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NEW



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Material Emissions Testing

Automated Micro-Scale Chamber Analysis

Emissions of volatile and semi-volatile chemicals from building materials, furnishings, and automotive interiors are a growing focus of regulation and of standards groups, such as ISO and ASTM, that develop methods to measure these chemicals.

Although indoor air (or vehicle cabin air) is measured directly using Thermal Desorption GC/MS, any chemicals found come from off-gassing of the solid materials in the room (or vehicle). Methods are needed to rapidly measure these emissions either for quality control purposes during production or as part of chemical forensic studies of consumer complaints, or for basic R&D of these materials.

For over 25 years, GERSTEL has been a leader in these types of analyses in the automotive and similar industries where material emissions are important. We recognized early on the challenges presented in particular by the higher-boiling semi-volatile organic chemicals (SVOC's) that can be the source of windshield fogging, unpleasant odors, and allergic and other reactions to exposure to particular chemicals.

With a focus on these SVOC's, we designed thermal desorption systems that were superior for SVOC analysis, with very short and properly heated sample pathways that were valve-less. We applied technologies such as our CIS 4 concentrator that are non-selective. The analysis of unknown chemicals off-gassing from materials is particularly important for diagnosing problems both before and after materials reach the public; having a non-selective system for this work is crucial.

The focus of standards organizations has now turned to SVOC's and related materials, and also to finding ways to screen materials using small vessels (micro-scale chambers) that in some ways mimic, for small samples, the processes that occur in larger environmental chambers or in homes and automobiles themselves. To aid these organizations in their work, GERSTEL has brought its advanced thermal desorption platform into this arena in a new product that is compliant with these standard methods: the GERSTEL TD 3.5⁺.

The TD 3.5⁺, and extension of GERSTEL's successful TDS and TDU thermal desorbers, extends the GERSTEL platform to the 3.5" TD tubes often found in standard methods. GERSTEL now brings its superior SVOC performance and non-selective concentration technology to these methods for enhanced performance.

As the "plus" implies, we also bring something more. For the first time in over 25 years, the 3.5" tubes themselves have been altered to contain more sorbent than the original design, up to 25 % more in most cases. The increased capacity of the GERSTEL Plus tubes can be used to sample more air or to be more flexible with what sorbent materials are used.

Although Thermal Desorption is a focus of material emissions standard methods, other techniques continue to be used as well: headspace analysis of gas sampling bags such as Tedlar bags, solid phase micro extraction (SPME) for off odors, and sometimes the use of pyrolysis to identify polymers and their additives. The use of dynamic headspace of small vessels to mimic emission processes, and rapidly evaluate them, is the focus of many new methods.

To support all of these methods, GERSTEL brings its entire material emission platform to the laboratory. In addition to superior TD performance and the support of multiple methods, the use of GERSTEL Plus tubes with dynamic headspace of micro-scale chambers is also possible using the new GERSTEL DHS 3.5. In addition to the superior performance of the DHS 3.5 and TD 3.5⁺, automated and time-resolved emission methods are possible using these vessels. For whatever material emissions challenge your laboratory faces, GERSTEL has the best solution.



Automated micro-scale chamber: A new fully automated micro-scale chamber analysis system for material emission testing is available from GERSTEL based on standard 3.5" sorbent tubes as specified in regulated methods. In the DHS L 3.5, samples are placed in individual inert chambers with a volume of up to 1 Liter at defined temperature and air exchange. Analytes are automatically collected at user-defined intervals followed by thermal desorption in the new TD 3.5⁺ and GC/MS determination. Emission profiles can be established automatically and automated spiking of standards onto sorbent tubes can be performed for calibration and qualification purposes. GERSTEL tubes with up to 25 % more sorbent can be used for improved analyte recovery, higher break-through volume, and lower limits of detection. For more information, please contact gerstel@gerstel.com.

New Developments in Thermal Desorption

At PittCon 2017, GERSTEL is introducing new members of the GERSTEL Thermal Desorption family of products. The Thermal Desorber TD 3.5+ and Dynamic Headspace Systems DHS 3.5 and DHS Large 3.5 are presented. GERSTEL Solutions Worldwide (GSW) Magazine spoke with GERSTEL TD Product Line Manager Kurt Thaxton about the new developments and the added value to the user.

GSW: What exactly are TD 3.5+ / DHS L 3.5?

Kurt Thaxton: The TD 3.5+ is part of a complete GERSTEL Thermal Desorption Platform using the MPS robotic Autosampler. The TD 3.5+ is a thermal desorber that can run "legacy" tubes (3.5" long by 1/4" OD) that are often specified in standard methods. In addition to those tubes, the TD 3.5+ can also run GERSTEL "Plus" tubes that hold more sorbent than the original tubes have, due to the complete heating of the tubes, all the way to the sampling end. The DHS 3.5 is a dynamic headspace system that allows both legacy and Plus tubes to be used for dynamic headspace and micro-scale environmental chamber experiments. The increased sorbent capacity of those tubes is particularly useful to those interested in using GERSTEL's DHS-Large vessels, which can have a volume of up to 1 Liter.



GERSTEL TD Product Line Manager Kurt Thaxton (r.)

GSW: What makes these systems interesting for the customer?

Kurt Thaxton: Users really like the platform approach to thermal desorption but sometimes have to meet specifications in standard methods, or they have to sample large volumes of air in many other applications. The TD 3.5+ will allow those users to meet those needs, while at the same time having access to other techniques on the platform, such as SPME or static headspace performed using Tedlar bags. Scientists in both the flavor/fragrance and material emissions worlds must often support multiple analysis methods, so the platform, now with increased whole air sampling capacity, will be interesting to them.

GSW: What distinguishes these systems?

Kurt Thaxton: The TD 3.5+ is very similar to the other TDs which GERSTEL makes: All use the non-selective CIS 4 focusing technology, are valve-less, and have little or no transfer line. The major difference in the TD 3.5+ is that it accommodates legacy tubes and GERSTEL Plus tubes with extra large amounts of sorbent for improved recovery. For the first time in recent history, the 3.5 inch format has been improved. As a plus, the TD 3.5+ is the only 3.5 inch compatible TD that offers other options such as Liquid introduction, HS, SPME, DHS, and so on.

GSW: What are special technical features...?

Kurt Thaxton: In short, the main features, advantages, and benefits are that the TD 3.5+ runs 3.5" tubes heating them

comprehensively all the way to the sampling enabling the use of more sorbent than any other system.

GSW: ... and the benefits?

Kurt Thaxton: The risk of carry-over is reduced and, by the way, GERSTEL's non-selective cryotrap technology eliminates the need to choose between different sorbent traps before starting the application. If you are looking for unknowns, you can't choose amongst a dozen or so sorbent traps when you don't know what you are looking for. Flavor/Fragrance, Food & Beverage, and Consumer Product customers

will benefit from the larger volumes of air than can be sampled from DHS L vessels. Not all of these customers sample large volumes, but if that kind of work becomes necessary the TD 3.5+ can easily accommodate them, while supporting all the techniques these users need day-in and day-out.

GSW: What is the added value of the TD 3.5+ / DHS L 3.5 to the customer / user?

Kurt Thaxton: As mentioned, people using the larger vessels (250, 500, 1000 mL) will benefit from being able to purge those volumes with larger amounts of gas, which will increase sensitivity and possibly recovery, depending on the situation. People that want to do time-resolved "micro-emission chamber" methods such as ISO 16000-25 will be able to do so in an automated, and compliant, way using the DHS Large, with or without the autosampler.

GSW: Why should the user choose TD 3.5+ / DHS L 3.5?

Kurt Thaxton: The new combination lets you purge more gas out of the sample vial, -chamber, or -vessel. Compared to other dynamic headspace systems, it supports more sorbent, with the previously mentioned benefits, and is fully automated: Time, temperature, and flow/volume are all accurately and precisely measured and recorded. The new system is compliant with many standard methods.

GSW: For which applications is the TD 3.5+ / DHS L 3.5 particularly suitable?

Kurt Thaxton: In addition to material emissions, anytime VVOC, VOC, or SVOC data is needed from large objects (fabrics, plants) or large quantities of samples (rice, cereals) this combination is perfectly suited. Five liter or more purge volumes are possible, making it a great system for large volume headspace work.

GSW: What would then be the reason to buy a TDU 2 and standard GERSTEL DHS system?

Kurt Thaxton: The “future of the TD platform” is still with the TDU 2. Introducing LESS sample, not more, will be the trend in the future, especially if you look at Agilent’s High Efficiency Source mounted on a GC-QQQ, for example. And the TDU 2 supports the full range of GERSTEL options. The TD 3.5+ is for those who either have to be compliant with a standard method or have to sample large volumes of air because they are somehow sensitivity limited. The future of TD-only systems, particularly for the direct desorption of solids, is with the TDS, by the way. We have just introduced a highly accurate temperature validation kit, which is especially useful for the material emission application area.

GSW: And on the DHS side, ...?

Kurt Thaxton: ... we have a very large group of satisfied customers in the flavor/fragrance business that use our standard DHS, and they would in most cases not benefit from larger tubes; I don’t see this group migrating to the TD 3.5+ / DHS 3.5, but I do think that many DHS Large users may prefer the new instrument.

GSW: Is there already an application example?

Kurt Thaxton: At Pittcon 2017, we are presenting a poster on Material Emission analysis, including VVOCs, VOCs and SVOCs. If you can’t make it to the presentation, drop by the GERSTEL booth for more information.

GSW: Kurt, thank you for the interview.

The interview was conducted by Guido Deussing.

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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): Dynamic Headspace (DHS) and DHS Large up to 1 L volume: Concentrates VOCs from liquids or solids, ultra-low LODs.

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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