

## Diablo Analytical at Pittcon '96

Diablo Analytical will be exhibiting for the first time at Pittcon '96, the major U.S. analytical trade show. Pittcon will be held in Chicago March 3-8, and the conference will provide national exposure for our analytical application business. Diablo has built its application business over two years through regional activities, primarily in Northern California. Several of our application products and services have extended into customer interest over a wider geographical area. We will emphasize these areas at the conference.

### HP GC-AED Applications

The primary focus of our booth will be application products and services related to the Hewlett-Packard GC-AED. Diablo has been a HP Channel Partner for analytical applications for over two years. Recently, our relationship with Hewlett-Packard has expanded in the GC-AED product area. Our GC-AED

products and services coincide with the release of a second generation GC-AED from HP. The new AED system provides performance improvements for a lower cost, in a smaller format, and on a modern computer platform (see page 3). Diablo provides instrument automation and data handling, AED methods, and computer platform transition services for the AED. The AED can be configured for many application areas:

petroleum, environmental, electronics, analytical problem-solving and many other special areas. Stop at booth #3047, near the Hewlett-Packard booth, to talk about your particular GC-AED interests or applications.

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**Visit Diablo Analytical at  
Pittcon '96 in Chicago:  
Booth #3047**

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### Other Applications

Diablo will also show analytical applications for "fast" GC (see page 2), MS, process monitoring, instrument automation and data handling. These applications have produced high-impact results in several key industry areas: petrochemicals, specialty chemicals, gas products, semiconductor manufacturing, and environmental.

### Presentations by Diablo Personnel at Pittcon '96

Session 11: Computers in Chemistry-LIMS, Monday Morning, Room E351, East Bldg, 11:05, "Use of Rapid Application Development (RAD) Programming Techniques in the Development of Complete Analytical Solutions", Scott J. Hein, Ph.D.

Session 74: Gas Chromatography-Atomic Emission Detection, Tuesday Afternoon, Room E256, East Bldg, 2:30, "Automation of Industrial Applications for the GC-AED and Elemental Chromatograms", Terry L. Ramus, Ph.D.

## Diablo's World Wide Web Home Page

Diablo Analytical now has a home page on the World Wide Web. You can find us at:

<http://www.diab.com>

We have set up our web page with a variety of materials including application notes and application highlights, a summary of our capabilities and services, and our company profile. In addition, we have added a page that includes active links to other web sites of interest to the analytical chemist. We

welcome any comments or suggestions.

In addition to the web page, we also have "ftp" space that allows us to exchange binary files (reports, data files, spreadsheets, etc) more efficiently with clients who have Internet access. Please contact us directly if you would like to take advantage of this capability.

You can contact us via Internet e-mail at:

[diablo@diab.com](mailto:diablo@diab.com)

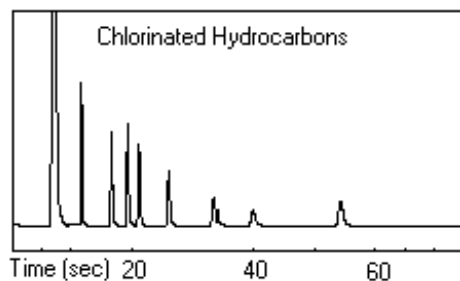
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# Analytical Application Focus: Fast Gas Chromatography

*High-speed, or fast* gas chromatography uses short, narrow-bore capillary GC columns in combination with specialized inlet and detection systems to perform complete GC analyses in seconds, rather than the minutes or hours required of conventional separations.



There are a number of ways to take advantage of the improved speed of analysis provided by fast GC:

## Increase Laboratory Throughput

The first and most obvious way to take advantage of fast GC is simply to reduce the time required to perform a GC analysis. This has the *potential* to increase laboratory throughput. However, one should be cautious and avoid overselling this advantage. *Total* sample analysis time includes sample preparation, data analysis, and reporting. Often the GC separation is a small part of the total sample analysis time. Consequently, significant reductions in the GC separation time will only marginally impact

the total analysis time. Fast GC will only make a significant impact on laboratory throughput if the GC separation itself is a significant bottleneck.

For those applications in which the GC separation *is* the bottleneck, using fast GC techniques to reduce the separation time is indeed a significant advantage.

## Improve Precision and Sensitivity

Another way to take advantage of fast GC is to perform many replicate analyses in the same time that it would take to perform a single conventional GC analysis. Analytical precision can then be improved by averaging the quantitative results from the replicate fast GC analyses. The ability to improve precision by replicate analysis is somewhat obvious, and can be accomplished easily with almost any data station. Much less obvious is the ability to improve sensitivity by averaging many *chromatograms* prior to integration and quantitation. Some work has been done in this area by exporting the raw data points and averaging the chromatograms manually using specialized software. Unfortunately, it is hard to evaluate the impact of this approach since it is difficult to accomplish in an automated fashion with most commercial chromatographic data systems.

## On-line Process Analysis

One of the most important applications of fast GC is in the area of on-line or in-situ process analysis. Most conventional process GC systems provide results on the order of every 10 minutes or greater. This is inadequate for many rapidly changing processes, or applications in which several sample streams are multiplexed to a single process GC. The fast GC approach obviously addresses some of the analysis-time deficiencies of conventional on-line GC systems.

## Reduced Cost of Ownership

A final, although indirect and underestimated benefit of fast GC is reduced cost of ownership due to significantly lower carrier gas consumption. Packed-column GC carrier gas flow rates are typically 30 mL/min, while conventional capillary column GC flow rates are 1-2 mL/min with additional split and make-up gas flow. Fast GC column flow rates are typically 0.1 mL/min or less. Over the lifetime of the instrument, this can result in a significant reduction in operating cost.

## How Fast is Fast?

There are often "discussions" in academia and between vendors that revolve around what can truly be considered "high-speed" or "fast" GC. Complete chromatographic separations on the millisecond time frame are indeed possible with specialized inlets, detectors, and data systems. On the other hand, the fast GC *approach* can be used with existing chromatographic instrumentation to reduce a 30 minute analysis to 5 minutes: hardly high-speed, but still significant to the end user. We tend to view these arguments largely as semantics, and focus instead on using the fast GC approach to develop practical applications for day-to-day use by the end user. Practical application of fast GC will continue to improve as the instrument technology advances.

## Commercial Fast GC Instrumentation

The following is a summary of some commercially available instrumentation designed for fast GC applications:

The **Hewlett-Packard 6890 Gas Chromatograph** electronics and FID/NPD detectors were designed for 200-Hz data acquisition rates to support high-speed GC.

**MTI Microsensor gas chromatographs** were the first commercially available high-speed GC systems and they are portable.

The **Varian FastGC** inlet system developed by Chromatofast is a cryogenic inlet system for fast GC.

The **Leco (Meridian) FCD** (fast chromatography detector) Time-of-flight mass spectrometry detector is designed specifically for fast GC-MS.

The **Thermodics Detection Flash 2D Analyzer system** is an interesting new commercial product that combines multi-dimensional GC with high-speed GC.

# HP's Second Generation GC-AED

Hewlett-Packard has announced the HP G2350A GC-AED: the second-generation version of the GC-Atomic Emission Detector system. The new AED is much smaller than the 5921A and costs less. The G2350A is about the size of the old HP 5970 MSD and sits to the right of a HP 5890 or 6890 GC. Much of the reduction in size is due to a much smaller spectrometer. The new spectrometer uses a Czerny-Turner configuration with a fixed Photodiode Array (PDA) and a rotating grating instead of the fixed-grating/moving PDA of the previous design. The smaller spectrometer has the added benefit of using less purge gas. In addition, the transfer line is much shorter since it can pass directly through the side of the GC into the AED.

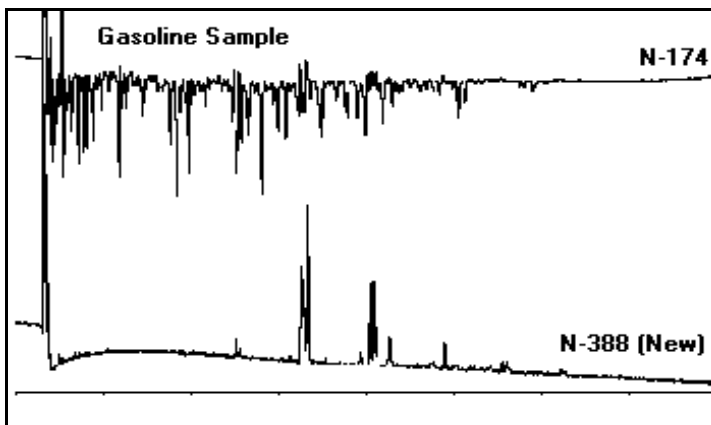
## Enhanced Nitrogen Selectivity

A new nitrogen channel option has also been developed with enhanced selectivity. The new channel uses a 388-nm wavelength, methane reagent gas, and requires a separate injection. The new nitrogen channel will be particularly important in petroleum applications where large hydrocarbon backgrounds can reduce sensitivity on the nitrogen 174 line as illustrated in the figure above.

## AED DOS ChemStation

Hewlett-Packard has simultaneously introduced the new AED DOS ChemStation to replace the venerable Pascal ChemStation. The new AED ChemStation is based on the "Asterix" GC/LC ChemStation that runs on the Windows 3.1 platform. The DOS ChemStation is much easier for the casual user to operate, and should make moving data through the laboratory much easier. Other benefits include simultaneous data acquisition and data analysis sessions.

## Pascal-to-DOS Transition Issues



Existing users of the Pascal ChemStation that are planning to migrate to the DOS ChemStation have a number of issues they will have to deal with. Most of these revolve around the change in computer platform.

**Converting Pascal Data files** is a two-step process. First, the Pascal data file must be physically transferred from the LIF (Pascal) disk onto a DOS disk. If you only have a small number of files to convert, this can be accomplished using the "LIF Utilities" available from HP. A better technique for large numbers of

data files is to transfer the files electronically over a ChemLAN. The ChemLAN requires a special board for the Pascal ChemStation, a network connection, and the ChemLAN software. Once the Pascal file is physically on the DOS disk, it must be converted into the DOS ChemStation file format. This is accomplished using an AED File converter program.

**Pascal Macros** will likely have to be completely re-written since the Asterix macro language is substantially different than the Pascal macro language.

**Pascal Methods and Sequences** will also have to be re-entered manually into the DOS ChemStation.



## Diablo's GC-AED Application and Transition Services

The following is a summary of Diablo's AED application development services and Pascal-to-Dos ChemStation transition products. We have both Pascal and DOS AED ChemStations connected by ChemLAN in our facility to assist customers with their transition from Pascal to DOS. Please contact us for more information on any of these services.

**DAI-AED-500: General AED Transition Service:** This AED transition service includes one day of AED application assistance directed to your specific application.

**DAI-AED-510: Pascal-to-DOS AED Data File Translation:** Diablo will translate your Pascal ChemStation data files to the new DOS format. Options

include on-site translation for sensitive or proprietary data files.

**DAI-AED-520: Pascal to DOS AED Macro Translation:** Diablo will rewrite your existing Pascal Macros to provide similar functionality under the new DOS ChemStation.

**DAI-AED-530: Pascal to DOS AED Method Transition Assistance:** This AED application service includes one day of AED method translation for your application.

**DAI-AED-540: Pascal-to-DOS AED Transition Training:** This AED application service includes one day of AED training directed to your specific application and the needs of your personnel.



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## Recent Diablo Application Highlights

**Analytical Measurements for Environmental Process Design** Diablo specified and configured an analytical lab for process development at a Client's facility. The facility is used to test certain environmental remediation technologies and qualify waste stream treatment. On-site analytical technologies were designed to produce quick results for engineering studies. This approach minimized the need for lengthy protocol analyses at external, qualified environmental labs, and it dramatically improved analytical feedback response time for engineering studies. A phased plan was developed for additional analytical techniques to meet future demands.

**Fast GC Application** Diablo assisted a Client to configure and automate a MTI fast GC system. The application was located in a process lab facility for quality assurance testing.

**Multi-column, Multi-detector GC System for Gas Analysis** Diablo assisted a Client to modify, simplify and re-configure a GC system for gas analysis. The application was re-configured to eliminate mechanical column switching.

**Automated Multi-stream Sampling Application** Diablo designed, configured, and implemented an automated multi-stream sampling valve for gas analysis by GC. The system integration project used a HP ChemStation to control critical aspects of the GC and sample valve position. The system replaces time-consuming manual operations.

**New Analytical Product Development** Diablo initiated, organized and facilitated a series of discussions between several companies with a common interest in the electronics industry. Potential

analytical technologies were identified, critical technical requirements were defined, and customer requirements were studied. The effort resulted in common agreement on an area of opportunity, targeted experiments, and business projections.

### ***How to Contact Diablo Analytical***

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