



GERSTEL

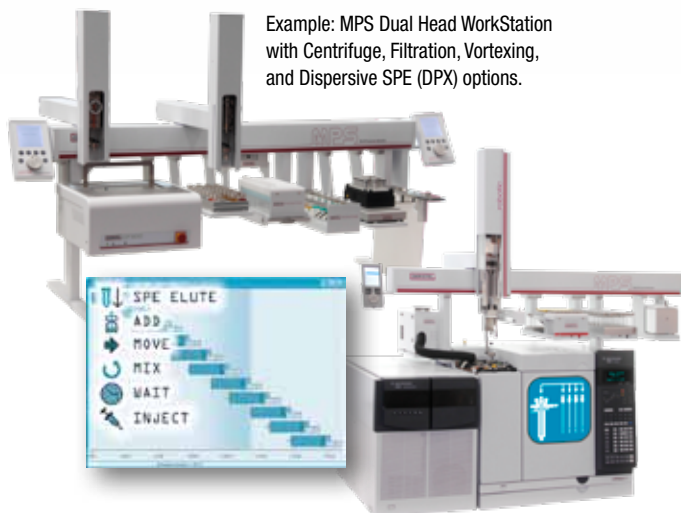
GERSTEL, Inc.

# Newsletter

GET GERSTELIZED!



Perfect fit!



Example: MPS Dual Head WorkStation with Centrifuge, Filtration, Vortexing, and Dispersive SPE (DPX) options.

Example: ALEX-GC-MS/MS-System for QuEChERS, Metabolomics...



## We bring the pieces together!

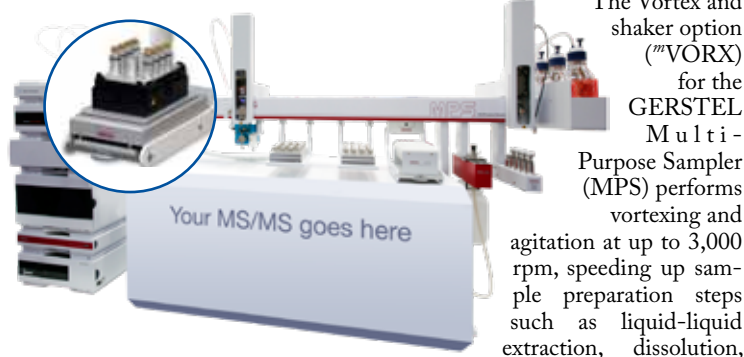
Whatever your sample preparation requirements, we help bring the pieces together for the perfect solution to meet your GC/MS and LC/MS needs:

- Automated Sample Prep
- Standards & Dilution Series
- SPE, Dispersive SPE (DPX), Online SPE (SPEXOS)
- Dynamic Headspace (DHS), HS & SPME
- Twister & Thermal Desorption/Extraction
- Intelligent PrepAhead productivity
- Application support at your service

What can we do for you?

GET GERSTELIZED!

## Vortex / Shaker option for the MPS



The Vortex and shaker option (<sup>m</sup>VORX) for the GERSTEL MultiPurpose Sampler (MPS) performs vortexing and agitation at up to 3,000 rpm, speeding up sample preparation steps such as liquid-liquid extraction, dissolution,

and homogenization. The <sup>m</sup>VORX performs efficient simultaneous vortex mixing of various vial sizes and 96 well plates. The MPS automatically loads samples placed in 2, 4 and 10 mL vials. A heating option for 96 well micro-titer plates is also available. Mixing movements are finely controlled using linear motors and are restricted to the horizontal plane, allowing even the most sensitive samples to be mixed efficiently without over-agitation. Automated operation under MAESTRO software control enables reliable and flexible sample processing, the PrepAhead functionality ensures best possible productivity and throughput.

## Automated Filtration Option

The Filtration option for the GERSTEL MultiPurpose Sampler (MPS) enables efficient automated clean-up of up to 98 samples or extracts using standard filters with Luer® fittings. Filtration can be combined with other sample preparation steps and/or with introduction to an LC-MS/MS- or GC/MS system. Without adding to the laboratory workload, filtration can significantly improve the reliability of the analysis and of the analysis system. Depending on the filter size used, up to 98 filters can be placed in the MPS tray. Liquid transfer is performed with exact control of flow and volume for highly reproducible results. MAESTRO software offers simple and efficient control by mouse-click, requiring no macro programming.



## Sampler with centrifuge

The GERSTEL CF 200 is a powerful centrifuge for the GERSTEL MultiPurpose Sampler (MPS). The CF 200 performs centrifugation of up to 6 samples at up to 4500 rpm/2000 g. Centrifugation power can be specified in rpm or in g force. Easily replaceable rotors for 2 mL or 10 mL vials are available. In combination with centrifugation, the GERSTEL MPS performs sample preparation and sample introduction. The MAESTRO PrepAhead functionality ensures Just-In-Time sample preparation followed directly by sample introduction to the LC/MS or GC/MS for best possible productivity and throughput.

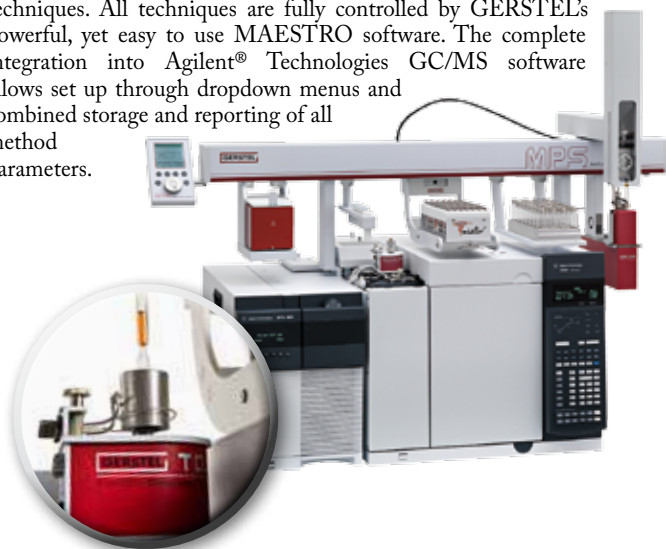


## Thermal Desorption Unit – TDU

The GERSTEL TDU is the heart of the most flexible and powerful sample introduction platform available for your GC/MS. This system adds 7 sample introduction options above and beyond the standard liquid, HS and SPME techniques, without taking up more bench space than a standard autosampler. The TDU enables ultra-trace analysis of a wide range of samples. The TDU mounts directly onto the CIS inlet, without the need for a transfer line, providing a completely inert sample path. Complete automation is performed by the GERSTEL MultiPurpose Sampler (MPS) – including automated spiking of adsorbent tubes with liquid standards. Extremely versatile: Liquid, HS & SPME plus seven (7) additional sample introduction options:

- Thermal Desorption of adsorbent packed tubes
- Direct thermal desorption/extraction of solid samples
- Thermal Extraction of liquids in  $\mu$ -vials (ATEX)
- Dynamic Headspace – DHS and DHS Large (1 L)
- Hot injection and trapping (HIT) for HS
- Stir Bar Sorptive Extraction (SBSE)
- Pyrolysis using the GERSTEL PYRO

It is extremely easy to add – or change between – sample introduction techniques. All techniques are fully controlled by GERSTEL's powerful, yet easy to use MAESTRO software. The complete integration into Agilent® Technologies GC/MS software allows set up through dropdown menus and combined storage and reporting of all method parameters.



## Multi-Position Evaporation Station (<sup>m</sup>VAP)

A six-position evaporation station (<sup>m</sup>VAP) is available for the GERSTEL MultiPurpose Sampler (MPS). Samples are concentrated at user defined temperature and vacuum, enabling significantly improved limits of detection. The MPS automatically loads samples placed in 2 mL, 4 mL or 10 mL vials. Solvent exchange to a GC or HPLC compatible solvent can be performed for improved chromatography. <sup>m</sup>VAP can be used in a stand-alone WorkStation in combination with SPE, Dispersive SPE (DPX) or liquid/liquid extraction to evaporate solvent from extracts. Configuration for injection into GC/MS or LC/MS is also possible. Every step is controlled by mouse-click using the MAESTRO PrepBuilder. Just one method and/or one sequence table is needed for the entire process including GC/MS or LC/MS analysis.



## Dynamic Headspace (DHS) and DHS Large



The GERSTEL DHS is an accessory module for the MultiPurpose Sampler (MPS) in combination with the Thermal Desorption Unit (TDU). DHS offers significantly improved limits of detection combined with the ruggedness and ease of use of static headspace analysis.

The headspace above a solid, viscous or liquid sample is purged with inert gas and analytes transferred to, and concentrated on, a replaceable adsorbent trap. The process is fully automated, including trap desorption in the TDU and GC/MS analysis.

The GERSTEL DHS Large (DHS L) is an extension of the DHS option for sample containers with a volume of up to 1 L. A single sample DHS L extension or an autosampler for up to 11 samples can be chosen. DHS Large can be used for material emission screening and for volatiles in consumer products among other application areas.



## GERSTEL MPS robotic<sup>PRO</sup>

MPS robotic<sup>PRO</sup>, the newest member of the GERSTEL MultiPurpose Sampler (MPS) family, is a highly efficient GC/MS autosampler, optimized to hold a significantly larger number of samples for higher throughput. MPS robotic<sup>PRO</sup> provides fast, reliable and highly accurate processing of complex tasks. Tools can be exchanged automatically, enabling automated change between Liquid Injection, Headspace, and SPME. MPS robotic<sup>PRO</sup> is controlled by the GERSTEL MAE-STRO software enabling PrepAhead productivity under integrated GC/MS system control. Priority samples can be added at any time without stopping the ongoing analysis sequence. Fast and error-free set-up of the daily analysis sequence is performed using the intelligent sequence editor functions or through a direct LIMS download.



### Metabolomics

## Automated ultrasonic extraction of a plant material using the GERSTEL MPS Dual Head WorkStation

Melissa Dunkle, Christophe Devos, Bart Tienpont, Frank David, Pat Sandra, Koen Sandra

KEYWORDS: Plant Material, Glycosides, Metabolomics, Automation, Ultrasonic Extraction, Filtration, LC-QTOF

Automated sample preparation was developed for the extraction of glycosides from plant material using the GERSTEL MPS Dual Head WorkStation. Ultrasonic extraction was performed on the plant material, and the extract was prepared for subsequent analysis by two filtration steps. To prevent blockage of the 1.0 mL syringe used for extract transfer, individual 17 µm stainless steel screen filters placed in the sample vials were utilized. Due to the nature of the sample, an additional filtration step using a 0.45 µm syringe filter was required before injection to the LC-MS instrument. Following analysis of the quality control samples used in a metabolomics study, it was determined that the results obtained were highly reproducible.

Download the full text of AppNote 08/2014: [www.gerstel.de/pdf/p-lc-an-2014-08.pdf](http://www.gerstel.de/pdf/p-lc-an-2014-08.pdf)



## Microwave Prep

The sample preparation portfolio of the GERSTEL MultiPurpose Sampler MPS has been expanded to include advanced microwave technology for accelerated solvent extraction and rapid chemical reactions. A recent application example is automated saponification



of fats in food in combination with esterification and FAME analysis by GC. The MPS including microwave can be coupled directly to a GC/MS or LC/MS system or used in stand-alone mode.

## More than one Twister needed: Move up to the Twicester

The Multi-Stir Bar Sorptive Extraction technique <sup>TM</sup>SBSE has been used successfully for the determination of a variety of flavor compounds in aqueous matrices such as green tea. Key elements of the technique are to use PDMS and EG-Silicone Twisters simultaneously in one sample vial and to desorb these together in the TDU for combined and comprehensive analysis. While the PDMS Twister stirs the sample and extracts non polar to medium polarity analytes, one or more EG-Silicone Twisters are kept stationary at the vial wall by a special holder. The EG-Silicone Twisters extract polar analytes, especially compounds with -OH or -NH functional groups. The Twicester technique enables the determination of a wide range of analytes of different polarities in one extraction step and one GC/MS run.



A novel multi-volatile method (MVM) for aroma analysis

## Sequential dynamic headspace sampling of brewed coffee and other aqueous samples provides more information in a single run

Headspace gas chromatography (HSGC) is frequently used for aroma analysis due to the volatility of aroma compounds. Several established HS techniques are available, for example SHS, DHS, HS-SPME and HSSE, but in terms of analyte recovery, these techniques tend to discriminate in favor of more volatile and/or hydrophobic compounds.

For more uniform enrichment of aroma compounds from several sample types, full evaporation DHS (FEDHS) can be used, enabling near complete vaporization and uniform recovery of aroma compounds, while largely eliminating non-volatile matrix. However, FEDHS methods often require large purge gas volumes in order to remove water from the adsorbent trap. This can lead to loss of VOCs due to breakthrough during the purge step.

A novel multi-volatile method (MVM) has now been introduced [1] based on sequential DHS sampling and sequential thermal desorption of the adsorbent traps leading to a single combined GC/MS run for all analytes. A variety of trapping conditions can be used to analyze a single sample and determine a wide range of aroma compounds in aqueous samples in a single run.

The MVM method consists of three different DHS sampling steps at increasing temperatures including a final FEDHS step. Feasibility and benefits of using the MVM method were demonstrated through the determination of key odor compounds in brewed coffee.

The analysis was performed using a DHS module and Thermal Desorption Unit (TDU), both mounted on a GC/MS system using a MultiPurpose Sampler (MPS) for automation. Replaceable adsorbent traps were used for analyte concentration, enabling sequential sampling from the same HS vial under different trapping conditions, even using different traps and adsorbents.

This flexibility enables the extraction and trapping of more volatile compounds with uniform recovery resulting in an accurate aroma profile.



### For more information

[1] Multi-volatile method (MVM) for aroma analysis using sequential dynamic headspace sampling with an application to brewed coffee, Tsunokawa, Ochiai, Sasamoto, Hoffmann. Journal of Chromatography A, 1371 (2014) 65–73

Free Download: <http://www.sciencedirect.com/science/article/pii/S0021967314016859>



## GERSTEL, Inc.

### Company Description

GERSTEL develops and produces automated sample preparation and sample introduction accessories for GC, GC/MS, LC, and LC/MS. GERSTEL technology enhances productivity and significantly improves detection limits. GERSTEL is recognized by Agilent Technologies as one of their Premier Solution Partners. GERSTEL solutions can also be integrated into other leading manufacturers' systems.

### Markets Served

- Food, beverages, flavors, and fragrances
- Personal care and cosmetics
- Material Emissions
- Polymers and packaging
- Extractables and Leachables
- Metabolomics and Forensics
- Environmental and industrial hygiene

### Major Products and Services

**MAESTRO Software:** Operates GERSTEL modules and systems independently or available as integrated solutions with Agilent ChemStation/MassHunter, LECO ChromaTOF, AB Sciex Analyst®, Thermo Scientific Xcalibur, and others. One method and sequence table run the complete system including GC/MS or LC/MS.

**MultiPurpose Sampler MPS:** GC, GC/MS, LC, and LC/MS autosampler and sample preparation robot. Performs the sample preparation techniques listed below and more: Automated Centrifugation, Solvent Evaporation, Weighing, Filtration, Vortexing, and Bar Code Reading

**Automated DPX:** Dispersive SPE technique for fast, efficient extraction and concentration of analytes.

**Automated SPE:** Independent of LC/MS or GC/MS or combined with sample introduction. Based on standard cartridges.

**Dynamic Headspace (DHS):** Concentrates VOCs from liquids or solids. Ultra-low detection limits.

**Thermal Desorption System (TDS):** Ultra-low detection limits for VOCs and SVOCs up to n-C40. Performs thermal desorption/ extraction and pyrolysis.

**Thermal Desorption Unit (TDU):** Highly flexible, automated analysis of up to 196 gaseous, liquid, or solid samples.

**Twister® Stir Bar Sorptive Extraction (SBSE):** Ultra trace-level determination of organic compounds in liquid matrices. Up to 1000 times more sensitive than SPME.

**Cooled Injection System (CIS):** Universal PTV inlet for optimized GC performance. High temperature version up to 650 °C, cryostatic cooling.

**Automated Liner EXchange (ALEX):** For samples with a heavy matrix load.

**Multidimensional GC with Column Switching:** Complex separations using two or more columns.

**Olfactory Detection Port (ODP):** For GC or GC/MS; complete with voice recognition, intensity indication, and peak annotation.

**Preparative Fraction Collector (PFC):** For GC or GC MS using up to six traps.

### Facilities

Full applications support laboratory at US headquarters near Baltimore, Maryland and a partner applications laboratory in Chicago, Illinois. Our applications team enables GERSTEL to assist customers in applying GC and LC analysis techniques to the solution of real-world challenges.



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