

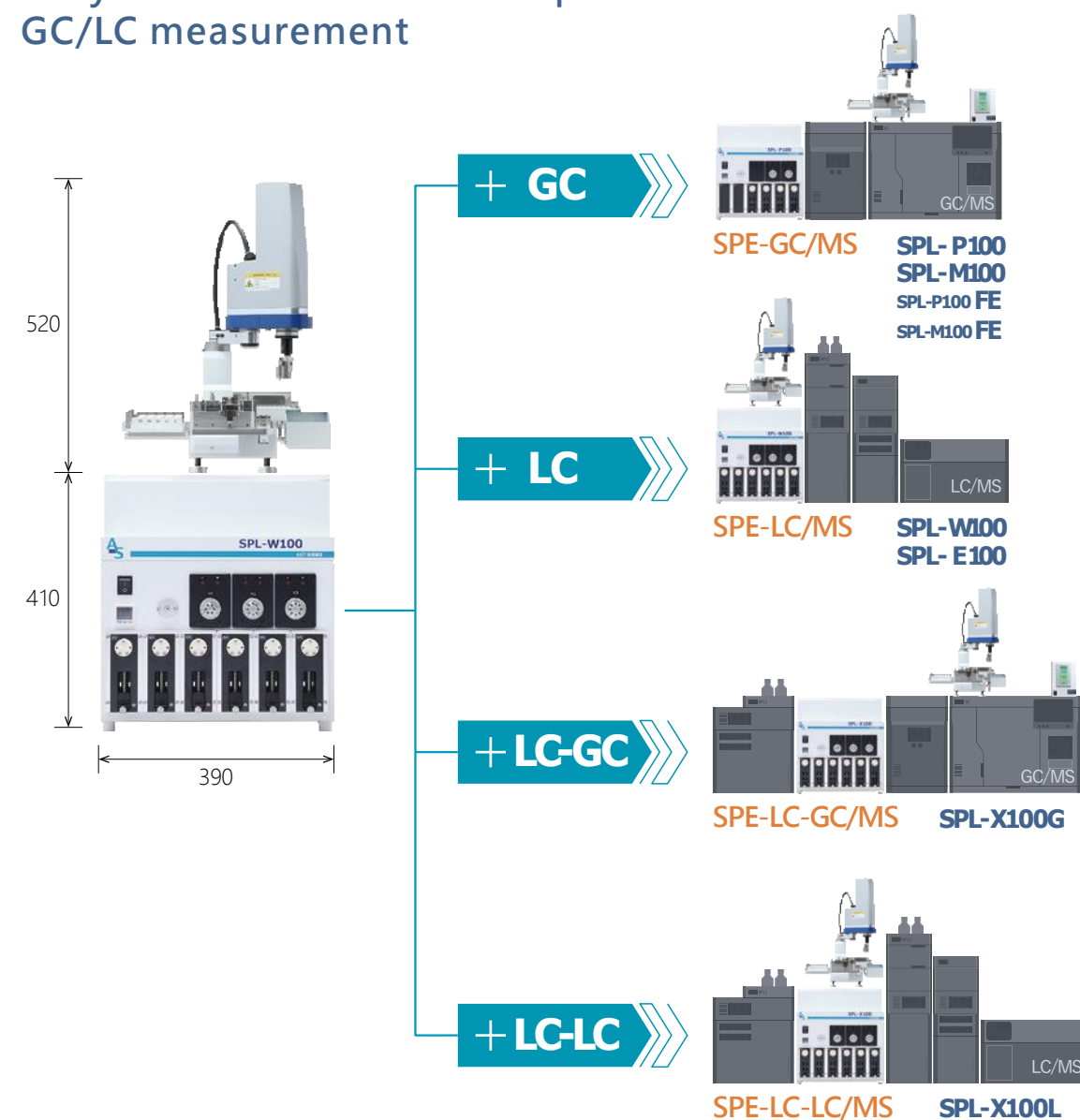


Online solid phase extraction (SPE) systems

SPL Series



Fully automated from solid-phase extraction to GC/LC measurement



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SPL Series

AISTI SCIENCE

Beyond your Imagination



AiSTI Science Co., Ltd.



SPL series product range

- SPE-GC/MS: SPL-P100, SPL-M100, SPL-P100 FE, SPL-M100 FE
- SPE-LC/MS: SPL-W100
- SPE-LC-GC/MS: SPL-X100G
- SPE-LC-LC/MS: SPL-X100L
- SPE-LC/MS: SPL-E100

ONLINE SYSTEM

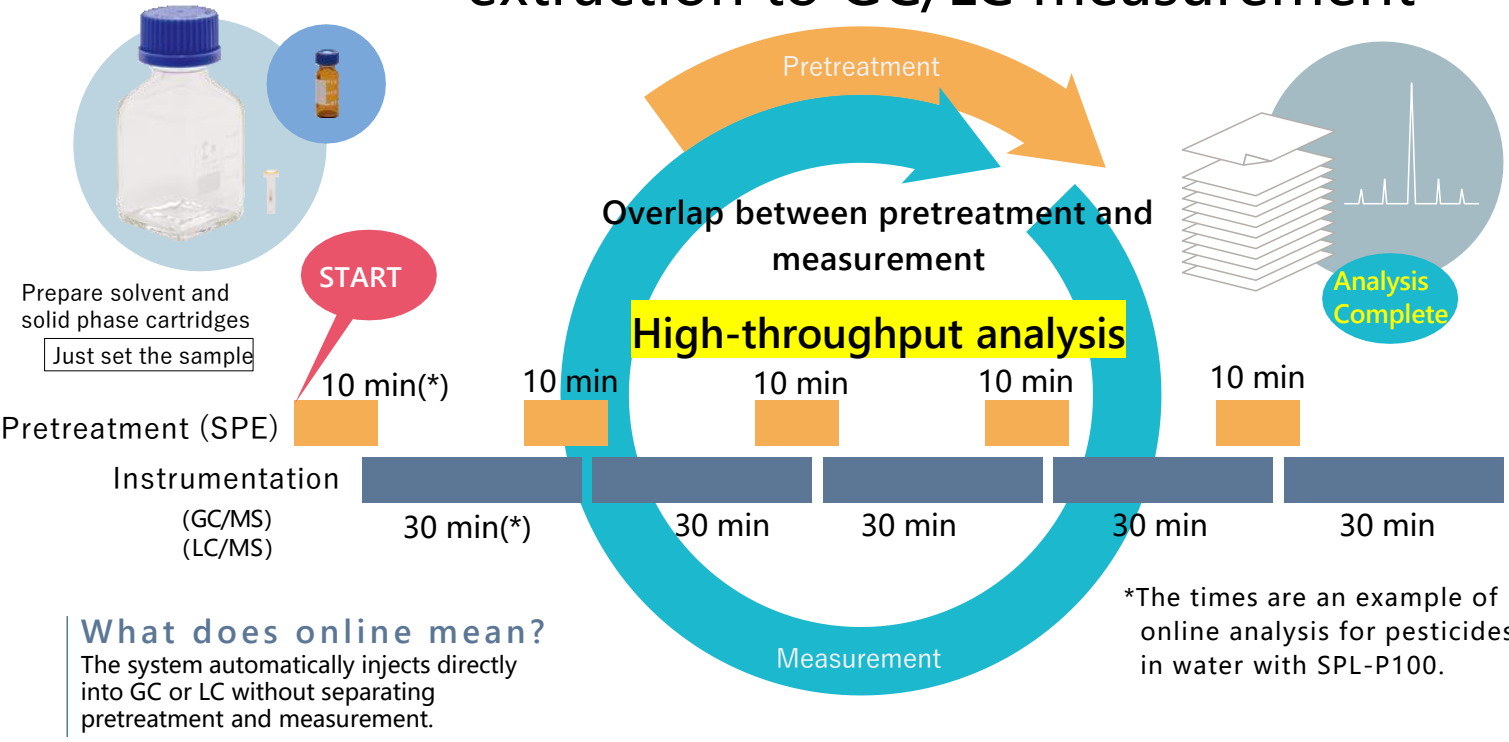
Analytical innovations realized by solid-phase extraction and online connection to GC and LC

The pretreatment unit is equipped with a robotic arm to automate the solid-phase extraction process.

The liquid supply unit is equipped with multiple independent syringe pumps and valves for different purposes.

Various types of analysis can be automated from this unit.


Fully automated from solid-phase extraction to GC/LC measurement




Pretreatment Unit

*Configuration varies depending on the model


Use of normal injectors
By removing the pretreatment table, analysis can be performed using a normal injector and inlet (front).



Shimadzu



Agilent




Nozzles and threading section
Conditioning, sample aspiration, loading, washing, drying and elution are performed with dedicated nozzles.

E-nozzle injects solid-phase eluent directly into GC
Standard solution can be injected directly without passing through the solid phase with the S nozzle.


Liquid Delivery Unit

The use of independent syringe pumps for each solution allows for efficient pumping without the risk of mixing solutions.

The flow path can be freely switched according to the method by switching the flow path with a valve.



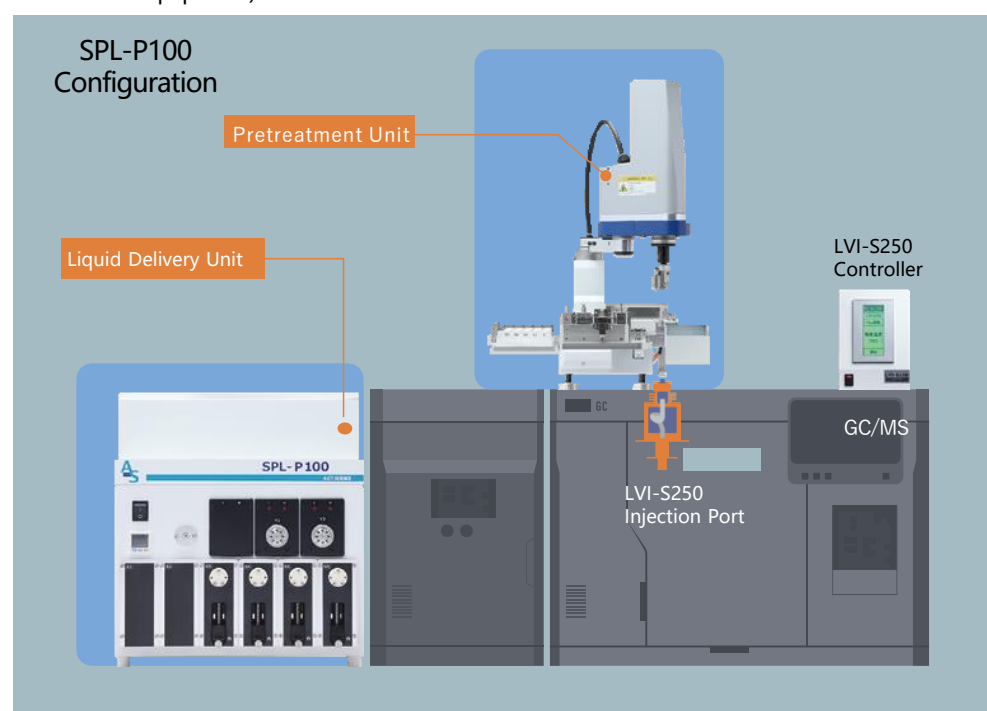
Syringe pumps and valves



Bottle Rack

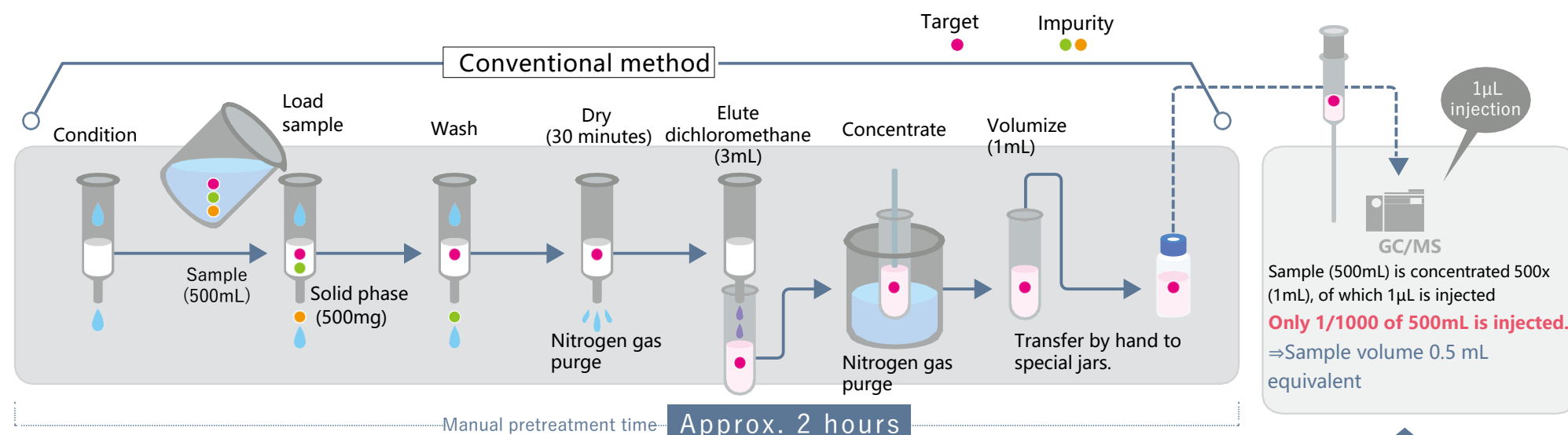
Fully automated from pretreatment to GC/MS analysis in water quality analysis

- ✓ Automated online analysis from solid-phase extraction to GC/MS measurement
- ✓ Scale-down and automation of solid-phase extraction significantly reduces pretreatment time
- ✓ Highly sensitive analysis by GC injection of the entire solid-phase eluate or smaller sample volume
- ✓ On-site solid-phase sampling is possible (solid-phase cartridges can be taken home and loaded into the equipment)



- Field ▶ Environment, Water Quality, Beverages
- Sample ▶ Environmental water, drinking water, soft drinks
- Target ▶ Pesticides, mold odor, petroleum other hazardous substances

2 hours of pretreatment is fully automated reducing processing time to about **10 minutes**



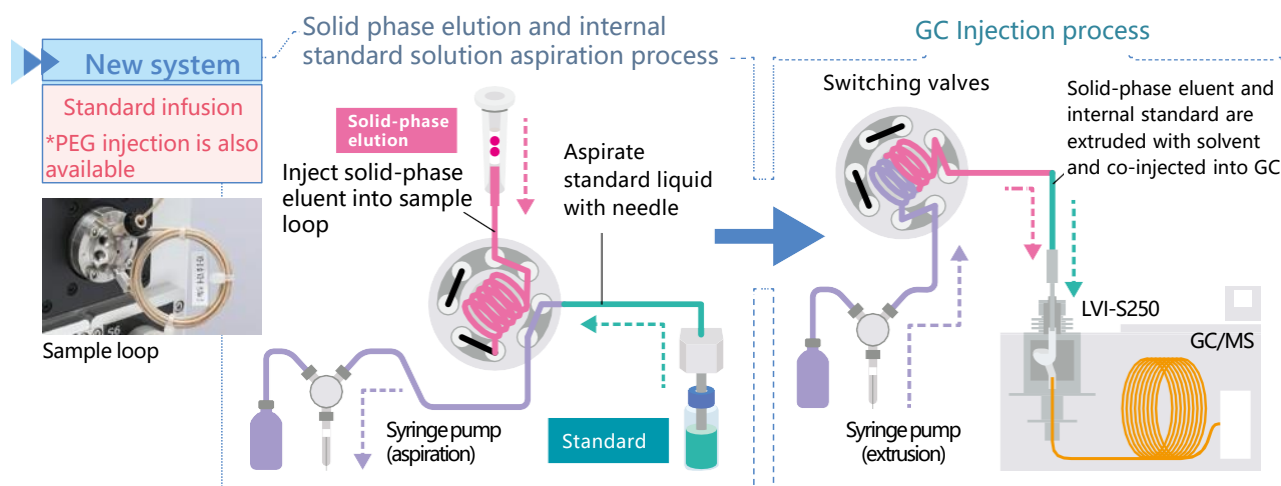
Same sensitivity

Sample volume 0.5mL equivalent
Inject full volume of sample (0.5mL)



Laborsaving
Expedited
Cost reduction

Target substance
Impurity

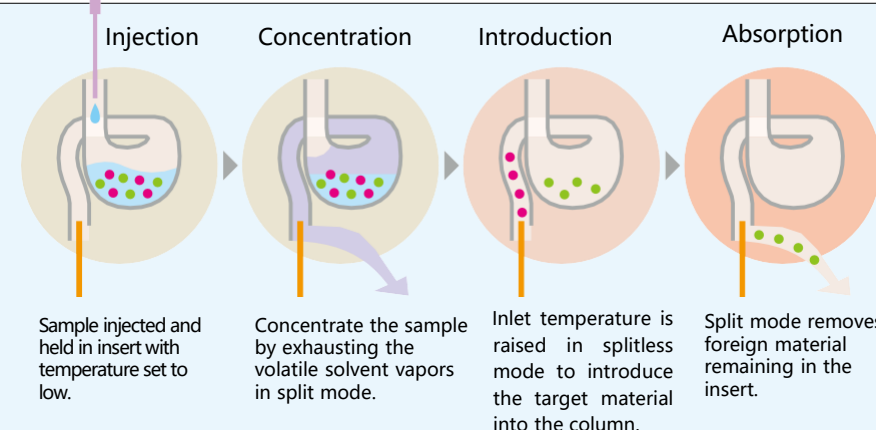


Large Volume Injector Unit for GC LVI-S250

Unique insert shape allows injection of up to 200μL

The insert has a spiral (stomach-shaped) structure, which enables large-volume injection in a liquid state. The greatly improved injection sensitivity leads to omission of concentration in pretreatment and reduction of sample volume.

Spiral Insert Capacity 0.6 mL



Derivatization of target substance in solid phase and online analysis up to GC/MS measurement

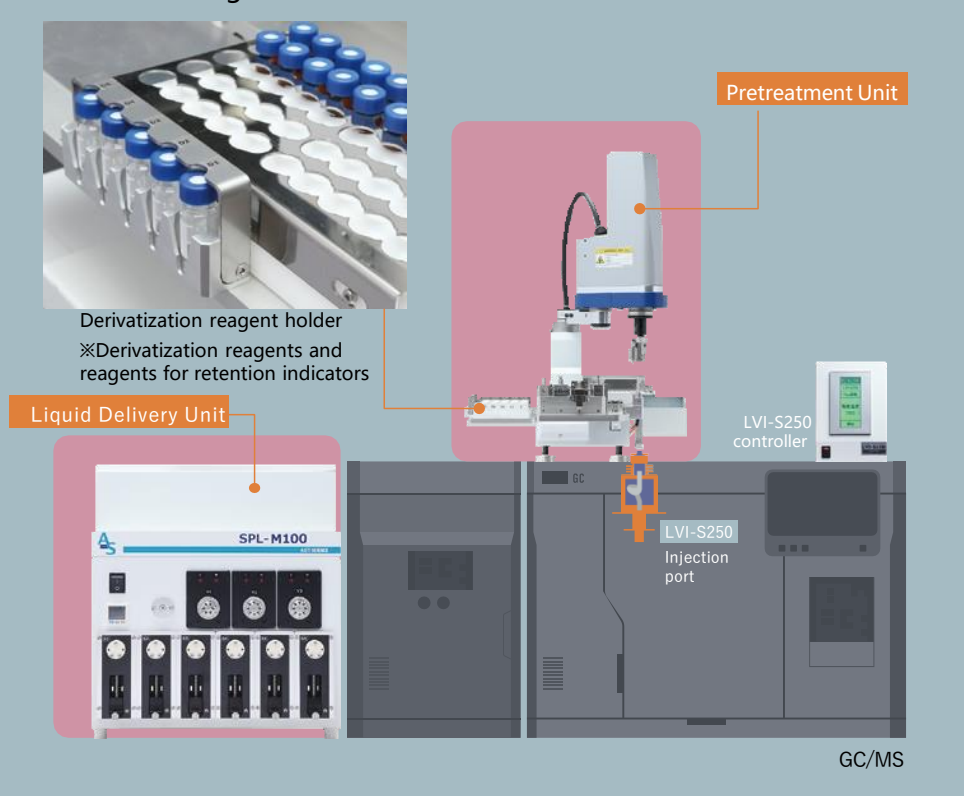
Automated pretreatment time (from purification, dehydration to derivatization)

Metabolomics, Biotechnology, Food,
Agriculture, Pharmaceuticals

Metabolomics (food and medical) fully automated from pretreatment to GC/MS analysis

- ✓ Significant reduction of analysis time by solid-phase derivatization (from approx. 20 hours to approx. 15 minutes)
- ✓ Same time from derivatization to GC injection for each sample
- ✓ Reduced solvent consumption and increased purification effect by solid-phase extraction
- ✓ Maximize the benefits of GC/MS measurements (Simultaneous analysis of amino acids, organic acids, and sugars possible / high resolution / library uses a library)

SPL-M100 Configuration

More than
250
ComponentsTMS-ization & methoximization
tBDMS-ization

Solid Phase Derivatization Group

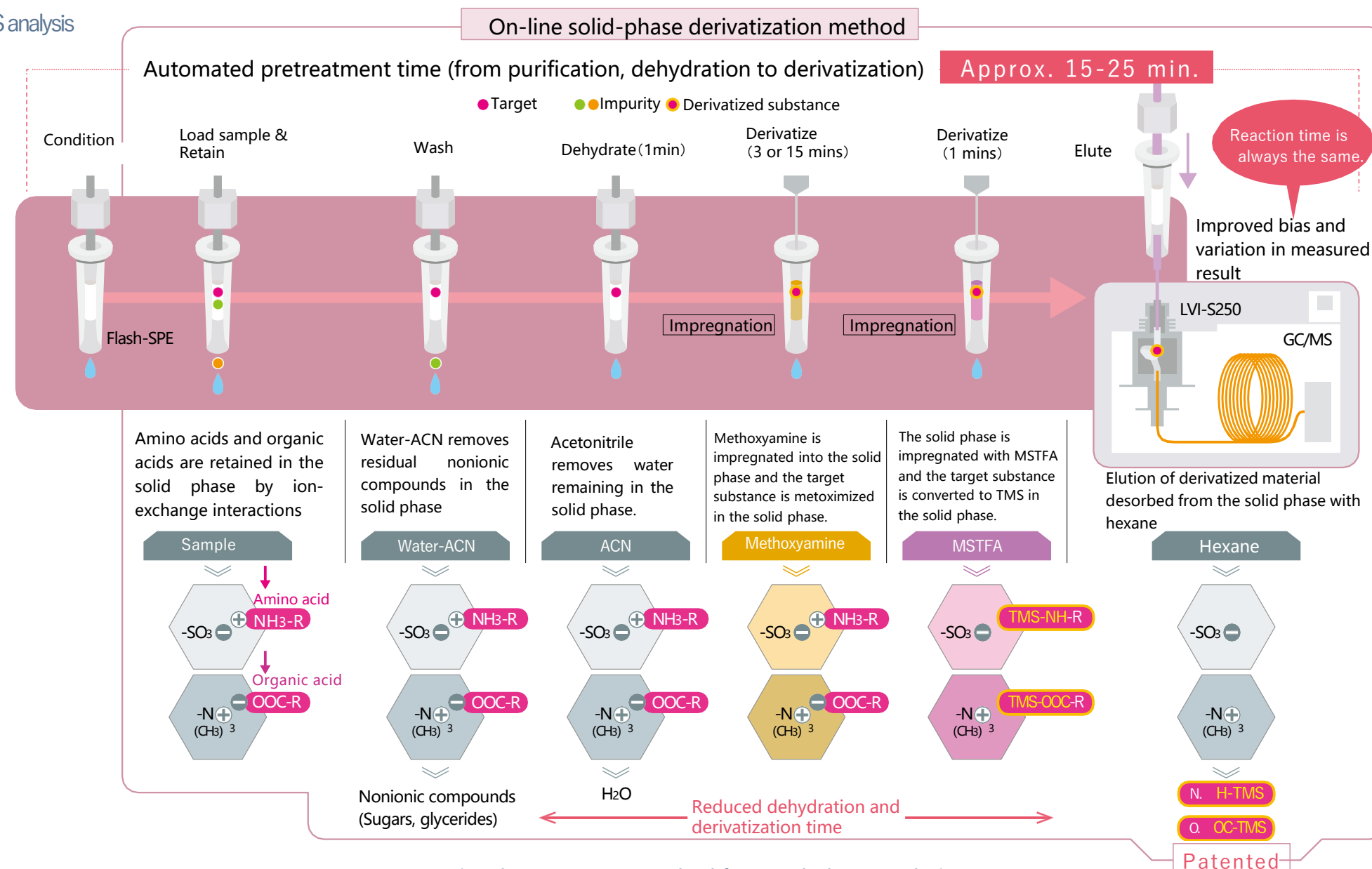
Amino acid
Amines
Polyamine
Catechol
Dipeptide
Amino-sugar

Sugars
Nucleoside
Nucleobase

Organic acid
Short-chain fatty acid
Long-chain fatty acid
Polyunsaturated fat
Aromatic fatty acid
Bile acid

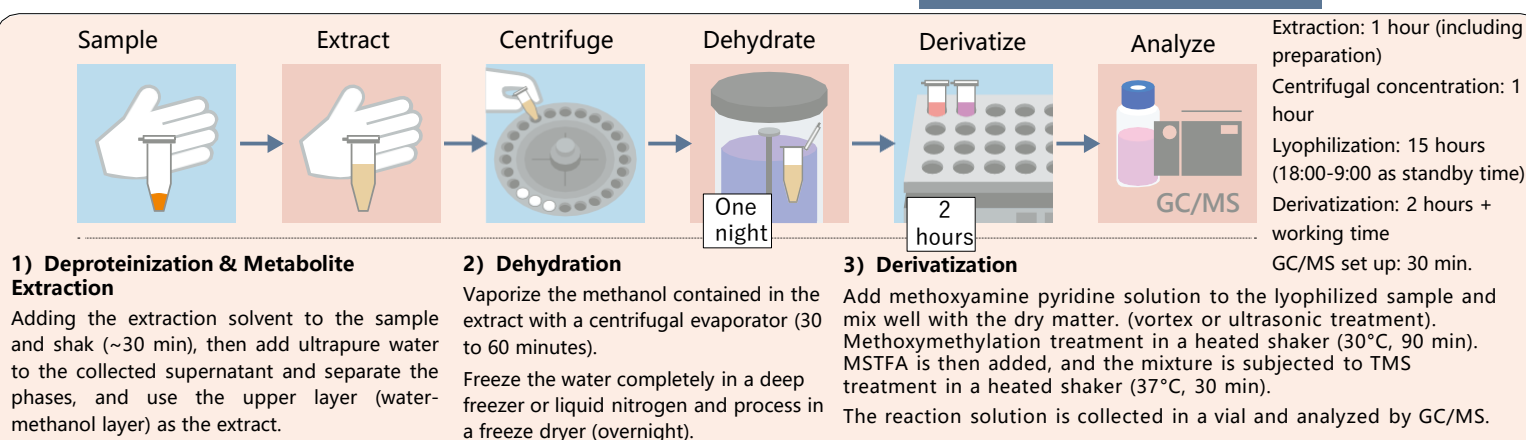
Glycophosphoric acid
Sugar Acid
Nucleotide

Steroid
Isoflavonoid
Vitamin A, D, E, K

Solid phase derivatization takes **20 hours** to about **15 minutes**

Conventional pretreatment method for metabolome analysis (Bligh & Dyer method)

Pretreatment time 20 hours



SPE-GC system for volatile analysis

SPL-P100FE SPL-M100FE
For Gas Chromatography

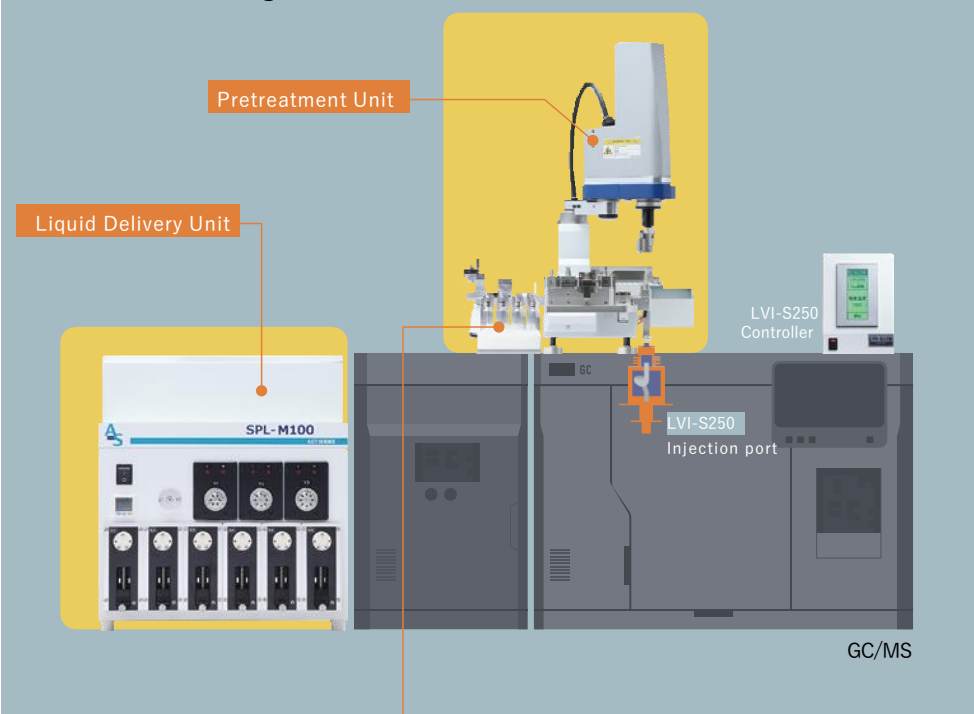
Volatile Analysis System that Uses Solid Phase Collection-Solvent Elution Method

Fully automated from pretreatment to GC/MS analysis in volatile analysis

Aspirate the gas phase in the sample vial and collect the volatile into the solid phase. The entire eluate is then injected from the solid phase into the GC/MS.

- ✓ Solvent elution enables analysis of heat-sensitive components
- ✓ Derivatization makes previously invisible components visible
- ✓ Quickly adsorbs a fixed amount of gas phase to solid phase
- ✓ On-site solid-phase sampling available

SPL-M100FE Configuration

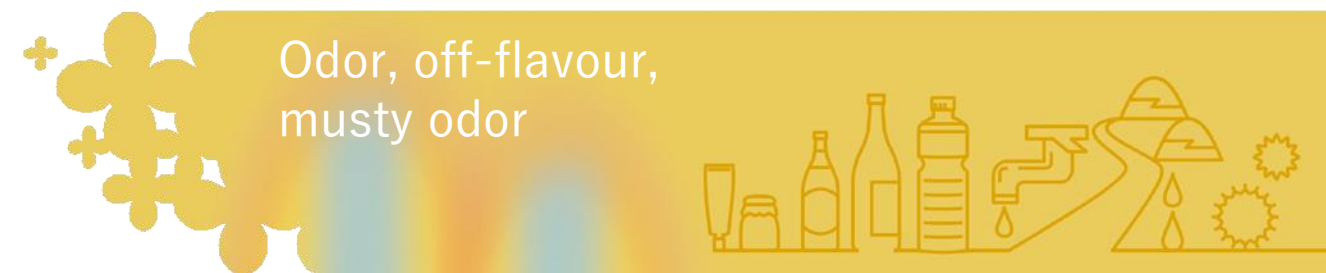


FE option enables volatile analysis

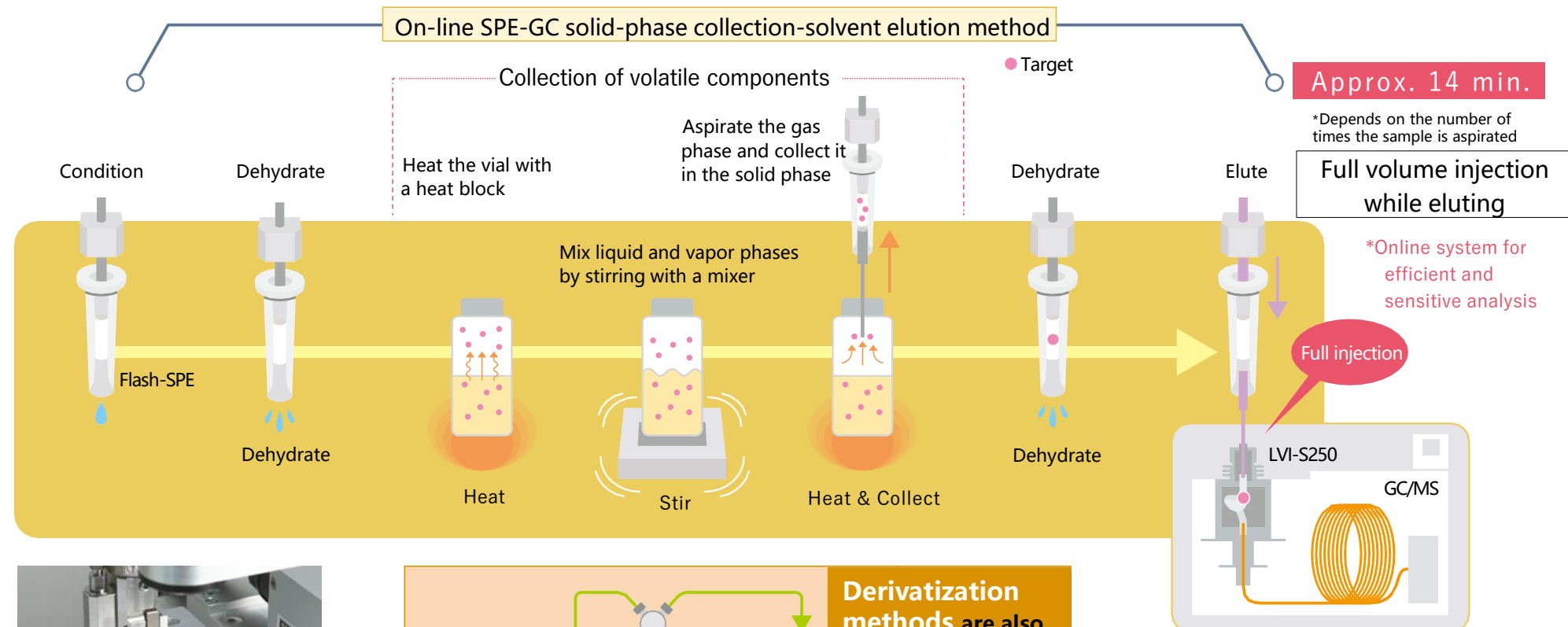
*Compatible with SPL-P100 and SPL-M100

Field	Odor, strange smell, musty odor
Sample	Food, beverages, etc.
Target	Various Odor components

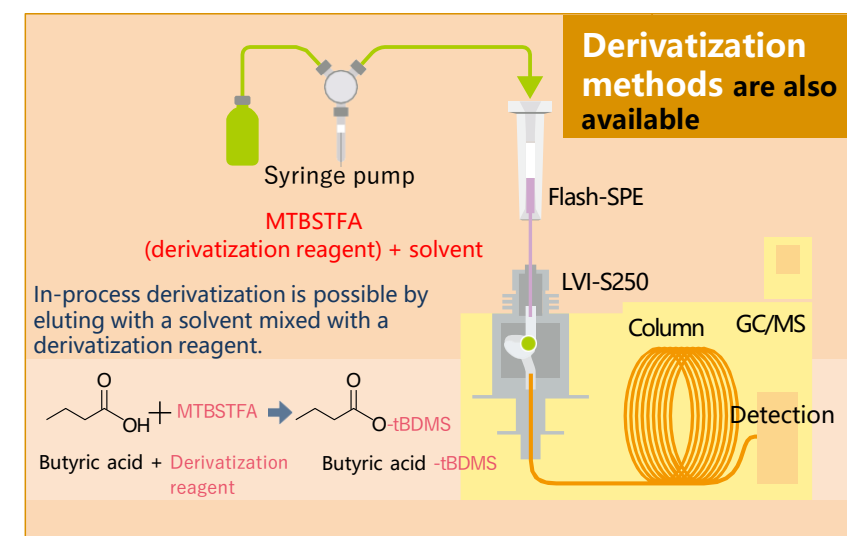
Volatile Analysis System FE Option



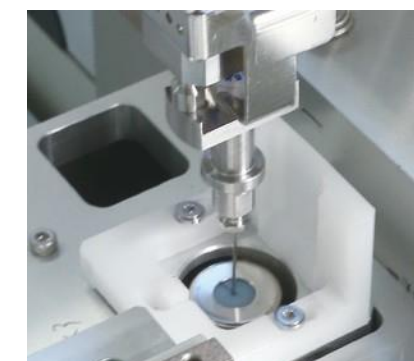
Collected in solid-phase cartridge and injected with full volume of eluent



Heat block

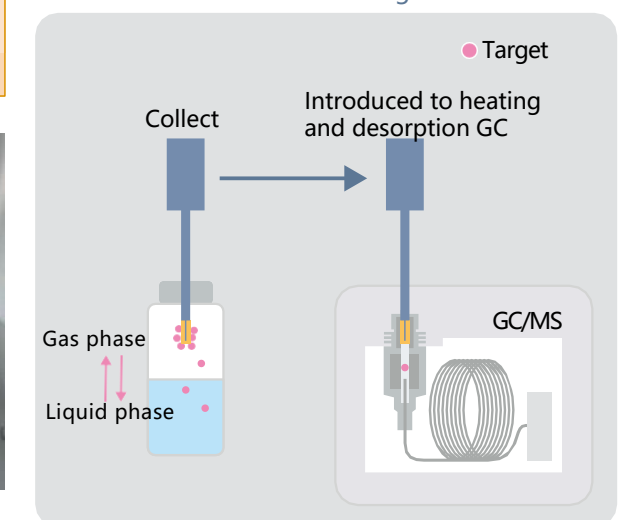


Stirring with a mixer



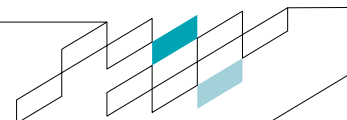
Aspirate gas phase

- Difference from solid-phase microextraction (SPME)**
- Not suitable for pyrolysable components
 - Sample collection takes relatively long time
 - Carryover concerns in fiber
 - Worries about fiber breakage



Online SPE-LC System

SPL-W100
For Liquid Chromatography

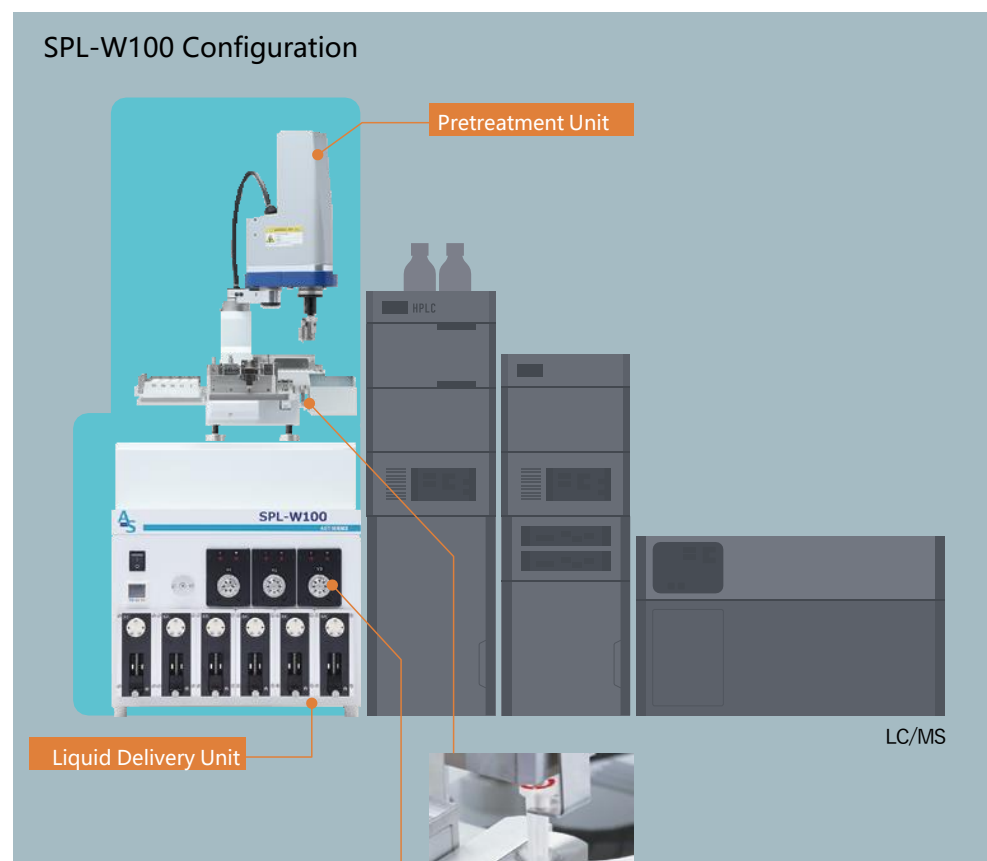


Online connection of solid-phase extraction system and HPLC/LC/MS

Fully automated from pretreatment to LC/MS analysis in various fields

- ✓ Scale-down and automation of solid-phase extraction significantly reduces pretreatment time
- ✓ Highly sensitive analysis by total LC injection of solid-phase eluent or smaller sample volume
- ✓ Dilute with water before introducing LC column to prevent broadening of peaks
- ✓ Applicable to various utilization methods (retention + purification/purification/pH adjustment/derivatization reactions)

SPL-W100 Configuration



Pretreatment Unit

Liquid Delivery Unit

LC/MS



LC solid phase elution port



Sample loop

Field → Solid phase extraction → HPLC, LC/MS

Sample → Various liquid samples and extracts

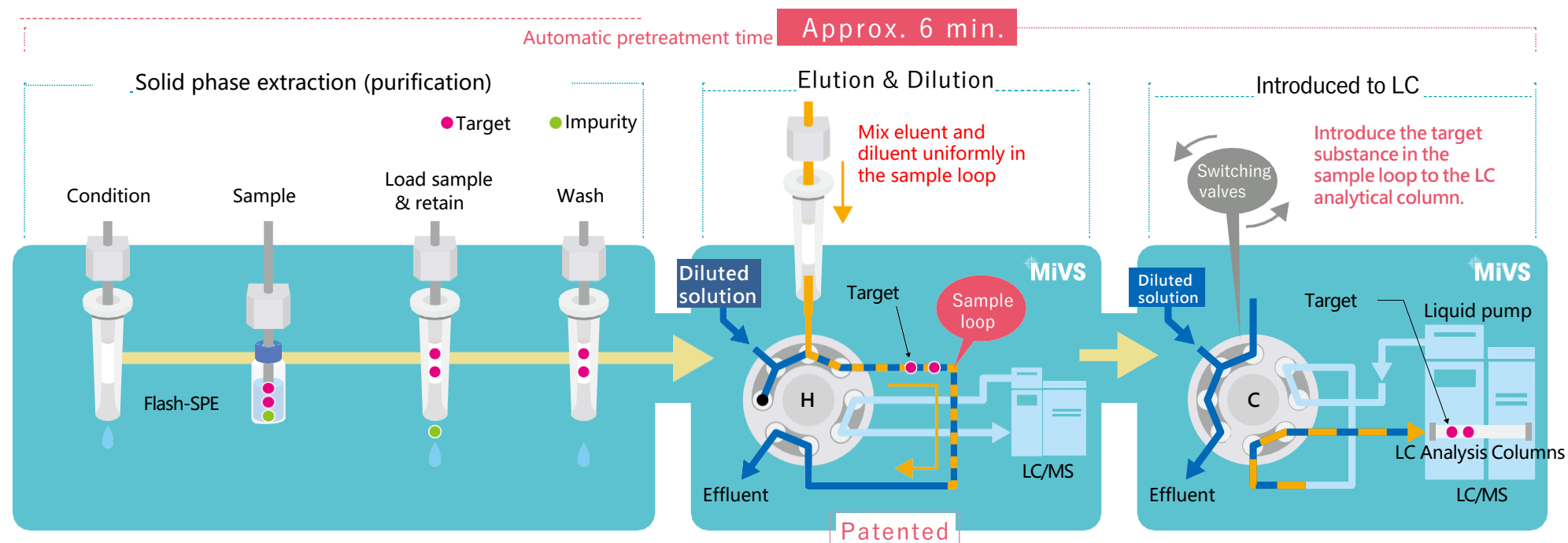
Targets → HPLC, LC/MS target ingredients

Example → PFAS in water, pesticides in water, metabolite analysis in biological samples

Solid phase extraction → HPLC-LC/MS



Two New Technologies Bring a New World to LC Analysis

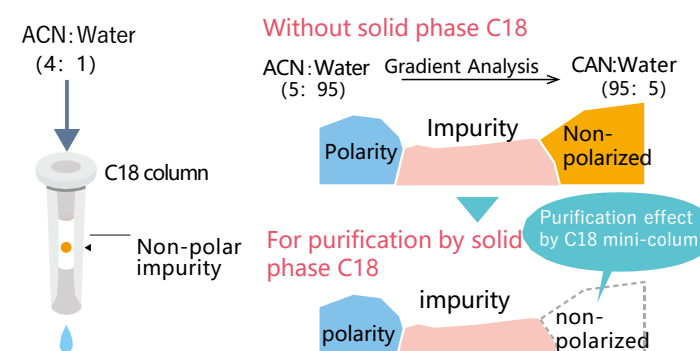


Effect of purification from use of a Flash-SPE (C18) column

Advantages of solid-phase C18

- Prevent HPLC column degradation
- Maintain peak shape
- Reduced analysis time

Pre-purification on a Flash-SPE (C18) column, which is the same as the Octadecylsilyl (ODS) silica gel columns often used in LC, prevents contamination of the analytical column by non-polar foreign substances.



Mixing and Injection Valve System

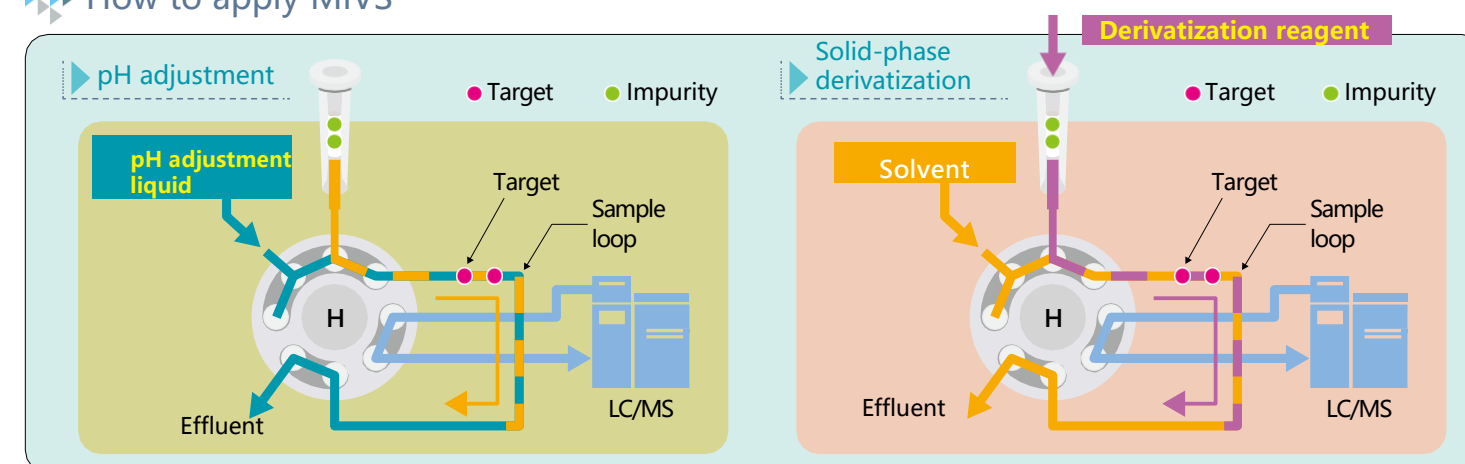
When the eluate from the solid phase is introduced into the sample loop, it can be mixed with the diluent in the valve. This increases polarity, which improves LC column separation and produces sharp peak shapes.



Hybrid Online SPE-LC

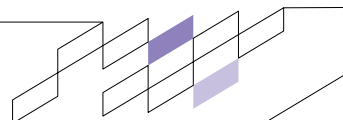
This online system combines the advantages of both off-line solid-phase extraction systems (disposable solid-phase cartridges) and inline solid-phase extraction systems (fully automated analysis).

How to apply MiVS

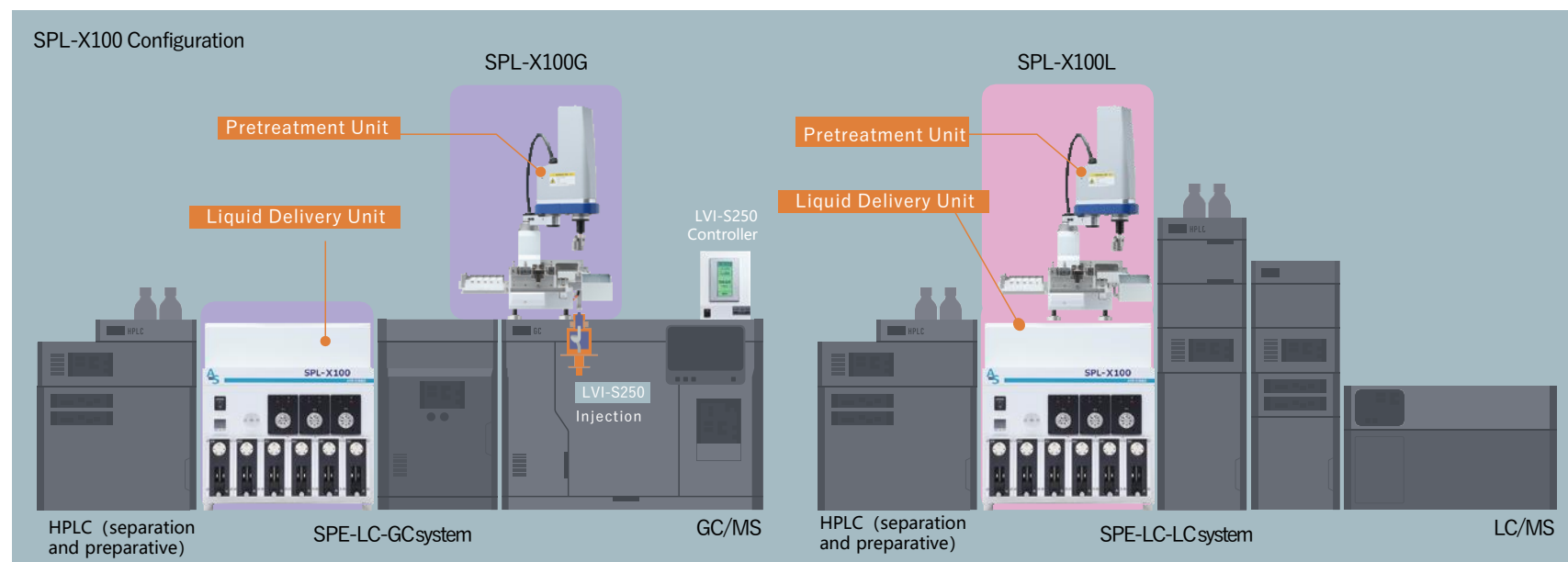


SPE-LC-GC system / SPE-LC-LC system

SPL-X100G For Gas Chromatography
SPL-X100L For Liquid Chromatography



Solid-phase extraction → separation and preparative separation by HPLC → GC/MS or LC/MS measurement Online analysis system for the entire process



Target Analysis

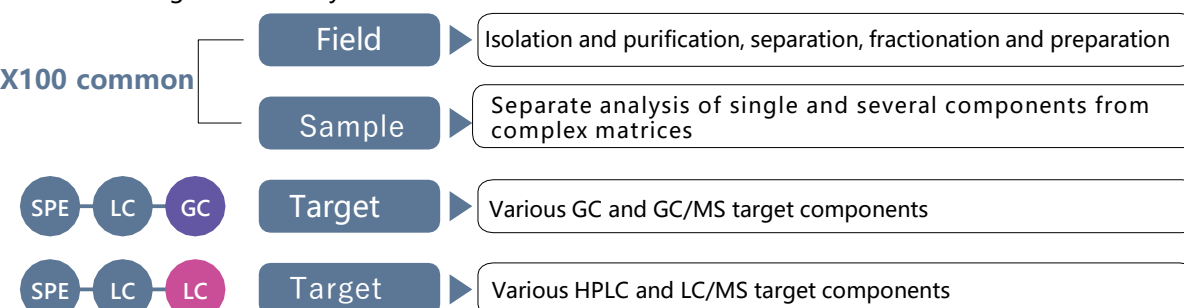


Systems expected to play an active role in a variety of fields

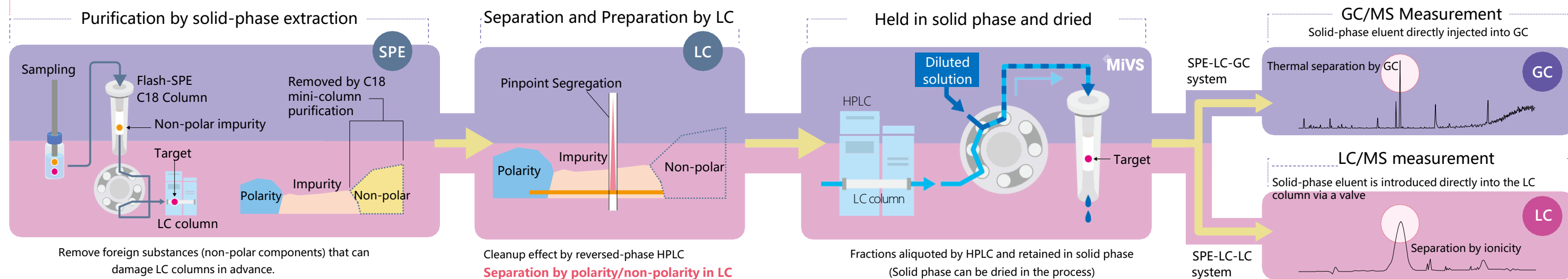
Fully automated targeted analysis of single and multiple components in samples with large amounts of contaminants

- ▶ Solid-phase extraction removes contaminants that can damage LC columns
- ▶ Eluates from the solid phase are separated by HPLC, and a portion of the fraction is aliquoted to remove foreign substances other than the target component
- ▶ Fractions obtained by LC separation can be analyzed by GC (thermal separation) or LC (re-separation) to obtain higher selectivity

SPL-X100 common

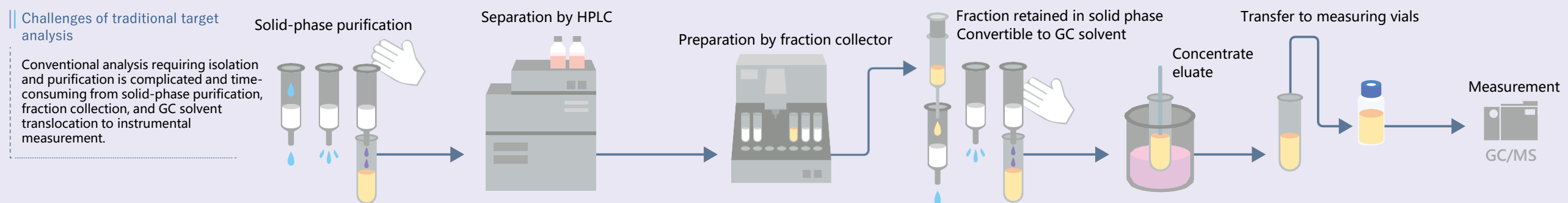


Fully automated from solid-phase extraction to preparative separation and measurement



▶ Conventional work is labor intensive

Manual operation



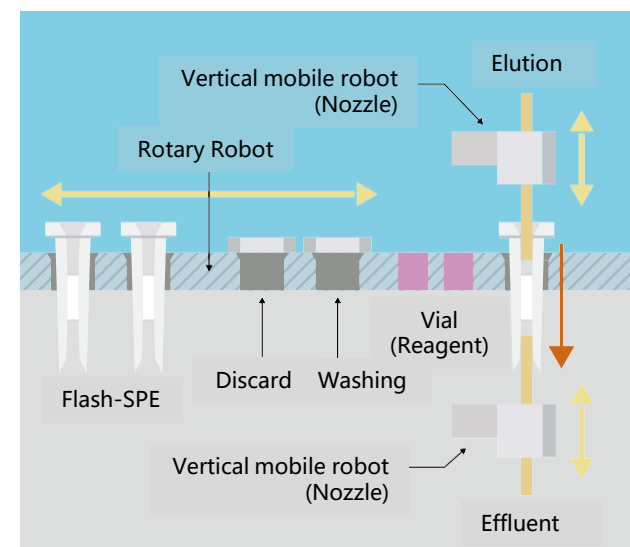
SPL-E100

For Liquid Chromatography

Compact one-piece system with integrated moving parts
Solid-phase extraction → LC/MS measurement online analysis system

Medical care

Registered as a Class I medical device in Japan, with operability and safety in the medical field as the top priority



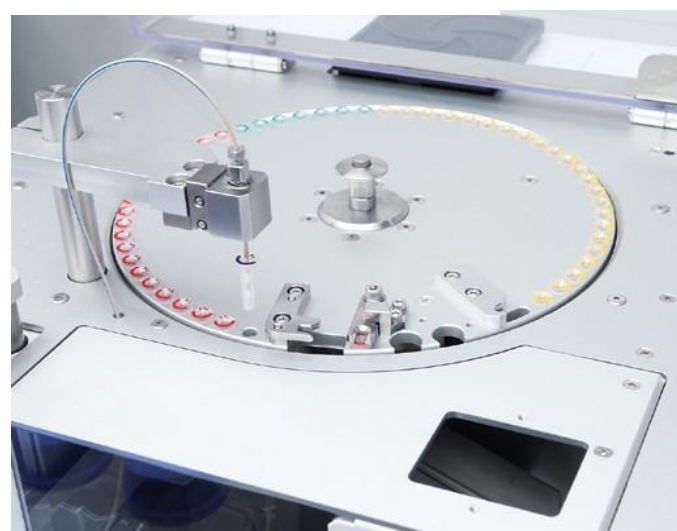
SPL-E100 Configuration

Pretreatment and Liquid Delivery Unit

Flash-SPE
Max
50

LC/MS

1 A disk-shaped solid-phase tray rotates, moving the solid phase to the respective ports, and the solvent is poured in by sandwiching it between the upper and lower nozzles.



2 Equipped with both vertical and rotary robots, the system enables shortening of pretreatment time with minimal movement. Solid-phase cartridges are disposable for each sample, and the flow path is cleaned after pretreatment, eliminating the risk of contamination.

MiVS
Mixing Injection Valve SystemHYBRID
ONLINE SPE-LC

3 The open/close cover on the front processing section reduces the risk of contact with a robot in operation. Front panel cover is designed for safety by reducing contact with piping and syringes.

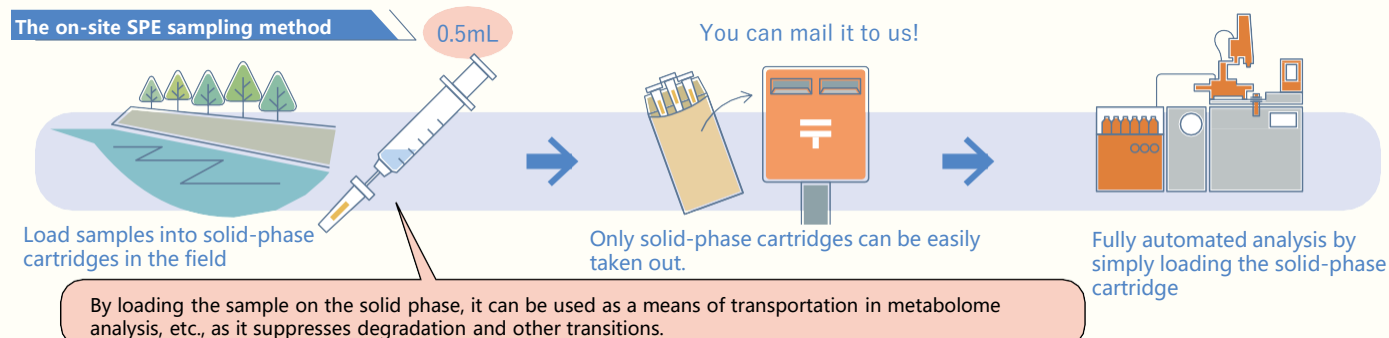
Online SPL Series Applications

On-site SPE sampling method (On-site sampling)

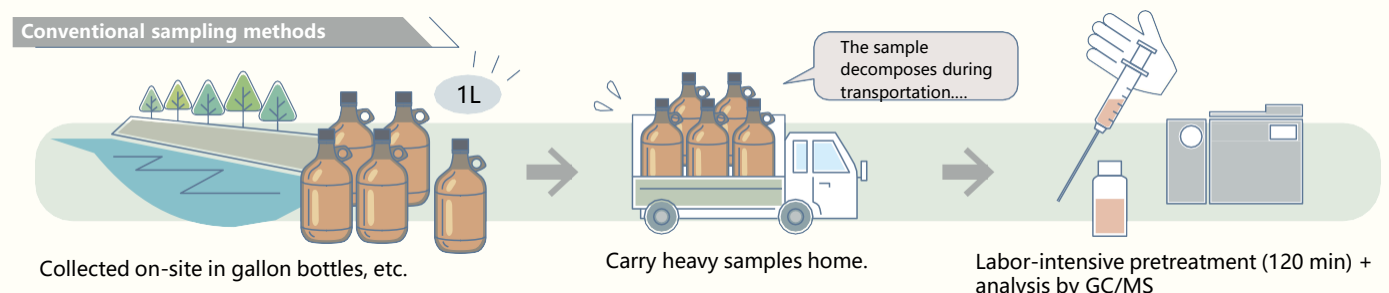
Enables sampling to solid phase on site and taking it home, saving labor, speed, and cost at all sites.

- No need for a large number of samples, allowing for extremely small sample volumes.
- Sampling in the solid phase reduces sample degradation.
- Only solid-phase cartridges are used to transport the sample, allowing remote sampling.

The on-site SPE sampling method



Conventional sampling methods



Solid-phase cartridges dedicated to Online SPL series

Flash-SPE

Patented

For Gas & Liquid Chromatography



Online dedicated solid-phase cartridges for low fill volume and waste free analysis

- Linear structure for smooth flow of samples and solutions
- Fast ventilation drying (30 seconds)
- Simple structure optimized for automation
- Small solid-phase fill volume of 2-5 mg
- Piping and needles can be connected from both upper and lower ends

Press-fit at both ends.
Secure connection and flexible design.

Straight structure for smooth liquid flow and drying.
Efficient pre-processing is realized.

Dissolution - GC injection



Solid-phase cartridge Flash-SPE

*Online SPE system only

	Model No.	Product name	Qty.	Unit
01	SA-4110-003	Flash-SPE C18	100	Box
02	SA-4410-005	Flash-SPE BEP	100	Box
03	SA-4561-003	Flash-SPE HLB	100	Box
04	SA-4581-003	Flash-SPE AXs	100	Box
05	SA-4585-003	Flash-SPE CXs	100	Box
06	SA-4589-003	Flash-SPE ACXs	100	Box