                                   |
| L56 | Isopropyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter                                                                                                                                                                                                                                                                                                                 |                                                   |
| L57 | A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 µm in diameter, with a pore size of 120 angstroms.                                                                                                                                                                                                                                                                    |                                                   |
| L58 | Strong cation-exchange resin consisting of sulphonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 7 to 11 µm diameter                                                                                                                                                                                                                                                            | Sep Na-L, Na-M, Na-H, Transgenomic Coregel 87N    |
| L59 | Packing having the capacity to separate proteins by molecular weight over the range of 10 to 500kDa. It is spherical(10µm), silica-based, and processed to provide hydrophilic characteristics and pH stability                                                                                                                                                                                               | Shodex PROTEIN KW-800 series, Shodex KW400 series |
| L60 | Spherical, porous silica gel, 3 to 10 µm in diameter, surface has been covalently modified with palmitamidopropyl groups and endcapped.                                                                                                                                                                                                                                                                       | C18-WP                                            |
| L61 | Hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles, pore size less than 10 Å, and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 85 nm diameter microbeads bonded with alkanol quaternary ammonium ions (6 %).                                                                  |                                                   |
| L62 | C30 silane bonded phase on a fully porous spherical silica, 3 to 15 µm in diameter.                                                                                                                                                                                                                                                                                                                           | C30                                               |
| L63 | Glycopeptide teicoplanin linked through multiple covalent bonds to a 100 Å units spherical silica                                                                                                                                                                                                                                                                                                             |                                                   |
| L64 | Strongly basic anion exchange resin consisting of 8% crosslinked styrene divinylbenzene copolymer with a quaternary ammonium group in the chloride form, 45 to 180 µm in diameter                                                                                                                                                                                                                             |                                                   |
| L65 | Strongly acidic cation exchange resin consisting of 8% sulfonated crosslinked styrene divinylbenzene copolymer with a sulfonic acid group in the hydrogen form, 63 to 250 µm in diameter                                                                                                                                                                                                                      |                                                   |
| L66 | A crown ether coated on a 5 µm particle size silica gel substrate. The active site is [S]-18-crown-6 ether                                                                                                                                                                                                                                                                                                    |                                                   |
| L67 | Porous vinyl alcohol copolymer with a C18 alkyl group attached to the hydroxyl group of the polymer, 2 to 10 µm in diameter                                                                                                                                                                                                                                                                                   | Shodex Asahipak ODP-40 Shodex ET-RP1              |
| L68 | Spherical, porous silica, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped                                                                                                                                                                                                                                                              |                                                   |
| L69 | Ethylvinylbenzene/divinylbenzene substrate agglomerated with quaternary amine functionalized 130nm latex beads, about 6.5 µm in diameter                                                                                                                                                                                                                                                                      |                                                   |
| L70 | Cellulose tris(phenyl carbamate) coated on 5 µm silica                                                                                                                                                                                                                                                                                                                                                        |                                                   |
| L71 | Arigid, spherical polymetacrylate, 4 to 6 µm in diameter                                                                                                                                                                                                                                                                                                                                                      | Shodex RSpak DE-613                               |
| L72 | [S]-phenylglycine and 3,5-dinitroaniline urea linkage covalently bonded to silica                                                                                                                                                                                                                                                                                                                             |                                                   |
| L73 | A rigid, spherical polydivinylbenzene particle, 5 to 10 µm in diameter                                                                                                                                                                                                                                                                                                                                        |                                                   |
| L74 | A strong anion-exchange resin consisting of a highly cross-linked core of 7-µm macroporous particles having a 100 Angstroms average pore size and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkyl quaternary ammonium ions.                                                                       |                                                   |
| L75 | A chiral-recognition protein, bovine serum albumin (BSA), chemically bonded to silica particles, about 7 µm in diameter, with a pore size of 300 Angstroms.                                                                                                                                                                                                                                                   |                                                   |

## Pressure unit conversion table

1atm = 1.01325bar

| UNIT                | Pa              | KPa                     | MPa                     | bar                    | kgf/cm <sup>2</sup>    | mmH <sub>2</sub> O      | mmHg                   | p.s.i                  |
|---------------------|-----------------|-------------------------|-------------------------|------------------------|------------------------|-------------------------|------------------------|------------------------|
| Pa                  | 1               | 10 <sup>-3</sup>        | 10 <sup>-6</sup>        | 10 <sup>-5</sup>       | 10.2×10 <sup>-6</sup>  | 101.97×10 <sup>-3</sup> | 7.5×10 <sup>-3</sup>   | 0.15×10 <sup>-3</sup>  |
| KPa                 | 10 <sup>3</sup> | 1                       | 10 <sup>-3</sup>        | 10 <sup>-2</sup>       | 10.2×10 <sup>-3</sup>  | 101.97                  | 7.5                    | 0.15                   |
| MPa                 | 10 <sup>6</sup> | 10 <sup>3</sup>         | 1                       | 10                     | 10.2                   | 101.97×10 <sup>3</sup>  | 7.5×10 <sup>3</sup>    | 0.15×10 <sup>3</sup>   |
| bar                 | 10 <sup>5</sup> | 10 <sup>2</sup>         | 10 <sup>-1</sup>        | 1                      | 1.02                   | 10.2×10 <sup>3</sup>    | 750.06                 | 14.5                   |
| kgf/cm <sup>2</sup> | 98066.5         | 98.07                   | 98.07×10 <sup>-3</sup>  | 0.98                   | 1                      | 10.000                  | 735.56                 | 14.22                  |
| mmH <sub>2</sub> O  | 9.806           | 9.807×10 <sup>-3</sup>  | 9.807×10 <sup>-6</sup>  | 98.07×10 <sup>-6</sup> | 10 <sup>-4</sup>       | 1                       | 73.56×10 <sup>-3</sup> | 1.42×10 <sup>-3</sup>  |
| mmHg                | 133.32          | 133.32×10 <sup>-3</sup> | 133.32×10 <sup>-6</sup> | 1.33×10 <sup>-3</sup>  | 1.36×10 <sup>-3</sup>  | 13.6                    | 1                      | 19.34×10 <sup>-3</sup> |
| p.s.i               | 6894.76         | 6.89                    | 6.89×10 <sup>-3</sup>   | 68.95×10 <sup>-3</sup> | 70.31×10 <sup>-3</sup> | 703.07                  | 51.71                  | 1                      |

## Pressure unit conversion table

| Solvent ①②           | UV wavelength nm ③ | Refractive index ④ | Boiling point °C | Viscosity (cp 25 °C) | Polarity | Solubility ⑤ | Dielectric constant 20 °C |
|----------------------|--------------------|--------------------|------------------|----------------------|----------|--------------|---------------------------|
| Isooctane (*)        | 210                | 1.389              | 99               | 0.47                 | 0.1      | 0.01         | 1.94                      |
| N-heptane (*)        | 200                | 1.385              | 98               | 0.4                  | 0.2      | 0.01         | 1.92                      |
| N-hexane (*)         | 190                | 1.372              | 69               | 0.3                  | 0.1      | 0.01         | 1.88                      |
| N-pentane (**)       | 210                | 1.355              | 36               | 0.22                 | 0        | 0.01         | 1.84                      |
| Cyclohexane          | 210                | 1.423              | 81               | 0.9                  | 0.1      | 0.012        | 2.02                      |
| Cyclopentane (*)     | 210                | 1.404              | 49               | 0.42                 | 0.2      | 0.004        | 1.97                      |
| Carbon tetrachloride | 265                | 1.457              | 77               | 0.9                  | 1.6      | 0.008        | 2.24                      |
| Toluene              | 285                | 1.494              | 110              | 0.55                 | 2.4      | 0.046        | 2.4                       |
| Xylene               | 290                | 1.493              | 138              | 0.6                  | 2.5      | unknown      | 2.3                       |
| Chlorobenzene        | unknown            | 1.521              | 132              | 0.75                 | 2.7      | unknown      | 5.6                       |
| Benzene              | 280                | 1.498              | 80               | 0.6                  | 2.7      | 0.07         | 2.3                       |
| Dichloromethane (**) | 245                | 1.421              | 40               | 0.41                 | 3.1      | 1.6          | 8.9                       |
| N-butanol            | 210                | 1.397              | 118              | 2.98                 | 3.9      | 7.81         | 17.5                      |
| N-propanol           | 210                | 1.385              | 97               | 2.27                 | 4        | Miscible     | 20.3                      |
| Tetrahydrofuran(*)   | 220                | 1.405              | 66               | 0.55                 | 4        | Miscible     | 7.4                       |
| Ethyl acetate (*)    | 256                | 1.37               | 77               | 0.43                 | 4.4      | 8.7          | 6.4                       |
| Isopropanol          | 210                | 1.384              | 82               | 2.3                  | 4.3      | Miscible     | 18.3                      |
| Chloroform (*)       | 245                | 1.443              | 61               | 0.53                 | 4.1      | 0.815        | 4.8                       |
| Acetone (*)          | 330                | 1.356              | 56               | 0.3                  | 5.4      | Miscible     | 21.4                      |
| Ethanol              | 210                | 1.359              | 78               | 1.08                 | 4.3      | Miscible     | 24.6                      |
| Acetic acid          | 230                | 1.37               | 118              | 1.26                 | 6        | Miscible     | 6.2                       |
| Acetonitrile         | 210                | 1.341              | 82               | 0.34                 | 6.2      | Miscible     | 37.5                      |
| Methanol (*)         | 210                | 1.326              | 65               | 0.54                 | 6.6      | Miscible     | 32.7                      |
| Glycol               | unknown            | 1.431              | 197              | 19.9                 | 6.9      | Miscible     | 37.7                      |
| Water                | 268                | 1.338              | 100              | 1                    | 10.2     | Miscible     | 80                        |

① (\*) means a low viscosity (<0.5cp), boiling point appropriate in (> 45 °C)

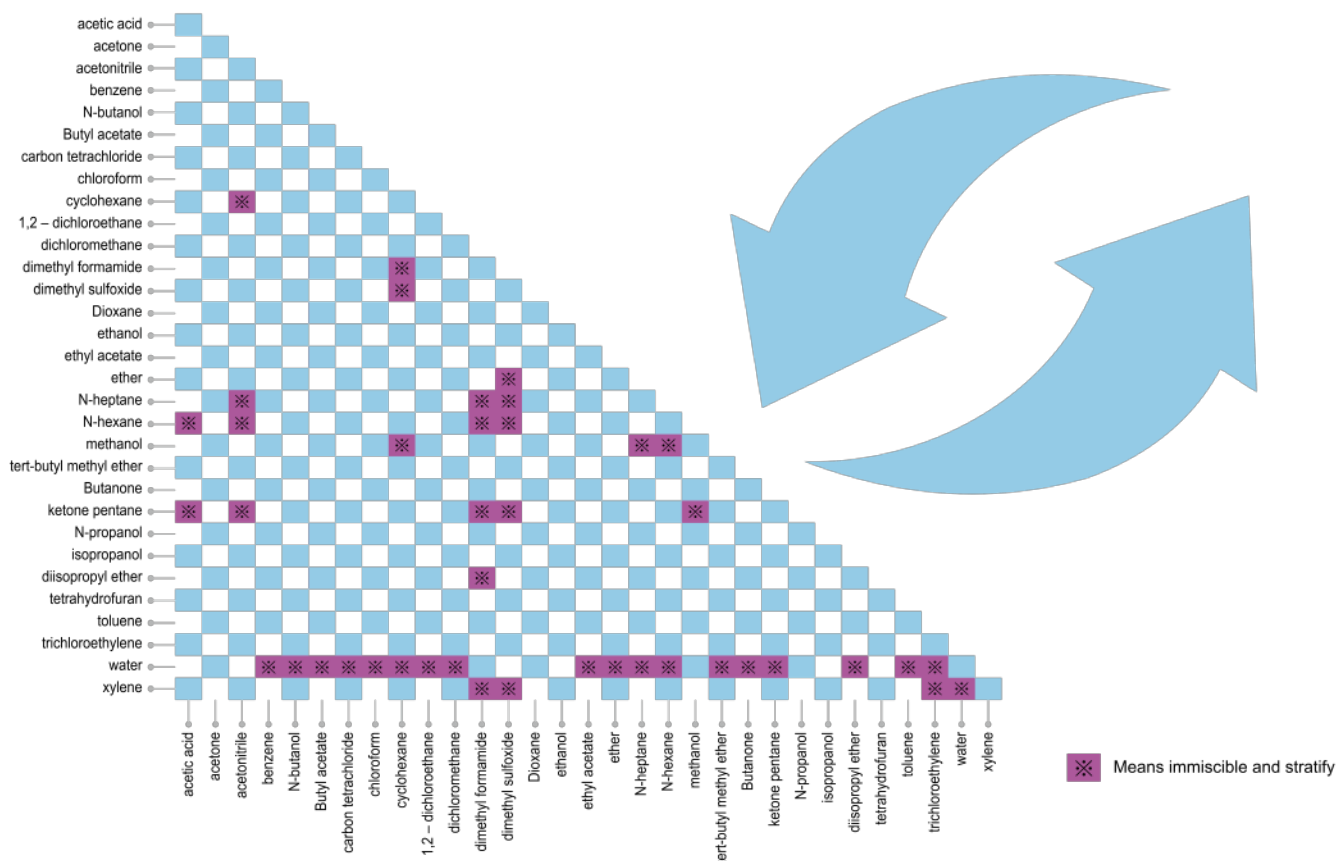
② (\*\*) means small viscosity, low boiling point solvent.

③ Means approximate cutoff wavelength,when lower than this value, solvent is opaque.

④ Refractive index when 25 °C .

⑤ Percentage by weight of water at 20°C when dissolved in a solvent, this value is useful in the liquid - solid chromatography.

## Solvent miscibility



## Application Index

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## Brief introduction

Currently, HPLC is widely used in the chemical, biological and pharmaceutical field. GVS three HPLC series include silica and polymer matrix columns, both analysis and preparative columns, to meet needs of customers in various fields.

### Silica-based analytical column

#### HPLC columns

The Columns base on high-purity silica gel, using unique bonding technique, with excellent peak shape, better selectivity, sensitivity and reproducibility. With low content of matrix metal, the columns show perfect peak shape for all types of analytes. Different types of bonded phases provide more flexibility for method development. To ensure excellent column performance and long column life, we comply with strict production process in manufacturing and have a strict quality control for HPLC columns.



- Suitable for all types of samples
- Excellent column reproducibility
- A variety of bonded phases

#### The packings information:

| Packings                                 | C18-WP   | C18      | C18-BIO  | C8      | C4      | Phenyl  | CN      | Diol    |
|------------------------------------------|----------|----------|----------|---------|---------|---------|---------|---------|
| Particle diameter (μm)                   | 3 and 5  | 5 and 10 | 5        | 3 and 5 | 5       | 5       | 3 and 5 | 3 and 5 |
| Pore size(Å)                             | 100      | 120      | 300      | 120     | 300     | 120     | 120     | 120     |
| Pore volume (mL/g)                       | 1.1      | 1.0      | 0.9      | 1.0     | 0.9     | 1.0     | 1.0     | 1.0     |
| Endcapped                                | Yes      | Yes      | Yes      | Yes     | Yes     | Yes     | Yes     | Yes     |
| Specific surface area(m <sup>2</sup> /g) | 450      | 300      | 100      | 300     | 100     | 300     | 300     | 300     |
| Metallic impurities (ppm)                | <10      | <10      | <10      | <10     | <10     | <10     | <10     | <10     |
| Carbon content                           | 17%      | 17%      | 8%       | 10%     | 3%      | 11%     | 7.5%    | 8.8%    |
| pH range                                 | 1.5 - 10 | 2 - 8    | 1.5 - 11 | 2 - 8   | 2 - 8   | 2 - 8   | 2.5 - 8 | 2.5 - 8 |
| Temperature range (°C)                   | 20 - 60  | 20 - 60  | 20 - 60  | 20 - 60 | 20 - 60 | 20 - 60 | 20 - 60 | 20 - 60 |

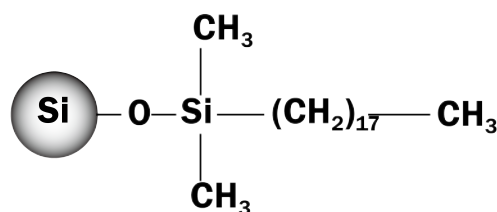
| Packings                                 | NH2     | Silica  | SAX     | SCX     | HILIC   | HILIC(2) | HILIC(3) | 30      |
|------------------------------------------|---------|---------|---------|---------|---------|----------|----------|---------|
| Particle diameter (μm)                   | 3 and 5 | 3 and 5 | 3 and 5 | 3 and 5 | 3 and 5 | 3 and 5  | 5        | 3 and 5 |
| Pore size(Å)                             | 120     | 120     | 120     | 120     | 120     | 120      | 120      | 120     |
| Pore volume (mL/g)                       | 1.0     | 1.0     | 1.0     | 1.0     | 1.0     | 1.0      | 1.0      | 1.0     |
| Specific surface area(m <sup>2</sup> /g) | 300     | 300     | 300     | 300     | 300     | 300      | 300      | 450     |
| Metallic impurities (ppm)                | <10     | <10     | <10     | <10     | <10     | <10      | <10      | <10     |
| Carbon content                           | 4%      | 0%      | 16%     | 11%     | 8.6%    | 8%       | 16%      | 20%     |
| pH range                                 | 2 - 8   | 2 - 8   | 2 - 8   | 2 - 8   | 1.5 - 8 | 1.5 - 8  | 1.5 - 8  | 2 - 8   |
| Temperature range (°C)                   | 20 - 60 | 20 - 60 | 20 - 60 | 20 - 60 | 20 - 60 | 20 - 60  | 20 - 60  | 20 - 60 |

## C18-WP

[ Recommended for Method Development, fit for a variety of mobile phase conditions ]

C18-WP use high purity of spherical silica matrix and have excellent stability. C18-WP can use 100% pure water as mobile phase for separation of acidic, neutral and basic organic compound, as well as many drugs and peptides etc. A variety of specifications, from analytical to preparative scale can be provided.

- bonded C18 groups
- pH stability range: 1.5-10
- Suitable for 100% water mobile phase
- Strong retain for polar substances
- Symmetrical peak shape for Alkaline substances
- High specific surface area, suitable for high load



### PH stability

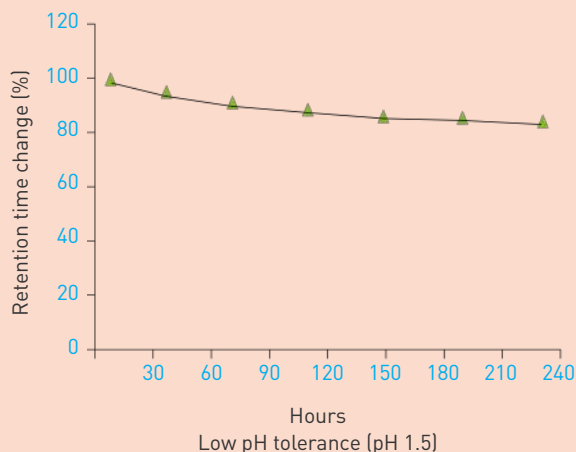
#### Stability of low pH

In the low pH mobile phase, the main reason for short column life is drop of chemical bonded group from silica gel by hydrolysis. Hydrolysis leads to changing retention time of the analyte, short lifetime and poor reproducibility.

The following figure shows C18-WP stability under the conditions of pH 1.5 mobile phase.

#### Low pH tolerance (pH 1.5)

|                    |                                                          |
|--------------------|----------------------------------------------------------|
| Column             | C18-WP, 4.6 x 150 mm, 5µm                                |
| Mobile phase       | Acetonitrile: 0.1% trifluoroacetic acid (pH 1.5) (50/50) |
| Flow rate          | 1.0 mL / min                                             |
| Detection          | UV 254 nm                                                |
| Column temperature | 30 ° C                                                   |
| Sample             | toluene                                                  |

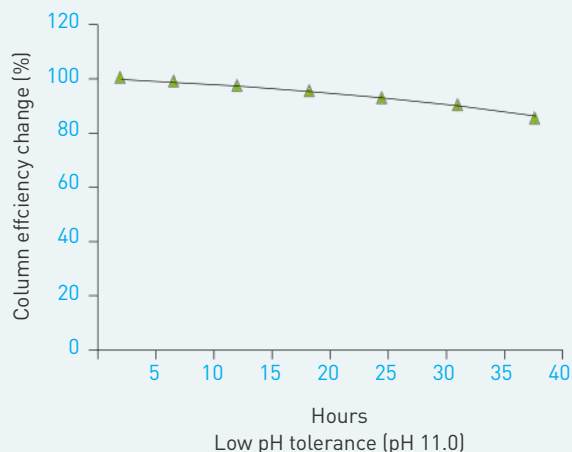


#### Stability of high pH

In the high pH mobile phase, silica matrix is gradually dissolved. Ordinary pH range of silica-based columns is 2-8. When the pH of mobile phase is more than 8, silica gel is dissolved speedily, and column life is very short. C18-WP columns can protect silica matrix to have a longer life in high pH conditions, due to unique bonding and endcapped technology.

#### High pH tolerance (pH 11.0)

|                    |                                                  |
|--------------------|--------------------------------------------------|
| Column             | C18-WP, 4.6 x 150 mm, 5µm                        |
| Mobile phase       | Methanol: 0.5% aqueous ammonia (pH 11.0) (20/80) |
| Flow rate          | 1.0 mL / min                                     |
| Detection          | UV 254 nm                                        |
| Column temperature | 30 ° C                                           |
| Sample             | Phthalatedipropyl                                |



# Chromatography

## 100% stability of the aqueous phase

Usually silica-based reversed-phase column can not be used in high proportion of water mobile phase conditions, and organic phase in the mobile phase must be maintained more than 5%. This may limit some polar compounds' separation in reversed-phase conditions. The reason is hydrophobic collapse.

"Hydrophobic collapse" is a phenomenon that reversed-phase column loss the ability of retaining compounds in a mobile phase with a very high water content. Due to the hydrophobic interaction of functional groups, the surface of the stationary phase cannot be wet by the mobile phase and hydrophobic chains fold up.

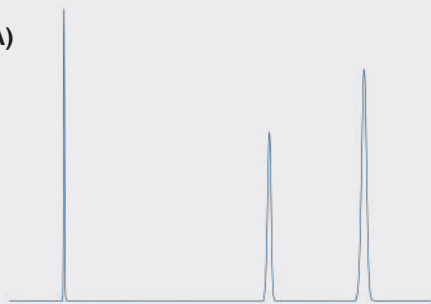
According to the research, the hydrophobic collapse generally occurs when restarting of the mobile phase after stopping pump. The experiment can verify whether a column is compatible with pure water. Test column efficiency at first, and wash the column with 100% water mobile phase at 1.0 mL/min for 2h. Then slow down the flow rate to zero and stop pump for 1h. Columns are washed with 100% water mobile phase again and tested for column efficiency the second time.

Compare the difference of retention before and after stopping pump.

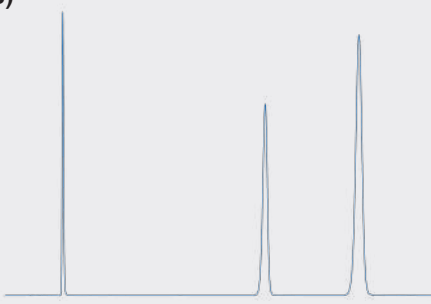
### Test Condition

|                    |                                     |
|--------------------|-------------------------------------|
| Column             | C18-WP, 4.6 x 150 mm, 5µm           |
| Mobile phase       | methanol: water (70/30)             |
| Flow rate          | 1.0 mL / min                        |
| Detection          | UV 254 nm                           |
| Column temperature | 30 ° C                              |
| Sample             | 1. Uracil 2. Toluene 3. Naphthalene |

(A)



(B)



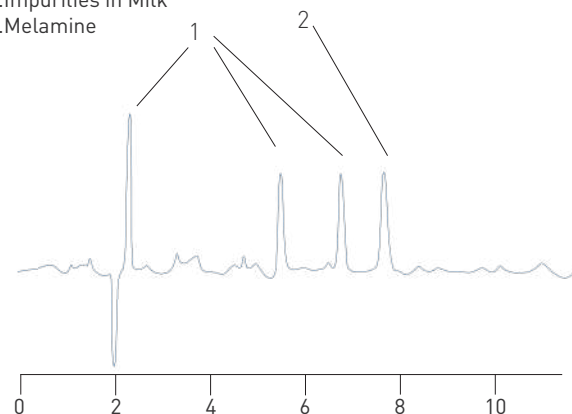
**100% water mobile phase compatibility**

A before pump stopping  
B after pump stopping

## Melamine in Milk Powder (according to GB/T22388-2008)

No.03215

1. Impurities in Milk  
2. Melamine



Column: C18-WP 4.6 x 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: 10 mM hexane sulfonate +10 mM citric acid  
buffer solution / acetonitrile (90/10)  
Flow rate: 1.0 mL/min  
Detection: 240 nm  
Column temperature: 40 °C

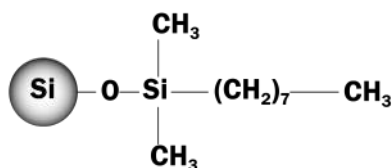
### Ordering information

| Product Code      | Particle size | diameter x length |
|-------------------|---------------|-------------------|
| HCA030U021X05073A | 3µm           | 2.1 x 50mm        |
| HCA030U021X10073A | 3µm           | 2.1 x 100mm       |
| HCA030U021X15073A | 3µm           | 2.1 x 150mm       |
| HCA030U021X20073A | 3µm           | 2.1 x 200mm       |
| HCA030U021X25073A | 3µm           | 2.1 x 250mm       |
| HCA030U046X05073A | 3µm           | 4.6 x 50mm        |
| HCA030U046X10073A | 3µm           | 4.6 x 100mm       |
| HCA030U046X15073A | 3µm           | 4.6 x 150mm       |
| HCA030U046X20073A | 3µm           | 4.6 x 200mm       |
| HCA030U046X25073A | 3µm           | 4.6 x 250mm       |
| HCA050U021X05072A | 5µm           | 2.1 x 50mm        |
| HCA050U021X10072A | 5µm           | 2.1 x 100mm       |
| HCA050U021X15072A | 5µm           | 2.1 x 150mm       |
| HCA050U021X20072A | 5µm           | 2.1 x 200mm       |
| HCA050U021X25072A | 5µm           | 2.1 x 250mm       |
| HCA050U046X05072A | 5µm           | 4.6 x 50mm        |
| HCA050U046X10072A | 5µm           | 4.6 x 100mm       |
| HCA050U046X15072A | 5µm           | 4.6 x 150mm       |
| HCA050U046X20072A | 5µm           | 4.6 x 200mm       |
| HCA050U046X25072A | 5µm           | 4.6 x 250mm       |

## C18

[ Conventional C18 column ]

- Bonded C18 groups
- High-purity silica, metal content <10ppm
- Less hydrophobic than C18-WP, with different selectivity
- Economic column

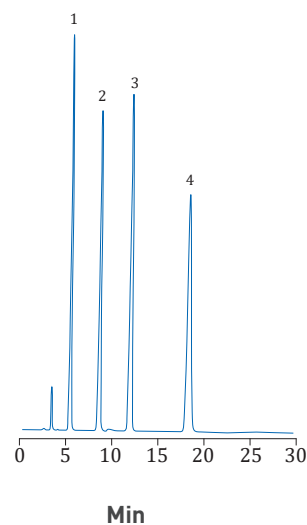


Based on high purity spherical silica, C18 column is good at separating a variety of compounds. It is a typical economic column with high price ratio, as well as long column lifetime. For most analytes, the retention times are shorter than that of C18-WP columns of same specifications.

Purine alkaloid

No.03217

- |                |            |
|----------------|------------|
| 1.Theobromine  | 3.Caffeine |
| 2.Theophylline | 4.Phenol   |

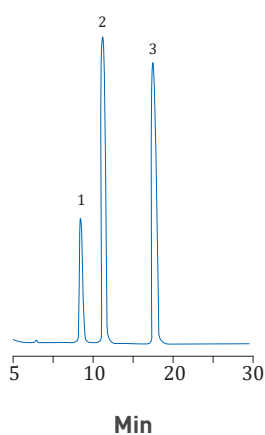


Column: C18 4.6 × 150mm, 5μm (HCA050U046X15071A)  
 Mobile phase: methanol / water (25/75)  
 Flow rate: 1.0 mL/min  
 Detection: 254 nm  
 Column temperature: 40 °C

Tricyclic antidepressants

No.03216

- 1.Protriptyline
- 2.Nortriptyline
- 3.Amitriptyline



Column: C18 4.6 × 150mm, 5μm (HCA050U046X15071A)  
 Mobile phase: methanol / 20 mM K<sub>2</sub>HPO<sub>4</sub> buffer (pH 7.0) (80/20)  
 Flow rate: 1.0 mL/min  
 Detection: 254 nm  
 Column temperature: 40 °C

### Ordering information

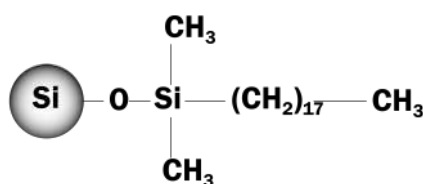
Particle size diameter × length Item No.

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA050U021X05071A | 5μm           | 2.1 × 50mm        |
| HCA050U021X10071A | 5μm           | 2.1 × 100mm       |
| HCA050U021X15071A | 5μm           | 2.1 × 150mm       |
| HCA050U021X20071A | 5μm           | 2.1 × 200mm       |
| HCA050U021X25071A | 5μm           | 2.1 × 250mm       |
| HCA050U046X05071A | 5μm           | 4.6 × 50mm        |
| HCA050U046X10071A | 5μm           | 4.6 × 100mm       |
| HCA050U046X15071A | 5μm           | 4.6 × 150mm       |
| HCA050U046X20071A | 5μm           | 4.6 × 200mm       |
| HCA050U046X25071A | 5μm           | 4.6 × 250mm       |
| HCA100U046X15074A | 10μm          | 4.6 × 150mm       |
| HCA100U046X25074A | 10μm          | 4.6 × 250mm       |

## C18-BIO

[ Applicable to macromolecules ]

- Bonded C18 groups
- 300Å pore size, fit for macromolecules separation, such as peptides 1
- High column efficiency and long lifetime
- Stable in the range of pH 1.5-11

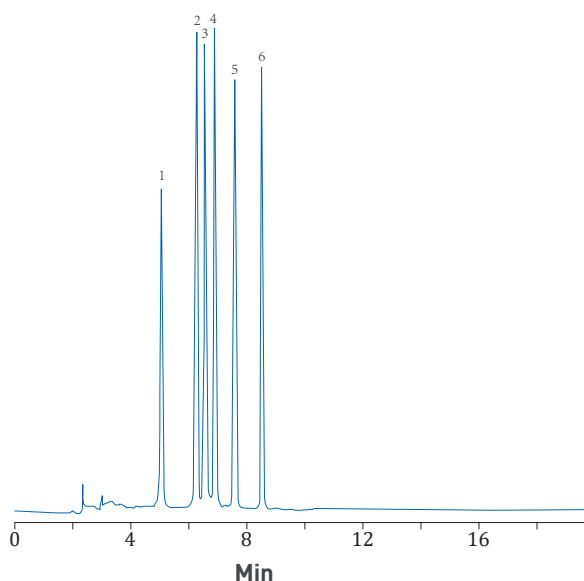


300Å pore size, highpurity silica, high density bonding, and completely endcapped, make C18-BIO able to separatelarge moleculars, especially proteins and polypeptides.

### Applications:

Oligonucleotide No.03218

- |              |              |
|--------------|--------------|
| 1.CAAGACGCAA | 4.CCCTGAACAA |
| 2.CAACCAACGT | 5.CGTGTATTGG |
| 3.GGTGATCAAC | 6.GGTCCTATAC |

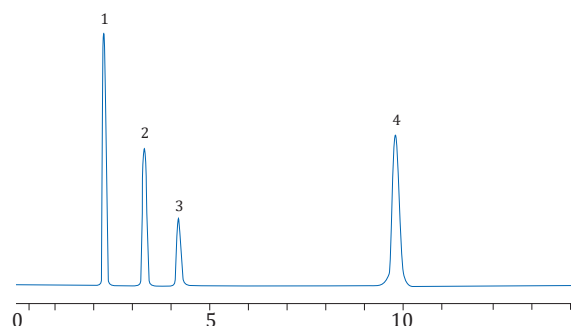


Column: C18-BIO 4.6 × 150mm, 5μm (HCA050U046X15078A)  
 Mobile phase: A: 50 mM NaH2PO4 buffer solution (pH 7.0); B: acetonitrile 0min B: 5%; 20min B: 15%  
 Flow rate: 1.0 mL/min  
 Detection: 260 nm  
 Column temperature: 25 °C

Anti-HIV drugs

No.03217

- |                |            |
|----------------|------------|
| 1.Theobromine  | 3.Caffeine |
| 2.Theophylline | 4.Phenol   |



Min

Column: C18-BIO 4.6 × 150mm, 5μm (HCA050U046X15078A)  
 Mobile phase: methanol / 20 mM NH4H2PO4 buffer (10/90)  
 Flow rate: 1.0 mL/min  
 Detection: 260 nm  
 Column temperature: 35 °C

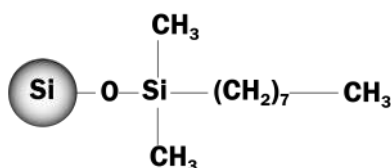
### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA050U021X05078A | 5μm           | 2.1 × 50mm        |
| HCA050U021X10078A | 5μm           | 2.1 × 100mm       |
| HCA050U021X15078A | 5μm           | 2.1 × 150mm       |
| HCA050U021X20078A | 5μm           | 2.1 × 200mm       |
| HCA050U021X25078A | 5μm           | 2.1 × 250mm       |
| HCA050U046X05078A | 5μm           | 4.6 × 50mm        |
| HCA050U046X10078A | 5μm           | 4.6 × 100mm       |
| HCA050U046X15078A | 5μm           | 4.6 × 150mm       |
| HCA050U046X20078A | 5μm           | 4.6 × 200mm       |
| HCA050U046X25078A | 5μm           | 4.6 × 250mm       |

## C8

[ High resolution, rapid analysis ]

- Bonded C8 groups
- Better resolution than C18 group for medium polarity subjects, and short retention time for non-polar compounds
- Good peak shapes for acidic, basic, and neutral substances
- Long column life and good repeatability



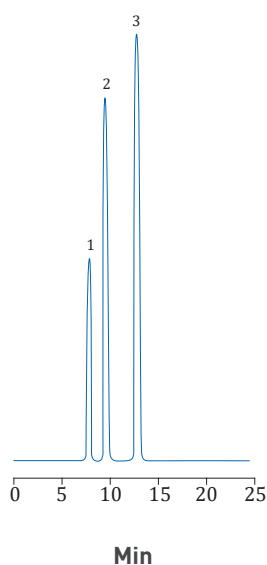
C8 offers less degree of hydrophobic selectivity compared to C18. C8 is a better choice if need to save time and achieve rapid analysis in the same chromatographic condition on octadecyl bonded phase.

### Applications

#### Tricyclic antidepressants

No.03220

1. Protriptyline
2. Nortriptyline
3. Amitriptyline

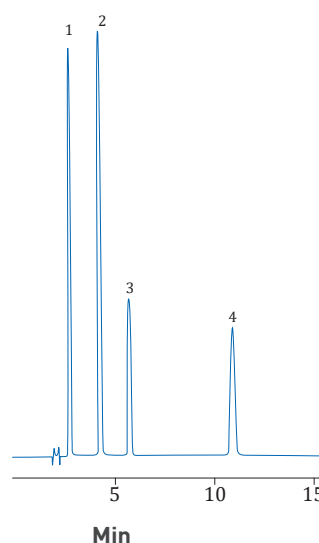


Column: C8 4.6 × 150mm, 5μm [HCA050U046X15075A]  
 Mobile phase: methanol / 20 mM K<sub>2</sub>HPO<sub>4</sub> buffer (pH 7.0) [80/20]  
 Flow rate: 1.0 mL/min  
 Detection: 254 nm  
 Column temperature: 40 °C

#### SulfaNo

No.03221

1. Sulfonamide
2. Sulfisomidine
3. Sulfadiazine
4. Sulfamethazine



Column: C8 4.6 × 150mm, 5μm [HCA050U046X15075A]  
 Mobile phase: acetonitrile / 0.1% H<sub>3</sub>PO<sub>4</sub> buffer [10/90]  
 Flow rate: 1.0 mL/min  
 Detection: 254 nm  
 Column temperature: 40 °C

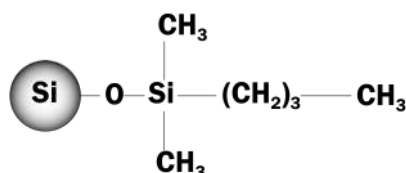
### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA030U021X05065A | 3μm           | 2.1 × 50mm        |
| HCA030U021X10065A | 3μm           | 2.1 × 100mm       |
| HCA030U021X15065A | 3μm           | 2.1 × 150mm       |
| HCA030U021X20065A | 3μm           | 2.1 × 200mm       |
| HCA030U021X25065A | 3μm           | 2.1 × 250mm       |
| HCA030U046X05065A | 3μm           | 4.6 × 50mm        |
| HCA030U046X10065A | 3μm           | 4.6 × 100mm       |
| HCA030U046X15065A | 3μm           | 4.6 × 150mm       |
| HCA030U046X20065A | 3μm           | 4.6 × 200mm       |
| HCA030U046X25065A | 3μm           | 4.6 × 250mm       |
| HCA050U021X05075A | 5μm           | 2.1 × 50mm        |
| HCA050U021X10075A | 5μm           | 2.1 × 100mm       |
| HCA050U021X15075A | 5μm           | 2.1 × 150mm       |
| HCA050U021X20075A | 5μm           | 2.1 × 200mm       |
| HCA050U021X25075A | 5μm           | 2.1 × 250mm       |
| HCA050U046X05075A | 5μm           | 4.6 × 50mm        |
| HCA050U046X10075A | 5μm           | 4.6 × 100mm       |
| HCA050U046X15075A | 5μm           | 4.6 × 150mm       |
| HCA050U046X20075A | 5μm           | 4.6 × 200mm       |
| HCA050U046X25075A | 5μm           | 4.6 × 250mm       |

## C4

[Low hydrophobic reverse phase, rapid analysis]

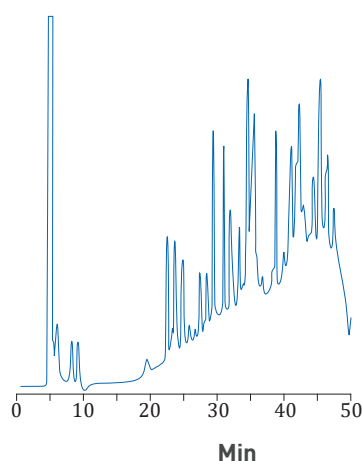
- Bonded C4 groups
- 300Å pore size, fit for macromolecules separation
- Rapid analysis
- High column efficiency and excellent peak shape



Retention times are shorter than on C8 and C18 phases. 300Å pore size is suitable for analysis of biological samples.

Hydrolysis bovine serum albumin

No.03222



Column: C4 4.6 × 250mm, 5µm (HCA050U046X15079A)  
 Mobile phase: A: 0.09% TFA; B: 0.085% TFA + 80% acetonitrile  
 0min B 5%; 5min B 5%; 35min B 50%; 45min B 100%  
 Flow rate: 1.0 mL/min  
 Detection: 214 nm  
 Column temperature: 25 °C

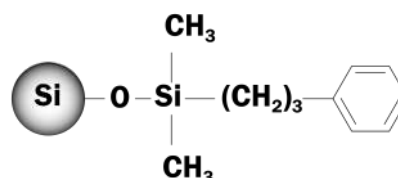
### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA050U021X05079A | 5µm           | 2.1 × 50mm        |
| HCA050U021X10079A | 5µm           | 2.1 × 100mm       |
| HCA050U021X15079A | 5µm           | 2.1 × 150mm       |
| HCA050U021X20079A | 5µm           | 2.1 × 200mm       |
| HCA050U021X25079A | 5µm           | 2.1 × 250mm       |
| HCA050U046X05079A | 5µm           | 4.6 × 50mm        |
| HCA050U046X10079A | 5µm           | 4.6 × 100mm       |
| HCA050U046X15079A | 5µm           | 4.6 × 150mm       |
| HCA050U046X20079A | 5µm           | 4.6 × 200mm       |
| HCA050U046X25079A | 5µm           | 4.6 × 250mm       |

## Phenyl

[ Analysis for compounds with cyclic structure ]

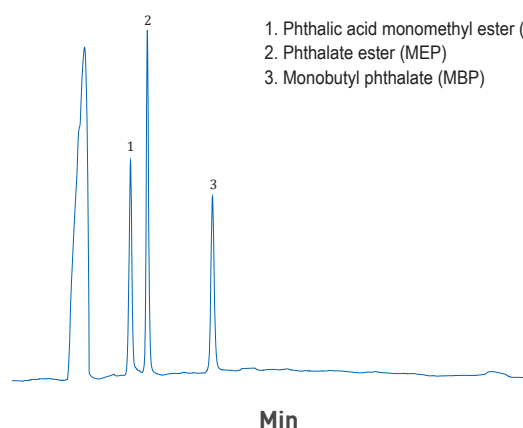
- Bonded phenylpropyl groups
- Interactions with π-π of aromatic compound
- Unique selectivity for compounds with cyclic structure
- Good reproducibility



Phenyl column bonded phenylpropyl group, with surface coverage is 3.0 µmol/m<sup>2</sup>. Phenyl exhibits a unique selectivity for aromatic compounds, due to a possibility for π-π interactions between the phenyl bonded phase and the solute.

O-phthalic monoester acid

No.03223



1. Phthalic acid monomethyl ester (M)
2. Phthalate ester (MEP)
3. Monobutyl phthalate (MBP)

Column: Phenyl 4.6 × 150mm, 5µm (HCA050U046X15037A)  
 Mobile phase: acetonitrile / water / acetic acid(45/55/0.2)  
 Flow rate: 0.8 mL/min  
 Detection: 228 nm  
 Column temperature: 25 °C

### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA050U021X05037A | 5µm           | 2.1 × 50mm        |
| HCA050U021X10037A | 5µm           | 2.1 × 100mm       |
| HCA050U021X15037A | 5µm           | 2.1 × 150mm       |
| HCA050U021X25037A | 5µm           | 2.1 × 250mm       |
| HCA050U046X05037A | 5µm           | 4.6 × 50mm        |
| HCA050U046X10037A | 5µm           | 4.6 × 100mm       |
| HCA050U046X15037A | 5µm           | 4.6 × 150mm       |
| HCA050U046X25037A | 5µm           | 4.6 × 250mm       |

## C30

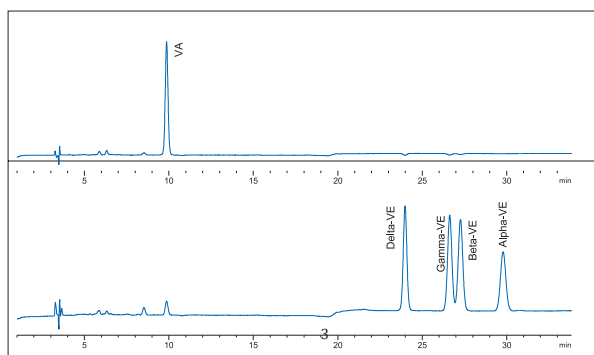
[ Applicable to Carotenoid Separation ]

- Unique C30 bonded phase, offering diverse selectivity
- High shape selectivity for structurally similar isomers

C30 is bonded with unique C30 functional groups, suitable for the separation of polar substances (such as sugars and nucleic acids) and lipophilic compounds (such as vitamin E and carotenoids).

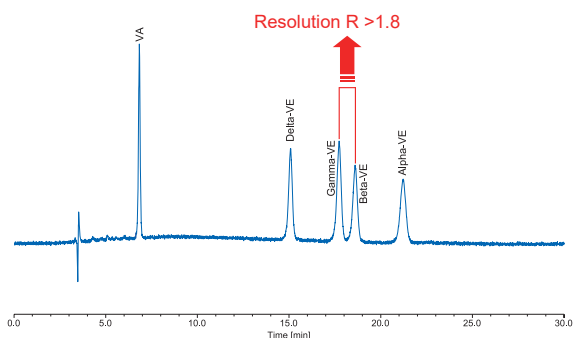
### Determination of vitamins A and E

GB5009.82—2016



Column: C30, 4.6 x 250mm, 5μm (HCA050U046X25052A)  
 Flow rate: 0.8ml/min  
 Column temperature: 20°C  
 Injection volume: 10μl  
 Detector: UV, vitamin A at 325nm; vitamin E at 294nm  
 Mobile phase: A: Methanol B: Water  
 Gradient conditions:

| Time (min) | Flow Rate | Water(%) | Methanol(%) |
|------------|-----------|----------|-------------|
| 0.0        | 0.8       | 4        | 96          |
| 12.0       | 0.8       | 4        | 96          |
| 12.5       | 1.0       | 4        | 96          |
| 17.0       | 1.0       | 0        | 100         |
| 30.0       | 1.0       | 0        | 100         |
| 31.0       | 0.8       | 4        | 96          |
| 33.0       | 0.8       | 4        | 96          |



Column: C30, 4.6 x 250mm, 3μm (HCA030U046X25053A)  
 Flow rate: 0.8ml/min  
 Column temperature: 20°C  
 Injection volume: 10μl  
 Detector: UV, 294nm  
 Mobile phase: 100% Methanol

### Determination of Lutein

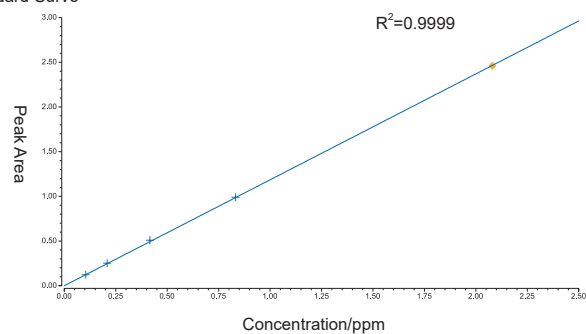
GB5009.248—2016

Column: C30, 4.6 x 250mm, 5μm (HCA050U046X25052A)  
 Flow rate: 1.0ml/min  
 Column temperature: 30°C  
 Injection volume: 50μl  
 Detector: UV, vitamin A at 325nm; vitamin E at 294nm  
 Mobile phase: A:Methanol : Water (88:12, volume ratio, containing 0.1% BHT)  
 B:Tert-butyl methyl ether(containing 0.1% BHT)

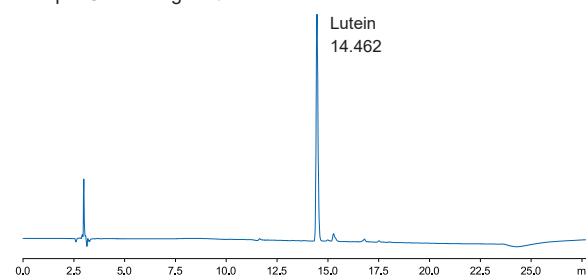
Gradient conditions

| Time (min) | A (%) | B (%) |
|------------|-------|-------|
| 0          | 85    | 15    |
| 5          | 85    | 15    |
| 18         | 60    | 40    |
| 18.1       | 85    | 15    |
| 25         | 85    | 15    |

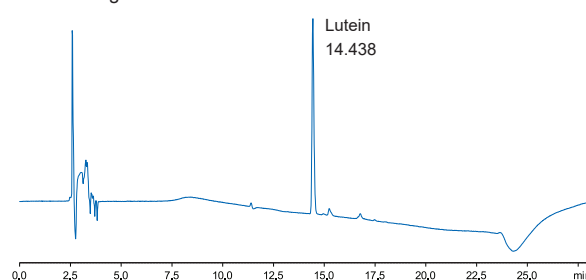
### Standard Curve



### Sample Chromatogram:



### Sample Chromatogram:



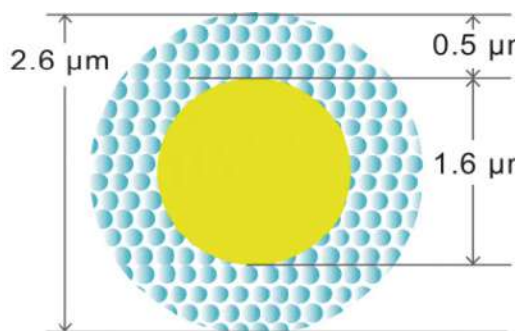
### Ordering information

| Packings                | Product Code       | diameter × length                        |
|-------------------------|--------------------|------------------------------------------|
| C30                     | HCA050U046X25052A  | 4.6 × 250mm,5μm                          |
| C30                     | HCA030U046X25053A  | 4.6 × 250mm,5μm                          |
| C30 Guard Cartridge Kit | HCA050U040X02052KA | 1 Holder and 1 Cartridge,5 μm,4.0 *20 mm |
| C30 Guard Cartridge     | HCA050U040X02052A  | 4.0×20mm, 5μm                            |

## C18 HPLC Column

[ Applicable to Carotenoid Separation ]

- High column efficiency, low column pressure
- High-throughput rapid analysis
- Compatible with UHPLC and HPLC
- High reproducibility



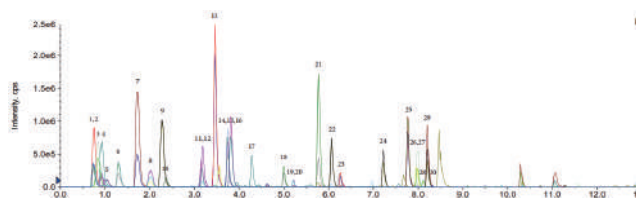
Shell is a nucleoparticle silica chromatography column with a particle size of 2.6  $\mu\text{m}$ . It consists of a solid spherical core with a diameter of 1.6  $\mu\text{m}$  and a porous shell layer with a thickness of 0.5  $\mu\text{m}$ . It possesses equal column efficiency and separation performance to sub-2  $\mu\text{m}$  UHPLC columns while only requiring half the column pressure. This allows it to be used on both UHPLC and HPLC instruments, enabling ultra-fast separation with shorter analysis times and higher separation efficiency. solute.

### HTraditional Chinese Medicine Pesticide Residues - Pharmacopoeia

1. CAAGACGCA  
2. CAACCAACGT  
3. GGTGATCAAC

4. CCCTGAACAA  
5. CGTGATTGG  
6. GGTCTATAC

1. Methamidophos  
2. Temidiphos ethyl sulfoxide  
3. Carbaryl  
4. Temidiphospropyl sulfoxide  
5. Ethyl parathion  
6. 3-Hydroxycarbofuran  
7. Thiophos  
8. Benxlithium thiosulfate  
9. Phosphanil  
10. Temidiphos  
11. Benxlithium sulfoxide  
12. Metsulfuron methyl  
13. Carbofuran  
14. Chlorsulfuron  
15. Metyl para-phosphorus sulfoxide  
16. Aminopropyl sulfuron  
17. Ethyl parathion  
18. Terbutyl thiophosphate sulfoxide  
19. Metyl para-phosphorus sulfoxide  
20. Nitrifurazone  
21. Benxlithium  
22. Fenthion  
23. Terbutyl thiophosphate sulfoxide  
24. Clorophene  
25. Thiochlorophen  
26. Methyl isothiophosphate  
27. Ciclophen  
28. Dieldrin  
29. Fenvalerate  
30. Metyl para-phosphorus



Column: C18 2.1  $\times$  100mm, 2.6 $\mu\text{m}$  (HCA026U021X10011A)  
A phase 0.1% formic acid solution (containing 5mmol/L ammonium formate)

Mobile phase: B phase acetonitrile - 0.1% formic acid solution (containing 5mmol/L ammonium formate) [95:5] wacetic acid[45/55/0.2]

Flow rate: 0.3ml/min

Temperature: 40°C

Ionization mod: ESI, positive ion mode analysis

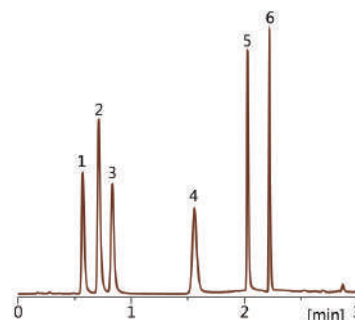
modetemperature: Multi-reaction monitoring (MRM)

| Time(min) | A(%) | B(%)   |
|-----------|------|--------|
| 0~1       | 70   | 30     |
| 1~12      | 70~0 | 30~100 |
| 12~14     | 0    | 100    |

### HTraditional Chinese Medicine Pesticide Residues - Pharmacopoeia

1. Sulfadiazine  
2. Sulfathiazole  
3. Sulfamerazine

4. Sulfamethoxyppyridazine  
5. Sulfamethoxazole  
6. Sulfalquinoxaline



Column: C18, 2.1mm $\times$ 50mm, 2.6 $\mu\text{m}$ , (HCA026U021X05011A)

Mobile phase: A: Acetonitrile ; B: 0.1% Formic Acid

Flow rate: 1.0ml/min

Detector: 254nm

Temperature: 40°C

| Time(min) | A(%) | B(%) |
|-----------|------|------|
| 0         | 10   | 90   |
| 2         | 90   | 10   |

### Ordering information

| Packings | Product Code      | Particle size     | diameter $\times$ length |
|----------|-------------------|-------------------|--------------------------|
| C18      | HCA026U021X05011A | 2.6 $\mu\text{m}$ | 2.1 $\times$ 50mm        |
| C18      | HCA026U021X10011A | 2.6 $\mu\text{m}$ | 2.1 $\times$ 100mm       |
| C18      | HCA026U046X10011A | 2.6 $\mu\text{m}$ | 4.6 $\times$ 100mm       |
| C18      | HCA026U046X05011A | 2.6 $\mu\text{m}$ | 4.6 $\times$ 50mm        |

### More information

| Packings | Product Code      | Particle size     | diameter $\times$ length |
|----------|-------------------|-------------------|--------------------------|
| PFP      | HCA026U021X10013A | 2.6 $\mu\text{m}$ | 4.6 $\times$ 50mm        |

## Silica

[ Non- bonded silica, normal phase ]

- Spherical silica, non- bonded
- For non-polar and medium polar organic compounds
- Ultra pure, low metal impurity
- Symmetrical peak shape

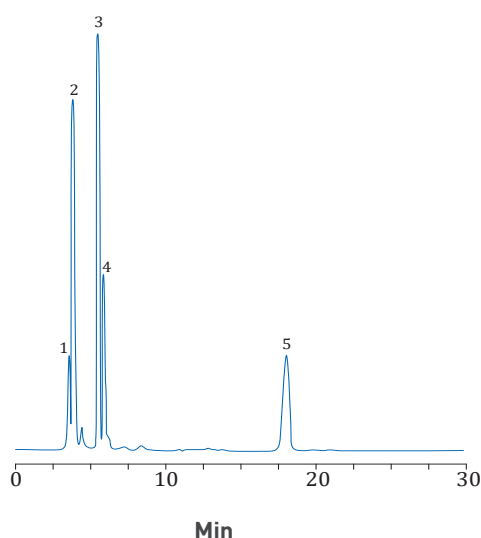
None bonded high-purity silica, metal impurity content <10ppm, high mechanical strength. Silica is fit for separation of non-polar and media polar organic compounds to achieve sharp peak shape and high reproducibility for columns.

### Fat-soluble vitamins

No.03224

- 1.Vitamin A palmitate
- 2.Vitamin K1
- 3.Vitamin E

- 4.Vitamin K3
- 5.Vitamin D

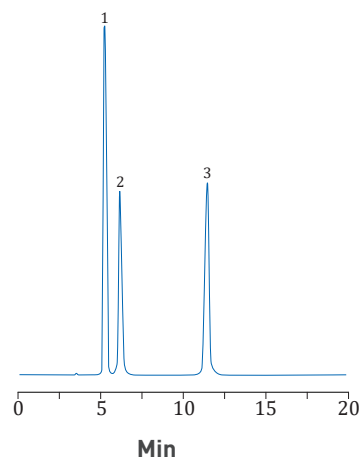


Column: Silica 4.6 × 150mm, 5µm (HCA050U046X15076A)  
 Mobile phase: n-hexane / chloroform (60/40)  
 Flow rate: 1.0 mL/min  
 Detection: 254 nm  
 Column temperature: 25 °C

### Steroid

No.03225

- 1.Estrone
- 2.Estradiol
- 3.Estriol



Column: Silica 4.6 × 150mm, 5µm (HCA050U046X15076A)  
 Mobile phase: n-hexane / ethanol (85/15)  
 Flow rate: 1.0 mL/min  
 Detection: 270 nm  
 Column temperature: 40 °C

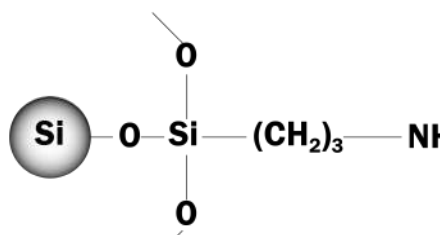
### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA030U021X05066A | 3µm           | 2.1 × 50mm        |
| HCA030U021X10066A | 3µm           | 2.1 × 100mm       |
| HCA030U021X15066A | 3µm           | 2.1 × 150mm       |
| HCA030U021X20066A | 3µm           | 2.1 × 200mm       |
| HCA030U021X25066A | 3µm           | 2.1 × 250mm       |
| HCA030U046X05066A | 3µm           | 4.6 × 50mm        |
| HCA030U046X10066A | 3µm           | 4.6 × 100mm       |
| HCA030U046X15066A | 3µm           | 4.6 × 150mm       |
| HCA030U046X20066A | 3µm           | 4.6 × 200mm       |
| HCA030U046X25066A | 3µm           | 4.6 × 250mm       |
| HCA050U021X05076A | 5µm           | 2.1 × 50mm        |
| HCA050U021X10076A | 5µm           | 2.1 × 100mm       |
| HCA050U021X15076A | 5µm           | 2.1 × 150mm       |
| HCA050U021X20076A | 5µm           | 2.1 × 200mm       |
| HCA050U021X25076A | 5µm           | 2.1 × 250mm       |
| HCA050U046X05076A | 5µm           | 4.6 × 50mm        |
| HCA050U046X10076A | 5µm           | 4.6 × 100mm       |
| HCA050U046X15076A | 5µm           | 4.6 × 150mm       |
| HCA050U046X20076A | 5µm           | 4.6 × 200mm       |
| HCA050U046X25076A | 5µm           | 4.6 × 250mm       |

## NH<sub>2</sub>

[ Both Normal and reverse phase mode ]

- Bonded aminopropyl group
- Suitable for normal and reverse phase mode
- Separate sugars in reverse mode

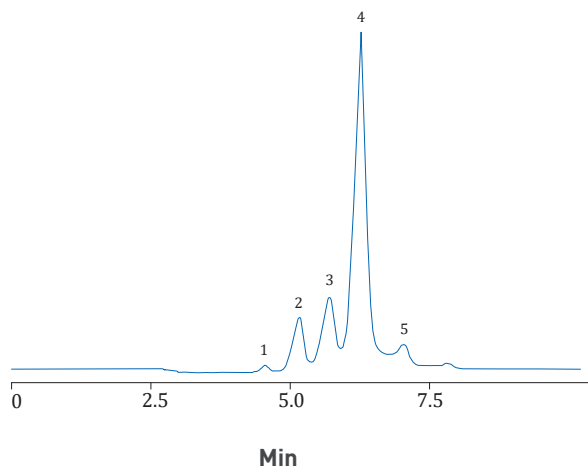


Aminopropyl stationary phase serves as a weak anion exchanger and offer polar selectivity under reversed phase and normal phase conditions.

### Carbohydrates

No.03226

- |                |                  |
|----------------|------------------|
| 1. Glucose     | 4. Maltotetraose |
| 2. Maltose     | 5. Matlopentaos  |
| 3. Maltotriose |                  |

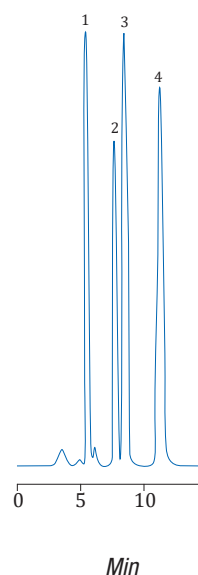


Column: NH<sub>2</sub> 4.6 x 150mm, 5µm (HCA050U046X15077A)  
 Mobile phase: acetonitrile / water (50/50)  
 Flow rate: 1.0 mL/min  
 Detection: RID  
 Column temperature: 40 °C

### Tocopherol isomers

No.03227

1. α-Tocopherol
2. α-Tocopherol
3. α-Tocopherol
4. α-Tocopherol



Column: NH<sub>2</sub> 4.6 x 150mm, 5µm (HCA050U046X15077A)  
 Mobile phase: n-hexane / ethyl acetate (70/30)  
 Flow rate: 1.0 mL/min  
 Detection: 295 nm  
 Column temperature: 40 °C

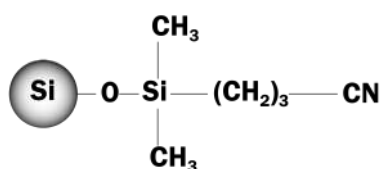
### Ordering information

| Product Code      | Particle size | diameter x length |
|-------------------|---------------|-------------------|
| HCA030U021X05067A | 3µm           | 2.1 x 50mm        |
| HCA030U021X10067A | 3µm           | 2.1 x 100mm       |
| HCA050U021X15067A | 3µm           | 2.1 x 150mm       |
| HCA030U021X20067A | 3µm           | 2.1 x 200mm       |
| HCA030U021X25067A | 3µm           | 2.1 x 250mm       |
| HCA030U046X05067A | 3µm           | 4.6 x 50mm        |
| HCA030U046X10067A | 3µm           | 4.6 x 100mm       |
| HCA030U046X15067A | 3µm           | 4.6 x 150mm       |
| HCA030U046X20067A | 3µm           | 4.6 x 200mm       |
| HCA030U046X25067A | 3µm           | 4.6 x 250mm       |
| HCA050U021X05077A | 5µm           | 2.1 x 50mm        |
| HCA050U021X10077A | 5µm           | 2.1 x 100mm       |
| HCA050U021X15077A | 5µm           | 2.1 x 150mm       |
| HCA050U021X20077A | 5µm           | 2.1 x 200mm       |
| HCA050U021X25077A | 5µm           | 2.1 x 250mm       |
| HCA050U046X05077A | 5µm           | 4.6 x 50mm        |
| HCA050U046X10077A | 5µm           | 4.6 x 100mm       |
| HCA050U046X15077A | 5µm           | 4.6 x 150mm       |
| HCA050U046X20077A | 5µm           | 4.6 x 200mm       |
| HCA050U046X25077A | 5µm           | 4.6 x 250mm       |

## CN

[ Can be used for normal or reverse phase separation ]

- Bonded cyanopropyl
- Can be used for normal or reverse phase separation
- High column efficiency and good reproducibility



CN is cyanide propyl bonded silica column with n-electron interaction and unshared electron pair hydrogen bonding. Can be used for both reverse phase and normal phase mode. When used for reverse mode, having different selectivity from C18 and C8 columns; when used for normal phase mode, retention is lower retention than non-bonded silica gel column.

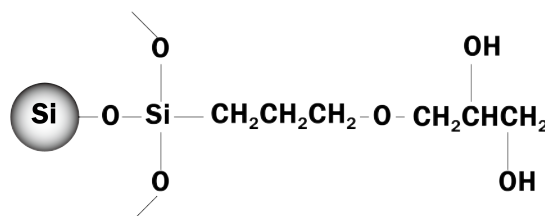
### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA030U021X15034A | 3μm           | 2.1 × 150mm       |
| HCA050U021X05033A | 5μm           | 2.1 × 50mm        |
| HCA050U021X10033A | 5μm           | 2.1 × 100mm       |
| HCA050U021X15033A | 5μm           | 2.1 × 150mm       |
| HCA050U021X20033A | 5μm           | 2.1 × 200mm       |
| HCA050U021X25033A | 5μm           | 2.1 × 250mm       |
| HCA050U046X05033A | 5μm           | 4.6 × 50mm        |
| HCA050U046X10033A | 5μm           | 4.6 × 100mm       |
| HCA050U046X15033A | 5μm           | 4.6 × 150mm       |
| HCA050U046X20033A | 5μm           | 4.6 × 200mm       |
| HCA050U046X25033A | 5μm           | 4.6 × 250mm       |

## Diol

[ Suitable for normal phase separation ]

- Bonded group of 1,2 - dihydroxy-propyl ether propionate
- Normal phase separation
- Good reproducibility



Diol bonded 1,2 - dihydroxy-propyl ether propionate group, coverage of 4.0 micromol / m<sup>2</sup>, can interact with polar compounds. diol is able to distinguish compounds from slight difference, also can separate biological molecules based on size exclusion mechanism.

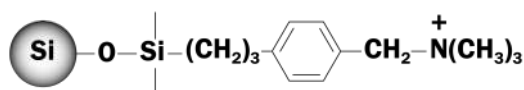
### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA030U021X05036A | 3μm           | 2.1 × 50mm        |
| HCA030U021X10036A | 3μm           | 2.1 × 100mm       |
| HCA030U021X15036A | 3μm           | 2.1 × 150mm       |
| HCA030U021X25036A | 3μm           | 2.1 × 250mm       |
| HCA030U046X05036A | 3μm           | 4.6 × 50mm        |
| HCA030U046X10036A | 3μm           | 4.6 × 100mm       |
| HCA030U046X15036A | 3μm           | 4.6 × 150mm       |
| HCA030U046X25036A | 3μm           | 4.6 × 250mm       |
| HCA050U021X05035A | 5μm           | 2.1 × 50mm        |
| HCA050U021X10035A | 5μm           | 2.1 × 100mm       |
| HCA050U021X15035A | 5μm           | 2.1 × 150mm       |
| HCA050U021X25035A | 5μm           | 2.1 × 250mm       |
| HCA050U046X05035A | 5μm           | 4.6 × 50mm        |
| HCA050U046X10035A | 5μm           | 4.6 × 100mm       |
| HCA050U046X15035A | 5μm           | 4.6 × 150mm       |
| HCA050U046X25035A | 5μm           | 4.6 × 250mm       |

## SAX

[ Suitable for analysis of acidic substances ]

- Strong anion exchange mode
- Suitable for analysis of acidic substances, including nucleotide and organic acids etc.
- High column efficiency, high batch stability, good columns reproducibility
- To adjust retention time of the analytes by changing buffer concentration of mobile phase
- Stable in high proportion of water mobile phase



SAX column are boned quaternary ammonium strong anion-exchange group in the high-purity silica matrix, having mixed chemical structure of quaternary ammonium and phenyl functional groups. This mixed-mode by strong anion exchange phase and hydrophobic phase is suitable for separation of aromatic or aliphatic carboxylic acids, sulfonic acids, nucleotides and acids etc.

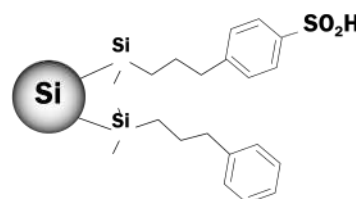
### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA030U021X05020A | 3μm           | 2.1 × 50mm        |
| HCA030U021X10020A | 3μm           | 2.1 × 100mm       |
| HCA030U021X15020A | 3μm           | 2.1 × 150mm       |
| HCA030U021X25020A | 3μm           | 2.1 × 250mm       |
| HCA030U046X05020A | 3μm           | 4.6 × 50mm        |
| HCA030U046X10020A | 3μm           | 4.6 × 100mm       |
| HCA030U046X15020A | 3μm           | 4.6 × 150mm       |
| HCA030U046X25020A | 3μm           | 4.6 × 250mm       |
| HCA050U021X05021A | 5μm           | 2.1 × 50mm        |
| HCA050U021X10021A | 5μm           | 2.1 × 100mm       |
| HCA050U021X15021A | 5μm           | 2.1 × 150mm       |
| HCA050U021X25021A | 5μm           | 2.1 × 250mm       |
| HCA050U046X05021A | 5μm           | 4.6 × 50mm        |
| HCA050U046X10021A | 5μm           | 4.6 × 100mm       |
| HCA050U046X15021A | 5μm           | 4.6 × 150mm       |
| HCA050U046X25021A | 5μm           | 4.6 × 250mm       |

## SCX

[ Suitable for analysis of alkaline substances ]

- Strong cation exchange mode
- Fit for analysis of alkaline substances, especially amines
- high column efficiency, stable batch, good columns reproducibility



SCX is benzenesulfonic acid boned silica, having mixed chemical structure of sulfonic acid group and phenyl group. SCX is mixed mode of strong cation exchange phase and hydrophobic phase. Not only can be used for separation of cationic / basic and nitrogenous compounds, but also give appropriate reservation for a variety of weak cation, neutral organic compound. SCX is used for separation and determination of amines and polyamine compounds, such as alkaloids, peptides and components in cold medicines.

### Ordering information

| Product Code      | Particle size | diameter × length |
|-------------------|---------------|-------------------|
| HCA030U021X05022A | 3μm           | 2.1 × 50mm        |
| HCA030U021X10022A | 3μm           | 2.1 × 100mm       |
| HCA030U021X15022A | 3μm           | 2.1 × 150mm       |
| HCA030U021X25022A | 3μm           | 2.1 × 250mm       |
| HCA030U046X05022A | 3μm           | 4.6 × 50mm        |
| HCA030U046X10022A | 3μm           | 4.6 × 100mm       |
| HCA030U046X15022A | 3μm           | 4.6 × 150mm       |
| HCA030U046X25022A | 3μm           | 4.6 × 250mm       |
| HCA050U021X05023A | 5μm           | 2.1 × 50mm        |
| HCA050U021X10023A | 5μm           | 2.1 × 100mm       |
| HCA050U021X15023A | 5μm           | 2.1 × 150mm       |
| HCA050U021X25023A | 5μm           | 2.1 × 250mm       |
| HCA050U046X05023A | 5μm           | 4.6 × 50mm        |
| HCA050U046X10023A | 5μm           | 4.6 × 100mm       |
| HCA050U046X15023A | 5μm           | 4.6 × 150mm       |
| HCA050U046X25023A | 5μm           | 4.6 × 250mm       |
| HCA050U046X25045A | 5μm           | 4.6 × 250mm       |

Note: HCA050U046X25045A is the original SCX column.

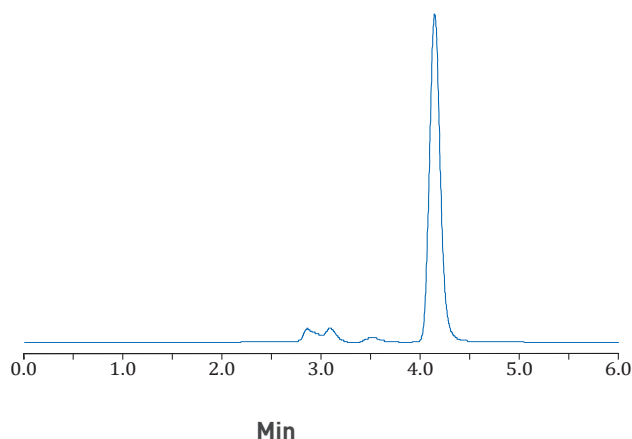
## HILIC

[ Suitable for analysis of strong polar substances ]

Hydrophilic interaction liquid chromatography (HILIC) is a kind of liquid chromatography analytical method for strong polar and strong hydrophilic compounds separation. Sometimes, it is difficult to retain polar compound on reverse-phase column and Ion pair reagent cannot be added to mobile phase in LC / MS analysis. When use normal phase chromatography for analysis, polar and hydrophilic compounds are often difficult to be dissolved in conventional normal phase solvents. This time HILIC will be considered to use for analysis.

In three HILIC stationary phases, HILIC is strong alkaline, HILIC (2) is weak alkaline, HILIC (3) is neutral.

**Melamine** No.03228



Column: HILIC (3) 4.6 × 250mm, 5μm (HCA050U046X25027A)  
 Mobile phase: acetonitrile / 10 mM ammonium acetate (90/10)  
 Flow rate: 1.0 mL/min  
 Detection: 240 nm  
 Column temperature: 25 °C

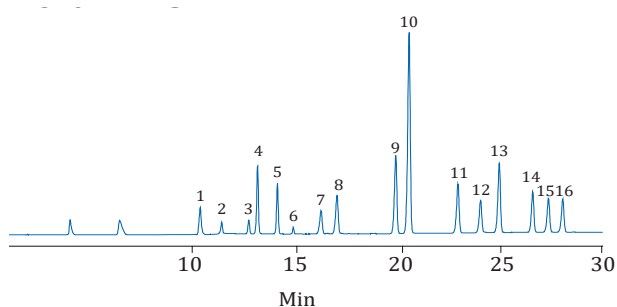
### Difference of reverse phase chromatography, normal phase chromatography and HILIC

|                              | stationary phase                           | mobile phase                                         | elution order                                     | applications                                  |
|------------------------------|--------------------------------------------|------------------------------------------------------|---------------------------------------------------|-----------------------------------------------|
| Reverse phase chromatography | Non-polar, such as C18, C8 etc             | Polar, such as methanol, ethanol, water etc.         | Polar subject flow quickly, non-polar flow slowly | Medium polar and non-polar substances         |
| Normal phase chromatography  | Polar, such as silica, amino, Cyano etc.   | "Non-polar, such as N-hexane, acid ethyl ester etc." | non-polar subject flow quickly, polar flow slowly | Medium polar and polar substances             |
| HILIC                        | Silica bonded hydrophilic stationary phase | Polar, methanol, ethanol, buffer saline etc.         | non-polar subject flow quickly, polar flow slowly | Strong polar and strong hydrophilic compounds |

### Ordering information

| Packings | Product Code      | Particle size | diameter × length |
|----------|-------------------|---------------|-------------------|
| HILIC    | HCA030U021X05030A | 3μm           | 2.1 × 50mm        |
| HILIC    | HCA030U021X15030A | 3μm           | 2.1 × 150mm       |
| HILIC    | HCA030U046X15030A | 3μm           | 4.6 × 150mm       |
| HILIC(1) | HCA030U021X10089A | 3μm           | 2.1 × 100mm       |
| HILIC(1) | HCA030U021X15089A | 3μm           | 2.1 × 150mm       |
| HILIC(1) | HCA050U021X05031A | 5μm           | 2.1 × 50mm        |
| HILIC(1) | HCA050U021X10031A | 5μm           | 2.1 × 100mm       |
| HILIC(1) | HCA050U021X15031A | 5μm           | 2.1 × 150mm       |
| HILIC(1) | HCA030U046X05089A | 3μm           | 4.6 × 50mm        |
| HILIC(1) | HCA030U046X25089A | 3μm           | 4.6 × 250mm       |
| HILIC(1) | HCA050U046X15031A | 5μm           | 4.6 × 150mm       |
| HILIC(1) | HCA050U046X25031A | 5μm           | 4.6 × 250 mm      |
| HILIC(2) | HCA030U021X05029A | 3μm           | 2.1 × 50mm        |
| HILIC(2) | HCA030U021X10029A | 3μm           | 2.1 × 100mm       |
| HILIC(2) | HCA030U021X15029A | 3μm           | 2.1 × 150mm       |
| HILIC(2) | HCA030U021X25029A | 3μm           | 2.1 × 250mm       |
| HILIC(2) | HCA050U021X05032A | 5μm           | 2.1 × 50mm        |
| HILIC(2) | HCA050U021X10032A | 5μm           | 2.1 × 100mm       |
| HILIC(2) | HCA050U021X15032A | 5μm           | 2.1 × 150mm       |
| HILIC(2) | HCA050U021X25032A | 5μm           | 2.1 × 250mm       |
| HILIC(2) | HCA030U046X05029A | 3μm           | 4.6 × 50mm        |
| HILIC(2) | HCA030U046X10029A | 3μm           | 4.6 × 100mm       |
| HILIC(2) | HCA030U046X15029A | 3μm           | 4.6 × 150mm       |
| HILIC(2) | HCA030U046X25029A | 3μm           | 4.6 × 250mm       |
| HILIC(2) | HCA050U046X05032A | 5μm           | 4.6 × 50mm        |
| HILIC(2) | HCA050U046X10032A | 5μm           | 4.6 × 100mm       |
| HILIC(2) | HCA050U046X15032A | 5μm           | 4.6 × 150mm       |
| HILIC(2) | HCA050U046X25032A | 5μm           | 4.6 × 250mm       |
| HILIC(3) | HCA030U021X15028A | 3μm           | 2.1 × 100mm       |
| HILIC(3) | HCA050U021X15027A | 5μm           | 2.1 × 150mm       |
| HILIC(3) | HCA050U021X25027A | 5μm           | 2.1 × 250mm       |
| HILIC(3) | HCA050U046X15027A | 5μm           | 4.6 × 150mm       |
| HILIC(3) | HCA050U046X25027A | 5μm           | 4.6 × 250mm       |
| HILIC(4) | HCA030U021X05082A | 3μm           | 2.1 × 50mm        |
| HILIC(4) | HCA030U021X15082A | 3μm           | 2.1 × 150mm       |
| HILIC(4) | HCA050U046X25083A | 5μm           | 4.6 × 250 mm      |

## PAHS

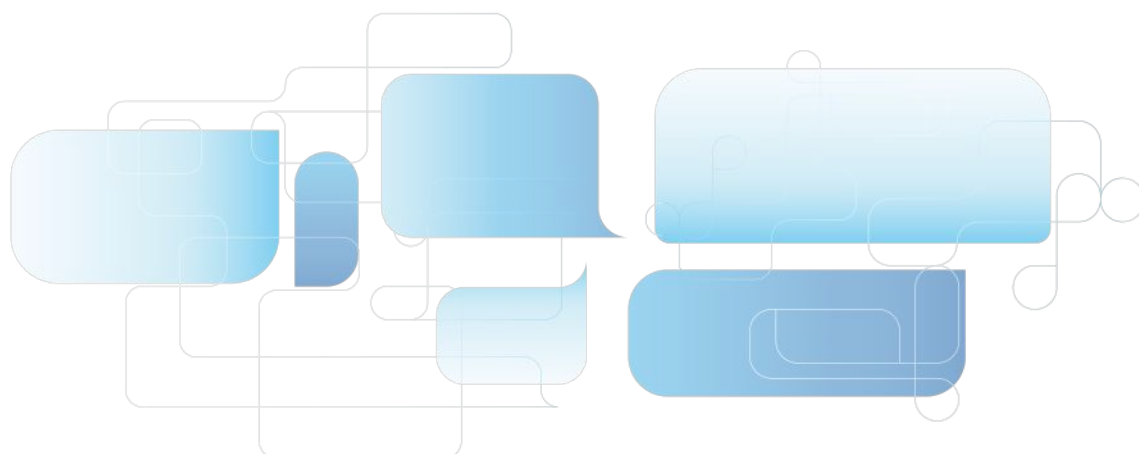


Column: PAHs 4.6 × 250mm, 5µm  
 Temperature: 30 °C  
 Mobile phase: gradient A:water B:acetonitrile,0min:40%B;25min 100%B;35min 100%B;45min 40%B  
 Flow rate: 2.0 mL/min  
 Uv: 266nm  
 Inj volume: 5µl ( 10ppm )

| No | Retain Time (min) | compound               | Area   | resolution | N      |
|----|-------------------|------------------------|--------|------------|--------|
| 1  | 10.308            | Naphthalene            | 68432  | 0          | 50295  |
| 2  | 11.296            | Acenaphthylene         | 30529  | 6.096      | 77067  |
| 3  | 12.628            | Acenaphthene           | 39603  | 7.939      | 85468  |
| 4  | 13.057            | Fluorene               | 200639 | 2.464      | 89050  |
| 5  | 14.033            | Phenanthrene           | 145706 | 5.558      | 101577 |
| 6  | 14.812            | Anthracene             | 15861  | 4.926      | 177837 |
| 7  | 16.174            | Fluoranthene           | 99718  | 6.995      | 67625  |
| 8  | 16.959            | Pyrene                 | 168211 | 1.89       | 74148  |
| 9  | 19.84             | Benzo(a)anthracene     | 327460 | 11.781     | 109283 |
| 10 | 20.497            | Chrysene               | 868613 | 2.694      | 110027 |
| 11 | 22.894            | Benzo(b)fluoranthene   | 213493 | 9.649      | 134462 |
| 12 | 24.006            | Benzo(k)fluoranthene   | 142185 | 4.479      | 151157 |
| 13 | 24.923            | Benzo(a)pyrene         | 301765 | 3.705      | 161656 |
| 14 | 26.564            | Dibenzo(a,h)anthracene | 167883 | 6.765      | 200804 |
| 15 | 27.336            | Benzo(g,h,i)perylene   | 149700 | 3.173      | 191558 |
| 16 | 28.039            | Indeno(1,2,3-cd)pyrene | 145279 | 2.814      | 202122 |

### Ordering information

| Packings                 | Product Code       | Particle size | diameter × length                       |
|--------------------------|--------------------|---------------|-----------------------------------------|
| PAHs                     | HCA050U046X25051A  | 5µm           | 4.6 × 250mm                             |
| PAHs Guard Cartridge     | HCA050U040X02051A  | 5µm           | 4.0 × 20mm                              |
| PAHs Guard Cartridge Kit | HCA050U040X02051KA | 5µm           | 1 Holder and 1 Cartridge 5µm,4.0 × 20mm |



## Guard column

[ Longer column life, higher column efficiency ]

- Protect analytical column, extend column life
- Easy to use
- Cartridges can be purchased separately, affordable

### Why use guard column?

Using guard column can protect analytical column from contamination by sample and solvent residue and extend column life.

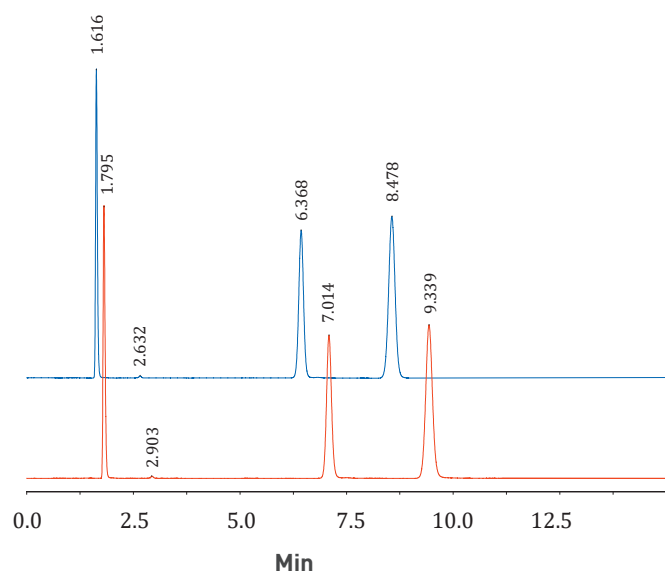
### Will use of guard columns affect analysis result?

In HPLC system, use of guard column will not affect analysis results. As shown in the figure, resolution and peak shape are not affected by increased guard column. The impact of 4mm ID guard column on pressure is only 50 psi.

### When to replace guard column?

Guard column is used to prevent contamination of column, so when the cartridges have been blocked by pollution, change a new one to avoid damage to analytical column.

We advise you replace guard cartridges periodically according to the properties of sample and the frequency of column use. When system pressure increases and peak shape become poor, check especially whether the problem is raised by guard column contamination. If true replace it in time.



### Ordering information

| Packings                   | Product Code       | Particle size | diameter × length |
|----------------------------|--------------------|---------------|-------------------|
| Guard Cartridge Holder A   | HCA040X0200HA      |               | 4.0 × 20mm        |
| C18-WP Guard Cartridge     | HCA050U040X02072A  | 5μm           | 4.0 × 20mm        |
| C18-WP Guard Cartridge Kit | HCA050U040X02072KA | 5μm           | 4.0 × 20mm        |
| C18-WP Guard Cartridge     | HCA050U021X02072A  | 5μm           | 2.1 × 20mm        |
| C18-WP Guard Cartridge Kit | HCA050U021X02072KA | 5μm           | 2.1 × 20mm        |
| C18 Guard Cartridge        | HCA050U040X02071A  | 5μm           | 4.0 × 20mm        |
| C18 Guard Cartridge Kit    | HCA050U040X02071KA | 5μm           | 4.0 × 20mm        |
| C8 Guard Cartridge         | HCA050U040X02075A  | 5μm           | 4.0 × 20mm        |
| C8 Guard Cartridge Kit     | HCA050U040X02075KA | 5μm           | 4.0 × 20mm        |
| C8 Guard Cartridge         | HCA050U021X02065A  | 5μm           | 2.1 × 20mm        |
| C8 Guard Cartridge Kit     | HCA050U021X02065KA | 5μm           | 2.1 × 20mm        |
| C4 Guard Cartridge Kit     | HCA050U040X02079KA | 5μm           | 4.0 × 20mm        |
| Silica Guard Cartridge     | HCA050U040X02076A  | 5μm           | 4.0 × 20mm        |
| Silica Guard Cartridge Kit | HCA050U040X02076KA | 5μm           | 4.0 × 20mm        |
| Silica Guard Cartridge     | HCA050U021X02067A  | 5μm           | 2.1 × 20mm        |
| Silica Guard Cartridge Kit | HCA050U021X02067KA | 5μm           | 2.1 × 20mm        |
| NH2 Guard Cartridge        | HCA050U040X02077A  | 5μm           | 4.0 × 20mm        |
| NH2 Guard Cartridge Kit    | HCA050U040X02077KA | 5μm           | 4.0 × 20mm        |
| NH2 Guard Cartridge        | HCA050U021X02067A  | 5μm           | 2.1 × 20mm        |
| NH2 Guard Cartridge Kit    | HCA050U021X02067KA | 5μm           | 2.1 × 20mm        |
| CN Guard Cartridge         | HCA050U040X02033A  | 5μm           | 4.0 × 20mm        |
| CN Guard Cartridge Kit     | HCA050U040X02033KA | 5μm           | 4.0 × 20mm        |
| CN Guard Cartridge         | HCA050U021X02034A  | 5μm           | 2.1 × 20mm        |
| CN Guard Cartridge Kit     | HCA050U021X02034KA | 5μm           | 2.1 × 20mm        |
| Phenyl Guard Cartridge     | HCA050U040X02037A  | 5μm           | 4.0 × 20mm        |
| Phenyl Guard Cartridge Kit | HCA050U040X02037KA | 5μm           | 4.0 × 20mm        |

### Description:

1. Guard Cartridge Kit specification: 1 piece cartridge holder+1piece cartridge
2. Guard cartridge specification: 2 pieces / box

## Polymer matrix analytical column

## Sep reverse phase column

[ Wider pH range ]

Sep series have three kinds of reverse phase which structure is phenyl functional group that enables hydrophobic interaction. Sep RP and RP3 bonded to porous particles. Sep RP is 100Å while Sep RP3 is 300Å. Sep SP is phenyl bonded to nonporous particles.

Compared with silica based reversed phases, PS/DVB matrix columns have advantages over applications at extreme pH(1-14) with special selectivity and slightly lower separation efficiency.

### Ordering information

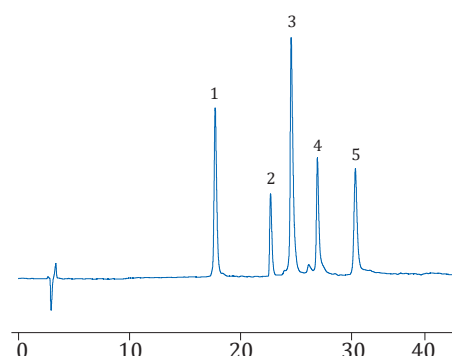
| Packings | Product Code      | Particle size | diameter × length |
|----------|-------------------|---------------|-------------------|
| Sep RP1  | HCA050U021X050A1A | 5μm           | 2.1×50mm          |
| Sep RP1  | HCA050U021X150A1A | 5μm           | 2.1×100mm         |
| Sep RP1  | HCA050U021X100A1A | 5μm           | 2.1×150mm         |
| Sep RP1  | HCA050U021X250A1A | 5μm           | 2.1×250mm         |
| Sep RP1  | HCA050U046X050A1A | 5μm           | 4.6×50mm          |
| Sep RP1  | HCA050U046X100A1A | 5μm           | 4.6×100mm         |
| Sep RP1  | HCA050U046X150A1A | 5μm           | 4.6×150mm         |
| Sep RP1  | HCA050U046X250A1A | 5μm           | 4.6×250mm         |
| Sep RP1  | HCA050U078X150A1A | 5μm           | 7.8×150mm         |
| Sep RP1  | HCA050U078X250A1A | 5μm           | 7.8×250mm         |
| Sep RP1  | HCA100U021X050A2A | 10μm          | 2.1×50mm          |
| Sep RP1  | HCA100U021X100A2A | 10μm          | 2.1×100mm         |
| Sep RP1  | HCA100U021X150A2A | 10μm          | 2.1×150mm         |
| Sep RP1  | HCA100U021X250A2A | 10μm          | 2.1×250mm         |
| Sep RP1  | HCA100U046X050A2A | 10μm          | 4.6×50mm          |
| Sep RP1  | HCA100U046X100A2A | 10μm          | 4.6×100mm         |
| Sep RP1  | HCA100U046X150A2A | 10μm          | 4.6×150mm         |
| Sep RP1  | HCA100U046X250A2A | 10μm          | 4.6×250mm         |
| Sep RP1  | HCA100U078X150A2A | 10μm          | 7.8×150mm         |
| Sep RP1  | HCA100U078X250A2A | 10μm          | 7.8×250mm         |
| Sep RP3  | HCA050U021X050A3A | 5μm           | 2.1×50mm          |
| Sep RP3  | HCA050U021X100A3A | 5μm           | 2.1×100mm         |
| Sep RP3  | HCA050U021X150A3A | 5μm           | 2.1×150mm         |
| Sep RP3  | HCA050U021X250A3A | 5μm           | 2.1×250mm         |
| Sep RP3  | HCA050U046X050A3A | 5μm           | 4.6×50mm          |
| Sep RP3  | HCA050U046X100A3A | 5μm           | 4.6×100mm         |
| Sep RP3  | HCA050U046X150A3A | 5μm           | 4.6×150mm         |
| Sep RP3  | HCA050U046X250A3A | 5μm           | 4.6×250mm         |
| Sep RP3  | HCA050U078X150A3A | 5μm           | 7.8×150mm         |
| Sep RP3  | HCA050U078X250A3A | 5μm           | 7.8×250mm         |
| Sep RP3  | HCA100U021X050A4A | 10μm          | 2.1×50mm          |
| Sep RP3  | HCA100U021X100A4A | 10μm          | 2.1×100mm         |
| Sep RP3  | HCA100U021X150A4A | 10μm          | 2.1×150mm         |

### Protein separation

No.03229

1. Ribonuclease B  
2. Insulin  
3. Cytochrome C

4. Lysozyme  
5. Bovine serum albumin (BSA)



Column: RP3 4.6 × 150mm, 5μm (HCA050U046X150A3A)  
 Mobile phase: A: 0.1% TFA aqueous solution  
 B: 0.1% TFA dissolved in acetonitrile  
 0min 5min 45min  
 20%B 20%B 60%B  
 Flow rate: 1.0 mL/min  
 Detection: 214 nm  
 Column temperature: 40 °C

### Ordering information

| Packings | Product Code       | Particle size | diameter × length |
|----------|--------------------|---------------|-------------------|
| Sep RP3  | HCA100U021X250A4A  | 10μm          | 2.1×250mm         |
| Sep RP3  | HCA100U046X050A4A  | 10μm          | 4.6×50mm          |
| Sep RP3  | HCA100U046X100A4A  | 10μm          | 4.6×100mm         |
| Sep RP3  | HCA100U046X150A4A  | 10μm          | 4.6×150mm         |
| Sep RP3  | HCA100U046X250A4A  | 10μm          | 4.6×250mm         |
| Sep RP3  | HCA100U078X150A4A  | 10μm          | 7.8×150mm         |
| Sep RP3  | HCA100U078X250A4A  | 10μm          | 7.8×250mm         |
| Sep SP   | HCA0030U021X050A5A | 3μm           | 2.1×50mm          |
| Sep SP   | HCA0030U021X150A5A | 3μm           | 2.1×150mm         |
| Sep SP   | HCA0030U046X050A5A | 3μm           | 4.6×50mm          |
| Sep SP   | HCA0030U046X100A5A | 3μm           | 4.6×100mm         |
| Sep SP   | HCA0030U046X150A5A | 3μm           | 4.6×150mm         |
| Sep SP   | HCA0030U046X250A5A | 3μm           | 4.6×250mm         |
| Sep SP   | HCA050U021X050A6A  | 5μm           | 2.1×50mm          |
| Sep SP   | HCA050U021X150A6A  | 5μm           | 2.1×150mm         |
| Sep SP   | HCA050U046X050A6A  | 5μm           | 4.6×50mm          |
| Sep SP   | HCA050U046X150A6A  | 5μm           | 4.6×150mm         |
| Sep SP   | HCA050U046X250A6A  | 5μm           | 4.6×250mm         |
| Sep SP   | HCA050U078X250A6A  | 5μm           | 7.8×250mm         |
| Sep SP   | HCA100U021X050A7A  | 10μm          | 2.1×50mm          |
| Sep SP   | HCA100U021X150A7A  | 10μm          | 2.1×150mm         |
| Sep SP   | HCA100U046X050A7A  | 10μm          | 4.6×50mm          |
| Sep SP   | HCA100U046X150A7A  | 10μm          | 4.6×150mm         |
| Sep SP   | HCA100U046X250A7A  | 10μm          | 4.6×250mm         |
| Sep SP   | HCA100U078X250A7A  | 10μm          | 7.8×250mm         |

## Sep sugar column and organic acids column

[ Sugars, sugar alcohols and organic acid analysis ]

Sep sugar column and organic acids column are based on low crosslinked polystyrene / divinylbenzene (PS/DVB) particles with the surface modified with sulfonic acid (-SO<sub>3</sub>H) for Carbomix H-NP resins, followed by chelating of calcium ions (Ca<sup>2+</sup>) for synthesis of Carbomix Ca-NP resins. Resin cross-linking degree is an important parameter in the separation. We provide a 5% (-L), 8% (-M) and 10% (-H), three kinds of crosslinking degrees products. And 5μm and 10μm particle size products are offered.

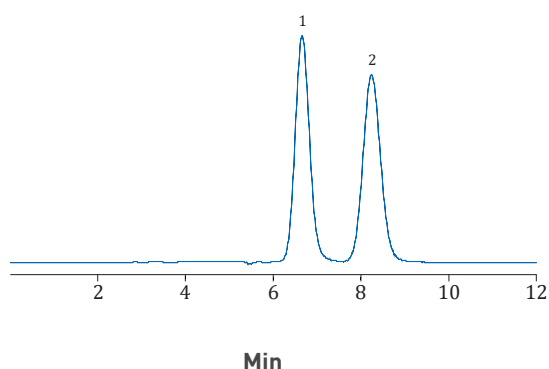
Sep sugar columns and organic acids columns are more comprehensive and economic, compared with Bio-Rad , Transgenomic and other brands of similar products.

| Packings | Type | Cross-linking degree | PH range | Maximum temperature | Applications                                                                            |
|----------|------|----------------------|----------|---------------------|-----------------------------------------------------------------------------------------|
| Sep H-L  | H    | 5%                   | 1-3      | 85°C                | fermentation products and fruit juice containing organic acids, sugar and sugar alcohol |
| Sep H-M  | H    | 8%                   | 1-3      | 85°C                |                                                                                         |
| Sep H-H  | H    | 10%                  | 1-3      | 85°C                |                                                                                         |
| Sep Ca-L | Ca   | 5%                   | 5-9      | 85°C                | monosaccharides, oligosaccharides and sugar alcohols                                    |
| Sep Ca-M | Ca   | 8%                   | 5-9      | 85°C                |                                                                                         |
| Sep Ca-H | Ca   | 10%                  | 5-9      | 85°C                |                                                                                         |
| Sep Pb-L | Pb   | 5%                   | 5-9      | 85°C                | Pentose and hexose in wood products, dairy products containing sucrose, lactose,        |
| Sep Pb-M | Type | 8%                   | 5-9      | 85°C                |                                                                                         |
| Sep Pb-H | Pb   | 10%                  | 5-9      | 85°C                |                                                                                         |
| Sep K-L  | Pb   | 5%                   | 5-9      | 85°C                | Sucrose, honey, corn syrup, etc.                                                        |
| Sep K-M  | K    | 8%                   | 5-9      | 85°C                |                                                                                         |
| Sep K-H  | K    | 10%                  | 5-9      | 85°C                |                                                                                         |
| Sep Na-L | K    | 5%                   | 5-9      | 85°C                | Oligosaccharides, samples containing sodium ions                                        |
| Sep Na-M | Na   | 8%                   | 5-9      | 85°C                |                                                                                         |
| Sep Na-H | Na   | 10%                  | 5-9      | 85°C                |                                                                                         |

### Sorbitol and Mannitol

No.03234

- 1.Mannitol
2. Sorbitol



Column: Sep Ca-M 4.6 × 250 mm, 10μm (HCA100U046X250C4A)  
 Mobile phase: water  
 Flow rate: 0.5 mL/min  
 Detection: RID  
 Column temperature: 80 °C

# Chromatography

## Sugar column and Organic acid column retention time reference table

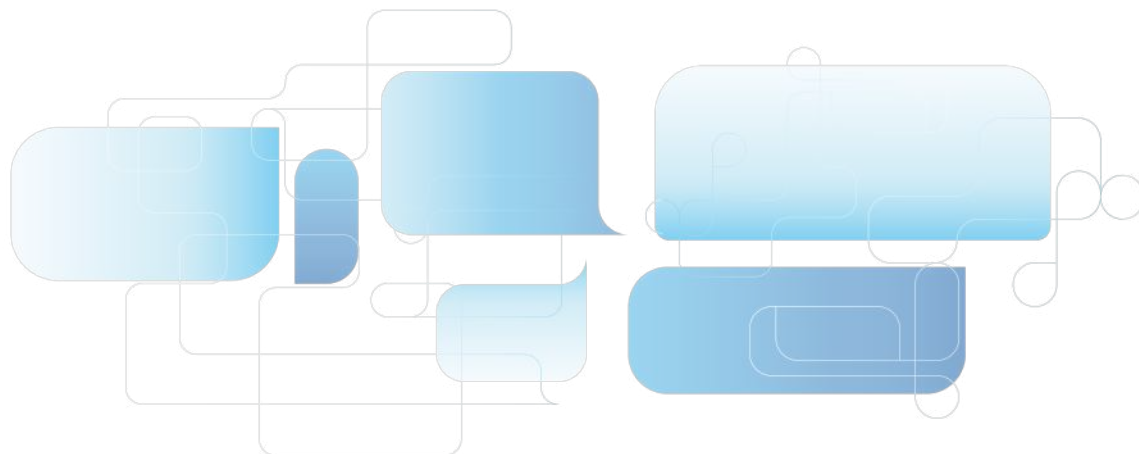
|                  | Sep H-L | Sep H-L | Sep H-M | Sep H-H | Sep Ca-M | Sep Ca-H |
|------------------|---------|---------|---------|---------|----------|----------|
| Particle size    | 5μm     | 10μm    | 10μm    | 10μm    | 10μm     | 10μm     |
| Malic acid       | 8.66    | 12.03   | 9.8     | 9.24    | /        | /        |
| Oxalic acid      | 8.94    | 7.72    | 7.44    | 7.72    | /        | /        |
| Citric acid      | 9.63    | 10.26   | 8.69    | 8.35    | /        | /        |
| Tartaric acid    | 10      | 10.74   | 8.94    | 8.64    | /        | /        |
| Maleic acid      | 10.01   | 9.5     | 8.53    | 8.56    | /        | /        |
| Succinic acid    | 12.26   | 14.45   | 11.54   | 10.47   | /        | /        |
| Fumaric acid     | 13.08   | 7.37    | 7.16    | 7.49    | /        | /        |
| Lactic acid      | 13.66   | 15.41   | 12.7    | 11.55   | /        | /        |
| Formic acid      | 14.97   | 16.11   | 13.51   | 12.48   | /        | /        |
| Acetic acid      | 16.07   | 17.52   | 14.64   | 13.39   | /        | /        |
| Maltotriose      | 9.08    | 8.94    | 7.7     | 7.9     | 8.33     | 8.57     |
| D-(+)-Cellobiose | 9.41    | 9.79    | 8.18    | 8.17    | 8.81     | 8.96     |
| [D-(+)-Maltose   | 9.51    | 10.01   | 8.29    | 8.23    | 9.02     | 9.09     |
| D-Lactose        | 9.6     | 10.24   | 8.42    | 8.29    | 9.25     | 9.22     |
| D-Glucose        | 10.73   | 11.9    | 9.68    | 9.16    | 10.61    | 10.32    |
| D-(+)-Mannose    | 11.13   | 12.55   | 10.13   | 9.48    | 12.05    | 11.45    |
| D-(+)-Galactose  | 11.16   | 12.54   | 10.15   | 9.48    | 11.77    | 11.2     |
| D-Fructose       | 11.24   | 12.65   | 10.27   | 9.58    | 13.34    | 12.45    |
| D-Xylose         | 11.32   | 12.61   | 10.24   | 9.6     | 11.63    | 11.19    |
| D-Lyxose         | 11.62   | 13.08   | 10.64   | 9.87    | 13.96    | 13.02    |
| L-(+)-Arabinose  | 11.89   | 13.45   | 10.93   | 10.08   | 13.41    | 12.53    |
| D-(-)-Arabinose  | 11.9    | 13.46   | 10.93   | 10.08   | 13.43    | 12.52    |
| D-(-)-Ribose     | 12.09   | 13.73   | 11.16   | 10.25   | 20.7     | 19.23    |
| D-(+)-Sucrose    | /       | /       | /       | /       | 8.93     | 9.03     |
| Maltitol         | 9.72    | 10.51   | 8.41    | 8.29    | 11.92    | 11.24    |
| D-Mannitol       | 11.56   | 12.99   | 10.53   | 9.79    | 17.34    | 15.6     |
| Galactitol       | 11.61   | 13.13   | 10.66   | 9.87    | 19.44    | 18.05    |
| D-Sorbitol       | 11.61   | 13.12   | 10.64   | 9.86    | 20.22    | 18.71    |
| Adonitol         | 12.15   | 13.59   | 11.1    | 10.26   | 14.73    | 13.67    |
| Arabinitol       | 12.33   | 13.82   | 11.3    | 10.41   | 17.72    | 16.06    |
| Xylitol          | 12.46   | 14.03   | 11.47   | 10.53   | 21.08    | 18.66    |
| Erythriol        | 13.16   | 14.7    | 11.94   | 11      | 15.98    | 14.47    |

Column: 7.8 × 300 mm, time unit (min)

7.8× 300 mm, time unit (min)

5μm: flow rate: 0.5mL/min, column temperature: 80 ° C, detection device: RID

10μm: flow rate: 0.6mL/min, column temperature: 80 ° C, detection device: RID



## Ordering information

| Packings | Product Code      | Particle size | diameter × length |
|----------|-------------------|---------------|-------------------|
| Sep H-L  | HCA100U046X300B2A | 10μm          | 4.6×300mm         |
| Sep H-L  | HCA100U078X300B2A | 10μm          | 7.8×300mm         |
| Sep H-M  | HCA050U046X250B3A | 5μm           | 4.6×250mm         |
| Sep H-M  | HCA050U078X100B3A | 5μm           | 7.8×100mm         |
| Sep H-M  | HCA050U078X300B3A | 5μm           | 7.8×300mm         |
| Sep H-M  | HCA100U046X250B4A | 10μm          | 4.6×250mm         |
| Sep H-M  | HCA100U046X300B4A | 10μm          | 4.6×300mm         |
| Sep H-M  | HCA100U078X300B4A | 10μm          | 7.8×300mm         |
| Sep H-H  | HCA100U046X300B6A | 10μm          | 4.6×300mm         |
| Sep H-H  | HCA100U078X300B6A | 10μm          | 7.8×300mm         |
| Sep Ca-L | HCA100U046X300C2A | 10μm          | 4.6×300mm         |
| Sep Ca-L | HCA100U078X300C2A | 10μm          | 7.8×300mm         |
| Sep Ca-M | HCA050U046X250C3A | 5μm           | 4.6×250mm         |
| Sep Ca-M | HCA050U078X300C3A | 5μm           | 7.8×300mm         |
| Sep Ca-M | HCA100U046X250C4A | 10μm          | 4.6×250mm         |
| Sep Ca-M | HCA100U046X300C4A | 10μm          | 4.6×300mm         |
| Sep Ca-M | HCA100U078X300C4A | 10μm          | 7.8×300mm         |
| Sep Ca-H | HCA050U046X250C5A | 5μm           | 4.6×250mm         |
| Sep Ca-H | HCA100U046X300C6A | 10μm          | 4.6×300mm         |
| Sep Ca-H | HCA100U078X300C6A | 10μm          | 7.8×300mm         |
| Sep Pb-L | HCA100U046X300D2A | 10μm          | 4.6×300mm         |
| Sep Pb-L | HCA100U078X300D2A | 10μm          | 7.8×300mm         |
| Sep Pb-M | HCA050U046X250D3A | 5μm           | 4.6×250mm         |
| Sep Pb-M | HCA050U078X100D3A | 5μm           | 7.8×100mm         |
| Sep Pb-M | HCA050U078X300D3A | 5μm           | 7.8×300mm         |
| Sep Pb-M | HCA100U046X300D4A | 10μm          | 4.6×300mm         |
| Sep Pb-M | HCA100U078X300D4A | 10μm          | 7.8×300mm         |
| Sep Pb-H | HCA100U046X300D6A | 10μm          | 4.6×300mm         |
| Sep Pb-H | HCA100U078X300D6A | 10μm          | 7.8×300mm         |
| Sep K-L  | HCA100U046X300E2A | 10μm          | 4.6×300mm         |
| Sep K-L  | HCA100U078X300E2A | 10μm          | 7.8×300mm         |
| Sep K-M  | HCA050U046X250E3A | 5μm           | 4.6×250mm         |
| Sep K-M  | HCA050U078X100E3A | 5μm           | 7.8×100mm         |
| Sep K-M  | HCA050U078X100E3A | 5μm           | 7.8×300mm         |
| Sep K-M  | HCA100U046X300E4A | 10μm          | 4.6×300mm         |
| Sep K-M  | HCA100U078X300E4A | 10μm          | 7.8×300mm         |
| Sep K-H  | HCA100U046X300E6A | 10μm          | 4.6×300mm         |
| Sep K-H  | HCA100U078X300E6A | 10μm          | 7.8×300mm         |
| Sep Na-L | HCA100U046X300F2A | 10μm          | 4.6×300mm         |
| Sep Na-L | HCA100U078X300F2A | 10μm          | 7.8×300mm         |
| Sep Na-M | HCA050U046X250F3A | 5μm           | 4.6×250mm         |
| Sep Na-M | HCA050U078X100F3A | 5μm           | 7.8×100mm         |
| Sep Na-M | HCA050U078X300F3A | 5μm           | 7.8×300mm         |
| Sep Na-M | HCA100U046X250F4A | 10μm          | 4.6×250mm         |
| Sep Na-M | HCA100U046X300F4A | 10μm          | 4.6×300mm         |
| Sep Na-M | HCA100U078X300F4A | 10μm          | 7.8×300mm         |
| Sep Na-H | HCA100U046X300F6A | 10μm          | 4.6×300mm         |
| Sep Na-H | HCA100U078X300F6A | 10μm          | 7.8×300mm         |

## Sep ion exchange column

### [ Polymer matrix ion exchange ]

Sep polymer matrix ion exchange column, which support is composed of a rigid, spherical, highly cross-linked poly(styrene divinylbenzene) (PS/DVB) bead, show high efficiency and high recovery separations for biological molecules. The PS/DVB resin surface is grafted with a highly hydrophilic, neutral polymer thin layer that eliminates non-specific bindings with biological analytes. Sep ion-exchange phases are composed of SCX, WCX, SAX, and WAX.

- Suitable for peptides, carbohydrates, polysaccharides, proteins, polynucleotides, etc
- Wide pH range: 2 - 12
- High resolution for slightly differed structures of biological species
- High adsorption capacity
- Excellent resolution and selectivity

### Ordering information

| Packings | Product Code      | Particle size | diameter × length |
|----------|-------------------|---------------|-------------------|
| Sep SCX  | HCA030U021X050H1A | 3μm           | 2.1×50mm          |
| Sep SCX  | HCA030U021X100H1A | 3μm           | 2.1×100mm         |
| Sep SCX  | HCA030U046X050H1A | 3μm           | 4.6×50mm          |
| Sep SCX  | HCA030U046X100H1A | 3μm           | 4.6×100mm         |
| Sep SCX  | HCA030U046X150H1A | 3μm           | 4.6×150mm         |
| Sep SCX  | HCA050U021X100H2A | 5μm           | 2.1×100mm         |
| Sep SCX  | HCA050U021X150H2A | 5μm           | 2.1×150mm         |
| Sep SCX  | HCA050U046X050H2A | 5μm           | 4.6×50mm          |
| Sep SCX  | HCA050U046X100H2A | 5μm           | 4.6×100mm         |
| Sep SCX  | HCA050U046X150H2A | 5μm           | 4.6×150mm         |
| Sep SCX  | HCA050U046X250H2A | 5μm           | 4.6×250mm         |
| Sep SCX  | HCA100U021X050H3A | 10μm          | 2.1×50mm          |
| Sep SCX  | HCA100U021X100H3A | 10μm          | 2.1×100mm         |
| Sep SCX  | HCA100U021X150H3A | 10μm          | 2.1×150mm         |
| Sep SCX  | HCA100U046X050H3A | 10μm          | 4.6×50mm          |
| Sep SCX  | HCA100U046X100H3A | 10μm          | 4.6×100mm         |
| Sep SCX  | HCA100U046X150H3A | 10μm          | 4.6×150mm         |
| Sep SCX  | HCA100U046X250H3A | 10μm          | 4.6×250mm         |
| Sep WCX  | HCA030U021X050H4A | 3μm           | 2.1×50mm          |
| Sep WCX  | HCA030U021X100H4A | 3μm           | 2.1×100mm         |
| Sep WCX  | HCA030U046X050H4A | 3μm           | 4.6×50mm          |
| Sep WCX  | HCA030U046X100H4A | 3μm           | 4.6×100mm         |
| Sep WCX  | HCA030U046X150H4A | 3μm           | 4.6×150mm         |
| Sep WCX  | HCA050U021X050H5A | 5μm           | 2.1×50mm          |
| Sep WCX  | HCA050U021X100H5A | 5μm           | 2.1×100mm         |
| Sep WCX  | HCA050U021X150H5A | 5μm           | 2.1×150mm         |
| Sep WCX  | HCA050U046X050H5A | 5μm           | 4.6×50mm          |
| Sep WCX  | HCA050U046X100H5A | 5μm           | 4.6×100mm         |
| Sep WCX  | HCA050U046X150H5A | 5μm           | 4.6×150mm         |
| Sep WCX  | HCA100U021X050H6A | 10μm          | 2.1×50mm          |
| Sep WCX  | HCA100U021X100H6A | 10μm          | 2.1×100mm         |
| Sep WCX  | HCA100U021X150H6A | 10μm          | 2.1×150mm         |
| Sep WCX  | HCA100U046X050H6A | 10μm          | 4.6×50mm          |
| Sep WCX  | HCA100U046X100H6A | 10μm          | 4.6×100mm         |
| Sep WCX  | HCA100U046X150H6A | 10μm          | 4.6×150mm         |
| Sep WCX  | HCA100U046X250H6A | 10μm          | 4.6×250mm         |

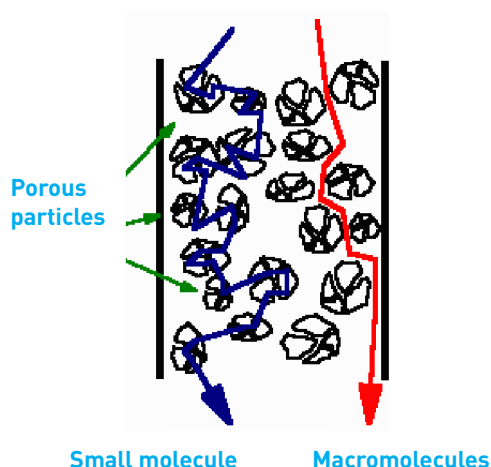
### Ordering information

| Packings | Product Code      | Particle size | diameter × length |
|----------|-------------------|---------------|-------------------|
| Sep SAX  | HCA030U021X050G1A | 3μm           | 2.1×50mm          |
| Sep SAX  | HCA030U021X100G1A | 3μm           | 2.1×100mm         |
| Sep SAX  | HCA030U046X050G1A | 3μm           | 4.6×50mm          |
| Sep SAX  | HCA030U046X100G1A | 3μm           | 4.6×100mm         |
| Sep SAX  | HCA030U046X150G1A | 3μm           | 4.6×150mm         |
| Sep SAX  | HCA050U021X050G2A | 5μm           | 2.1×50mm          |
| Sep SAX  | HCA050U021X100G2A | 5μm           | 2.1×100mm         |
| Sep SAX  | HCA050U021X150G2A | 5μm           | 2.1×150mm         |
| Sep SAX  | HCA050U046X050G2A | 5μm           | 4.6×50mm          |
| Sep SAX  | HCA050U046X100G2A | 5μm           | 4.6×100mm         |
| Sep SAX  | HCA050U046X150G2A | 5μm           | 4.6×150mm         |
| Sep SAX  | HCA100U021X050G3A | 10μm          | 2.1×50mm          |
| Sep SAX  | HCA100U021X100G3A | 10μm          | 2.1×100mm         |
| Sep SAX  | HCA100U021X150G3A | 10μm          | 2.1×150mm         |
| Sep SAX  | HCA100U046X050G3A | 10μm          | 4.6×50mm          |
| Sep SAX  | HCA100U046X100G3A | 10μm          | 4.6×100mm         |
| Sep SAX  | HCA100U046X150G3A | 10μm          | 4.6×150mm         |
| Sep SAX  | HCA100U046X250G3A | 10μm          | 4.6×250mm         |
| Sep WAX  | HCA030U021X050G4A | 3μm           | 2.1×50mm          |
| Sep WAX  | HCA030U021X100G4A | 3μm           | 2.1×100mm         |
| Sep WAX  | HCA030U046X050G4A | 3μm           | 4.6×50mm          |
| Sep WAX  | HCA030U046X100G4A | 3μm           | 4.6×100mm         |
| Sep WAX  | HCA030U046X150G4A | 3μm           | 4.6×150mm         |
| Sep WAX  | HCA050U021X050G5A | 5μm           | 2.1×50mm          |
| Sep WAX  | HCA050U021X100G5A | 5μm           | 2.1×100mm         |
| Sep WAX  | HCA050U021X150G5A | 5μm           | 2.1×150mm         |
| Sep WAX  | HCA050U046X050G5A | 5μm           | 4.6×50mm          |
| Sep WAX  | HCA050U046X100G5A | 5μm           | 4.6×100mm         |
| Sep WAX  | HCA050U046X150G5A | 5μm           | 4.6×150mm         |
| Sep WAX  | HCA100U021X050G6A | 10μm          | 2.1×50mm          |
| Sep WAX  | HCA100U021X100G6A | 10μm          | 2.1×100mm         |
| Sep WAX  | HCA100U021X150G6A | 10μm          | 2.1×150mm         |
| Sep WAX  | HCA100U046X050G6A | 10μm          | 4.6×50mm          |
| Sep WAX  | HCA100U046X100G6A | 10μm          | 4.6×100mm         |
| Sep WAX  | HCA100U046X150G6A | 10μm          | 4.6×150mm         |
| Sep WAX  | HCA100U046X250G6A | 10μm          | 4.6×250mm         |

## Size exclusion column (SEC)

Size Exclusion Chromatography (SEC), is a chromatographic method in which molecules in solution are separated by their size, not by molecular weight. It is usually applied to large molecules or macromolecular complexes such as industrial polymers, proteins and nano-particles.

Major brands on the market are TKS, Shodex etc. CNW size exclusion columns have the same excellent performance.



The column used is filled with high-purity silica or polymer containing many pores. Macromolecules which cannot enter the pores flow quickly through the column, while small molecules which can penetrate deep into the pores flow more slowly through the column; other molecules have different retention time according to their size.

Compare the calibration curves and select a column that is best suited to the range of molecule weights to be measured. If samples contain molecules larger than the packing material pores, they are excluded and can cause a peak to appear near the exclusion limit.

Size exclusion chromatography can be divided into:

Gel permeation chromatography (GPC) which uses a hydrophobic column packing material and a non-aqueous mobile phase (organic solvent) to measure the molecular weight distribution of synthetic polymers.

Gel filtration chromatography (GFC) which uses a hydrophilic packing material and an aqueous mobile phase to separate, fractionate, or measure the molecular weight distribution of molecules soluble in water, such as polysaccharides and proteins.

## Gel silica matrix SEC column

Gel columns are all silica matrix size exclusion chromatography. X and S series packings, offering both 3µm and 5µm two particle sizes, can meet different separation requirements. Widely used in biological molecules and water-soluble polymers separation, including proteins, nucleic acids, etc. X-Series packing is more universal. Compared to X-Series, S-Series is more suitable for insulin, trypsin etc. hydrophobic protein, as well as monoclonal antibody protein.

### Gel X series of columns (Universal)

pH range: 2 - 8.5, maximum temperature 80 °C , salt concentration 20 mM -2.0M, mobile phase is conventional aqueous phase and organic phase solvent.

#### Filler Model

| packing model            | aperture diameter | Partical size | protein molecular weight | water-soluble       |
|--------------------------|-------------------|---------------|--------------------------|---------------------|
| polymer molecular weight | 100Å              | 3µm           | 100 - 100,000            | 500 - 10,000        |
| Gel X3015                | 150Å              | 3µm           | 500 - 150,000            | 500 - 25,000        |
| Gel X3030                | 300Å              | 3µm           | 5,000 - 1,250,000        | 1,000 - 100,000     |
| Gel X5010                | 100Å              | 5µm           | 100 - 100,000            | 500 - 10,000        |
| Gel X5015                | 150Å              | 5µm           | 500 - 150,000            | 500 - 25,000        |
| Gel X5030                | 300Å              | 5µm           | 5,000 - 1,250,000        | 1,000 - 100,000     |
| Gel X5050                | 500Å              | 5µm           | 15,000 - 5,000,000       | 2,500 - 500,000     |
| Gel X5100                | 1000Å             | 5µm           | 50,000 - 7,500,000       | 5,000 - 1,500,000   |
| Gel X5200                | 2000Å             | 5µm           | >10,000,000              | 50,000 - >2,500,000 |

# Chromatography

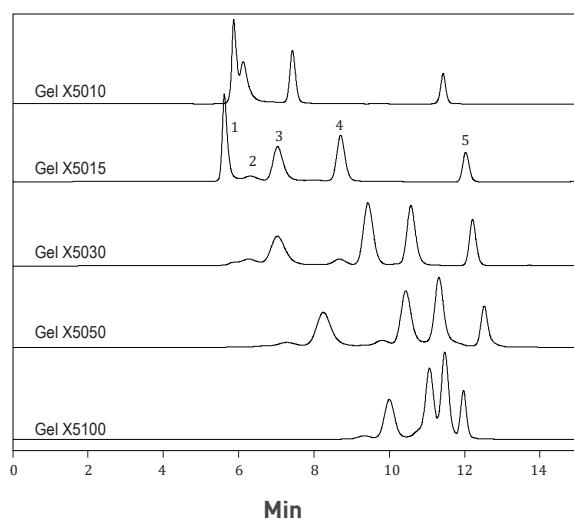
Gel S series columns (S series packing is ideal for separation of insulin, trypsin etc. hydrophobic protein, as well as monoclonal antibody protein)

pH range: 2 - 8.5, maximum temperature 80°C , salt concentration 20 mM - 2.0M, mobile phase is conventional aqueous phase and organic phase solvent.

| Packing model | Aperture diameter | Partical size | Protein molecular weight |
|---------------|-------------------|---------------|--------------------------|
| Gel S3010     | 100Å              | 3µm           | 100 - 100,000            |
| Gel S3015     | 150Å              | 3µm           | 500 - 150,000            |
| Gel S3030     | 300Å              | 3µm           | 5,000 - 1,250,000        |
| Gel S5015     | 150Å              | 5µm           | 500 - 150,000            |
| Gel S5030     | 300Å              | 5µm           | 5,000 - 1,250,000        |
| Gel S5050     | 500Å              | 5µm           | 15,000 - 5,000,000       |

Comparison of different columns for separation of protein samples

No.03235



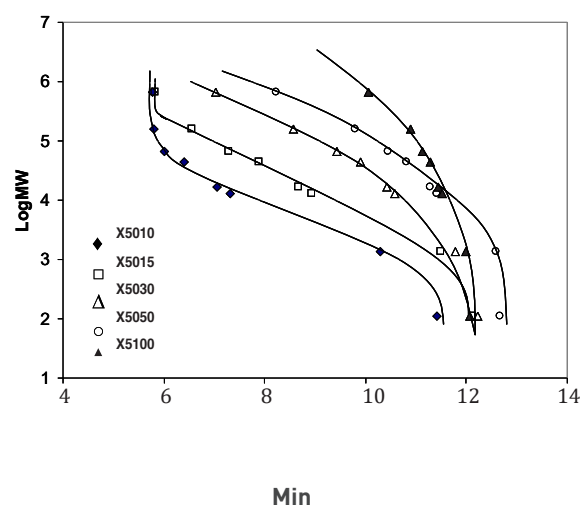
Column: Gel X5010 4.6 × 300mm, 5µm (HCA050U046X300ADA)  
 Gel X5015 4.6 × 300mm, 5µm (HCA050U046X300AEA)  
 Gel X5030 4.6 × 300mm, 5µm (HCA050U046X300AFA)  
 Gel X5100 4.6 × 300mm, 5µm (HCA050U046X300AHA)

Mobile phase: 150 mM sodium phosphate buffer (pH 7.0)  
 Flow rate: 0.35 mL/min  
 Detection: 214 nm  
 Column temperature: 23 °C

1. Thyroglobulin (1.0 mg/mL), 670 kD
2. BSA dimer, 132 kD
3. BSA (1.0 mg/mL), 66 kD
4. Ribonuclease A (1.0 mg/mL), 13.7 kD
5. Uracil (2.5 ug/mL), 120 kD.

protein molecular weight calibration curve

No.03236



Column: Column: Gel X5010 7.8 × 300mm, 5µm (HCA050U078X300ADA) Gel X5015 7.8 × 300mm, 5µm (HCA050U078X300AEA)  
 Gel X5030 7.8 × 300mm, 5µm (HCA050U078X300AFA)  
 Gel X5100 7.8 × 300mm, 5µm (8.830AH.0001)

Mobile phase: 150 mM sodium phosphate buffer (pH 7.0)  
 Flow rate: 0.35 mL/min  
 Detection: 214 nm  
 Column temperature: 23 °C

1. Thyroglobulin, 670 kD
2. gamma-Globulin, 158kD
3. BSA, 66 kD
4. Ovalbumin, 44 kD
5. Myoglobin, 17.6 kD
6. Ribonuclease A, 13.7 kD
7. B12, 1.35 kD
8. Uracil, 120.

## Ordering information

| Packings | Product Code      | Particle size | diameter × length |
|----------|-------------------|---------------|-------------------|
| X3010    | HCA030U046X050AAA | 3µm           | 4.6×50mm          |
| X3010    | HCA030U046X150AAA | 3µm           | 4.6×150mm         |
| X3010    | HCA030U046X250AAA | 3µm           | 4.6×250mm         |
| X3010    | HCA030U046X300AAA | 3µm           | 4.6×300mm         |
| X3010    | HCA030U078X050AAA | 3µm           | 7.8×50mm          |
| X3010    | HCA030U078X150AAA | 3µm           | 7.8×150mm         |
| X3010    | HCA030U078X250AAA | 3µm           | 7.8×250mm         |
| X3010    | HCA030U078X300AAA | 3µm           | 7.8×300mm         |
| X3015    | HCA030U046X050ABA | 3µm           | 4.6×50mm          |
| X3015    | HCA030U046X150ABA | 3µm           | 4.6×150mm         |
| X3015    | HCA030U046X250ABA | 3µm           | 4.6×250mm         |
| X3015    | HCA030U046X300ABA | 3µm           | 4.6×300mm         |
| X3015    | HCA030U078X050ABA | 3µm           | 7.8×50mm          |
| X3015    | HCA030U078X150ABA | 3µm           | 7.8×150mm         |
| X3015    | HCA030U078X250ABA | 3µm           | 7.8×250mm         |
| X3015    | HCA030U078X300ABA | 3µm           | 7.8×300mm         |
| X3030    | HCA030U046X050ACA | 3µm           | 4.6×50mm          |

## Ordering information

| Packings | Product Code      | Particle size | diameter × length |
|----------|-------------------|---------------|-------------------|
| X3030    | HCA030U046X150ACA | 3μm           | 4.6×150mm         |
| X3030    | HCA030U046X250ACA | 3μm           | 4.6×250mm         |
| X3030    | HCA030U046X300ACA | 3μm           | 4.6×300mm         |
| X3030    | HCA030U078X050ACA | 3μm           | 7.8×50mm          |
| X3030    | HCA030U078X150ACA | 3μm           | 7.8×150mm         |
| X3030    | HCA030U078X250ACA | 3μm           | 7.8×250mm         |
| X3030    | HCA030U078X300ACA | 3μm           | 7.8×300mm         |
| X5010    | HCA050U046X050ADA | 5μm           | 4.6×50mm          |
| X5010    | HCA050U046X150ADA | 5μm           | 4.6×150mm         |
| X5010    | HCA050U046X250ADA | 5μm           | 4.6×250mm         |
| X5010    | HCA050U046X300ADA | 5μm           | 4.6×300mm         |
| X5010    | HCA050U078X050ADA | 5μm           | 7.8×50mm          |
| X5010    | HCA050U078X150ADA | 5μm           | 7.8×150mm         |
| X5010    | HCA050U078X250ADA | 5μm           | 7.8×250mm         |
| X5010    | HCA050U078X300ADA | 5μm           | 7.8×300mm         |
| X5015    | HCA050U046X050AEA | 5μm           | 4.6×50mm          |
| X5015    | HCA050U046X150AEA | 5μm           | 4.6×150mm         |
| X5015    | HCA050U046X250AEA | 5μm           | 4.6×250mm         |
| X5015    | HCA050U046X300AEA | 5μm           | 4.6×300mm         |
| X5015    | HCA050U078X050AEA | 5μm           | 7.8×50mm          |
| X5015    | HCA050U078X150AEA | 5μm           | 7.8×150mm         |
| X5015    | HCA050U078X250AEA | 5μm           | 7.8×250mm         |
| X5015    | HCA050U078X300AEA | 5μm           | 7.8×300mm         |
| X5030    | HCA050U046X050AFA | 5μm           | 4.6×50mm          |
| X5030    | HCA050U046X150AFA | 5μm           | 4.6×150mm         |
| X5030    | HCA050U046X250AFA | 5μm           | 4.6×250mm         |
| X5030    | HCA050U046X300AFA | 5μm           | 4.6×300mm         |
| X5030    | HCA050U078X050AFA | 5μm           | 7.8×50mm          |
| X5030    | HCA050U078X150AFA | 5μm           | 7.8×150mm         |
| X5030    | HCA050U078X250AFA | 5μm           | 7.8×250mm         |
| X5030    | HCA050U078X300AFA | 5μm           | 7.8×300mm         |
| X5050    | HCA050U046X050AFA | 5μm           | 4.6×50mm          |
| X5050    | HCA050U046X150AFA | 5μm           | 4.6×150mm         |
| X5050    | HCA050U046X250AFA | 5μm           | 4.6×250mm         |
| X5050    | HCA050U046X300AFA | 5μm           | 4.6×300mm         |
| X5050    | HCA050U078X050AFA | 5μm           | 7.8×50mm          |
| X5050    | HCA050U078X150AFA | 5μm           | 7.8×150mm         |
| X5050    | HCA050U078X250AFA | 5μm           | 7.8×250mm         |
| X5050    | HCA050U078X300AFA | 5μm           | 7.8×300mm         |
| X5100    | HCA050U046X050AHA | 5μm           | 4.6×50mm          |
| X5100    | HCA050U046X150AHA | 5μm           | 4.6×150mm         |
| X5100    | HCA050U046X250AHA | 5μm           | 4.6×250mm         |
| X5100    | HCA050U046X300AHA | 5μm           | 4.6×300mm         |
| X5100    | HCA050U078X050AHA | 5μm           | 7.8×50mm          |
| X5100    | HCA050U078X150AHA | 5μm           | 7.8×150mm         |
| X5100    | HCA050U078X250AHA | 5μm           | 7.8×250mm         |
| X5100    | HCA050U078X300AHA | 5μm           | 7.8×300mm         |
| X5200    | HCA050U046X050AJA | 5μm           | 4.6×50mm          |
| X5200    | HCA050U046X150AJA | 5μm           | 4.6×150mm         |
| X5200    | HCA050U046X250AJA | 5μm           | 4.6×250mm         |
| X5200    | HCA050U046X300AJA | 5μm           | 4.6×300mm         |
| X5200    | HCA050U078X050AJA | 5μm           | 7.8×50mm          |

| Packings | Product Code      | Particle size | diameter × length |
|----------|-------------------|---------------|-------------------|
| X5200    | HCA050U078X150AJA | 5μm           | 7.8×150mm         |
| X5200    | HCA050U078X250AJA | 5μm           | 7.8×250mm         |
| X5200    | HCA050U078X300AJA | 5μm           | 7.8×300mm         |
| S3010    | HCA030U046X050AKA | 3μm           | 4.6×50mm          |
| S3010    | HCA030U046X150AKA | 3μm           | 4.6×150mm         |
| S3010    | HCA030U046X250AKA | 3μm           | 4.6×250mm         |
| S3010    | HCA030U046X300AKA | 3μm           | 4.6×300mm         |
| S3010    | HCA030U078X050AKA | 3μm           | 7.8×50mm          |
| S3010    | HCA030U078X150AKA | 3μm           | 7.8×150mm         |
| S3010    | HCA030U078X250AKA | 3μm           | 7.8×250mm         |
| S3010    | HCA030U078X300AKA | 3μm           | 7.8×300mm         |
| S3015    | HCA030U046X050ALA | 3μm           | 4.6×50mm          |
| S3015    | HCA030U046X150ALA | 3μm           | 4.6×150mm         |
| S3015    | HCA030U046X250ALA | 3μm           | 4.6×250mm         |
| S3015    | HCA030U046X300ALA | 3μm           | 4.6×300mm         |
| S3015    | HCA030U078X050ALA | 3μm           | 7.8×50mm          |
| S3015    | HCA030U078X150ALA | 3μm           | 7.8×150mm         |
| S3015    | HCA030U078X250ALA | 3μm           | 7.8×250mm         |
| S3015    | HCA030U078X300ALA | 3μm           | 7.8×300mm         |
| S3030    | HCA030U046X050AMA | 3μm           | 4.6×50mm          |
| S3030    | HCA030U046X150AMA | 3μm           | 4.6×150mm         |
| S3030    | HCA030U046X250AMA | 3μm           | 4.6×250mm         |
| S3030    | HCA030U046X300AMA | 3μm           | 4.6×300mm         |
| S3030    | HCA030U078X050AMA | 3μm           | 7.8×50mm          |
| S3030    | HCA030U078X150AMA | 3μm           | 7.8×150mm         |
| S3030    | HCA030U078X250AMA | 3μm           | 7.8×250mm         |
| S3030    | HCA030U078X300AMA | 3μm           | 7.8×300mm         |
| S5015    | HCA050U046X050ANA | 5μm           | 4.6×50mm          |
| S5015    | HCA050U046X150ANA | 5μm           | 4.6×150mm         |
| S5015    | HCA050U046X250ANA | 5μm           | 4.6×250mm         |
| S5015    | HCA050U046X300ANA | 5μm           | 4.6×300mm         |
| S5015    | HCA050U078X050ANA | 5μm           | 7.8×50mm          |
| S5015    | HCA050U078X150ANA | 5μm           | 7.8×150mm         |
| S5015    | HCA050U078X250ANA | 5μm           | 7.8×250mm         |
| S5015    | HCA050U078X300ANA | 5μm           | 7.8×300mm         |
| S5030    | HCA050U046X050AOA | 5μm           | 4.6×50mm          |
| S5030    | HCA050U046X150AOA | 5μm           | 4.6×150mm         |
| S5030    | HCA050U046X250AOA | 5μm           | 4.6×250mm         |
| S5030    | HCA050U046X300AOA | 5μm           | 4.6×300mm         |
| S5030    | HCA050U078X050AOA | 5μm           | 7.8×50mm          |
| S5030    | HCA050U078X150AOA | 5μm           | 7.8×150mm         |
| S5030    | HCA050U078X250AOA | 5μm           | 7.8×250mm         |
| S5030    | HCA050U078X300AOA | 5μm           | 7.8×300mm         |
| S5050    | HCA050U046X050APA | 5μm           | 4.6×50mm          |
| S5050    | HCA050U046X150APA | 5μm           | 4.6×150mm         |
| S5050    | HCA050U046X250APA | 5μm           | 4.6×250mm         |
| S5050    | HCA050U046X300APA | 5μm           | 4.6×300mm         |
| S5050    | HCA050U078X050APA | 5μm           | 7.8×50mm          |
| S5050    | HCA050U078X150APA | 5μm           | 7.8×150mm         |
| S5050    | HCA050U078X250APA | 5μm           | 7.8×250mm         |
| S5050    | HCA050U078X300APA | 5μm           | 7.8×300mm         |

## CruxPoly and ElfPoly polymer matrix SEC column

CruxPoly and ElfPoly series columns are based on highly cross-linked polystyrene / divinylbenzene (PS/DVB) particles with very narrow particle size and pore size distributions. Their uniform pore size distribution offers near linear calibration curves covering wide molecular weight range. Compared to silica gel matrix size exclusion column, polymer matrix is stable to resist wide range of solvents, and have low background noise for light scattering detection. They are used to separate polystyrene, polyacrylate, polysiloxane etc.

### CruxPoly series columns

PH range: 1 – 14; maximum temperature: 145 °C . Mobile phase is organic solvents (THF, DMAC, TCB, NMP etc.).

| packing model  | aperture diameter | Partical size | Molecular weight exclusion limit |
|----------------|-------------------|---------------|----------------------------------|
| CruxPoly T100  | 100Å              | 5µm,10µm      | 100 - 100,000                    |
| CruxPoly T300  | 300Å              | 5µm,10µm      | 500 - 250,000                    |
| CruxPoly T500  | 500Å              | 5µm,10µm      | 1,000 - 750,000                  |
| CruxPoly T1000 | 1000Å             | 5µm,10µm      | 5,000 - 2,500,000                |
| CruxPoly TMIX  | 100 - 1000Å       | 5µm,10µm      | 5,000 - 2,500,000                |

### Ordering information

| Packings       | Product Code      | Particle size | diameter × length |
|----------------|-------------------|---------------|-------------------|
| CruxPoly T100  | HCA050U046X300BAA | 5µm           | 4.6×300mm         |
| CruxPoly T100  | HCA050U078X050BAA | 5µm           | 7.8×50mm          |
| CruxPoly T100  | HCA050U078X300BAA | 5µm           | 7.8×300mm         |
| CruxPoly T100  | HCA100U046X300BBA | 10µm          | 4.6×300mm         |
| CruxPoly T100  | HCA100U078X300BBA | 10µm          | 7.8×300mm         |
| CruxPoly T300  | HCA050U046X050BCA | 5µm           | 4.6×50mm          |
| CruxPoly T300  | HCA050U046X300BCA | 5µm           | 4.6×300mm         |
| CruxPoly T300  | HCA050U078X050BCA | 5µm           | 7.8×50mm          |
| CruxPoly T300  | HCA050U078X300BCA | 5µm           | 7.8×300mm         |
| CruxPoly T500  | HCA050U078X300BEA | 5µm           | 4.6×300mm         |
| CruxPoly T500  | HCA050U078X050BEA | 5µm           | 7.8×50mm          |
| CruxPoly T500  | HCA050U078X300BEA | 5µm           | 7.8×300mm         |
| CruxPoly T1000 | HCA050U046X300BGA | 5µm           | 4.6×300mm         |
| CruxPoly T1000 | HCA050U078X300BGA | 5µm           | 7.8×300mm         |

## Preparative column

Preparative columns and semi-preparative columns have a variety of packings, particle size as 5 and 10µm.

### Silica gel matrix:

C18 C18-BIO C8  
C4 Phenyl  
Silica CN NH2  
Diol HILIC  
HILIC(2)  
HILIC(3) SAX  
SCX

### Polymer matrix:

Sep RP1 Sep RP3  
Sep SP Sep SAX  
Sep WAX Sep SCX  
Sep WCX

### Size exclusion chromatography:

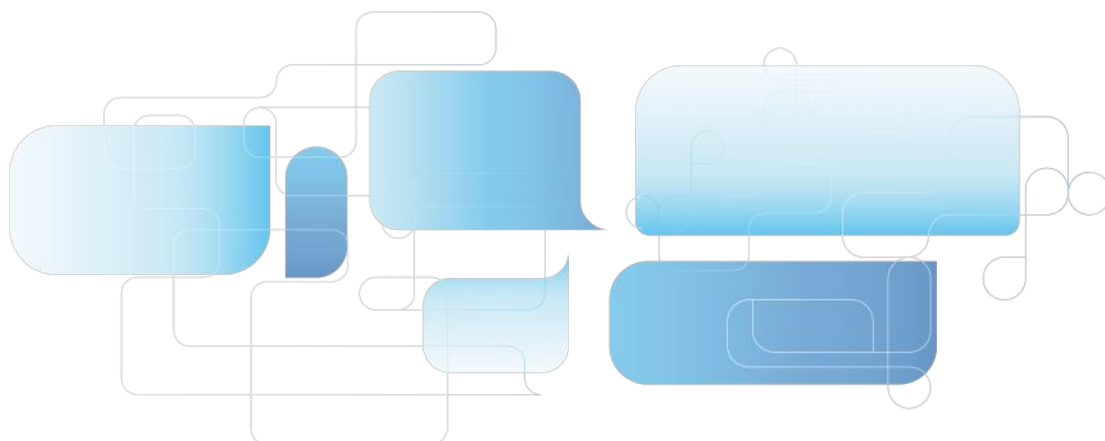
Gel X5010  
Gel X5015  
Gel X5030  
Gel X5050  
Gel X5100  
Gel X5200  
Gel S5015  
Gel S5030  
Gel S5050  
CruxPoly T100  
CruxPoly T300  
CruxPoly T500  
CruxPoly T1000  
CruxPoly TMIX  
ElfPoly Z300  
ElfPoly Z500  
ElfPoly Z1000  
ElfPoly Z2000  
ElfPoly ZMIX

### Preparative column and semi-preparative column dimensions as:

50mm x 10.0mm  
100mm x 10.0mm  
150mm x 10.0mm  
250mm x 10.0mm  
10mm x 21.2mm  
50mm x 21.2mm  
100mm x 21.2mm  
150mm x 21.2mm  
250mm x 21.2mm  
50mm x 30.0mm  
100mm x 30.0mm  
150mm x 30.0mm  
250mm x 30.0mm  
50mm x 50.0mm  
150mm x 50.0mm  
250mm x 50.0mm



The description and characteristics of preparative and semi-preparative similar to analytical column. Please contact GVS salesman or inquire for price and delivery date.

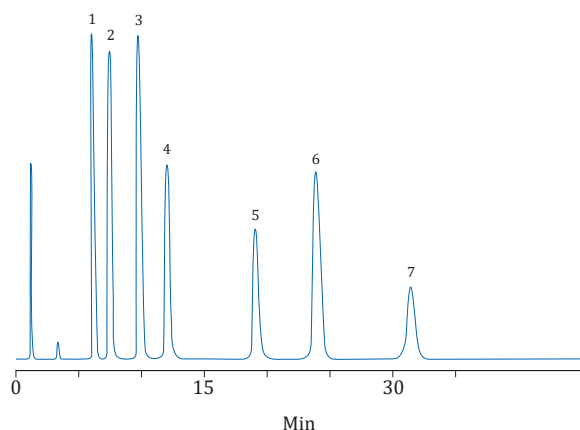


## Application: Drugs

### Tricyclic antidepressants

No.1209001

- |                  |                  |
|------------------|------------------|
| 1. Protriptyline | 5. Imipramine    |
| 2. Desipramine   | 6. Amitriptyline |
| 3. Nortriptyline | 7. Trimipramine  |
| 4. Doxepin       |                  |

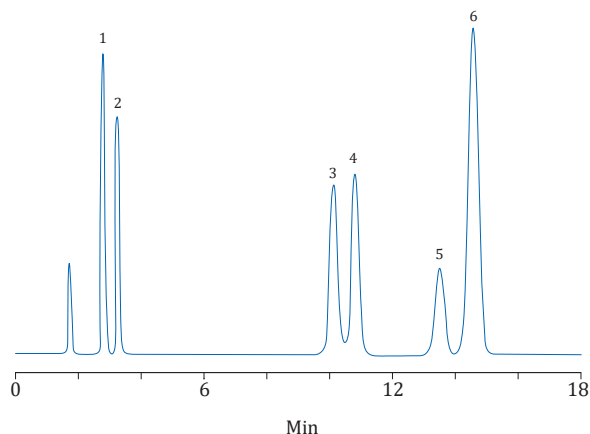


Column: C18-WP 4.6 × 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: methanol / 20 mM KH<sub>2</sub>PO<sub>4</sub> - K<sub>2</sub>HPO<sub>4</sub> buffer  
(pH 7.0) (70/30)  
Flow rate: 1.2 mL/min  
Detection: 240 nm  
Column temperature: 30 °C

### Cough and cold medicine ingredients

No.1209003

- |                             |                |
|-----------------------------|----------------|
| 1. Acetaminophen            | 4. Aspirine    |
| 2. Caffeine                 | 5. Ethenzamide |
| 3. Chlorpheniramine Maleate | 6. Bucetin     |

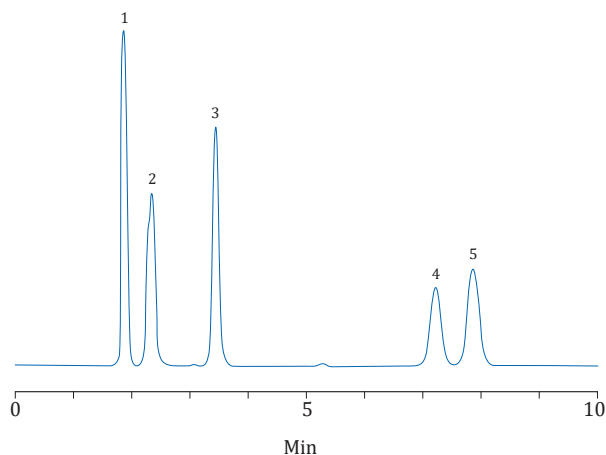


Column: C18-WP 4.6 × 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: methanol / 50 mM NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> - H<sub>3</sub>PO<sub>4</sub>  
buffer (pH 2.5) (20/80)  
Flow rate: 1.0mL/min  
Detection: 235 nm  
Column temperature: 40 °C

### Beta-blockers

No.1209002

- |               |                |
|---------------|----------------|
| 1. Atenolol   | 4. Propranolol |
| 2. Nadolol    | 5. Alprenolol  |
| 3. Metoprolol |                |

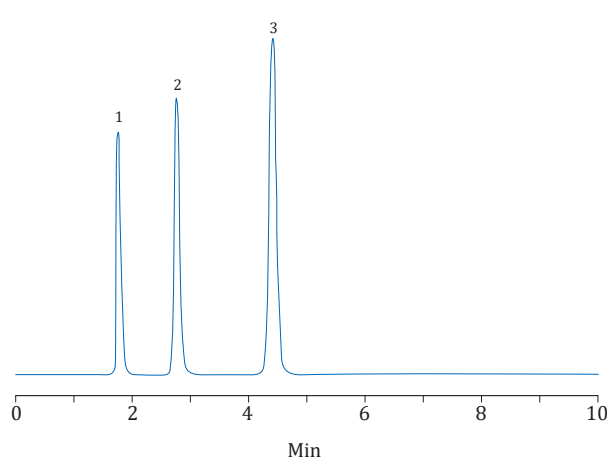


Column: C18-WP 4.6 × 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: methanol / 20 mM KH<sub>2</sub>PO<sub>4</sub> - K<sub>2</sub>HPO<sub>4</sub>  
buffer (pH 7.0) (70/30)  
Flow rate: 1.2 mL/min  
Detection: 240 nm  
Column temperature: 30 °C

### Procainamide

No.1209004

- |                         |
|-------------------------|
| 1. Uracil               |
| 2. Procainamide         |
| 3. N-Acetylprocainamide |



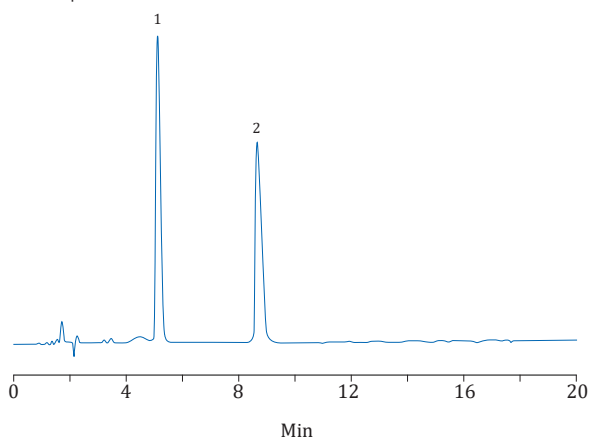
Column: C18-WP 4.6 × 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: methanol / 50 mM NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> - H<sub>3</sub>PO<sub>4</sub>  
buffer (pH 2.5) (20/80)  
Flow rate: 1.0mL/min  
Detection: 235 nm  
Column temperature: 40 °C

# Chromatography

## Anticholinergics

No.1209005

1. Scopolamine Hydrobromide
2. Atropine Sulfate

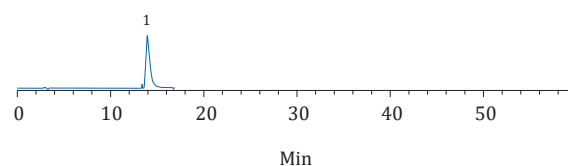


Column: C18-WP 4.6 × 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: methanol / 30 mM NaH<sub>2</sub>PO<sub>4</sub> buffer (15/85)  
Flow rate: 1.0 mL/min  
Detection: 254 nm  
Column temperature: 40 °C

## Glycyrrhizin

No.1209007

1. Glycyrrhizin

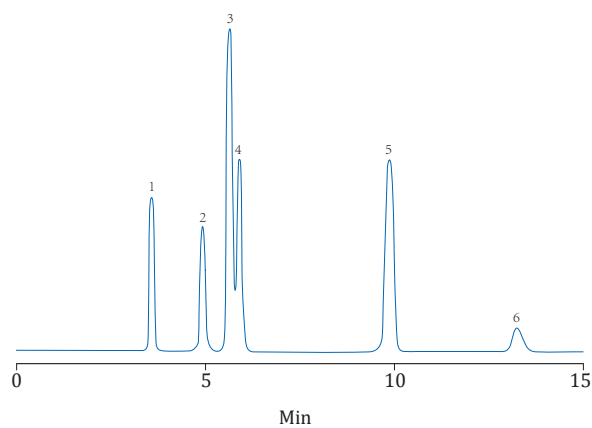


Column: C18-WP 4.6 \* 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / 0.1% acetic acid (38/62)  
Flow rate: 1.0mL/min  
Detection: 254 nm  
Column temperature: 30 °C

## Non-steroidal anti-inflammatory drugs

No.1209006

1. Piroxicam
2. Sulindac
3. Ketoprofen
4. Naproxen
5. Flurbiprofen
6. Ibuprofen

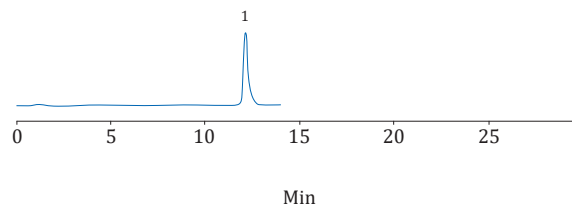


Column: C18-WP 4.6 × 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: acetonitrile / 1% acetic acid buffer solution  
(65/35)  
Flow rate: 1.0 mL/min  
Detection: 260 nm  
Column temperature: 40 °C

## Matrine

No.1209008

1. Matrine



Column: C18-WP 4.6 \* 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / 0.1% phosphoric acid  
(triethylamine adjusted pH 8.0) = 28/72  
Flow rate: 2.0mL/min  
Detection: 220 nm  
Column temperature: 40 °C

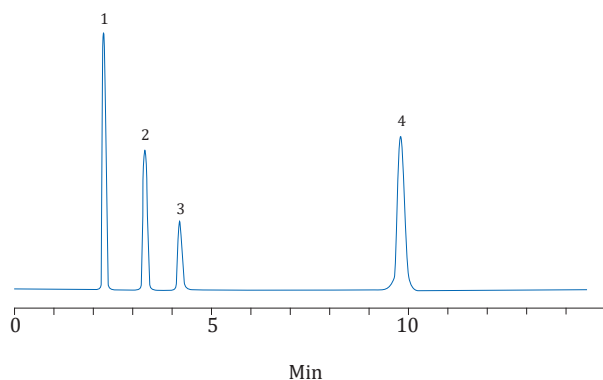
# Chromatography

## Anti-HIV drugs

No.1209009

1. Thymidine
2. d4T

3. AZT-Glucuronide
4. AZT

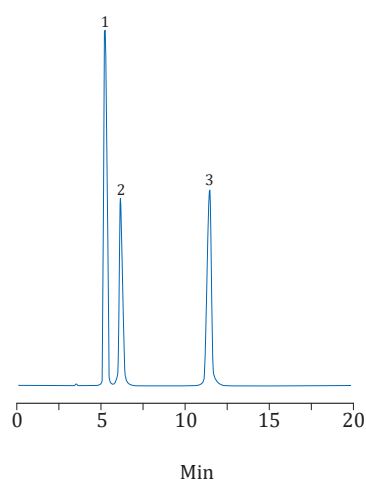


Column: C18-BIO 4.6 × 150mm, 5µm  
(HCA050U046X15078A)  
Mobile phase: methanol / 20 mM NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> buffer (10/90)  
Flow rate: 1.0 mL/min  
Detection: 260 nm  
Column temperature: 35 °C

## Steroids -1

No.1209011

1. Estrone
2. Estradiol
3. Estriol

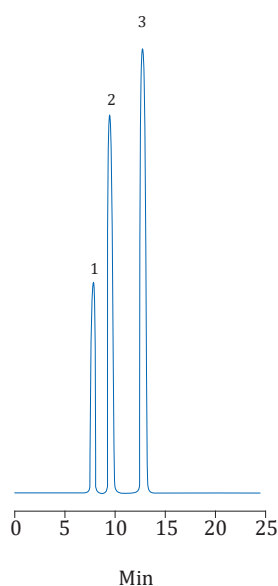


Column: Silica 4.6 × 150mm, 5µm  
(HCA050U046X15076A)  
Mobile phase: n-hexane / ethanol (85/15)  
Flow rate: 1.0mL/min  
Detection: 270 nm  
Column temperature: 40 °C

## Tricyclic antidepressants

No.1209010

1. Protriptyline
2. Nortriptyline
3. Amitriptyline

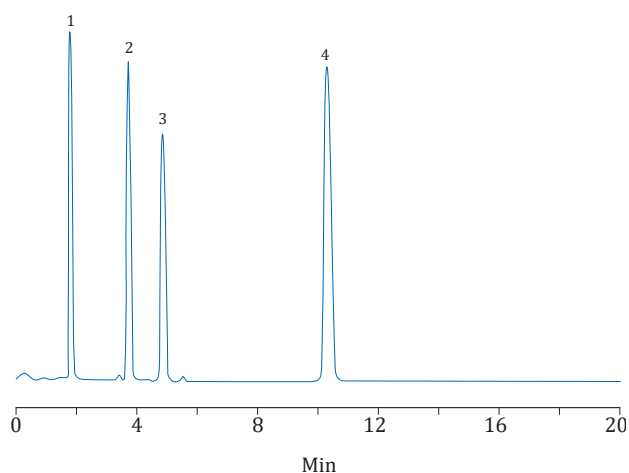


Column: C8 4.6 × 150mm, 5µm (HCA050U046X15075A)  
Mobile phase: methanol / 20 mM K<sub>2</sub>HPO<sub>4</sub> buffer (pH 7.0)  
(80/20)  
Flow rate: 1.0 mL/min  
Detection: 254 nm  
Column temperature: 40 °C

## Steroids -2

No.1209012

1. Estriol
2. β-Estradiol
3. Estrone
4. Progesterone

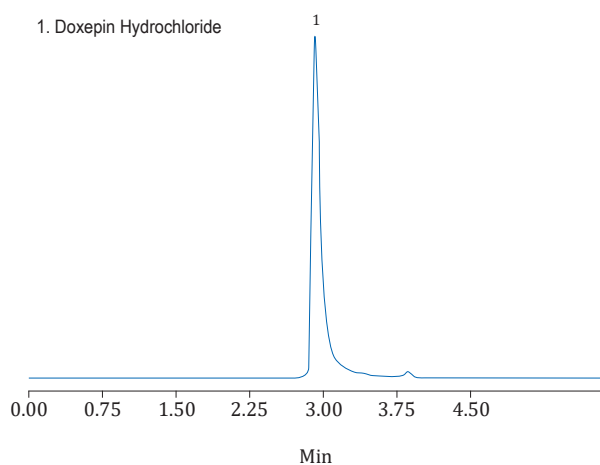


Column: C18-WP 4.6 × 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: acetonitrile / water (60/40)  
Flow rate: 1.0mL/min  
Detection: 30 nm  
Column temperature: 35 °C

# Chromatography

## Doxepin Hydrochloride

No.1209013

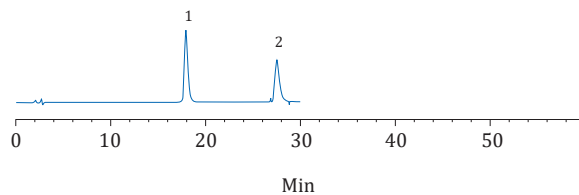


Column: C 18 - W P, 5um, 250mm x 4 .6mm  
(HCA050U046X25072A)  
Mobile phase: 0.1% triethylamine 0.2 mol / L sodium  
dihydrogen phosphate: methanol = 65:35 PH =  
2.5  
Flow rate: 1.0 mL/min  
Detection: 254 nm  
Column temperature: 50 °C

## Deoxyschizandrin schisandrin B

No.1209015

1. Deoxyschizandrin
2. Schisandrin B

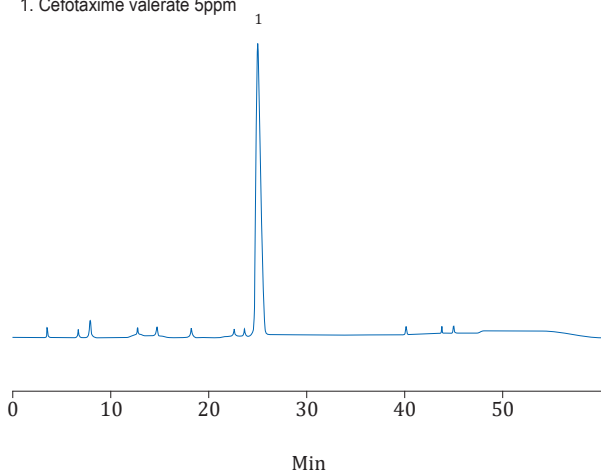


Column: C18-WP 4.6 \* 250mm, 5um  
(HCA050U046X25072A)  
Mobile phase: methanol / water (77/23)  
Flow rate: 1.0mL/min  
Detection: 254 nm  
Column temperature: 30 °C

## Cefotaxime valerate

No.1209014

1. Cefotaxime valerate 5ppm



Column: C18-WP 150mm x 4.6, 5 um  
(HCA050U046X15072A)  
Mobile phase: 

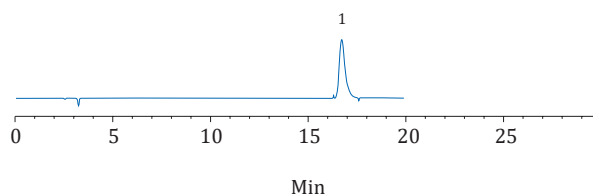
| T(min) | Sodium dihydrogen phosphate(pH = 6.25) | methanol |
|--------|----------------------------------------|----------|
| 0-7    | 86                                     | 14       |
| 7-9    | 86-82                                  | 14-18    |
| 9-16   | 82                                     | 18       |
| 16-45  | 82-60                                  | 18-40    |
| 45-50  | 60                                     | 40       |
| 50-55  | 60-86                                  | 40-14    |
| 55-60  | 86                                     | 14       |

  
Flow rate: 1.0 mL/min  
Detection: 235nm  
Column temperature: 30 °C

## Calcium pantothenate

No.1209016

1. Calcium pantothenate



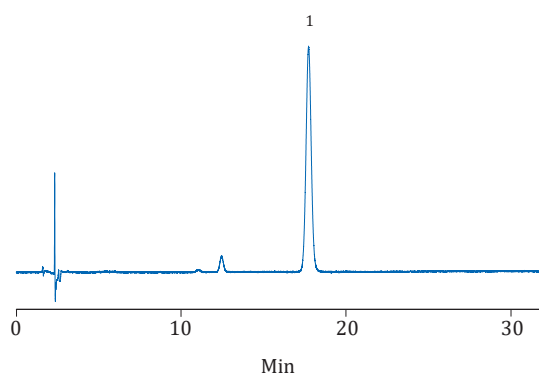
Column: C18-WP 4.6 \* 250mm, 5um  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / 20 mM potassium phosphate  
dibasic = 5/95  
Flow rate: 1.0mL/min  
Detection: 200 nm  
Column temperature: 30 °C

# Chromatography

## Cefotaxime Sodium

No.1209017

### 1. Cefuroxime Sodium

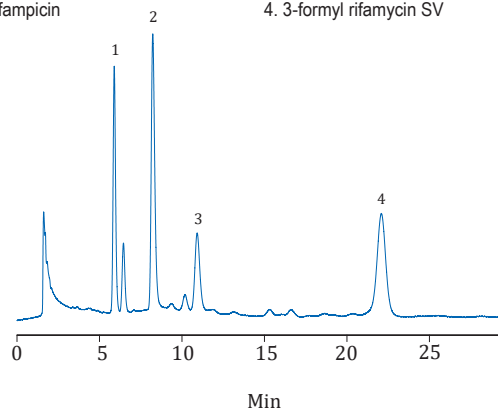


Column: C18 4.6 × 250mm, 5µm (HCA050U046X25071A)  
Mobile phase: sodium acetate - acetic acid buffer solution (pH3.4) / acetonitrile = 10/1  
Flow rate: 1.5mL/min  
Detection: 254 nm  
Column temperature: 25 °C

## Rifampicin and related substances

No.1209019

1. rifampicin quinone
2. rifampicin
3. N-oxidation of rifampicin
4. 3-formyl rifamycin SV

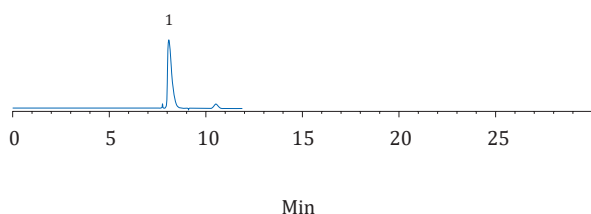


Column: C8 4.6 × 150mm, 5µm (HCA050U046X15075A)  
Mobile phase: methanol / acetonitrile / 0.075mM potassium dihydrogen phosphate / 1M citric acid (30/30/36/4)  
Flow rate: 1.0mL/min  
Detection: 254 nm  
Column temperature: 25 °C

## Taurine

No.1209018

### 1. taurine

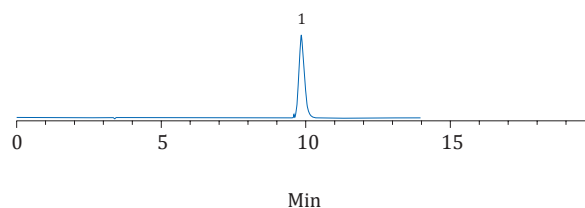


Column: C18-WP 4.6 \* 250mm, 5µm (HCA050U046X25072A)  
Mobile phase: methanol / 50mM sodium acetate (37/63)  
Flow rate: 1.0 mL/min  
Detection: 360 nm  
Column temperature: 30 °C

## Melatonin

No.1209020

### 1. melatonin



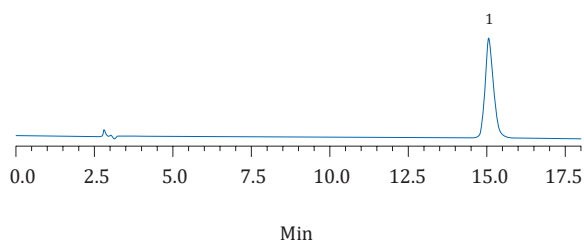
Column: C18-WP 4.6 \* 250mm, 5µm (HCA050U046X25072A)  
Mobile phase: methanol / water +50 mM TFA (45/55)  
Flow rate: 1mL/min  
Detection: 222 nm  
Column temperature: 30 °C

# Chromatography

Day ephedra

No.1209021

1. day ephedra

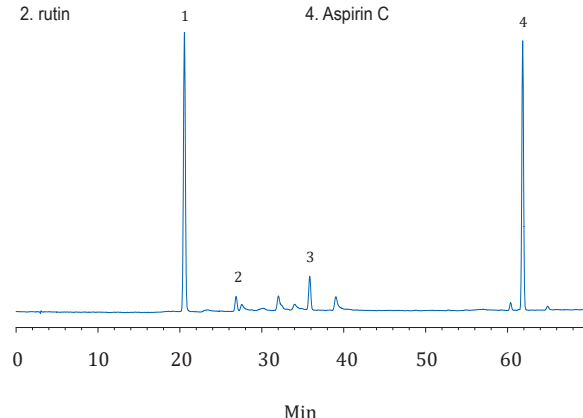


Column: C18-WP 4.6 \* 250mm, 5um  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / water / 0.1% phosphoric acid  
(1/2/97)  
Flow rate: 1.0 mL/min  
Detection: 222 nm  
Column temperature: 25 °C

Aspirin C in propolis

No.1209023

1. p-coumaric acid  
2. rutin  
3. cinnamic acid  
4. Aspirin C

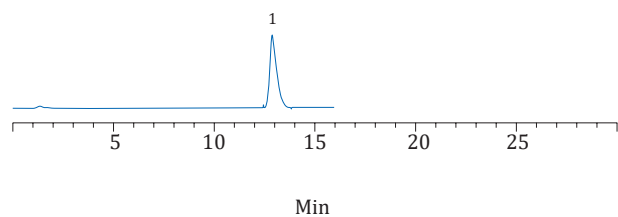


Column: C18-WP 4.6 \* 250mm, 5um  
(HCA050U046X25072A)  
Mobile phase: A: methanol B: water (formic acid adjusted  
PH = 2.7)  
0min 70min 75min  
20%A 95%A 80%A  
Flow rate: 1mL/min  
Detection: 310 nm  
Column temperature: 40 °C

Berberine

No.1209022

1. berberine

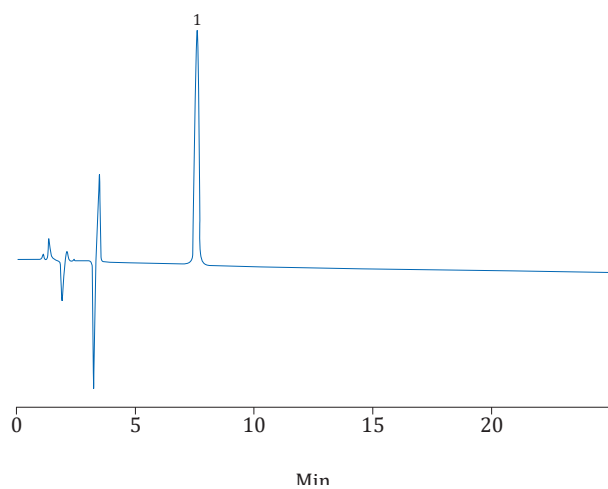


Column: C18-WP 4.6 \* 250mm, 5um  
(HCA050U046X25072A)  
Mobile phase: 12.5mM sodium dodecyl / 12.5mM potassium  
dihydrogen phosphate / acetonitrile [25/25/50]  
Flow rate: 1.0mL/min  
Detection: 345 nm  
Column temperature: 25 °C

Nicotinamide

No.1209024

1. Nicotinamide



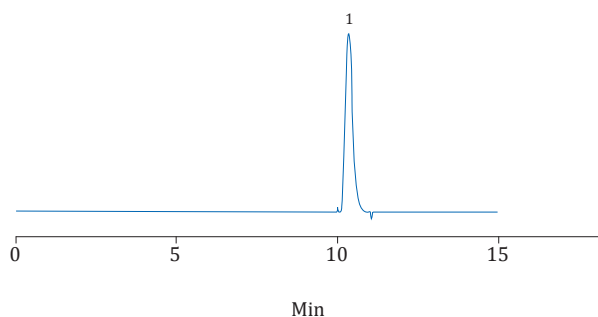
Column: C 18-WP, 5 µm, 150 mm × 4.6 mm,  
(HCA050U046X15072A)  
Mobile phase: methanol 70 mL, isopropanol, 20 mL,  
heptane sulfonate 1 g, was dissolved with  
910 mL of water and after mixing using  
perchloric acid to adjust to pH 2.1 ±0.1,  
filtered through 0.45 µm membrane  
Flow rate: 1.0mL/min  
Detection: 261 nm  
Column temperature: 25 °C

# Chromatography

VitB6

No.1209025

1. VitB6

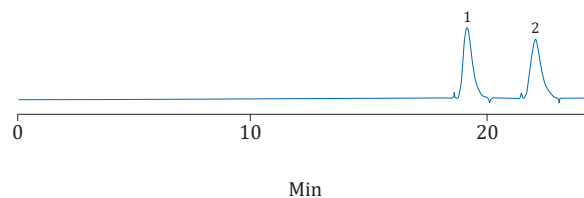


Column: C18-WP 4.6 \* 250mm, 5um (HCA050U046X25072A)  
Mobile phase: methanol / 0.04% pentane sulfonate (use acetic acid to adjust pH3.0) = 15/85  
Flow rate: 1mL/min  
Detection: 291nm  
Column temperature: 30 °C

Psoralen

No.1209027

1. psoralen  
1. isopsoralen

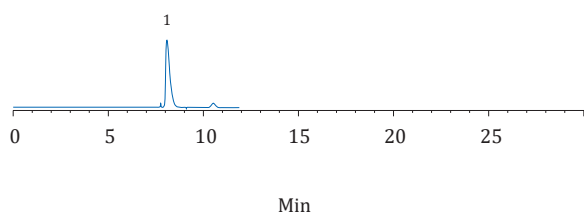


Column: C18-WP 4.6 \* 250mm, 5um (HCA050U046X25072A)  
Mobile phase: methanol / water = 40/60  
Flow rate: 1mL/min  
Detection: 246 nm  
Column temperature: 30 °C

Coenzyme Q

No.1209026

1. taurine

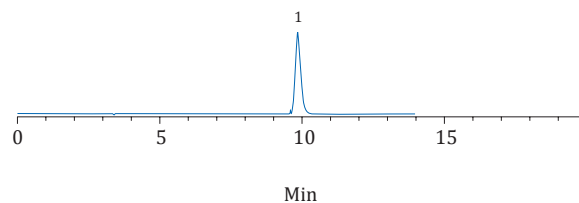


Column: C18-WP 4.6 \* 250mm, 5um (HCA050U046X25072A)  
Mobile phase: methanol / ethanol = 50/50  
Flow rate: 1mL/min  
Detection: 275nm  
Column temperature: 30 °C

Loganin

No.1209028

1. melatonin



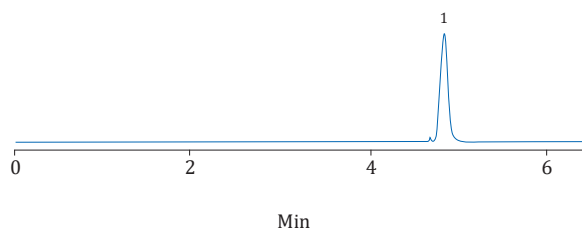
Column: C18-WP 4.6 \* 250mm, 5um (HCA050U046X25072A)  
Mobile phase: methanol / acetonitrile / 0.1% phosphoric acid = 5/9/86  
Flow rate: 1mL/min  
Detection: 236 nm  
Column temperature: 30°C

# Chromatography

Paeonol

No.1209029

1. Paeonol

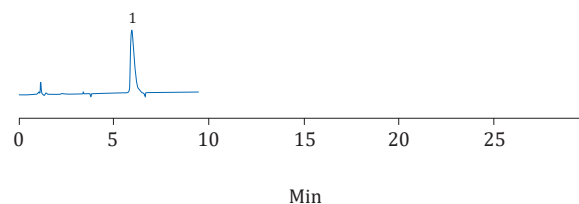


Column: C18-WP 4.6 \* 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: methanol / water = 70/30  
Flow rate: 1.0 mL/min  
Detection: 274 nm  
Column temperature: 30 °C

Clarithromycin

No.1209031

1. Clarithromycin

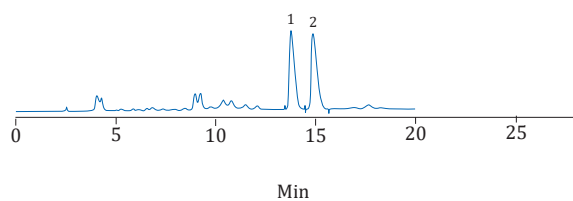


Column: C18-WP 4.6 \* 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / phosphate buffer (pH5.5) = 40/60  
Flow rate: 1.0 mL/min  
Detection: 210 nm  
Column temperature: 30 °C

Cefixime

No.1209030

1. E isomer  
2. cefixime

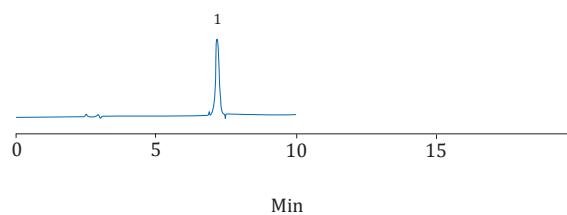


Column: C18-WP 4.6 \* 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: tetrabutylammonium hydroxide (pH7.0) /  
acetonitrile = 72:28  
Flow rate: 1.0mL/min  
Detection: 254 nm  
Column temperature: 30 °C

Paeoniflorin

No.1209032

1. Paeoniflorin



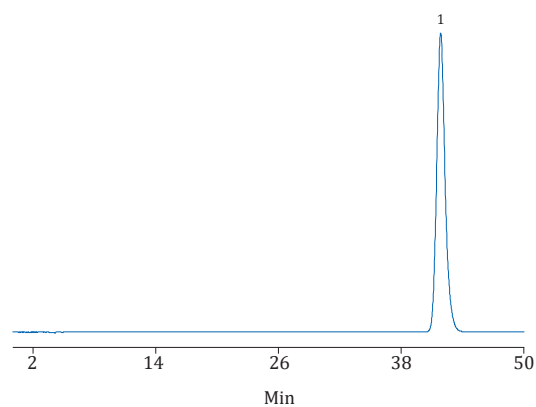
Column: C18-WP 4.6 \* 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / 0.04% phosphoric acid = 15/85  
Flow rate: 1.0mL/min  
Detection: 230nm  
Column temperature: 30 °C

# Chromatography

## Carbamazepine

No.1209033

### 1. Carbamazepine

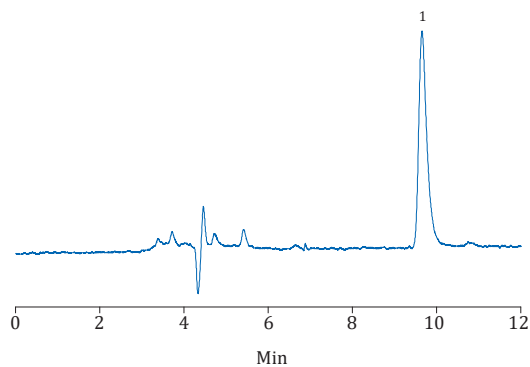


Column: CN 4.6 × 250mm, 5µm (HCA050U046X25033A)  
Mobile phase: methanol / water / trifluoroacetic acid (12/85/3)  
Flow rate: 1.0mL/min  
Detection: 230nm  
Column temperature: 25 °C

## Domiphen bromide

No.1209035

### 1. Domiphen bromide

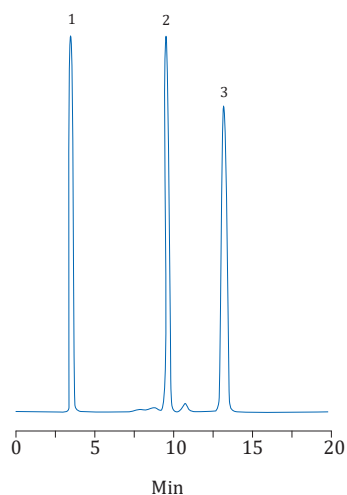


Column: SCX 4.6 × 250mm, 5µm (HCA050U046X25033A)  
Mobile phase: methanol / 50mM ammonium acetate (80/20)  
Flow rate: 0.7mL/min  
Detection: 274 nm  
Column temperature: 25 °C

## Acetylacetone

No.1209034

1. Acetylacetone
2. 1-Nitronaphthalene
3. Naphthalene

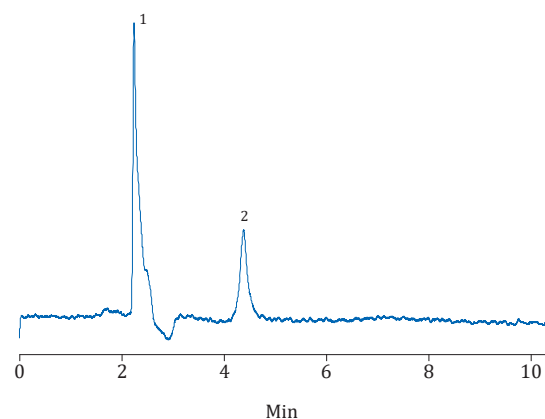


Column: C18 4.6 × 150mm, 5µm (HCA050U046X15071A)  
Mobile phase: 30mM Na<sub>3</sub>PO<sub>4</sub> buffer (Use H<sub>3</sub>PO<sub>4</sub> to adjust pH2.5)  
Flow rate: 1.0mL/min  
Detection: 254nm  
Column temperature: 40 °C

## Methotrexate

No.1209036

1. Methanol
2. Methotrexate



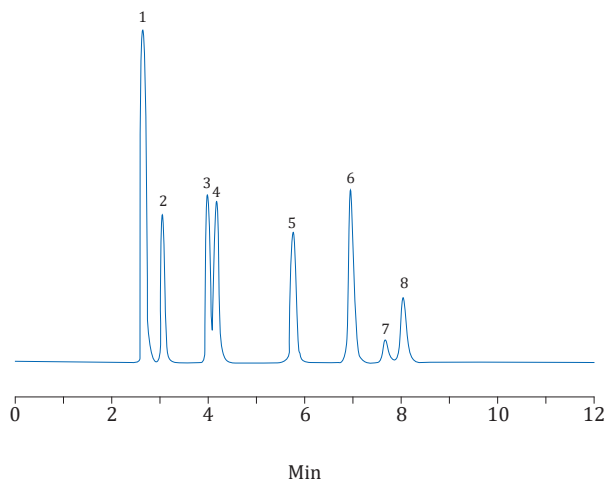
Column: HILIC 4.6 × 150mm, 5µm (HCA050U046X15031A)  
Mobile phase: acetonitrile / 10mM ammonium acetate (90/10)  
Flow rate: 1.0mL/min  
Detection: 306 nm  
Column temperature: 25 °C

## Application: Foods

### Water-soluble vitamins

No.1209037

- |                   |                         |
|-------------------|-------------------------|
| 1. Vitamin C      | 5. Pyridoxal            |
| 2. Vitamin B13    | 6. Pyridoxine           |
| 3. Nicotinic acid | 7. Calcium pantothenate |
| 4. Nicotinamide   | 8. Thiamin              |

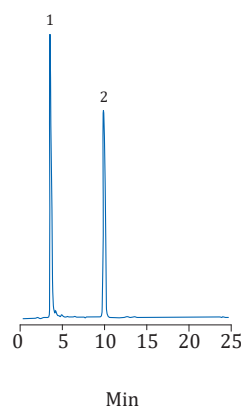


Column: C18-WP 4.6 × 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / 20mM H3PO4 +5 mM pentane sulfonate buffer [8/92]  
Flow rate: 1.0 mL/min  
Detection: 210 nm  
Column temperature: 40 °C

### Vitamin B

No.1209039

1. Thiamin HCl
2. Riboflavin

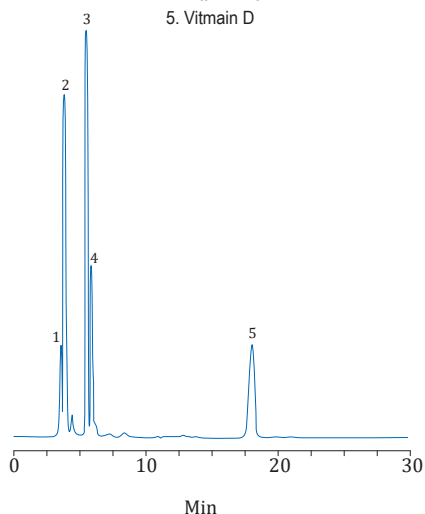


Column: C18 4.6 × 150mm, 5µm (HCA050U046X15071A)  
Mobile phase: acetonitrile / 10mM Na3PO4 buffer (adjust to pH 5.0) =15/85  
Flow rate: 1.0mL/min  
Detection: 254 nm  
Column temperature: 40 °C

### Fat-soluble vitamins

No.1209038

- |                 |               |
|-----------------|---------------|
| 1. VA palmitate | 4. Vitamin K3 |
| 2. Vitamin K1   | 5. Vitamin D  |
| 3. Vitamin E    |               |

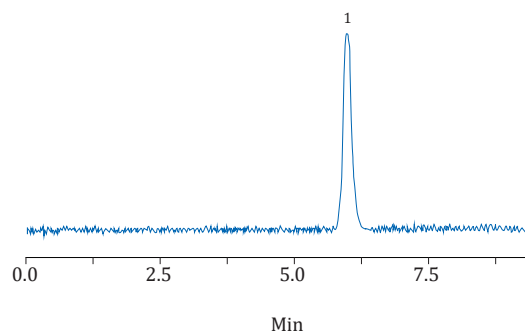


Column: Silica 4.6 × 150mm, 5µm (HCA050U046X15076A)  
Mobile phase: hexane / chloroform [60/40]  
Flow rate: 1.0 mL/min  
Detection: 254 nm  
Column temperature: 25 °C

### Citrus red No. 2 in juice

No.1209040

1. Citrus red No. 2



Column: C18-WP 4.6 × 150mm, 5µm  
(HCA050U046X15072A)  
Mobile phase: acetonitrile / water [80/20]  
Flow rate: 1.0mL/min  
Detection: 500 nm  
Column temperature: 35 °C

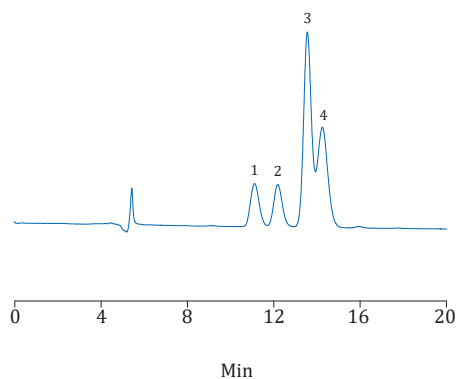
# Chromatography

## Carbohydrate -1

No.1209041

1. Glucose
2. L-xylose

3. Fructose
4. Lyxose



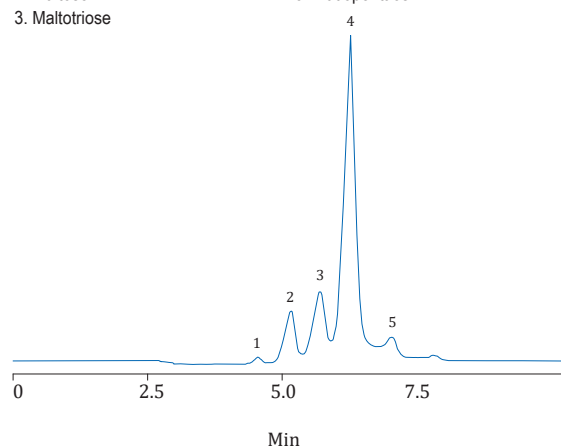
Column: Sep Ca-H 7.8 × 300mm, 5μm  
(HCA050U078X300C3A)  
Mobile phase: water  
Flow rate: 0.6mL/min  
Detection: 192nm  
Column temperature: 85 °C

## Carbohydrate -3

No.1209043

1. Glucose
2. Maltose
3. Maltotriose

4. Maltotetraose
5. Matlopentaos



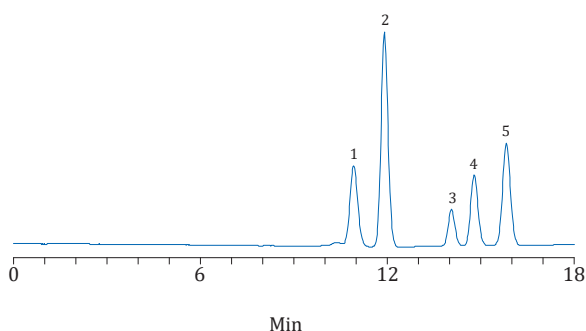
Column: NH<sub>2</sub> 4.6 × 150mm, 5μm (HCA050U046X15077A)  
Mobile phase: acetonitrile / water (50/50)  
Flow rate: 1.0mL/min  
Detection: RID  
Column temperature: 40 °C

## Carbohydrate -2

No.1209042

1. Maltotriose
2. Maltose
3. Glucose

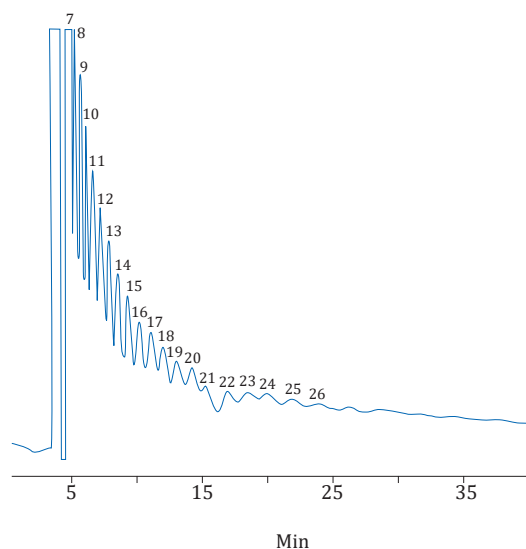
4. Mannose
5. Fructose



Column: Sep Ca-H 7.8 × 300mm, 5μm  
(HCA050U078X300C3A)  
Mobile phase: water  
Flow rate: 0.6 mL / min  
Detection: 192nm  
Column temperature: 85 °C

## Isomaltooligosaccharide

No.1209044

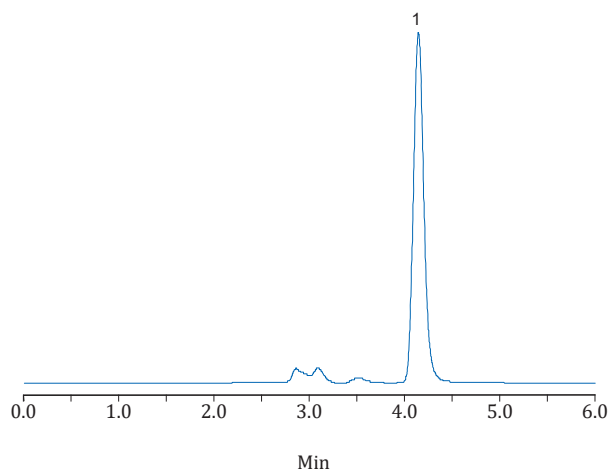


Column: C4 4.6 × 150mm, 5μm  
(HCA050U046X15079A)  
Mobile phase: methanol / water (2.5/97.5)  
Flow rate: 1.0mL/min  
Detection: RID  
Column temperature: 40 °C

# Chromatography

## Melamine No.1209045

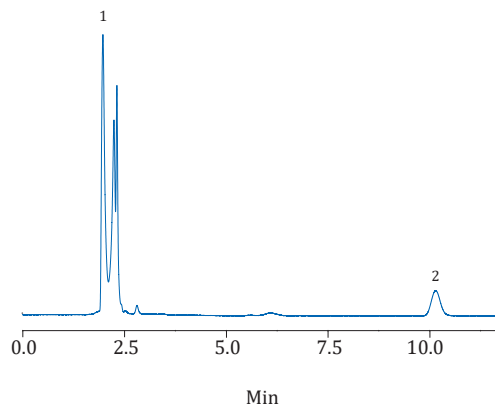
1. Melamine



Column: HILIC (3) 4.6 × 250mm, 5μm (HCA050U046X25027A)  
 Mobile phase: acetonitrile / 10mM ammonium acetate (90/10)  
 Flow rate: 1.0mL/min  
 Detection: 240nm  
 Column temperature: 25°C

## Melamine in raw milk (according to GB / T 22400-2008) No.1209047

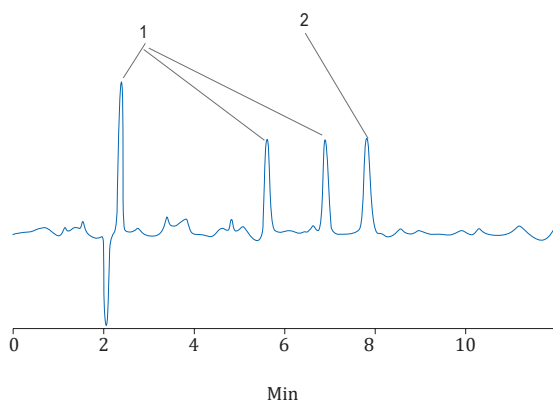
1. Impurity  
 2. Melamine



Column: sil SCX 4.6 × 250mm, 5μm (HCA050U046X25045A)  
 Mobile phase: acetonitrile / 50mM KH<sub>2</sub>PO<sub>4</sub> buffer (pH 3.0) (30/70)  
 Flow rate: 1.5mL/min  
 Detection: 240nm  
 Column temperature: 25°C

## Melamine in Milk Powder No.1209046

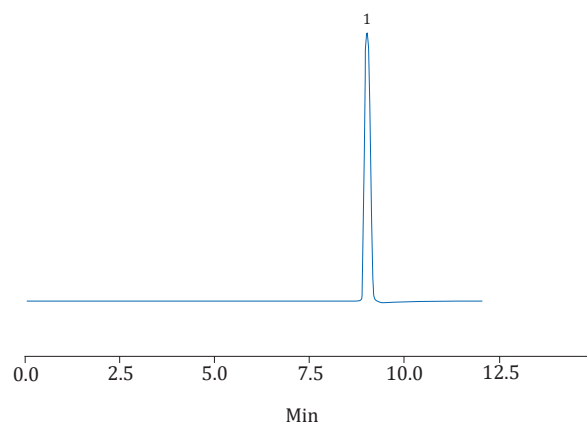
1. Milk impurities  
 2. Melamine



Column: C18-WP 4.6 × 150mm, 5μm (HCA050U046X15072A)  
 Mobile phase: 10mM citrate buffer +10 mM sodium hexane solution / acetonitrile (90/10)  
 Flow rate: 1.0 mL / min  
 Detection: 240nm  
 Column temperature: 40°C

## Furosine No.1209048

1. Furosine

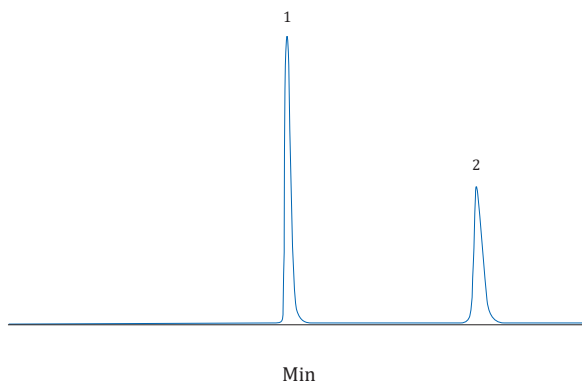


Column: C18-WP 4.6 \* 250mm, 5um (HCA050U046X25072A)  
 Mobile phase: A = 0.1% TFA aqueous solution; B = 0.1% TFA acetonitrile  
 Gradient: 0min: 1%B, 25min: 21%B  
 Flow rate: 1mL/min  
 Detection: 280nm  
 Column temperature: room temperature

## Vanillin and ethyl vanillin

No.1209049

1. Vanillin
2. Ethyl vanillin

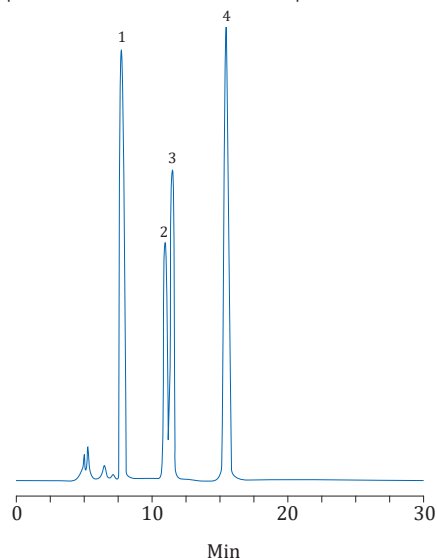


Column: C18-WP 4.6 \* 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / 0.02M sodium dihydrogen  
phosphate (PH4.0) = 30/70  
Flow rate: 1.0mL/min  
Detection: 276nm  
Column temperature: 30 °C

## Tocopherol isomers

No.1209051

1. α-Tocopherol
2. β-Tocopherol
3. γ-Tocopherol
4. δ-Tocopherol

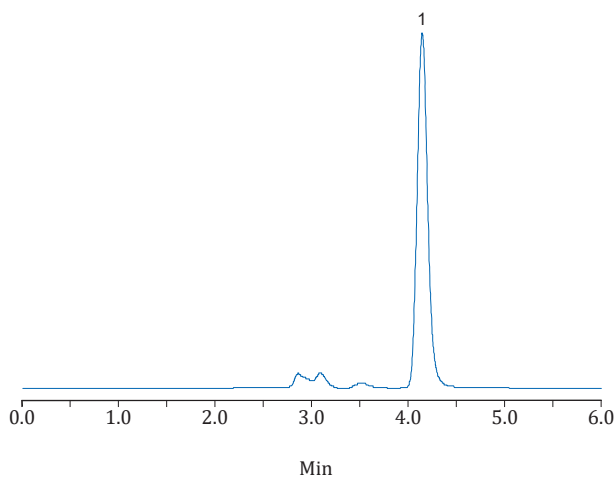


Column: Silica 4.6 × 150mm, 5µm (HCA050U046X15076A)  
Mobile phase: hexane / ethanol (99/1)  
Flow rate: 0.7mL/min  
Detection: 280nm  
Column temperature: 40 °C

## Tocopherol isomers

No.1209050

1. Tocopherol isomers

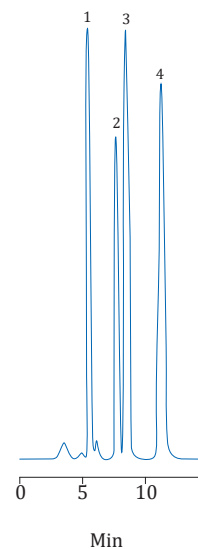


Column: HILIC [3] 4.6 × 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile / 10mM ammonium acetate (90/10)  
Flow rate: 1.0 mL / min  
Detection: 240nm  
Column temperature: 25 °C

## Tocopherol

No.1209052

1. α-Tocopherol
2. β-Tocopherol
3. γ-Tocopherol
4. δ-Tocopherol



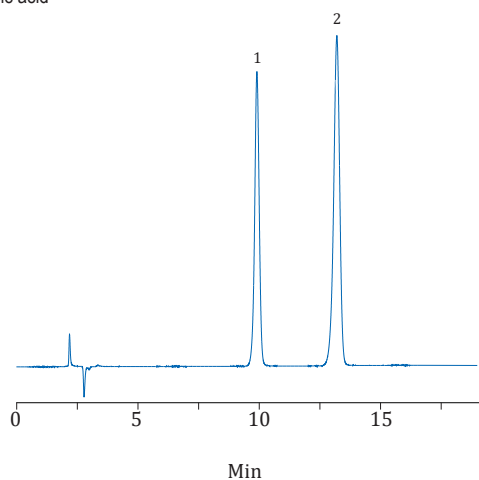
Column: NH<sub>2</sub> 4.6 × 150mm, 5µm (HCA050U046X15076A)  
Mobile phase: hexane / ethyl acetate (70/30)  
Flow rate: 1.0mL/min  
Detection: 295nm  
Column temperature: 40 °C

# Chromatography

## Benzoic acid, sorbic acid

No.1209053

1. Benzoic Acid
2. Sorbic acid

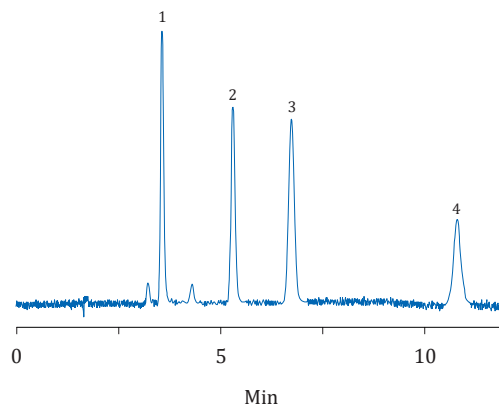


Column: C18-WP 250mm \* 4.6,5  $\mu$ m  
(HCA050U046X25072A)  
Mobile phase: 20mM ammonium acetate / methanol (90/10)  
Flow rate: 1.0mL/min  
Detection: 230nm  
Column temperature: 25°C

## Sudan in chili sauce

No.1209055

1. Sudan I
2. Sudan II
3. Sudan III
4. Sudan IV

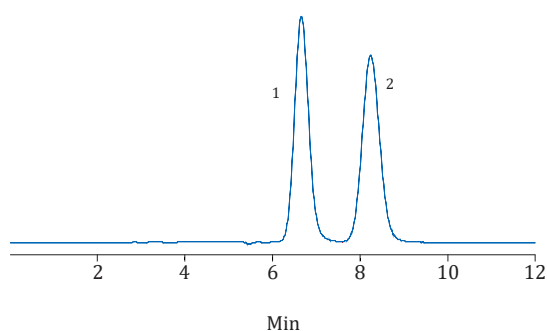


Column: C18-WP 4.6  $\times$  150mm, 5 $\mu$ m  
(HCA050U046X15072A)  
Mobile phase: acetonitrile / water (95/5)  
Flow rate: 1.0mL/min  
Detection: 500nm  
Column temperature: 35°C

## Sorbitol and mannitol

No.1209054

1. Mannitol
2. Sorbitol

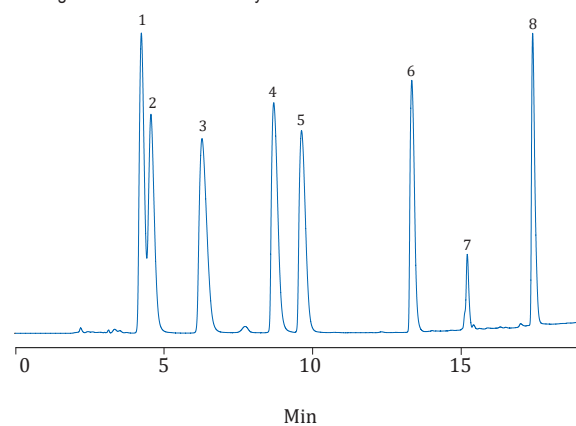


Column: Sep Ca-M 4.6  $\times$  250mm, 10 $\mu$ m  
(HCA100U046X250C4A)  
Mobile phase: water  
Flow rate: 0.5 mL/min  
Detection: RID  
Column temperature: 80°C

## Synthetic colorants

No.1209056

1. New Red
2. Tartrazine
3. Amaranth
4. Indigotine
5. Ponceau 4RC
6. Sunset Yellow
7. Brilliant Blue FCF
8. Erythrosin B disodium salt



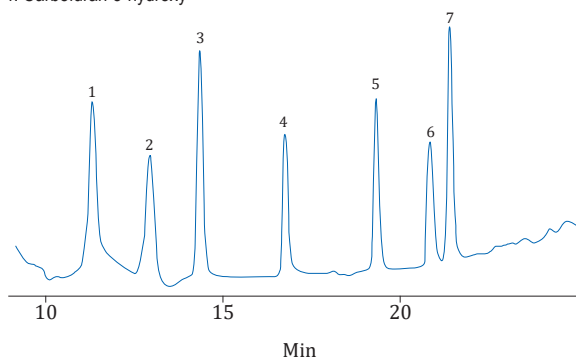
Column: C18-WP 4.6  $\times$  250mm, 5 $\mu$ m  
(HCA050U046X25072A)  
Mobile phase: A: methanol; B: 20mM ammonium acetate (pH 4.0) 0min B: 80%; 5min B: 65%; 12min B: 2%  
Flow rate: 1.0mL/min  
Detection: 254nm  
Column temperature: 25°C

## Application:Pesticide

### Carbamate pesticide in pepper

No.1209057

1. Aldicarb-sulfoxide
2. Aldicarb-sulfone
3. Methomyl
4. Carbofuran-3-hydroxy
5. Aldicarb
6. Carbofuran
7. Carbaryl



Column: C18-WP 4.6 × 250mm, 5μm (HCA050U046X25072A)  
 Mobile phase: 

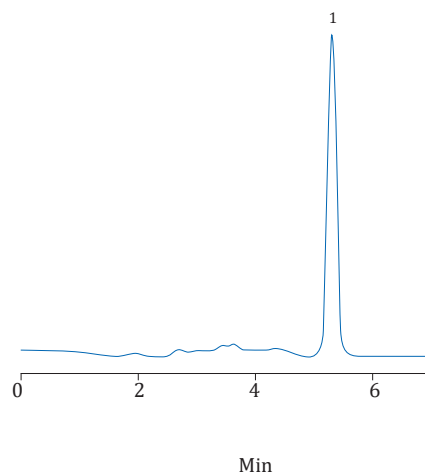
| t(min) | % water | % methanol | Flow rate (mL / min) |
|--------|---------|------------|----------------------|
| 0      | 85      | 15         | 0.5                  |
| 2      | 75      | 25         | 0.5                  |
| 8      | 75      | 25         | 0.5                  |
| 9      | 60      | 40         | 0.8                  |
| 10     | 55      | 45         | 0.8                  |
| 19     | 20      | 80         | 0.8                  |
| 25     | 20      | 80         | 0.8                  |
| 26     | 85      | 15         | 0.5                  |

  
 Detection: Fluorescence detector, λ<sub>ex</sub> 330nm, λ<sub>em</sub> 465nm  
 Column: 50mM NaOH solution and OPA reagent, flow rate 0.3mL/min;  
 Column temperature: 42 °C

### Glyphosate

No.1209059

1. Glyphosate

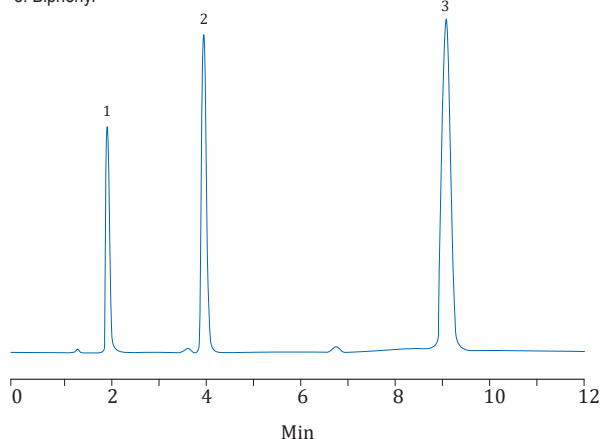


Column: SAX 4.6 × 150mm, 5μm (HCA050U046X15021A)  
 Mobile phase: methanol / 10mM KH<sub>2</sub>PO<sub>4</sub> (pH 2.0) (15/85)  
 Flow rate: 1.0mL/min  
 Detection: 195 nm  
 Column temperature: 25 °C

### Fungicides

No.1209058

1. Ithabendazole
2. o-Phenylphenol
3. Biphenyl

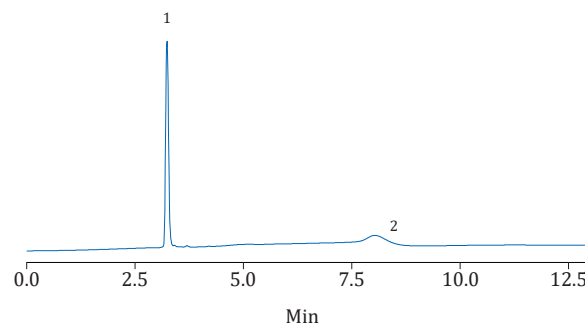


Column: C18-WP 4.6 × 150mm, 5μm (HCA050U046X15072A)  
 Mobile phase: acetonitrile / 30mM NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> buffer (65/35)  
 Flow rate: 1.0 mL/min  
 Detection: 254 nm  
 Column temperature: 40 °C

### Clethodim

No.1209060

1. Clethodim
2. Impurity



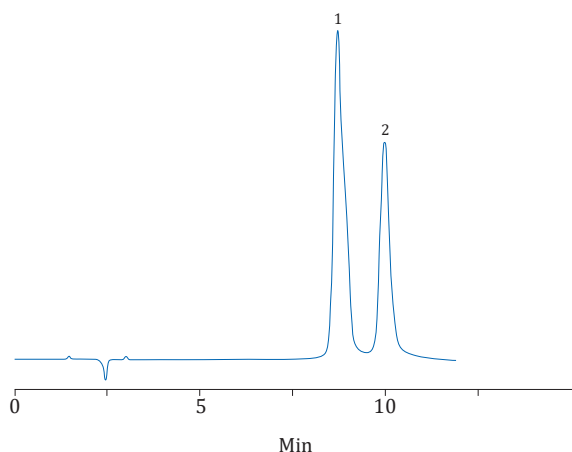
Column: Silica 4.6 \* 250mm 5um (HCA050U046X25076A)  
 Mobile phase: dichloromethane: cyclohexane (70:30, containing 0.5%acetic acid)  
 Flow rate: 1.0mL/min  
 Detection: 280nm  
 Column temperature: 25 °C

## Application: Veterinary drug residues

### Quinolones

No.1209061

1. Norfloxacin
2. Ciprofloxacin

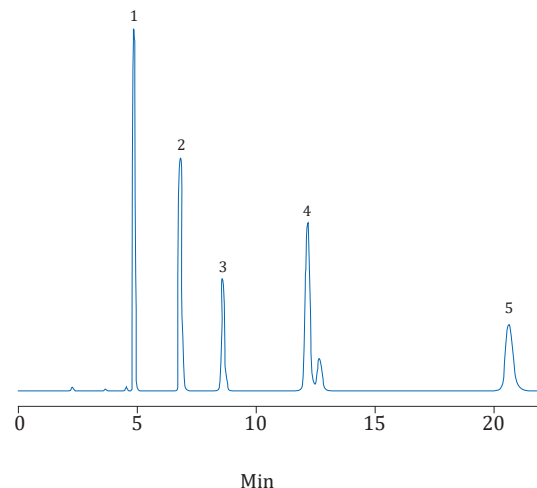


Column: C18-WP 4.6 × 150mm, 5µm (HCA050U046X15072A)  
 Mobile phase: 25mM phosphate buffer / acetonitrile (85/15)  
 Flow rate: 1.0mL/min  
 Detection: 254 nm  
 Column temperature: 25 °C

### Sulfa drugs in feed

No.1209063

1. Sulfadiazine
2. Sulfamethazine
3. Sulfamonomethoxine
4. Sulfamethoxazole
5. Sulfachinoxalin

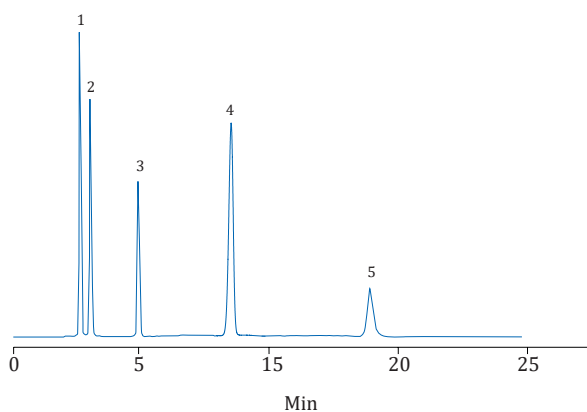


Column: C18-WP 4.6 × 150mm, 5µm (HCA050U046X15072A)  
 Mobile phase: acetonitrile / water / acetic acid (25/75/0.3)  
 Flow rate: 1.0mL/min  
 Detection: 270 nm  
 Column temperature: 25 °C

### Sulfa

No.1209062

1. Sulfanilamide
2. Sulfisomidine
3. Sulfadiazine
4. Sulfamethazine
5. Sulfamonomethoxine

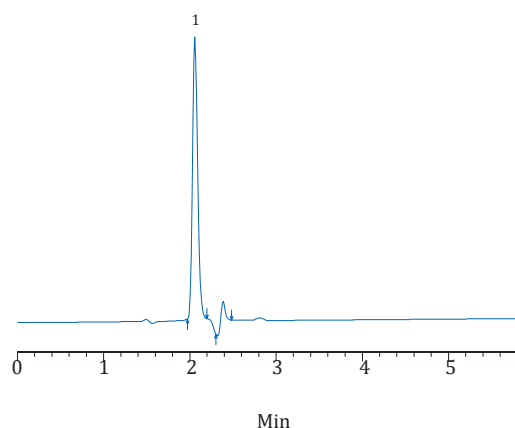


Column: C18-WP 4.6 × 150mm, 5µm (HCA050U046X15072A)  
 Mobile phase: acetonitrile / 10mM H3PO4 buffer (15/85)  
 Flow rate: 1.0 mL/min  
 Detection: 254 nm  
 Column temperature: 40 °C

### Clenbuterol

No.1209064

1. Clenbuterol



Column: C18-WP 250mm \* 4.6,5 µm (HCA050U046X25072A)  
 Mobile phase: water / acetonitrile (20/80)  
 Flow rate: 1.0mL/min  
 Detection: 240nm  
 Column temperature: 25 °C

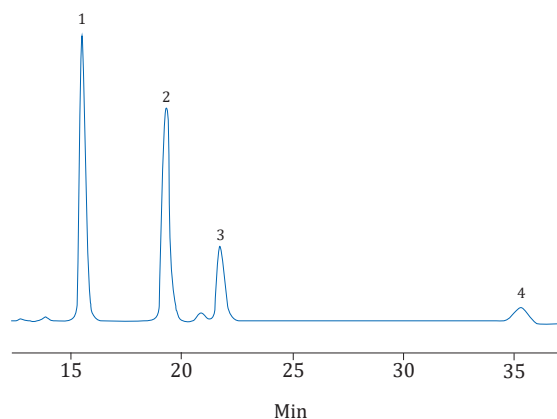
# Chromatography

## Fluoroquinolones

No.1209065

1. Ciprofloxacin
2. Danofloxacin

3. enrofloxacin
4. Sarafloxacin

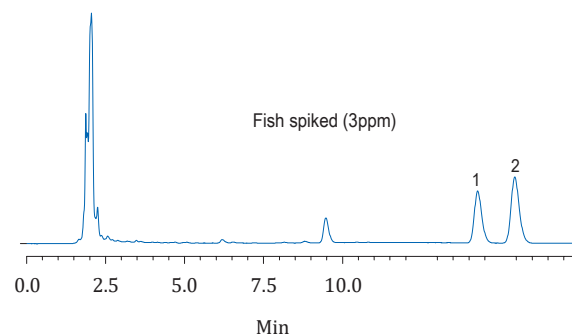


Column: C18-WP, 5µm, 4.6 \* 250mm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile +0.05 mol / L phosphoric acid /  
triethylamine (18 +82)  
Flow rate: 0.8mL/min  
Detection: 280nm  
Column temperature: 35°C

## Malachite green and crystal violet aquatic

No.1209067

1. malachite green
2. crystal violet



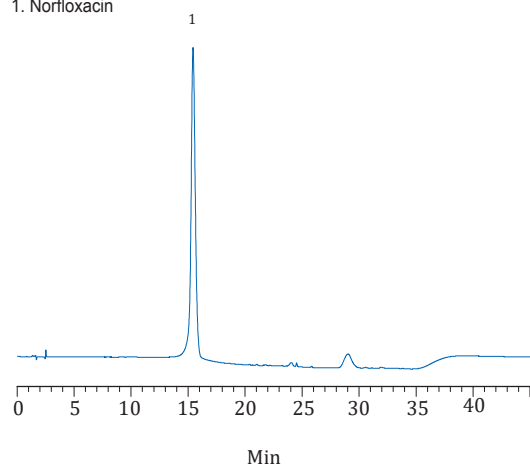
Column: C18-WP, 5µm, 4.6\*250mm  
(HCA050U046X25072A)  
Mobile phase: acetonitrile +0.125 mol / L ammonium acetate  
pH = 4.5 (80 +20)  
Flow rate: 1.3mL/min  
Detection: 265nm  
Column temperature: 35°C

## Application: Environment

## Norfloxacin

No.1209066

1. Norfloxacin

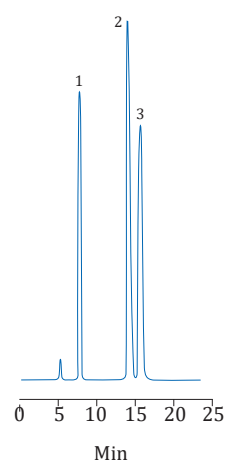


Column: C18-WP 150mm \* 4.6,5 µm  
(HCA050U046X15072A)  
Mobile phase: 0.025mol / L phosphoric acid solution  
(triethylamine adjusted to pH 3.0) / acetonitrile  
(87/13)  
Flow rate: 1.0 mL/min  
Detection: 278 nm  
Column temperature: 40°C

## Nitroaniline

No.1209068

1. o-nitroaniline
2. m-nitroaniline
3. p-nitroaniline



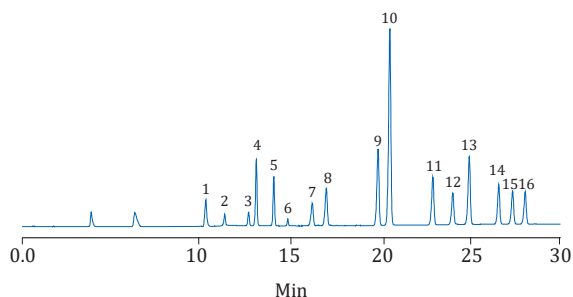
Column: Silica 4.6 × 150mm, 5µm (HCA050U046X15076A)  
Mobile phase: hexane / chloroform (40/60)  
Flow rate: 0.7 mL/min  
Detection: 254nm  
Column temperature: 25°C

# Chromatography

## Polycyclic aromatic hydrocarbons (PAHs)

No.1209069

- |                       |                            |
|-----------------------|----------------------------|
| 1. Naphthalene        | 10. Chrysene               |
| 2. Acenaphthylene     | 11. Benzo(b)fluoranthene   |
| 3. Acenaphthene       | 12. Benzo(k)fluoranthene   |
| 4. Fluorene           | 13. Benzo(a)pyrene         |
| 5. Phenanthrene       | 14. Dibenzo(a,h)anthracene |
| 6. Anthracene         | 15. Benzo(g,h,i)perylene   |
| 7. Fluoranthene       | 16. Indeno(1,2,3-cd)pyrene |
| 8. Pyrene             |                            |
| 9. Benzo(a)anthracene |                            |

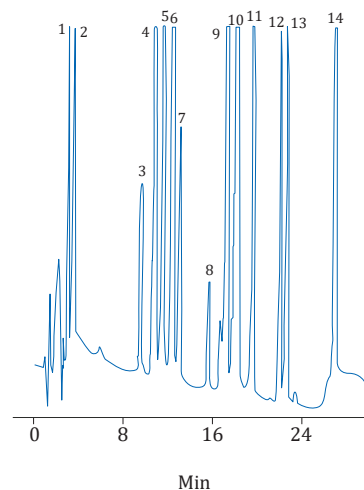


Column: PAHs 4.6 × 250mm, 5μm(HCA050U046X25051A)  
 Column Temperature: 30 °C  
 Mobile phase: gradient A: water B:acetonitrile  
 0min:40%B;25min 100%B;35min 100%B;45min 40%B  
 Flow rate: 2.0ml/min  
 Detection: 266nm  
 Inj volume: 5ul(10ppm)

## Watery nonvolatile pesticides

No.1209071

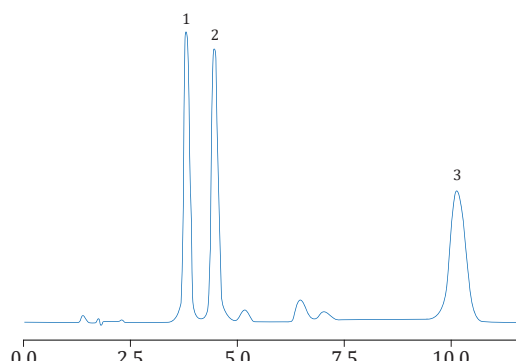
- |               |                 |
|---------------|-----------------|
| 1. Oxamyl     | 9. Atrazine     |
| 2. Methomyl   | 10. Carbaryl    |
| 3. Aldicarb   | 10. Fluometuron |
| 4. Simazine   | 11. Diuron      |
| 5. Monuron    | 12. Propachlor  |
| 6. Cyanazine  | 13. Propachlor  |
| 7. Metribuzin | 14. Linuron     |
| 8. Carbofuran |                 |



Column: C18-WP 4.6 × 250mm, 5μm (HCA050U046X25072A)  
 Mobile phase: A: water / acetonitrile (90/10); B: acetonitrile  
 0min B: 20%; 5min B: 20%; 30min B: 70%  
 Flow rate: 1.5 mL / min  
 Detection: 220nm  
 Column temperature: 25 °C

## Tetracyclines

1. Oxytetracycline
2. Tetracycline
3. Chlortetracycline

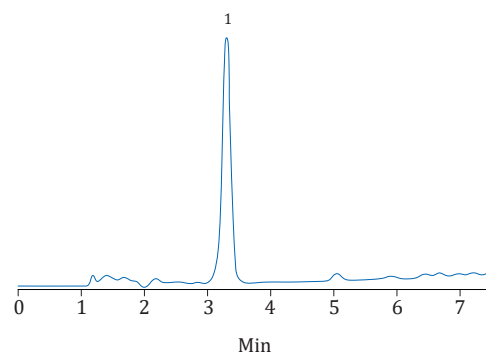


Column: C18-WP (4.6 × 250mm, 5μm (HCA050U046X25072A)  
 Mobile phase: acetonitrile / methanol / 10mM oxalic acid solution (15/15/70)  
 Flow rate: 1.0 mL/min  
 Detection: 355nm  
 Column temperature: 25 °C

## Bisphenol A

No.1209072

1. Bisphenol A



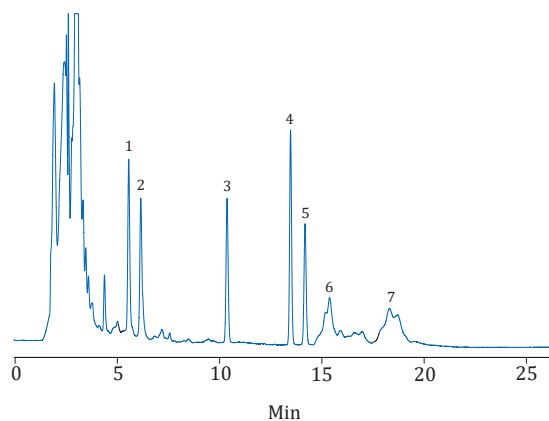
Column: C18-WP 4.6 × 150mm, 5μm (HCA050U046X15072A)  
 Mobile phase: A: Acetonitrile; B: Water  
 0min B: 40%; 7min B: 5%  
 Flow rate: 1.0mL/min  
 Detection: 216nm  
 Column temperature: 35 °C

## Application: Industrial parts

### Leather's phthalates

No.1209073

- |         |         |
|---------|---------|
| 1. BBP  | 5. DNOP |
| 2. DBP  | 6. DINP |
| 3. DNHP | 7. DIDP |
| 4. DEHP |         |



Column: C18-WP 4.6 × 250mm, 5µm (HCA050U046X25072A)  
 Mobile phase: 

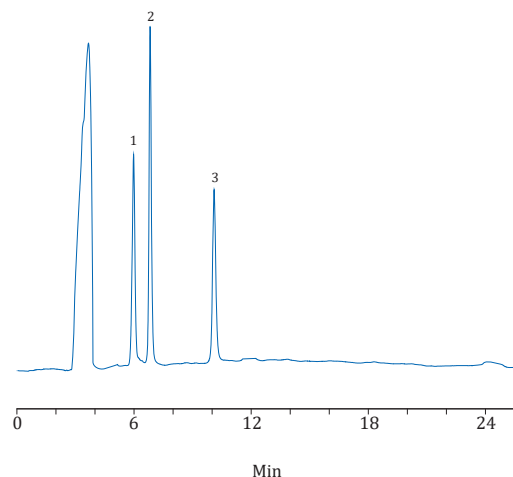
| t(min) | acetonitrile | water | flow rate(mL/min) |
|--------|--------------|-------|-------------------|
| 0      | 90           | 10    | 1                 |
| 6.5    | 100          | 0     | 1.5               |
| 7.5    | 100          | 0     | 1.5               |

  
 Flow rate: 1.0mL/min  
 Detection: 228 nm  
 Column temperature: 25 °C

### Phthalate monoester

No.1209075

1. MMP
2. MEP
3. MBP

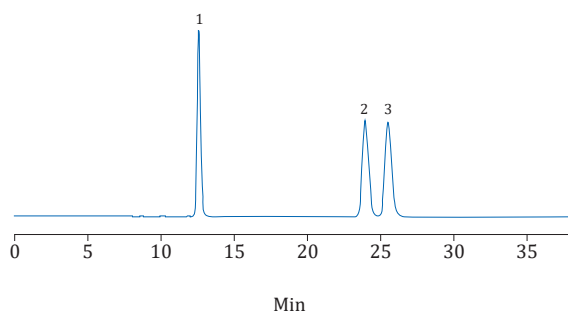


Column: Phenyl 4.6 × 150mm, 5µm (HCA050U046X15037A)  
 Mobile phase: acetonitrile / water / acetic acid (45/55/0.2)  
 Flow rate: 0.8 mL/min  
 Detection: 228 nm  
 Column temperature: 25 °C

### Parabens in cosmetics

No.1209074

1. Iso-propyl paraben
2. Iso-butyl paraben
3. Iso-butylparaben

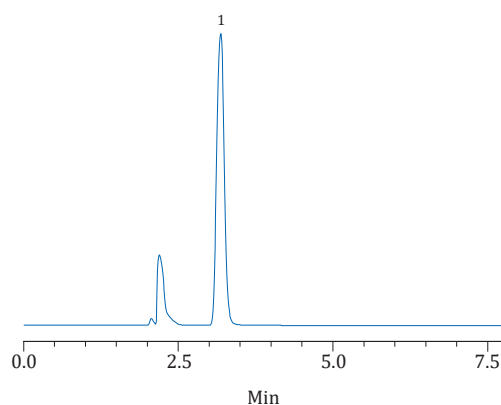


Column: C18 (HCA050U046X25071A)  
 Mobile phase: methanol / 20mM aqueous ammonium acetate = 58/42  
 Flow rate: 1.0 mL/min  
 Detection: 254 nm  
 Column temperature: room temperature

### Bromopyrene-C8

No.1209076

1. Bromopyrene



Column: C8 4.6 × 150mm, 5µm (HCA050U046X15075A)  
 Mobile phase: 100% methanol  
 Flow rate: 1.0mL/min  
 Detection: 254nm  
 Column temperature: 25 °C

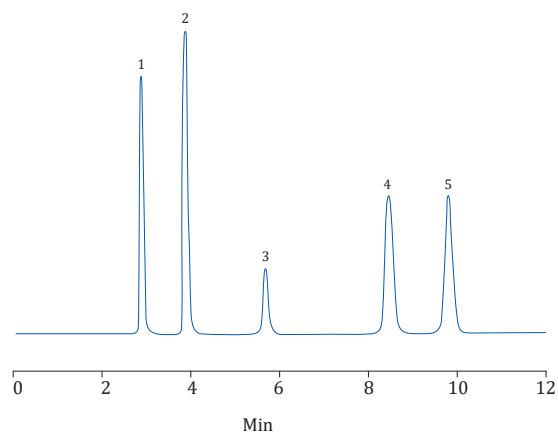
## Application: Biochemistry

### Nucleoside -1

No.1209077

1. Cytosine
2. Uracil
3. Cytidine

4. Uridine
5. Thymine



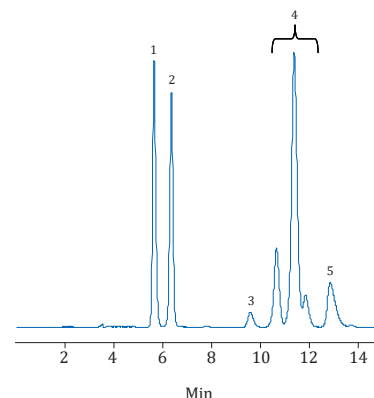
Column: C18-WP 4.6 × 250mm, 5µm  
(HCA050U046X25072A)  
Mobile phase: 100% water  
Flow rate: 1.0 mL / min  
Detection: 254 nm  
Column temperature: 40 °C

### Nucleoside

No.1209079

1. Uridine
2. Cytidine
3. Guanosin

4. Inosine and impurities
5. Adenosine



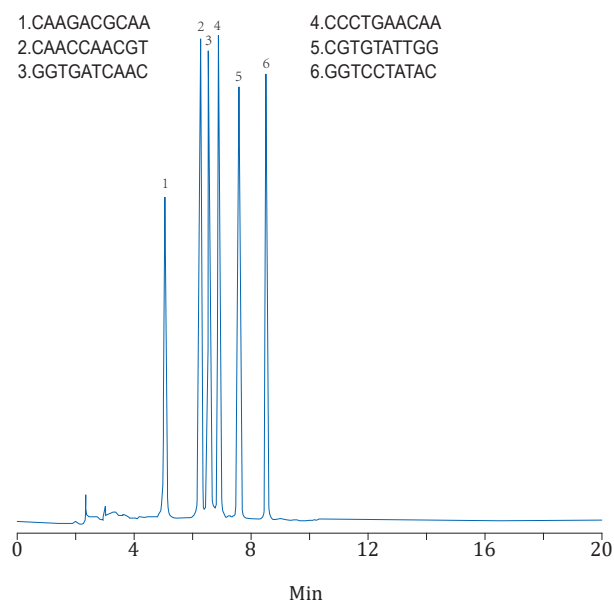
Column: SCX 4.6 × 150mm, 5µm (HCA050U046X15023A)  
Mobile phase: 50mM sodium phosphate buffer (pH 2.5)  
Flow rate: 0.5 mL/min  
Detection: 280 nm  
Column temperature: 25 °C

### Oligonucleotide

No.1209078

1. CAAGACGCAA
2. CAACCAACGT
3. GGTGATCAAC

4. CCCTGAACAA
5. CGTGTATTGG
6. GGTCTTATAC



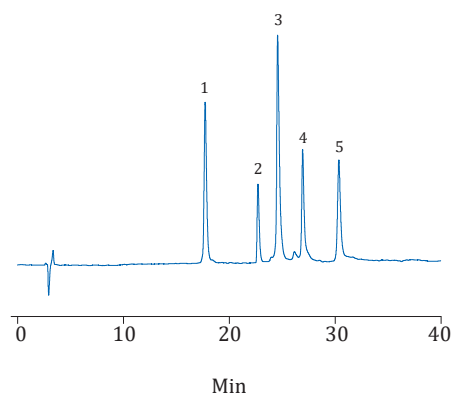
Column: C18-BIO 4.6 × 150mm, 5µm  
(HCA050U046X15078A)  
Mobile phase: A: 50mM NaH<sub>2</sub>PO<sub>4</sub> buffer solution (pH 7.0); B: Acetonitrile 0min B: 5%; 20min B: 15%  
Flow rate: 1.0 mL/min  
Detection: 260nm  
Column temperature: 25 °C

### Protein separation

No.1209081

1. Ribonuclease B
2. Insulin
3. Cytochrome C

4. Lysozyme
5. BSA

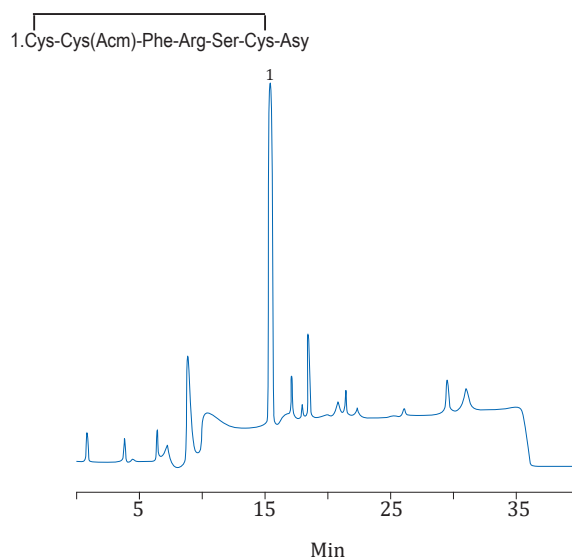


Column: Sep RP3 4.6 × 150mm, 5µm (HCA050U046X150A3A)  
Mobile phase: A: 0.1% TFA aqueous solution  
B: 0.1% TFA in acetonitrile  
0min 5min 45min 20%B  
20%B 60%B  
Flow rate: 1.0 mL / min  
Detection: 214nm  
Column temperature: 40 °C

# Chromatography

## Synthetic peptide

No.1209083

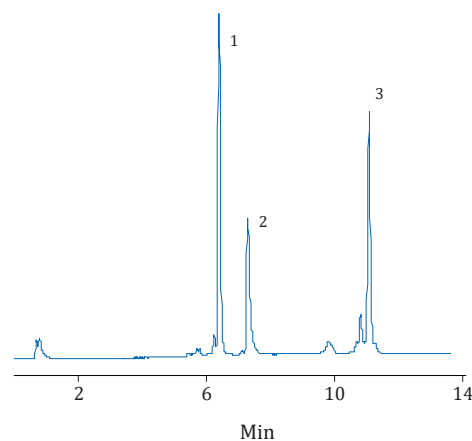


Column: C18 4.6 × 150mm, 5μm (HCA050U046X15071A)  
 Mobile phase: A: 10mM TFA; B: 10mM +60% acetonitrile  
 0min to 30min proportion of mobile phase B  
 gradient from 0% to 100%  
 Flow rate: 1.0 mL / min  
 Detection: 214nm  
 Column temperature: 25°C

## Protein sample

No.1209084

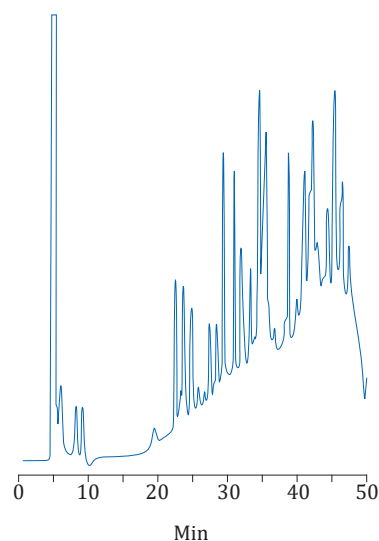
1. Cytochrome
2. Ribonuclease A
3. Lysozyme



Column: Sep SAX 4.6 × 50mm, 3μm (HCA030U046X050G1A)  
 Mobile phase: A: 10 mM phosphate buffer (pH 6.0); B: A + 1.0 M NaCl 0-15min, B: 0% -70%  
 Flow rate: 0.5mL/min  
 Detection: 280nm  
 Column temperature: 25°C

## Hydrolysis of bovine serum albumin

No.1209082



Column: C4 4.6 × 250mm, 5μm (HCA050U046X25079A)  
 Mobile phase: A: 0.09%TFA; B: 0.085% TFA +80% acetonitrile  
 0min B 5%; 5min B 5%; 35min B 50%; 45min B 100%  
 Flow rate: 1.0 mL/min  
 Detection: 214nm  
 Column temperature: 25°C

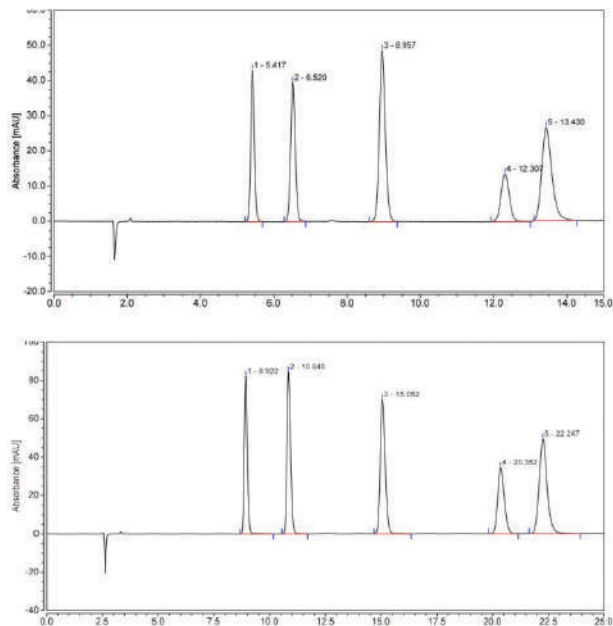
## Specialized Chromatography Columns

### Preservative Analysis Chromatography Column

[GB 5009.28-2016 National Food Safety Standard  
Determination of Benzoic Acid, Sorbic Acid, and Sodium  
Saccharin in Foods]

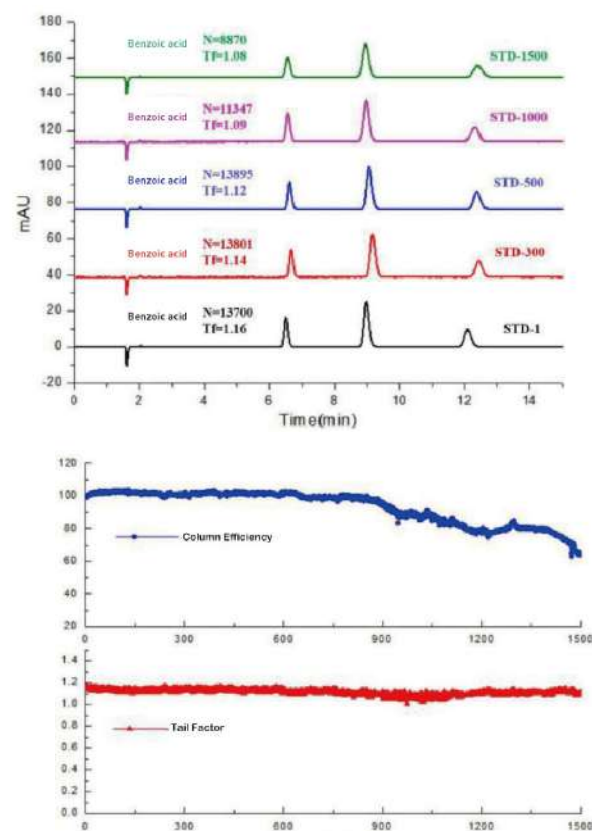
[GB 5009.121-2016 National Food Safety Standard  
Determination of Dehydroacetic Acid in Foods]

BST-C18 is a newly developed chromatography column by , specifically designed for the detection of preservatives. It employs a polar small molecule end-capping technique to reduce the bonding density of C18, which enhances the hydrophilicity of the filler material and aims to slow down the rate of contamination in the chromatography column. This design extends the column's service life and improves its durability for preservative detection applications. Even after consecutive injections of over a thousand samples, the column still maintains outstanding peak shape and resolution.

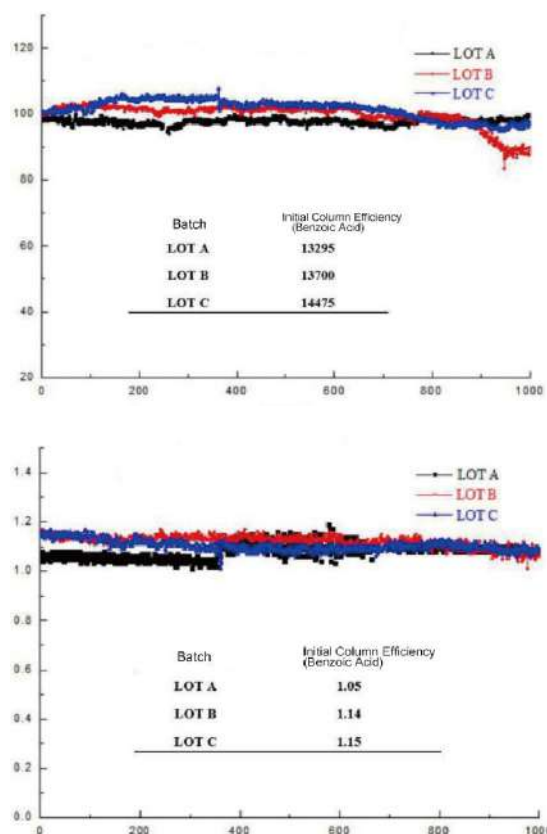


Column: BST-C18, 4.6 mm x 150 mm, 5 $\mu$ m BST-C18, 4.6 mm x 250 mm, 5 $\mu$ m  
Mobile phase: Methanol: 20 mM Ammonium Acetate (5:95)  
Flow rate: 1.0 mL / min  
Detection: 230 nm  
Column temperature: 35°C

### 1.BST-C18 Batch Stability Test Initial Column



### 2. BST-C18 Batch Stability Test Initial Column



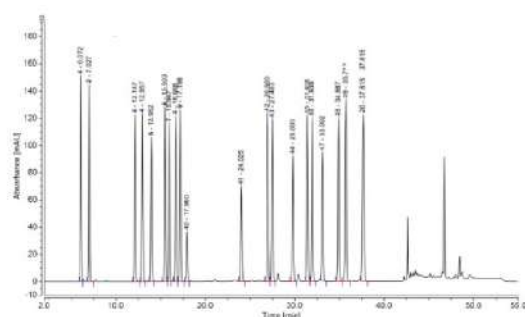
# Chromatography

## Ordering information

| Packings                                                   | Product Code       | Particle size | diameter ×length |
|------------------------------------------------------------|--------------------|---------------|------------------|
| BST-C18(III) HPLC                                          | HCA050U046X15092A  | 5μm           | 4.6×150mm        |
| BST-C18(III) HPLC                                          | HCA050U046X25092A  | 5μm           | 4.6×250mm        |
| BST-C18(III) Guard Cartridges                              | HCA050U040X02092A  | 5μm           | 4.0 * 20 mm      |
| BST-C18(III) Guard Cartridge Kit, 1 Holder and 1 Cartridge | HCA050U040X02092KA | 5μm           | 4.0 * 20 mm      |

## AAA HPLC Column

The Amino Acid Analysis Column is a chromatography column developed by , specifically designed for the detection of amino acids. Its accompanying method package utilizes the pre-column derivation method with phenylisothiocyanate (PITC), offering the following advantages: (1) PITC has good stability, can be stored for half a year at 2-8°C, and avoids the hassle of frequent replacement or preparation due to the expiration of the derivative reagent; (2) the mobile phase pH is 6.5 (±0.05), which is conducive to extending the life of the chromatography column and reducing costs. The AAA Method Package can be widely applied to the detection of amino acids in biological fermentation broth, feed, amino acid injections, food, and beverages.



# New Mobile Phase Filter

## New Mobile Phase Filter

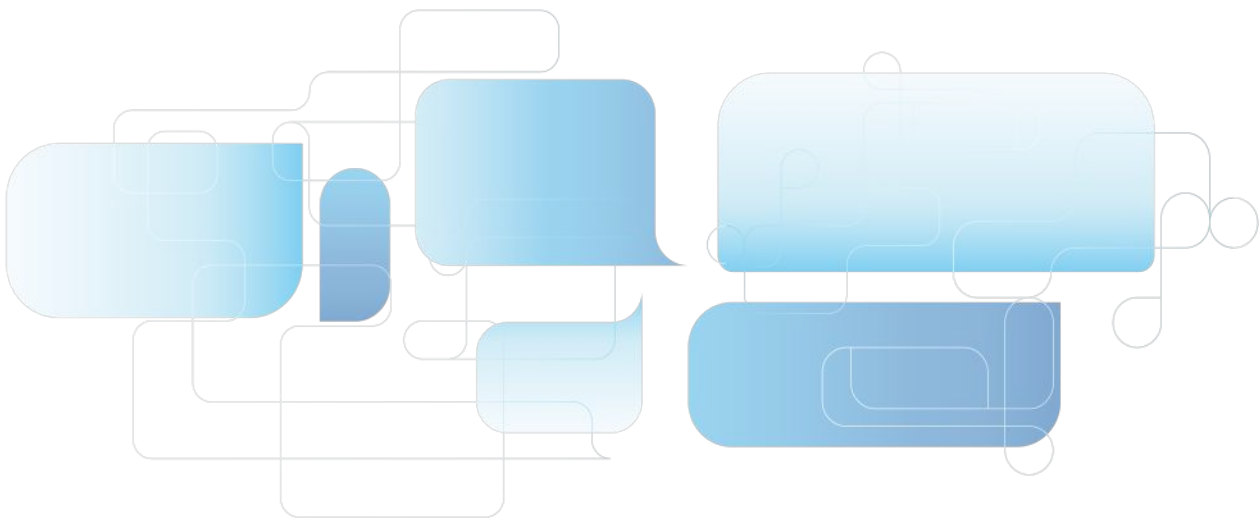


New Mobile Phase Filter is designed to solvent rapidfiltration and degassing, suitable for filtering anddegassing of the HPLC mobile phase solvent, Can prolong the service life of instrument and the chromatographic column, improve the detection accuracy; Used in gravimetric analysis, trace analysis, trace analysis, colloid separation and sterile in the laboratory.

Compare to traditional Solvent Filter, the new design solve following questions:

- 1.Larger filter cup capacity, avoid multiple adding;
- 2.Removes clamp, avoid potential leaking;
- 3.Substitute Frosted Seal to Thread fastening, avoid fusion after long time usage.
- 4.Substitute Quartz sand core to PTFE filter plate, avoid hard cleaning.
- 5.Substitute Conical flask to GL45 ISO Bottles, avoid solvent transfer after filter.

| Description                                              | Packaging    | Product Code      |
|----------------------------------------------------------|--------------|-------------------|
| PTFE Solvent filter assembly,with 1000mL glass reservoir | 1 per carton | VHOLDERAPTFE1000A |



# **Multi-Functional Purification Plates**

## 24-Well Multi-Functional Purification Plates



### Features

- High throughput: process 24 samples in one time, suitable for automated sample preparation workstations.
- High recovery rate: good purification effect, no background interference, high recoveries
- Good stability: reduce experimental errors, highly reproducible experimental data.
- Simple and fast: the purification can be finished within 30 seconds.
- Achieve selective adsorption of impurities such as pigments, lipids, and proteins in sample.

### Procedures

#### 24-Well HLB Lim Plates



1. Pipette the sample supernatant to a 24-Well Multi-Functional Purification Plates.



2. Filter with Positive Pressure 24 Processor.



3. Concentrate by 24-Well Plate Intelligent Nitrogen Evaporator



4. Filter by Syringe Filter and Sample Vials.



5. Liquid chromatography mass spectrometry analysis.

## 24-Well Multi-Functional Purification Plates

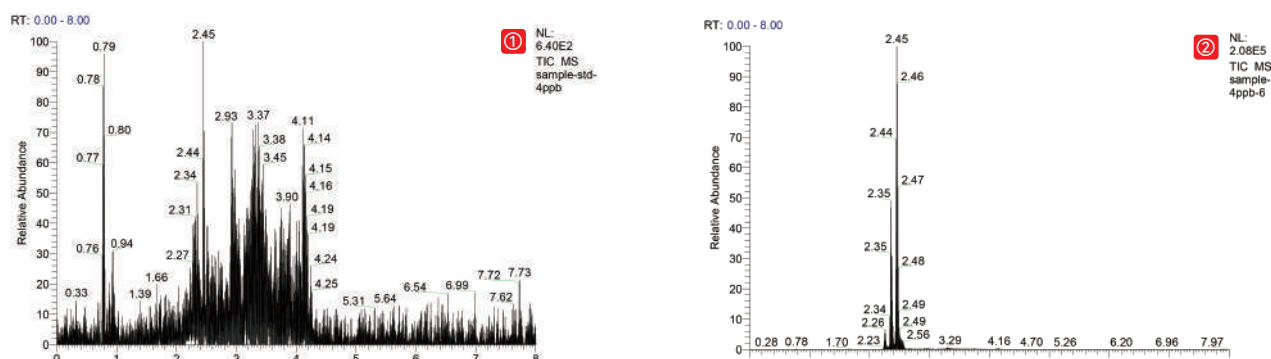


Figure 1 TIC Chromatograms of Corn Flour Sample  
( ① Before Purification ② After Purification by 226 Multifunctional Clean-Up Plate)

| Test   | Spike<br>(ng/g) | 226 Multifunctional Clean-Up Plate |        |
|--------|-----------------|------------------------------------|--------|
|        |                 | Recovery<br>(%, n=24)              | CV (%) |
| AFT B1 | 0.5             | 105                                | 3.92   |
|        | 1               | 101                                | 2.41   |
| AFT B2 | 0.5             | 102                                | 4.12   |
|        | 1               | 95.8                               | 4.15   |
| AFT G1 | 0.5             | 105                                | 2.69   |
|        | 1               | 104                                | 4.13   |
| AFT G2 | 0.5             | 101                                | 4.28   |
|        | 1               | 95.4                               | 3.75   |

Based on Figure 1, the impurities are obviously adsorbed, therefore miscellaneous peaks are fewer in the TIC chromatogram. As result, the purified sample is cleaner, and the purification effect is better.

Based on Table 1, the recovery rates of aflatoxin in the 24 wells are between 90-110%, and the CV value of the recovery rate between wells is less than 5%, which meet the standard of experimental requirements.

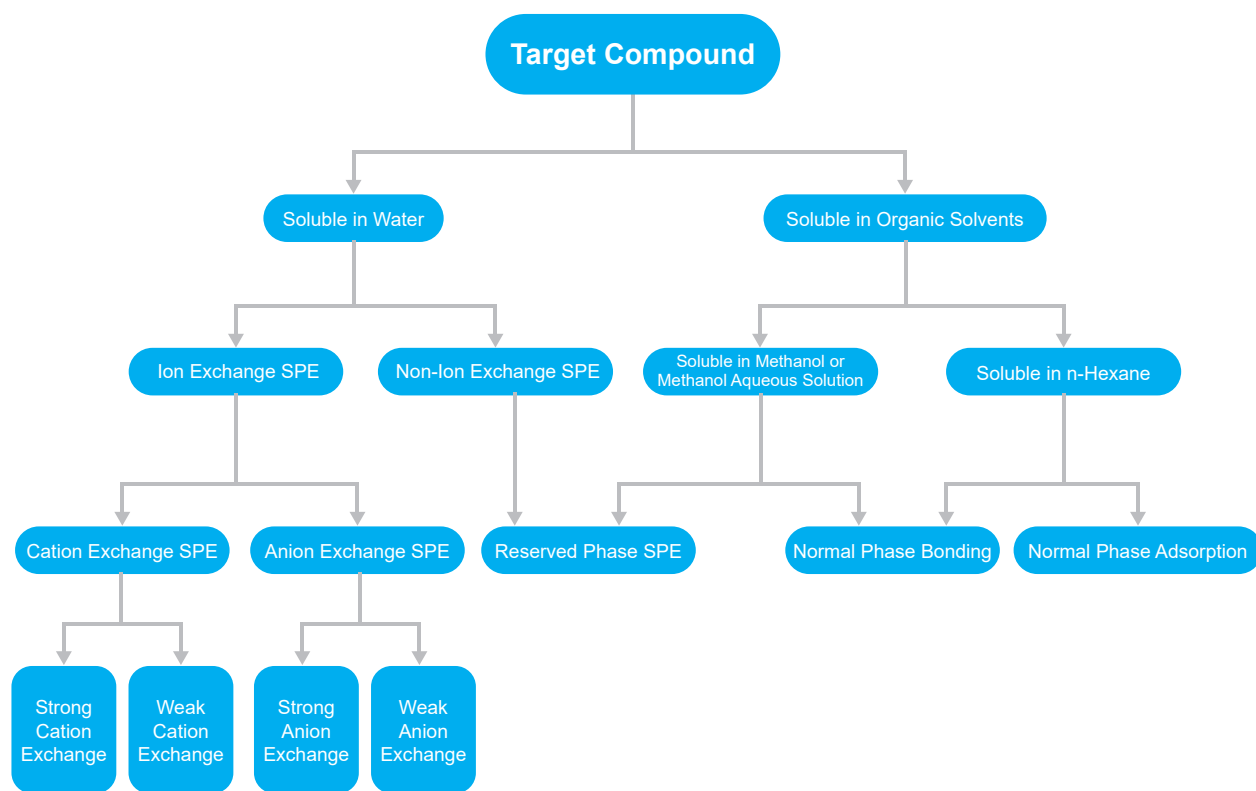
### Conclusion

According to the results, the 24-Well Multi-Functional Purification Plates are more stable. The miscellaneous peaks are less on the chromatogram, and no interfering peaks next to the target peaks result in more accurate quantification.

### Ordering information

| Product Code | Description                                   | Application                          | Qty.      |
|--------------|-----------------------------------------------|--------------------------------------|-----------|
| CUCMFP1819A  | 228 Multifunctional Clean-Up Plate            | Patulin, Aflatoxin B1, B2, G1, G2    | 1 Pc/Box  |
| CUCMFP1820A  | 226 Multifunctional Clean-Up Plate            | Zearalenone, Alatoxin B1, B2, G1, G2 | 1 Pc/Box  |
| CUCMFP1821A  | 224 Multifunctional Clean-Up Plate            | Zearalenone                          | 1 Pc/Box  |
| CUCMFP1823A  | 223 Multifunctional Clean-Up Plate            | Aflatoxin M1, M2                     | 1 Pc/Box  |
| CUCMFP1824A  | 230 Multifunctional Clean-Up Plate            | Deoxynivalenol                       | 1 Pc/Box  |
| CUCMFP1818A  | 229 Multifunctional Clean-Up Plate            | Ochratoxin                           | 1 Pc/Box  |
| CUCMFP1822A  | 302 Multifunctional Clean-Up Plate            | Multiple functions                   | 1 Pc/Box  |
| CHREQU2402EA | Positive Pressure 24 Processor                |                                      | 1 Set/Ctn |
| CHREQU24YYEA | 24-Well Plate Intelligent Nitrogen Evaporator |                                      | 1 Set/Ctn |

## SPE Cartridge Sorbent Selection Guide



### Mechanism of Action

| Type                | Reversed Phase                                                                                                                                             | Normal Phase                                                                                                                                        | Ion Exchange                                                                                                               | Other                                                                             |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Mechanism           | The reversed phase column sorbent is less polar substance, which extract medium or less polar substances from the extract through hydrophobic interaction. | The normal phase column sorbent is a strong polar substance, which extract strong polar substance from the extract through hydrophilic interaction. | The ion exchange column sorbent is charged, which extract corresponding charged ions by interaction force.                 | Solid Supported Liquid-Liquid Extraction (SLE), Graphite-Carbon Black (GCB), etc. |
| Typical Application | Degreasing by reversed phase column in the detection of veterinary drug residues in foods of animal origin.                                                | Remove organic acids from plant-based foods by normal phase column in pesticide residues test.                                                      | The MCX column adsorbs the target alkaline compounds such as melamine, ractopamine, etc., then rinse to remove impurities. | Extract aromatic amines in aqueous solution by SLE in azo dyes detection.         |

## Solid Phase Extraction Cartridge Operation Procedures

Distinguish whether the SPE cartridge is used to adsorb the target compound or impurities before experiment. If the SPE cartridge adsorbs the target compound, process will be in 4 steps: activating, loading, washing and elution. If the SPE cartridge adsorbs the impurities, process will be in 3 steps: activating, loading and elution. 1-2 mL/min flow rate and Vacuum Manifolds with pressure control function are recommended.

### General Procedures



① Activating



② Loading



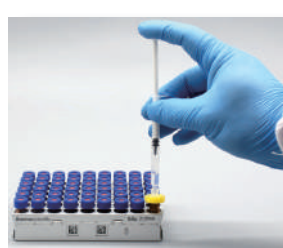
③ Washing



④ Elution



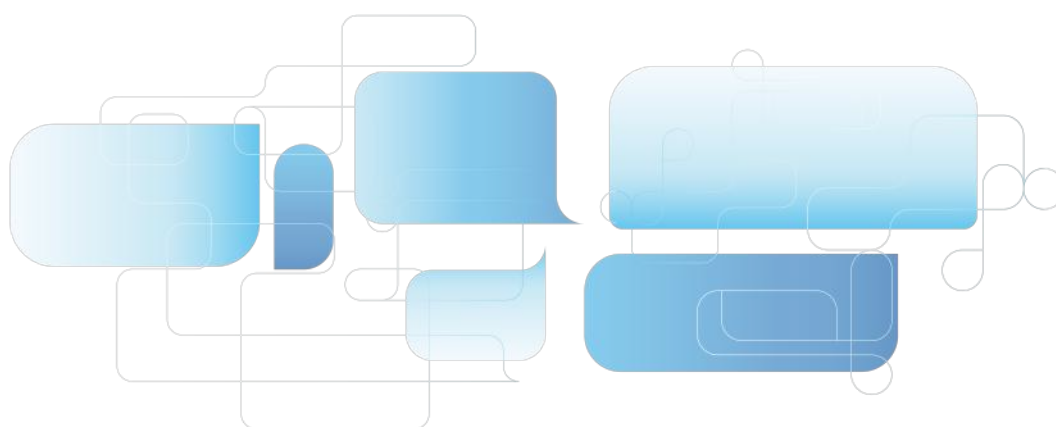
⑦ Analysis



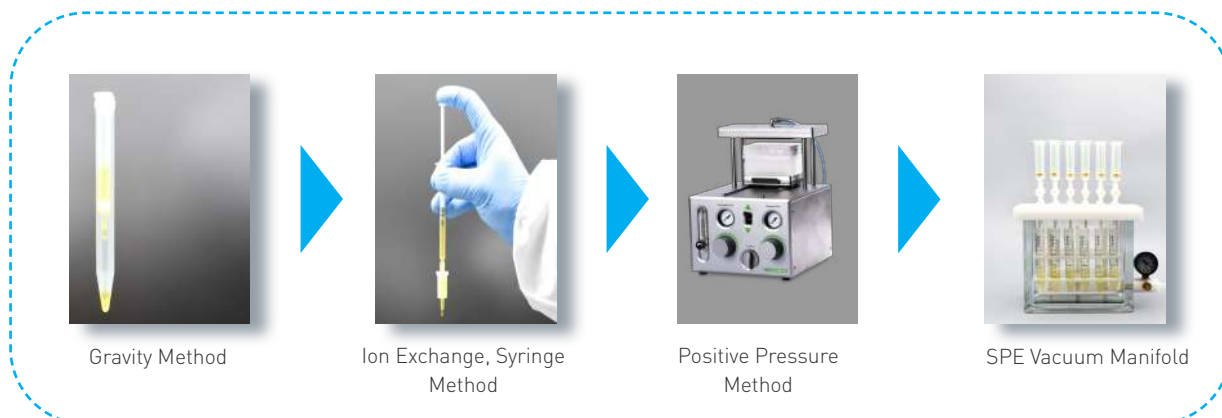
⑥ Filtration



⑤ Concentration



## SPE Cartridge Directions



### Solvent Selection

| SPE Cartridges             | Category              | Low Elution Strength Solvent (Weak Solvent) |
|----------------------------|-----------------------|---------------------------------------------|
| Reversed Phase Cartridges  | HLB, C18, C8          | Water, Acetonitrile, Methanol               |
| Normal Phase Cartridges    | Florisil, ALN, Silica | n-Hexane, Cyclohexane                       |
| Cation Exchange Cartridges | MCX, SCX, WCX, PRS    | Acidic or Neutral Solution                  |
| Anion Exchange Cartridges  | MAX, SAX, WA X        | Alkaline or Neutral Solution                |

The elution strength gradually increases during the experiments. In general, weak solvent is used during activating and loading. Weak solvent (might mixed with small amount of strong solvent) used during washing. Strong solvent (might mixed with small amount of weak solvent) during elution.

## Analysis and Solutions of Low Recovery Rate

### ① Analyze the Solution Collected Each Step

When the absolute recovery of the target substance is low, detect the solution collected after each step, then optimize the filtration method.

| Detected Target                                              | Reason                                       | Solution                                                               |
|--------------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------|
| Low recovery of blank spike                                  | Improper SPE cartridge or improper operation | Replace the SPE cartridge or exclude improper solvent                  |
| Good recovery of blank spike, but low recovery of pre spike  | Matrix effect interference                   | Optimize pretreatment method or use matrix standard for quantification |
| Good recovery of pre spike, but low recovery of matrix spike | Low extraction efficiency                    | Change the extraction solvent or the extraction method                 |

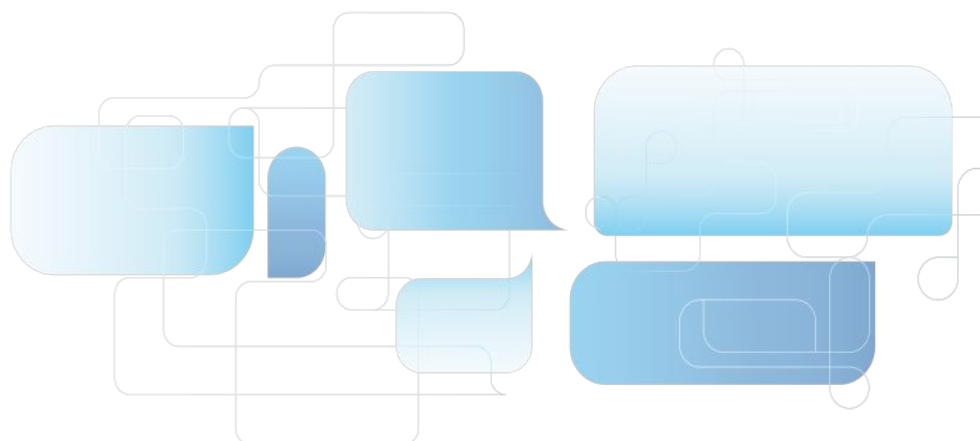
### ② Add Spike in Different Steps

| Detected Target                                              | Reason                                       | Solution                                                               |
|--------------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------|
| Low recovery of blank spike                                  | Improper SPE cartridge or improper operation | Replace the SPE cartridge or exclude improper solvent                  |
| Good recovery of blank spike, but low recovery of pre spike  | Matrix effect interference                   | Optimize pretreatment method or use matrix standard for quantification |
| Good recovery of pre spike, but low recovery of matrix spike | Low extraction efficiency                    | Change the extraction solvent or the extraction method                 |

Notes: ① Blank spike: add a spike to pure solvent. ② Pre spike: add a spike to blank matrix extract. ③ Matrix spiked: add a spike to blank matrix.

## Solid Phase Extraction (SPE) Cartridge Product List

| SorbentPhase     | GVS          | Waters            | Agilent             | Phenomenex       | Supelco                     | Agela                  |
|------------------|--------------|-------------------|---------------------|------------------|-----------------------------|------------------------|
| C18              | C18          | Sep-pak tC18      | Bond Elut C18       | Strata C18-E     | Sepelclean ENVI-18          | Cleanert C18           |
| C18-Ne           | C18-n        | Sep-pak C18       | Bond Elut C180H     | Strata C18-U     |                             | Cleanert C18-N         |
| C8               | C8           | Sep-pak C8        | Bond Elut C8        | Strata C8        | Sepelclean ENVI-8           | Cleanert C8            |
| CN               | CN           | Sep-pak CN        | Bond Elut CN-E      | Strata CN        | Sepelclean LC-CN            | Cleanert CN            |
| NH2              | NH2          | Sep-pak NH2       | Bond Elut NH2       | Strata NH2       | Sepelclean LC-NH2           | Cleanert NH2           |
| PSA              | PSA          |                   | Bond Elut PSA       | Strata PSA       | Sepelclean PSA              | Cleanert PSA           |
| SAX              | SAX          |                   | Bond Elut SAX       | Strata SAX       | Sepelclean LC-SAX           | Cleanert SAX           |
| SCX              | SCX          |                   | Bond Elut SCX       | Strata SCX       | Sepelclean LC-SI            | Cleanert SCX           |
| Silica           | Silica       | Sep-pak SI        | Bond Elut SI        | Strata SI-I      | Sepelclean LC-SCX           | Cleanert Silica        |
| HLB              | HLB          | Oasis HLB         | Bond Elut Plexa     | Strata-X         | Supel-Select HLB            | Cleanert PEP           |
| HLB              | HLB-lim      | Oasis PRIME HLB   |                     |                  |                             |                        |
| MCX              | MCX          | Oasis MCX         | Bond Elut Plexa PCX | Strata-XC        | Supel-Select SCX            | Cleanert PCX           |
| MAX              | MAX          | Oasis MAX         | Bond Elut Plexa PAX | Strata-XA        | Supel-Select SAX            | Cleanert PAX           |
| Florisil         | Florisil     | Sep-pak FI        | Bond Elut FL        | Strata FR-PR     | Sepelclean LC-Florisil      | Cleanert Florisil      |
| Graphitized Bond | Carb-GCB     |                   | Bond Elut Carbon    |                  | Sepelclean ENVI Carb        | Cleanert PestiCarb     |
| Alumina-N        | ALN          | Sep-pak Alumina-N | Bond Elut Alumina-N | Strata Alumina-N | Sepelclean LC-Alumina-N     | Cleanert AluminaN      |
| Alumina-A        | ALA          | Sep-pak Alumina-A | Bond Elut Alumina-A | Strata Alumina-A | Sepelclean LC-Alumina-A     | Cleanert AluminaA      |
| Alumina-B        | ALB          | Sep-pak Alumina-B | Bond Elut Alumina-B | Strata Alumina-B | Sepelclean LC-Alumina-B     | Cleanert AluminaB      |
| GCB/NH2          | Carb-GCB/NH2 |                   | Bond Elut Carb/NH2  |                  | Sepelclean ENVI Carb/NH2    | Cleanert PestiCarb/NH2 |
| GCB/PSA          | Carb-GCB/PSA |                   | Bond Elut Carb/PSA  |                  | Sepelclean ENVI Carb-ll/PSA |                        |



## Polymer Sorbent

GVS provides various specifications and sorbents of polymeric SPE Cartridges. Each batch has passed performance verification to meet the pretreatment needs of various sample matrices. We provide excellent products of high recoveries and good stability to customers.

### HLB Hydrophilic-Lipophilic Balanced

Extracting non-polar to moderately polar acidic, neutral and alkaline compounds

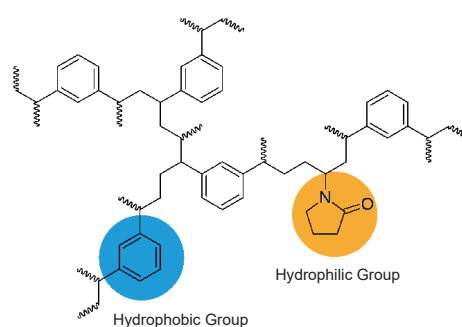
#### Specifications

Surface area: 600 m<sup>2</sup>/g    Particle size: 40 µm    Pore size: 300 Å

#### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00HLB01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEB00HLB03060A  | 60mg/3mL    | 50 Pcs/Box  |
| SPEB00HLB03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00HLB06150A  | 150mg/6mL   | 30 Pcs/Box  |
| SPEB00HLB06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB00HLB06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00HLB12500A  | 500mg/12mL  | 20 Pcs/Box  |
| SPEB00HLB01060A  | 60mg/1mL    | 100 Pcs/Box |
| SPEB00HLB01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00HLB03030A  | 30mg/3mL    | 50 Pcs/Box  |
| SPEB00HLB061000A | 1g/6mL      | 30 Pcs/Box  |

Note: equivalent to Waters Oasis HLB



### MAX Mixed-mode Anion Exchange

Extracting acidic compounds

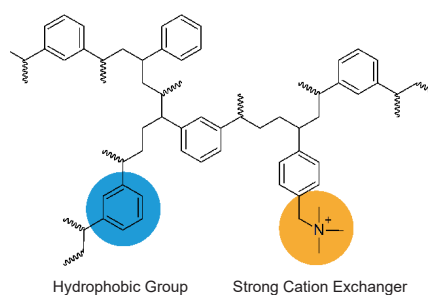
#### Specifications

Surface area: 600 m<sup>2</sup>/g

#### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00MAX01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEB00MAX01060A  | 60mg/1mL    | 100 Pcs/Box |
| SPEB00MAX03030A  | 30mg/3mL    | 50 Pcs/Box  |
| SPEB00MAX03060A  | 60mg/3mL    | 50 Pcs/Box  |
| SPEB00MAX03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00MAX03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00MAX06150A  | 150mg/6mL   | 30 Pcs/Box  |
| SPEB00MAX06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB00MAX06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00MAX12500A  | 500mg/12mL  | 20 Pcs/Box  |
| SPEB00MAX121000A | 1g/12mL     | 20 Pcs/Box  |

Note: equivalent to Waters Oasis MAX



# Chromatography

## MCX Mixed-mode Cation Exchange

Extracting alkaline compounds

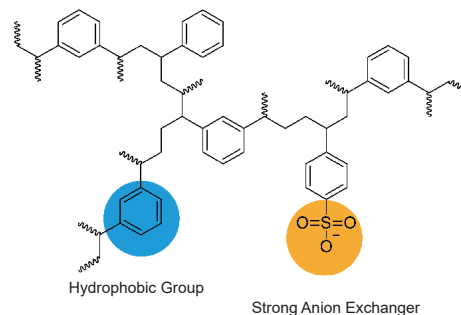
### Specifications

Surface area: 600 m<sup>2</sup>/g Particle size: 40 μm Pore size: 300 Å

### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00MCX01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEB00MCX01060A  | 60mg/1ml    | 100 Pcs/Box |
| SPEB00MCX03030A  | 30mg/3ml    | 50 Pcs/Box  |
| SPEB00MCX03060A  | 60mg/3mL    | 50 Pcs/Box  |
| SPEB00MCX03500A  | 500mg/3ml   | 50 Pcs/Box  |
| SPEB00MCX06150A  | 150mg/6mL   | 30 Pcs/Box  |
| SPEB00MCX06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB00MCX06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00MCX12500A  | 500mg/12mL  | 20 Pcs/Box  |
| SPEB00MCX121000A | 1g/12ml     | 20 Pcs/Box  |

Note: equivalent to Waters Oasis MCX



## WCX Weak Cation Exchange

Extracting strong bases

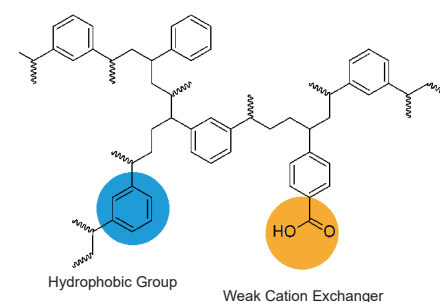
### Specifications

Surface area: 600 m<sup>2</sup>/g Particle size: 40 μm Pore size: 300 Å

### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00WCX01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEB00WCX01060A  | 60mg/1ml    | 100 Pcs/Box |
| SPEB00WCX03030A  | 30mg/3ml    | 50 Pcs/Box  |
| SPEB00WCX03060A  | 60mg/3mL    | 50 Pcs/Box  |
| SPEB00WCX03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00WCX06150A  | 150mg/6mL   | 30 Pcs/Box  |
| SPEB00WCX06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB00WCX06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00WCX12500A  | 500mg/12ml  | 20 Pcs/Box  |
| SPEB00WCX121000A | 1g/12ml     | 20 Pcs/Box  |

Note: equivalent to Waters Oasis WCX



## WAX Weak Anion Exchange

Extracting strong acids

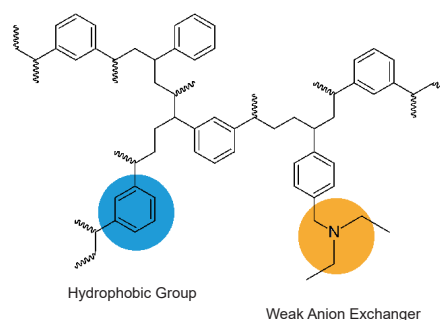
### Specifications

Surface area: 600 m<sup>2</sup>/g Particle size: 40 μm Pore size: 300 Å

### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00WAX01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEB00WAX01060A  | 60mg/1ml    | 100 Pcs/Box |
| SPEB00WAX03030A  | 30mg/3ml    | 50 Pcs/Box  |
| SPEB00WAX03060A  | 60mg/3mL    | 50 Pcs/Box  |
| SPEB00WAX03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00WAX06150A  | 150mg/6mL   | 30 Pcs/Box  |
| SPEB00WAX06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB00WAX06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00WAX12500A  | 500mg/12ml  | 20 Pcs/Box  |
| SPEB00WAX121000A | 1g/12ml     | 20 Pcs/Box  |

Note: equivalent to Waters Oasis WAX



## HLB Lim Cartridges for Multi-Residue Analysis of Veterinary Drug



HLB Lim cartridge is a new type of solid phase extraction column packed with special sorbent. Comparing to traditional SPE cartridges, it removes interfering substances such as fat, phospholipid and pigment faster to reduce matrix effect.

The HLB Lim Cartridge greatly simplifies the process of sample preparation. Activation and equilibration steps can be skipped. Filtering the sample directly after extraction saves a lot of time and reagents so that the sample preparation is simpler and more efficient.

### Features

- One step purification and shorter pretreatment time
- High recovery rate and good reproducibility
- Suitable for multi-matrix and multi-residue analysis of veterinary drug
- Save solvent and cost

### Typical Recovery

| Compound          | Recovery (%) |
|-------------------|--------------|
| Tetracycline      | 97.7         |
| Chlortetracycline | 87.9         |
| Oxytetracycline   | 87.7         |
| Ractopamine       | 95.8         |
| Salbutamol        | 108          |
| Clenbuterol       | 91.6         |

### Ordering information

| Product Code    | Description              | Qty.       |
|-----------------|--------------------------|------------|
| SPEB00HLB03200A | HLB Lim Cartridges, 3 mL | 50 Pcs/Box |

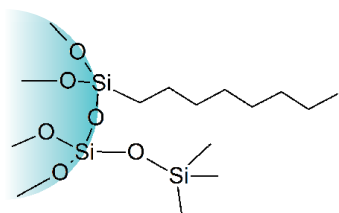
## SPE Cartridges



SPE cartridges generally include traditional silica-based SPE cartridges and inorganic chemical based SPE cartridges. GVS independently researches and develops sorbents to ensure its stability and performance. Normal phase, reverse phase, and ion exchange phase are available to improve sample preparation efficiency.

### C8 Octyl

Extracting non-polar compounds



#### Specifications

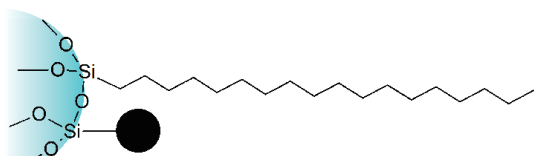
Carbon content: 9%      Surface area: 280 m<sup>2</sup>/g  
Particle size: 40 - 75 µm      Pore size: 70 Å

#### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB000C801100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB000C803200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB000C803500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB000C806500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB000C8061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB000C8122000A | 2000mg/12mL | 20 Pcs/Box  |

### C18 A Unendcapped Octadecyl

Extracting non-polar compounds



#### Specifications

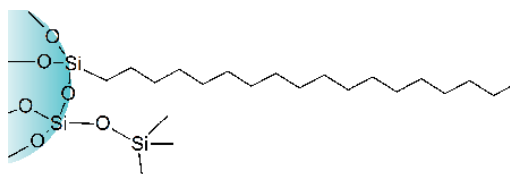
Carbon content: 12%      Surface area: 300 m<sup>2</sup>/g  
Particle size: 40 - 75 µm      Pore size: 70 Å

### C18 A Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB0C18A01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB0C18A03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB0C18A03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB0C18A06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB0C18A061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB0C18A121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB0C18A122000A | 2000mg/12mL | 20 Pcs/Box  |

### C18 Endcapped Octadecyl

Extracting non-polar compounds



#### Specifications

Carbon content: 17.6%      Surface area: 300 m<sup>2</sup>/g  
Particle size: 40 - 60 µm      Pore size: 70 Å

#### Ordering information

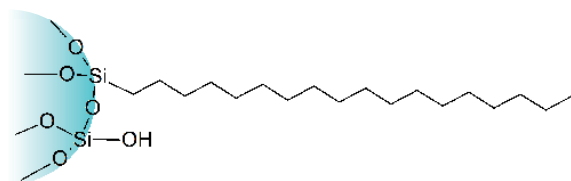
| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00C1801100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00C1803060A  | 60mg/3mL    | 50 Pcs/Box  |
| SPEB00C1803200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00C1803500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00C1806500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00C18061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB00C18121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB00C18122000A | 2000mg/12mL | 20 Pcs/Box  |
| SPEB00C1803250A  | 250mg/3mL   | 50 Pcs/box  |
| SPEB00C1803300A  | 300mg/3mL   | 50 Pcs/Box  |
| SPEB00C1806200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB00C1806300A  | 300mg/6mL   | 30 Pcs/Box  |
| SPEB00C18065000A | 5g/60mL     | 12 Pcs/Box  |

Note: equivalent to Waters Sep-Pak tC18/C18, Agilent Bond Elut C18, Supelco Supelclean ENVI-18

# Chromatography

## C18N Unendcapped Octadecyl

Extracting polar and non-polar compounds



### Specifications

Carbon content: 17%      Surface area: 300 m<sup>2</sup>/g  
Particle size: 40 - 75 µm      Pore size: 70 Å

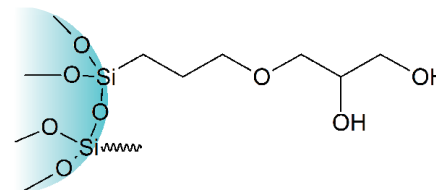
### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB0C18N01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB0C18N03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB0C18N03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB0C18N06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB0C18N061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB0C18N121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB0C18N122000A | 2000mg/12mL | 20 Pcs/Box  |
| SPEB0C18N06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB0C18N06300A  | 300mg/6mL   | 30 Pcs/Box  |
| SPEB0C18N605000A | 5g/60mL     | 12 Pcs/Box  |

Note: equivalent to Agilent Bond Elut C18-OH

## Diol Dihydroxy

Extracting polar compounds



### Specifications

Surface area: 290 m<sup>2</sup>/g      Carbon content: 5.5%  
Particle size: 40-75 µm      Pore size: 70 Å

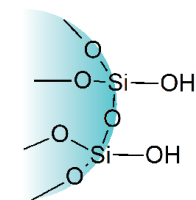
### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB0DIOL01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB0DIOL03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB0DIOL03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB0DIOL06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB0DIOL061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB0DIOL121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB0DIOL122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Waters Sep-Pak Diol & Agilent Bond Elut 20H

## Silica Unbounded Silica Gel

Extracting polar compounds



### Specifications

Surface area: 480 m<sup>2</sup>/g  
Particle size: 40 - 75 µm  
Pore size: 70 Å

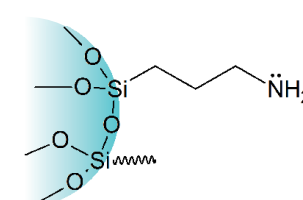
### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEBSILIC01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEBSILIC03100A  | 100mg/3mL   | 50 Pcs/Box  |
| SPEBSILIC03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEBSILIC03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEBSILIC06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEBSILIC061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEBSILIC062000A | 2g/6mL      | 30 Pcs/Box  |
| SPEBSILIC121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEBSILIC122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Agilent Bond Elut Silica & Waters Sep-Pak Silica

## NH<sub>2</sub> Aminopropyl

Extracting moderately polar and acidic compounds



### Specifications

Surface area: 200 m<sup>2</sup>/g      Carbon content: 4.5%  
Particle size: 40-75 µm      Pore size: 70 Å

### Ordering information

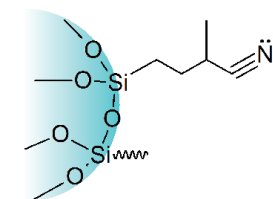
| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00NH201100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00NH203200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00NH203250A  | 250mg/3mL   | 50 Pcs/Box  |
| SPEB00NH203500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00NH206500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00NH2061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB00NH2121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB00NH2122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Waters Sep-Pak NH<sub>2</sub> & Agilent Bond Elut NH<sub>2</sub>

# Chromatography

## CN Cyanopropyl

Extracting polar and non-polar compounds, enriching metal ions



### Specifications

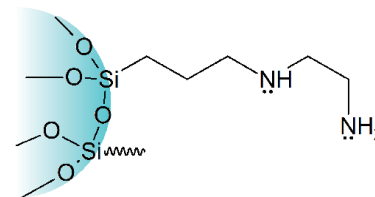
Surface area: 280 m<sup>2</sup>/g      Carbon content: 5.8%  
Particle size: 40 - 75 µm      Pore size: 70 Å

### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB000CN01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB000CN03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB000CN03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB000CN06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB000CN061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB000CN122000A | 2000mg/12mL | 20 Pcs/Box  |

## PSA Primary-Secondary Amine

Extracting strong acids, polar compounds and metal ions



### Specifications

Surface area: 500 m<sup>2</sup>/g      Carbon content: 8%  
Particle size: 50-75 µm      Pore size: 70 Å

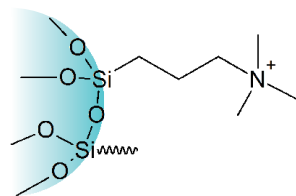
### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00PSA01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00PSA03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00PSA03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00PSA06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00PSA061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB00PSA121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB00PSA122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Agilent Bond Elut PSA

## SAX Strong Anion Exchange

Extracting acidic compounds



### Specifications

Surface area: 510 m<sup>2</sup>/g      Particle size: 40-75 µm  
Pore size: 70 Å

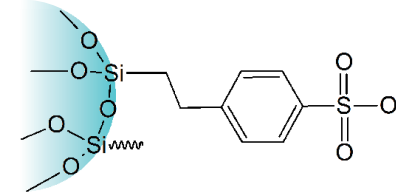
### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00SAX01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEB00SAX01060A  | 60mg/1mL    | 100 Pcs/Box |
| SPEB00SAX01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00SAX03060A  | 60mg/3mL    | 50 Pcs/Box  |
| SPEB00SAX03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00SAX03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00SAX06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB00SAX06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00SAX061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB00SAX121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB00SAX122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Supelco Supelclean LC-SAX

## SCX Strong Cation Exchange

Extracting basic compounds



### Specifications

Surface area: 510 m<sup>2</sup>/g      Particle size: 40 - 75 µm  
Pore size: 70 Å

### Ordering information

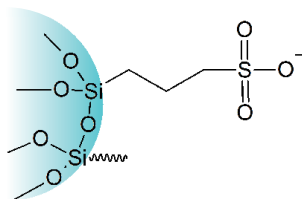
| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00SCX01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEB00SCX01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00SCX03060A  | 60mg/3mL    | 50 Pcs/Box  |
| SPEB00SCX03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00SCX03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00SCX06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEB00SCX06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00SCX061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB00SCX121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB00SCX122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Waters Sep-Pak CN

# Chromatography

## PRS Propylsulfonic Acid

Extracting weak bases in biological fluids



### Specifications

Surface area: 310 m<sup>2</sup>/g      Carbon content: 4.5%  
Particle size: 40-75 µm      Pore size: 70 Å

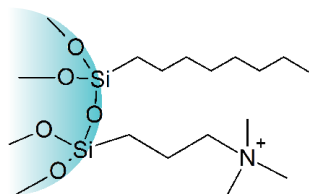
### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00PRS01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00PRS03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00PRS03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00PRS06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00PRS061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB00PRS121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB00PRS122000A | 2g/12mL     | 20 Pcs/Box  |

Note: equivalent to Agilent Bond Elut PRS

## C8/SAX Octyl/Strong Anion Exchange

Extracting acidic drugs in biological fluids



### Specifications

Surface area: 510 m<sup>2</sup>/g Particle  
size: 40-75 µm  
Pore size: 70 Å

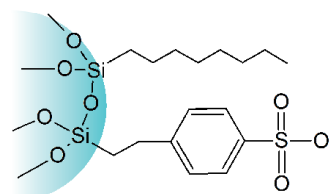
### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEBC8SAX01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEBC8SAX01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEBC8SAX03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEBC8SAX03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEBC8SAX06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEBC8SAX06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEBC8SAX061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEBC8SAX121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEBC8SAX122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Agilent Bond Elut Certify II & Phenomenex Screen-A

## C8/SAX Octyl/Strong Anion Exchange

Extracting acidic drugs in biological fluids



### Specifications

Surface area: 510 m<sup>2</sup>/g      Particle size: 40-75 µm  
Pore size: 70 Å

### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEBC8SCX01030A  | 30mg/1mL    | 100 Pcs/Box |
| SPEBC8SCX01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEBC8SCX03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEBC8SCX03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEBC8SCX06200A  | 200mg/6mL   | 30 Pcs/Box  |
| SPEBC8SCX06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEBC8SCX061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEBC8SCX121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEBC8SCX122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Agilent Bond Elut Certify & Phenomenex Screen-C

## Carb-GCB Graphitized Carbon Black

Extracting herbicides in drinking water

### Specifications

Surface area: 100 m<sup>2</sup>/g Particle  
size: 100-300 mesh  
Ordering information

| Product Code     | Description | Qty.       |
|------------------|-------------|------------|
| SPEB00GCB03500A  | 500mg/3mL   | 50 Pcs/Box |
| SPEB00GCB03250A  | 250mg/3mL   | 50 Pcs/Box |
| SPEB00GCB06500A  | 500mg/6mL   | 30 Pcs/Box |
| SPEB00GCB061000A | 1000mg/6mL  | 30 Pcs/Box |

Note: equivalent to Agilent Bond Elut Carbon

## Carb-GCB/PSA

Graphitized Carbon Black/ Primary- Secondary Amine  
Bilayer

Cleanup of samples in multiresidual pesticide analysis

### Specifications

Surface area: 100 m<sup>2</sup>/g      Particle size: 100-300 mesh

### PSA Specifications

Surface area: 500 m<sup>2</sup>/g      Carbon content: 8%  
Particle size: 40-75 µm      Pore size: 70 Å

### Ordering information

| Product Code    | Description     | Qty.       |
|-----------------|-----------------|------------|
| SPEB0PSGC065X5A | 500mg/500mg/6mL | 30 Pcs/Box |

# Chromatography

## Carb-GCB/NH<sub>2</sub>

Graphitized Carbon Black/Aminopropyl Bilayer

Cleanup of samples in multiresidual pesticide analysis

### GCB Specifications

Surface area: 100 m<sup>2</sup>/g Particle size: 100-300 mesh

### NH<sub>2</sub> Specifications

Carbon content: 4.5% Surface area: 200 m<sup>2</sup>/g

Particle size: 40 - 75 µm Pore size: 70 Å

### Ordering information

| Product Code    | Description     | Qty.       |
|-----------------|-----------------|------------|
| SPEB0NHGC065X5A | 500mg/500mg/6mL | 30 Pcs/Box |
| SPEB0NHGC065X2A | 500mg/250mg/6mL | 30 Pcs/Box |
| SPEB0NHGC065X5A | 500mg/500mg/6mL | 30 Pcs/Box |
| SPEB0NHGC121X1A | 1g/1g/12mL      | 20 Pcs/Box |

## Florisil Pesticide Grade

Extracting multiresidual pesticides

### Specifications

Particle size: 150 - 250 µm

### Ordering information

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEBFLORI01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEBFLORI03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEBFLORI03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEBFLORI06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEBFLORI061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEBFLORI121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEBFLORI122000A | 2000mg/12mL | 20 Pcs/Box  |

## ALA, ALN, ALB, Alumina

Extracting aromatic amines

### Specifications

Surface area >150 m<sup>2</sup>/g

pH: Acidic Alumina pH 4.0

Neutral Alumina pH 7.0

Basic Alumina pH 9.5

### Ordering information

① Acidic Alumina (ALA)

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00ALA01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00ALA03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00ALA03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00ALA06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00ALA061000A | 1g/6mL      | 30 Pcs/Box  |
| SPEB00ALA062000A | 2g/6mL      | 30 Pcs/Box  |
| SPEB00ALA121000A | 1g/12mL     | 20 Pcs/Box  |
| SPEB00ALA122000A | 2g/12mL     | 20 Pcs/Box  |

Note: equivalent to Waters Sep-Pak Alumina-A

② Neutral Alumina(ALN)

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00ALN01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00ALN03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00ALN03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00ALN06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00ALN061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB00ALN062000A | 2g/6mL      | 20 Pcs/Box  |
| SPEB00ALN121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB00ALN122000A | 2000mg/12mL | 20 Pcs/Box  |
| SPEB00ALN124000A | 4g/12mL     | 20 Pcs/Box  |
| SPEB00ALN125000A | 5g/12mL     | 20 Pcs/Box  |

Note: equivalent to Waters Sep-Pak Alumina-N

③ Basic Alumina(ALB)

| Product Code     | Description | Qty.        |
|------------------|-------------|-------------|
| SPEB00ALB01100A  | 100mg/1mL   | 100 Pcs/Box |
| SPEB00ALB03200A  | 200mg/3mL   | 50 Pcs/Box  |
| SPEB00ALB03500A  | 500mg/3mL   | 50 Pcs/Box  |
| SPEB00ALB06500A  | 500mg/6mL   | 30 Pcs/Box  |
| SPEB00ALB061000A | 1000mg/6mL  | 30 Pcs/Box  |
| SPEB00ALB062000A | 2g/6mL      | 30 Pcs/Box  |
| SPEB00ALB121000A | 1000mg/12mL | 20 Pcs/Box  |
| SPEB00ALB122000A | 2000mg/12mL | 20 Pcs/Box  |

Note: equivalent to Waters Sep-Pak Alumina-B

# Chromatography

## Mycotoxin Clean-up Columns

### Mycotoxin Rapid Testing Solutions

Mycotoxin immunoaffinity column is an affinity chromatography column made by the principle of immunoaffinity chromatography for the analysis of antigens. After extraction, dilution, and column passing, most impurities can be removed.

#### General Procedures of Mycotoxin Clean-Up Columns



① Activating



② Washing & Eluting



③ Concentration



④ Filtration



⑤ Analysis

### Aflatoxin Immunoaffinity Columns

Aflatoxin is a highly toxic substance, which is harmful to human and animal liver tissues. Aflatoxin Immunoaffinity Columns are based on the antigen-antibody specific reaction, binding the antibody to the gel to combine with aflatoxin specificity, thereby achieving the effect of separation and purification.



#### Ordering information

| Product Code  | Description                 | Qty.       |
|---------------|-----------------------------|------------|
| IMMBAFLT0001A | Aflatoxin B1,B2,G1,G2 , 1mL | 25 Pcs/Box |
| IMMBAFLT0003A | Aflatoxin B1,B2,G1,G2 , 3mL | 20 Pcs/Box |
| IMMBAFLB1001A | Aflatoxin B1, 1mL           | 25 Pcs/Box |
| IMMBAFLB1003A | Aflatoxin B1, 3mL           | 20 Pcs/Box |
| IMMBAFLM1001A | Aflatoxin M1, 1mL           | 25 Pcs/Box |
| IMMBAFLM1003A | Aflatoxin M1, 3mL           | 20 Pcs/Box |

### Zearalenone Immunoaffinity Columns

Zearalenone is widely found in moldy corn, sorghum, wheat, oats, barley and other cereal crops and milk, and is the most widely contaminated Fusarium toxin in the world. It has estrogenic effects, mainly acts on the reproductive system, and is very harmful to humans and animals. Zearalenone Immunoaffinity Columns can be used to extract and enrich zearalenone from samples ,which makes high targeted purification performance come true.



#### Ordering information

| Product Code  | Description      | Qty.       |
|---------------|------------------|------------|
| IMMBZEARA001A | Zearalenone, 1mL | 25 Pcs/Box |
| IMMBZEARA003A | Zearalenone, 3mL | 20 Pcs/Box |

# Chromatography

## Four-in-one (ADOZ) Immunoaffinity Columns

ADOZ immunoaffinity column is suitable for the purification of aflatoxin B1, B2, G1, G2, zearalenone, DON, ochratoxin A in samples of grain, food, feed, nuts, peanuts, soy sauce, etc. This method can treat four toxins at one time, greatly improving the pretreatment efficiency, and the recoveries of the four toxins can reach more than 80%.

### Ordering information

| Product Code  | Description | Qty.       |
|---------------|-------------|------------|
| IMMBFIOAD003A | 3mL         | 10 Pcs/Box |

## Deoxynivalenol Immunoaffinity Columns

DON, also known as deoxynivalenol, is mostly distributed in wheat, barley, corn and other grains, and has a certain harmful effect on the human body. It is three-level carcinogen in the EU classification standard. DON Immunoaffinity Columns can selectively separate deoxynivalenol from the sample by the specific binding of antibody and antigen to achieve good purification effect.



### Ordering information

| Product Code  | Description         | Qty.       |
|---------------|---------------------|------------|
| IMMBDEOXY001A | Deoxynivalenol, 1mL | 25 Pcs/Box |
| IMMBDEOXY003A | Deoxynivalenol, 3mL | 20 Pcs/Box |

## Ochratoxin A Immunoaffinity Columns

Ochratoxin A is very common in moldy grains and feed. It comes from the aspergillus and penicillium on various crops (wheat, corn, barley, oats, rye, rice and millet), peanuts, vegetables (beans), etc., which cause enormous harm to the kidneys and livers of human and animal. Ochratoxin A immunoaffinity column can selectively adsorb ochratoxin A in the sample extract, so as to have a very targeted purification effect on ochratoxin A in the sample solution.



### Ordering Information

| Product Code  | Description       | Qty.       |
|---------------|-------------------|------------|
| IMMBORCRA001A | Ochratoxin A, 1mL | 25 Pcs/Box |
| IMMBORCRA003A | Ochratoxin A, 3mL | 20 Pcs/Box |

# Chromatography

## T-2 Toxin Immunoaffinity Columns

T-2 toxin is a mycotoxin produced by a variety of *Fusarium* species. It mainly pollutes wheat, barley, corn and other food crops and their products, and poses great harm to human health and animal husbandry. T-2 toxin immunoaffinity column can selectively adsorb the T-2 toxin in the sample solution to specifically purify T-2 toxin. The purified sample solution can be directly used in the liquid phase test.

### Ordering information

| Product Code  | Description    | Qty.       |
|---------------|----------------|------------|
| IMMBT2TOX001A | T-2 toxin, 1mL | 25 Pcs/Box |
| IMMBT2TOX003A | T-2 toxin, 3mL | 20 Pcs/Box |

## Fumonisin FB Immunoaffinity Column

Fumonisin FB is a mycotoxin, which is a watersoluble metabolite produced by *Fusarium moniliforme*. It is a kind of diester compound composed by different polyhydric alcohols and glycerol tricarboxylic acid. Fumonisin has FA1, FA2, FB1, FB2, FB3 etc. FB1 is the main component.

### Ordering information

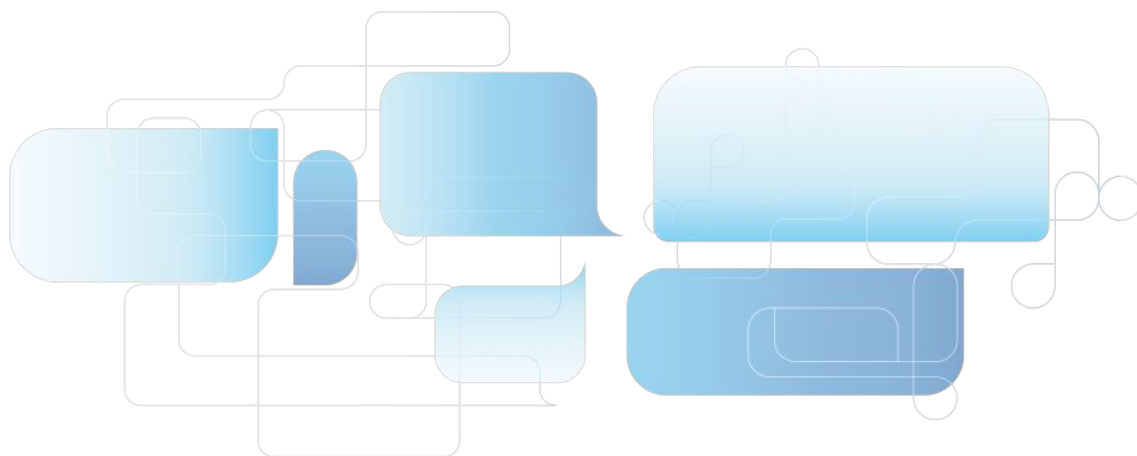
| Product Code  | Description       | Qty.       |
|---------------|-------------------|------------|
| IMMBFUMFB003A | Fumonisin FB, 3mL | 20 Pcs/Box |

## Tetrodotoxin Immunoaffinity Column

Tetrodotoxin is an amino perhydro quinazolin compound, which is one of the most toxic neurotoxins found in nature. It was once considered to be the most toxic non-protein toxin in nature. The toxin has a local stimulating effect on the intestinal tract. After absorption, it acts on nerve endings and nerve centers rapidly. It can block sodium ion channels on nerve excitation membrane with high selectivity and affinity, and block nerve conduction, thus causing nerve paralysis and death. Tetrodotoxin immunoaffinity column has a strong targeted purification effect on the extraction and enrichment of tetrodotoxin.

### Ordering information

| Product Code  | Description       | Qty.       |
|---------------|-------------------|------------|
| IMMBTETRO003A | Tetrodotoxin, 3mL | 20 Pcs/Box |



# Chromatography

## Multi-Functional Purification Column

Multi-Functional Purification Column contains multiple adsorption matrices to adsorb quickly and selectively of lipids, organic acids, proteins, pigments and other impurities. The matrices do not absorb the target to realize fast purification.

### Features

- Complete purification in 30s
- Easy operation and high efficiency
- Stored at room temperature for more than 18 months
- Recovery rate  $\geq 90\%$ , RSD  $\leq 5\%$

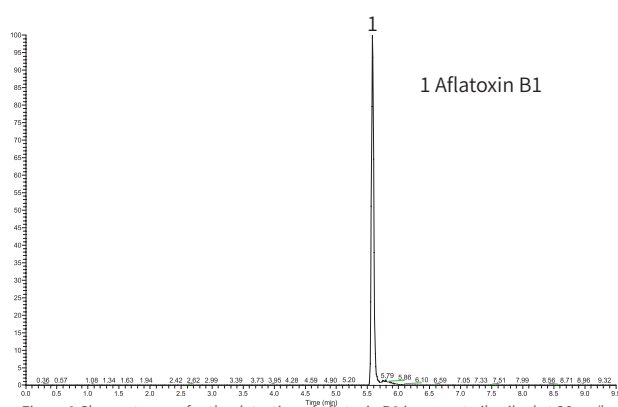


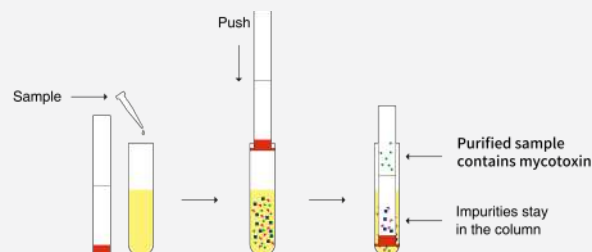
Figure 1 Chromatogram for the detection of aflatoxin B1 in peanut oil spiked at 20  $\mu\text{g/kg}$

Table 1 Recovery of aflatoxin B1 in 20  $\mu\text{g/kg}$  peanut oil

| Compound     | Recovery (%) | Average recoveries (%) | RSD (%) | Average recoveries (%) | RSD (%) |
|--------------|--------------|------------------------|---------|------------------------|---------|
| 1            | 2            | 3                      |         |                        |         |
| Aflatoxin B1 | 81.9         | 84.5                   | 82.4    | 82.9                   | 1.7     |

### Procedures

1. Extract sample.
2. Add the extracted sample to the test tube and insert the rubber-tipped end of the purification column into the test tube.
3. Push the purification column to the bottom of the test tube.
4. The purified sample passes through sorbent to the top of the purification column.
5. The purified sample can be analyzed after concentrate.



### Ordering information

| Product Code | Description                              | Application                        | Qty.       |
|--------------|------------------------------------------|------------------------------------|------------|
| CUCMFP1819A  | 228 Multi-Functional Purification Column | Patulin, Aflatoxin B1 B2 G1 G2     | 25 Pcs/Box |
| CUCMFP1820A  | 226 Multi-Functional Purification Column | Zearalenone, Aflatoxin B1 B2 G1 G2 | 25 Pcs/Box |
| CUCMFP1821A  | 224 Multi-Functional Purification Column | Zearalenone                        | 25 Pcs/Box |
| CUCMFP1823A  | 223 Multi-Functional Purification Column | Aflatoxin M1 M2                    | 25 Pcs/Box |
| CUCMFP1824A  | 230 Multi-Functional Purification Column | Deoxynivalenol                     | 25 Pcs/Box |
| CUCMFP1818A  | 229 Multi-Functional Purification Column | Ochratoxin A                       | 25 Pcs/Box |
| CUCMFP1822A  | 302 Multi-Functional Purification Column | Multiple functions                 | 25 Pcs/Box |

## Special SPE Cartridges

### Cartridges for Ion chromatography Preparation

In ion chromatography, organic, metal and other interfering ions may affect the analysis of target compounds. The pretreatment columns are based on the principle of reversed phase adsorption or ion exchange, can effectively remove interferences and ensure the accuracy of the results.

#### Ordering information

| Product Code  | Description   | Format | Qty.       |
|---------------|---------------|--------|------------|
| SPEB0IC18001A | C18 cartridge | 300mg  | 50 Pcs/Box |
| SPEB0IC0H001A | H cartridge   | 1mL    | 50 Pcs/Box |
| SPEB0ICNA001A | Na cartridge  | 1mL    | 50 Pcs/Box |

### Destaining Cartridges for Chrome (VI) Testing

Chrome (VI) in leather articles are converted from Chrome (III) in the process of leather production. The toxic substance has been banned by China and EU. To determine Chrome (VI), pigments in leather should be removed firstly.

Destaining cartridges for Chrome (VI) testing are dedicatedly optimized, capable of helping you remove pigments.

#### Features

- Optimized for destaining leather samples
- Improved recovery and repeatability
- Complying with official methods

#### Applications

- Determination of Chrome (VI) in leather

#### Ordering information

| Product Code     | Description | Qty.       |
|------------------|-------------|------------|
| SPEB0PACR121000A | 1000mg/12mL | 20 Pcs/Box |

### Polyamide(PA) SPE Cartridges

#### For Testing Artificial Color in Extraction Samples

PA is a macromolecule substance polymerized by Amide monomer(hexanolactam, adipamide, Oxalic acid), its amido linkage is easily to bring Hydrogen bond with other Polar bond groups, this enables to remove interferences such as artificial color from samples, this is used for testing artificial color.

PA SPE cartridges are filled with special optimized PA sorbent which enables its good decoloring and high recovery.



#### Specifications

- Particle Size: 100-200 mesh

#### Ordering information

| Product Code     | Description | Qty.       |
|------------------|-------------|------------|
| SPEB0PACR03500A  | 500mg/3mL   | 50 Pcs/Box |
| SPEB0PACR06500A  | 500mg/6mL   | 30 Pcs/Box |
| SPEB0PACR061000A | 1000mg/6mL  | 30 Pcs/Box |

### Cartridges for Plasticizer Testing

#### Determination of phthalate esters

Plasticizers are currently used in plastic and packaging food contact materials and their products are mostly phthalate esters (PAEs), some of which are carcinogenic and reproductively toxic. As toxic PAEs leached into food cause health risks for human beings, their use is strictly limited in EU, the U.S., China, Japan, etc.

GVS cartridges for plasticizer testing are made of glass tubes and PTFE frits that prevent impurities from being introduced into the sample. Dedicatedly optimized PSA sorbent also enables thorough cleanup and satisfactory recoveries for official methods.

#### Features

- Chemically inert glass tubes
- High purity PTFE frits
- Satisfactory recoveries for official methods

#### Applications

- Determination of phthalate esters in foods



#### Ordering information

| Product Code    | Description     | Qty.       |
|-----------------|-----------------|------------|
| SPEB00PAE065X5A | 500mg/500mg/6mL | 30 Pcs/Box |

# QuEChERS

## QuEChERS

In 2003, Michelangelo Anastassiades and Steven J. Lehotay developed a dispersive SPE (dSPE) method called QuEChERS (Quick, Easy, Cheap, Effective, Rugged, and Safe) to simplify the preparation of food samples pesticide analysis. The groundbreaking preparation method is widely applied to pollution tests in food safety, environmental water samples and soil pollutants.

GVS offers various centrifuge tubes, extraction tubes, purification tubes in different specifications to help you establish standard detection quickly.

### Features

- Good recovery rate for most pesticides, veterinary drugs and additives
- Fewer steps to limit manual error
- More friendly to the operators and environment
- Simple, quick and inexpensive

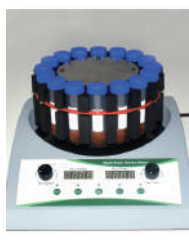
### Standards

- EN 15662 Foods of Plant Origin - Determination of pesticide residues using GC-MS and/or LC-MS/MS following acetonitrile extraction/partitioning and clean-up by dispersive SPE - QuEChERS-method
- AOAC Official Method 2007.01 Pesticide Residues in Foods by Aceton

### General Procedures of Mycotoxin Clean-Up Columns



① Weight Sample & Add Acetonitrile



② Vortex



③ Add QuEChERS Salts



④ Mix Well & Centrifuge



⑤ Add supernatant to A QuEChERS Clean Up Tube



⑩ Analysis



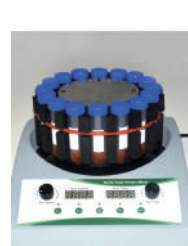
⑨ Filtration



⑧ Concentration



⑦ Centrifuge



⑥ Vortex

# Chromatography

## QuEChERS Extraction Kits

QuEChERS Extraction Kits include extraction pouches and 50 mL centrifuge tubes, ceramic homogenizers are optional as well. The pouches contain anhydrous extraction salts. Among the mixture,  $\text{MgSO}_4$  is responsible for removing water from samples, while other components are responsible for maintaining appropriate pH to ensure the recoveries of alkaline-sensitive pesticides.

Directly adding water-abundant samples into tubes containing extraction salts may cause local overheating which compromise the resulting recoveries. To avoid such situations, GVS provides separate extraction salt pouches that the operator can add extraction salts after the addition of organic solvents.

### Features

- The salts are sealed in aluminum foil bags to avoid leakage.
- The compositions are printed on the bag for handy choice. The easy-tear package is very convenient for use.
- Automated powder dispensing & packaging assembly line promise the accuracy and repeatability.

### Ordering information

#### AOAC 2007.01 Kits

| Product Code | Description                                      | Sorbents            | Qty.       |
|--------------|--------------------------------------------------|---------------------|------------|
| QUEB50X20YHA | Extraction Salts+50 mL Tube                      | 6 g $\text{MgSO}_4$ | 50 Pcs/Box |
| QUEB50X20CHA | Extraction Salts+50 mL Tube+Ceramic Homogenizers | 1.5 g NaOAc         | 50 Pcs/Box |

#### EN 15662 Kits

| Product Code | Description                                      | Sorbents                                        | Qty.       |
|--------------|--------------------------------------------------|-------------------------------------------------|------------|
| QUEB50X10YHA | Extraction Salts+50 mL Tube                      | 4 g $\text{MgSO}_4$<br>1 g NaCl                 | 50 Pcs/Box |
| QUEB50X10CHA | Extraction Salts+50 mL Tube+Ceramic Homogenizers | 1 g Trisodium Citrate<br>0.5 g Disodium Citrate | 50 Pcs/Box |

## Clean-Up Kits

QuEChERS Clean-Up Kits include sorbents and anhydrous  $\text{MgSO}_4$ , 2 mL and 15 mL centrifuge tubes, ceramic homogenizers are optional as well.

### Features

- Supply 2 mL or 15 mL clean-up tubes

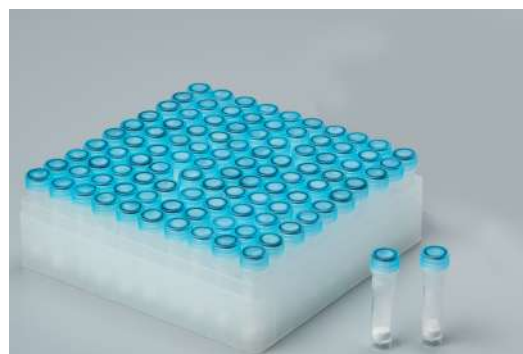
### Ordering information

#### BS EN 15662: 2018 Kits

| Product Code | Format | Application                                       | Sorbents                                       | Qty.       |
|--------------|--------|---------------------------------------------------|------------------------------------------------|------------|
| QUEB15X22YHA | 15 mL  | General fruits and vegetables                     | 150 mg PSA, 900 mg $\text{MgSO}_4$             | 50 Pcs/Box |
| QUEB15X32YHA | 15 mL  | General fruits and vegetables with fats and waxes | 150 mg PSA, 150 mg C18, 900 mg $\text{MgSO}_4$ | 50 Pcs/Box |

#### Ceramic Homogenizers

| Product Code | Description                 | Qty.       |
|--------------|-----------------------------|------------|
| QUEBCER15YYA | Ceramic Homogenizers, 15 mL | 100/Bottle |
| QUEBCER02YYA | Ceramic Homogenizers, 2 mL  | 200/Bottle |



# Chromatography

## QuEChERS Bulk Sorbents

GVS provides superior quality QuEChERS bulk sorbents which have been verified by our lab. You can choose the ratio according to the needs of the experiment.

### Features

- Supply 2 mL or 15 mL clean-up tubes
- Suitable for AOAC 2007, EN 15662 standards, etc.



### Ordering information

| Product Code      | Sorbent  | Specification                                                                                        | Qty.  |
|-------------------|----------|------------------------------------------------------------------------------------------------------|-------|
| SPESORB00PSA2100A | PSA      | Carbon Content: 8%, Surface area: 480 m <sup>2</sup> /g, Particle size: 50-75 µm, Pore size: 70 Å    | 100 g |
| SPESORB00C181100A | C18      | Carbon Content: 17.6%, Surface area: 300 m <sup>2</sup> /g, Particle size: 40-75 µm, Pore size: 70 Å | 100 g |
| SPESORB00GCB1050A | Carb-GCB | Surface area: 100 m <sup>2</sup> /g, Particle size: 100-300 mesh                                     | 50 g  |

## QuEChERS Ceramic Homogenizers

GVS Ceramic Homogenizers can be used in QuEChERS extraction kit and clean-up kit to improve extraction recovery and reproducibility.

### Features

- Inert ceramic material, no impurities dissolution
- Shorten sample extraction time and reduce labor cost
- Improve recovery rate and reproducibility of sample extraction



### Ordering information

| Product Code | Description                 | Qty.        |
|--------------|-----------------------------|-------------|
| QUEBCER02YYA | Ceramic Homogenizers, 50 mL | 100 Pcs/Box |
| QUEBCER15YYA | Ceramic Homogenizers, 15 mL | 100 Pcs/Box |
| QUEBCER50YYA | Ceramic Homogenizers, 2 mL  | 200 Pcs/Box |

## Empty Spin Columns with Filters



### Ordering information

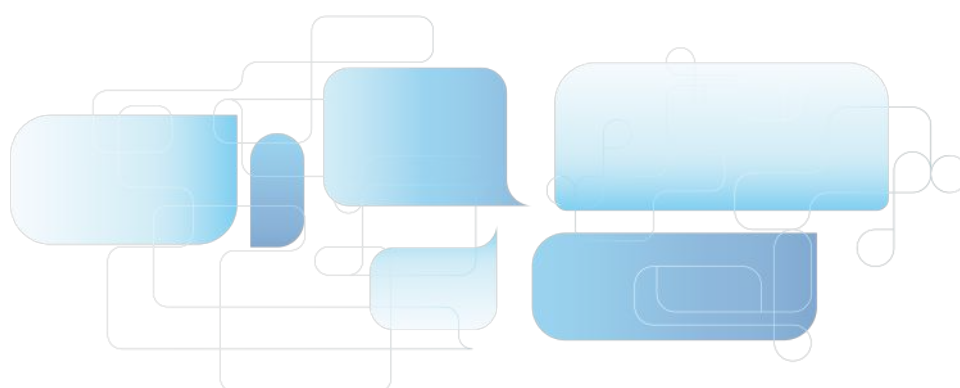
| Product Code  | Description                                                                                    | Qty.         |
|---------------|------------------------------------------------------------------------------------------------|--------------|
| SCB020C17400A | 2 mL Empty Spin Columns, outer tubes, capped inner tubes, UHMW-PE frits and fixing rings       | 1000 Pcs /PK |
| SCB020C17410A | 2 mL Empty Spin Columns, capped outer tubes, inner tubes, UHMW-PE frits and fixing rings       | 1000 Pcs /PK |
| SCB020C17700A | 2 mL Empty Micro Spin Columns, capped outer tubes, Inner Tubes, UHMW-PE frits and fixing rings | 1000 Pcs /PK |
| SCB015C17600A | 15mL Empty Spin Columns, outer tubes, inner tubes, UHMW-PE frits and fixing rings"             | 50 Pcs /PK   |
| SCB500C17500A | 50 mL Empty Spin Columns, outer tubes, inner tubes, UHMW-PE frits and fixing rings             | 10 Pcs /PK   |

## Lysis-Filtration Columns

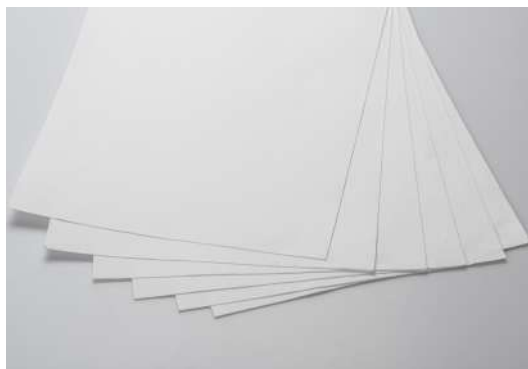


### Ordering information

| Product Code    | Description                                                   | Qty.       |
|-----------------|---------------------------------------------------------------|------------|
| SCB015B1001A    | 1.5 mL Lysis-filtration column, cappless spin column          | 500 Pcs/PK |
| SCB015B10011SA  | 1.5 mL Lysis-filtration column, cappless spin column, sterile | 100 Pcs/PK |
| SCB020B1002A    | 2.0 mL Lysis-filtration column, cappless spin column          | 500 Pcs/PK |
| SCB020B10021SSA | 2.0 mL Lysis-filtration column, cappless spin column, sterile | 50 Pcs/PK  |
| SCB020B10022A   | 2.0 mL Lysis-filtration column, capped spin column            | 100 Pcs/PK |
| SCB020B10022SA  | 2.0 mL Lysis-filtration column, capped spin column, sterile   | 100 Pcs/PK |



## Silica Membrane



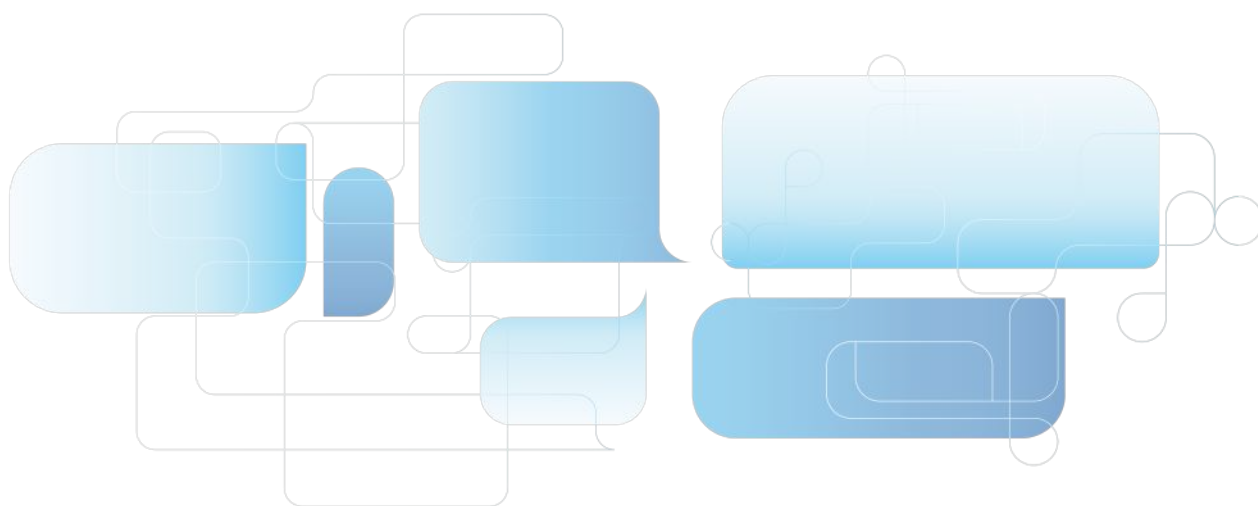
GVS Silica membrane is a key component in spin columnbased nucleic acid purification technology. Under low pH and chaotropic conditions, nucleic acids specifically bind to silica membrane while polysaccharides and proteins pass through. Impurities are further removed by washing. Finally, under low-salt conditions, nucleic acids are desorbed and eluted from the membrane.

### Features

- High quality with high yield and good reproducibility
- Suitable for spin columns or plates

### Ordering information

| Product Code | Description                       | Qty.         |
|--------------|-----------------------------------|--------------|
| NAEB181828A  | Silica Membrane, 210*297 mm/Sheet | 100 Sheet/PK |



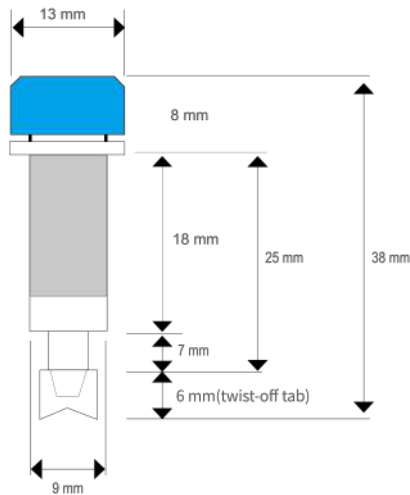
## Empty Screw Cap Spin Columns



GVS Empty Screw Cap Spin Columns are designed for small volume protein purification, which can be filled with different chromatography media such as agarose, dextran, ion exchange resin, biogel and etc. The principle is centrifugation to purify protein quickly.

### Direction

Load affinity resin and other fillers into the spin column. After the filler deposit automatically, gently remove the twists off bottom and allow the excess buffer flow out. Load the sample to combine, then, centrifuge to remove unbound impurities. Finally, elute purified products.



### Features

- Columns are made of medical polypropylene with polyethylene frits, ensuring minimal protein-binding properties
- Compatible with 1.5 mL and 2.0 mL centrifuge tubes
- Capacity: 800  $\mu$ L
- Resin volume: 40-400  $\mu$ L
- O-ring screw top caps and twist-off bottom

### Ordering information

| Product Code | Description                                           | Qty.       |
|--------------|-------------------------------------------------------|------------|
| SCB008A5001A | 800 $\mu$ L Empty Screw Cap Spin Columns, Hydrophilic | 50 Pcs/Box |
| SCB008A5002A | 800 $\mu$ L Empty Screw Cap Spin Columns, Hydrophobic | 50 Pcs/Box |

## Empty Micro-spin Chromatography Columns



GVS Empty Micro-spin Chromatography Columns are designed for easy and efficient small-scale protein purification. Researchers can pack a wide range of chromatography resins to purify proteins of interest using a microcentrifuge.

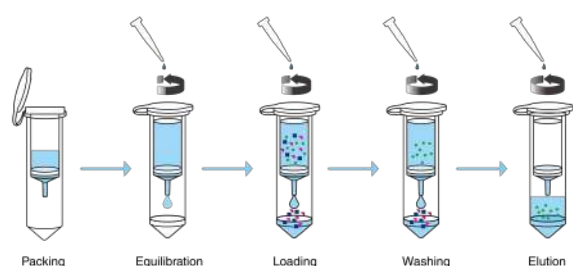
Researchers can pack columns with their own chromatographic media using different separation mechanisms (e.g., immunoaffinity, ion exchange, size exclusion, reverse phase) to realize various applications.

### Features

- Tubes are made of high quality medical-grade polypropylene
- Sintered UHMW-PE Frits with excellent solvent compatibility
- Suitable for 1.5 mL and 2.0 mL microcentrifuge tubes
- Volume of spin column: 800  $\mu$ L
- Volume of resin: 20-500  $\mu$ L

### Applications

Affinity chromatography, desalting, IP, co-IP



### Ordering information

| Product Code | Description                                                                                                                                          | Qty.       |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| SCB020A1001A | 2 mL Empty Micro-spin Chromatography Columns, including Collection Tubes (2.0 mL), Spin Columns (800 $\mu$ L, with lids), Frits and Bottom Caps      | 100 Pcs/PK |
| SCB020A1101A | 2 mL Empty Micro-spin Chromatography Columns, including Collection Tubes (2.0 mL), Spin Columns (800 $\mu$ L, without lids), Frits and Bottom Caps   | 100 Pcs/PK |
| SCB015A1102A | 1.5 mL Empty Micro-spin Chromatography Columns, including Collection Tubes (1.5 mL), Spin Columns (800 $\mu$ L, without lids), Frits and Bottom Caps | 100 Pcs/PK |

## Empty Spin Chromatography Columns



GVS Empty Spin Chromatography Columns are designed for easy and efficient large-scale protein purification.

### Features

- Tubes are made of high quality medical-grade polypropylene
- Sintered UHMW-PE Frits with excellent solvent compatibility
- Suitable for 15 mL and 50 mL centrifuge tubes
- Volume of spin column: 4 mL/22 mL

### Application

Affinity chromatography, desalting, IP, co-IP

### Ordering information

| Product Code | Description                                                                                                              | Qty.      |
|--------------|--------------------------------------------------------------------------------------------------------------------------|-----------|
| SCB150A300A  | 15 mL Empty Spin Chromatography Columns, including Collection Tubes (15 mL), Spin Columns (4 mL), Frits and Bottom Caps  | 50 Pcs/PK |
| SCB500A200A  | 50 mL Empty Spin Chromatography Columns, including Collection Tubes (50 mL), Spin Columns (22 mL), Frits and Bottom Caps | 20 Pcs/PK |

## Solid Phase Extraction Vacuum Manifolds



12-Port SPE Vacuum Manifold



24-Port SPE Vacuum Manifold

The SPE Vacuum Manifolds realize activating, loading, rinsing, eluting and other processes in SPE sample pretreatment by controlling the pressure.

### Features

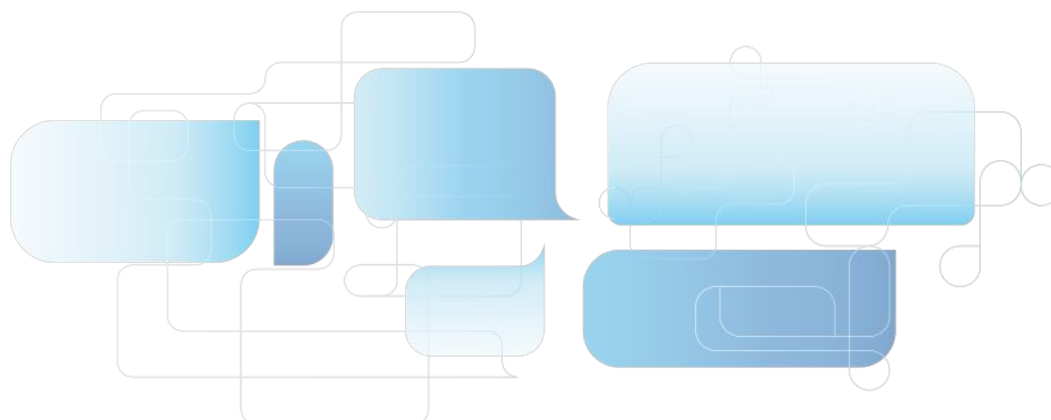
- Accuracy: individual valves control the flow rate independently
- Compatibility: the height of the test tube rack is adjustable

### Parameters

| Model                | SPMF12G               | SPMF24G-S             |
|----------------------|-----------------------|-----------------------|
| Ports                | 12                    | 24                    |
| Lid                  | Polyoxymethylene      | Polyoxymethylene      |
| Glass Vacuum Chamber | Quartz                | Quartz                |
| Pressure Resistance  | -80 Kpa               | -80 Kpa               |
| Stable Pressure      | 0~80 Kpa              | 0~80 Kpa              |
| Test Tubes           | ≤ 105 mm, Φ10/Φ13/Φ15 | ≤ 105 mm, Φ10/Φ13/Φ15 |

### Ordering information

| Product Code   | Description                                                                         | Qty.         |
|----------------|-------------------------------------------------------------------------------------|--------------|
| SPEMANIB12GEA  | 12-Port SPE Vacuum Manifold, square shape, individual flow valve, transparent glass | 1 Set/Carton |
| SPEMANIB24GSEA | 24-Port SPE Vacuum Manifold, square shape, individual flow valve, transparent glass | 1 Set/Carton |



## Vacuum Manifolds

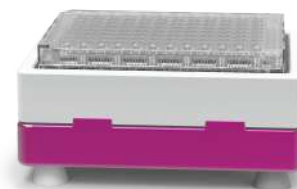
The manifolds are adapted to 48/96/384 well plates and Luer-inlet columns to eliminate repetition of pipetting and centrifugation in traditional nucleic acid extraction methods.



Universal Vacuum Manifolds



Double-Layer



Micro-Filter Plate Vacuum Manifolds

### Features

- Reliability: made of anti-corrosion and durable material
- Uniformity: the compact design ensures uniform flow rate during extraction at negative pressure
- Convenience: eliminate repeated operations of centrifugation and pipetting in traditional methods to improve efficiency

### Applications

|                                     |                                                                                                                                                                                |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Universal Vacuum Manifolds          | Nucleic acid extraction, solid phase extraction, protein precipitation, QuEChERS, phospholipids removal, Oligo synthesis of deprotection, ammonolysis and other processes etc. |
| Double-Layer Vacuum Manifolds       | Enable filtration and extraction at same time for nucleic acid extraction, solid phase extraction, protein precipitation, phospholipids removal, etc.                          |
| Micro-Filter Plate Vacuum Manifolds | Protein kinase and phosphatase assays, protein purification, receptor interaction assays, protein binding assays, ELISPOT assays, mass spectrometry, fluorescent dye removal   |

### Ordering information

| Product Code   | Description                                         | Qty.         |
|----------------|-----------------------------------------------------|--------------|
| MANIFBZZNE03RA | Universal Vacuum Manifolds (rose red)               | 1 Set/Carton |
| MANIFBZZNE03BA | Universal Vacuum Manifolds (sapphire blue)          | 1 Set/Carton |
| MANIFBZZNE04RA | Double-Layer Vacuum Manifolds (rose red)            | 1 Set/Carton |
| MANIFBZZNE04BA | Double-Layer Vacuum Manifolds (sapphire blue)       | 1 Set/Carton |
| MANIFBZZNE07RA | Micro-Filter Plate Vacuum Manifolds (rose red)      | 1 Set/Carton |
| MANIFBZZNE07BA | Micro-Filter Plate Vacuum Manifolds (sapphire blue) | 1 Set/Carton |

## Vacuum Pump

GVS Vacuum Pumps are designed to work with vacuum manifolds. Utilizing diaphragm vacuum technology without oil to eliminate contamination of media that occurs in rotary vane pumps.



Adjustable

### Parameters

| Oil-Free Vacuum Pump | Adjustable           |
|----------------------|----------------------|
| Model                | SPEPUMPB02EA         |
| Ultimate Pressure    | 0.02~0.08            |
| Max. Flow            | 5~30 L/min           |
| Power                | 90 W                 |
| Power Supply         | A.C. 220 V, 50/60 Hz |
| Weight               | 3.8 Kg               |

### Ordering information

| Product Code | Description                                                                                       | Qty.         |
|--------------|---------------------------------------------------------------------------------------------------|--------------|
| SPEPUMPB02EA | Adjustable Oil-Free Vacuum Pump, adjustable pressure: 0.02~0.08, waste collection bottle included | 1 Set/Carton |



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## PRODUCT COLLECTION - Chromatography

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