

Automated Sample Preparation for  
Gel Permeation Chromatography GPC  
Solid Phase Extraction SPE  
Sample Concentration AccuVap



# PrepLinc - Specialized Automated Sample Preparation Instrumentation for Gel Permeation Chromatography, Solid Phase Extraction (SPE) and Sample Concentration

Sample Preparation also for difficult and complex applications

The Gel Permeation Chromatography (GPC) Cleanup Module for PrepLinc performs cleanup of a wide range of sample matrices including foods, tissues, grains, plants and environmental samples, such as soil, sludge, and hazardous waste for US EPA (SW-846 Method 3640A), US FDA, USDA, USGS, CDC, DFG S19 / L 00.00-43, AOAC as well as CFIA GPC Cleanup methods.

The PrepLinc SPEi Solid Phase Extraction Modules accentuate the line of full-featured automated sample preparation instruments. The SPEi system uses positive pressure for consistent flow sample to sample and run to run. The intuitive software and range of parameters make method development easy. Converting any manual SPE method to automated takes minimal time and effort.



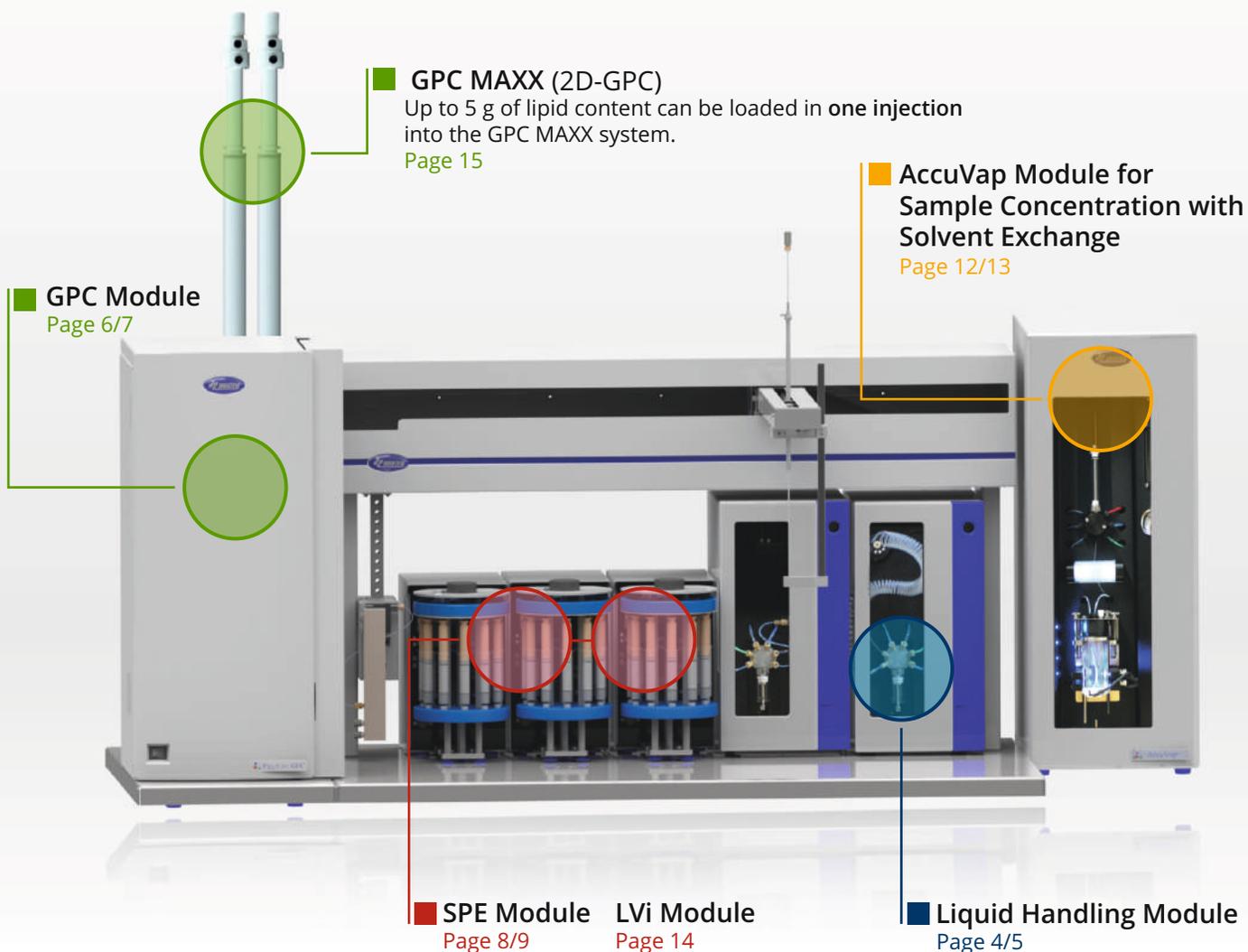
## PrepLinc

J2 Scientific introduces the ultimate flexibility and automation for the sample prep lab. The PrepLinc Platform Automated Sample Preparation System offers the ability of combining common sample prep process inline on one system. With modules available for automating Solid Phase Extraction, Gel Permeation Chromatography Cleanup and Concentration, there are a multitude of configuration possibilities. Combine SPE with Concentration, combine GPC Cleanup with SPE, even concentrate a sample between two processes.

The combination of these technologies gives the user flexibility and options to significantly decrease sample handling while increasing data quality and productivity.

# PrepLinc Modules

Ultimate flexibility and automation for the sample prep lab



## ● PrepLinc Basic Module

Autosampler and liquid handling

- The flexible autosampler mat editor and tray editor provide for a variety of sample and collect tray configurations.
- The Linc Editor makes it possible to “linc” methods from different modules together to process a sample in one process.
- Liquid-Handling functionality comprises Sample Mixing, Transfer Sample Dispense, Transfer Sample Pickup, Homogenize Sample, Sample Vial Rinse, Sample Injection, Spike Sample, Probe Rinse, Drying/Clear.

## ● GPC Module

Gel Permeation Chromatography

- Meets guidelines for US EPA, US FDA, USDA, CDC DFG S19, L-00.00-34, AOAC, and CFIA GPC Cleanup.
- Uses both traditional and high pressure columns of up to 5500 psi.
- Optional multi-GPC-column select valve.

## ● AccuVap Module

Sample concentration, solvent exchange

- Fully automated sample exchange.
- Inline concentration for samples eluting from SPE or GPC.
- Offline sample concentration for samples collected in vial.
- Two endpoint settings: dryness or defined endpoint volume
- Programmable vacuum control.
- Enclosed evaporation chamber. No heated oil bath.

## ● SPE Module

Solid Phase Extraction

- Single and multi-column methods.
- Use for columns up to 15 mL; not limited to one manufacturer.
- Forward and reverse flow on any position.
- Positive pressure with programmable flow rates.

Solid Phase Extraction for large samples

- Large volume pump option for a variety of water methods from 20 mL to > 1 L.

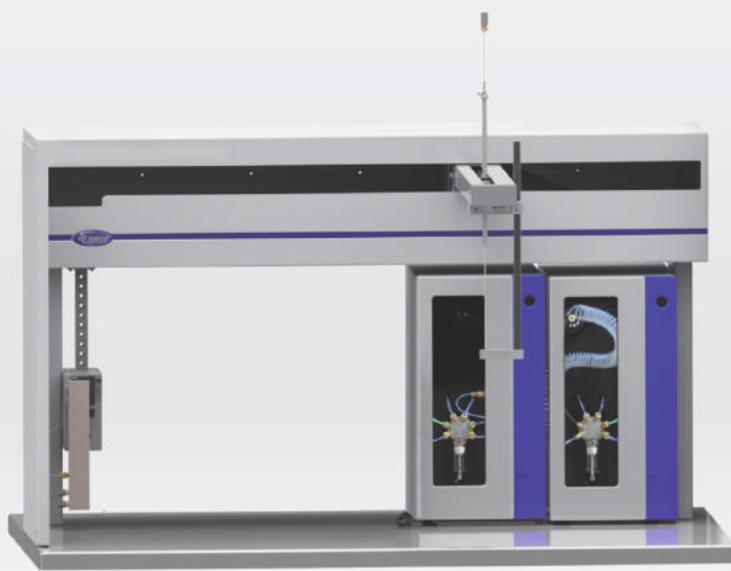
# Autosampler Liquid Handling Module

PrepLinc Basic Module

The Liquid Handling Module, which is placed on the autosampler, forms the basis for each PrepLinc system. The basic system can be equipped with the following modules for Solid Phase Extraction, Gel Permeation Chromatography, Filtration und Sample Concentration.



**PrepLinc Basic Module AS2**  
580 mm



**PrepLinc Basic Module AS4**  
920 mm

Different solvents can be connected to the liquid handling module. The high precision syringe drive as well as the possibility of controlling the aspirate and dispense rates in every method step attain the highest possible precision and accuracy in liquid sample handling. Probe depths that are user-programmable and the probe Smart Track keep contact with the sample to a minimum. Programmable rinse volumes and solvents eliminate cross-contamination.

## Autosampler in two sizes

The size of the autosampler determines the size of the PrepLinc platform.

The autosampler is available in two sizes: AS2 with a length of 580 mm and AS4 with a length of 920 mm.

The basic system can be expanded to meet future needs. Various sample preparation modules are available for system expansion.

## Liquid handling functionality

- Dosing
- Dispense
- Dilute
- Solve
- Transfer
- Pipetting
- Homogenize
- System cleaning
- Sample splitting
- Sample introduction
- Sample injection

The autosampler can be equipped with temperature-controlled racks to store the samples under optimal conditions.

# Autosampler

## Hardware configurations and capacities

- GPC Cleanup System: 216 samples with AccuVap
- GPC Cleanup with Inline SPE: 45 samples
- SPEi Inline SPE System: 45 samples
- LVi SPE Water Extraction System: 40 samples

## Needle wash port

Different wash ports are available for the autosampler module. The needle is cleaned by moving into the wash port, where it is cleaned from the inside as well as from the outside. If waste water is generated during the sample preparation, waste water is emptied separately from the solvent waste into a separate bottle in order to minimize disposal costs.



# Sample Vials / Racks

The flexible autosampler mat editor and tray editor provide for a variety of sample and collect tray configurations.

More than 90 standard racks are available for the autosampler. Racks from other instruments or self-made racks can be created and set up in the program.

## Needle depths:

Up to ten different depths per rack can be defined by the user, which are then taken into account for the different steps within the automated sample preparation.

**Smart Tracking**  
Probe depths that are user-programmable and the probe Smart Track keep contact with the sample to a minimum. Programmable rinse volumes and solvents eliminate cross-contamination.

# Configuration Options

Simply add sample prep modules to your Preplinc system:

With modules available for automating Solid Phase Extraction, Gel Permeation Chromatography Cleanup and Concentration, there are a multitude of configuration possibilities. You can combine SPE with Concentration,

combine GPC Cleanup with SPE, even concentrate a sample between two processes. The combination of these technologies gives the user flexibility and options to significantly decrease sample handling while increasing data quality and productivity. High-powered software utilizes the features of each module to make the Preplinc a complete sample prep solution.

# Gel Permeation Chromatography GPC

Module for traditional GPC and 2D-GPC clean up

The GPC Cleanup Module performs Automated Gel Permeation Chromatography (GPC) for the cleanup of a wide range of sample matrices including foods, tissues, grains, plants and environmental samples such as soil, sludge, and hazardous waste for EPA (SW-846 Method 3640A), CLP, FDA, USDA, USDI and DFG S19 (L00.00-34, DIN EN 12393) analysis.



## Functional Principle

Gel Permeation Chromatography refers to displacement of a solution containing analytes of interest, using a mobile (solvent) phase, through a bed of porous particles.

In most applications for GPC cleanup of organic extracts, the porous column bed, which is the stationary phase, is composed of cross-linked polymeric material.

A classic example is polystyrene that has been polymerized with a small amount of divinylbenzene. The resulting beads are swollen with solvent to form a "gel" that can be packed into a column.

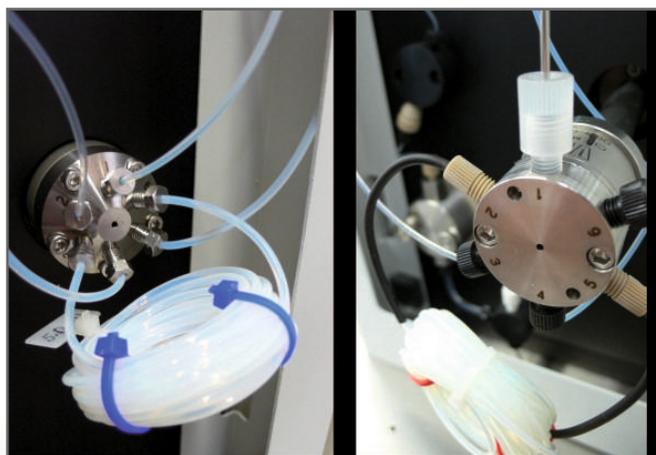
## PrepLinc GPC

Drawing from our extensive experience, we have perfected the GPC Cleanup on this new platform. All the unique features of previous models are combined with high-powered software and the ability for further automation by combining GPC with other prep processes on the PrepLinc.

The PrepLinc GPC Cleanup Module provides another level of functionality to the PrepLinc™ system. The ability of combining GPC Cleanup with Automated Concentration and/or SPE on the PrepLinc system, completes the sample prep package.

## GPC Module Standout Features:

- **Direct Inject**  
Inject the entire sample onto the column
- **Septum piercing standard**  
for sample and collect vials
- **Probe tracking**  
and user-defined rinses
- **Three-column selector valve**
- **UPS Power Watchdog**
- **Specialized calibration and reporting software**  
features for GPC
- **Create methods directly** from the column calibration file
- **Use with low pressure glass** or high pressure columns
- **Integrate** with PrepLinc SPE and AccuVap modules



### GPC sample injection

The sample is either injected into an injection port or introduced via a loop overfill.

It is possible to inject the entire sample or a precisely defined sample quantity into the GPC column.

## GPC Columns

We offer a variety of columns for Gel Permeation Chromatography:

The **traditional glass column** referenced in USEPA SW-846 Method 3640A and DFG S 19 (L00.00-34, DIN EN 12393) and - for faster run time and less solvent consumption - **the Express™ column** and the High Pressure GPC Cleanup Column **EnviroSep-ABC™**.

The GPC module is equipped with a high-pressure pump that can run at a flow rate of 1 to 10 mL up to 170 bar. Thus, in addition to the most commonly used low pressure GPC column according to the DFG S19 method with a back pressure of approximately 0.4 bar, medium pressure columns up to 170 bar can also be used. A special version of the high-pressure pump of up to 374 bar back pressure is also available as an option for use with high pressure columns.



### Multi-column Selector Valve

With the Multi-Column Selector Valve, it is possible to have more than one column attached to the system at all times. You no longer have to manually switch the tubing and connections to use a different column. Simply designate a column for a particular method, and the software automatically puts that column inline at the start of the sample run.

### GPC Cleanup Reports

The PrepLinc software makes keeping track of your column calibration and sample data easy. Create Method and Configuration reports to report system setup.

Create Sequence reports with time/date stamps.

Create calibration and comparison reports in compliance with Method 3640a and CLP guidelines.

Quickly determine if a column calibration has met pass/fail requirements and print a report to prove it!

### 2D Gel Permeation Chromatography (GPC MAXX)

The PrepLinc 2D GPC feature enables you to control the GPC Dump, Collect and Wash steps through two columns in series, thereby increasing the lipid capacity.

The PrepLinc 2D GPC system can achieve significant time and solvent savings using a single-column cleanup for extreme lipid loads.

### UV Detectors

Two UV detectors are available for the PrepLinc GPC Module:

**UV detector with fixed wavelength** (254 nm) as well as a **UV detector with variable wavelength**.

The retention times determined from the GPC column reports can be directly applied to the GPC methods.

# Solid Phase Extraction SPE

Automated Solid Phase Extraction Modules SPE and LVi

The PrepLinc SPEi Solid Phase Extraction Modules accentuates the line of full-featured automated sample preparation instruments. The SPEi system uses positive pressure for consistent flow sample to sample and run to run. The intuitive software and range of parameters make method development easy. Converting any manual SPE method to automated takes minimal time and effort.



The PrepLinc Platform Automated Sample Preparation System offers the ability of combining automated Solid Phase Extraction and concentration with solvent exchange.

This combination allows you to make a concentration of a sample between two SPE processes. Create simple, single-column or complex multi-column methods using the same intuitive method editor. Fully automated sample prep for production labs. PrepLinc automates complex SPE applications that use several different SPE cartridges.

## SPE standout features

- Use cartridges of 1 mL - 15 mL plus many specialty and flash chromatography columns
- Multi-column procedures with up to 5 columns
- Flow Inject Module for water/aqueous samples
- Programmable flow rates of up to 50 mL/min
- Program up to 12 different solvents in a method
- Positive Pressure Elution for Sample and Solvents
- Nitrogen drying
- Closed system with pressure monitoring
- Elution of the sample directly to the evaporation chamber with inline evaporation. If desired, also with automated solvent exchange

## Solid Phase Extraction Modules



The SPEi Inline Solid Phase Extraction Modules adapt to columns from 1 mL to 15 mL.

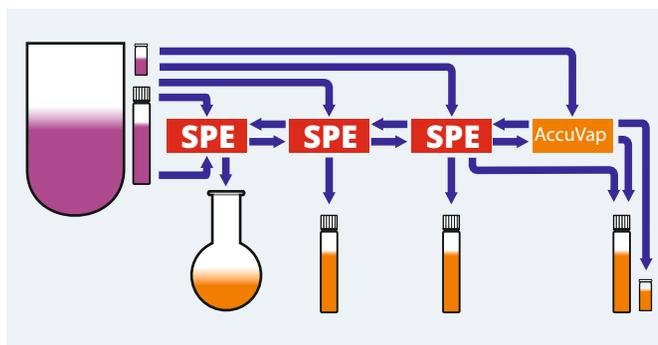
It is ideal for sample and elution volumes of up to 50 mL.

Each column module holds nine columns, and the system can accommodate up to five column modules.

## Multi-Column SPE methods

Combine SPE with Concentration, combine GPC Cleanup with SPE, even concentrate a sample between two processes. The combination of these technologies gives the user flexibility and options to significantly decrease sample handling while increasing data quality and productivity.

High-powered software utilizes the features of each module to make the PrepLinc a complete sample prep solution.



## Applications

- SPE for environmental, water, food, pharma and forensics samples.
- EPA Method 3535 Solid Phase Extraction
- EPA Column Cleanup Methods: 3610B - Alumina, 3611B - Alumina for Petroleum, Waste, 3620C - Florisil, 3630C - Silica
- SPE methods from AOAC, ASTM, USDA and other agencies.

## Features

- The SPEi system uses positive pressure for consistent flow sample to sample and run to run.
- The intuitive software and range of parameters make method development easy. Converting any manual SPE method to automated takes minimal time and effort.



## Elution Modes

The SPE cartridges of the PrepLinc system can be eluted as follows:

-  Elution from top to bottom
-  Reverse elution
-  Bypass elution
-  Elution via sample loop, cartridge inline
-  Elution without sample loop, cartridge inline
-  Elution via sample loop, cartridge bypass
-  Elution without sample loop, cartridge bypass

### Programming Multi-Module Methods

The Linc Editor makes it possible to “linc” methods from different modules together to process a sample in one process. The drag-and-drop editor is very easy to use and perfectly complements the PrepLinc group of products.

Use the SPEi as a stand-alone automated SPE system or integrate it with other PrepLinc modules, such as the AccuVap Evaporation module or GPC Cleanup module for a completely automated sample prep system.

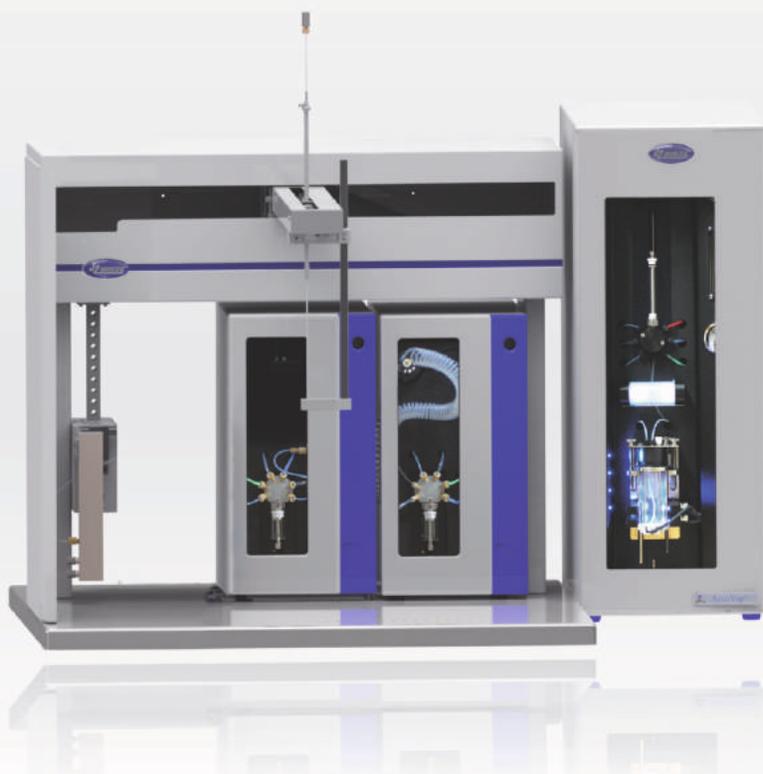
### SPE Module Functions

- Condition
- Dilute
- Wash / Rinse
- Mixing sample
- Sample introduction inline
- Sample injection
- Dry
- Elute / Reverse Elute
- Fractionate
- Sample Transfer
- Elute directly to the evaporation chamber

# Evaporation Module AccuVap

Evaporation Module AccuVap with Solvent Exchange

Adding an AccuVap Concentration Module to the PrepLinc System during processes like SPE or GPC Cleanup eliminates the need for a separate bulk evaporation step. AccuVap offers concentration of solvent directly from another process (GPC or SPE), AccuVap FLX also allows offline concentration.



Unlike other semi-automated evaporation systems, the AccuVap will automatically solvent exchange and quantitatively transfer your sample to a GC vial ready for analysis. Powerful software controls heat and vacuum at every stage of the process to protect analyte recoveries. Programmable heated rinses eliminate carry-over.

## Sample Splitting

Subsequent analytical systems (GC-MS/MS and MS-MS/MS) or further subsequent sample preparation steps (e. g. SPE) usually require samples to be dissolved in different solvents.

With the concentration module AccuVap, it is possible to split the sample in different concentrations and different solvents.

The sample can be split and mixed with up to five different solvents and subsequently transferred either to vials or SPE modules or the GPC module.

## High-precision components guarantee a loss-free sample concentration

Sensors automatically control the temperature and vacuum settings according to the filling level in the evaporation chamber and the evaporation progress.

The level sensor of the evaporation chamber also detects complex samples; for instance, cocoa samples can easily be concentrated.

The small hysteresis of the temperature and vacuum control as well as the corresponding careful treatment of analytes facilitate evaporation to dryness without losing analytes.

# Innovative Static Evaporation System

- Enclosed evaporation chamber
- Three heating zones with user-defined heat and vacuum for each zone
- Vacuum control from 100 - 760 torr
- Two endpoint settings: dryness or adjustable endpoint (1-5 mL)
- Manage use of up to three solvents for sample exchange, final solvent and rinsing
- Add a pre-evaporation spike
- Add a keeper solution
- Perform multiple solvent exchanges
- Heated rinse cycle with choice of solvent ensures no carry-over
- Transfer concentrated sample into GC vial or other storage vial
- Transfer concentrated sample inline to SPE or GPC module



## Method Editor

- The PrepLinc AccuVap Method Editor is full-featured, yet intuitive.
- Parameters for each stage of the concentration process are clearly separated.
- Solvents are programmed at software setup for easy recall when programming methods.
- Heating rates and vacuum settings are adjustable on the fly for quick method development.

## Evaporation Modes

The AccuVap Inline Evaporation Module can either evaporate to dryness or alternatively with multiple solvent exchange (liquid / liquid) without going to dryness.

The sample can be solvent exchanged and split into different fractions for different analysis systems or following sample preparation modules like SPE.

## Live Update

For method development, specific method parameters can be adjusted during the evaporation process.

By adjusting the parameters and simply clicking on "Live Update", the new parameters will be immediately taken over by the evaporation system.

This will save time during the method development process and ensure accurate method parameters.

### Dryness Method

Most PrepLinc users directly select the dryness method, since with the AccuVap evaporation system, this is performed with high sensitivity to the analytes in the evaporation chamber.

Once dryness is reached, the temperature of the base of the evaporation chamber is immediately shut off and a stream of nitrogen is blown into the base of the evaporation chamber to lower the temperature of the base. Dryness will only be reached at the end of the evaporation process. During evaporation, the analytes are kept in solvent. If desired, a keeper solvent can be added to the chamber automatically at the start of the evaporation process. Due to the low mass of the heated ceramic base, the temperature hysteresis is kept extremely low, so as to prevent any loss of analytes. The sample is homogenized before transferring same to another sample prep module or into a GC vial.

### Level Sensor Method (Liquid/Liquid)

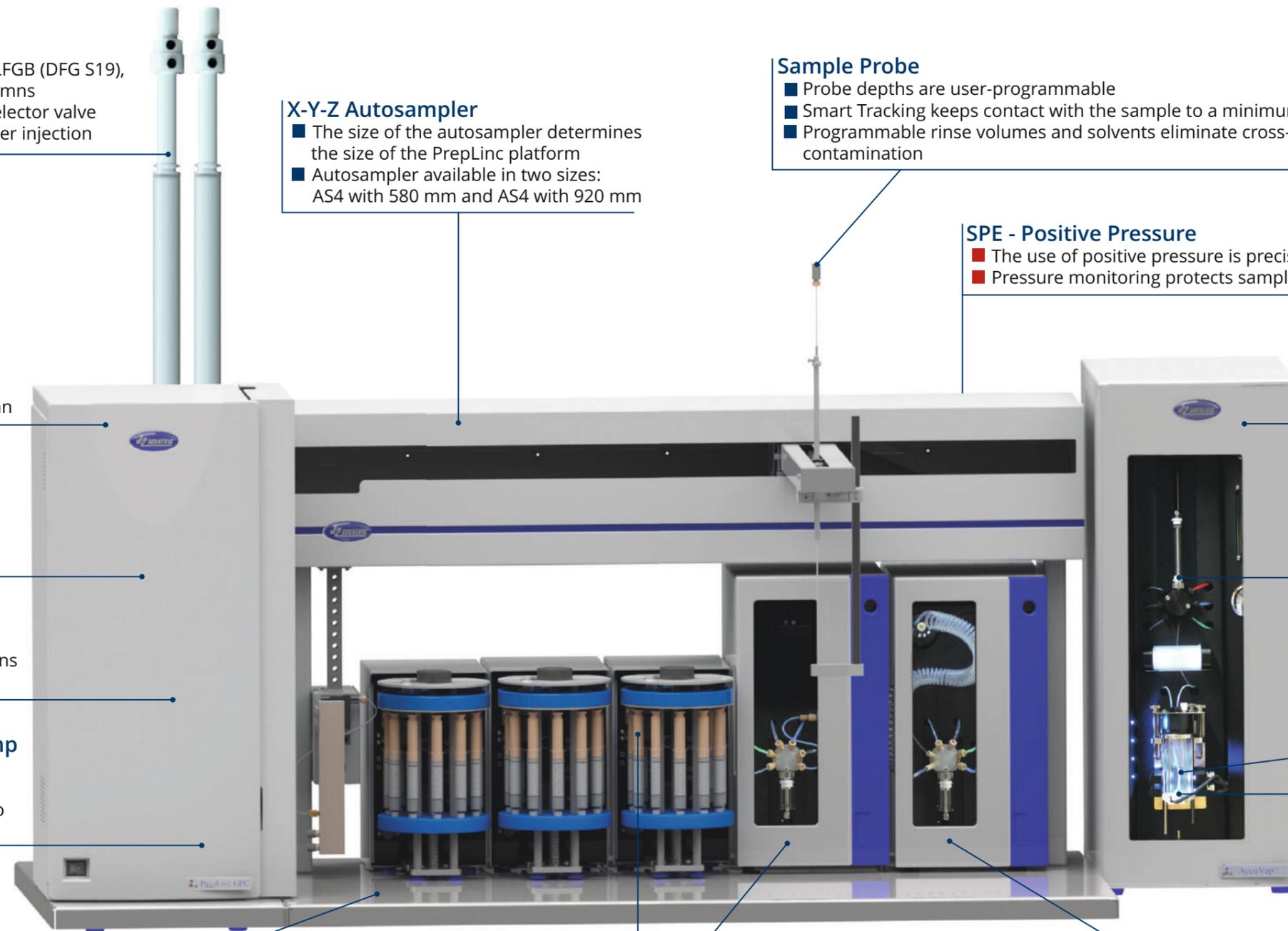
When evaporating to the level sensor, the solvent level will be evaporated until the lower level sensor is reached by the sample. If a solvent exchange is desired, the exchange solvent will be added to the evaporation chamber and heated up under vacuum. This step is performed several times until the analytes are dissolved in the exchange solvent.

To transfer the correct amount of solvent, the solvent level can be adjusted in 1 µl increments to the desired final volume. Once the final volume is complete, the sample is homogenized and transferred into GC vials or to other sample preparation modules, such as Solid Phase Extraction, Filtration or Gel Permeation Chromatography. Partial transfer is also possible with the solvent exchange of the remaining sample. AccuVap is the perfect automation tool for treating every sample the same way without manual sample handling.

# PrepLinc Platform Automated Sample Preparation System



Overview of the Module Options



## GPC Columns

- Traditional Glass Columns § 64 LFGB (DFG S19), High-Pressure GPC cleanup columns
- Optional column- and solvent selector valve
- GPC MAXX: up to 5 g lipid load per injection

## GPC Module

- Direct- or Loop Overfill injection
- Modes:
  - GPC Only
  - GPC with SPE
  - GPC with AccuVap
- Pressure sensor
- Adjustable flow rates: 0 - 10 mL/min
- Typically: 5 mL/min low pressure column

## Internal UV-Detector

- Creates a method directly from the GPC column calibration file

## Pressure Sensor

- Pressure monitoring protects columns
- Adjustable maximum pressure

## Internal High-Pressure Pump

- High-pressure standard pump with 170 bar back pressure
- High-pressure pump with up to 374 bar back pressure

## Sample Racks (not pictured)

- Temperature-controlled racks available for storing samples under optimal conditions
- A variety of standard sample and collect trays (> 90) are available
- Existing racks can be added to the autosampler mat and edited with up to ten different probe depths

## X-Y-Z Autosampler

- The size of the autosampler determines the size of the PrepLinc platform
- Autosampler available in two sizes: AS4 with 580 mm and AS4 with 920 mm

## Sample Probe

- Probe depths are user-programmable
- Smart Tracking keeps contact with the sample to a minimum
- Programmable rinse volumes and solvents eliminate cross-contamination

## SPE - Positive Pressure

- The use of positive pressure is precise and repeatable
- Pressure monitoring protects samples and equipment

## AccuVap Module FLEX or Inline

- Sample injection directly into the chamber or can be used as a stand-alone (replaces the rotary evaporator)
- Precise control devices monitor solvent volume, temperature and vacuum to ensure controlled evaporation
- Full automation for overnight runs

## Solvent Exchange

- Multiple solvent exchanges possible

## Evaporation Chamber with Liquid Sensors

- Control vacuum and heat settings for each chamber zone
- Level Sensors work with any solvent, sample, or matrix

## Sample Concentration

- Can be set to dryness level
- or a defined final volume (liquid/liquid)
- With automated solvent exchange
- Blow down with nitrogen (optional)
- Precise transfer to any sample vials (qualitative / quantitative) or
- Direct transfer to SPE modules

## SPE Cartridge Module(s)

- Use up to 45 SPE cartridges in up to five modules; SPE cartridges are not limited to one manufacturer
- Single- or multi-column methods
- Forward or reverse elution on any position
- Positive pressure with programmable flow rates
- Adjustable pressure sensor
- Ability to program up to 12 different solvents or solvent mixes in a single method

## SPE Main Module

- Use up to 15 mL columns; not limited to one manufacturer
- Programmable SPE method steps: Condition, Dilution, Dispense, Sample Pickup, Sample, Drying / Clear, Elution, Flow Path Rinse, Mixing, Nitrogen Purging, Prime, Probe Rinse, Rinse Direct Inject Port, Sample Injection, Sample Introduction, Wait / Soak, Wash

## Liquid Handling Module

- The Liquid Handling Module can be used for the following operations: Dispense, Homogenize sample, Dilute, Solve, Transfer, Pipetting, Spike sample, Dosing, Sample introduction, System cleaning, Sample split, Sample injection

# PrepLinc LVi-SPE Water Extraction

Automated Large Volume Water Extraction

The PrepLinc LVi SPE Water Extraction System performs SPE extractions on large volume water samples with ease. Specialized SPE column modules accommodate water extraction discs as well as standard SPE columns.



## Programming Multi-Module Methods

The precision of the LVi pump module gives the necessary control of sample introduction to the extraction media. Powerful and “smart” software enables you to prioritize settings for flow over pressure. The system not only adjusts the flow to keep the pressure within limits, but also responds to minimum flow and pressure settings that you determine. Being the newest and trouble-free system for large-volume water extraction automation, using LVi’s Automatic Next Sample programming means you never have to worry about arriving in the morning to find the system shut down on sample number one.

## Applications

- SPE for large volume environmental, water, food, pharma and forensics samples.
- EPA Method 3535 Solid Phase Extraction
- EPA 500 & 600 Series Water Methods
- Integrates with other PrepLinc modules for inline concentration and the addition of a secondary SPE column for drying or cleanup.

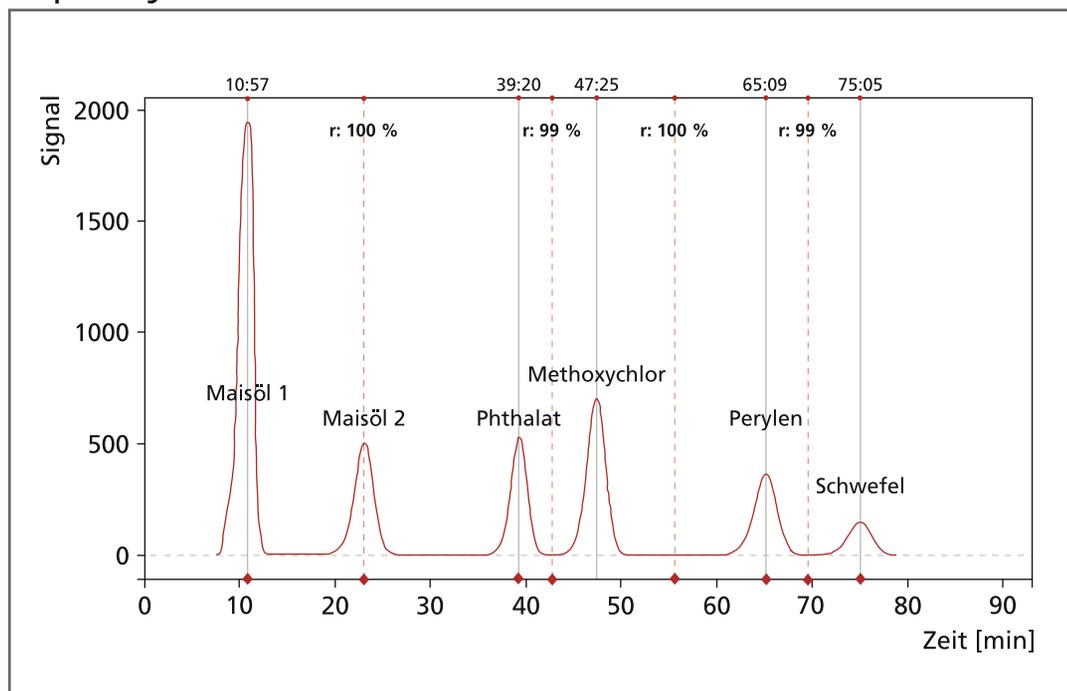
## LVi standout features

- **Flow Control** Pump module gives consistent flow rates of up to 90 mL/min.
- **Pressure and Flow** lets you select Flow Rate Priority for flow-critical methods. Selecting Pressure Priority adjusts the flow as pressure changes.
- **Probe Depth** not only lets you select probe depths for sample pickup to avoid sediment, but is also vital in bottle rinsing to maximize recoveries.
- **Cartridges** are compatible with a wide variety of water extraction cartridges and discs.
- **Tray Options** feature a capacity of up to 24 one-liter samples and 12 two-liter samples. Increased capacity of up to 40 for smaller sample volumes.
- **Drying Time** can be programmed to remove water completely from the cartridge.

# GPC MAXX Maximized Lipid Load

Maximized Lipid Capacity with 2D-GPC

The typical lipid load for traditional GPC columns is not more than 1 g of lipid per 5 mL injection. The PrepLinc GPC MAXX feature allows the user to control the GPC Dump, Collect and Wash steps through two columns in series, thereby greatly increasing the lipid capacity.



2D-GPC Chromatogram with a lipid load of 5 g corn oil

## Functional Principle

The PrepLinc GPC MAXX feature allows the user to control the GPC Dump, Collect and Wash steps through two columns in series, thereby greatly increasing the lipid capacity. A high-lipid sample can be injected into the GPC with the first Dump to waste passing only through the first column. When the majority of the lipid content has been removed from the sample, the second GPC column is switched inline to complete the separation.

The lipid loaded onto the second column is reduced by the first column, thereby maximizing separation in a single sample injection.

Traditional GPC cleanup methods may require multiple GPC runs to achieve the same lipid removal for large samples required to achieve very low limits of detection.

### GPC MAXX Upgrade

The PrepLinc GPC MAXX system can achieve significant time and solvent savings using a single-column cleanup for extreme lipid loads. Moreover, its technology is highly suitable for reducing the time and solvent required for cleaning up lower-lipid samples.

PrepLinc GPC systems can easily be upgraded to GPC MAXX. Information on how to upgrade your existing PrepLinc system is available at ANTEC GmbH.

### Literature

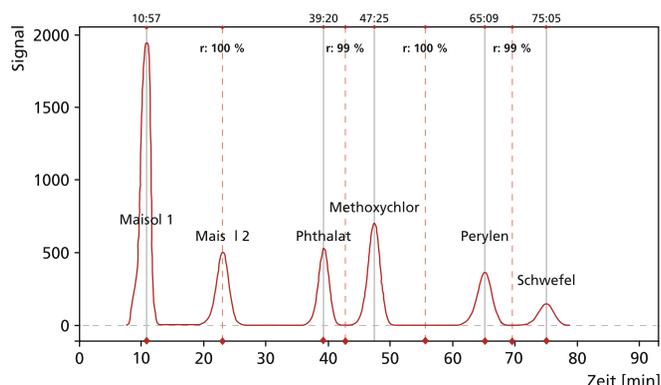
„PAKs in Fetten und Ölen - Bestimmung von leichten und schweren polycyclischen aromatischen Kohlenwasserstoffen (PAKs) in Fetten und Ölen pflanzlicher und tierischer Herkunft mittels automatisierter 2D-GPC und anschließender GC-MS-Detektion“, Melanie Lehneke, Dipl.-Lebensmittelchemikerin, Prüfleiterin Food Services der Intertek Food Services GmbH in der Deutschen Lebensmittel-Rundschau (110. Jahrgang).

# GPC Module Options

for the PrepLinc GPC Module

## GPC MAXX

The performance of the sample preparation with GPC, which is determined by the dumped matrix fraction, can be significantly increased with the GPC MAXX feature. Lipid quantities of up to 4 to 5 g can be injected into the GPC MAXX with a single injection.

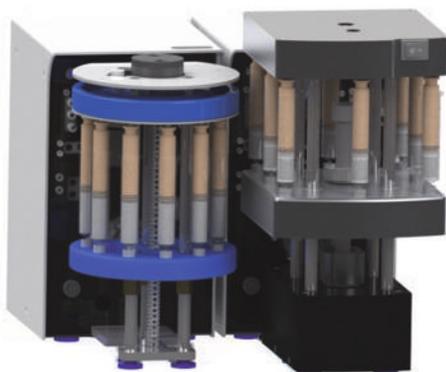


The traditional EPA GPC Cleanup column cannot handle lipid loads above 1g for most applications. The two-columned GPC MAXX method requires a total time of 90 minutes and 450 mL of solvent, while cleanup for a 5 g lipid sample using the conventional column alone would require 5 hours and 1500 mL of solvent. The PrepLinc GPC MAXX system can achieve significant time and solvent savings using a single column cleanup for extreme lipid loads.

## SPE Plunger

for PrepLinc SPE Cartridge Modules

The use of SPE Column Plungers is beneficial for reducing or removing the space at the head of the SPE bed. This allows for precise control of sample addition and mobile phases to the column bed resulting in more predictable elutions, lower solvent consumption, and typically better recoveries. Using the SPE Plungers to remove the headspace will reduce variability in pressure and elution volumes from column to column.



## GPC Multi-Column Valve

With the Multi-Column Selector Valve, it is possible to have more than one column attached to the system at all times. You no longer have to manually switch the tubing and connections to use a different column. Simply designate a column for a particular method, and the software automatically puts that column inline at the start of the sample run.



## UV Detectors

Two UV detectors are available for the PrepLinc GPC Module:

**UV detector with fixed wavelength (254 nm)** as well as a **UV detector with variable wavelength.**

The retention times determined from the GPC column reports can be directly applied to the GPC methods.

UV Detectors may be also used for quality assurance to evaluate the separation efficiency of applied GPC columns.

Selecting the appropriate sized plunger:

**P/N CS1011X-00**

3 ml Cartridge Plunger  
min. bed range: 10 mm  
max. bed range: 56 mm

**P/N CS1014X-00**

6 ml Cartridge Plunger (short)  
min. bed range: 18 mm  
max. bed range: 56 mm

**P/N CS1015**

6 ml Cartridge Plunger (long)  
min. bed range: 0 mm  
max. bed range: 38 mm

**P/N CS1018X-00**

15 ml Cartridge Plunger (short)  
min. bed range: 33 mm  
max. bed range: 66 mm

**P/N CS1019X-00**

15 ml Cartridge Plunger (long)  
min. bed range: 5 mm  
max. bed range: 38 mm

# Chromatography Columns

for Gel Permeation Chromatography (GPC)

## Traditional Glass Column

### Low-Pressure GPC Cleanup Column

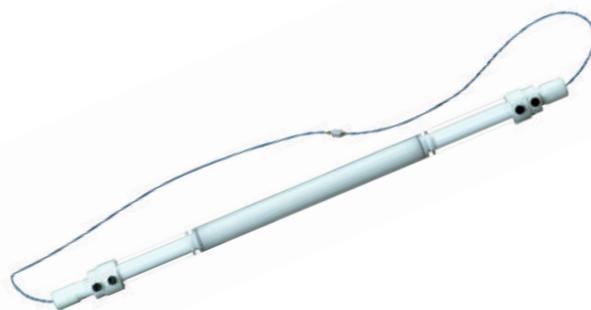
The column referenced in EPA SW-846 Method 3640A and DFGS 19 / L00.00-34. Packed with BioBeads S-X3 resin, the traditional column provides enough resolution to meet CLP requirements. Up to one gram of lipid per sample can be loaded into the column, making it useful for most matrices. Movable plungers and a simple design make repacking easy and economical. While methylene chloride is the referenced solvent system, others are available for labs trying to limit chlorinated solvent waste.

Applications:

DFG S19 - Method DFG S19

L-00.00-34

USEPA SW-846 Method 3640A, etc.



## Express Glass Column

### Low-Pressure GPC Cleanup Column

The Express™ column provides a faster run time and less solvent consumption compared to the traditional column. This smaller, repackable column also operates at low pressures.

The Express™ column removes the bulk of lipid content in fatty matrices prior to GC analysis. Up to 0.5 g of lipid content can be loaded per sample. With half the time and solvent, the Express™ column makes adding GPC cleanup to the prep routine cost-effective.

Applications:

Multiple methods for determining GC and LC types of pesticides (according to Fanny Hildmann, Dresden), etc.



## High Pressure Envirosep ABC™

### High Pressure GPC Cleanup Column

The Envirosep ABC high-pressure GPC Cleanup column not only offers faster run time and less solvent usage like the Express™ column, but is also solvent switchable for use with many applications. The Envirosep ABC can separate up to 0.5 g of lipid content per injection.



## Accessories



### Precolumn filter

P/N FR300K - Housing

P/N FR332 - Frit, Stainless Steel

P/N FT652 - Fitting Adapter



### Filter for GPC sample filtration

Disposable filter 0.45 µm; diameter 30 mm

P/N 900-300 - Pack /100

# Literature & Application Notes

Application Notes for GPC, 2D GPC and SPE

**With PrePLinc, the following methods related to GPC or SPE are automated according to the following guidelines and regulations among others:**

§ 64 LFGB L 00.00-34 (vormals § 35 LMGB), VDLUFA Methodenbuch, Band 7, Umweltanalytik - Methode 3.7.1, AQS - Länderearbeitsgemeinschaft Wasser (LAWA), AOAC, ASTM, Centers for Disease Control (CDC), CLP, EN 12393, EN 1528, EPA 1613 Dioxin Cleanup, EPA 3535 Solid Phase Extraction (SPE), EPA 500 & 600 Series Water Methods, EPA 8290, EPA Column Cleanup Methods 3610B - Alumina, EPA 3611B - Alumina for Petroleum Waste, EPA 3620C - Florisil, EPA 3630C - Silica, USDA, USEPA, USFDA, USGS, SPE für großvolumige Umwelt-, Wasser-, Lebensmittel-, Pharma- und forensische Proben.

**The following Literature and Application Notes of users of our systems show the diverse fields of application of the automated sample preparation:**

- Bestimmung von leichten und schweren polycyclischen aromatischen Kohlenwasserstoffen (PAKs) in Fetten und Ölen pflanzlicher und tierischer Herkunft mittels automatisierter 2D-GPC und anschließender GC-MS-Detektion
- Automatisierte Probenvorbereitung für die Bestimmung von Pestizidrückständen in hocheffizienten Laboratorien mit GPC-GC-MS/MS und -LC-MS/MS
- Maximierte Probenaufgabe mit zweidimensionaler Gelpermeationschromatographie (2D-GPC)
- Automatisierung der Bausteine GPC, C1 und C2 der Methode L 00.00-34
- Maximizing Lipid Load With 2-Dimensional GPC Cleanup
- QuEChERS, SPE and GPC: A Comparison of Sample Preparation Techniques for Analysis of Pesticides in Problematic Matrices
- Automated GPC with Inline SPE to Improve Sample Cleanup Without Adding Time or Solvent
- Additional Cleanup for DIN EN 12393 Minimising Matrix Effects and Improving Result Quality in GC-MS
- A Combined SPE Method for Analysis of Chloroacetic Acids in Drinking Water
- Cleanup-Methode für Nahrungsergänzungsmittel
- Modifizierte Cleanup-Methode für Dioxine und persistente organische Schadstoffe (POPs)
- Automatisierung der Wasserextraktion mit dem SPE-Wasserextraktionssystem Lvi
- Traditionelles Dioxin-Cleanup mit dem PrePLinc System
- Wiederauffindungsraten unterschiedlicher Pflanzenschutzmittel mit GPC und AccuVap
- Erfahrungen zur Automatisierung des GPC-Reinigungsverfahrens bei der Untersuchung von tierischen Lebensmitteln auf Chlorkohlenwasserstoffe
- Der Einsatz der automatischen Gelchromatographie zur Reinigung von Pestizidextrakten
- Organochlor-Pflanzenbehandlungsmittel in Tabak und Tabakerzeugnissen
- Bestimmung der Fungizide Bitertanol, Fuberidazol, Imazalil, Rabenzazole, Triadimefon und Triadimenol in Pflanzen und Boden
- Methode zur Aufarbeitung von Lebensmitteln und Futtermitteln pflanzlicher und tierischer Herkunft für die Multirückstandsbestimmung lipoid- und wasserlöslicher Pflanzenbehandlungsmittel
- Zur Analytik von Chlorkohlenwasserstoffen in Zwiebeln nach Reinigung mit der Gelpermeationschromatographie
- Schnelle Untersuchung von Milch auf chlorierte Kohlenwasserstoffe mittels automatischer Gelchromatographie
- Automatisierte Gelchromatographie als Reinigungsverfahren zum Nachweis von ECD-erfaßbaren Wirkstoffen, chlorierten Kohlenwasserstoffen, Pentachlorphenol sowie von Diphenyl und o-Phenylphenol in pflanzlichen Materialien
- Untersuchungen zum Einsatz der Gelpermeationschromatographie in der Rückstandsanalytik
- Nachweis von Aflatoxin B1 in Futtermitteln für Milchtiere
- Bestimmung der Rückstände von aromatischen Dinitroverbindungen mittels gelchromatischer Reinigung
- Die Gelpermeationschromatographie, eine universelle Reinigungsmethode in der Analytik von Pflanzenschutzmitteln
- Untersuchungen zur Messung und Bewertung von Rückständen des Ektoparasitenbekämpfungsmittels Phoxim in Milch
- Methode zur Aufarbeitung von Lebensmitteln und Futtermitteln pflanzlicher und tierischer Herkunft für die Multirückstandsbestimmung lipoid- und wasserlöslicher Pflanzenbehandlungsmittel
- Untersuchungen zur Gelchromatographie (GPC) als Reinigungsverfahren in der Rückstandsanalytik von Tierarzneimitteln
- Eine schnelle Methode zur Bestimmung des Ebergeruchsteroids Androstenon
- Analysenverfahren zur Bestimmung von polychlorierten Dibenzodioxinen und Dibenzofuranen in Muttermilch
- Untersuchungen zum Vorkommen von Moschus-Xylol in Fischen
- GPC-Cleanup von fetthaltigen Matrices in der Rückstandsanalytik unter Verwendung von OPTIMA-Säulen
- Entwicklung einer Methode zur Bestimmung von Nitromoschusverbindungen im Hausstaub
- Pesticide residues in chicken eggs: A sample preparation methodology for analysis by GC-MS/MS and LC-MS/MS

# Company History

ANTEC GmbH

45 Years of Automated Sample Preparation with Gel Permeation Chromatography by ABC Laboratories / J2 Scientific.



Early **1970s**: The environmental laboratory ABC Laboratories, Columbia Missouri, led by Dr. David L. Stalling, began providing external users an automated GPC system, which was initially developed for the laboratory's own needs. The Chemische Landesuntersuchungsamt Münster and the Bayerische Hauptversuchsanstalt für Landwirtschaft Freising-Weihenstephan were the first users of the GPC-Autoprep system in Germany. The GPC rapidly developed into a standard for sample preparation used in many laboratories for residue analysis.

**1988**: Automated evaporation was added to the GPC. The evaporator, which was called AutoVap, simplified sample preparation by inline evaporation.

**1991**: ANTEC GmbH took over the sample preparation business from Foss Electric, which was previously distributing the equipment manufactured by ABC in Germany. Development and manufacturing of the systems, which started at ABC Laboratories, later evolved into a special company and taken over by J2 Scientific LLC, which is also located in Columbia, Missouri.

**2001**: Thanks to the use of modern computer-controlled programs in conjunction with high-precision syringe modules, the GPC-MPS system gave new possibilities for individual application.

**2006**: The new inline evaporation module AccuVap for GPC systems was introduced.

**2010**: The PrepLinc system was introduced, which, in addition to GPC and automatic sample concentration, was now able to automate Solid Phase Extraction on one platform.

From **2013** onwards: The development of the 2D-GPC facilitated the injection of large amounts of lipid content into the GPC system with one injection, thereby further improving the efficiency of the entire GPC system.

**2016**: 25 years of ANTEC GmbH.





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