AUTOMATED SAMPLE PREPARATION
INTELLIGENT SYSTEM SOLUTION

SOLUTIONS BY LC Tech

Food, Feed, Mycotoxin Analysis, Environmental Analysis, Drug Screening, Pharmaceutical Samples …

FREESTYLE | SPE | ThermELUTE | EVAporation | GPC | Software

FREESTYLE – always ready

Sample processing with
- always the same precision,
- always the same speed,
- always the same reliability,
- always a calculable throughput,
- always …

… day and night, including weekends.

THE NEXT GENERATION AUTOMATED SAMPLE PREPARATION. FLEXIBEL, PRECISE, MODULAR.

FREESTYLE –
unique system with versatile application

The FREESTYLE system is a fully automated sample preparation system and is used in nearly all areas that demand intensive sample preparation. This applies to food and feed samples, environmental and pharmaceutical samples, to drug screening and many other areas.

The principle is very simple: Set up the base system FREESTYLE BASIC and add modules to the system that you need.

If several modules are installed, you can use these individually or in combination. The required function is determined exclusively through method selection in the software.

Mechanical changes to the unit are not required. All you need to do is to insert the appropriate racks intended for the selected method.

Module –
single or combined

The FREESTYLE system is always based on the same principle: the FREESTYLE BASIC will be equipped with the necessary modules suitable for the intended purpose.

SPE-Module for all methods in the area of solid phase extraction.

ThermELUTE-Module for the highly automated analysis „from extract to chromatogram" of aflatoxins and ochratoxin A in all regulated matrices.

GPC-Module for gel permeation chromatography (clean-up).

EVAporation-Module for the automated concentration of solutions to a defined end volume between 0.2 and 5.0 mL (in combination with the SPE and GPC module).

HPLC Direct Injection-Module for direct injection into LC.

Many possibilities –
uncomplicated in its application

Necessary mechanical changes, for example to cater for new container types or different SPE column formats, are extremely simple to perform without „teaching" or the need for a service call.

Neither technical intervention nor alteration of the equipment is necessary; simply select a suitable rack type for the containers or an adapter for the SPE columns. Then include these in the method. On calling up the method, the FREESTYLE system only needs to be equipped with the linked components: Finished!

Top advantages are: Different methods can be mixed within one sample sequence. The FREESTYLE system can run throughout the night and as such be worked to optimum capacity.


Food


Fodder


Environment


Spices, Coffee, Tea, Natural Extracts


Pharma


River Water


Doping Control

// FREESTYLE:SYSTEM //

INGENUITY LIES AT THE CENTRE OF THE CONCEPT.

Image exemplary with racks

FREESTYLE BASIC
The FREESTYLE BASIC is obligatory

The FREESTYLE BASIC is the basic building block consisting of xyz-robot including injection pump, sample loop, solvent distribution and double-walled needle. Using modules, the basic system is then customized to perform specific tasks. Modules can be retrofitted at any time, which makes the system responsive to changing requirements in the laboratory.

Powerful software permits the selection of individual modules or the application of all functions within one single method. For example, in SPE (solid phase extraction) the SPE steps may be carried out alone or in combination with the EVAporation module. Subsequent concentration could be automated including a possibly necessary solvent exchange.

FREESTYLE SPE
New approaches for the automation of SPE applications

The most important feature of the FREESTYLE SPE module is the solid connection of the SPE column with the robotic arm through which the columns can be moved to any area on the platform. This opens up completely new possibilities for automation, e.g. in sample loading or for a multi-stage elution. The connection of column with robotic arm allows controlled pressure application of up to 4 bars, which is particularly important for applications in which the column can become blocked through suspended particles.

All SPE standard formats (1, 3, 6, 8, 15 mL) or LCTech glass columns (up to 15 mL) can be used for automation; or indeed mixed within one sample sequence.

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FREESTYLE SPE with ThermELUTE
Fully automated mycotoxin analysis

The combination of the FREESTYLE SPE with the ThermELUTE enables the fully automated analysis of aflatoxins B1, B2, G1, G2 as well as M1 and ochratoxin A, from extract to chromatogram. The eluate of the immunoaffinity column will be eluted directly and quantitatively from the SMART column, as sample loop partial filling, into the injection system of the LC unit. Since the entire eluate is injected and the adjustment to the HPLC mobile phase is omitted, extremely low detection levels can be achieved.

After the extract is supplied, the FREESTYLE system takes over all the remaining steps.

The time saving is extraordinary. Preparation and injection by the FREESTYLE system run in parallel with the LC analysis. Up to 3 samples per hour can be processed. And all that around the clock! The system is suitable for all regulated matrices.

More on page 18

FREESTYLE EVAporation
Concentration of the samples to a defined end volume of between 0.2 mL and 5.0 mL

Evaporation is a comparatively easy task, but nevertheless fraught with enormous potential for error.

The FREESTYLE EVAporation system, however, provides a solution with its reliable and reproducible evaporation. Samples are sequentially evaporated, similar to the rotatory evaporator principle, or blown off with nitrogen. Alternatively, both principles can be combined. In this way, volatile analytes can be reliably processed.

An automated solvent exchange is also possible.

The whole process can be parameterized: final volume, vacuum, nitrogen, temperature – all easily configured via the software and reproducibly defined within a method. Unique is the ability to calibrate the vacuum chamber at any time. This allows to integrate the testing of the evaporation step in an accredited laboratory and to reconfirm the result.

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FREESTYLE – HPLC Direct Injection
Another step towards full automation

As a final step leading to full automation, e.g. after SPE and/or EVAporation, a direct injection module can be integrated. In this module, the sample can be injected directly from the EVAporation chamber into the HPLC sample loop through sample loop overfilling. This module also includes ten cooled positions for standards, such that the calibration function can be directly performed without the use of an HPLC autosampler.

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FREESTYLE GPC
Clean-up with the traditional, universal method

Sample clean-up via GPC (gel permeation chromatography) is used for all samples in the analysis of residues and contaminants and is therefore universally applicable. Amongst others, this methods is described in detail in § 64 LFGB under L 00.00-34 (originally DFG S19).

The FREESTYLE GPC is ideal for automatic processing of these samples: flexible, suitable for large series, easy to handle and highly efficient. In combination with the EVAporation module, the samples are prepared with or without solvent exchange and presented in GC vials ready for analysis.

Due to the high quality components, the system is durable, low maintenance and a guarantee for reliable performance.

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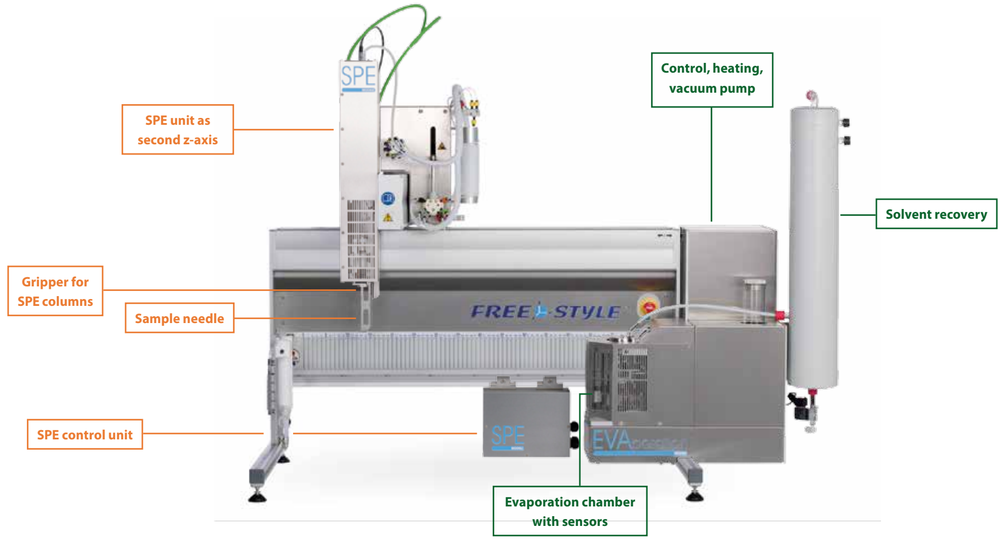
// FREESTYLE:SYSTEM //

EXAMPLE OF A COMMONLY CHOSEN CONFIGURATION
FREESTYLE SPE WITH EVAPORATION



This is a much-valued configuration among users for all types of SPE applications.

In combination with the EVAporation module, many manual steps can be processed automatically.

Reliable, around the clock.

SPE module

For all common column formats: SPE, IAC columns, LCTech glass columns.

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EVAporation module

Fully automated concentration similar to the rotatory evaporator principle, and/or blowing off with nitrogen to a continuously adjustable end volume of 0.2 mL to 5.0 mL.

More on page 24

FOOD – ANIMAL FEED - ENVIRONMENTAL ANALYSIS
FREESTYLE GPC WITH EVAPORATION

GPC module

Robust and durable gelpermeation chromatography system with all options (also for sample preparation in dioxin analysis).

More on page 30

EVAporation module

Fully automated concentration similar to the rotary evaporator principle, and/or blowing off with nitrogen to a continuously adjustable end volume of 0.2 mL to 5.0 mL.

More on page 24

The best-selling LCTech device for trouble-free, fully automated sample preparation, e.g. for pesticide and PAK analysis.

OUTSTANDING FLEXIBILITY – MANY RACKS – PLENTY OF CHOICE

Examples of our wide range of racks

There is a large variety of vials, bottles and other containers, which are used in laboratories around the world – the choice of racks is equally large to cater for all container sizes.

This shows the great flexibility of the FREESTYLE system. FREESTYLE offers no clearly defined robotic platform, instead, the user can compose his own „ robotic platform" at any time, which is in line with the sample sequence to be processed and the accordingly selected method.

All racks are already integrated in the system software, such that this software-based routine procedure only takes a few seconds to carry out.

Adjustments made easy

One universal rack for all types of standard SPE formats: 1 mL, 3 mL, 6 mL, 8 mL, 15 mL, immunoaffinity columns (standard cartridges and IAC columns) and all types of LCTech glass columns (up to 15 mL). This is unique.

Reusable adapter make the system incredibly flexible. All known SPE standard columns can be used in only one universal rack. Different formats can even be mixed within the same sample sequence.
Sample 1 with 3 mL SPE column
Sample 2 with 1 mL SPE column
… no problem.

FOOLPROOF HANDLING

Combinations

Only one platform – on which a large variety of containers can be combined at any time to create a suitable configuration. There is hardly a limit.

The procedure is very simple: All rack types are already stored in the software. The user selects for each method the required rack types and saves them together with the method.

Insertion of racks

Simply hook the required racks into the robotic system. The position is not predetermined.

Connect rack position and rack type in the software with a few mouse clicks – positions, dimensions and container volumes are thus clearly identified.

Now we can get started …

Start

The samples are recorded in the sequence list. This is done individually per sample or for several samples concurrently. The assignment of the sample to the raw sample container and the result container is clearly displayed on the screen, making it easy to follow. Now, the system is ready to get started.

Colour coding of the samples on screen show graphically the current state of the sample processing.

SPE – Solid Phase Extraction:

- Many methods
- Many solvents
- Many SPE columns

… simply automate with FREESTYLE

The number of SPE methods is virtually innumerable. The individual method requirements couldn't be more different. Yet almost all methods can be automated using the FREESTYLE SPE - without compromise.

AN INGENIOUS PRINCIPLE

Conceptually different
LCTech's approach to the handling of SPE columns is as simple as it is effective.
The column is received by the z-axis of the robot, gripped air and liquid tight, and is connected with the injection pump and valve system via an integrated tube. This unit ensures the uniqueness of the system and enables the SPE column to be moved to any place on the platform.

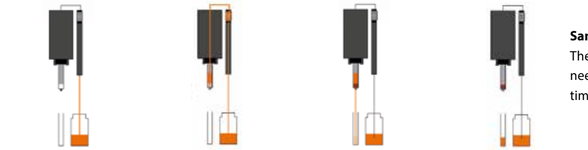
Owing to the solid connection of SPE column and robotic arm, real pressure can be applied to the column, e.g. up to 4 bar in order to push liquids containing suspended particles (e.g. river water) through the column in a controlled way.

All under pressure – all under control
In such a closed system, permanent pressure control can take place during loading and elution of a sample. Sample processing will be terminated if pressure is exceeded; the unit cleans itself and then continues with the next sample. Long sample sequences can thus be processed during the night without the danger of the system being blocked and awaiting remedial action. FREESTYLE marks the problematic samples in the sequence list, which the user can easily identify and then process again.

Due to the tight connection, the flow rates can be controlled very accurately. This is particularly important for a precise elution.

UNIQUE: THREE VERSIONS OF SAMPLE LOADING

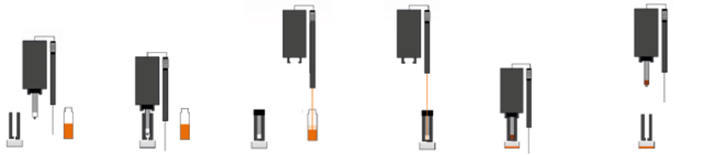
Simply select from the software during method set-up.



Suck up sample into sample loop. | Load onto SPE column. | Discharge into waste or collect in a container. | Ready for further processing steps.

Sample loading of large-volume samples
These samples (up to ca. 100 mL) are ideally sucked via the needle (first z-axis) into the sample loop (potentially several times) and then loaded onto the SPE column (second z-axis).

Loading of small-volume samples (e.g. 500 µL)
The column is conditioned and positioned in the wash port. There, the small sample volume (e.g. 500 µL) is directly pipetted with the needle onto the column. The SPE unit then takes up the column and the process continues.



Gripper holds the SPE column, | positions it in the wash port. | Sucking up sample from sample container. | Discharge into SPE column. | Discharge into waste. | Gripper takes the column again; ready for further processing steps.

Sucking up of the sample from the sample container directly into the SPE column. | Collection of the filtrate in the analysis container. | Ready for further processing steps.

Loading and direct/parallel discharge of sample
Samples of up to 60 mL can be loaded directly onto the SPE column via the sample needle without z-axis movement of the robotic unit and be discharged into the adjacent analysis container.

ELUTION, EXACTLY AS YOU REQUIRE

The requirements for elution of analytes from the SPE column can be extremely variable. FREESTYLE SPE carries out all elution procedures to perfection. The different procedures are stored as a macro in the software and can thus be easily integrated into a method.

Standard procedures

Elution with one solvent into an analysis container

Elution with several solvents into different containers

Special procedures

Elution with one solvent into several containers of the same size (up to 10 vials). Each vial is filled to its maximum, before the next vial is filled.

Elution with several solvents into one container

Only the FREESTYLE makes it possible

Elution of the sample directly into the EVAporation chamber with subsequent concentration, and if required including a solvent exchange. Concentration is done either under a stream of nitrogen/heating or with vacuum/heating (principle: rotatory evaporator). The sample can be directly injected from the EVA chamber into the HPLC.

Elution directly into the EVAporation chamber

// SPE-MODULE //

HERE A FEW EXAMPLES

FOR A WIDE RANGE OF APPLICATIONS

High throughput in doping control

If tens of thousands of urine samples from racing horses are to be cleaned-up via SPE cartridges, nothing must come to a holt. Pressure control alone is not enough. The LCTech software resolves this intelligently: Should a column block because of the urine properties, the processing will be terminated, the sample will be marked in the sequence list and the system resumes with the processing of the next sample! Such features realise the end-to-end automation without downtime.

It goes without say: no cross contamination, high recovery rates.

„High Pressure" for suspended particles in river water

Suspended particles in water make sample processing difficult. Often, the concentration of environmental pollutants on the particles is up to 100 times higher than it is in the surrounding water. Hence, the inclusion of the suspended particles in water analysis is of great importance. It is well known that these can easily clog or block the surface of an SPE column. The LCTech SPE system pushes the sample through the column applying a pressure of up to 4 bar – fully automated including elution if desired – even in long sequences. Unique!

Antibiotics in honey

Honey is said to have by nature special healing powers (antibacterial/antimycotic). However, this positive effect can be turned into the opposite if antibiotics are sprayed against fire blight during the flowering season of fruit crops. In advance of the analytical detection, an SPE clean-up is performed. This step is ideally suited for automation using the FREESTYLE SPE.

H53: Thousands of samples at a reduced cost

FREESTYLE enables the effortless and cost-effective analysis of mineral oil hydrocarbons: Extract and put the finished sample into the GC – all intermediate steps are carried out by FREESTYLE. Here, the inexpensive LCTech Florisil glass columns are used for clean-up and the samples are then concentrated automatically to 1 mL. Depending on the laboratory organisation, FREESTYLE also performs just the SPE step or EVAporation. Whichever way you prefer!

The recovery rates of a TPH standard: > 80%.

Mycotoxins: Toxic, but not for the FREESTYLE SPE

It is the same story over and over again – what people dislike the most is what FREESTYLE likes the best. Diligently day and night, the longest running applications in mycotoxin analysis will be accurately processed.

The FREESTYLE SPE can be used for all types of mycotoxin columns of leading manufacturers. Elution can be conveniently carried out in a 2 mL or 5 mL flask, such that the eluted volume can be adjusted quickly to a precise value.

FREESTYLE SPE in research:
Let me show you what I can do …

Apart from routine and standard tasks, particular challenges sometimes exist in research. A university research group wanted to investigate sediments with respect to their chemical composition. 250 µL of extract were available for SPE. Elution posed a challenge, as five different solvents were to be used without mixing. In addition, the column bed was not to run dry and the elution from the SPE column needed to be into vials sealed with septa. Owing to the technical options offered through FREESTYLE with SPE module, this problem was quickly resolved.

Mycotoxin analysis – ppt instead of ppb:

From raw extract to chromatogram – fully automated, fast and with high sensitivity

Time is money. This particularly applies to mycotoxin analysis. Using the FREESTYLE ThermELUTE in combination with an HPLC, the path from raw extract to chromatogram can be completely automated. The workload is minimised; the sample throughput is maximised – topped with excellent results.

SIMPLE MEANS LEAD TO GREAT RESULTS
ANALYSIS OF AFLATOXINS B1, B2, G1, G2, M1 AND OCHRATOXIN A

From the filtered and diluted raw extract to the chromatogram without manual intermediate steps: performed by FREESTYLE ThermELUTE in combination with HPLC.

For this, the FREESTYLE BASIC is equipped with an SPE module and a ThermELUTE module. This combination allows the fully automated and very fast processing of the practical SMART immunoaffinity columns. Elution is carried out directly from the immunoaffinity column into the HPLC.

Direct is faster …
The sample is completely processed by the FREESTYLE system: release of the buffer from the SMART column, loading an aliquot of a sample, washing, transfer into the heating block. Thermal denaturation is followed by large-volume, watery elution with quantitative transfer directly into the HPLC sample loop.

Via an interface, the sample will now be released, taken over by the HPLC and analysed. In parallel, the next sample is already being prepared by FREESTYLE.

In this way, processing is fast and undertaken without any manual intermediate steps. Losses through evaporation or adsorption effects (e.g. with aflatoxins) are thereby excluded and sensitivity is drastically increased.

… More accurate and secure
FREESTYLE ThermELUTE is unique. No other system reduces the workload in this manner, increases simultaneously the number of analyses and heightens its measuring sensitivity (ppt instead of ppb). Without special measures and further processing steps, the required maximum levels for baby food are measured and monitored – without exception for each matrix and each sample!

EXCEPTIONALLY SMALL, EXCEPTIONALLY FAST

scale 1:1

SMART-columns — small, but mighty

The LCTech immunoaffinity columns SMART Edition are the key to high throughput in the analysis of aflatoxins B1, B2, G1, G2 and M1 as well as Ochratoxin A. In performance, they are comparable with the standard 1 mL and 3 mL immunoaffinity columns, however, require through miniaturisation of the overall process less sample, less solvent and less time. In the automated process on FREESTYLE, SMART columns are always filled with liquid (buffer, sample or solvent). Consequently, the flow rate can be optimised, accurately controlled and precisely eluted in the HPLC.

Economical and fast

As a rule, the user uses only a small aliquot of the cleaned sample for injection into the analyser. Whether for manual handling or in high throughput automation – only the required aliquot will be prepared when SMART columns are used. Thus, in comparison to conventional processing protocols up to 80 % of solvent and time can be saved. Nevertheless, performance and reliability remain the same. The loading capacity of 100 ng aflatoxin B1, M1 or Ochratoxin A makes the columns AOAC-compliant.

Method: simple is better

Using the FREESTYLE robotic system, the extracted, diluted and filtered sample is loaded onto the high-performance SMART column. After washing, the column is heated, which causes the bond between toxin and antibody to break up. The toxins, in form of a large-volume, aqueous eluate, are directly eluted into the HPLC sample loop via partial filling. The injection valve switches, the sample is put onto the HPLC column, analytes are separated and then derivatised (Aflatoxin B1, G1), and finally detected in the fluorescence detector. There is only one method per toxin, which is used for all regulated matrices.

It could not be any easier to achieve excellent results with minimum effort.

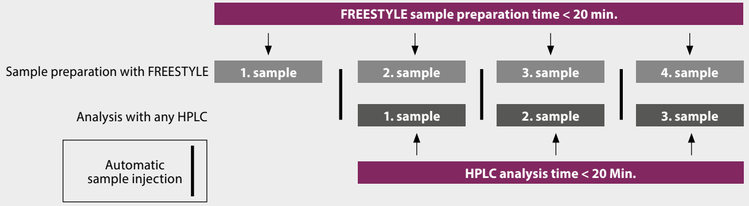
SMART COLUMN & FREESTYLE AUTOMATION: THE PERFECT COMPLEMENT

Highlights

Through comprehensive automation „from raw extract to chromatogram" without manual intervention, four main parameters can be optimised:

1. High sample throughput > 70 samples/day.
   Up to 120 samples can be loaded as a sequence, e.g. to make use of time over the weekend.
2. Automation for sample processing round the clock.
3. Incredible sensitivity in the lower ppt-region.
4. Reproducible results with excellent recovery rates for all matrices.

The system is controlled by sensors and thus lends itself to be used around the clock as a comprehensive and optimised fully automated system.



The FREESTYLE carries out sample preparation, during which the HPLC analyses the previously prepared sample.
This happens fully automatic, round the clock. Thus, analysis throughput can be increased to more than 70 samples per day.

Exemplary Recovery Rates

Matrix	Aflatoxins			
	B1	B2	G1	G2
Almonds	91	93	89	91
Peanuts	90	94	90	89
Maize	89	92	87	87

RELIABLE ACHIEVEMENT OF THE LIMIT VALUES THROUGH AUTOMATION

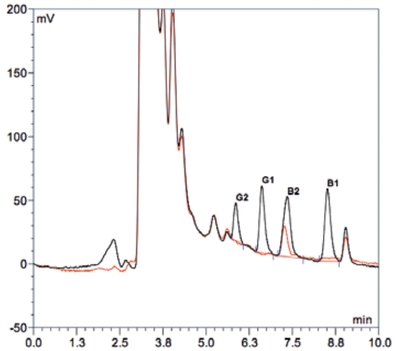
The automation of the analysis processes allows to process samples consistently in the same manner and gives the certainty of being able to always measure below the European limits.

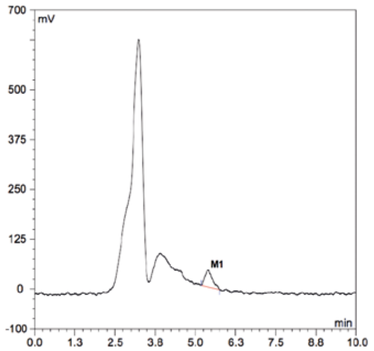
Measuring below the limits - even for baby food

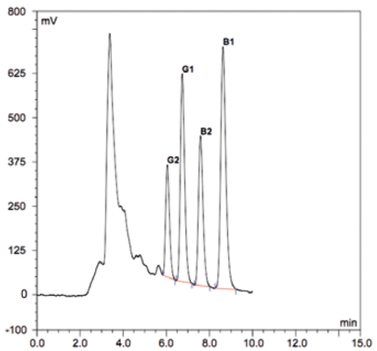
Baby food
Analysis of aflatoxins in baby wheat
(total aflatoxin 0.1 ppb (B1/G1 0.04 ppb; B2/G2 0.01 ppb))
Load: 10 mL sample (represents 0.28 g matrix equivalent)
Loading speed: 3 mL/min
Washing: 2 mL deionised water
Speed: 3 mL/min
Elution: Afla-Eluator in ThermELUTE
Duration of run: ca. 20 mins for a 10 mL sample

Milk products
Analysis of aflatoxin M1 in milk
(total aflatoxin M1 5 ppt)
Load: 20 mL sample (represents 10 mL milk)
Loading speed: 1 mL/min
Washing: 4 mL deionised water
Speed: 1 mL/min
Elution: HPLC-water + additive in ThermELUTE
Duration of run: ca. 30 mins for a 20 mL sample

Nuts
Analysis of aflatoxins in peanuts
(total aflatoxin 10 ppb)
Load: 2.5 mL sample (represents 0.07 g matrix equivalent)
Loading speed: 3 mL/min
Washing: 2 mL deionised water
Speed: 3 mL/min
Elution: Afla-Eluator in ThermELUTE
Duration of run: ca. 20 mins for a 10 mL sample







Superimposition of line diagrams: baby food not spiked (red) and spiked (black) with0.1 ppb total aflatoxin

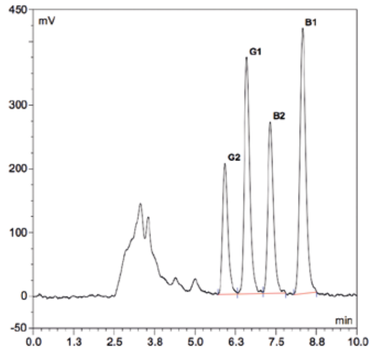
IMPRESSIVE PERFORMANCE

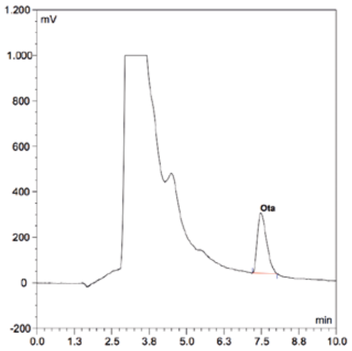
**Even the selection of methods is considerably simplified:
For example, ochratoxin A can be analysed in all coffee types with the same method.**

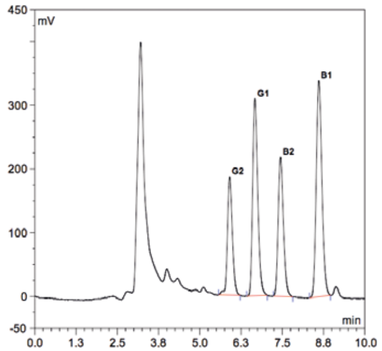
Spices
Analysis of aflatoxins in chilli
(total aflatoxin 6 ppb)
Load: 2.8 mL sample (represents 0.08 g matrix equivalent)
Loading speed: 3 mL/min
Washing: 2 mL deionised water
Speed: 3 mL/min
Elution: Afla-Eluator in ThermELUTE
Duration of run: ca. 20 min for a 10 mL sample

Coffee
Analysis of ochratoxin A in roasted coffee 5 ppb
(total ochratoxin A 5 ppb)
Load: 10 mL sample (represents 0.05 g matrix)
Loading speed: 1.5 mL/min
Washing: 2 mL deionised water
Speed: 1.5 mL/min
Elution: (HPLC-water) in ThermELUTE
Duration of run: ca. 20 min for a 10 mL sample

Feed
Analysis of aflatoxins in dog food pellets
(total aflatoxin 10 ppb)
Load: 2.8 ml sample (represents 0.08 g matrix equivalent)
Loading speed: 3 mL/min
Washing: 2 mL deionised water
Speed: 3 mL/min
Elution: Afla-Eluator in ThermELUTE
Duration of run: ca. 20 min for a 10 mL sample







For further details regarding applications please contact: info@LCTech.de

EVAPORATION – PRECISION EVEN IN UNOBSERVED MOMENTS

Precise end volume between 0.2 mL and 5.0 mL:
Reproducible and high recovery rates

The EVAporation module evaporates all types of organic solvents to a precise end volume. If required with solvent exchange. Day and night, including weekends.

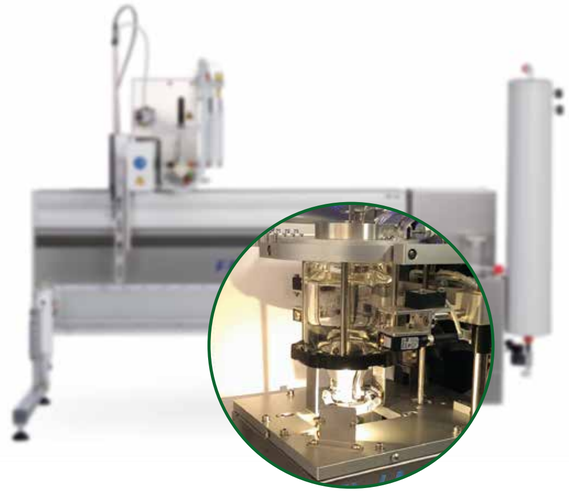
SMALLEST QUANTITY, HIGHEST CONCENTRATION, CONCISTENTLY HIGH RECOVERY RATES

We have thought of everything – all is integrated
Required for EVAporation:
- the robotic unit FREESTYLE BASIC
- the EVAporation module
- and possibly further modules in combination

Integrated in the EVAporation module are:
- the EVAporation chamber optimised for fast, low-loss and accurate evaporation
- sensors for precise process controls
- membrane pump with intelligent vacuum control
- closed heating system for heating the evaporating flask
- condensator for solvent recovery

Experience and technology at its finest
The samples can be concentrated fully automated to a precise end volume of 0.2 mL and 5.0 mL. Software and sensors control the process. Methods with different end volumes can be mixed within the same sequence. For certified laboratories especially valuable: the end volumes can be automatically calibrated.

Individualised for best results
An abundance of parameters allows for individual adjustment of the method to the requirements of the samples.
An exemplary selection:
- Concentration through rotary evaporator technology (vacuum); if necessary combined with gentle blowing with nitrogen
- Automated solvent exchange liquid/liquid or to dryness/uptake in a new solvent
- Filling the evaporated sample into one or divided in aliquots into freely selectable containers (e.g. closed GC vials),
- Free from cross-contamination through customised rinsing of the EVAporator chamber
- Excellent recovery rates and reproducibility



FLEXIBILITY IN ALL AREAS OF EVAPORATION

Flexibility makes everything easier

Flexibility is not an end in itself. With FREESTYLE being such a flexible and fully automated system, you will save time in the performance of all processing steps. This increases the productivity and leads to a higher sample throughput.

Flexible in the choice of the evaporation principle

The sample can either be evaporated similar to the rotary evaporator principle with controlled heating of the sample via a closed water cycle and the subsequent application of a vacuum; or by blowing off with nitrogen accelerated by heating of the sample that is to be evaporated.

A combination of both principles is possible, e.g. evaporation similar to the evaporator principle to a residual volume of 5.0 mL, and then blowing off with nitrogen up to a defined end volume.

Flexible in the size of initial sample and end volume

Users like to use the system as an evaporation system only. Sample volumes of up to 350 mL can be concentrated in one operation. The sample is sucked up in batches into the smaller high-performance EVAporator chamber using a vacuum. The system recognises when the entire sample has reached the vacuum chamber.

Any volume of between 0.2 mL and 5.0 mL can be defined and reliably achieved as the end volume. This is done without mechanical intervention, but solely via software-controlled sensors. Consequently, samples with different end volumes can be mixed within one sample sequence.

Flexible in the choice of solvents

The sample can be dissolved in a solvent of choice. Normally, evaporation to dryness should be avoided to protect volatile analytes. The FREESTYLE EVAporation system reliably ensures this process.

Also selectable is evaporation to dryness und resuspension in a solvent of your choice. Available are up to 3 solvents (standard) or 6 solvents (upgrade); choose according to your tasks.

Pictures without protective cover to show technical details.

EVAPORATION TAILORED TO YOUR REQUIREMENTS

We would gladly give recommendations for the correct use and configuration. We can also advise you on processes for which the use of the FREESTYLE EVAporation system is not recommended. Please ask: info@LCTech.de

Free from carry-over

Already during the process, the analytes are repeatedly rinsed from the walls of the EVAporation chamber down into the concentrate. This step is particularly intensive just before reaching the selected end volume.

Before the next sample is processed, EVAporation chamber and tubes that are contaminated with the sample will be rinsed. Some samples are particularly difficult. The rinsing process can be adapted to the characteristics of the sample matrix and stored as part of the method.

Thereby, a carry-over is reliably avoided.

Free from analytes

If the FREESTYLE is used as EVAporation module, then samples should be transferred from the sample container to the EVAporation chamber without loss of any analytes.

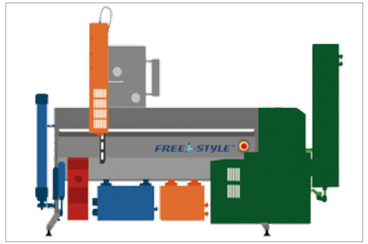
For a complete as possible transfer of analytes, these are washed down under pressure from all around the walls of the sample container using a double-walled needle and a chosen solvent. The analytes are then transferred to the EVAporation chamber. Unique with FREESTYLE!

Flexible method set-up

All details for the optimal processing of a sample are specified and combined in the method via the software. Simply save the method, recall and assign to a sample by pressing a button.

Different methods can be mixed within a sequence. This also applies to the use of all installed modules. EVAporation only or in combination with SPE or GPC – just choose whatever is required at the time.

SUCCESS LIES IN THE STRENGHT OF COMBINATION



Combination of processing steps

In the area of sample preparation, there is often a need for several evaporations. In the FREESTYLE system, this demand is met by the addition of the EVAporation module. The EVAporation step (also usable for solvent exchange) can be integrated into almost any method and enables thereby the full automation of any processing chains. A few examples:

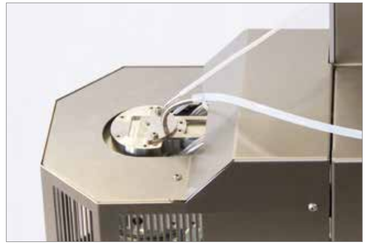
Sample preparation for pesticides, PAKs, Dioxins/PCBs:
FREESTYLE BASIC, combined with GPC and EVAporation module

Sample preparation for environmental samples
FREESTYLE BASIC, combined with SPE and EVAporation module (if required also with direct injection module for HPLC)

Online from SPE

Desired results online

By combining EVAporation options with SPE columns or sample clean-up via GPC, complete sample preparation processes can be automated simply and reliably. The process is defined in the method and reliably executed: exactly to the pre-selected end volume, with solvent exchange if required, filling into vials or divided into aliquots, direct injection into an HPLC system. All always reproducible!



Online from GPC

Ready for analysis

Through online-combination of processes, manual intermediate steps are eliminated, e.g. sample transfer into vials or the rotary evaporator flask.

The samples are directly eluted or transferred online from SPE or GPC into the EVAporation chamber; without losses and the risk of contamination.

At the end, the sample is filled or divided into aliquots in freely selectable containers, e.g. in closed GC vials and a vial for sample storage. The perfectly processed sample can be injected directly into an HPLC.

SPECIAL SITUATIONS EASILY MASTERED

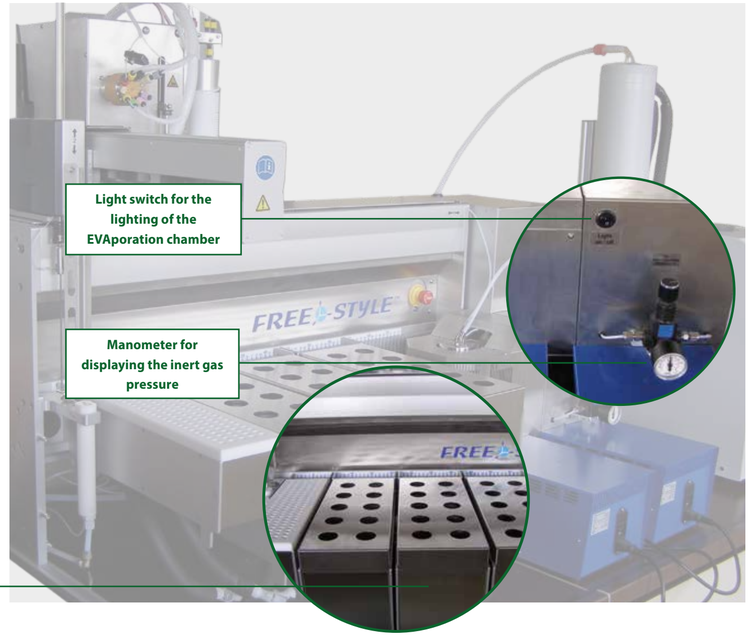
A special application example
Using the FREESTYLE EVAporation module, special tasks can also be handled.

The challenge
The system was tasked with the following situation occurred in the field of aroma research:

- Oxygen sensitive analytes
- Light sensitive analytes
- Heat sensitive analytes and solvents (diethyl ether)
- Fully automated concentration to 1 mL

The solution:

- Protected from light and temperature-controlled storage of samples in special racks.
- The processing temperature is accurately monitored and the movable level sensor of the EVA chamber ensures an exact end volume.
- The aliquot is taken directly from the EVAporation chamber and bottled.



GPC – CLEAN-UP
Proven does not mean boring

Clean-up with gel permeation chromatography

Reliable technology married with technical finesse results in a fully automated chromatographic sample preparation system.
Particularly powerful together with the EVAporation module.

UNDENIABLY UNIVERSAL

Effective and proven: clean-up with GPC
Food, feed, environmental samples or pharmaceutical natural extracts – all regulated matrices can be cleaned using the proven GPC method. Particularly powerful is the GPC in combination with the EVAporation module. Thus, the entire process is automated to the extent that only the vial needs to be placed into the GC or LC. The FREESTYLE GPC meets the requirements of general methods in all areas, e.g. L 00.00-34 and EPA 3640A.

Nothing left to be desired
The GPC module is extremely flexible:

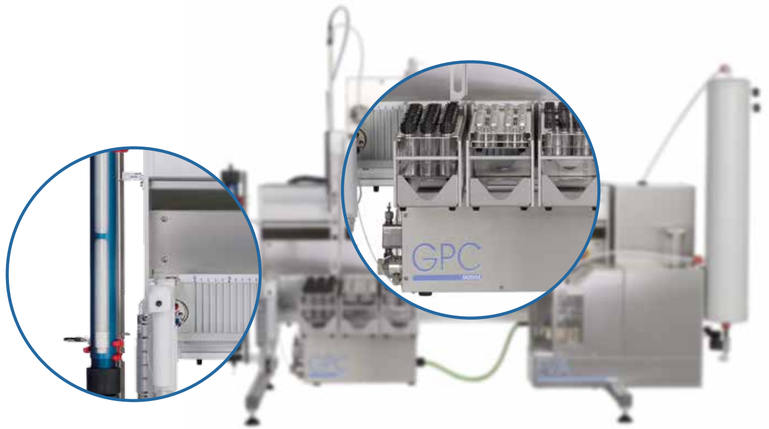
- Variable depth of immersion in order to protect the needle from sediments; can be defined individually for each method
- No loss occurs during sample loading from containers sealed with septa; five injection options are offered through the software ranging from simple sample loop overfilling to residue-free quantitative sample transfer; individually assigned to each method
- Loss-free fraction collection into septa-sealed containers
- Repeated combination of the same sample fractions on one collection position; individually definable for each method (especially important for dioxin/PCB analysis)
- Optimum results through individual definition of the flow rate for each method
- Intake speed of sample adjustable depending on the type of solvent in order to avoid distortion of the sample volume caused by suction speed when using volatile solvents.

Flexible and safe
The user's safety is important to us. When using GPC, significant amounts of solvent accumulate after only a few samples have been processed. Especially with fully automated processes, consistent process control is of paramount importance. Hence, significant control points are included in the system and parameters can be set individually:

Leakages: Lead generally to under-pressure. Their detection and instant shut down of the pump prevents the uncontrolled leakage of a large amount of solvents.

Over-pressure: Clogging of a column can easily lead to over-pressure. This damages the bed material of the column or may lead to leaks in the system. With a special low-pressure sensor, the pressure is monitored and on reaching the set value, the system will be shut down. Consequently, columns as well as laboratory are protected.

An overfill sensor prevents overflow of the waste container (optional).



SOFTWARE

Detailed and varied method set-up as well as simple routine applications are successfully managed through the FREESTYLE software.

The FREESTYLE software at a glance:

- One user interface for all FREESTYLE modules.
- Expandability of the system with new modules by a simple mouse click.
- Easy operation through drag & drop.
- Simple set-up, re-use and modification of the methods.
- Different methods can be mixed in one sequence list.
- Prioritization of the samples is possible at any time, even during operation.

SIMPLE, QUICK AND CLEAR IN YOUR DAILY ROUTINE – PAIRED WITH GREATEST FLEXIBILITY.

Sample and method

Methods are the prerequisite that the samples are processed by the system in the required manner. According to the integrated modules, methods can be defined and combined.

To register the samples in the software, they are placed in appropriate racks and simply hung into any position on the FREESTYLE system. The user checks the positions in the software and adjusts them as necessary.

Simple sample registration

In the daily routine, the user assigns the methods to the samples: individually, sample by sample. This approach allows the use of many methods in only one sample sequence.

However, the process speeds up significantly, if several samples are treated with the same method. Just assign the desired method to a sample sequence with only a few mouse clicks. Thus, even an extensive sample sequence will be ready for processing in less than a minute.

For unambiguous identification, sample IDs can be entered manually or read in with a barcode reader. All essential sample characteristics can be printed using the report generator.

Flexible in all important aspects

The user can make use of several methods within one sample sequence list. Depending on the currently pending work in the laboratory, methods can be individually and effortlessly adapted.

Adding of samples to a sample sequence is possible at any time. Place sample into the FREESTYLE; assign method – done!

Prioritize a particularly urgent sample: Place sample into the FREESTYLE, assign a method and register the sample in the sample list directly behind the currently processed sample – done!

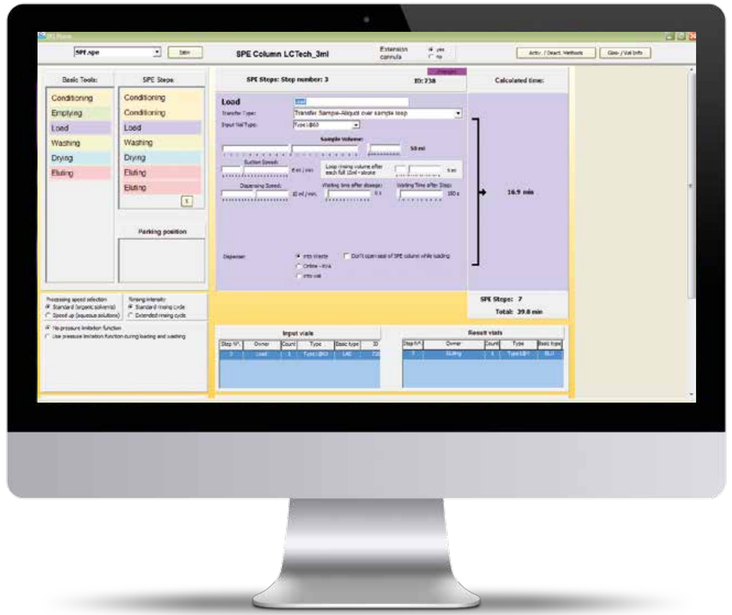
// SOFTWARE //

METHOD SET-UP SPE: EXACT TRANSFER OF A MANUAL METHOD INTO AUTOMATION

To convert manual method processing into a fully automatic process the FREESTYLE software offers „basic tools", such as conditioning, sample loading and elution, which are similar to the manual method descriptions.

By means of „drag & drop", the basic structure of a method for any method sequence can be defined within seconds. Simply by moving bars, parameters such as volume or speed can be adjusted. For your control, the value will be displayed as a figure.

There is a wide choice for sample loading: only a few µL or a volume of 100 mL, the most suitable way for loading your sample is already pre-stored and easily selectable.



METHOD SET-UP EVAPORATION: SIMPLE SET-UP OF COMPLEX PROCESSES

With the EVAporation module, samples are easily, reliably and precisely concentrated to an end volume, which has already been defined in the software.
The user decides, which method the FREESTYLE system should apply:

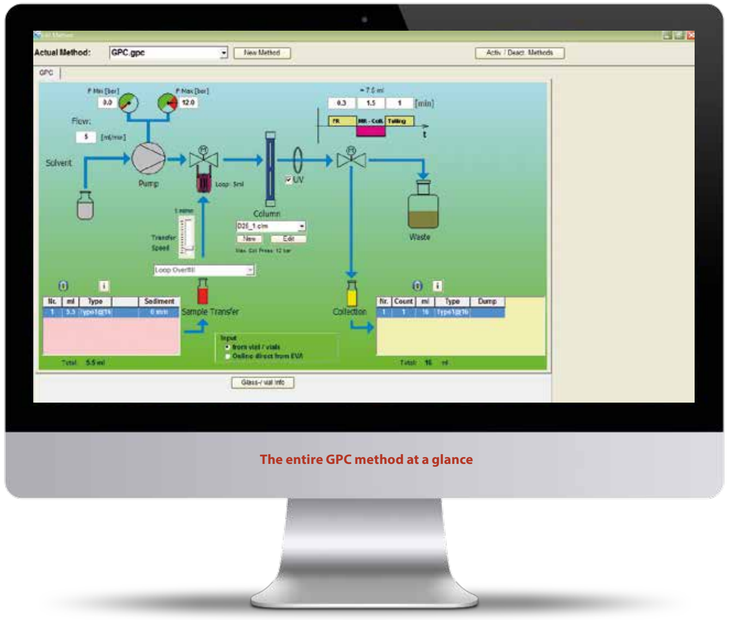
- exclusively vacuum and energy supply (similar to the rotary evaporation principle)
- blowing-off with nitrogen
- the combination of both physical options

The user also selects whether or not a solvent exchange should be carried out, and whether the samples will be transferred into one or more with septa sealed vials.

The desired individual steps can be integrated into the evaporation process with a simple click. As with the SPE, simply by moving bars the desired values can be adjusted.

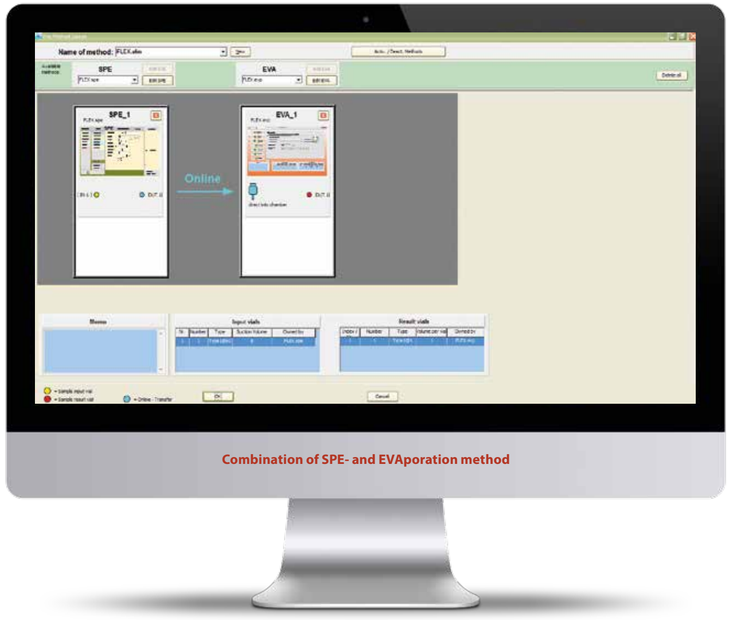
METHOD SET-UP GPC: CLEARLY STRUCTURED AND QUICKLY PERFORMED

The basic procedure of sample preparation with GPC is pre-installed: forerun, main run (several fractions possible) and tailings. A clearly laid out graphic helps with the design of your GPC method. The user just enters the values and starts the system.



The entire GPC method at a glance

FLEX METHODS – COMBINE AND SAVE TIME



Combination of SPE- and EVAporation method

Should you wish to use several modules in combination, simply combine the individual modules to form a so-called “FLEX” method.
For example, you could link GPC and SPE methods with the automatic EVAporation module. GPC fractions or SPE eluates will be fed online into the EVAporation chamber, then evaporated and a solvent exchange will be carried out if required. The “FLEX” methods are saved and can be recalled and used at any time.

THAT'S NOT ALL – FURTHER EXPANSION OPTIONS

Direct is better – the Direct Injection module

The HPLC Direct Injection module enables complete automation from raw extract to chromatogram and thus dramatically reduces the manual effort afforded per sample. The samples are prepared on FREESTYLE, for example via SPE (solid phase extraction), GPC (gel permeation chromatography) after a solvent exchange and EVAporation or through a combination of any of those functions. Subsequently, the finished samples are injected into the HPLC. The injection volume is parameterisable.

The module consists of 10 coolable (Peltier) positions for the loading of standards. Optionally, 4 mL- or 1 mL- vials may be used. The size of the sample loop is variable.

Waste sensor

FREESTYLE is designed for continuous operation, 24 hours a day, and seven days a week. In order to facilitate smooth system operation during the weekend without supervision, a waste sensor prevents overflow of the waste container. The sensor is made from Teflon and stainless steel and is therefore suitable for the use with solvents. Once a certain filling level is reached, the unit will switch off.

Barcode reader

The use of a barcode reader greatly helps with sample registration. Especially longer sequences can be quickly registered and clearly assigned: scan, place sample on the next available rack space – done.

Now, you need to allocate the methods with a few mouse clicks and the processing of the sequence is ready to start on FREESTYLE.

MORE USEFUL ACCESSORIES FOR THE GPC APPLICATION

Accessories as required

UV-detector: a 254 nm fixed wavelength detector for quality assurance of GPC columns. Data entry including analysis and comparison with former chromatograms via FREESTYLE software.

Column switching valve: This valve switches automatically and facilitates utilisation of different types of columns for different sample matrices. The column is allocated to a method and automatically selected.

Sample loops: Different sizes of sample loops are available. These can easily replace the 5 mL standard sample loop without great expense.

Optional equipment

High-pressure version: The low-pressure version of a GPC system has many advantages and is particularly interesting for most standard applications. If required, a high-pressure version of the system can be supplied.

Feed pump: The LCTech GPC pump is a fully-fledged preparative LC pump. Since the pump operates in the lower flow range only, wear and tear is extremely low and, accordingly, very little needs to be invested in its maintenance. On demand, the pump can be supplied with different specifications.

Sometimes you might like an added extras

In most cases, special customer requirements can be met very easily by the FREESTYLE system.

Do the samples need to be temperature-controlled?
There is a wide range of standard racks available for temperature sensitive samples.

Are the samples light sensitive or can they only be processed under inert gas?
Even such special requirements have already been addressed by the FREESTYLE system.

Please communicate your requirements: info@LCTech.de

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