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May 1, 2009

Pittcon 2009 GC Systems and Accessories Review

By John V. Hinshaw



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The Pittsburgh Conference retains its place as the preeminent annual analytical sciences meeting in the U.S. This year's conference witnessed the withdrawal of a number of companies from the exhibition. Most notable for gas chromatographers was Varian Instruments' choice to present posters and papers on their latest developments at the conference while shifting sales, marketing, and application information to an online exhibit at

<http://www.thevarianexperience.com>~<http://www.thevarianexperience.com/>

[<http://www.thevarianexperience.com>]~<http://www.thevarianexperience.com/%0A%09%09%09%09>].

Reflecting this trend, the number of registered exhibitors was down from 2008's level, although the total number of registrants was only slightly less than last year's New Orleans venue. The number of nonexhibitor conferees increased a little, a trend that is in line with past increments seen whenever the conference moves north to Chicago. This year's technical program was as strong as ever, with more than 2400 presentations that included expanded conferee networking sessions and over 100 short courses. At this year's meeting, the American Chemical Society Division of Analytical Chemistry (ACS-DAC) hosted a celebration of the 25th anniversary of its Subdivision of Chromatography and Separation Chemistry (SCSC) along with six symposia as part of their ongoing coprogramming with the Pittsburgh Conference. Next year, the conference returns to Orlando, Florida from February 28 through March 5, 2010, and in 2011 it will be held in Atlanta, Georgia.

This annual "GC Connections" installment reviews gas chromatography (GC) instrumentation and accessories shown at this year's Pittcon or introduced during the previous year at conferences such as ASMS (June 1–8, 2008). For a review of new chromatography columns and accessories, please see "Column Watch" in the March and April 2009 issues of *LCGC* (1,2). The information presented here is based

upon manufacturers' replies to questionnaires, as well as on additional information from manufacturers' press releases, websites, and product literature, and not upon actual use or experience of the author. During the conference, I took time to walk around the convention aisles and see some of the new products firsthand as well as discover a number of items that were not covered by the questionnaires. Every effort has been made to collect accurate information, but due to the preliminary nature of some of the material, *LCGC North America* cannot be responsible for errors or omissions. This article cannot be considered to be a complete record of all new GC products shown at this year's Pittcon because not all manufacturers chose to respond to the questionnaire, nor is all of the submitted information included here due to the limited available space.

GC Instruments

Again at this year's Pittcon, GC instruments continued to show a surprising number of new product introductions or major upgrades for a mature science. Although no awards were won, the array of new offerings was broad and innovative. See Table I for the list. Agilent introduced the model 7820A GC system as a follow-on to the model 7890A GC system that was introduced two years ago, also here in Chicago. The new model is targeted for routine, standardized GC methods with its simplified keypad and available inlets, detectors, and accessories that cover routine applications outside of those found in research or infrequently used methodologies. The model 5000B from Konik brings additional horsepower to the company's offerings in a system that is useful for standard GC analyses as well as conventional multidimensional methods. In addition, this system can perform high performance liquid chromatography (HPLC)–GC or HPLC–GC×GC separations.

Table I: GC instrument systems

The remaining new GC systems all incorporate mass spectrometry (MS) detectors as standard, the most unique of which is O.I. Corporation's Ion Camera nonscanning dispersive mass spectrometer, which incorporates an optional micro-GC inlet and column assembly that are fully integrated into the mass spectrometer case, along with a small, high-pressure carrier gas supply tank. The unit is field portable and runs on 24 V. Shimadzu's MDGC/GCMS-2010 system integrates a dual-oven Deans switching multidimensional GC system with their model 2010 quadrupole mass spectrometer. The integrated Deans switching device is chemically deactivated and has no moving parts. Finally, Leco's TrueTOF HT GC–MS system combines the company's benchtop time-of-flight mass spectrometer with their ChromaTOF software to yield an instrument system suitable for high-speed GC–MS at spectral acquisition rates up to 80 Hz.

GC Instrument Detectors and Accessories

Table II: GC instrument detectors and accessories

As was the case with the new instrument systems, new GC detectors were dominated by MS offerings this year, shown in Table II. First, the Evolution GC–MS–MS triple-quadrupole system from ChromSys LLC is a modification of an existing mass-selective detector that converts it into a triple-quadrupole detector by adding a collision cell and a final quadrupole section. The system is suitable for use with trace level samples in high-background or difficult matrix samples. Agilent showed its model 7000A triple-quadrupole system that offers a high spectral acquisition rate of up to 500 multiple-reaction monitoring transitions per second and a wide mass range; it is supported by the company's Mass Hunter software. JEOL displayed its AccuTOF JMS-T100GCV high resolution time-of-flight mass spectrometer with a mass range of up to 4000 amu.

O.I. Analytical brought its model 5350 Tandem PID/ELCD system to the show. This series combination detector mounts photoionization detection (PID) and electrolytic conductivity detection (ELCD) systems together in a single integrated housing for Agilent GC systems that eliminates extradetector connecting tubing yet permits simultaneous independent operation as well as series operation. Other detector combinations — PID–flame ionization detection (FID) and PID–halogen-specific detection (XSD) — also are available.

In the supercritical fluid chromatography (SFC) realm, Modular SFC introduced its CFC-2c fraction collector and concentrator that adds large sample capability to its centrifugal fraction collection system. The new system enables the use of 250-cm³ bottles for simultaneous fraction collection and evaporation with recirculation of the rotor chamber gas at up to 50 ft³ (1.4 m³)/min.

GC Autosamplers and Accessories

A relatively large number of companies had new automated sampling systems for thermal desorption, purge-and-trap, and solid-phase microextraction (SPME) at this year's conference. In addition, two companies announced new cooperative ventures in the sampling area: PerkinElmer will now offer Teldyne Tekmar purge-and-trap samplers; Agilent and Markes International announced a strategic alliance for distribution and market development of analytical thermal desorption instruments used with GC and GC-MS systems.

The new product offerings are listed in Table III. The Master TD 4750 from O.I Analytical is an air sample processing system with a 50-position sorbent tube autosampler plus SUMMA canister and Tedlar bag sampling capability. EST Analytical's Centurion W/S is an upgraded purge-and-trap autosampler for both water and soil samples that utilizes a robotic x-y sampling platform. Two of the samplers can connect to a single GC system. Teldyne Tekmar showed the Atomx Automated VOC Sample Prep System that incorporates a methanol clean-up system for high-level samples and three independent injection systems for standards, surrogates, and matrix spikes.

Model No.	Description
Model 5200HP	CDS Analytical had its model 5200HP high pressure pyrolyzer on display. This unique pyrolyzer can subject samples to high pressures and temperatures plus a variety of reactant gases and is targeted towards the characterization of biomass feedstocks under reactor conditions. The model 7150 headspace preconcentrator from Entech uses a unique active SPME first stage that helps with recovery of high boilers, plus a cryocooled Tenax trap for volatiles recovery, to improve overall sampling efficiency.

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Gerstel's Automated SPME Multi-Fiber EXchange (MFX) option for the company's MPS sampler manages the selection and regeneration of up to 25 SPME fibers, which are stored in individual sealed compartments. From Markes International, the Unity 2 Single Tube Thermal Desorber is a cryogen-free, single tube, two-stage thermal desorber that is compatible with reactive analytes and can be interfaced with headspace samplers, canisters, bags, and on-line air-gas streams.

Agilent announced the 7693A Series automatic liquid sampler, which replaces the company's previous workhorse liquid autosamplers. This is a new modular design that starts with a basic 16-sample turret and adds options such as three 50-vial racks and a heater-mixer-barcode reader module. The sampler also performs sandwiched injections for the addition of internal standards or additional solvent aliquots before injection.

General Accessories

Rounding out this year's panoply of new products at Pittcon 2009, the general accessories comprise a collection of interesting and useful devices. Agilent has introduced a new multimode inlet system that incorporates programmed-temperature vaporization (PTV) injection and split-splitless injection along with the company's Turn-Top inlet liner changing feature. Phenomenex showed its manual Cool-Lock nut for capillary GC columns that avoids inlet or detector thread stripping and locks the fused-silica column in place before installation. The SilTite FingerTite nut from SGE is similar in function and works with the company's SilTite metal ferrules that help reduce air background and contamination from polymeric ferrules.

Table III: GC autosamplers and autosampling accessories

Product Name	Manufacturer	Description
Smart Micro General Flow Technology	Restek	The Smart Micro general flow detector can rapidly detect flow changes associated with column switching or releasing unwanted material from a column. Its multidimensional operation on a single sample, the Smart Micro can replace the 3-needle which is based on the general flow technology and the 3-needle, which is a suitable alternative design for general flow applications, such as detection of column switching or flow detector.
C-line Syringes	Hamilton	Available for all GC methods, C-line syringes feature a stainless steel needle and plunger, a high-precision piston, and a stainless steel barrel. The syringe is designed for use with all GC methods, including those requiring high-pressure and high-temperature applications.
MeltFit Tubes	Nlisis	The company introduced three new MeltFit tubes: the MeltFit 1 tube, MeltFit 2 tube, and MeltFit 3 tube. These tubes are suitable for switching between flow paths, switching or heartcutting capabilities ranging from connecting two detectors to one column, or removing unwanted material from a column, to multidimensional separations on complex samples.
SWAfer Syringes	PerkinElmer	A new generation of syringes that can be used with the company's SWAfer valves, the SWAfer syringes are designed for use with the company's SWAfer valves, the SWAfer syringes are designed for use with the company's SWAfer valves.

Other new products help manage gas supplies and connections. From CONCOA, the IntelliSwitch II is an automated switchover gas tank management system with networking capability, and Agilent showed a low gas alarm system attachment for standard tank regulator gauges that senses when the high pressure gauge needle has dropped below a set level. Both devices help prevent down time and potential damage from continued operation without carrier or detector gases. Restek's new electronic leak detector is an update to these sensitive hand-held devices that help avoid performance-robbing gas leaks.

Product Name	Manufacturer	Description
IntelliSwitch II	CONCOA	Automated switchover gas tank management system with networking capability.
Low Gas Alarm	Agilent	Attachment for standard tank regulator gauges that senses when the high pressure gauge needle has dropped below a set level.
Electronic Leak Detector	Restek	Update to sensitive hand-held devices that help avoid performance-robbing gas leaks.

Table IV: General GC accessories

For sample handling, Hamilton's new color-coded C-line syringes have improved needle seal and plunger tip designs that provide improved chemical resistance and inertness. Some new vial septa, the Cepure-5000 septa from Pawling Scientific, are made from fluoropolymer-coated natural rubber for improved sealing and inertness.

A couple of new products for multidimensional GC were shown this year. Nlisis added three new configurations to its MeltFit tubes for column switching applications including cross, Y, and switching tube devices. The Swafer micro-channel flow system from Perkin Elmer enables detector switching or heartcutting capabilities ranging from connecting two detectors to one column, or removing unwanted material from a column, to multidimensional separations on complex samples. Swafer devices are available in two configurations.

Company Name	Address	City	State	Zip	Country
Agilent	3500 Central Expressway	Folsom	CA	95630	USA
Hamilton	10000 Hamilton Drive	Menasha	WI	54952	USA
Restek	2000 McGraw Hill Drive	Reston	VA	20191	USA
PerkinElmer	1000 Lakeside Drive	Shelton	CT	06484	USA
Nlisis	1000 Nlisis Drive	San Jose	CA	95128	USA
Pawling Scientific	1000 Pawling Drive	Wilmington	MA	01897	USA
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(2) R. Majors, *LCGC* **27**(4), 290–304 (2009).

John V. Hinshaw

Table I: GC instrument systems		
Product Name	Vendor	Description
7820A GC	Agilent	The Agilent 7820A GC is a routine instrument for analyses using st 7820A GC system uses electronic pneumatics control (EPC) and dig simplified 5-button keypad. The temperature programmable oven 50 °C. Inlet choices include: split/splitless for megabore and all cap for wide bore capillary and packed columns. The instrument supp injection tower, and can control two heated valves. Available dete (FID); thermal conductivity (TCD); micro-electron capture (micro-EC (NPD). The 7820A is available in many countries, except for the Un
GC 5000B	Konik	The Konik 5000 is designed for conventional gas chromatography including multi-valve, multi-columns systems such as refinery gas a tions. The system also can be fitted to perform fast and multidime HPLC×GC and HPLC×GC×GC. The Konik 5000 features a fast heati (+/-0.1 °C displayed), a cold septum purgeless injector, and a full r electronics are based on field-programmable gate array (FPGA) te PCs. The system provides diagnostics and remote control via TCP/IP
Trace GC×GC	Thermo Scientific	The Trace GC×GC is built on the company's Trace GC Ultra platform comprehensive GC×GC for simultaneous orthogonal analysis on tw includes a solid state dual jet CO2 modulator, support for the full r injection modes, fast detector's electronics (FFID), and automatic cc tate setup. Thermo's dedicated GC×GC hyperchrom software provi tion, reconstruction of the first dimension chromatogram, plus GC> tation. The system is targeted for solving problems related to Fast ; low concentration components in complex matrices, and exhaustiv
Guardion-7 Custodion-10 Laboratory GC- TMS	Torion Technologies, Inc.	The Guardion-7 hand-portable GC-torodial ion trap mass spectrom thermal mass capillary gas chromatograph with ballistic temperat ure toroidal ion trap mass spectrometer with a mass range from 5 injected using the company's SPME fiber Custodion-10™ custody s chip for collecting and storing sample and chain-of-custody inform system is totally self-contained and weighs less than 25 pounds. Th is ideally suited for rapid (less than 5") screening of chemical agen substances. The Laboratory GC-TMS places the same GC and TMS c enclosure for method development prior to field deployment.
Ion Camera	O.I.Analytical	The Ion-Camera is a transportable, double-focusing mass spectrom Mattauch-Herzog sector-field geometry and a CCD detector array. air-sampling modules provide sample input and separation. The va 2 mL/min of GC carrier gas flow, and both internal and external ca The system is suitable for applications in environmental analysis, p lic safety, and other general MS applications. The instrument runs

Table I: GC instrument systems

Table II: GC instrument detectors and accessories		
Product Name	Vendor	Description
Evolution GC-MS-MS triple quad	ChromSys LLC	The Chromtech Evolution is built upon the Agilent 5973/5975C instrument package keeps the original inert ion source, the hypodermic case of the 5975C the Triple-Axis detector, as the basis for the system. It adds a proprietary IonRail collision cell and another high performance filter Q3. The system is available with 3 pump options. It is designed for handling high background or matrix effects such as environmental monitoring, QC, food flavor fragrance.
Model 5350 Tandem PID/ELCD	O.I. Analytical	The Model 5350 Tandem PID/ELCD is a combination detection detector (PID) with an electrolytic conductivity detector. It is a completely integrated detector assembly. Simultaneous detection of multiple compounds is possible, which eliminates the need for two separate detectors. It eliminates transfer lines and uses only one detector port. It can be used independently, if desired. The PID/ELCD is available for installation on most manufacturer's instruments. Other PID tandem combination detectors include flame ionization detector (FID) and halogen specific detector.
7000A Triple Quadrupole GC/MS	Agilent Technologies	The 7000A Triple Quadrupole GC/MS combines a solid ion optics, a hexapole collision cell, and a new triple-axis detector. It provides level sensitivity with high selectivity and very low noise at the detection limit. It is capable of 500 multiple reaction monitoring (MRM) transitions per second. The resolution is 1050 amu, and the system delivers a signal-to-noise ratio of 1000. It can detect femtograms of octafluoronaphthalene (OFN). This system is designed for trace levels of target compounds in complex matrices. It is compatible with Mass Hunter data analysis and reporting software.
AccuTOF JMS-T100GCV	JEOL	This latest update to the company's time-of-flight AccuTOF system provides a detection rate of 25 averaged spectra per second with a resolution of 0.1 amu (FWHM). The system comes standard with an electron ion source. Optionally available ion sources and attachments include: photoionization (PI) sources plus direct injection (DI) and direct exposure (DE). The system is specified at a sensitivity of S/N ≥ 100 for octafluoronaphthalene at a resolution of R ≥ 6000 at m/z 600, and mass accuracy of 2×10^{-3} u. The mass range is up to m/z 4000.
CFC-2c Fraction Collector and Concentrator	Modular SFC	This enhancement to the company's line of centrifugal SFC systems provides the use of large volume 250 cm ³ bottles for simultaneous fraction collection and evaporation. The system collects fractions at atmospheric pressure into four glass sample containers. The CFC-2c captures non-volatile compounds from a gaseous CO ₂ eluant stream with greater than 95% recovery. The system is enabled by recirculating rotor chamber gas into each container at 50 cfm while the rotor spins and fractions are being collected.

Table IV: Continued		
Product Name	Vendor	Description
Swafer Micro-channel Flow Technology	PerkinElmer	The Swafer micro-channel flow devices are capillary GC flow-switching, detector switching or heartcutting capabilities ranging from column switching, or removing unwanted material from a column, to multi-column switching for complex samples. The Swafer is available in two options: the D-Swafer, which is based on the classical Deans Switch principle, and the S-Swafer, which is a scale for sample-stream splitting between a range of detectors or columns. The S-Swafer comprises 13 user-interchangeable configurations and over 15 positions.
C-line Syringe	Hamilton	Available for all GC and HPLC PAL instruments, C-Line Syringes feature a design which eliminates interactions between the sample and glued surfaces. The C-Line material provides chemical resistance, while a color-coded needle design ensures proper installation and operation. Units are available in a range of sizes.
Meltfit Tubes	Nlisis	The company introduced three new Meltfit tube accessories: the Meltfit Tube, and Meltfit Cross-Tube. These devices are capillary column accessories for column injector splitting, detector switching, flow reversal, heating, and backflushing. The new connecting tubes are based on the Meltfit / sealing technology.
SilTite FingerTite	SGE	A finger-tightened capillary column nut for use with the compatible FingerTite nut prevents overtightening and stripping of capillary columns in the GC oven.

Companies listed in this article

-Agilent Technologies Wilmington, DE	-Modular SFC Franklin, MA
-Analytical Flow Products Thetford Mines, Quebec, Canada	-Nlisis Cypress, TX
-ASAP Analytical Covington KY	-OI Analytical College Station, TX
-CDS Analytical Oxford, PA	-Parker Balston Haverhill, MA
-ChromSys LLC Alexandria, VA	-Pawling Scientific Products Pawling, NY
-Concoa Virginia Beach, VA	-PerkinElmer Shelton, CT
-Entech Simi Valley, CA	-Phenomenex Torrance, CA
-EST Analytical Fairfield, Ohio	-Restek- Corporation Bellefonte, PA
-Gerstel Linthicum, MD	-SGE Austin, TX
-Hamilton Reno, NV	-Shimadzu Columbia, MD
-JEOL Peabody, MA	-Teldyne Tekmar Mason, OH
-Konik Miami, FL	-Thermo Scientific Waltham, MA
-Leco St. Joseph, MI	-Torion Technologies American Fork, UT
-Markes International New Haven , CT	-Zip Scientific Hudson NH


Table II: GC instrument detectors and accessories

Table III: GC autosamplers and autosampling accessories

Table IV: General GC accessories

Companies listed in this article



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