VOLUME 17

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ChemStation Designed for the Future

- Best-selling ChemStation now even better
- Single ChemStation for LC, GC and LC/MS
- Designed for future compatibility

By Chet Sharrar
GC Data Systems Product Manager

Agilent Technologies is pleased to introduce the new Revision B.01.01 ChemStation for LC, GC and LC/MS. The ChemStation Plus family is the industry's' most widely sold data system, providing instrument control, data acquisition and data management. With its modular design, the system can be extended and scaled upwards as laboratory needs grow. To ensure compatibility with future PCs and their operating systems, the new revision B.01.01 uses 32-bit internal software architecture and also includes the following key improvements:

Full Support for Long File Names

Data, method and sequence file names are no longer limited to eight characters. As shown in Figure 1, long "real-world" file naming provides easier file tracking and recognition.

Additional Improvements

- Improved enhanced integrator with new integration event parameters and user interface
- Virtual GC instruments (6890 and 6850)
- Backwards compatibility for method, data and sequence files from previous ChemStation versions
- Backwards compatibility for custom macros; macro execution itself remains the same
- Supported LAN-based hardware: 1100LC, 6850 & 6890N GCs, 1100 MSD and 35900E A/D
- Supported GP-IB-based hardware: 5890, 6890A & Plus GC and 1090 LC
- Alternate 'Companion' – simplified user interface for GC production labs
- Simplified de-installation via Windows® "Add / Remove Programs" dialog
- Improved system performance and stability

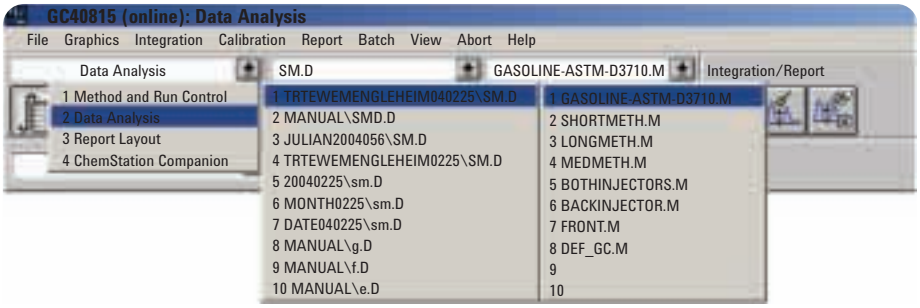


Figure 1. Long file names make it easier to identify method and data files

Ordering Information

As shown in the table below, ordering Revision B.01.01 of the Agilent ChemStation for LC, GC, and LC/MS is very similar to ordering the previous revision.

Note: Existing Revision A.10.02 ChemStation products remain available concurrently with the new Revision B.01.01 ChemStation products.

Learn More

For more information, go to: www.agilent.com/chem and select DataSystems under Products & Services.

Order guide

Product Numbers: Rev A.10.02	Rev B.01.01	Product Description:
G2070AA	G2070BA	GC ChemStation software
G2071AA	G2071BA	Additional GC instrument control software module
G2170AA	G2170BA	HPLC 2D ChemStation software
G2171AA	G2171BA	Additional LC instrument control software module
G2710AA	G2710BA	LC/MS ChemStation software
G1656A	G1656B	ChemStation software revision for upgrading ChemStation NOTE: It may be necessary to upgrade your PC hardware and software.

Find Hidden Target Compounds

Revolutionary MSD Software

- Save analysis time
- Increase quality of results

By Chin-Kai Meng, Ph.D. and Mike Szelewski

Typical target compound analysis requires finding target ions and meeting qualifier ion ratios. It is always very difficult to identify target compounds from high matrix background because the matrix affects the ion ratios of the target compounds. Background subtraction and manual integration are often required to be certain of the results. This is a time-consuming process; it can take an experienced analyst an hour to review/confirm one data file.

Two powerful GC/MS techniques – Retention Time Locking (RTL) and peak deconvolution – have been combined to create a quantitation and screening tool that can identify 567 pesticides and endocrine disrupters from a single run in a minute or two.

Easily Find Target Compounds in Complex Matrices

The term deconvolution is used here in the broad sense of extracting signals from a complex mixture, as depicted in Figure 1. This is the goal of AMDIS (Automatic Mass Spectral Deconvolution and Identification Software) developed by NIST (National Institute of Standards and Technology) for detecting chemicals in violation of the Chemical Weapons Convention.

Figure 2 is an example of using AMDIS to identify trace levels of one of the target compounds, methyl parathion, in grape extract. The top portion of the figure is the total ion chromatogram (TIC) of the extract. A section of the TIC (14.6 to 18.3 minutes) is expanded, as shown in the middle portion of Figure 2. It is obvious from the white TIC that it would be unlikely for an analyst to find the insecticide if the ChemStation did not report it. The bottom portion of the figure is the actual spectrum (in black) at retention time

(continued on page 5)

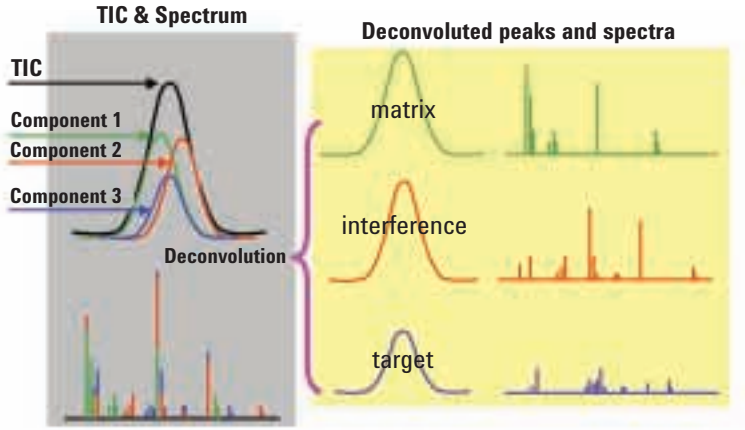


Figure 1. Deconvolution – extraction of target signals from matrix background and interference

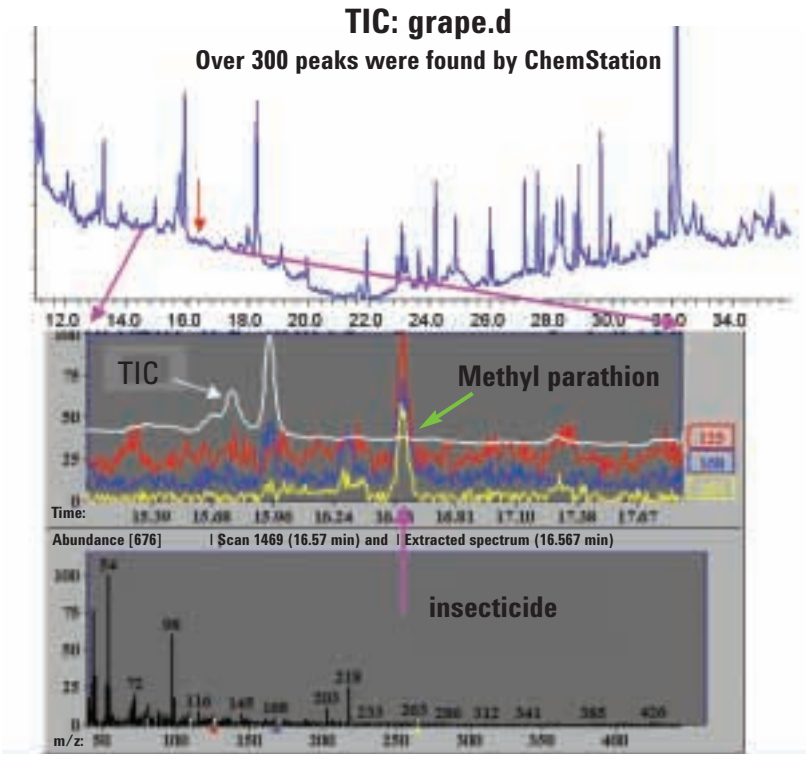


Figure 2. A total ion chromatogram (TIC) of grape extract and associated extracted ion chromatograms and mass spectra

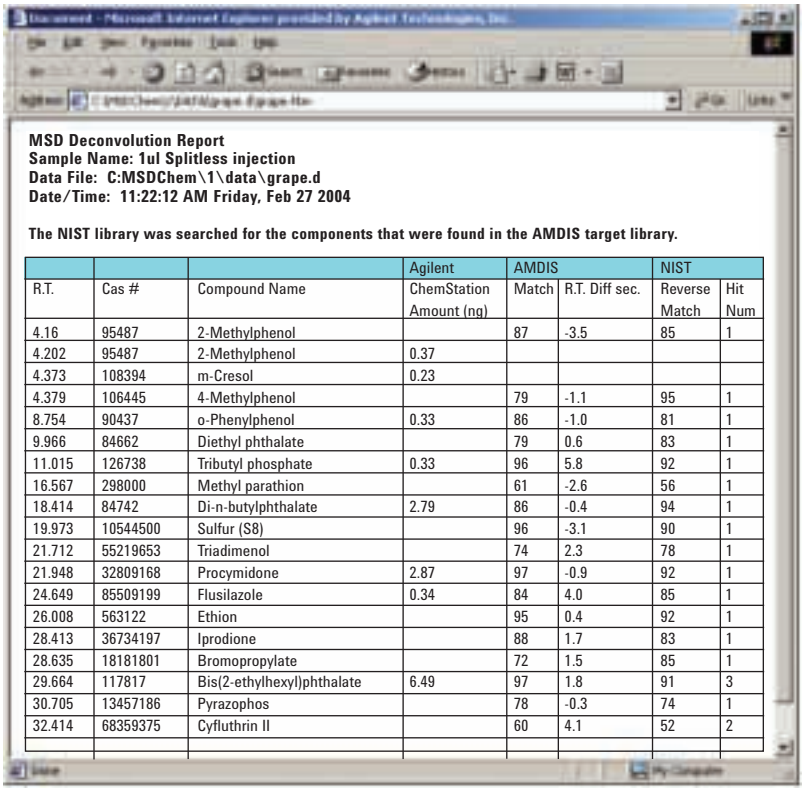
(continued from page 4)

16.57 min. The white spectral lines in the spectrum are the deconvoluted ions identified by AMDIS. Each deconvoluted/cleaned spectrum is searched against an AMDIS target library for identification. In this example, the deconvoluted spectrum matched the spectrum of methyl parathion.

Increase Confidence with Combined Report

The Deconvolution Reporting Software (DRS) for target compound analysis combines the results from Agilent ChemStation, AMDIS, and the NIST 2002 Mass Spectral Search Program (NIST02, >143,000 compounds) into one easy-to-read report, shown in Figure 3. The three result files are consolidated and sorted by both retention time and by CAS#. A printed report can be generated together with a report file in HTML format. By using RTL, detected target compounds can be disqualified when they are outside the expected retention time window. This minimizes false positives and provides a more concise final report.

The advantage of deconvolution is that it identifies target compounds in complex matrices quickly and accurately. A collaboration project with the California Department of Food and Agriculture (CDFA) Center for Analytical Chemistry demonstrated that automated DRS identified all the target compounds the analyst found in fruit, vegetable and surface water extracts. In addition, DRS found pesticides not found by the analyst. Most importantly, the time saved using the DRS was at least 30-fold, and operator concentration and skill level did not affect the consistency/accuracy of the DRS reports.



MSD Deconvolution Report
Sample Name: 1ul Splitless injection
Data File: C:MSDChem\1\data\grape.d
Date/Time: 11:22:12 AM Friday, Feb 27 2004

The NIST library was searched for the components that were found in the AMDIS target library.

			Agilent	AMDIS		NIST	
R.T.	Cas #	Compound Name	ChemStation Amount (ng)	Match	R.T. Diff sec.	Reverse Match	Hit Num
4.16	95487	2-Methylphenol		87	-3.5	85	1
4.202	95487	2-Methylphenol	0.37				
4.373	108394	m-Cresol	0.23				
4.379	106445	4-Methylphenol		79	-1.1	95	1
8.754	90437	o-Phenylphenol	0.33	86	-1.0	81	1
9.966	84662	Diethyl phthalate		79	0.6	83	1
11.015	126738	Tributyl phosphate	0.33	96	5.8	92	1
16.567	298000	Methyl parathion		61	-2.6	56	1
18.414	84742	Di-n-butylphthalate	2.79	86	-0.4	94	1
19.973	10544500	Sulfur (S8)		96	-3.1	90	1
21.712	55219653	Triadimenol		74	2.3	78	1
21.948	32809168	Procymidone	2.87	97	-0.9	92	1
24.649	85509199	Flusilazole	0.34	84	4.0	85	1
26.008	563122	Ethion		95	0.4	92	1
28.413	36734197	Iprodione		88	1.7	83	1
28.635	18181801	Bromopropylate		72	1.5	85	1
29.664	117817	Bis(2-ethylhexyl)phthalate	6.49	97	1.8	91	3
30.705	13457186	Pyrazophos		78	-0.3	74	1
32.414	68359375	Cyfluthrin II		60	4.1	52	2

Figure 3. A report generated by Deconvolution Reporting Software (DRS) for the grape extract

Save Time

The deconvolution power of AMDIS increases the quality (no false positives) and confidence level (no false negatives) of the report. Compared with manual manipulation of the data by an experienced analyst (peak averaging and background subtraction of each potential target compound), the time savings using the new software program is about one hour per sample. When DRS searches for 560 target pesticide compounds, the total processing time is one to two minutes per file. Additionally, DRS has the potential to identify more compounds in complex matrices than an analyst would.

For more information

To find out more about the new Deconvolution Reporting Software, go to www.agilent.com/chem/gc. Under GC & GC/MS Data Systems, click MSD Productivity ChemStation. From there, click the link to Deconvolution Reporting Software.

To review the application note, "Comprehensive Pesticide Screening by GC/MSD Using Deconvolution Reporting Software," go to www.agilent.com/chem/library and then type publication number 5989-1157EN into the keyword field.

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Information

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Need the best possible performance from your instruments and columns? Agilent experts have years of experience in chromatography and are happy to share their insights. "Ask the Experts" offers practical information to make your job easier. Learn how to choose the best column for your application, optimize methods or troubleshoot problems.

How to select a guard column for an LC analysis

By Maureen Joseph, Ph.D.
HPLC Business Development Manager

A guard column protects the analytical column from damage caused by particulate matter and strongly adsorbed material. Ideally, the packing of the guard column should be the same as the analytical column so that the chromatography of the analytical column is not altered. If the identical material is not available, then similar or less retentive packing may be used for the guard column.

To maintain an adequate capacity for sample impurities without introducing excessive peak dispersion, choose a guard column with an internal diameter close to or the same as the analytical column and with a similar or slightly larger particle size. The guard column should be no more than 20% of the length of the analytical column. For low-volume columns, select an in-line filter for column protection.

Take the Guesswork Out of Guard Column Selection

Order your guard columns at the same time as your analytical columns. In our catalog, the LC columns and their suitable guard columns are listed together.

Or use our online compatibility guide to find which guard cartridges are compatible with each Agilent HPLC column type. For easy ordering, this guide shows pictures and part numbers of guard column hardware, with links to the online store.

Go to:
www.agilent.com/chem/columns
and select **Cartridge/Guard Cartridge Systems Compatibility Guide under LC & LC/MS Columns & Guards**.

GC/MS Tips and Tricks: Automatic Analyzer Bake-out

By Harry Prest, Ph.D
Senior Applications Chemist GC/MS

After you clean the source and confirm that there are no leaks in the MSD, you can "bake" the source and quadrupole to rapidly lower the air-water background. With the macro programming available in the ChemStation software, you can automatically bake the MS analyzer for a period and return it to operating temperatures. You can call the bake macro in a sequence to automatically bake out the GC/MSD analyzer, return it to operating temperatures, autotune the MSD, and run a checkout sample to confirm performance. Figure 1 shows such a sequence. Details of the macro are given in application note 5989-0678EN, available at **www.agilent.com/chem/library**. Type publication number 5989-0678 into the keyword field to find the application note.

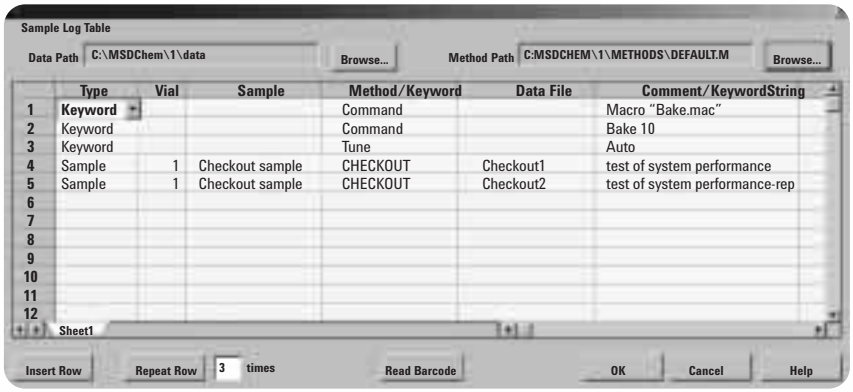

Figure 1. Sequence to bake analyzer, tune and confirm performance

Choosing between on-column and splitless GC injection

By Eberhardt Kuhn, Ph.D.
Senior Applications Chemist

Both on-column and splitless injection techniques are suitable for analyzing trace analytes (analytes in the part-per-million level or less in the final injected sample). Each technique offers advantages over the other, and frequently the choice of technique is a compromise between a variety of variables.

Regardless of injection technique, regular maintenance of the column and injection port liner is very important. Even "clean" samples, such as water extracts and pure solvents, contain some nonvolatile material. This contamination, as it accumulates from numerous sample injections, may cause chromatography problems such as activity or retention time shifts. Regular maintenance prevents these problems.

Which injection technique is best for your method?

Variable	Common Examples	Yes	No	Preferred Technique
Sample residues	soil/biological extracts,buffers, sample degradation products, salts	x		Splitless
			x	Both
Active analytes	-NHx, -OH,-C00H,-CHO,-SH, -NHOH, cyclic -N=.	x		On-column
			x	Both
Thermally labile analytes	epoxides, ureas, explosives	x		On-column
			x	Both
Low volatility analytes	motor oil, waxes, trigylcerides	x		On-column
			x	Both

Information

To select the right liner, visit our Web site at **http://www.chem.agilent.com/cag/cabu/linerselect.htm**

For an instructional video on how to properly install a liner, go to **http://www.chem.agilent.com/cag/cabu/howtovideo.htm**

Change Liners in 30 Seconds!

Innovative Flip Top System

Eliminate the time and dangers of handling heated parts; avoid frustrating searches for special wrenches or tools; decrease down-time; and extend column life by minimizing exposure to ambient air.

Exclusively from Agilent, the Flip Top Inlet Sealing System is great news for anyone who changes inlet liners on an Agilent 6890, 6850 or 5890 GC or GC/MS.

The Flip Top Inlet Sealing System allows you to safely and reliably:

- **Change an inlet liner in as little as 30 seconds**
- **Without any tools**
- **Without any leaks**
- **No handling of heated parts, which means no burns**
- **No lengthy downtime, for increased productivity**
- **Minimal exposure to ambient air, for longer column life**

Simplifying a Frequent Maintenance Task
When running a GC or GC/MS system, a hot inlet may have to be opened as often as every 24 hours to change a dirty inlet liner. The special wrench used for this operation is often misplaced, bent at an odd angle, too thin, or simply awkward to use. Even after cooling, the inlet nut is usually too hot to handle so it must be turned several times with the wrench before it will release the top weldment assembly of the injection port.

Once the dirty liner is changed, the inlet nut must be replaced on the injection port and occasionally the wrench slips off the nut, leading to scrapes, burns and cuts. It can take five minutes or more just to replace the liner. Finishing the procedure, including re-equilibration, can result in **15 minutes of total downtime.**

Changing liners on a GC/MS causes even more problems as ambient air is drawn into the capillary column, through the hot MS interface, and into the heated source. The result: multiple problems for the operator, including shortened column life and air background in the MS.

Order guide

Description	Part Number
Flip Top Inlet Sealing System	5188-2717
Inlet Liner O-Rings for the Flip Top System, 10/pack	5188-2741

How It Works

- A levered arm attaches to any Agilent 6890, 6850 or 5890 GC insert weldment and locks to the injection port using an adapter ring screwed onto the inlet.
- You simply lift the arm of the Flip Top, which releases the insert weldment from the injection port and allows instant access to the liner.
- You reverse the process to re-seal the weldment to the port.

You've Got to See It to Believe It

How easy is the new Flip Top Inlet Sealing System to use? Just view our online video demonstration of the Flip Top in action at:
www.agilent.com/chem/fliptop4u

With its inherent safety, simplicity and reliability, the Flip Top Inlet Sealing System is perfect for anyone who changes liners on an Agilent GC.

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- No septa clumping or sticking.
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- Lamp replacement
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Service performed to factory specifications using traceable diagnostic equipment	√	NO
Testing to factory specifications	√	NO
Replacement of detector lamp	√	MAYBE
Firmware upgrade to latest revision	√	NO

Separate Complex LC Samples Faster

ZORBAX Eclipse XDB-CN Column

- Use ZORBAX Eclipse XDB-CN for polar and non-polar analytes
- High resolution, efficient separations

By Maureen Joseph, Ph.D.
HPLC Business Development Manager

It can be difficult to attain the ideal separation of a complex sample, such as a mixture of pesticides. This type of mixture often contains both polar and non-polar compounds. An HPLC separation on a C18 reversed phase column, such as the Eclipse XDB-C18 column, is frequently long and inefficient. For this type of sample, a more polar bonded phase is a powerful choice. A more polar, cyano bonded phase, such as the new Eclipse XDB-CN, can reduce the retention times of the most non-polar analytes while still maintaining good retention of the more polar analytes.

Figure 1 shows the separation of a mixture of six pesticides on the Eclipse XDB-C18 and the new Eclipse XDB-CN column. On the Eclipse XDB-C18 column (Fig. 1A), all peaks are well resolved, but the analysis time is 54 minutes due to the excessive retention of the pesticide pencycuron. When the pesticides are separated using the more polar selectivity of the new Eclipse XDB-CN column (Fig. 1B), **the analysis time is reduced by 85% under the same mobile phase conditions**. This is primarily because the retention of the most non-polar pesticide is reduced. At the same time, high resolution of all components and the trace impurities has been maintained.

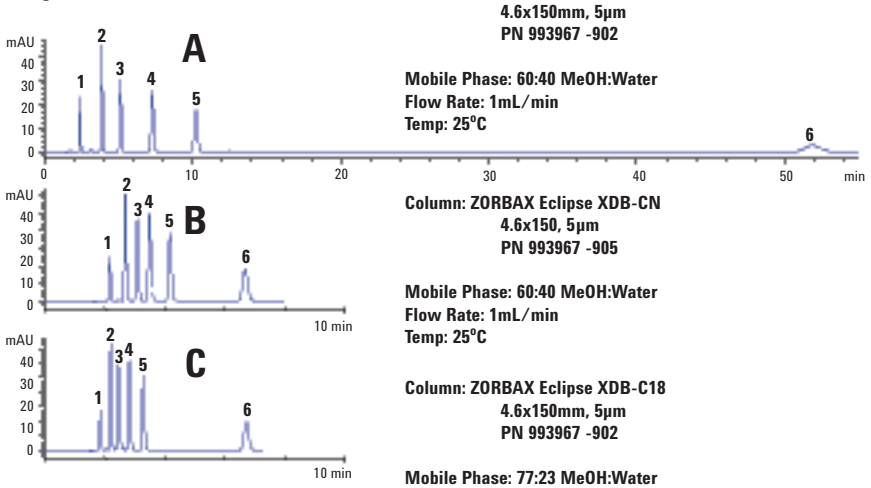
Figure 1C shows that while the retention time of the last peak can be reduced on the Eclipse XDB-C18 to match that of the Eclipse XDB-CN column by increasing the organic in the mobile phase, the k values indicate that all other peaks are less well retained and the resolution is inferior. Therefore the new Eclipse XDB-CN column, with its more polar bonded phase, provides the best separation of this mixture of polar and non-polar pesticides.

For more information
Download free application notes about the Eclipse XDB-CN column! Go to www.agilent.com/chem/library.
At the top of the page, enter the keyword Eclipse XDB-CN and click the Search button.

Urea Pesticide Analysis

Comparison of Eclipse XDB-CN vs. Eclipse XDB-C18

Figure 1.



Column: ZORBAX Eclipse XDB-C18
4.6x150mm, 5µm
PN 993967 -902

Mobile Phase: 60:40 MeOH:Water
Flow Rate: 1mL/min
Temp: 25°C

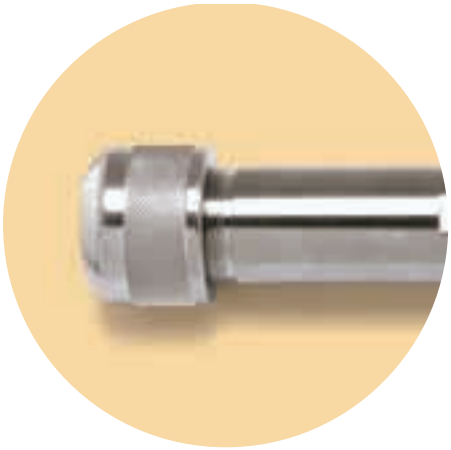
Column: ZORBAX Eclipse XDB-CN
4.6x150, 5µm
PN 993967 -905

Mobile Phase: 60:40 MeOH:Water
Flow Rate: 1mL/min
Temp: 25°C

Column: ZORBAX Eclipse XDB-C18
4.6x150mm, 5µm
PN 993967 -902

Mobile Phase: 77:23 MeOH:Water
Flow Rate: 1mL/min
Temp: 25°C

	Capacity Factors (k)		
Peak	A	B	C
1. Fenuron	0.71	0.53	0.31
2. Monuron	1.75	0.90	0.56
3. Monolinuron	2.65	1.19	0.74
4. Diuron		4.19	1.49
1.00			
5. Linuron	6.29	1.97	1.34
6. Pencycuron	36.1	3.76	3.79



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- Keep common instrument supplies for easier support and budget management.

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Custom GC Columns for Unique Needs

For the rare times when you need a capillary GC column that is not among the nearly 1,800 regularly available from Agilent, our Custom Column Shop can usually make the column for you. Some columns can be on their way in only a few days while others (such as custom columns with unique film thicknesses or diameters) may take up to three to four weeks for manufacturing and testing. Deactivated fused silica tubing and CE columns are also available from the Custom Column Shop.

New Web site for Custom Column Quote
NOW to speed the process, customers and distributors in the U.S., Canada and Puerto Rico can submit requests for a custom GC column quotation through our Web site. Go to:

www.agilent.com/chem/gc.customcolumn

After you submit your requirements and request a quotation, within two business days an Agilent Call Center representative will either fax or e-mail a quotation to you. The representative normally will follow up with a telephone call to make sure that the quotation arrived, to answer any questions, and to accept an order if you want to proceed.

Customers and distributors outside of the U.S., Canada and Puerto Rico should continue to contact their local Agilent sales office to submit a request for a custom column quotation.

A convenient order form is available on page 747 of the 2002-2003 Chromatography and Spectroscopy Supplies Catalog (5988-4785EN).

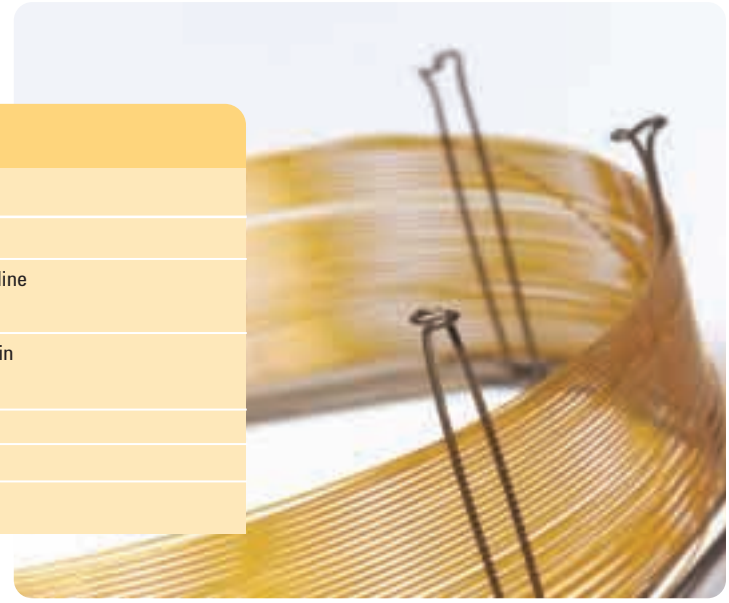
Information

Unsure what custom column you need or whether you need one at all?

Contact Technical Support or your local Agilent Technologies representative.
Go to: www.agilent.com/chem
and select **Contact Us**.

Custom GC Column Types

	Column type
√	Individual custom column
√	Individual column with fused silica guard column or transfer line (including DuraGuard integrated guard columns)
√	Dual column assembly (two columns attached end to end or in parallel with a Y connector)
√	Standard column rewound on a 5" or custom cage
√	Custom fused silica tubing (no stationary phase)
√	Other



Run Longer at Top Performance

Preventive Maintenance Programs

- Ensure optimum performance
- Avoid unplanned downtime
- Extend instrument life

By Gary Lee
Services Marketing Specialist

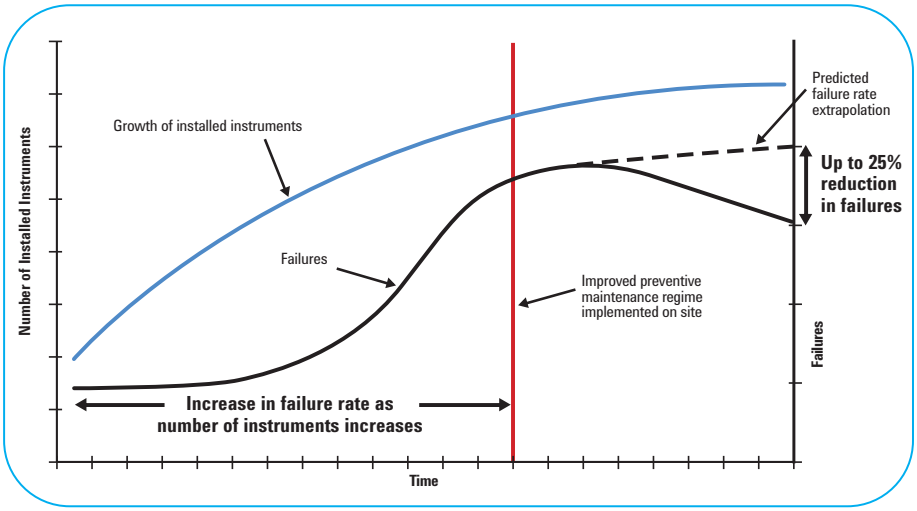
In today's laboratory environment, technical professionals require their instruments to provide highly sensitive and accurate analyses reliably — day in and day out. Important factors that can have an impact on instrument performance, quality of results and instrument lifetime include routine care and regularly scheduled preventive maintenance (PM). Performing regular preventive maintenance will help to assure optimum performance and avoid expensive unplanned downtime and repairs, as well as substantially extend the useful life of your equipment. This is especially true for:

- Method development and R&D labs where instruments are subject to a diversity of analyses and, sometimes, instrument users.
- Analytical services labs where instruments need to be available to analyze a broad range of samples.
- Quality assurance labs that require accurate analytical data on a timely basis. In many cases, analytical systems in this environment run on a 24-hour basis and must operate within stringent regulatory guidelines. Instrument to instrument uniformity and performance are critical.

Regularly Scheduled Preventive Maintenance reduces downtime and repair cost.

Studies of instrument repair call activities conclude that over 60% of repairs are not functional failures but are mainly due to lack of preventive maintenance – replacing components that wear on a regular basis. A regularly scheduled preventive maintenance program is a predictable expenditure that reduces unplanned instrument downtime and repair cost, as well as inconvenience and lost productivity. It increases the effectiveness of laboratory personnel.

The Effect of Preventive Maintenance



The graph above shows what happens as a lab grows with new equipment. Failure rate increases as the instrument population increases because most modern instrument failures occur in the first year or two of instrument life. As the population stabilizes, the failure rate should flatten (predicted failure rate extrapolation). However, when the laboratory implements a thorough maintenance program, the failure rate decreases by up to 25% for mechanical systems.

Developing a preventive maintenance program

The frequency of preventive maintenance largely depends on your application requirements, workload and regulatory requirements. In developing a preventive maintenance program for your instruments, consider the following factors:

- Type of instrument – Gas and liquid chromatographs, instruments with liquid pumping systems, auto-samplers and mass selective detectors etc. generally require more preventive maintenance than simpler instrument systems such as UV/VIS or IR.
- Run-time requirements – This can be based on hours used or number of injections (e.g. 24-hour operations). Preventive maintenance should be performed at least twice a year for QA/QC labs to maximize uptime. In FDA/GLP environments, it is general practice to perform preventive maintenance prior to operational qualification.
- Instrument usage – If your analytical instrument is used to analyze a wide range of samples, uses several analytical conditions and is run by multiple users, then regular preventive maintenance minimizes downtime and time spent troubleshooting instrument problems. This helps free scientists to develop methods, and to focus on R&D and/or analyzing samples. Two PM calls per year may be required depending on the samples and operating conditions.
- Instrument age – As analytical instruments age, regular preventive maintenance will keep them operating to manufactured specifications.

Qualified Personnel Should Perform Preventive Maintenance using Genuine Parts

Instrument damage can result when unqualified personnel attempt to provide preventive

(continued on back page)

Unconventional Approach for Drugs of Abuse

- Novel approach uses LC/MS instead of immunoassay and GC/MS
- Faster sample turnaround
- Flexibility for new analytes

By Ron Majors, Ph.D.
Senior Applications Chemist

Located just below the Arctic Circle in Norway, the city of Trondheim seems an unlikely place to find one of the largest drugs of abuse (DOA) testing labs in Europe, the St. Olavs Hospital/Trondheim University Hospital. Under the auspices of Kolbjorn Zahlsen of the Department of Clinical Pharmacology, the laboratory has adopted an analysis strategy unlike that of other drugs of abuse testing laboratories throughout the world. Most laboratories do a preliminary screen of urine samples using immunological methods. If they find a positive result for drugs, they retest the urine using gas chromatography/mass spectrometry (GC/MS) for confirmation. Zahlsen's approach is to perform screening using only liquid chromatography/mass spectrometry (LC/MS), with specificity and performance that is comparable to GC/MS confirmation.

Cost-Effective Analyses

It might seem that LC/MS would not be cost-effective in handling 3,000 analyses per day in samples from all over Norway. However, the LC/MS technique competes effectively with the expensive immunochemicals and the rigid testing protocols of the immunoassay-GC/MS approach.

Immediate Answers without Rework

There are other reasons to prefer LC/MS as the analysis technique. Although immunoassay is fast and simple, there are inherent difficulties with the technique. Most of the tests are not specific, broadly looking at DOA classes such as amphetamines, opiates, benzodiazepines, barbiturates and so on. If a positive result is obtained, the urine sample must be reanalyzed; the suspected analytes are chemically derivatized with a reagent required for GC volatility, and then the reanalysis is performed by GC/MS. With LC/MS, the specific compound is determined in the initial analysis without the need for further rework. Such specificity is especially valuable when a urine sample contains several classes of illegal drugs in combination with legal drugs, and has proven very useful for DOA control of samples from methadone treatment maintenance. For some categories of samples, such as forensic samples and samples that have serious legal implications, GC/MS confirmation is performed in addition to the LC/MS screen.

Short Turnaround Time

Another advantage of Zahlsen's strategy is short turnaround time, crucial in drug overdose situations. In the clinical toxicology department, typical turnaround times are one to two hours after the sample is received — which sometimes can mean life or death for the affected individual. Sometimes, GC derivatizations alone in the conventional DOA laboratory can take an hour. Then additional time is required for sample preparation, immunoassay and the GC/MS analysis.

Fast Method Development

LC/MS is superior for analysis of new drugs. Development of the antibodies for a new immunoassay may take up to a year. With LC/MS, the method can be developed in one or two days if a reference substance is available.

It is this flexibility that has allowed Zahlsen's laboratory to extend its LC/MS work to ethical drugs (pharmaceuticals) in the therapeutic drug-monitoring (TDM) program. The ability to monitor a patient's drug levels in a hospital setting is crucial to maintain quality medical treatment. Patients often require different optimum levels of drugs so that they do not suffer from adverse effects of having too much or too little active drug in their systems. Over 70 drugs are now routinely monitored in patient samples.

Success Leads to Laboratory Growth

Zahlsen started method development with mass spectrometry in 1990 with one Hewlett-Packard GC/MS system. He bought his first LC/MS system, an 1100 Series LC/MSD system, in 1998. At that time he had 15 employees handling about 50,000 analyses in urine and serum samples. Last year, as depicted in Figure 1, the laboratory performed 820,000 analyses with 80 employees and 10 Agilent GC/MS systems, 24 Agilent LC/MSD systems and one Agilent LC/MSD Trap. This year, he expects to perform more than a million LC/MS analyses in his lab. Kolbjorn is shown below with one of his LC/MSD systems.

Number of Analyses 1996-2003

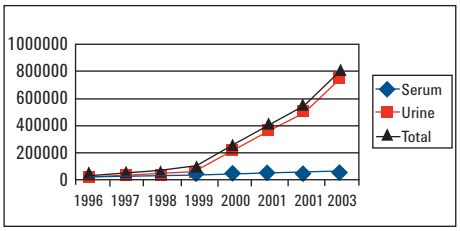


Figure 1.

Kolbjorn Zahlsen can be contacted at the email address: zahlsen@online.no.

Run Longer at Top Performance

(continued from page 14)

maintenance on analytical instruments. Improper installation or non-compatible consumables used for preventive maintenance can extend downtime of your instrument. Agilent engineers have extensive training and many years of experience in identifying potential problems. They can propose appropriate actions that need to be taken to optimize performance and avoid system downtime.

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