

SPE-01 Plus Cleanup Station

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

The instrument can handle up to 9 samples per batch without attendance. Up to 5 solvents can be used for column conditioning and multi step elution. Two fractions can be collected for each sample. These features make SPE-1 plus an ideal tool for sample preparation in multi residue analysis.



1. Features

1.1 Easy operation

SPE-01 plus 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 plus 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. It 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 plus:

Line #	Action	Flow rate	Volume
1	Elute with 2	15	5.0
2	Elute with 1	15	10.0
3	Add sample	6	20.0
4	Elute with 2	6	5.0
5	Collect to 1	6	5.0
6	Elute with 3	10	10.0
7	Collect to 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.

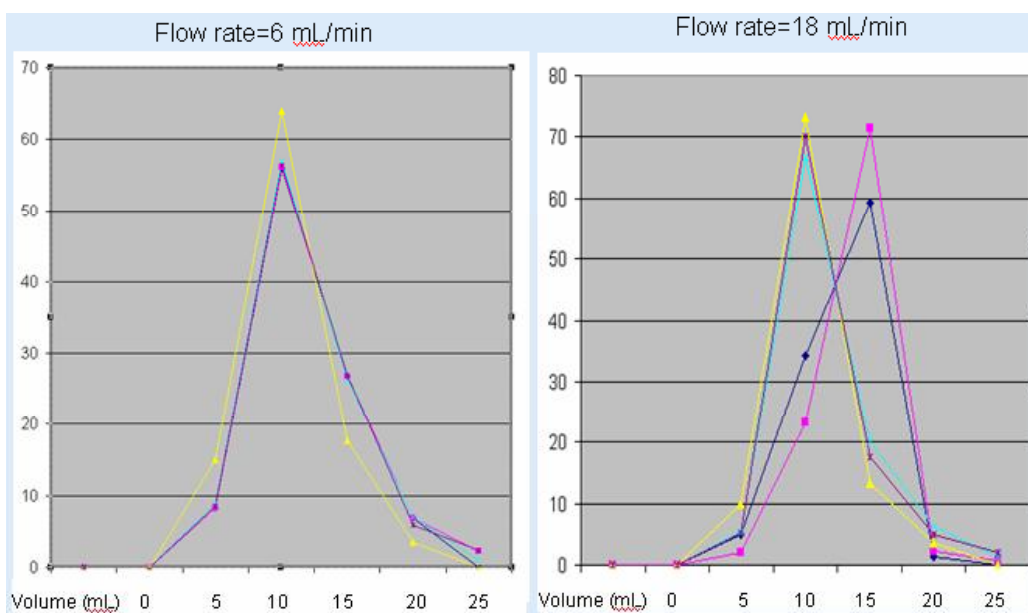
A typical clean up method involves pre-conditioning of column using a strong solvent (such as acetone) followed by a weak solvent (such as hexane). After adding the sample, columns are first eluted with a weak solvent to remove lipids and other low polarity components from sample matrix. The strength 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 plus 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 florisil (fenpropathrin, cyhalothrin, cypermethrin, denvalerate, deltamethrin). Data provided by Tea Research Institute, Chinese Academy of Agric. Sci.

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 plus, it becomes possible to use columns with smaller particles.

3. Specifications

Sample capacity	9 per batch
Volume of sample	1 to 500 mL
Material of wetted parts	Teflon, PEEK, Pyrex glass
System control	Micro controller with touch screen LCD as interface
Method	Permanent storage of 3 methods
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-01-02	Includes SPE-01 plus mainframe, 24V power supply, collection tray, adapter for 3-mL and 6-mL columns, and user manual	