GERSTEL

Online SPE with replaceable cartridges

SPE*xos*

Lowest limits of detection

Less sample and solvent needed

Reliable results, minimal carry-over

Simpler logistics and significant savings

GERSTEL SPE^{xos}

Online SPE system with replaceable SPE cartridges: The best of all worlds

GERSTEL SPE^{xos} expands your sample preparation portfolio with online SPE. Compared with standard SPE, SPE^{xos} utilizes a much smaller cartridge with 50 mg of sorbent, enabling a significant miniaturization of the entire process: Much smaller sample amounts are needed to reach required detection limits and much less solvent is needed for analyte elution reducing cost, simplifying logistics, and increasing method sensitivity.

The SPE^{xos} system is completely integrated into the LC-MS/MS setup and the eluate transferred 100 % to the LC column for best possible recovery and limits of detection.

The GERSTEL SPE^{xos} is inserted into the overall LC-MS/MS system between the GERSTEL Multi-Purpose Sampler (MPS) and the HPLC system. Online SPE can be combined with sample preparation steps performed by the MPS, including addition of standards, dilution, derivatization, and more. Following the MPS sample preparation steps, the sample is introduced to the SPE^{xos} system. At the end of the SPE process, analytes are eluted by the HPLC mobile phase and transferred directly to the LC column for maximum recovery.

The complete system including MPS and SPE^{xos} is intuitively controlled by mouse click through the GERSTEL MAESTRO Software, integrated with the LC-MS/MS sequence table or independently in stand alone operation. The PrepAhead function enables multi-sample overlapping of sample preparation and LC-MS/MS analysis, which ensures optimal system utilization and best possible Return on Investment (ROI).

MPS — prep — load

SPE^{xos}

LC/MS — elute — analyze
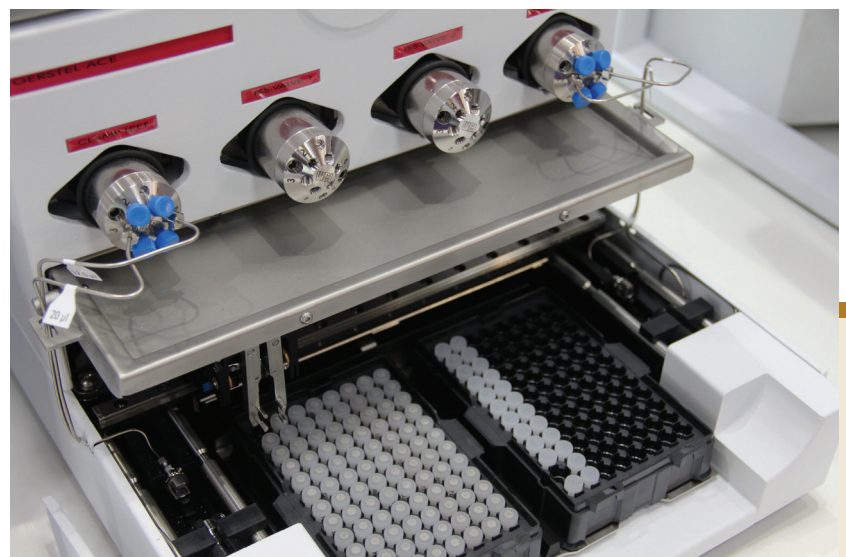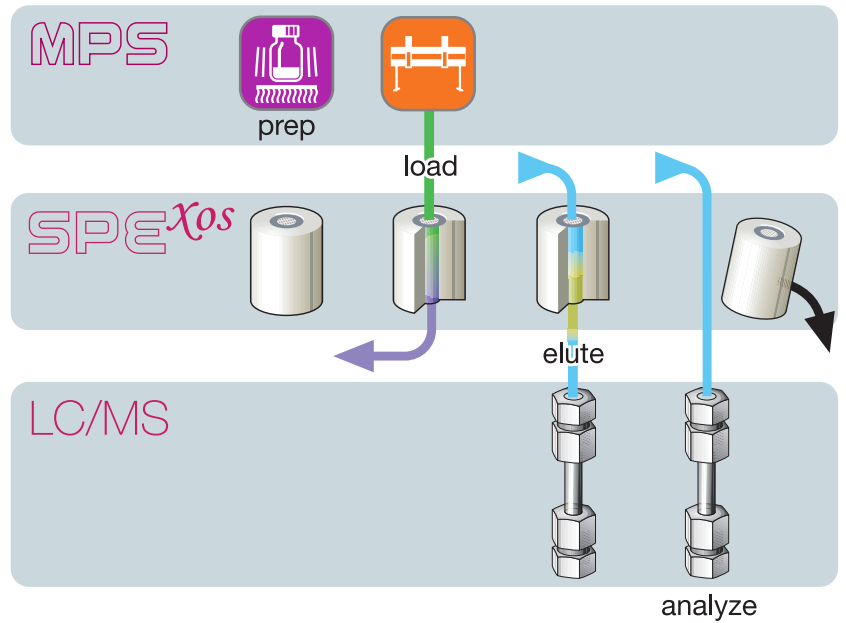
SPE^{xos} cartridges

SPExos cartridges with all standard SPE phases are available. The typical amount of solid sorbent is 50 mg per cartridge, with particle size < 10 μm for most materials. Elution can be done with minimal volume for best possible concentration factor at good reproducibility. Cartridges can withstand pressures of up to 200 Bar, enabling their insertion directly into the HPLC mobile phase and ensuring 100 % transfer of analytes to the HPLC column for best possible sensitivity and limits of detection.

SPExos cartridges are placed in 96 position trays, which are loaded directly into the system. Trays are automatically identified by the sampler. The software control ensures that cartridges are used only the number of times specified by the user.
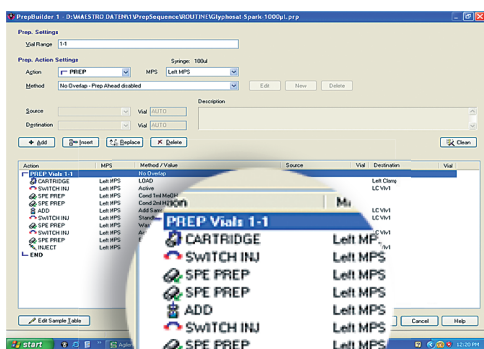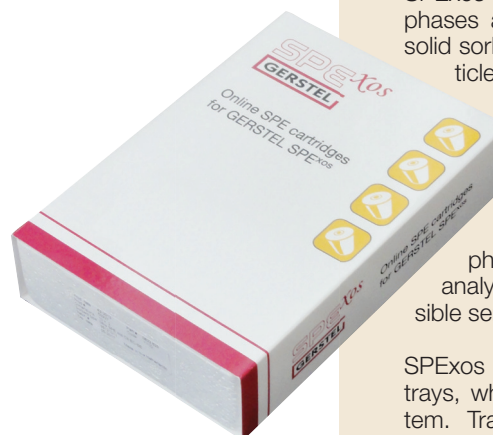
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Benefits of GERSTEL SPE^{xos}

1 User Selectable Cartridge exchange
- Reliable results through elimination of sample to sample carry-over since cartridges are replaced at regular intervals.
- Cost savings though multiple use of cartridges when analyzing relatively clean samples

2 Sealed extraction system
- No evaporation of solvents or ingress of impurities from laboratory air, reliable results
- Less solvent needed
- Improved laboratory work environment

3 Cartridge inserted into the LC mobile phase for elution
- Best possible analyte transfer to the analysis system, highest analyte recovery

4 100% Analyte transfer to the LC-MS/MS
- Simplified laboratory logistics, less sample and less solvent needed
- Reliable results even when less sample is available
- Lowest limits of detection, no further concentration steps needed

5 Small cartridges / small sorbent volume
- Best possible LC separation based on small elution volume
- High sensitivity and high concentration factor even when small sample volumes are used

6 Easily adapted for multiple analysis methods
- Flexible and simple adaptation through simple valve switching
- Flexible sample preparation in combination with MPS Sample Preparation Technologies
- Time savings and elimination of manual steps through comprehensive automation
- Highly flexible operation since all standard SPE sorbents are available

7 Control through GERSTEL MAESTRO Software
- Error elimination through uniform and intuitive user interface for the complete sample preparation process
- Best possible system utilization with PrepAhead synchronization of Sample Prep and analysis

Determination of Glyphosate and AMPA in water and agricultural products

Glyphosate is one of the most widely used crop protection products world-wide.

This means that residues of Glyphosate and its main metabolite Aminomethylphosphonic acid (AMPA) must be monitored both in agricultural products and in environmental samples. For this analysis, LC-MS/MS is the most widely used technique combined with analyte derivatization and SPE clean-up.

The complete sample preparation process is automated. The derivatization is performed by the MPS using 9-Fluorenylmethyl-chloroformiate (FMOC-Cl) to form N-(9-Fluorenylmethylcarbonyl)-Glyphosate as well as N-(9-Fluorenylmethylcarbonyl)-AMPA. The subsequent solid phase extraction (SPE) is performed using the GERSTEL SPE^{xos}.

For the determination of Glyphosate und AMPA in water, excellent limits of quantitation (LoQs) of 10 ng/L are reached combined with an outstanding linearity coefficient of 0.999.

Using the method presented here, Glyphosate and AMPA residues were determined in the following types of samples: Tea, Linseed oil as well as grains.
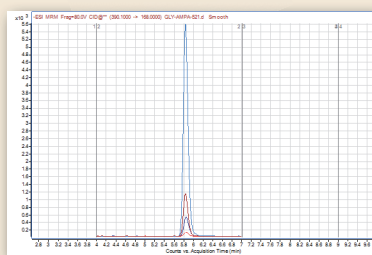
Overlay chromatograms of 0.1; 0.5; 1.0; and 5.0 ng/mL Glyphosate standards after FMOC-Cl derivatization and online SPE clean-up.
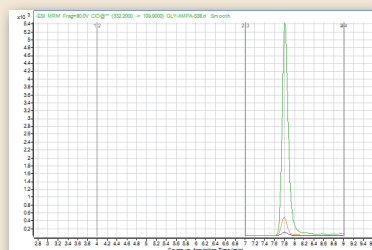
Overlay chromatograms of 0.1; 0.5; 1.0; and 5.0 ng/mL AMPA standards after FMOC-Cl derivatization and online SPE clean-up.

MPS
- Add standards and FMOC-Cl derivatization agent.

SPE^{xos}
- Load a SPE^{xos} cartridge
- Condition it with 1 mL of Methanol
- Rinse with 2 mL of water

MPS
- Inject 1000 µL sample onto the SPE^{xos} cartridge using the MPS

SPE^{xos}
- Wash the cartridge with 1100 µL water
- Elute the cartridge directly in the HPLC mobile phase

LC/MS
- LC-MS/MS determination of the derivatized analytes

The automated sample preparation process is completed in 25 minutes. The LC-MS/MS cycle time is less than 20 min. Sample preparation and analysis are perfectly synchronized for maximum productivity and throughput using MAESTRO PrepAhead.
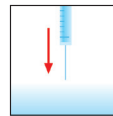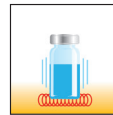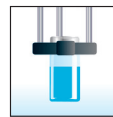
GERSTEL MAESTRO Software

Next generation software for automated sample preparation and sample introduction. MAESTRO optimizes performance and throughput of GERSTEL modules and systems.

- Stand-Alone operation or fully integrated in the Agilent MassHunter Software
- One sequence table operates the entire system including LC/MS or GC/MS
- Sample Prep by Mouse-Click using the PrepBuilder functions
- Scheduler for easy planning of sequences and of laboratory work-flow
- PrepAhead / Multiple Sample Overlap: Automated overlapping of sample preparation and analysis for maximum throughput
- Priority samples can be added to the system at any point in the analysis sequence
- LOG file and Service LOG file functions ensure traceability
- Automated E-mail notification if the sequence is stopped
- Control of up to 4 systems from one PC
- Real-time monitoring of all modules and parameters
- Interactive on-line help fuction

Sample Prep by Mouse-Click

The MultiPurpose Sampler (MPS) is an autosampler and sample preparation robot for GC and LC. Sample preparation steps are performed during the analysis of the preceding sample for best possible system utilization and highest sample throughput. Sample preparation steps are performed in a controlled and highly accurate and reproducible manner for best possible results. Every step is selected by mouse-click from a pull-down menu in the MAESTRO software and added to the overall GC/MS or LC/MS method. Available sample prep techniques are:

- Solid Phase Extraction (SPE)
- Dispersive SPE (DPX)
- Derivatization, addition of standard
- Extraction, dilution, filtration
- Weighing, sonication, centrifugation and evaporation (ᵐVAP)
- Heating, conditioning, mixing and vortex (ᵐVORX)
- Twister Back Extraction (TBE)
- Automated Liner EXchange (ALEX)
- Automated TDU-Liner EXchange (ATEX) and thermal extraction in micro-vials
- Automated Twister desorption and analysis (SBSE)
- Thermal Desorption and Thermal Extraction (TDS/TDU)
- Dynamic Headspace (DHS)
- SPME and SPME MultiFiber Exchange (MFX)
- Multidimensional GC (MCS)

Action	Method / Value
PREP Vials 1-98	Ahead, Extensive
ADD	Standard-Zugabe 100 µl
MOVE	
MIX	Mischen 5 min, 40°C
MOVE	
INJECT	Flüssiginjektion 10 µl.mth
END	

MAESTRO Software enables Sample Prep by Mouse-Click. All sample preparation steps are conveniently and easily selected from a drop down menu and added to the method. Example:

ADD
Add solvent, internal standard or reagent

MOVE
Move the vial or cartridge

MIX
Agitate or stir and incubate the sample at a set temperature

INJECT
Introduce an aliquot of the sample to the GC or LC system

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GERSTEL GLOBAL ANALYTICAL SOLUTIONS

ISO 9001
CERTIFIED QM-SYSTEM
ISO 9001:2008
CERTIFICATE NO. 0089 D

ECOPROFIE
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