

PC Tech 2011



Valve Systems for LC & LC/MS

Instrument Catalog

Auto SPE



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SPE-01 Cleanup Station

SPE-01 cleanup station is designed for sample preparation in trace analysis of food and environmental samples. By automating the tedious cleanup procedures, SPE-01 helps to increase the sample throughput and improves the quality of analytical results.

1. Features

1.1 Easy operation

SPE-01 uses built-in methods for automatic column cleanup. The method can be easily edited and can be saved for repeated use. The operation of instrument involves only 7 buttons.

Below are typical routine operation procedures:

- Place sample probes in samples
- Place columns and receiving tubes
- Choose/edit method
- Select samples
- Press the start/stop button



The instrument will process samples one by one till all of the samples have been cleaned up. The touch screen LCD makes operation of the instrument easy and fast.

1.2 Full automation

SPE-01 can automatically fulfill the following actions:

- Pre-condition of columns
- Sample loading
- Multi-step elution to remove sample matrix
- Blowing air through the column to dry the sorbent
- Multi-step fraction collection
- Detection and smart handling of column blockage

When the instrument detects a blockage in column, it will automatically reduce the flow rate. Only when the problem cannot be solved by using lower flow rates, the instrument will go to the pause mode. The process can resume after the blockage is removed. It is not necessary to start all over again.

1.3 Small footprint and computer-free operation

The instrument has a small footprint and does not need a computer. The solvent bottles are placed on top of the instrument. The compact design helps to save precious laboratory space. When volatile or toxic solvents (such as hexane, acetone, and petroleum ether) are used in sample preparation, the instrument can be conveniently placed in a fume hood.

1.4 Easy transfer of existing manual methods

Below is an example of methods for SPE-01:

| Line # | Action | Flow rate | Volume |
|--------|-----------|-----------|--------|
| 1 | Elute 2 | 15 | 5.0 |
| 2 | Elute 1 | 15 | 10.0 |
| 3 | Add samp | 6 | 20.0 |
| 4 | Elute 2 | 6 | 5.0 |
| 5 | Collect 1 | 6 | 5.0 |
| 6 | Elute 3 | 10 | 10.0 |
| 7 | Collect 2 | 6 | 10.0 |

The format is very similar to manual methods. Any manual procedure for column cleanup can be conveniently transferred to an instrument method.

2. Applications

2.1 Column cleanup for analysis of drug and pesticide residues in food samples

Traditional column cleanup uses glass columns packed with silica gel, alumina, or Florisil. Now pre-packed solid phase extraction cartridges are getting popular.

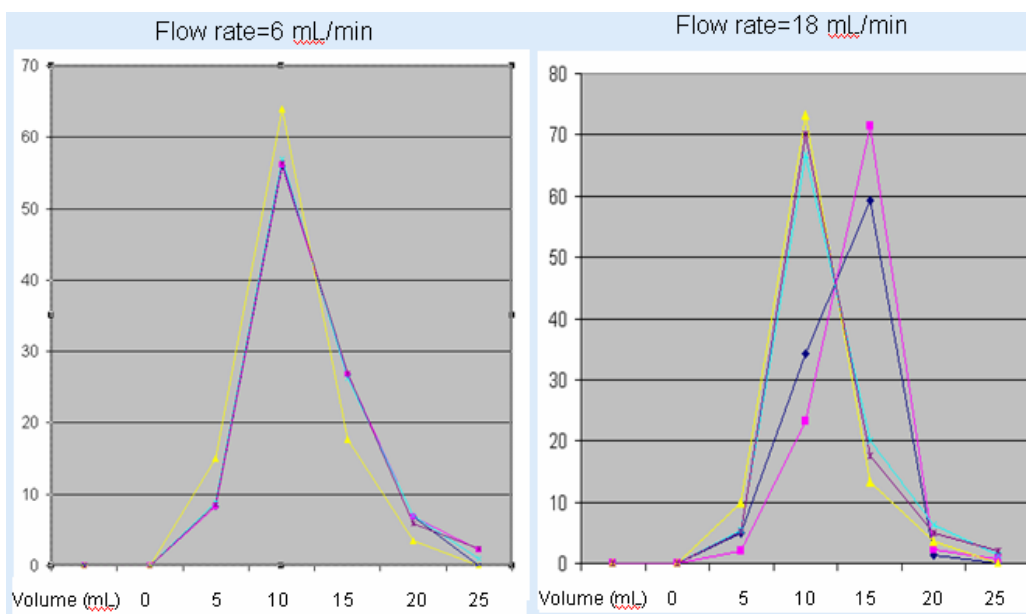
A typical clean up method involves pre-conditioning of column using a strong solvent (such as acetone) followed by a weak solvent (such as hexane). After adding the sample, columns are first eluted with a weak solvent to remove lipids and other low polarity components from sample matrix. The strength of elution solvents can then be increased stepwise. In handling multi-residue analysis, pesticides of different polarity may be collected into two fractions. Existing methods can be easily modified and used for SPE-01 plus automation process.

Since it is hard to control the flow rate and volume of solvents, the repeatability of manual SPE is not satisfactory and is mainly used for simple clean up. SPE-01 plus can control flow rate accurately and helps to improve reproducibility of the analysis. With SPE-01 plus, users can do multi step elution using up to 5 solvents. Therefore, the instrument is very useful for the clean up of complex samples and especially for the simultaneous analysis of multi-residues.

2.2 Accelerated elution (Flash column chromatography)

The flow rate in manual column cleanup is limited by gravity and particle size of the sorbent. In addition to unstable flow rate, the elution cannot be accelerated. In organic synthesis field, column chromatographic purification has seen a drastic improvement after introduction of flash HPLC which uses higher flow rate and sorbent of smaller particles. However this technique is seldom used for sample cleanup in trace analysis due to the lack of suitable automated cleanup instruments.

The performance of the pump in SPE-01 is comparable to the pump used in a flash LC. It can deliver a flow rate up to 20 mL/min. The high output pressure also allows to use smaller particles (10-20 μm) to improve the column efficiency. Below is an example of its application for pesticide residue cleanup in tea.



Elution pattern of 5 pyrethroid insecticides on column packed with 3 gram florasil (fenpropathrin, cyhalothrin, cypermethrin, denvalerate, deltamethrin).

As shown in the above figures, elution pattern at 18 mL/min is similar to that at 6 mL/min (near the flow rate in manual column cleanup). A much faster elution speed can be achieved in automated column cleanup.

Currently the particle size of packing material for SPE cartridges and column chromatographic cleanup is normally of 40 μm and above. Although it is known that a smaller particle gives better separation efficiency and reduces elution volume in chromatography, it is not practical in manual operation as the liquid will have problem flowing out. With the introduction of SPE-01, it becomes possible to use columns with smaller particles.

3. Specifications

| | |
|--------------------------|--|
| Sample capacity | 6 per batch |
| Volume of sample | 1 to 100 mL |
| Fraction collection | 2 fractions per sample, maximum fraction volume, 50 mL |
| Material of wetted parts | Teflon, PEEK, Pyrex glass |
| System control | Micro controller with LCD and keypad |
| Method | Permanent storage of 3 methods |
| Method functions | Pre condition, load sample, elution with 5 solvents, blow dry of sorbent, fraction collection. |
| Pump flow rate | 1 to 20 mL/min |
| Precision of pump | CV < 1.5% |
| Power supply | 24 VDC |
| Current | < 1 A |
| Weight | 12.5 kg |
| Dimension | 34 x 34 x 45cm (width x depth x height) |

4. Ordering Information

| Part Number | Description | Price (US\$) |
|-------------|---|--------------|
| SPE-01-01 | Includes SPE-01 mainframe, 24V power supply, collection tray, adapter for 3-mL and 6-mL columns, and user manual. | |

SPE-03 4-Channel Cleanup Station

SPE-03 4-channel cleanup station is designed for automatic solid phase extraction of large volume water samples. It has four pumps to handle four samples simultaneously. By providing constant flow rate and well controlled elution procedures, SPE-03 helps to improve quality and efficiency of water analysis and release chemists from tedious sample preparation routines.

1. Features

1.1 Easy operation

SPE-03 uses built-in methods for automatic extraction. The methods can be easily edited and saved for repeated use. The operation of instrument involves only 7 buttons. Below are typical routine operation procedures:

- Place sample inlet probes in samples
- Place columns and receiving containers
- Select method
- Press start/stop button

1.2 Blockage detection and smart handling

The system can detect the blockage and reduce the flow rate accordingly. If blockage still occurs at the minimum flow rate, the instrument will pause and wait for human attendance.

1.3 Built-in air pump for drying of SPE column

If the final analysis is by GC or GC-MS, the collected fraction after SPE cleanup needs concentration. Moisture left in the fraction can affect the concentration process. A drying step is necessary after loading the water sample to SPE column. This is normally achieved by blowing air or nitrogen through the SPE column. SPE-03 has a built-in air pump and thus a gas cylinder is not necessary.

1.4 Small footprint and computer-free operation

The instrument has a very small footprint and does not need a computer. The elution solvents are placed on the top of the instrument. The compact design helps to save precious laboratory space.

1.5 Different flow rate for each elution steps

Different flow rates can be set for column conditioning, sample loading, and elution. Procedures that are not sensitive to flow rate (e.g. conditioning and blow dry) can use higher flow rate to save time.



1.6 Separate collection of water waste and solvent waste

SPE-03 collects water waste and organic solvent waste in different containers. This feature helps to protect our environment and reduce cost in waste treatment.

2. Specifications

| | |
|------------------------------|--|
| Sample capacity | 4 per batch |
| Volume of sample | 1 to 4000 mL |
| Material of wetted parts | Teflon, PEEK, Pyrex glass |
| System control | Micro controller with LCD and keypad |
| Method | Permanent storage of three methods |
| Method functions | Pre condition, load sample, elution with 5 solvents, blow dry of sorbent, fraction collection. |
| Pump flow rate | 1 to 30 mL/min |
| Pressure limit of pump | 6 bar |
| Pump reproducibility (C.V.%) | <1.5 |
| Power supply | 24 VDC |
| Current | < 1 A |
| Weight | 13 Kg |
| Dimension (cm) | 34 x 34 x 45cm (width x depth x height) |

3. Ordering Information

| Part Number | Description | Price (US\$) |
|-------------|---|--------------|
| SPE-03-01 | Includes SPE-03 mainframe, 24V power supply, collection tray, sample inlet head with filter, adapter for 3-mL and 6-mL columns, and user manual | |

SPE-04 Cleanup Station

SPE-04 cleanup station is designed for automatic cleanup of biological samples. Compared to SPE-01, SPE-04 has smaller sample volume and fraction volume and can process much larger number of samples per batch.

1. Features

1.1 Easy operation

The operation of SPE-04 is similar to SPE-01. It involves only 7 buttons. Below are typical routine operation procedures:

- Select method
- place sample columns and receiving containers on the tray
- Press start/stop button

1.2 Small footprint and computer-free operation

Like other SPE instrument from PromoChrom, SPE-04 has a very small footprint and does not need a computer. The elution solvents are placed on the top of the instrument. The compact design helps to save precious laboratory space.



1.3 Different flow rate for each elution steps

Different flow rates can be set for column conditioning, sample loading, and elution. Procedures that are not sensitive to flow rate (e.g. conditioning and blow dry) can use higher flow rate to save time.

1.4 Automatic needle wash

Sample needle is thoroughly washed before processing each sample. The tubing is also continuously washed to avoid cross contamination.

1.5 Upgradeable to advanced functions

SPE-04 can be upgraded to add online SPE and online derivatization function. It can also add function for auto sample injection for HPLC.

2. Specifications

| | |
|------------------------------|--|
| Sample capacity | 18 or 41 per batch |
| Volume of sample | 4 or 20 mL |
| Fraction collection | 2 fractions with maximum volume 50 mL or 4 mL |
| Material of wetted parts | Teflon, PEEK, Pyrex glass |
| System control | Micro controller with LCD and keypad |
| Method | Permanent storage of three methods |
| Method functions | Pre condition, load sample, elution with 5 solvents, blow dry of sorbent, fraction collection. |
| Pump flow rate | 1 to 30 mL/min |
| Pressure limit of pump | 6 bar |
| Pump reproducibility (C.V.%) | <1.5 |
| Power supply | 24 VDC |
| Current | < 1 A |
| Weight | 7 Kg |
| Dimension (cm) | 34 x 42 x 35 cm (width x depth x height) |

3. Ordering Information

| Part Number | Description | Price (US\$) |
|-------------|--|--------------|
| SPE-04-01 | Includes SPE-04 mainframe, 24V power supply, and user manual | |

SPE-05 multi function SPE

SPE-05 multi function SPE is a flexible and versatile platform for automatic sample preparation. It can perform multiple tasks: offline SPE, online SPE, normal sample injection, and online derivatization with controlled temperature.

1. Features

1.1 Offline SPE

It can work like above described SPE-04 for offline column cleanup and fraction collection. When working in offline mode, computer is not necessary. Users can set up the instrument quickly using the 7 buttons.



1.2 Online SPE

In online mode, the collected fraction is directly injected into an HPLC or LC-MS for final determination. The control software for online SPE is user friendly and is compatible with most HPLC software.

The software uses methods and sequences for the automation. It has similar structure as Agilent Chemstation. Users of HPLC can easily understand the SPE-04 software.

The software can perform overlapped injection. When HPLC is performing an HPLC run, SPE-04 can start processing the next sample.

In online mode, SPE-05 can perform derivatization under controlled temperature. This function is very useful for analysis of amino acids, hormones, and some pesticides.

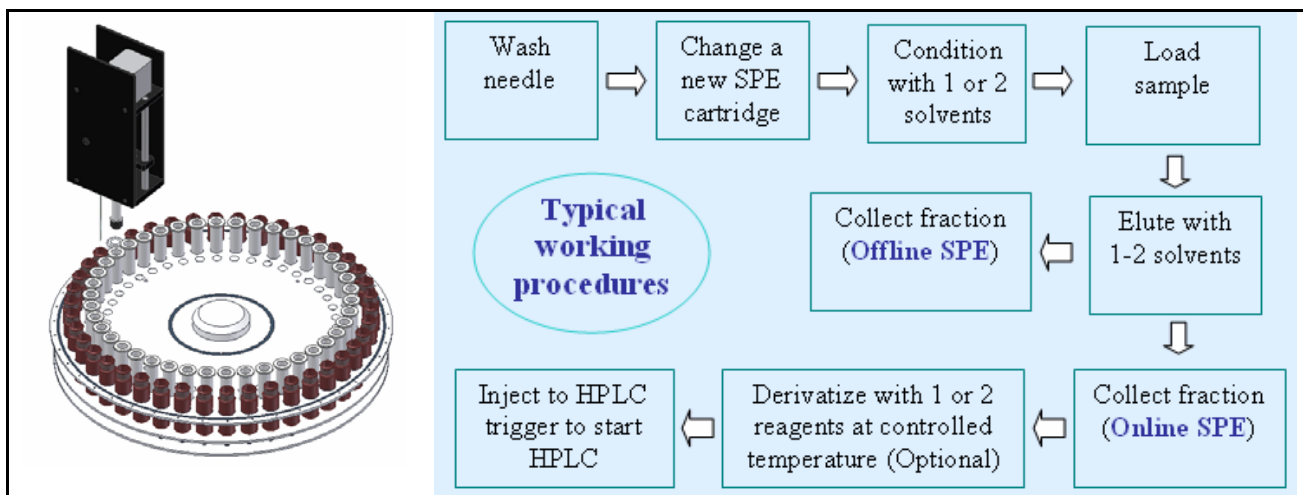
| Action | Parameter 1 | Parameter 2 | Time | Vial | Method |
|-------------------------|-------------|-------------|------|------|-------------|
| elute C1 with 1 | 2 | 10 | 0.00 | 3 | test1.txt |
| elute C1 with 2 | 2 | 10 | 4 | 5 | steprun.txt |
| load sample to C1 | 2 | 3 | 8 | 6 | steprun.txt |
| elute C1 with 2 | 1 | 5 | 10 | 1 | steprun.txt |
| blow air | 4 | 20 | 20 | 2 | steprun.txt |
| elute C1 with 3 | 0.2 | 5 | 30 | 3 | steprun.txt |
| collect fraction | 1 | 5 | 40 | 4 | steprun.txt |
| blow air | 2 | 20 | 50 | 5 | steprun.txt |
| load fraction to heater | 0.4 | 0 | 60 | 6 | steprun.txt |
| heat | 70 | 3 | 70 | 7 | steprun.txt |
| inject reactant | 0.2 | 4 | 80 | 8 | steprun.txt |
| start LC | 0.0 | 5 | 90 | 9 | steprun.txt |
| clean needle | 1 | 3 | 100 | 10 | steprun.txt |

1.3 Direct sample injection

SPE-05 can work as an auto sampler. Therefore, the HPLC does not need to have another sample introduction device. This feature can reduce the cost of an HPLC system considerably.

2. Working principle

The following diagrams describe the structure and typical working procedures of the 3-in-1 model.

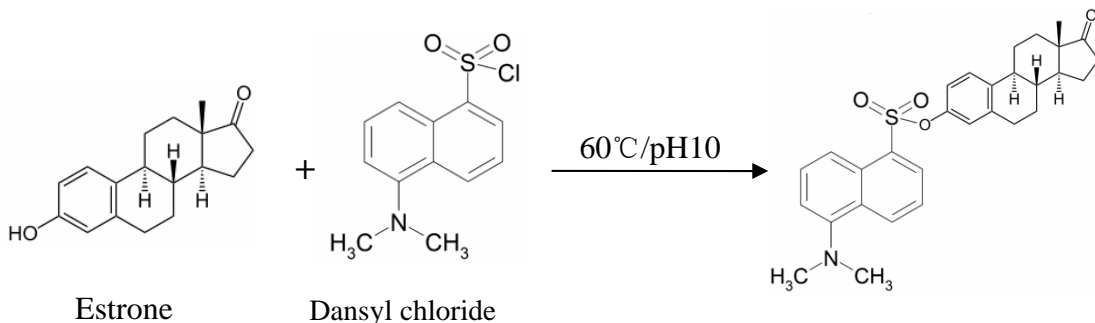


The plunger for SPE column can seal the column well. It can work with SPE columns from most suppliers. There is no need for a special cap or adapter.

3. Application example

Direct analysis of hormone in plasma sample:

- 1) Dilute plasma sample with 1% phosphoric acid at 1:1 ratio
- 2) Precondition a 3-mL/500-mg C18 SPE column with 2 mL methanol followed by 2 mL water
- 3) Load 2 mL sample and wash with 4 mL water+methanol (80:20)
- 4) Wash SPE column using methanol and collect 1 mL fraction



- 5) Derivatize the fraction with dansyl chloride at 60 °C
- 6) HPLC analysis using a PCTsil C18 column and UV or fluorescence detection.

4. Specifications

| | |
|--------------------------------|---|
| Sample capacity | 18 or 41 per batch |
| Maximum sample volume | 4 or 20 mL |
| Material of wetted parts | Teflon, PEEK, Pyrex glass |
| System control | Computer or micro controller with LCD and keypad |
| Method functions | Pre condition, load sample, elution with 5 solvents, blow dry of sorbent, mix fraction with 1 or 2 derivatization reagents, heat up to 80 °C. |
| Temperature for derivatization | Ambient to 80 °C |
| Type of derivatization reagent | 2 |
| Pump flow rate | 1 to 30 mL/min |
| Pressure limit of pump | 6 bar |
| Pump reproducibility (C.V.%) | <1.5 |
| Power supply | 24 VDC |
| Current | < 1 A |
| Weight | 7 Kg |
| Dimension (cm) | 34 x 42 x 35 cm (width x depth x height) |

5. Ordering Information

| Part Number | Description | Price (US\$) |
|-------------|--|--------------|
| SPE-05-01 | Includes SPE-05 mainframe, sample injection module for HPLC, control software, remote cable for HPLC, 24V power supply, and user manual. | |
| SPE-05-02 | Includes SPE-05 mainframe, sample injection function for HPLC, online derivatization module, and control software, remote cable for HPLC, 24V power supply, and user manual. | |

Online SPE for Direct Analysis of Water Samples

Online SPE is for direct analysis of water samples. It combines sample extraction and LC or LC-MS analysis.

1. Working principle

The online SPE uses valves and a syringe pump to transfer sample to SPE column and then to the HPLC system.

The control software looks after the detailed valve switches. Users only need to select the necessary actions. Such as “load sample”, “add reagent 1”, “inject”, “start LC”, etc. The device uses remote signal to trigger start of HPLC. While the HPLC is running a sample, online SPE can carry out extraction of next sample. The overlapped introduction saves the time for sample preparation.

2. Applications

Below is an example for direct analysis of polycyclic aromatic hydrocarbons (PAH) in tap water at ppt level. A 40-mL tap water is analyzed directly. Since the whole portion of the sample is injected to the analytical column, the detection limit can go down to 5 ppt without using fluorescence detection. By using the overlapped injection feature, the processing time for one sample is only 15 minutes.



Online SPE PromoChrom

Initialize Configure Report Method Sequence Step run Diagnosis

Start Pause Run status: Ready Loaded method: Example.txt Time elapsed: []

| Action | Parameter 1 | Parameter 2 |
|-------------------|-------------|-------------|
| elute with 2 | 5.0 | 5 |
| elute with 1 | 3.0 | 10 |
| flush sample line | 0.5 | 5 |
| load sample | 10.0 | 4 |
| elute with 1 | 2.0 | 5 |
| inject | 20.0 | 5 |
| start LC | 0.0 | 1 |

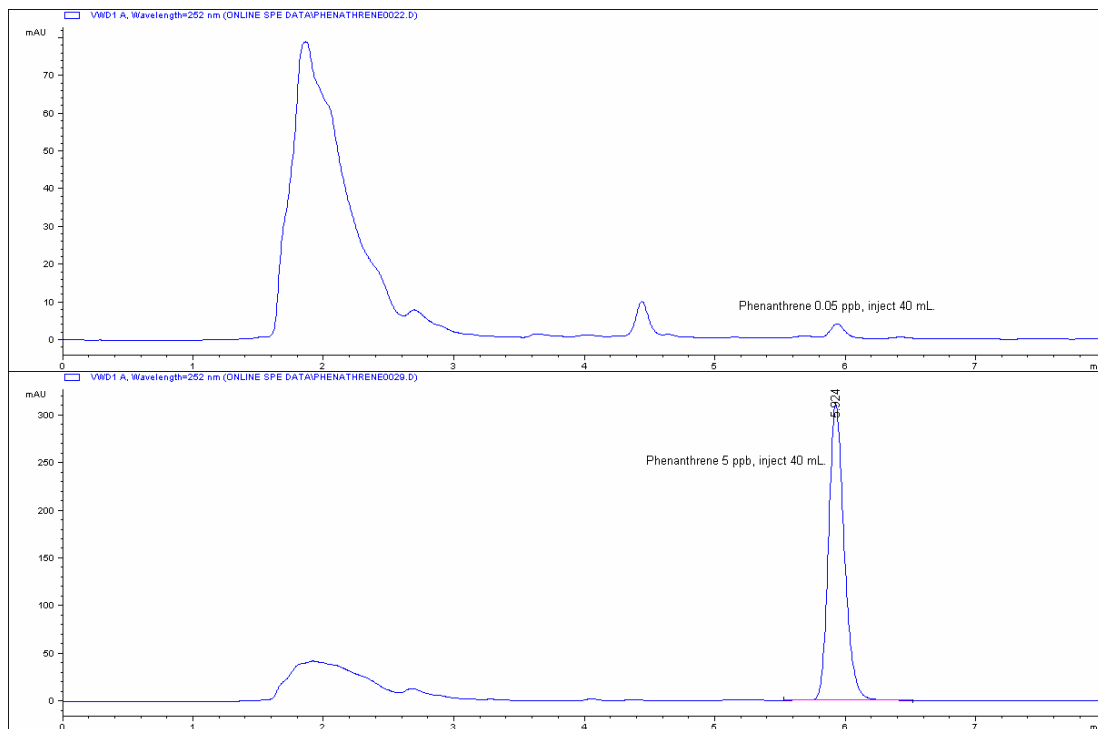
| Time | Vial | Method | Description |
|------|------|-----------|-------------|
| 0.02 | 1 | short.txt | |

Method: default.txt (selected), Example.txt, short.txt. Description: For demo regular method.

Sequence: default.txt (selected), Routine.txt, short.txt.

Save report: Report name: [] Description: []

Ready



Direct analysis of phenanthrene in tap water at 5 ppb and 50 ppt level using online SPE coupled with HPLC. SPE column, TrapN; analytical column PromSil C18; sample volume, 40 mL; flow rate for sample loading, 6 mL/min; detection wavelength, 252 nm.

In an offline approach, normally 500 to 1000 mL water need to be extracted. Further concentration and solvent exchange are followed before the instrument analysis. Only a very small portion of the concentrated sample is injected to the HPLC. To achieve similar detection limit of online SPE, 4-liters of water need to be extracted. The processing time for one sample is above 1 hour.

Another advantage of online SPE over offline SPE is its good reproducibility. Since online SPE involves fewer procedures than the offline approach and all these procedures are controlled by instrument, the chance of error is much less. Even at 0.05 ppb level, the %RSD is only 2.5 (n=3).

Therefore, if the pollutant can be analyzed by HPLC, the online approach should be used.

The key for a successful application of online SPE is the selection of a suitable SPE column and the analytical column. To simplify the method development, PromoChrom provides two method kits with well matched SPE column and the analytical column. They also include the method parameters for most common analysis. By slightly adjusting the parameters, users can easily development their own methods.

3. Specifications

| | |
|------------------------------|--|
| Number of samples | 10 |
| Volume of sample (mL) | 1-100 |
| Number of elution solvents | 4 |
| Pump reproducibility (C.V.%) | < 1.5 |
| Pressure limit of pump | 10 bar |
| Material of wetted parts | Stainless steel, Teflon, PEEK, special glass |
| System control | Software via computer |
| Power supply | 24 VDC |
| Current | < 1 A |
| Weight | 7.0 Kg |
| Dimension | 26 x 26 x 37 cm (width x depth x height) |

4. Ordering Information

| Part Number | Description | Price (US\$) |
|-------------|--|--------------|
| LC-03-01 | Online SPE | |
| LC-03-03 | Method kit for compounds of low polarity (Include 5 TrapN SPE column, one analytical column, and methods) | |
| LC-03-04 | Method kit for compounds of high polarity (Include 5 TrapP SPE column, one analytical column, and methods) | |

LC-05 Auto Injector

LC-05 auto injector is for automatic introduction of samples from a fixed source. Typical applications are online monitoring. It enables a normal HPLC to fulfill tasks that cannot be done using a HPLC auto sampler.

By adding a valve based fraction collector, large scale purification can be achieved using an analytical scale HPLC.

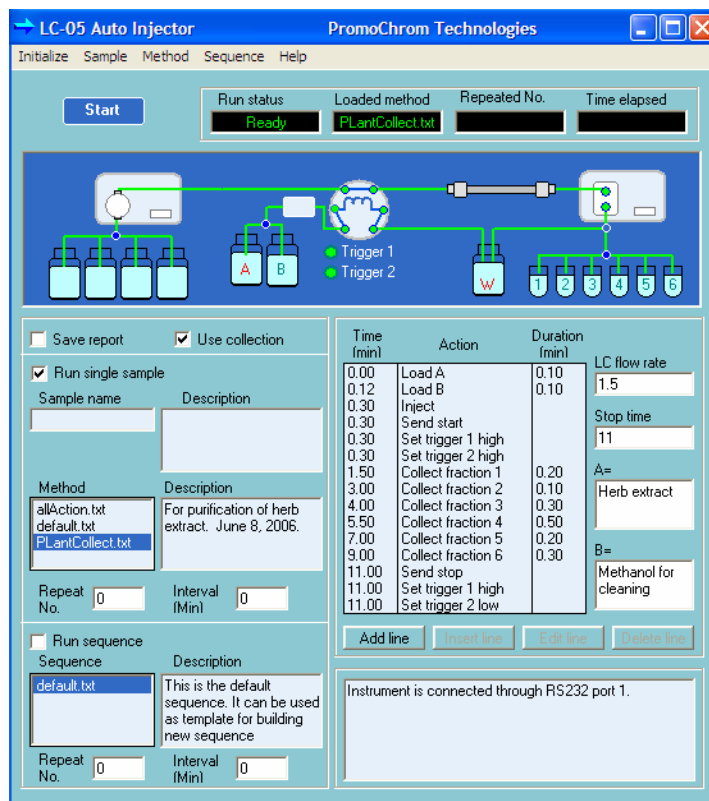
LC-05 Auto Injector is designed to work with any type of HPLC instruments. Its versatile interface makes the integration easy and fast. The user friendly and powerful software provides highly automatic and reliable control.



1. Working principle

The injector consists of a divert valve, a load pump, a high-pressure switch valve, and the control software. The divert valve makes selection between two sources for injection. For on-line analysis, one source can be the sample and the other source can be the calibration solution. In case of repeated injection for large scale purification, the two sources can be two samples. The load pump is used to deliver sample to the sample loop. The pump can deliver very accurate volume, since the volume per cycle is fixed and the number of cycles is controlled by the software. The switch valve is used to connect the HPLC pump to the sample loop for injection.

The diagram of the software not only demonstrates the working principle but also serves as a graphical user interface. The software provides two types of control for the injector. The components of the injector can be directly switched by clicking on the relevant icons in the diagram. A second click can stop the pump. For a more automatic control, methods or sequence can be used. The software monitors the status of the injector and the HPLC regularly. The status is reflected in the diagram for easy observation. For example, when the switch



The user interface of the control software

valve changes from inject position to load position; its connection diagram is updated for the new position. If the switch valve goes out of control, a warning message and help tips will be given in the notice panel. The analysis will be paused. The injector will also monitor the status of HPLC through a remote cable. It will start a run only when the HPLC is ready for analysis.

2. Specifications

| Injection valve | |
|--------------------------|--|
| Material of wetted parts | Stainless steel, Valcon H (carbon fiber reinforced PTFE) |
| Pressure limit | 5,000 psi (liquid) |
| Switch time | <120 ms |
| Sample loop | Specify when order (5 uL to 10 mL) |
| Loading pump | |
| Material of wetted parts | Teflon and PEEK |
| Flow rate | 4 mL/min |
| Accuracy (C.V.%) | 2 |
| Repeatability (C.V.%) | 1 |
| Maximum outlet pressure | 5 psi (0.35 bar) |
| System | |
| Communication with PC | RS232 |
| Power supply | 24 VDC |
| Current | < 1 A |
| Remote interface | TTL signal or contact closure for input; TTL output |
| Weight | 2 Kg |
| Dimension | 25 x 23 x 11.5 cm (width x depth x height) |

3. Ordering Information

| Part Number | Description | Price (US\$) |
|--------------------|---|---------------------|
| LC-05A | LC-05 Auto injector | |
| LC-05A-01 | LC-05 Auto injector with fraction collector | |

LC-05 Plus Online Injector

LC-05 Plus online injector is designed for process monitoring and optimization in pharmaceutical and chemical industries. The online injector works with an Agilent 1200 HPLC for online monitoring of reaction progress. It provides a more reliable control on the product quality and helps to improve the production yields by providing a timely harvest indication.



1. Working principle

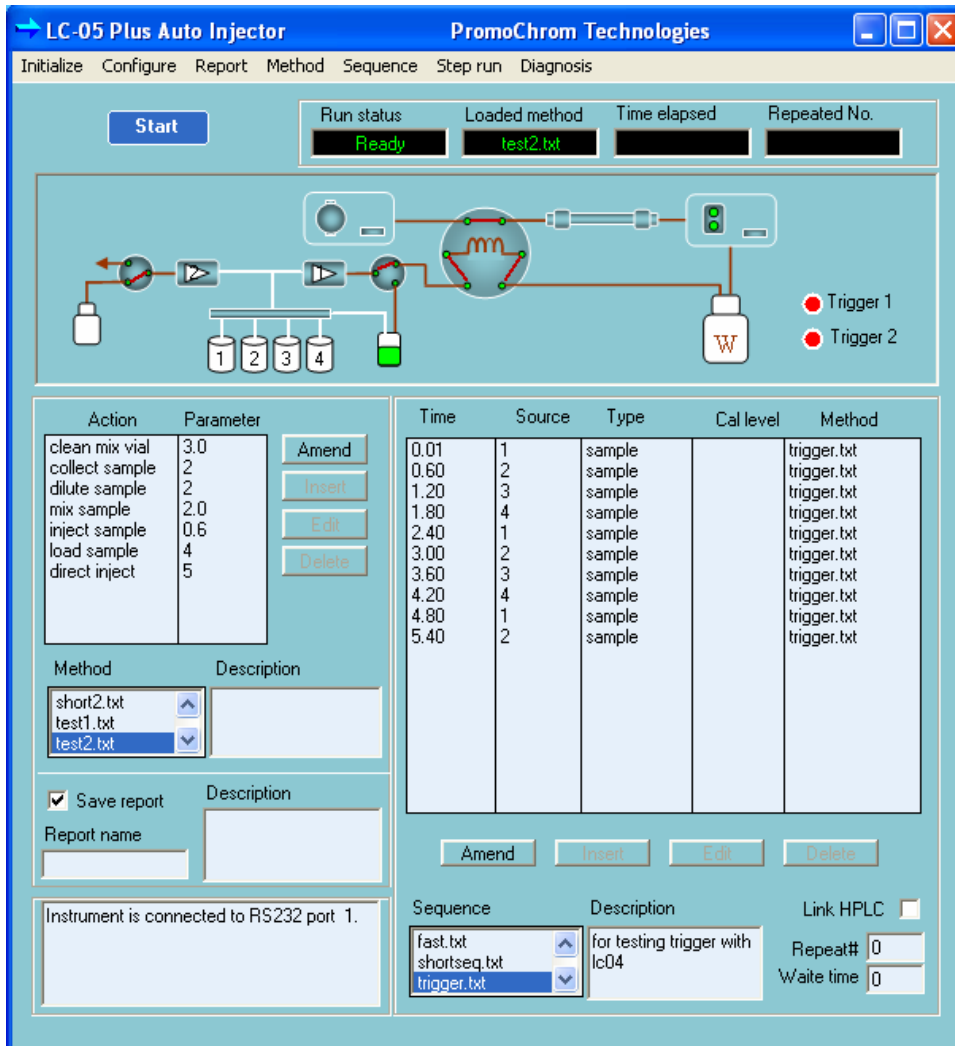
A typical working cycle includes following steps:

- 1) Collect and filter a sample from a site (a reaction vessel or a calibration standard).
- 2) Dilute the sample to make the media compatible with the HPLC mobile phase and the concentration suitable for the HPLC detector.
- 3) Load the sample to the loop of the injection valve.
- 4) Export the sample information (such as sample source, type, collection time, and data file name) to the Chemstation sequence table.
- 5) Check the status of the HPLC. Start HPLC analysis when the HPLC is ready.
- 6) Clean the dilution vial and the sample line.

All the above procedures are carried out automatically using methods or sequence. Users do not need to know the real valve and pump switches.

The integration of the online injector with Agilent HPLC is based on dynamic data exchange. There are no cables involved. The injector also provides an injection port to allow manual introduction of calibration standard for HPLC calibration.

The software monitors the status of the injector and the HPLC regularly. The status is reflected in the diagram for easy observation. For example, when the switch valve changes from inject position to load position; its connection diagram is updated for the new position. If the switch valve goes out of control, a warning message and help tips will be given in the notice panel. The analysis will be paused. The injector will also monitor the status of HPLC through a remote cable. It will start a run only when the HPLC is ready for analysis.



The user interface of the control software

2. Ordering Information

| Part Number | Description | Price (US\$) |
|-------------|--|--------------|
| LC-05-01 | LC-05 plus online injector (4 sampling points) | |
| LC-05-02 | LC-05 plus online injector (1 sampling points) | |

LC-051 Sample Collector

LC-051 online sample collector can collect samples from up to 4 sites. The fraction collection is based on stream selection valves and can have up to 18 fractions. Since the system does not use XY motion control, the receiving containers can have any shape and volume.



1. Features

The most outstanding feature of the online sampler is its computer free operation. It saves space and cost of a computer. It also enables the device to be placed near the sampling site.

The device can store two methods and a sequence for automatic operation. Although the online sampler involves two pumps and many valves, the commands of a method is simple, such as “collect”, “dilute”, etc. The device will look after the operation of the relevant pumps and valves according to the method command.

The online sampler can work as a control master and use the sequence to decide sampling location, collection time, and the collection position. It can also work as a slave and carry out sample collection at the request from other devices (such as the reaction vessel controller or a pH sensor). The communication with other devices is through two ports with 2 digital outputs and 4 digital inputs. The integration is easy and fast.

2. Ordering Information

| Part Number | Description | Price (US\$) |
|-------------|--|--------------|
| LC-051-01 | LC-051sample collector (4 sampling point) | |
| LC-051-02 | LC-051 sample collector (1 sampling point) | |

Online Degassers

An on-line degasser helps to reduce detection noise and improve the retention time reproducibility. When a low pressure gradient pump is used, an on-line degasser is required for a smooth operation. PromoChrom offers 6 types of degassers to meet the needs from analytical scale to preparative scale HPLC.

The degassers use a smart micro-controller to control the vacuum system and to ensure durable and trouble free operation. The LCD shows the real-time vacuum level. It gives a clear indication of the working status of the degasser.



1. Feature of online degassers

- 1) Real-time display of vacuum level to ensure proper operation
- 2) Separate degassing chamber for each channel to avoid cross contamination
- 3) Output signal for error monitoring
- 4) Inert wetting material: PTFE, ETFE, PPS, Chemraz
- 5) Small foot print for easy accommodation

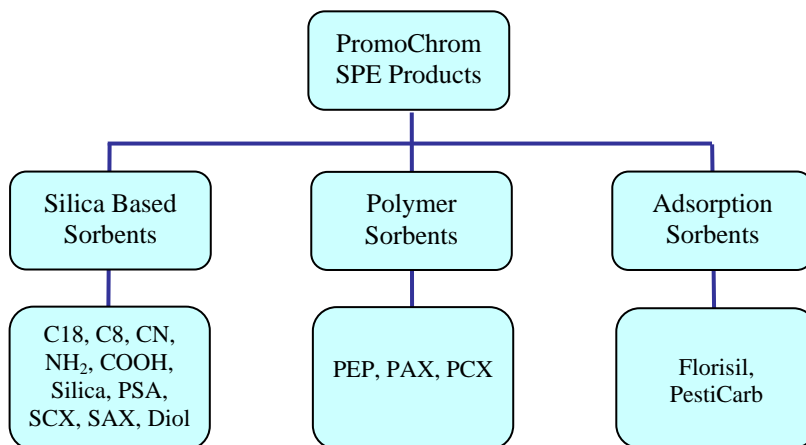
2. Ordering Information

| Part Number | Description | Price (US\$) |
|-------------|---|--------------|
| DG-052 | Degasser for analytical HPLC Two channels; maximum flow rate, 5 mL/min. | |
| DG-054 | Degasser for analytical HPLC Four channels; maximum flow rate 5 mL/min. | |
| DG-102 | Degasser for semi-preparative HPLC Two channels; maximum flow rate, 10 mL/min. | |
| DG-104 | Degasser for semi-preparative HPLC Four channels; maximum flow rate 10 mL/min. | |
| DG-501 | Degasser for preparative HPLC One channel; maximum flow rate, 50 mL/min. | |
| DG-502 | Degasser for preparative HPLC Two channels; maximum flow rate 50 mL/min. | |

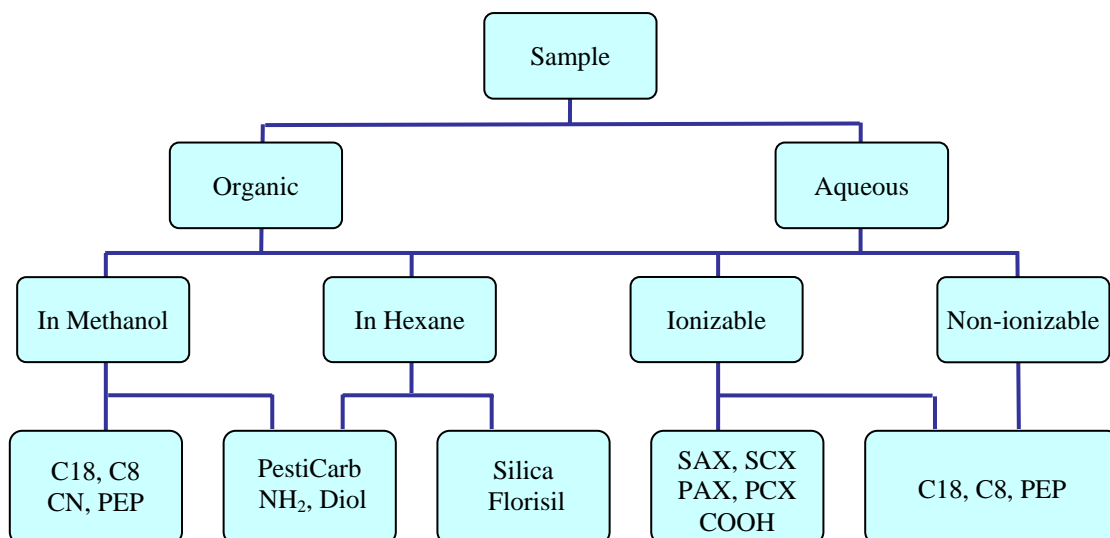
Solid Phase Extraction Cartridges

Solid phase extraction (SPE) is the most powerful technique currently available for rapid, selective sample preparation. The versatility of SPE allows it to be used for a number of purposes, such as purification, fractionation, trace enrichment, solvent exchange, desalting, and derivatization.

PromoChrom Technologies provides three major types of SPE sorbents.



1. Selection Guide – PromoChrom SPE Cartridges



2. Order Information – PromSil SPE Cartridges

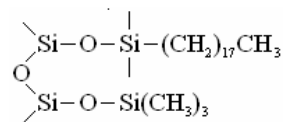
PromSil Silica Based Sorbents – C18, C8, CN, PSA, SAX, SCX, COOH, & PRS

Made of high quality and pure silica particles
Sorbent surface is specially modified to ensure high sample recovery and good reproducibility

Average particle diameter: 45 µm
Average Pore Size: 60 Å
Pore Volume: 0.8 cm³/g
Specific Surface Area: 480 m²/g

C18 (Endcapped) SPE Cartridge Order Information:

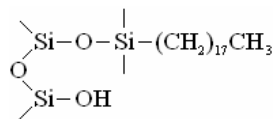
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | 18-010-1-C | 108 |
| 200 mg, 3 mL | 50 | 18-020-3-C | 75 |
| 500 mg, 3 mL | 50 | 18-050-3-C | 88 |
| 500 mg, 6 mL | 30 | 18-050-6-C | 58 |
| 1000 mg, 6 mL | 30 | 18-100-6-C | 85 |



Structure of C18 silane and trimethyl silyl endcapping group, covalently bonded to the surface of a silica particle.

ODS C18-N (Non-endcapped) SPE Cartridge Order Information:

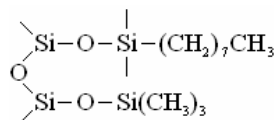
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | 18-010-1-N | 108 |
| 200 mg, 3 mL | 50 | 18-020-3-N | 75 |
| 500 mg, 3 mL | 50 | 18-050-3-N | 88 |
| 500 mg, 6 mL | 30 | 18-050-6-N | 58 |
| 1000 mg, 6 mL | 30 | 18-100-6-N | 85 |



Structure of C18 octadecylsilane (ODS), covalently bonded to the surface of a silica particle.

C8 SPE Cartridge Order Information:

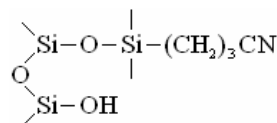
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | 08-010-1 | 108 |
| 200 mg, 3 mL | 50 | 08-020-3 | 75 |
| 500 mg, 3 mL | 50 | 08-050-3 | 88 |
| 500 mg, 6 mL | 30 | 08-050-6 | 58 |
| 1000 mg, 6 mL | 30 | 08-100-6 | 85 |



Structure of C8 octyl silane and trimethyl silyl endcapping group, covalently bonded to the surface of a silica particle.

CN Cyanopropyl SPE Cartridge Order Information:

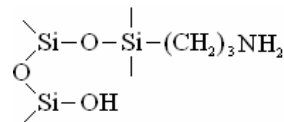
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | CN-010-1 | 108 |
| 200 mg, 3 mL | 50 | CN-020-3 | 88 |
| 500 mg, 3 mL | 50 | CN-050-3 | 108 |
| 500 mg, 6 mL | 30 | CN-050-6 | 78 |
| 1000 mg, 6 mL | 30 | CN-100-6 | 118 |



Structure of cyanopropyl silane, covalently bonded to the surface of a silica particle.

NH₂ Aminopropyl SPE Cartridge Order Information:

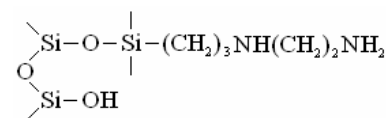
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | NH-010-1 | 108 |
| 200 mg, 3 mL | 50 | NH-020-3 | 75 |
| 500 mg, 3 mL | 50 | NH-050-3 | 88 |
| 500 mg, 6 mL | 30 | NH-050-6 | 58 |
| 1000 mg, 6 mL | 30 | NH-100-6 | 85 |



Structure of amino (NH₂) silane, covalently bonded to the surface of a silica particle.

PSA (N-aminoethyl) Aminopropyl SPE Cartridge Order Information:

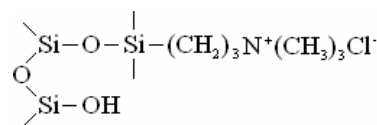
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | PA-010-1 | 108 |
| 200 mg, 3 mL | 50 | PA-020-3 | 75 |
| 500 mg, 3 mL | 50 | PA-050-3 | 88 |
| 500 mg, 6 mL | 30 | PA-050-6 | 58 |
| 1000 mg, 6 mL | 30 | PA-100-6 | 85 |



Structure of PSA silane, covalently bonded to the surface of a silica particle.

SAX (Strong Anion Exchanger) SPE Cartridge Order Information:

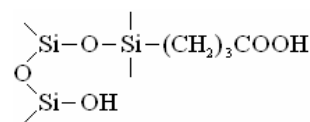
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | SA-010-1 | 108 |
| 200 mg, 3 mL | 50 | SA-020-3 | 88 |
| 500 mg, 3 mL | 50 | SA-050-3 | 108 |
| 500 mg, 6 mL | 30 | SA-050-6 | 78 |
| 1000 mg, 6 mL | 30 | SA-100-6 | 118 |



Structure of SAX silane, covalently bonded to the surface of a silica particle.

COOH (Weak Cation Exchanger) SPE Cartridge Order Information:

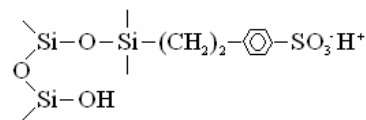
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | CH-010-1 | 108 |
| 200 mg, 3 mL | 50 | CH-020-3 | 88 |
| 500 mg, 3 mL | 50 | CH-050-3 | 108 |
| 500 mg, 6 mL | 30 | CH-050-6 | 78 |
| 1000 mg, 6 mL | 30 | CH-100-6 | 118 |



Structure of propyl carboxylic acid (COOH) silane, covalently bonded to the surface of a silica particle.

SCX (Strong Cation Exchanger) SPE Cartridge Order Information:

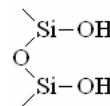
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | SC-010-1 | 108 |
| 200 mg, 3 mL | 50 | SC-020-3 | 88 |
| 500 mg, 3 mL | 50 | SC-050-3 | 108 |
| 500 mg, 6 mL | 30 | SC-050-6 | 78 |
| 1000 mg, 6 mL | 30 | SC-100-6 | 118 |



Structure of SCX silane, covalently bonded to the surface of a silica particle.

Silica SPE Cartridge Order Information:

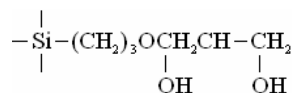
| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | SI-010-1 | 90 |
| 200 mg, 3 mL | 50 | SI-020-3 | 68 |
| 500 mg, 3 mL | 50 | SI-050-3 | 78 |
| 500 mg, 6 mL | 30 | SI-050-6 | 54 |
| 1000 mg, 6 mL | 30 | SI-100-6 | 70 |



Structure of silanol groups on the surface of a silica particle.

Diol SPE Cartridge Order Information:

| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | DI-010-1 | 108 |
| 200 mg, 3 mL | 50 | DI-020-3 | 88 |
| 500 mg, 3 mL | 50 | DI-050-3 | 108 |
| 500 mg, 6 mL | 30 | DI-050-6 | 78 |
| 1000 mg, 6 mL | 30 | DI-100-6 | 118 |



Structure of diol silane, covalently bonded to the surface of a silica particle.

PromSil Polymer Sorbents – PEP, PAX & PCX

PEP SPE Cartridge Order Information:

| Description | Tubes/Box | Part Number | Price (US\$) |
|--------------|-----------|-------------|--------------|
| 30 mg, 1 mL | 100 | PE-003-1 | 138 |
| 60 mg, 3 mL | 50 | PE-006-3 | 98 |
| 100 mg, 3 mL | 50 | PE-010-3 | 118 |
| 200 mg, 6 mL | 30 | PE-020-6 | 108 |
| 500 mg, 6 mL | 30 | PE-050-6 | 128 |

Polystyrene/divinylbenzene with vinyl prolidone
 Greater capacity than silica based sorbents
 Extract both polar and non polar compounds
 pH range: 1 - 14
 Average particle diameter: 35 µm
 Average pore size: 80 Å
 Specific surface area: 600 m²/g
Alternative to Oasis HLB

PAX SPE Cartridge Order Information:

| Description | Tubes/Box | Part Number | Price (US\$) |
|--------------|-----------|-------------|--------------|
| 30 mg, 1 mL | 100 | AX-003-1 | 138 |
| 60 mg, 3 mL | 50 | AX-006-3 | 88 |
| 100 mg, 3 mL | 50 | AX-010-3 | 118 |
| 200 mg, 6 mL | 30 | AX-020-6 | 108 |
| 500 mg, 6 mL | 30 | AX-050-6 | 128 |

Polystyrene/divinylbenzene with strong anion exchange function
 Mixed-mode sorbents (reverse phase and ion exchange)
 pH range: 0 - 14
 Average particle diameter: 40 µm
 Average pore size: 70 Å
 Specific surface area: 600 m²/g

PCX SPE Cartridge Order Information:

| Description | Tubes/Box | Part Number | Price (US\$) |
|--------------|-----------|-------------|--------------|
| 30 mg, 1 mL | 100 | CX-003-1 | 138 |
| 60 mg, 3 mL | 50 | CX-006-3 | 88 |
| 100 mg, 3 mL | 50 | CX-010-3 | 118 |
| 200 mg, 6 mL | 30 | CX-020-6 | 108 |
| 500 mg, 6 mL | 30 | CX-050-6 | 128 |

Polystyrene/divinylbenzene with strong cation exchange function
 Mixed-mode sorbents (reverse phase and ion exchange)
 pH range: 0 - 14
 Average particle diameter: 40 µm
 Average pore size: 70 Å
 Specific surface area: 600 m²/g

PromSil Adsorption Sorbents – PestiCarb and Florisil

PestiCarb SPE Cartridge Order Information:

| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | PC-010-1 | 299 |
| 200 mg, 3 mL | 50 | PC-020-3 | 168 |
| 500 mg, 3 mL | 50 | PC-050-3 | 168 |
| 500 mg, 6 mL | 30 | PC-050-6 | 158 |
| 1000 mg, 6 mL | 30 | PC-100-6 | 178 |

Graphitized Carbon
 Average particle size: 120~400 mesh
 Specially for sample cleanup in pesticide residue analysis

Similar to Supelco Envicarb

Florisil (Magnesia Silica) SPE Cartridge Order Information:

| Description | Tubes/Box | Part Number | Price (US\$) |
|---------------|-----------|-------------|--------------|
| 100 mg, 1 mL | 100 | FS-010-1 | 90 |
| 200 mg, 3 mL | 50 | FS-020-3 | 68 |
| 500 mg, 3 mL | 50 | FS-050-3 | 78 |
| 500 mg, 6 mL | 30 | FS-050-6 | 54 |
| 1000 mg, 6 mL | 30 | FS-100-6 | 70 |

Synthetic Magnesia-Silica Adsorbent
 Average particle diameter: 45-60 µm
 Average pore size: 80 Å
 Specific surface area: 290 m²/g
 Specially for sample cleanup in pesticide residue analysis

Terms and Conditions

Price

Prices in this catalog are for reference only and may change without notice. The prices do not include tax and costs on shipping and handling. Please ask PromoChrom or an authorized distributor for a quotation before placing your order.

Design Changes

Due to continuing improvements in design, some items may differ slightly from the descriptions and photographs. Specifications are subject to change without notice.

Warranties

The warranty period for instruments is one year. If notice of defects is received within the warranty period, PromoChrom shall, at its option, either repair or replace the defective products. If PromoChrom is unable to repair or replace the defective products within a reasonable time, buyers shall receive refund of the purchase price upon return of the products. The warranty for defects is limited to the purchase price of the product. In no event shall PromoChrom Technologies be liable for incidental or consequential damages in connection with the furnishing, performance, or use of the products.