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**GOT ETHICS?**

**HOW AN ETHICS AND DATA INTEGRITY PROGRAM  
CAN IMPROVE DATA QUALITY AND TRUST**

**NO INTERFERENCE:  
MANAGING THE INERTNESS OF  
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## “Appifying” the Laboratory

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**Sara Goudarzi**



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**Vince McLeod**

Lab Manager Magazine has a great lineup of webinars for the middle of May and early June, starting with a Tech Trends webinar on CO<sub>2</sub> incubators May 17. “Innovations in CO<sub>2</sub> Incubators: Is it Time to Upgrade?” runs from 12:30 – 2:00 p.m. EDT and will help potential buyers determine which incubator is best for their labs and what features they need through advice from a panel of industry experts. Those experts will talk about the latest trends and improvements in CO<sub>2</sub> incubator technology and which types of incubators can be best tweaked to attendees’ specific workflows and uses. Following the mid-May webinar, be sure to check out the Lab Manager Academy webinar, “Making Time Work for You” — described in further detail in this issue — on June 6. Another Tech Trends webinar, “Emerging Uses of FTIR Spectroscopy,” will round out our Spring webinars on June 7 where attendees will learn all about the new applications of FTIR spectroscopy. Registration for these free webinars is easy, just head to our website — [www.labmanager.com](http://www.labmanager.com) — and click on the “Webinars & Events” tab to find the webinar that interests you in either the events calendar or “Upcoming Webcasts” section.

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**Yes, There *Is* an App for That**

Some expect the mobile apps market to quadruple over the next four years, from \$6.8 billion to \$25 billion. Others forecast revenues at \$29.5 billion by 2013, increasing from \$7 billion in 2010. And still others have projected that by 2014 the revenues generated by apps sales globally will hit \$35 billion. No matter who's exactly right, it's safe to say that apps are certainly on a growth trajectory. This month's cover story looks at the types of mobile apps that are making their way into the laboratory. While we sample just a few, "it seems inevitable that the use of versatile compact software apps will continue to grow as their value becomes more evident and entrenched, indeed more indispensable," says author Bernard Tuls. If you use other apps in your lab, please let us know which ones and for what. We would like to continue tracking this exciting trend to see how it changes things in your laboratory.

Many think of an automated lab as consisting of large, complex robotic systems carrying out myriad streamlined analytical processes at amazing speeds. However, sometimes that image is not only wrong, but also inappropriate for any number of analytical tasks. This month's Lab Automation article, "Modular and Flexible," describes a simple modular automated system that employs three microplate-based instruments linked with a plate mover to shuttle microplates as required for the ELISA process. Advantages of such a system include increased throughput, maximum instrument usage, better operations monitoring, and safety and space efficiency. Turn to page 26 to learn more.

In this month's Lab Management article, "Got Ethics?," author Tandra Thomas stresses the importance of laboratory ethics and data integrity programs. She argues that such programs, which emphasize and support sound ethics, improve data integrity and data quality, which in turn improves "trust from the laboratories' customers, regulatory agencies, and fellow coworkers and management team." Turn to page 22 to discover some ways that your lab can build and flex its ethical muscle.

As many of you may know firsthand, selecting, implementing, and running a new LIMS is fraught with challenges and unknowns. Vendors promise the moon, but in the end will the LIMS do what you want it to do and change when you want it to change? This month's Product Focus on LIMS (page 70), as well as a case study describing such a real world LIMS-selection scenario, may provide some guidance in your decision-making process. In "Faster Turnaround Means Happier Customers," the end-user was looking to get better insight into all aspects of his processes. "With data easy to find, we'll be able to see where our bottlenecks are, which will make my job easier, which will make data go out faster," he said. Turn to page 40 to find out how things turned out.

This month we feature our third INSIGHTS supplement, focused on automated liquid handling systems. If you're in the market for an ALH, I encourage you to take a look at this very in-depth study of the trends, the business pros and cons of investing in such a system, what you need to know once you've installed an ALH in your lab, and candid feedback from end-users who have gone down the same path. Forewarned is forearmed. Lastly, for a snapshot of this year's Pittcon product highlights and award winners, turn to page 90.

Best,

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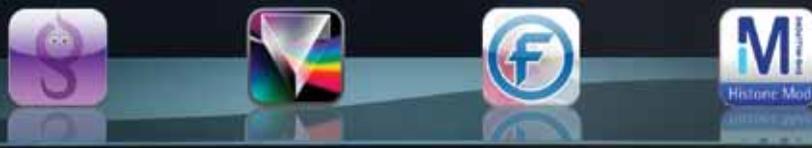
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# “APPIFYING” THE LABORATORY

SPECIALIZED APPS FOR RESEARCH ARE BECOMING  
MORE EVIDENT, ENTRENCHED, & INDISPENSIBLE by Bernard Tului



For many techies, the launch of Apple's App Store was like shooting off a starter's pistol for today's unrelenting apps race. No stranger to marketing hyperbole, Apple's late CEO Steve Jobs immediately dubbed the App Store "...a grand slam, with a staggering 10 million applications downloaded in just three days."

Upon announcing the 2008 launch in Cupertino, CA, Jobs had famously noted, "Developers have created some extraordinary applications, and the App Store can wirelessly deliver them to every iPhone and iPod touch user instantly." At its opening, just over 800 native applications were available from the App Store.

As on many other occasions, what once seemed like Jobs hype turned out to be right on the money. Just two years later, the International Data Corporation (IDC), a provider of market intelligence and business advice to the IT, telecommunications and consumer technology markets that is based in Framingham, MA, estimated a total of about 10.9 billion mobile app downloads in 2010, from all suppliers. A Long Island, NY-based market intelligence firm, ABI Research, which acknowledged the App Store as a veritable starting point, has also noted that the app world now has a much broader field of developers and stakeholders. Consultants and market researchers working at M&M in Dallas, TX, estimate that by 2015, the App Store will account for 20.5 percent of overall app revenues.

"Apps have gained the acceptance and even gratitude of a broad spectrum of laboratory managers, research scientists and bench technologists."

IDC projects about 76.9 billion downloads in 2014, as apps are created for a more pervasive range of personal and business activities. Scott Ellison, IDC's VP for mobile and connected consumer platforms, noted that the availability of mobile apps will be one of the "hallmarks of the new decade" and that "mobile app developers will 'appify' just about every interaction you can think of in your physical and digital worlds."

Still, not much agreement exists on the size of the apps market. M&M, in its *World Mobile Applications Market Report, 2010-2015*, projected in January 2011 that the mobile apps market will quadruple over the next four years, from \$6.8 billion to \$25 billion. Meanwhile, the research firm Gartner, Inc., forecast revenues for global apps sales at \$29.5 billion by 2013, increasing from \$7 billion in 2010. And, in December 2010, IDC projected that by 2014 the revenues generated by apps sales

globally will hit \$35 billion.

A notable contributor to these billion-dollar disparities is believed to be the lack of uniformity in how apps are described and defined, and what categories of apps are included in different revenue estimates. The editors at mobiThinking—an expert mobile Web marketing site—describe apps as compact software with built-in capabilities for specific functions. Two types of apps are widely recognized: Native apps are those that are preinstalled on devices and include address books, calendars, games



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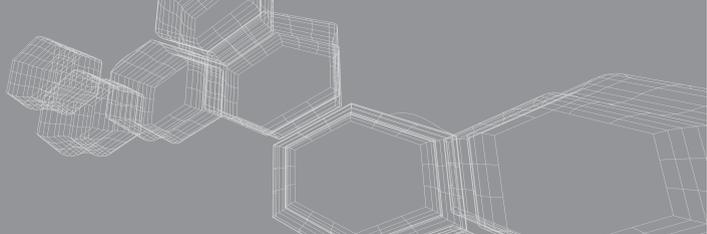
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and Internet browsers that are downloadable from different sites; they are often designed to be compatible with specific device functionalities. Web apps, on the other hand, are housed on servers and are accessible via the Internet. Each time a Web app is used, portions of it are processed by the downloading device so, in general, the same app can be used by a variety of different devices.

**"Some segments of management equate iPads and iPhones ... with downtime, entertainment & leisure."**

Differences in total revenue estimates notwithstanding, apps are clearly on a growth trajectory. This trend is likely to escalate as the shift from desktop to mobile computing intensifies. M&M estimates the compound annual growth rate for apps from 2009 through 2014 to be 29.6 percent. Such growth is the product of several technological (e.g., enhanced networking and 4G systems) and business factors, revamped revenue-sharing practices, and decreasing fees for data usage plans and new advertising business prospects, as well as changing social and cultural trends, especially around the use of smart phones.

To be sure, despite impressive growth, apps are not exactly problem-free. Some experts believe that the proliferation of mobile devices, on which most apps run, may have opened the door a little bit wider for perpetrators of data theft who operate by unleashing spyware and an assortment of phishing tricks. The lack of specific business-oriented apps has also been a constant lament, and there is still a propensity in some segments of management to equate iPads and iPhones, regardless of the apps being run on them, with downtime, entertainment and leisure.

In recent years, research labs have been a notable beneficiary as a variety of highly functional and specialized apps have gained the acceptance and even gratitude of a broad spectrum of laboratory managers, research scientists and bench technologists. True to form, one of the most progressive segments of the research laboratory industry—instrumentation manufacturers and vendors—is at the forefront of the move to phase mobile apps into routine operations.



Case in point is the Shimadzu UV iPhone app, which is available for download from the Apple iTunes Store. Shimadzu Scientific Instruments, (Columbia, MD), offers the app free of charge to UV-Vis spectroscopists, who can use it to access information rapidly and reliably from anywhere. The app facilitates the monitoring of chemical and physical properties of solvents, including the lower limit of usable wavelengths, and boiling and melting points, at any time. The app allows technicians to choose from a variety of solvents by simply scrolling through a list. According to Shimadzu's literature, this is a convenient way to reference measurements and conversions in laboratory applications, including "distance, mass, pressure, temperature, angles and more."

Meanwhile, *Shimadzu News*, a corporate magazine from Shimadzu Europa, is now available as an Apple app for the iPhone and iPod. Both the current and archived issues of the publication are available. The app features a search function and provides access to articles on products as well as market overviews. It also allows users to order the general product catalog, provides information on related articles and is a venue to register for the *Shimadzu eNewsletter*.



Researchers can download the free Thermo Fisher Scientific Nalgene bottles and carboys app from the Apple iTunes Store as well as from the Google Play Store (formerly Android Market). The instrumentation maker and seller has developed the app to facilitate the selection of the most appropriate Nalgene bottles, carboys and vials for different food and pharmaceutical laboratory needs. Users input a number from the Nalgene catalog or appropriate search terms and the app selects and recommends the most suitable container from among some 700 possibilities in the inventory. To make the selection, the app sifts through a range of characteristics including chemical resistance, autoclave and temperature tolerability, inertness, and a vast array of parameters and certifications applicable to the lab procedure under consideration. The app also facilitates additional refinements in the final bottle selection by allowing users to change their search criteria and review their drawings and dimensions to evaluate quality before ordering. In addition, it allows users to save their results



Chantal's first glimpse into the ocean came courtesy of an 11th birthday gift: a mask, fins and snorkel from her mother. She quickly became enchanted with the "new worlds" she found in the Sound.

# A Sound Plan for the Future

## Q&A with Chantal Collier, New Long Island Sound Program Director

BY CARA CHANCELLOR

As a child, Chantal Collier spent her summers snorkeling through sea grass meadows just off the Connecticut coast. Now, as the new director of the Conservancy's Long Island Sound Program, she shares with us her hopes and vision for the Sound's next 20 years.

### Q. What are the goals of the Long Island Sound Program?

A. Two of our main priorities are ecosystems and people.

To benefit ecosystems, we're researching things like how to help sea grasses grow. These plants feed and shelter important wildlife, such as scallops, but are disappearing rapidly in some areas.

The connection to people is that local communities also benefit from healthy coastal habitats. Eelgrass meadows filter pollution and help reduce wave energy, which can erode beaches and contribute to flooding during storms.

### Q. Millions of people live, work and play on the Sound. How do we support both people and nature?

A. Currently, we're mapping the location of crucial habitats and organisms throughout Long Island Sound. Once completed, this assessment will help pinpoint compatible locations for transportation, fishing, energy development and other human uses in the Sound.

The Conservancy is unique because we operate with a long-term view. We're investing in strategic planning now that will yield outcomes for the next 10 to 25 years.

### Q. What do you hope the Sound will look like in 20 years?

A. I think the effects of climate change—sea level rise, more frequent storms and flooding—will make the connection between natural resources and people's quality of life more evident. For

example, salt marshes and eelgrass can reduce storm impacts and support local fisheries.

We've hardened our coasts with sea walls and breakwaters that diminish these resources. Twenty years from now, I hope to see that reversed.

### Q. You grew up on the Sound. How has it changed?

A. I've been back to our old summer house as an adult, and the beach is much smaller and the water less clear than I remember. There's also a tremendous amount of new coastal development.

### Q. What one thing should each member do to help the Sound?

A. Be engaged in your community, in expressing environmental concerns to state and local officials—and, of course, please give to the Long Island Sound program. This great estuary affects all of us, and we need to work together to protect it.

### MEET CHANTAL COLLIER

Learn more about her experience and hopes for her home state at [nature.org/ctupdate](http://nature.org/ctupdate).

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## “APPIFYING” THE LABORATORY

for further assessments; results can also be emailed to the primary user and other parties.

The world’s first dynamic power meter and spectrum analyzer accessory for the iPad, iPod touch and iPhone—the WiPry-Combo—was introduced by the Saelig Company in December 2011. The WiPry-Combo is based on technology developed by iOS-based test equipment developer Oscium (Taiwan). According to literature from the New York-based Saelig, “WiPry-Combo turns an iOS device into an ultraportable spectrum analyzer and dynamic power meter. WiPry-Combo brings RF power measurements to a graphical interface to show RF waveforms like an oscilloscope; instead of showing voltage, RF amplitude is displayed on an iOS portable device.” The software required to run WiPry-Combo, including a demo package not requiring the actual WiPry device, is available free of charge at Apple’s App Store. “The WiPry-Combo is compatible with all generations of iPod touch, iPhone, and iPad devices running iOS version 3.1.3 or higher,” according to Saelig.

“StarVue, a free desktop-based app, lets scientists examine the structures of compounds and related data quickly and conveniently.”

The current arsenal of drug discovery apps received a key addition in the middle of last year when Optibrium, a drug discovery software developer, launched a new version of StarVue, a free desktop-based app that lets scientists examine the structures of compounds and related data quickly and conveniently. “StarVue 1.1 is newly compatible with the recently released StarDrop 5, a software platform that intuitively guides the design and selection of high-quality compounds in drug discovery. This compatibility improves the ease with which compound data generated with StarDrop and other sources can be shared, without the need for expensive spreadsheet plug-ins,” according to the Optibrium announcement at the launch of StarVue. Free StarVue support may be accessed through Optibrium’s online community at [www.optibrium.com/community](http://www.optibrium.com/community). This community forum also “gives users the opportunity to discuss best-

## "APPIFYING" THE LABORATORY

practice methods and approaches in the drug optimization field," according to the company.



Meanwhile, in May 2011, EMD Millipore, the Life Science Division of Merck KGaA, Darmstadt, Germany, launched a free first-of-its-kind interactive histone modification mobile app. Users of the app can explore an extensive collection of core histone modifications and access information relating to their "biological significance and epigenetic implications with links to published references," according to EMD Millipore. It incorporates more than 500 references that describe all known core histone modifications and potential modifications, which are expected to have some degree of biological relevance. The app also enables users to "browse available antibodies and enzymes for histone modification and epigenetic research," according to EMD Millipore literature. Geoffrey Schwartz, director of Strategic Marketing Communications at EMD Millipore, says, "The net result is a compelling mobile application that provides relevant scientific and product information through a simple and intuitive interface built using a sound architecture and best practices." More information on the interactive histone modification mobile application, including how to download it to an iPad, is available at [www.millipore.com/histonemodapp](http://www.millipore.com/histonemodapp).



And in January of this year, scientific software company BioData Ltd., founded by Digital Science, an arm of Macmillan Publishers, launched Labguru, a tool to help manage research in academic labs. Labguru features affordable Web applications that are customizable to help researchers plan their experiments, track progress, share results and comments, manage their inventories, and organize documentation, lab protocols and data. Jonathan Gross, founder and co-CEO of BioData, says, "Labguru helps researchers, principal investigators and lab managers see the big picture of their research without losing sight of the details vital to scientific discovery."

Among its features, Labguru boasts an intuitive Web-based interface and email alert service. It helps to facilitate and improve how experiments are planned and how research projects are tracked, both in terms of current status and long-term goals. The app helps researchers annotate their findings, figures, protocols and papers. Furthermore, it helps to establish context

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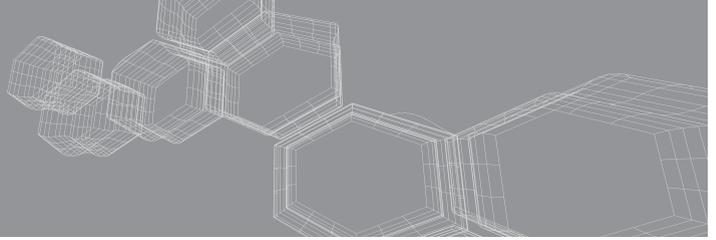
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"Despite impressive growth, apps are not exactly problem free."

by associating research papers with protocols, notes and data to facilitate the preparation of manuscripts and theses. Some of its practical features include the ability to locate reagents and samples in the lab facility, mitigate inventory shortages, and prevent order duplication and missed expiration dates as well as schedule the use of shared equipment. One of its key features is the ability to retain knowledge as key lab staff switch from projects or leave altogether. It is free for individual use, and for a nominal fee users may obtain "additional sophisticated collaboration, order management and equipment scheduling features."

The foregoing is just a miniscule sampling of some of the recently launched apps for the research laboratory setting. With the current proliferation of mobile tools and their growing applicability in the scientific work space, it seems inevitable that the use of versatile compact software apps will continue to grow as their value becomes more evident and entrenched, indeed more indispensable, in the modern research laboratory setting.

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## MAKING TIME WORK FOR YOU

By Dr. Gayle Carson, CSP CMC



There are certain “guaranteed to make life easier” tips you can use that will make your day flow just a little bit better.

One of the reasons time is so important is that when you feel pressed for it, stress results, and that isn’t good. Did you know that five minutes of negative thinking takes the body 24 hours to recover from? Since most of us don’t have that extra 24 hours, we must surround ourselves with as much positive energy as we can, along with having good coping mechanisms. Here are a dozen tips that will make life better, more calming, and let you enjoy yourself more.

- 1. Keep a time log every day for two weeks.** Find out who and what are taking your energy and spirit. The same people continue to bother you over and over. It is up to you to decide what you want to do about them.
- 2. Plan your day the night before.** Although it seems impossible because of the many crises that occur, at least you will have a general idea of what you need to do first thing, the order of your day, and how much extra time you may have in that day.

- 3. Learn to prioritize.** Label things A, B or C. A’s are urgent and important and must be done immediately. B’s may be urgent but not important or important but not urgent. They may be able to be put off for two hours or 24 hours. C’s are not important at all, however, other people’s A’s get forced on you, even though you may consider them a C. Therefore, stick to your guns and focus on *your* A’s. This way you will always be working on the most important and urgent things.

- 4. Rank your A’s.** You probably have a lot of A’s. You must rank them A1, A2, A3 etc. No matter what, always do A1 first. The temptation is to cross off a lot of little easy things that don’t matter. Don’t get sidetracked.

- 5. Write everything down.** Our mind only remembers 40 percent of what we want it to—on time. If you know you have it properly placed and written, your mind becomes freer to handle all your other tasks and you don’t have to keep shifting gears to see where you put it.

- 6. Have everything in its place.** When a piece of paper comes into your life,

make a decision on it. There are only three things you can do with it—trash it, route it to someone else, or file it. Never put a piece of paper down without putting it in a file because nothing grows faster without food or water than paper. There are also only three files on your desk at the end of the day and those are the ones you see when you first come into your office. One is a *reading file*, another is a *correspondence/memo file*, and the third is a *project file*. All other files are in a cabinet to be pulled when needed.

- 7. Keep an interruption log for two weeks** so you know when they are the heaviest. This includes people, phone calls, email etc. Again, you will find the same people keep interrupting you, while others seem to solve their own problems. Figure out what you need to do to educate “the interrupters” so they can make wise decisions.

- 8. Meetings shouldn’t be held when there isn’t a purpose.** All meetings must start and end on time—have an agenda and stick to it. Only the people concerned with that agenda should be present. A short daily meeting with your staff is always advisable.

### LABCAST

Be sure to attend Dr. Gayle Carson CSP CMC’s Lab Manager Academy webinar, “Making Time Work for You,” on Wednesday, June 6, or afterwards at [www.labmanager.com/time](http://www.labmanager.com/time) to watch the archived video.

9. **Discover your prime hours** so that you can schedule yourself accordingly. Do your best work at your worst times and your worst work at your best times. Are you a morning person, can't get going until your first cup of coffee, or do you jump out of bed with vim and vigor? Figure it out and work out your tasks from there.
10. **Set deadlines for everything.** If people don't know when something is due, they won't have it, and if they do know, there should be no excuses.
11. **Put all messages on a single piece of paper.** It is far easier to return calls from a single sheet rather than 20 pink slips.
12. **Use a "to-do" list to keep yourself on track and on target.** At the end of the day, transfer what is left (should only be B's and C's) and see if they are still important or can be crossed off as well.

*Dr. Gayle Carson, CSP CMC, is an expert adviser and coach to CEOs and entrepreneurial managers around the world. Winner of the Best Seller Quill Award, she was inducted into the National Academy of Best Selling Authors. Selected as a "Legend of the Speaking Profession," she has appeared on all the major TV networks and appeared in USA Today, WSJ, Newsweek and hosted Entrepreneur Magazine's "Women in Business" radio show. She can be reached at [gayle@gaylecarson.com](mailto:gayle@gaylecarson.com)*

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# INFORMATION TECHNOLOGY AND YOUR WORKFORCE

By Alan Edwards



**F**rom a utilitarian standpoint, it was inevitable that technology would redefine the processes of the modern lab. It began with the need to automate as suppliers realized they could help labs significantly improve their products by taking manual work out of the equation. Automation, in turn, became the standard for every lab stakeholder—and technology has only served to continually improve these processes over time.

Automation—that was the need decades ago and technology filled it with tangible, measurable results. But modern labs now are facing challenges that are much harder to quantify. These challenges involve the ways people work today—and the ways those who work specifically in the sciences are starting to view knowledge sharing and communication. Just like the need to automate, these “human” challenges are redefining the lab once again, and will continue to do so far into the future.

“Lab managers must be open to all the new ways IT is advancing the modern lab.”

But with these human challenges, there’s also not always an easy, straightforward solution. It’s a constant, sometimes immeasurable evolution. That doesn’t mean, however, that information technology innovations can’t provide real solutions just like automation technology did for advancing lab processes. It simply means that lab managers must be open to all the new ways IT is advancing

the modern lab from a very technical, utilitarian viewpoint as well as from the more nuanced viewpoint of dealing with a lab’s workforce.

It starts with thinking about talent in a different way. Labs today are dealing with business on a global scale. The business model, it could be argued, has permanently changed because of it. The best talent is likewise global in nature. They have abandoned the more traditional, closely guarded ways of working and instead want to acquire skills, knowledge, and expertise through collaboration with colleagues who could be anywhere in the world. These people value the ability to bring their experiences to the table and to contribute where their ideas will be appreciated. More and more potential employees are embracing the contract or “free agency” way of working to meet all these goals.

These goals are also blurring the lines between the personal and the professional. Those working in the sciences

today know that having the power to work when and where

they want presents so many more opportunities for flexibility and lifestyle freedom. This won’t be a novel idea in as little as 10 years from now. This year, in fact, flexible professionals across all industries already comprise as much as 22 percent of the workforces at Fortune 500® companies, and these numbers will grow significantly. Many experts believe that most people in the workforce will

have parted ways with traditional human capital management by 2020, recognizing that this rigid, ineffective way of engaging the best people no longer works in the new workplace.

“Flexible professionals across all industries already comprise as much as 22 percent of the workforces at Fortune 500® companies.”

Yet for all these expectations that employees now have as we move toward the new world of work, there is often a large gap between these expectations and what the employer is willing to accommodate. The use of technology and other IT solutions is critical to bridging this gap.

Be willing, for example, to help employees continually crack open the scientific process by embracing the niche social networks designed specifically for scientists to connect to colleagues around the world. ResearchGate.com is one of a growing number of sites that facilitates questions and answers, as well as the sharing of papers and a chance to collaborate with scientists who your employees might not otherwise meet in person.

Developing apps for your specific lab could also help both business goals and communication with your workforce.

An app that could give your personnel remote access to various databases could be a valuable tool, especially if you are able to outsource work to a certain area of the world or to a pocket of people who have the particular expertise you are looking for.

Communication would be easier for everyone involved with this kind of information in the cloud, and projects could get done faster.

And remember that the operating system for your lab needs to meet critical, basic functions for your user base. You should avoid customizing it, so everyone involved will find it easier to integrate project-specific systems when and if you need them.

Seeking ways to integrate IT and other technology solutions into how you run the core functions of your lab as well as your workforce will always keep you ahead of the competition—and ensure that you are ready to transition to the way the best people want to work in the future.

*Alan Edwards is vice president and science product leader, Americas Products Group, Kelly Services®. Kelly Services, Inc., a leader in providing workforce solutions, is headquartered in Troy, Michigan. For more information, visit [kellyservices.com](http://kellyservices.com). Alan can also be followed on LinkedIn® and Twitter®.*



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# GOT ETHICS?

**A WELL IMPLEMENTED ETHICS AND DATA INTEGRITY PROGRAM IMPROVES DATA QUALITY AND TRUST** by Tandra Thomas



Does your laboratory have “ethical muscle”? Do you feel your employees are flexing this muscle? Ethics and data integrity should be an integral part of your laboratory’s quality program. Just as peanut butter, jelly and bread go together, so do ethics, data integrity, and quality. However, it is a concept that is too often overlooked in the field of science.

Let’s consider the meaning of ethics alone and then apply it to the concept of data integrity in laboratories. What does the term “ethics” mean in our world today? According to Merriam-Webster, it is “the principles of conduct governing an individual or group.” But its simpler meaning is to do what’s right and not do what’s wrong, with the assumption that all individuals *know* the right thing to do.

Now let’s consider ethics as it applies to the workplace. You often hear the words “work ethic.” Is it something we either have or don’t have? Is a good work ethic a learned behavior as a person matures in their career and their life or is it already developed by the time they begin working? The answer to that is up for debate, but it’s a critical question. One of the first questions I ask during the interview process when bringing on a new employee to be part of our laboratory team is the following: “How would you describe your work ethic?”

Having a good work ethic means being responsible, reliable, and always willing to go above and beyond, and generally involves putting forth your best efforts to get the work done. Let’s take this thought further. What other traits can be considered to be part of someone’s good work ethic? I would argue it also means being honest and forthright in the workplace. It doesn’t matter what your job actually entails. What matters is that you

have a sense of right and wrong as it applies to your job. If something doesn’t seem right, do you question it? Do you report it to the appropriate person? Maybe you run across a situation with your own work that causes you to question whether it’s acceptable to do it this way or that way. Do you ask the question when you’re unsure or do you let it go, thinking that no one will care or notice?

Let’s take this idea to the next level. Consider how ethics relates to data integrity for laboratories. Having an appropriate work ethic leads to making sound ethical decisions in the laboratory. This leads to data produced in laboratories being of good quality. Good quality data is critical. It is critical to the customers, and it is critical to the environment and the community when the data specifies contaminant levels in drinking water, for instance. Good quality data is also critical for trust...trust from the laboratories’ customers, regulatory agencies, and your fellow coworkers and management team.

“Having an appropriate work ethic leads to making sound ethical decisions in the laboratory.”

This begs the question, “How can I create a solid ethics and data integrity program for my laboratory?” I will address this question as it pertains to each member of the laboratory team as well as those in charge of quality for the laboratory.

The goal of a solid ethics and data integrity program—one that your laboratory can be fully committed to—is to train and sustain. First you need to train. Then you need to know how to sustain. Employees must have the moral

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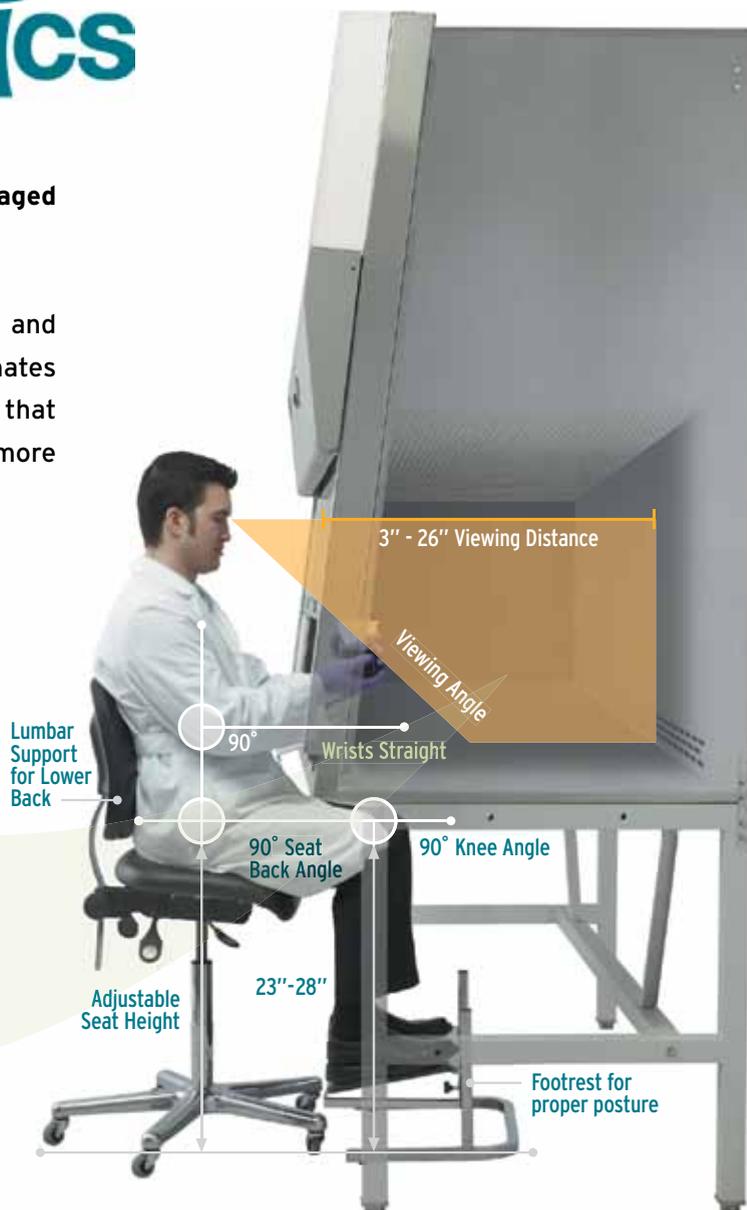
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compass, especially when dealing with data, to understand how to do the right thing. If there is a question about the procedure they are performing, they need to ask. If something doesn't make sense to them, they need to ask. Especially critical is that they practice the true corrective action if their data does not pass the assigned quality-control criteria. It may mean troubleshooting the procedure and checking for errors in analysis. It may also mean starting over from square one. There may be tremendous pressure involved in finishing the analysis and getting the data out the door to the customers. Maybe there is a deadline that must be met for a research project or your boss is counting on you to finish the project in order to obtain funding for their next research endeavor. These possible situations as well as countless others make it tempting to cut corners to get the job done. Employees need to know it is never the right decision to cut corners or otherwise alter data to make it acceptable.

First, employees in the laboratory need to be trained in how to correctly produce and review their data. Second, they need to be trained in how to recognize data that is of

questionable quality. Third, they need to be encouraged to bring forward possible issues with their data and have enough integrity where their work is concerned to not alter their data in any way that is unacceptable. Training is the key to producing quality data. Also key is for employees to have their moral compass in alignment.

Train your employees not only on the importance of ethics and data integrity, but also how to be aware of flexing their ethical muscles in the laboratory. Inform them and empower them to make the right choices. Then sustain this effort by making ethics and data integrity a crucial part of your quality system.

**“If there is a question about the procedure they are performing, [employees] need to ask.”**

Let's first consider how to train the employees. Teach them about the ways that data can be compromised. A few examples include improper manual integration, time travel, dry labbing, and unwarranted manipulation of computer software. Once they understand the acceptable ways of dealing with their data, they can then apply their own moral compass to ensure data integrity. An excellent way to accomplish training is to have a formal training session about ethics and data integrity as part of the new hire orientation. A formal policy regarding ethics and data integrity is also a good idea. In addition, conduct a yearly refresher on this subject for all members of your team. Document the training in an effort to hold them accountable for any infractions.

Next, sustain this effort by always following your lab's ethics and data integrity policy. For the quality assurance managers out there, an excellent way of achieving this is to perform periodic monitoring of data integrity. This could consist of many things, including spot checking data for inconsistencies or errors, checking for completion of documentation, and examining data involving manual integrations when dealing with chromatograms. You may also sustain data integrity by performing internal audits of your laboratory. This may mean an audit of the entire quality systems program in your laboratory or perhaps an audit focusing on a particular area of concern. It is always good practice to document all findings and determine corrective action if needed. If corrective actions are required, sustain this effort by always following up to ensure the corrective action is being carried out.

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At the other end of the spectrum, managers have the moral duty to uphold their end of the bargain. Managers are not necessarily immune to the pressures of getting work done at any cost. Assuming they are ethical employees themselves, how can they demonstrate the importance of ethics and data integrity to their team? In addition, how do they train and sustain? It doesn't have to be a complex process if you don't want it to be. It can be very simple.

I like to regard data integrity as the scientists' golden rule. When determining if data is of good quality, think of it in these terms: Ensure the work was performed, can be authenticated, can be reconstructed, and is traceable. In addition...document, document, document. Document everything. Further, don't release data until you are confident of its quality. This applies to those producing the data as well as those reviewing the data. We are all in this together.

“Managers are not necessarily immune to the pressures of getting work done at any cost.”

If I sound like I'm preaching, well...I am! As a fellow scientist, I am passionate about ethics and data integrity. It is our moral (and sometimes legal) responsibility to ensure quality data. I don't claim to have all the answers, but I seek those answers when needed. Just as it takes a village to raise a child, it takes the entire laboratory team to ensure a superior ethics and data integrity program.

Training and sustaining a good ethical program in your laboratory will ensure your customers' trust as well as the essential trust between each member of your laboratory team. The bottom line? If you are a manager, encourage your team to flex their ethical muscles. If you are a member of the team, challenge yourself to flex your own ethical muscles by fully participating in your laboratory's ethics and data integrity program. Accept nothing less than the best from yourself and others. It's that simple.

*Tambra Thomas, quality assurance manager at Suburban Laboratories, Inc., can be reached at [tambtrat2000@botmail.com](mailto:tambtrat2000@botmail.com) or by phone at 708-544-3260*

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# MODULAR & FLEXIBLE

**SMALLER AUTOMATION SYSTEMS ENABLE EASY RECONFIGURATION AND REPURPOSING TO MEET CHANGING RESEARCH NEEDS** by Paul Held, Ph.D. & Dean Mulyk

Automation has been defined as the use of control systems to reduce the need for human work in the production of goods and services. In the realm of biomedical research or clinical testing, automation often involves processing liquid-based analytical tests. Automated biological testing can take on many forms, ranging from individual instruments performing a single task to large, room-sized, custom-robotic systems capable of automating very complex tasks. In between these two extremes are simple modular automated systems designed to automate a select series of tasks necessary for a specific assay technology, such as enzyme-linked immunosorbent assays (ELISA).

ELISA is one of the most widely used assay formats in biomedical research. Numerous clinical, veterinary and research assays use the specificity of antibodies, typically in pairs, to quantify a diverse array of analytes from different sample matrices. Despite the analyte diversity, the general ELISA process is constant. With a typical ELISA protocol, several cycles of washing microplates, adding reagents and incubating are repeated to elicit the chemistries and remove unbound material before data collection. Numerous repetitive steps in manual ELISA and other standard laboratory assays make the process extremely time-consuming, requiring lab technicians and scientists to spend time on pipetting, washing and dispensing steps as well as on feeding plates into an automated reader for analysis. By incorporating specific instruments such as microplate washers, dispensers, readers, automated pipettors and more, the assays are easier to accomplish. By linking two or more individual operations with simple automation, one may now accomplish all or part of the overall workflow with less time and labor than are required by manual methods. Here we describe a

simple modular automated system that employs three microplate-based instruments linked with a plate mover to shuttle microplates as required for the ELISA process.

“A small benchtop automation module to link two or more instruments increases overall throughput without increasing full-time employees.”

The robotic system used an Orbitor™ RS microplate mover from Thermo Fisher Scientific (Burlington, Ontario, Canada) to move microplates to and from each station. A 405™ TS microplate washer and a MultiFlo™ microplate dispenser from BioTek Instruments (Winooski, VT) were used to perform assay washing and reagent dispensing, respectively. Ambient temperature incubations were carried out using the random-access plate hotels of the Orbitor RS system, and absorbance measurements were made using an Eon™ microplate spectrophotometer from BioTek Instruments. The robotic system was configured on a standard two-sided lab bench. The fully configured system had a footprint of 60 x 32 inches (Figure 1). While an open bench end was used, the low height (29 inches) allows the plate mover to be used under many commonly used center-bench shelving units. A mezzanine table from Thermo Fisher Scientific was used to support the 405 TS and MultiFlo. The table unit provides upper and lower shelves capable of supporting multiple instruments. The top shelf is configured on sliding rails, while the bottom shelf pivots outward, allowing easy access to the instruments for offline use or maintenance.

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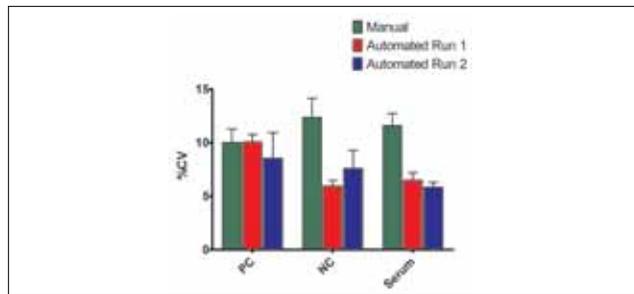
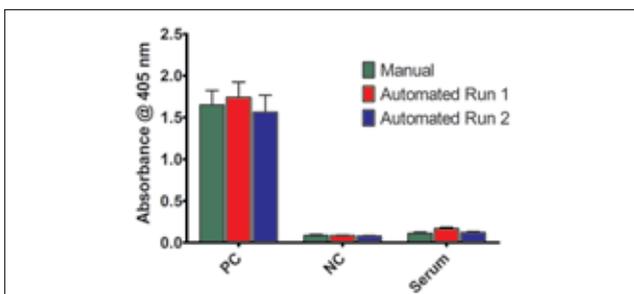
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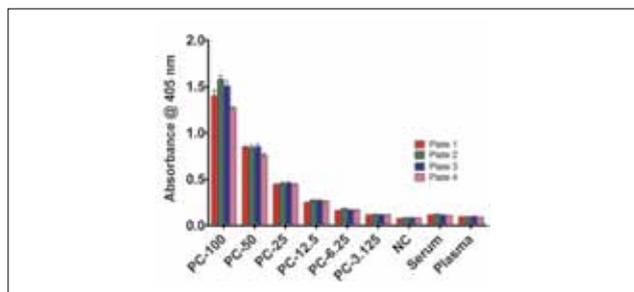


▲ Figure 1: Rendered graphic and actual modular robotic system.

Using an HIV1/2 ELISA kit from Avioq, Inc. (Research Triangle Park, NC), we compared the results of the automated and manual methods. Positive and negative absorbance controls were compared, as were pooled serum samples from separate batches, and they demonstrated very similar mean values that meet the kit validation criteria (Figure 2) between manual and automated assays. Comparison of the %CVs show that the automated system exhibits slightly less variation than the manual batch (Figure 3). As demonstrated in Figure 4, the plate-to-plate variation is minimal, suggesting that the results from several plates within a run can be compared against one another. These data indicate that this simple modular automated system may be employed to process ELISA that have ambient incubations and require four reagents or fewer. Additional instrumentation, such as a temperature-controlled plate hotel, would expand the assay menu.



▲ Figure 3: Intra-assay precision comparing manual to automated procedures. %CV of the positive control (PC), negative control (NC) and pooled serum samples were calculated for individual plates. Data indicates the mean %CV for each assay run.



▲ Figure 4: Repeatability of the Automated Avioq HIV-1 Microelisa Assay. Dilutions of the positive control (PC) along with the negative control (NC), pooled human serum and pooled human plasma were assayed in replicates of eight on four separate microplates. Data represent the mean and standard deviations of each microplate.

There are a number of advantages to simple modular automated systems when compared to manual or large, integrated systems. The most obvious advantage is the ability to do more research in less time, also referred to as an increase in throughput. Lab managers are increasingly tasked with increasing throughput in less time and using a leaner operation. In nonautomated laboratories, increased throughput is managed through increased individual productivity or increased full-time employees (FTEs). Instruments increase throughput somewhat, but typically these instruments are used only during normal operating hours, so the net operational or throughput gain may not be as large as expected, while requiring more precious bench space. Adding a small benchtop automation module

◀ Figure 2: Comparison of manual and automated assay formats. Batch runs of the Avioq HIV-1 assay were performed manually (three plates) or in two separate runs using the automated Orbitor RS ELISA workstation (five plates each). Data represent the mean and standard deviations of all the data points for each batch experiment.

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to link two or more instruments increases overall throughput without increasing FTEs. An operator is required to set up and start an automated system, but once it is operational the system runs unattended, allowing scientists more time to take on additional value-added tasks such as data analysis, interpretation and reporting.

Furthermore, individual instrument usage can be maximized because automation provides just-in-time plate delivery. A technician does not need to feed an instrument on a regular basis, so labs where employees are already multitasking while regularly feeding an instrument are no longer subject to slippage. Additional throughput is garnered through unattended overnight or off-shift runs. Automation typically provides better sample consistency, assay control and uniform processing, resulting in increased data quality. Full automation can improve assay data quality by eliminating the operator variability that exists in manual methods. For example, liquid handling parameters such as volumes, aspiration and dispense speeds and heights, mixing speeds, and cycle number are set during automated method development; therefore, there is no variability from plate to plate. Additionally, strict plate incubation times are defined during method development. By controlling these variables within plate, intra-assay (between plates in the same batch) and inter-assay (batches separated in time) runs, variability is significantly reduced through automation.

Automation provides the means to monitor assay operations that are difficult or impossible to track with manual operations. Standard questions—such as When was it run? What were the conditions? Who ran it? Were any issues noted?—are all tracked automatically. The operations performed on specific samples or plates are date and time stamped and can be audited at a later date. Automated systems also can provide remote feedback during operation by sending e-mails, text messages or pages to notify users of the system status. Lab managers can quickly and easily review the passage of all assay plates to determine if any spurious operation times or conditions were reported.

Simple modular automated systems also improve laboratory safety. Automating repetitive ELISA tasks decreases repetitive strain injuries associated with manual pipetting. Lab personnel have less exposure to hazardous chemicals and biologicals, and waste may be directed to specific locations without spill or exposure risk. For example, liquid waste from plate washers, serial dilutions and more are collected in waste bottles, which can be electronically monitored to notify the technician when it is time to empty them. Small modular systems can be placed to interact with fume hoods or biological safety cabinets or can be provided with their own environmental enclosure to protect staff.

Gone are the days of having a large multipurpose automated system—instead, with smaller modular benchtop automation like Thermo Scientific's Orbitor RS and Orbitor BenchTrak™, one can create automated workstations for partial or complete workflows. The overall investment required by large stand-alone automated systems consisting of four or more instruments (7 to 15 instruments on average) typically meant that they were the domain of large pharmaceutical companies or, more rarely, academic core facilities. The flexibility and size of small modular systems provide distinct advantages over larger multipurpose automated systems. Modular systems are easily reconfigured to address the ever-changing assay needs of today's laboratory. Each instrument is a discrete entity that can be removed and replaced with a different device. For example, the plate washer could be replaced with a pipetting device if a wash step is no longer required but a sample dilution step has been added to the process.

Modular systems can be configured for optimal assay performance. Modular systems employ one or more stand-alone instruments designed to perform specific tasks; as such, they are capable of outperforming many large integrated systems. In regular use, micro-

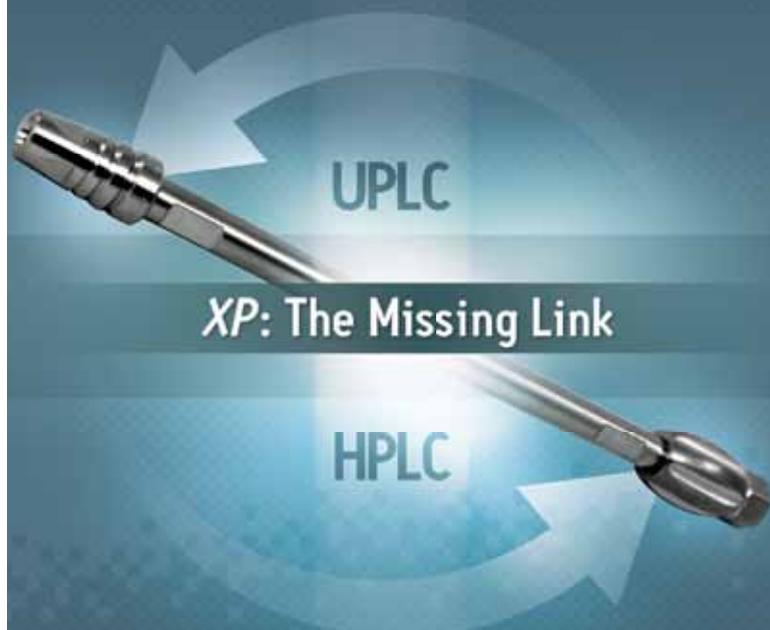
plates are loaded onto each instrument and processed. Processed plates are removed, and another plate is loaded onto the instrument. As each instrument is designed for a specific task, performance is optimized, whereas with an all-in-one system, performance compromises are often made as a result of design considerations. Modularity also simplifies repair and serviceability of the automated system. Routine maintenance can be performed on individual stand-alone modules while allowing the rest of the system to continue operation. In the case of hardware failure, the loss of a subsystem with many large integrated systems results in the entire system being inoperable until a field technician can arrive, diagnose the problem and make the repairs. Modular systems need to have only the failed module swapped with a functional unit, which can be shipped complete.

Small, simple and modular automated systems efficiently use laboratory space. While modular systems can be configured to have numerous devices, many contain only a few instruments that do not require much space. Standard lab counters are usually sufficient to support the system, while integrated systems are larger than a standard lab bench and require special tables to accommodate their size. Relative to the larger systems, benchtop automation modules are focused toward the end user by enabling quick and easy reconfiguration, redeployment and repurposing to meet changing needs. Instruments can be readily swapped in and out of the automated workstation and may also be used offline to maximize their overall usage.

While ELISA was used as an example, many analytical technologies used in biomedical research and clinical assays are amenable to automation in microplate format. The standardized 96-, 384- and 1,536-well format of microplates provides the means to automate many tasks. Typical workflow processes done by these small automations include sample preparation, ELISA, nucleic acid and protein purification, cell or biochemical assays, cell maintenance, qPCR and next-generation sequencing.

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# LET'S TALK ABOUT THE LATEST OLD NEWS – the Return of the Paperless Lab

By Susan Najjar  
Thermo Fisher Scientific

*For the past 10 years at least, labs across the widest range of industries have been talking about improving efficiencies and reaping the benefits of time and money saved by automating manual processes. Here we are again, but this time the technology just might have caught up with the conversation.*

## What is a Paperless Lab?

**A** Paperless Lab integrates the laboratory with the enterprise and automates systems by eliminating paper-based, manual and error-prone processes. While most companies have invested in many instruments and software solutions in the laboratory, manufacturing and the enterprise to improve operations, these systems are not seamlessly integrated, creating data silos, or standalone information repositories that do not communicate with one another. By automating operations and integrating these individual solutions, organizations can reduce paperwork, increase efficiency and throughput, automate regulatory compliance, reduce costs, foster collaboration and make faster, better informed business decisions (Figure 1).

## What's Wrong with Paper?

The benefits of using paper are evident. It's easy to use, convenient, portable and legally defensible; plus, it requires little (or no) user training and supports multiple data types. Unfortunately paper also has some

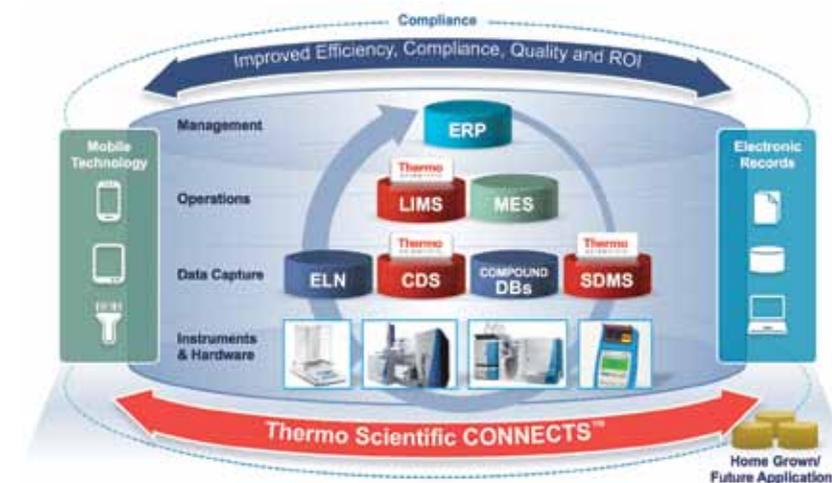


Figure 1: Delivering the Paperless Lab Environment

major drawbacks. It introduces security risks, it's expensive, it's not searchable, it's not collaborative, there are significant storage issues and, perhaps most importantly, it's error prone and susceptible to transcription mistakes. In any process, the handling of paper is almost always a manual (human) activity. And manual activity is inherently prone to errors.

## Just How Costly are Manual Errors?

Imagine, for example, that you have seven people in your lab spending 20% of their time annually writing or approving documents. If you could reduce those efforts by 20%, you could put 672 hours, or 84 days, back into doing more productive and meaningful work.

What could your company do with savings potential like this? You would probably want your scientists and lab personnel to spend more time on value-added activities that generate revenue.

---

By automating the laboratory, companies save a tremendous amount of time and resources on manual activities in the lab.

By automating the laboratory, the Paperless Lab delivers improved efficiency, productivity, consistency, quality and reduced costs typically by over 20%.

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#### **Why Should You Move Towards a Paperless Lab Now?**

Companies have always recognized the potential benefit of integration across the enterprise. But in a continuing effort to reduce costs and harmonize processes across multiple labs or geographies, more and more companies have turned their attention to automating laboratory processes and/or

#### **JUST HOW COSTLY ARE YOUR CURRENT OPERATIONS?**

Here's an example of how a company could reap the benefits of reducing time spent on manual documentation efforts.



Figure 2: Reaping the Potential Benefits of the Paperless Lab

instrumentation and integrating that data with existing ERP, LIMS, ELN and CDS systems, among others.

Typically these tools and technologies are accessed individually, creating islands of information. Compiling data from multiple systems is laborious, and users will often resort to spreadsheets in order to access the data they need. Data is disaggregated across the organization, both internally (R&D, manufacturing, geographic, functionally, etc.) and externally (contract companies, suppliers, research institutes, etc.). To exacerbate the problem, new solutions (tablets and mobile devices) further complicate the integration issue.

Keeping these systems separated fails to maximize your investment and introduces unnecessary inefficiencies and errors. In addition to not achieving expected ROI, you may not be able to find the information you need or view your data in a way that

enables fast and informed decisions. What is the end result? Companies are left with significant exposure, from compromised product quality to delayed decision making to releasing bad products into the market.

#### **Conclusion**

If your company has made significant investments in enterprise and laboratory tools, technologies and solutions but you're not reaping the ROI or seeing the improvements in productivity, efficiencies and data management that such investments promised, the Paperless Lab concept deserves serious consideration. Not only can such an integrated environment improve compliance and quality by eliminating data silos and connecting islands of information across the enterprise, but it can free up your scientists and laboratory professionals to spend more time on value-added research, new product development or other activities that bring revenue to your business.

---

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For more information, please visit [www.thermoscientific.com/paperlesslab](http://www.thermoscientific.com/paperlesslab) or contact [marketing.informatics@thermofisher.com](mailto:marketing.informatics@thermofisher.com).

# NO INTERFERENCE

## MANAGING THE INERTNESS OF THE GC FLOW-PATH PROTECTS YOUR INSTRUMENT, YOUR COLUMN AND YOUR RESULTS by Ken Lynam

As samples become increasingly active and more complex, labs simply cannot afford interferences caused by flow path activity in their GCs. A non-inert flow path can cause peak tailing and signal loss. It can also hide parts of samples, so users would never know what was missing. In addition, the need to repeat or verify suspect analyses wastes resources, hinders productivity and hurts the bottom line. Most important, unreliable results can be catastrophic in terms of environmental safety, food quality and inaccurate drug abuse accusations.

Users need the most inert flow path possible to achieve the lower detection limits demanded by increasingly tough regulatory obligations and to confidently quantify active analytes.

This article discusses the importance of GC flow-path inertness and includes five top inertness tips so users can be confident that nothing has been lost from samples, even at trace levels.

### What's the solution?

Here are five top tips for GC flow path inertness that can help users be confident that nothing has been lost from samples, even at trace levels, and that productivity is maintained.

#### 1. Maintain the inlet

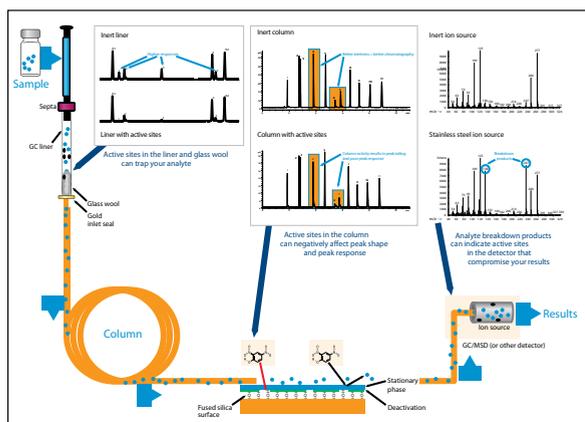
Inlet cleanliness is critical to reliable, repeatable GC results. The choice of consumables, including septa and liner O-rings, affects the speed and quality of routine inlet maintenance. This is particularly important during work with trace, ECD and MSD analyses when out-gassing or silicone residue can be a problem. Inlet cleanliness is thus a major concern. The best option is to use septa and O-rings made from the purest materials, manufactured in clean facilities and housed in packs that maintain cleanliness and prevent contamination during shipping and handling.

Silicone components in the heated inlet are known to stick to hot metal surfaces. Adherent residues force unscheduled inlet cleaning, reducing productivity. Users can avoid this problem by selecting treated O-rings and septa that stop them from sticking to the metal surface of the inlet. The contaminant-free material prevents adhesion and unnecessary inlet cleaning, saving downtime and expense.

Preventive maintenance helps ensure peak instrument performance and productivity. Inspect and replace worn or dirty flow-path supplies, such as syringe needles, septa, ferrules and inlet seals, on a regular basis to eliminate leaks and minimize downtime. Record any changes in your lab book. Using certified vials, caps, septa, ferrules and gold inlet seals also extends the inert GC flow path.

Gold seals are made from stainless steel, electro-polished and gold-plated. The smooth exterior provides an inert surface that reduces breakdown of active compounds and reduces the risk of leaks.

You can also use high performance (HP) septa that are manufactured from a material lined with a very robust PTFE. These septa significantly reduce the amount of siloxanes that leach out of the material and offer favorable chemical compatibility. Because they provide dramatically cleaner backgrounds under very



▲ *Figure 1. Are you building the most inert flow path?*

### Where's the problem?

Every stage of the flow path can degrade your results, from the inlet liner to the ion source. Figure 1 shows the different components of the flow path where lack of inertness can impact your results.



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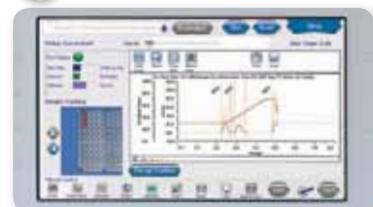
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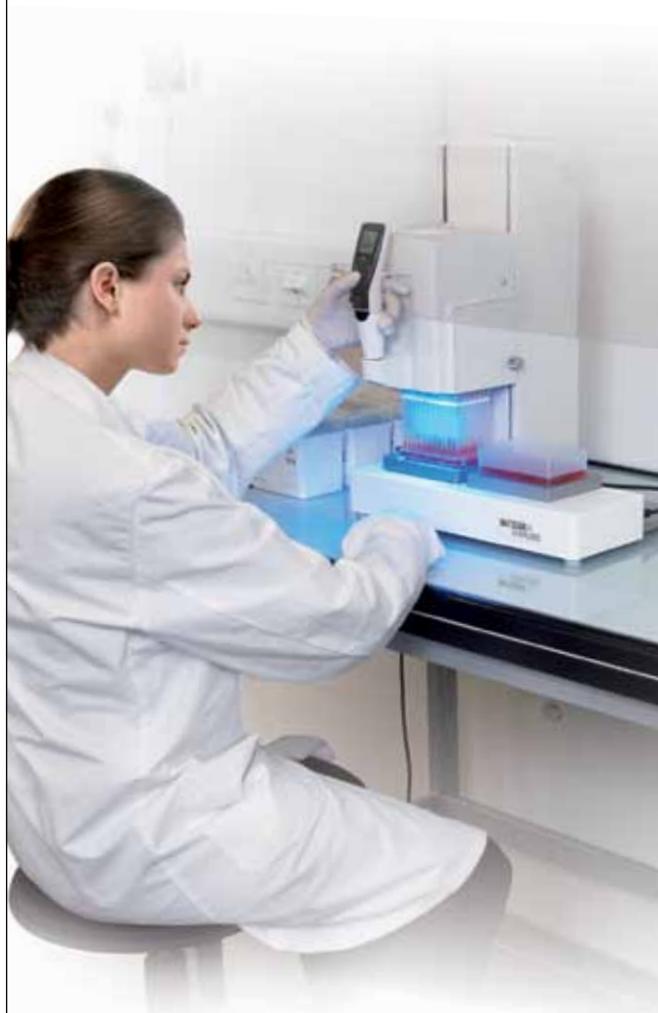
**2** Select Method and tap Run



**3** Load and inject sample



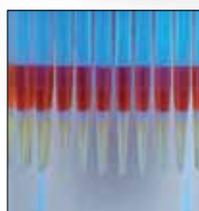
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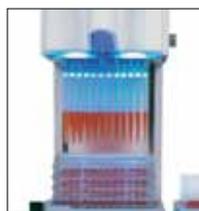
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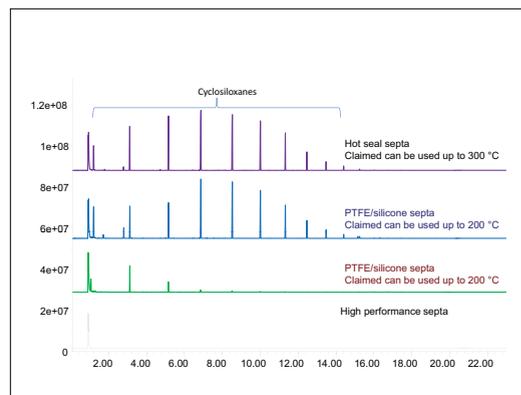
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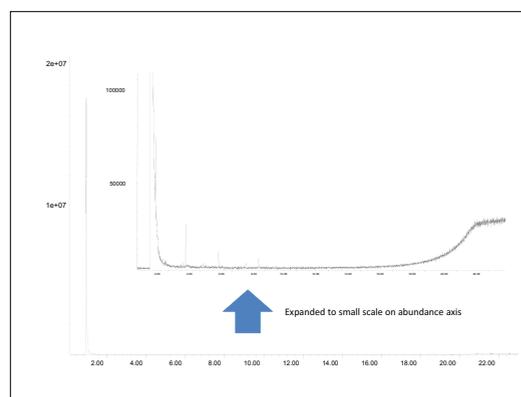
stringent operating conditions, HP septa are your best option for reliable and efficient headspace analysis-high-temperature GC.

Figure 2 shows a comparison of high-performance and non-high-performance septa. The contaminant-free cleanliness of the chromatogram produced using HP septa is clearly evident.

Figure 3 is an expanded view, showing how high-performance septa provide industry-leading chromatographic purity at 300°C.



▲ *Figure 2. GC-MS chromatogram comparison of vial blank with different PTFE/silicone headspace septum and high-performance septum. Vials were equilibrated at 300°C for 30 minutes. Using a high-performance septum delivers a chromatogram free of contamination.*



▲ *Figure 3. A high-performance septum provides significantly cleaner blank background at high-temperature headspace testing. Even with an expanded abundance scale, the 300°C vial blank chromatogram with an HP septum shows few siloxane peaks with very low abundance.*

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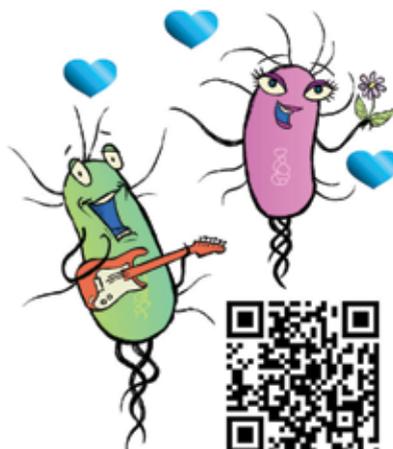
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**2. Prevent sample loss at injection**

Inlet liners are critical links in the sample flow path, and they can be a source of activity and analyte loss. Liner design and chemistry impact the transfer of compounds into the column because active sites in the liner and the glass wool can cause loss of analyte; therefore, users should always use a reliably deactivated liner suited to the injection technique in use and change the liner as needed. This will maximize sample transfer and minimize sample loss.

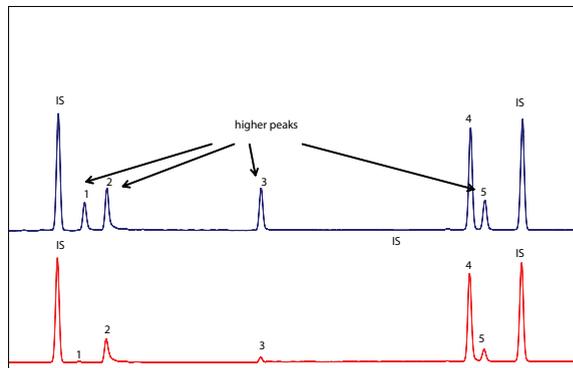
Inlet liners with glass wool are widely used because the wool promotes homogenous sample mixing and better quantitation. Using a liner with wool seems like the obvious solution to trap high-boiling-point matrix interference and prevent “junk” from contaminating GC or GC-MS systems.

However, glass wool liners can have drawbacks. The active sites on the wool surface can trap sensitive analytes, preventing these compounds from being delivered to the column for separation and analysis, and therefore causing significant loss of system sensitivity.

Users can now inject heavy matrix samples and retain sensitivity by using ultra-inert liners with wool for trace-level analyses such as semi-volatiles, pesticides and even drugs of abuse. As well as protecting the inlet and column, and ultimately the MS source, the highly deactivated surfaces of these liners and wool are so inert that the negative impact of surface activity is significantly reduced, as shown in Figure 4.

**Peaks**

- 1. 2,4-Dinitrophenol
- 2. 4-Nitrophenol
- 3. 4,6-Dinitro-2-methylphenol
- 4. 4-Aminobiphenyl
- 5. Pentachlorophenyl
- IS1. Acenaphthene-d10
- IS2. Phenanthrene-d10



▲ *Figure 4. Using an ultra-inert liner preserves analyte integrity (above) compared to a liner without ultra-inert capability (below).*

With environmental samples or samples extracted from plasma or urine, users will be dealing with heavy matrix samples that can have a marked effect on instrument condition every day. Modern ultra-inert liners provide excellent consistency, even with heavy matrix samples. The high level of inertness permits use of glass wool to trap the nonvolatiles in the matrix, extending lifetime and protecting the column and the detector.

**3. Use a column featuring low activity**

Peak shape and response can also be adversely affected by what happens to analytes in the column, so high inertness is important here too. High column inertness minimizes compound loss and degradation for more accurate quantitation of active analytes, especially at trace levels of acids, bases and other active compounds. To ensure consistent column inertness, choose a column that has been tested with a rigorous test probe mixture for in-depth evaluation of column deactivation. Check that the chemical species in the probe are known to adsorb onto active surfaces so you can trust that the results provide a searching test of column inertness.

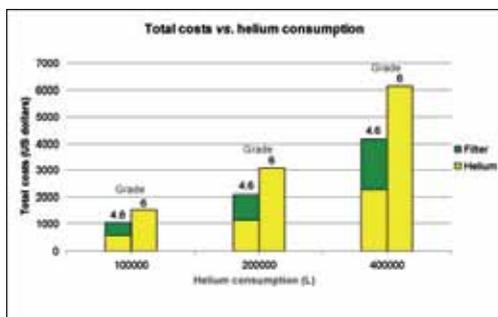
When installing the column, start with high-quality ferrules and examine column ends under magnification for chips and burrs. Make sure the column is positioned at the recommended depth into the inlet and detector. Inert columns can be routinely used for applications in the environmental, forensics, foods/flavors/fragrances, pharmaceutical and special chemical industries.



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◀ *Figure 5. Potential cost savings when using gas filters and 4.6 grade helium rather than 6.0 grade helium.*

A good gas clean-filter system enables use of 99.996 percent (4.6) pure helium and gets high-quality analytical results. This is preferable to the more expensive 99.999 percent (5.0) or 99.9999 percent (6.0) grade gas. Figure 5 compares the costs of filtered and nonfiltered carrier gas using helium grades 4.6 and 5.0. The expected cost saving is approximately 30 percent.

#### 4. Remember the detector

To ensure accurate quantification and high sensitivity, the entire flow path must be highly inert, including detector surfaces. This is especially true of mass spectrometers, where an inert ion source is necessary to prevent active compounds from attaching to metal surfaces. Analyte breakdown products can indicate active sites in the detector that can compromise your data. The best inert sources are constructed of a solid inert material, as opposed to an inert coating that can wear away over time.

#### 5. Purify the gases

Ensuring gas hygiene is one of the most important steps you can take to optimize GC system performance. Impure gases can introduce contaminants and cause installation delays, premature instrument failure and flawed results. In addition, the inefficient use of increasingly expensive and rare gas can go right to the bottom line.

Users need filters for oxygen, hydrocarbons and moisture to avoid loss of sensitivity and accuracy of the GC or damage to the system. Impurities in gases can activate glass wool in liners and accelerate septum degradation. The results are high background signals and ghost peaks. These lead to time-consuming troubleshooting. Inserting gas filters in the gas line immediately in front of the GC inlet greatly reduces the level of impurities, thus improving trace analysis. Contaminants entering the GC column will also be reduced, which is critical for high-temperature analysis and essential for longer column life. Gas filters also ensure clean gas delivery, provide fast stabilization and reduce helium gas consumption.

#### Keep your GC clean – and working

With a busy schedule, it can be too easy to lose sight of the need for an inert flow path. However, if you don't manage the inertness of your system, you risk jeopardizing your instrument, your column and your results, with a potentially serious impact on economy and productivity.

To get a poster detailing the components of an inert GC flow path please visit [www.agilent.com/chem/UIorder](http://www.agilent.com/chem/UIorder).

*Ken Lynam, applications chemist, Agilent Technologies, Inc., can be reached at [Kenneth\\_lynam@agilent.com](mailto:Kenneth_lynam@agilent.com) or by phone at 302-636-8162.*

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# FASTER TURNAROUND MEANS HAPPIER CUSTOMERS

## A SEQUENCING SERVICES LAB'S EXPERIENCE WITH ADOPTING A LIMS

by **Melissa Kamkar**

Managing the pace of technological change that defines next-generation sequencing (NGS) isn't just an issue for NGS labs. It also challenges the makers of NGS instrumentation. The pressure to stay ahead of the curve is particularly felt in vendor sequencing services labs, which provide on-demand service to their instrumentation customers, as well as sequencing services to clients who outsource their sequencing projects.

"As sales increased, so did our responsibility to our customers to make sure their sequencing results were turned around as quickly as possible," said Larry DeDionisio, scientist at the Illumina FastTrack Sequencing Services lab. The lab saw such a dramatic increase in its workload that tracking and assessing its own internal performance took a back seat as staff focused on getting high-quality sequencing data back to clients.

"We were sequencing more than ever before, which meant we were collecting more information than ever before," said Courtney McCormick, project manager for sequencing services at Illumina. "And our methods for organizing that information were still catching up. We needed a solution that would help us evaluate our processes and find ways to work more efficiently."

In May 2011, the FastTrack lab opted to replace its homegrown sample-tracking database with the GenoLogics LIMS, a system that provides end-to-end information management of samples, tests, and results for next-generation genomics labs. In one week, the FastTrack Sequencing Services lab was tracking test samples in the LIMS, which is preconfigured specifically for Illumina sample preparation, cluster generation, and

sequencing protocols. Even during the testing phase, the lab staff noticed significant time savings, since the LIMS automates manual tasks in the workflow. The LIMS has also been flexible enough to accommodate different types of instruments and protocol changes that pass through the lab on a near-weekly basis.

*"Even during the testing phase, the lab staff noticed significant time savings."*

"The nature of our services puts us in a prime position to adopt this system," said DeDionisio. "We work with different products and methods, and we also need to track samples and keep the lab running. It's a challenging environment, but from what we've seen so far, the GenoLogics LIMS should be able to handle it."

### Outgrowing homegrown data management

Every stage of the flow path can degrade your results, from the inlet liner to the ion source. Figure 1 shows the different components of the flow path where lack of inertness can impact your results.

The standard Illumina workflow (sample receipt, sample preparation, cluster generation, sequencing, analysis, and return of results to customers) can be complicated because customers often have different requirements. According to McCormick, some customers just need FASTQ output, while other customers request the raw data files so



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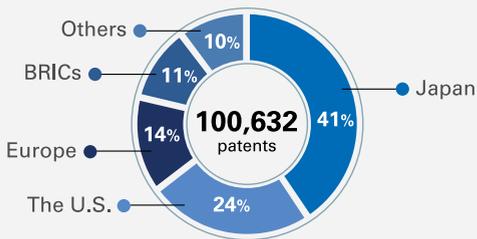
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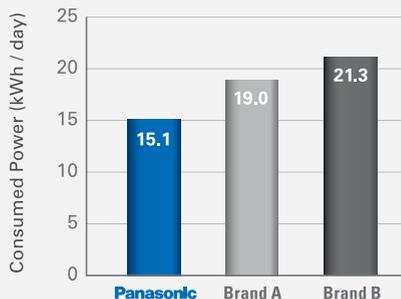
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▲ Figure 1. The GenoLogics LIMS is preconfigured for the Illumina NGS workflow.

that they can run their own analysis pipeline on the data. “This means we have to provide different outputs based on who is asking for the data,” she explained.

For several years, the FastTrack Sequencing Services lab used an in-house-developed system to track samples as they passed through the sequencing workflow. But the system wasn’t flexible enough for the lab’s needs for a couple of reasons. First, according to DeDionisio, the system was not a full-featured LIMS, but rather a database. Excel spreadsheets served as the primary interface for scientists, which made data retrieval time-consuming.

“I could probably find information about sample volume by looking at the dates on the sample manifests I’d completed over the past year, but that’s an arduous process,” McCormick said. “With the amount of work we

had going on, we needed a better way to search data.”

Second, the in-house database was not immune to the typical problems that labs encounter with homegrown systems: maintaining and updating them is difficult for labs whose first priority is doing science rather than building software.

“We needed a real LIMS—something that would map to our workflow while providing visibility into our processes so that we could get a better handle on ongoing projects and work,” said DeDionisio.

### Preconfigured for fast implementation

The FastTrack lab began working with the GenoLogics LIMS in May, and the test system that was implemented was tracking the lab’s sequencing runs in one week. Many elements of GenoLogics LIMS are available preconfigured to support Illumina-specific protocols for sample preparation and cluster generation, which made the system easy to implement (Figure 1). “The preconfigured steps for sample prep were invaluable,” said DeDionisio.

Sample preparation is generally labor intensive and manual. The former in-house

“With the amount of work we had going on, we needed a better way to search data.”

system required scientists to scan barcodes for everything, even consumable tubes that would not ultimately be stored for future use. The LIMS has removed unnecessary tracking steps during sample preparation, and data associated with sample transfer steps is automatically carried forward by the LIMS after an initial scan, eliminating the need for scientists to scan



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“Hardly any interaction is needed between scientists and the sequencers while runs are in progress.”

barcodes for every tube used for each step.

Preconfiguration in the GenoLogics LIMS also enabled the system to interface with Illumina instruments to monitor sequencing. Once scientists have scanned the barcode and loaded the flow cell into a sequencer, the LIMS “sees” the activity, generates a sample sheet, and begins collecting data associated with the run from the appropriate sequencing server. According to DeDionisio, hardly any interaction is needed between scientists and the sequencers while runs are in progress.

“The LIMS is doing all the work, collecting data from the sequencers and loading the sample sheet in the proper place in the basecalls folder,” said DeDionisio.

“The benefits of having certain things preconfigured are numerous,” said DeDionisio, particularly when compared with what the lab did previously to track samples. Yet he pointed out that not everything should be preconfigured in a system. In particular, functionality that labs tend to tweak and customize themselves should not be preconfigured. DeDionisio noted that even in the sample preparation protocol, which is well-specified by Illumina, labs often choose “custom” index adapters or sample placement configurations. Additionally, while it is helpful for the LIMS to handle BCL conversion after a run is finished, the LIMS should not require a particular READ length, as labs often want to select a READ length independent of the length of the run. “Choices like these really should be left to individual labs and not be dictated by the LIMS,” DeDionisio explained.

“The flexibility is really what made this system [LIMS] attractive.”

Fortunately, the preconfigured Illumina package in the GenoLogics LIMS does not restrict what labs can do with the system. “GenoLogics anticipated many of the needs by preconfiguring sample prep in particular and automating the data collection off the sequencers,” said DeDionisio. But in other areas, the system remains flexible enough to adapt to a range of different instruments and changing protocols. For instance, the FastTrack Sequencing Services lab recently tested a new sample prep procedure that called for the use of 48 indexes. The former in-house system could accommodate only 12 indexes, and scientists lacked the programming knowledge to change the software so that additional indexes could be added. “The GenoLogics LIMS can use any size index, which is great because our customers often have custom indexes that they provide to us with their samples,” said DeDionisio.

“The flexibility is really what made this system attractive,” said Christian Haudenschild, director of the FastTrack Sequencing Services lab. Haudenschild pointed out that the lab is about to deploy a new Illumina instrument and the instrument specifications are still evolving. “Based on our experience with the LIMS so far, we are confident that we’ll be able to accommodate whatever we might run into,” he said.

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## Saving scientists time

Even before rolling out the system to production, scientists in the FastTrack Sequencing Services lab saw noticeable time savings. For example, the cluster generation group used to spend about 20 hours each week collectively entering data associated with a flow cell into the in-house sample tracking system. Automation with the LIMS has cut this time in half. Hand-off between the cluster group and the reader group used to create another bottleneck; now, data is transferred automatically. “I’m anticipating that some of our staff in the cluster group will be at loose ends wondering what to do once much of the manual work is eliminated,” said DeDionisio. “They are figuring out that they can put more effort on checking runs in the LIMS.”

“Automation with the LIMS has cut [data entry] time in half.”

Lab staff and scientists are beginning to envision other ways that the LIMS could be used to improve lab efficiency. They expect, for instance, that the LIMS will help staff with quality control. “It’s all been manual, so you need eyes to look at the samples and determine what’s been passed and failed and what’s ready to go and what needs to stay,” said McCormick. “We’d rather track this in a software program that can show us what’s good to go, what needs more work, or what should be done first.”

Conceivably, such visibility into the workflow should also provide some predictive control over processes. McCormick hypothesized that with data stored and searchable in a LIMS, they should be able to project how long a project will take based on the work required and the staff and instrumentation available. “Right now, we make guesses based on a general idea of past performance,” she said. “Information on past runs stored in the LIMS should enable us to align our projections with actual data, which will help us not only calibrate customer expectations but prioritize work streams more effectively.”

“Our ultimate aim is to more efficiently deliver data to customers,” McCormick concluded. “The LIMS will give us better insight into all aspects of our process—what pieces of the project are finished, what has passed QC, which samples need rerunning, whether we

have high enough cluster density on enough lanes to get quality output. With data easy to find, we’ll be able to see where our bottlenecks are, which will make my job easier, which will make data go out faster—and faster turnaround means happier customers.”

*Melissa Kamkar, MS, manager, Field Application Scientists Team, GenoLogics Life Sciences Software, can be reached at melissa.kamkar@genologics.com or by phone at 250-483-3353.*

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Allis Chien, Ph.D.

# ASK THE EXPERT

## ACCELERATING RESEARCH WITH MASS SPECTROMETRY

by Tanuja Koppal, Ph.D.

Allis Chien, Ph.D., director of the Vincent Coates Foundation Mass Spectrometry Laboratory at Stanford University's mass spectrometry shared core resource facility, talks to contributing editor Tanuja Koppal, Ph.D., about the advances being made in the instrumentation and applications for mass spectrometry (MS). The core facility has a variety of mass spectrometers that include ion trap, quadrupole, triple quadrupole, quadrupole time-of-flight (Q-TOF) and Orbitrap instruments, coupled with HPLC (high performance liquid chromatography), UHPLC (ultra HPLC), Nano UHPLC, and capillary LC and GC (gas chromatography) systems. Dr. Chien discusses some of the challenges that are commonly encountered while working with these instruments, such as sample prep and data analysis, and identifies areas for improvements.

**Q:** Why do you have so many different types of mass spectrometers in your facility? I guess there is no one size that fits all applications.

**A:** We do have a diverse group of users—chemists, biologists, clinicians, engineers—and they cover a broad range of applications. So we don't have the luxury of specializing in any one type of MS. It also has to do with the way the lab has grown over the years. We started out as a chemistry support lab, so initially we had an ion trap mass spectrometer. Then people wanted to do proteomics, so we needed an MS system for proteomics. And then the users wanted to specifically quantify molecules for target analysis, and we needed a triple quadrupole instrument for that. So the lab has grown organically over the years and we've added different types of instrumentation—whatever's most appropriate for what people need. Until two years ago, we were doing

proteomics on an ion trap MS, then we invested in an Orbitrap instrument. That was a game changer. We have an open-access lab and chemistry and proteomics services are a big part of what we do. Metabolomics is new but it is growing, and quantitation is the other main application.

**Q:** Along with HPLC and UHPLC, you have also invested in Nano LC systems coupled to MS. Is that for proteomics?

**A:** The Nano LCs are definitely for proteomics, or if you need the sensitivity. A general rule of thumb is when you halve the column diameter, you should improve your sensitivity by about fourfold. We're also looking to work with Capillary LC for some applications. Capillary LC is a good compromise between achieving the right robustness and sensitivity.

**Q:** In which areas do you see MS lagging?

**A:** MS is evolving so fast. The quality of the instruments nowadays versus the quality

from just five years ago is a huge leap forward. But I think that as scientists, we always want more—more speed, more sensitivity, more accuracy. That's because it's really a continuum. Every advance in technology opens up more possibilities. So with the new instruments, something that was once impossible to do now becomes just really hard to do. Something that was excruciatingly difficult becomes just difficult, the difficult becomes routine, and the routine becomes easy. So we always want more; we're never satisfied. We can do an immense amount today that we couldn't do just a few years ago, and I am pretty happy with that.

**Q:** Can you talk about some areas that need improvement?

**A:** Perhaps it would be the instrument-control software. In and of itself, the software for each instrument works pretty well, although they all have their idiosyncrasies. But when we need different systems to work together is when we get very strange glitches. A lot of times these glitches are intermittent, hence, they're hard to reproduce. For example, with the MS software working with the LC software or even with our institution's security software, you have strange things happening. You'll come back in the morning and find that your run stopped in the middle of the night, and nobody knows why. Or, even worse, your mass spectrometer stopped collecting data but your LC kept running, so you lost all your samples.

**Allis Chien, Ph.D.**, is director of the Vincent Coates Foundation Mass Spectrometry Laboratory, Stanford University's mass spectrometry shared core resource facility (<http://mass-spec.stanford.edu>). The laboratory provides researchers in diverse fields with broad-based mass spectrometry expertise and support, including qualitative and quantitative analyses and proteomics and metabolomics services. It also serves as the Proteomics Shared Resource for the Stanford Cancer Institute and as the mass spectrometry core facility for the Stanford Bio-X Initiative. Beyond making state-of-the-art, user-friendly facilities and services available, the laboratory enables education, methods development and new applications development, designed to meet the rapidly evolving needs of researchers. Dr. Chien graduated from the University of San Francisco with a B.S. in chemistry and an emphasis in biochemistry. She earned her Ph.D. in chemistry from Stanford University in 2000, and then stayed on to establish and grow the mass spectrometry facility.

In that sense, I think the interfaces of different software just need to play better together.

**Q:** In terms of the analysis itself, what aspect still remains a big challenge?

**A:** What I've noticed is that the challenges lie at the interfaces. When going from the sample to the instrument, it's about sample preparation, and that is definitely a big one. The mass spectrometers themselves are actually pretty easy to run, but the liquid chromatography end is sometimes a challenge. Going from the raw data to getting results, which is data processing, is another transition that's tough. For bigger projects, you're often pulling data off of different instruments, from different manufacturers, and you run into that compatibility problem of how to bring everything together. The researchers want to know more, so a lot of times the software that the manufacturers provide just isn't enough, and you have to go to third-party software. So bridging that gap is another issue.

However, I think one of the biggest challenges is actually talking to the researchers. The biologists or clinicians have their language and their methods, and as MS people, we have a different language. Learning to communicate with them so that we know what they need from the analysis and they know how to prepare the samples based on what we need is a challenge.

We're getting better at that as the lab matures, but there's always someone new and something new to learn.

**Q:** What are some of the common concerns of users who are involved with large-scale proteomics and metabolomics projects?

**A:** Data analysis is the big concern. Users know they're going to get reams of data and they need solutions for handling that data, particularly statistical analysis. A lot of studies will need a statistician on board, and the best-case scenario is when we can actually sit down and plan the study together with the statistician. Experiment design is also important, because it has to do with that interface challenge again. The experiment has to produce something that we can put into the mass spectrometer, or we have a protocol that we can transform to be compatible with MS. An example would be immunoprecipitation (IP), in which people traditionally use detergents like sodium dodecyl sulfate (SDS) to elute their proteins from an IP column. Previously, detergents were not compatible with MS. But with protocols recently developed for removing SDS, we can now use those detergent samples. Hence, taking care of the details and talking through the procedures beforehand is important.

**Q:** For your open-access lab, what types of training do you provide your users?

**A:** For the open access, we have a single quadrupole GC-MS and an LC-MS, and that's what we let people work on. They are under software control, so people are not developing their own methods. They bring in their samples, select a method that's already predefined, and run their samples using an autosampler. Users are not reconfiguring or tuning the instruments, and that's necessary to keep the instruments running. Those instruments analyze 10,000 to 12,000 samples a year and are pretty busy. Usually the people who come in don't have a lot of, or any, practical MS experience. So the training has to cover the whole range, from the sample prep all the way to deciding which method would be appropriate for the samples. And then there's the practical training on how to get the data, a little bit on data interpretation, what libraries are available and such. We do have formal training sessions, but a lot of the actual learning comes afterward. It's not until users have run a few samples, looked at their data and tried to make sense of it that they really have questions. Then we'll sit down with them, one on one, and tutor them.

# ALL KEYED UP

**ESTABLISHING COMPUTER  
WORKSTATION ERGONOMIC  
GUIDELINES TO AVOID INJURY**  
by Vince McLeod



Computers have revolutionized our lives. How many hours a day do you average sitting in front of one? We are willing to wager it is more than a few for most us. Especially since even after a full day of work, it is usual to check email, Facebook, blogs, and Twitter, and then maybe do some Internet research or shopping after we get home. There always seems to be a reason to turn on the computer and start working away, and before you realize it, a couple of hours or more have gone by.

Working in today's research laboratory is no different. In fact, there is a good chance you spend many hours at a computer workstation entering data and researching databases. As we continue to become bound to our keyboard, mouse and monitor, chances of developing pain in the neck, wrists, back and shoulders grow with each passing minute, hour and day. By setting up your computer workstation optimally and paying attention to a few key elements of positioning and alignment, you can greatly reduce the chance of an ergonomic injury such as carpal tunnel syndrome or a repetitive stress injury. Let's see if we can improve your computer workstation setup by reviewing the simple principles of proper ergonomics.

## The science of strain and stress prevention

Ergonomics is simply the study of how humans interact with their environment. Used mostly in the context of work, it is how we physically perform our required work tasks. Ergonomics seeks to optimize the mechanics of the task to the physical structure and limitations of the human

body in order to prevent musculoskeletal disorders. The idea is to design our workplaces and equipment to fit the users by taking into account how we interact with these tools, machines and structures. The goals are to optimize human health and well-being while maintaining productivity and system performance.

“There is no single ‘correct’ posture or arrangement of computer, keyboard, monitor and mouse.”

The problem is that no two human bodies are identical. Therefore, there is no single “correct” posture or arrangement of computer, keyboard, monitor and mouse. However, there are some basic guidelines to follow in setting up your workstation that will help minimize any potential for problems. One excellent place to begin is with the OSHA ergonomic eTool.<sup>1</sup> This comprehensive

website has many articles and checklists to use in evaluating your current workstation setup and for making specific adjustments or improvements.

## Posture is the key

We begin by conducting an honest evaluation of working posture. We are aiming for a balanced and neutral overall position. Let's go from the top down. So, when sitting at your computer, start by ensuring that your workstation is arranged so that your head and neck are upright. In other words, the head, neck and torso are in line and not bent down or back. Next, face forward. This seems like simple common sense, but one of the most common things we run into is people having their monitor or the keyboard off to one side, forcing them to twist their head, neck or trunk while working. This is a guarantee for problems and must

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By James A. Kaufman

*We recommend the establishment of a chemical management system. This system provides for the safe procurement, storage, use and disposal of chemicals.*

*The system begins with the assumption of responsibility. Management needs to have written policies for the safe use and disposal of chemical and biological materials. A hazardous waste coordinator needs to be appointed to oversee the process and be thoroughly familiar with the state and federal regulations. The facility needs to function as a single site. Safe disposal of hazardous wastes needs to be everyone's responsibility.*

*Today, more than 40 percent of the chemicals disposed of from laboratories are perfectly good unopened containers. A good chemical inventory is essential in avoiding the purchase of unneeded materials. Next, it's more effective to buy small quantities and discard empty containers. When the cost of disposal is factored in, the larger size may no longer be the most cost effective.*

*Adopt strategies for waste minimization. Exchange unwanted surplus materials, recycle and reclaim by-products, substitute less hazardous materials and use smaller scale reactions when possible. Acid and base streams can be neutralized. Hazardous wastes can be processed in the collection vessel.*

*Kaufman, James A., Laboratory Safety Guidelines - Expanded Edition, The Laboratory Safety Institute, [www.labsafetyinstitute.org](http://www.labsafetyinstitute.org)*

be avoided. It is best if the trunk or torso is perpendicular to the floor. A slight lean back into a good backrest is ok, but having to lean forward is asking for trouble.

Now let us move down to our shoulders and arms. Shoulders and upper arms should also generally be in line with your torso and nearly perpendicular to the floor. This is where most folks will harbor tension, so try to maintain awareness throughout the work shift and keep them relaxed. Try not to hunch your shoulders up or stretch forward. Keep upper arms and elbows close to the body and comfortably hanging or supported on armrests. Lower arms, i.e., forearms, wrists and hands, should remain straight and roughly 90 degrees to the upper arms. Pay particular attention to the wrists. If they are not kept straight in line with the hands and are bent up, down or sideways, you are asking for wrist strain that could lead to carpal tunnel syndrome and serious problems.

The final third is focused on a good foundation. The legs should form a near 90-degree angle, with the thighs horizontal and parallel to the floor and the lower legs perpendicular to the floor. It is okay if the thighs are slightly higher than the knees. Do not allow the thighs to be lower than the knees, though, as this tends to induce a forward lean and corresponding poor posture. Feet should rest comfortably flat on the floor or be supported with a sound footrest.

### Technology tools and fit

Having a clear picture of the proper posture in mind, we now turn our attention to the hardware—the technological tools of the computer workstation—and how to set these up to facilitate our posture model. The three pieces that we use to interact with our workstation are the keyboard, the input device (e.g., mouse or trackball) and the monitor. By aligning these components properly, we can ensure that our posture remains optimal and our body stays injury-free. Thanks to the

World Wide Web and powerful search engines, there are thousands of documents, articles and guides on the subject, and all are readily available. A couple of very good places to begin are those developed by two of the largest companies in the computer arena, i.e., Microsoft and Apple. Microsoft's Healthy Computing Guide is an excellent and succinct article with clear, simple illustrations.<sup>2</sup> And Apple's Ergonomics web pages are some of the most easily understood and comprehensive we have seen.<sup>3</sup>

First we will discuss the keyboard and input device. These two need to be kept close together, ideally on a stable platform or tray that is easily adjustable. The mouse or trackball should be immediately next to the keyboard so its use does not require one to reach. Recall that proper posture means keeping our hands and wrists in line, so adjust the keyboard tray accordingly. Make sure there are no sharp edges or corners that the hands or wrists will rest on.

When setting up the monitor, keep these points in mind: Position the monitor directly in front of you so twisting or turning of your head or neck is not required. Pay attention to glare, either from windows or from lights, and try to set the screen facing away from these sources. Most experts recommend that the top of the monitor be close to eye level or slightly below it. Distance from the head to the screen should provide for easy reading without the need to lean your head, neck or torso either forward or backward. Workers with bifocals/trifocals will need extra assistance. Screen resolution and font style and size can also be adjusted to aid with this.

Finally, we are strong believers in prevention and proactive programs. If you haven't done so already, develop a computer workstation policy and train every employee regarding its proper setup. Perform routine surveillance of workstations along with a regular assessment, evaluation and updating of the policy. Do not assume that just because you have

a workstation policy everyone will follow it. Take the time to occasionally observe your workers. Review the computer workstation guidelines as needed and purchase ergonomic hardware when it is warranted. You may consider bringing in an experienced and trained ergonomist to assist with this program depending on the size and nature of your facility. Review the policy and procedures at least annually and keep them up to date. By being proactive and observant, you are doing everything you can to prevent injury and keep your employees safe.

1. *OSHA Ergonomic Solutions: Computer Workstations eTool*. Occupational Safety and Health Administration, US Department of Labor. Washington, D.C. 2008 <http://www.osha.gov/SLTC/etools/computerworkstations/index.html>
2. *Microsoft Healthy Computing Guide*. Microsoft Corporation. Washington, D.C. 2008 <http://www.microsoft.com/hardware/en-us/support/healthy-computing-guide>
3. *Ergonomics*. Apple, Inc., Cupertino, Calif. 2010 <http://www.apple.com/about/ergonomics/>

*Vince McLeod is an industrial hygienist certified by the American Board of Industrial Hygiene and the senior industrial hygienist in the University of Florida's Environmental Health and Safety Division. He has 22 years of occupational health and safety experience at the University of Florida, and he specializes in conducting exposure assessments and health-hazard evaluations for the university's 2,200-plus research laboratories.*

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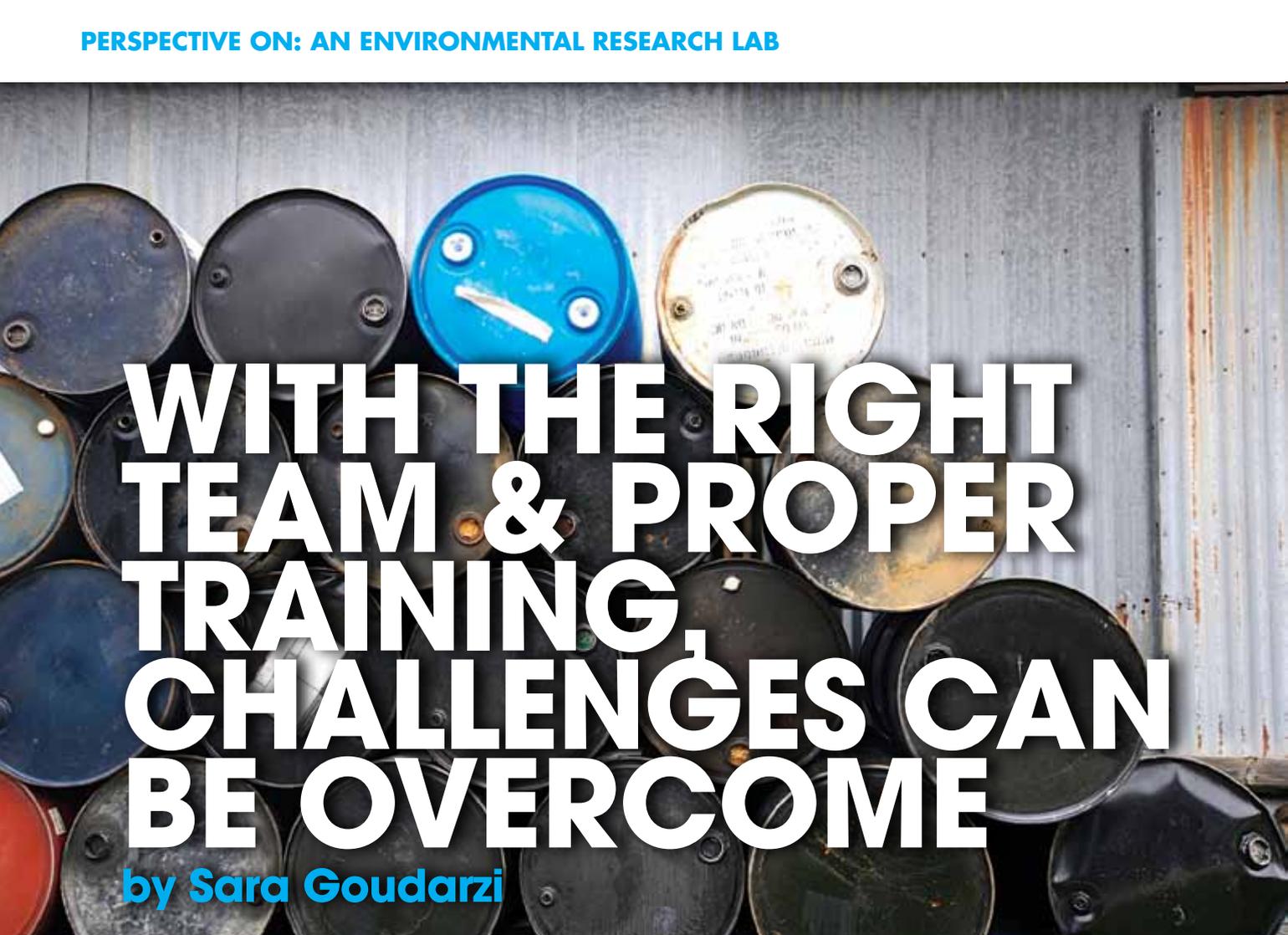


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# WITH THE RIGHT TEAM & PROPER TRAINING, CHALLENGES CAN BE OVERCOME

by Sara Goudarzi

Clean Harbors of Baltimore, Inc., is a transfer storage and disposal facility and part of the largest hazardous waste disposal company in North America. Clean Harbors provides recycling, treatment and disposal of a variety of hazardous and nonhazardous wastes.

In order to ensure proper treatment and disposal of incoming waste, the facility analyzes incoming waste to determine safe and feasible treatment options to ensure that the materials leaving the plant meet or exceed environmental requirements.

“Every incoming tanker, railcar, roll-off box or drum full of industrial hazardous waste gets researched to determine its hazardous characteristics and the compliant method(s) we should employ to safely treat this waste

at our plant,” says Bill Fornoff, laboratory manager, Clean Harbors Environmental Services.

“The lab also researches industrial waste samples that customers send to see if the plant can process their waste,” he adds.

Additionally, because of the tools and capabilities of the Baltimore lab, Fornoff and his staff also take on research projects for other Clean Harbors facilities.

“Research projects can include determining the unknown chemical makeup of certain wastes or process streams,” Fornoff says. “We also research new instrumental tools that might be applicable to our field of work. We may also design chemical treatment procedures to treat wastes being received at other facilities.”

“It’s important for any new members to quickly integrate themselves into the current team.”

## Lab structure and managerial roles

Fornoff manages Clean Harbors of Baltimore’s 1,500-square-foot laboratory located on the company’s six-acre campus. He currently has a staff of four full-time and two part-time chemists reporting to him. Together his team analyzes hundreds of samples each month.

“In February 2012, the lab chemists analyzed 500 incoming tanker and railcar samples representing approximately 2.5 million gallons

of industrial wastewater,” he says. “In that same month we analyzed 360 internal plant process samples. We also analyzed 12 incoming generator samples for approval into the plant and had a few projects for other facilities.”

The staff consists of chemists and environmental engineers holding either Bachelor of Science or Master of Science degrees.

Fornoff, who reports directly to the facility’s general manager, has a Bachelor of Science in chemistry from Elon University in North Carolina and a Master of Science in environmental science and policy from Johns Hopkins University in Maryland.

“I started with Clean Harbors of Baltimore in 1994 as a receiving chemist,” he says. “In 1996, I went into customer service. In January 2000, I took a position as second-shift lab supervisor in Baltimore. In March 2000, the lab manager left the organization and I was assigned the lab manager position.”

In 2007, Fornoff was given the opportunity to branch out and assist the many labs within the company. He travels to the various Clean Harbors labs to perform audits, help train lab personnel, install instrumentation and assist in solving problems.

“I also keep an inventory of the [more than] 350 pieces of lab instrumentation that we have throughout [our more than] 25 labs in the company,” he says. “This way, as a company, we can utilize our internal resources before going outside to make big purchases.”

Additionally, Fornoff assists in managing two large corporate service agreements.

“We have a corporate agreement with PerkinElmer for our company ICP-MS, ICP and AAs. We have a corporate agreement with Full Spectrum for our GC/MS, GC and TOCs,” he says. “I am also involved with our various lab supply vendors such as Thermo Fisher to leverage our buying power to get the best pricing on lab items we purchase.”

► *Lab manager, Bill Fornoff, in front of Clean Harbors of Baltimore’s clean extraction system bench extractor, used to determine distribution coefficients of dissolved organic compounds in an aqueous solution with supercritical carbon dioxide. It also allows lab personnel to see how a wastewater stream will react when mixed with supercritical CO<sub>2</sub>. Photo credit: Sue D. Richardson.*



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▲ Clean Harbors of Baltimore's first and second shift lab chemists. From left to right: Carlton Nelson, Calvin Fabio, Petre Ionescu, Bill Fornoff, and Arvind Thanki. Photo credit: Sue D. Richardson.

### Inventory, maintenance and hiring

In order to run experiments on schedule, a senior chemist performs a monthly inventory. Additionally, Fornoff maintains an inventory sheet where all the chemists can make a note about any items that might be running low in the laboratory.

To maintain the variety of instruments used, the lab utilizes corporate service agreements, which offer annual preventive maintenance services and emergency on-site and over-the-phone repairs.

"Daily maintenance is performed by senior chemists," Fornoff says. "I and my most senior chemist do GC-MS and GC maintenance [on items such as] inlets, columns, detectors [and] traps [and do] source cleaning, etc.

"It is very important that each instrument is running and producing accurate results," he adds. "It is an additional challenge when one or maybe even multiple instruments are not cooperating. Maybe they are not passing calibration verification or curve linearity, or [they] might be down

altogether and require a column change or source cleaning."

Because the laboratory has just a handful of staff, it's important for any new members to quickly integrate themselves into the current team and keep up with the work level. For this reason Fornoff is very particular when it comes to hiring.

"I receive resumes screened by our recruiters," Fornoff says. "I'll schedule and perform the initial interviews [and] will normally have potential candidates come back for a second interview with me and plant management. It takes a certain type of scientist to fill the role of lab chemist at Clean Harbors. I typically try to scare them off first until I can see they are [people who are] good fits for this fast-paced, challenging work."

### Challenges

Most days the lab in Maryland handles 20 to 30 5,000-gallon tankers that have to be analyzed and released to the proper facility processing location.

“Each tanker may have from 10 to 18 different types of analytical methods that have to be completed to fulfill our permit requirements and best management protocols to enable us to safely decide how to handle the waste material,” Fornoff explains.

“These tanker loads often have truck drivers on the clock waiting [for the material] to get off-loaded,” he adds. “So we look to turn around samples within two hours.”

Another big challenge is when a customer waste load does not match what they’d initially indicated they were sending to the lab. This often requires the operation managers to work as a team with the company’s sales team and the client to come up with solutions.

## “Be the voice of the lab to the outside world.”

“Another big challenge is to quickly turn around samples that generators send us to see if we can take their waste,” Fornoff says. “We have to spend a lot of time with these to make sure our plant process will work to compliantly treat their waste and that there will be no incompatibility issues. However, in the meantime, the generator’s holding tank is at or near capacity, and they need to maintain their production too, [so] they need it gone.”

These challenges are exactly the reason Fornoff loves his job—with the right team and proper training, the challenges make every day different.

“Every day has a problem or many problems to solve, and I enjoy solving problems,” he says. “I also enjoy working with the team at the plant and the team of lab managers across Clean Harbors.”



▲ A sampling of Clean Harbors of Baltimore’s laboratory instruments, including a TOC analyzer, two GC-MS systems, a GC, an AA and an ICP. Photo credit: Sue D. Richardson.

The challenges also provide incentive for Fornoff’s staff, who are given opportunities to learn many different methods.

“We have a wide variety of instrumentation in the lab, from pH meters to GC-MS systems,” Fornoff says. This lab can allow a person to branch off into many different types of specialties and to experience the most demanding and sophisticated sample-preparation and analytical techniques. “It’s a win-win for the company and the chemist who wants to be challenged on a daily basis.”

Specialties include analytical chemistry, research and development, instrumentation training and repair, water and wastewater treatment, compliance, regulations and environmental laws, engineering and consulting, lab reagents and equipment sales.

“A chemist has the opportunity to learn many different methods in a very short time.”

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“Once you have proven yourself, upper management gives you the freedom to try out ideas and really put your mark on the company.”

### Communication

Although the organization provides opportunities for employees to grow and make a difference in the company, Fornoff believes that as a manager he can play a major role in the success of his staff and laboratory. Much of this comes from communicating with the lab staff.

“Listen to each employee [and] acknowledge their concerns or goals and get an answer for them,” he says. “Leave the door and your phone open. Encourage team members to come into the office or call anytime. Communicate your expectations and then follow up.”

In addition to communicating about work affairs, Fornoff believes that getting to know each of his employees adds an extra dimension for opening doors to exchanging ideas.

“Get to know something about each person, like what [his or her] hobby is or a favorite sports team or pet, something that you can keep up with and easily start a conversation with,” he adds.

And finally, he believes that being a leader and teacher is an important aspect of a manager’s role.

“Push and reinforce safety every day,” he says. “Find each team member’s strength and when possible, develop a side project for them that builds on that strength.”

In addition to fostering communication within the lab, Fornoff considers it important for a manager to be able to interact with the clients. This is especially essential because his lab handles material that’s highly regulated due to its hazardous potential; therefore he wants to ensure that clients trust the

facility to manage their waste in a safe and responsible manner.

“Be the voice of the lab to the outside world. In other words, be able to explain and simplify lab speak in terms that the folks in management and everyone else can understand.”

The company also takes great care in communicating about their work with the local community to show that their work benefits those around them.

“We allow tours of our facility and lab to local students, businesses and public emergency responders,” Fornoff says. “We want to show what we do and how we hold compliance and health and safety to the highest standards. We strive to have a positive impact on our community.”

*Sara Goudarzi, is a freelance writer based in New York City. Her website is [www.saragoudarzi.com](http://www.saragoudarzi.com).*

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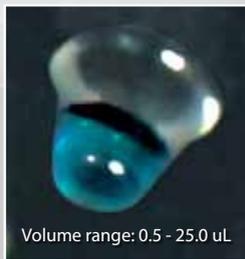
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# BIOLOGICAL SAFETY CABINETS

by Rachel Muenz

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**B**iological safety cabinets—also known as biosafety cabinets or BSCs—are extremely important in conducting experiments safely in many laboratories that deal with biohazardous material on a regular basis. These days, the main trends in BSCs are customer desires for greater energy efficiency and a lower total cost of ownership. When looking at purchasing a new or used biosafety cabinet, one of the most important things is to make sure the cabinet compensates for filter-loading. As filters load, the BSC should be able to maintain at least 90 percent of its maximum airflow in order to keep lab workers safe and reduce the number of filter changes and frequency of contamination. However, this shouldn't be a problem in most modern biosafety cabinets as motors have improved greatly over the last few years with today's standard motors rated at 50,000 hours and higher—some motors last as many as 100,000 hours. Service requirements, energy consumption, and NSF certification are other important factors buyers should look at when purchasing a BSC and they should always ask plenty of questions to get all the information they need from their vendor.

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**AS MULTIFACETED AS THE INSTRUMENTS THEY CONTROL**

by Nazlie Latefi, Ph.D.

The right chromatography data system (CDS) can spell the difference between a streamlined data-collection process and one that is haphazard. CDSs are software packages that collect, store, and help users interpret data. Some have instrument control functions as well.

CDSs come in many different varieties, which can make selecting one a daunting exercise. The good news is that vendors can provide expert advice on features most suitable to specific workflows. And, in recognition of the diverse chromatography system designs, CDSs are evolving toward improved cross-company integration and modular systems that adapt to a lab's changing needs.

Data system packages can run on desktops (single workstation) or servers (networked) and cost anywhere from several thousand to several hundred thousand dollars, depending on the size of the network and the CDS's capabilities. Software capabilities range from basic instrument operation, data collection, and storage to highly integrated network systems designed to meet strict FDA quality-control and security standards. "Basic, single workstation CDS software is sufficient for most labs developing protocols and running routine analyses," says Brian Murphy, public relations manager at

Waters, Corp. He likens entry-level software to Microsoft Windows® 7, saying, "It does a lot of things, but most people are only going to use a limited number of features."

Basic CDS software can integrate signals from multiple detectors (UV/Vis, refractive index, photodiode array detectors, electrochemical detectors, evaporative light scattering, and others) and transform those signals into chromatograms. A CDS can also integrate chromatographic peaks and assist in method development. More advanced functions include managing and storing data for integration with data from other runs. Some of the most sophisticated data systems assimilate data from hundreds of instruments networked together and allow a lab to comply with Good Laboratory Practices and data requirements of Good Manufacturing Practices that stipulate how securely data should be stored and archived. More complex capabilities like sample preparation, finer instrument control, and data management can usually be added onto a basic software package later.

With all these functions to choose from, customers have been demanding flexibility, and vendors have heeded their requests—most are moving toward ever-increasing scalability and multi-vendor integration. According to Christoph Nickel, CDS marketing manager at Agilent Technologies, multi-vendor

controls started to appear in the late 1990s when customers insisted on the ability to integrate data from multiple vendors' systems. Initially, this was expensive and time-consuming; the language was not standardized and vendors had to write separate drivers for each new instrument that was added to the network. Since then, vendors have made considerable progress in standardizing programming languages.

Chromatography system vendors traditionally do not cooperate closely with control and data software developers—or with their competitors—on software drivers. That is changing. Today, most top instrument makers do what they need to do to facilitate "plug and play" introduction of their devices into standard networks. Nickel says that one day, installing a new device will be as straightforward as plugging in a new printer.

Adding to the pressure on instrument manufacturers for customer satisfaction, independent software developers have begun to offer their own CDSs that compete with packages provided with—and often sold separately from—instrumentation. "Third-party software has been successful with established technologies like gas and liquid chromatography," says Nickel, "but purchasers might be better off sticking with the manufacturer's software with newer technologies like capillary

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electrophoresis or the latest ultra-high-pressure liquid chromatographs.” Fraser McLeod, vice president, Chromatography Software, Thermo Fisher Scientific, agrees. For standard HPLC or GC, he says, “I don’t see any advantage in going with the manufacturer, but more sophisticated instruments are another story. Labs should decide which software meets their needs.”

Most basic CDSs can be used to organize, sort, and present data, and can also export to Microsoft Excel. “CDSs will work well with any decent desktop computer,” says Greg Benedict, an engineer at SRI Instruments, “but some vendors force customers to buy a

Not surprisingly, CDSs are going mobile. In the near future, operators will be able to check chromatography operations and instrument status (temperature, flow rate, number of samples processed) from a smartphone or tablet. Also in the works for CDSs are continued improvements in user friendliness. One goal is to make chromatograph systems simple enough for nonspecialist users. In addition to ease of use, says Brian Murphy, “CDSs are increasingly tailored to very specific applications and workflows.”

Other goals for CDSs are improved integration with NMR, mass spectrometry, spectroscopy, and other analysis modes.

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### “CDSs come in many different varieties, which can make selecting one a daunting exercise.”

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computer with the chromatograph and data package at a huge markup.” This practice affords some convenience, he says, but customers could buy the same computer at a discount through numerous local or online outlets.

CDSs need regular updates every 12 to 24 months, and replacement every three to five years. According to Christoph Nickel, the main drivers for replacement are changes in computer operating systems and alterations to or replacements of chromatography hardware.

Despite significant improvements over the last three to five years, CDSs still have a way to go to provide the levels of flexibility, control, and expandability to accommodate all chromatography workflows with seamless integration.

*Nazlie Latefi is a freelance writer based in New York City. You may reach her at [nazlie.latefi@gmail.com](mailto:nazlie.latefi@gmail.com).*

**Because the number of chromatography applications is growing, especially in the petrochemical, food, and pharmaceutical industries, chromatography data systems have become indispensable for many labs. If you’re interested in learning more about the CDSs being used in your peers’ labs, a “Survey Says” article is set to be published on this important topic in the July 2012 issue of Lab Manager Magazine. Here you will learn what applications your fellow readers are using their CDSs for, what systems are most popular, and what features they are looking for when purchasing a CDS. Hopefully, this information will help when you consider buying a CDS for your own laboratory.**

FOR ADDITIONAL RESOURCES ON CHROMATOGRAPHY DATA SYSTEMS, INCLUDING USEFUL ARTICLES AND A LIST OF MANUFACTURERS, VISIT [WWW.LABWRENCH.COM/CDS-GC](http://WWW.LABWRENCH.COM/CDS-GC) OR [WWW.LABWRENCH.COM/CDS-LC](http://WWW.LABWRENCH.COM/CDS-LC)

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## FUME HOODS

**ENERGY SAVINGS, STAFF SAFETY, AND AN INTEGRATED APPROACH MAKE UP KEY PLANNING CONSIDERATIONS**

by Mike May, Ph.D.

The fume hood in your lab might seem ancient, unless you imagine Thomas Edison working in the early 1900s under a fireplace chimney. In the summer, though, Edison's idea failed to create enough draft as outside temperatures increased. So for his warm-weather "fume hood," Edison worked on a shelf placed outside a window, where he could raise and lower the vertical sash for access and protection as needed. Fortunately, modern fume hoods offer much better performance from safety and efficiency perspectives.

In essence, a fume hood should allow a researcher to work with—but not be exposed to—materials that create toxic fumes or particles. The sash on a fume hood helps to confine the toxic substances inside and it also protects the user from most splashes, for example, as long as the sash is kept as low as possible. Airflow through a hood also plays a fundamental role in confining any fumes.

In many labs, the same fume hoods stay in service for decades, serving generations of students and researchers. Consequently, some users simply want fume hoods that look and function like they fit in a modern lab. For example, Jacquie Richardson, Ph.D., director of the organic chemistry teaching labs at the Uni-

versity of Colorado at Boulder, says, "Our student fume hoods are pretty behind the times. The main upgrade I'd like to see is getting something that's up to date."

Meeting modern fume-hood standards requires a range of features. The hood must provide high performance in terms of safety, energy efficiency, and durability.

### Energy-efficient exhaust

"Energy savings is one of the biggest trends or points of concern in fume hoods," says David Campbell, vice president of sales at HEMCO (Independence, MO). "A fume hood has to exhaust air to maintain a safe working environment for the user. So when it's exhausting air to the outside, that's an energy hog for balancing air conditioning and heating in labs."

Despite this energy issue, lots of users keep hoods open. "You can walk into virtually any lab with a hood and find a sash wide open and no one using the hood," says Campbell. Consequently, many fume hoods come with energy-saving features. For example, the opening height of the sash can be limited. A hood can even include a sensor that closes the hood partway when the user walks away. "The key is keeping the sash lowered," says Campbell. "The opening height determines how much air is necessary to maintain a ve-

locity that needs to be met for the user's requirements."

Users can also add night setback devices. These reduce a hood's energy consumption during off hours by cutting back the airflow rate when no one is likely to be using the hood.

### Resisting rust and corrosion

Energy makes up just one element in keeping a fume hood green. A second factor comes from making a long-lasting piece of lab equipment. "If a fume hood rusts out in a short period of time, that's not green," says Campbell.

To help a hood stand up to chemicals and corrosion, different companies take various approaches. For example, Campbell and his colleagues at HEMCO use composite resin surfaces. He adds, "We mold the pieces together seamlessly with the same material rather than using screws."

Other materials also battle corrosion. NuAire (Plymouth, MN), for example, builds fume hoods from polypropylene. "This is a real niche market," says Terry Thompson, polypro sales manager at NuAire. "You go with it over steel or fiberglass for really corrosive environments ... Polypropylene won't rust and it can stand up to virtually any chemical out there."

## Location, location, location

In real estate, location always plays a key role in success—making up the top three factors, according to the industry mantra. Likewise, location fundamentally impacts the performance of a fume hood.

To understand the finer points of designing and planning a laboratory, researchers can turn to Rx3D, headquartered in New York City. The experts at Rx3D design and plan clinical and basic research laboratories for a wide range of applications, including animal biosafety, the pharmaceutical industry, and much more.

“Fume hoods are a key component in the design of many clinical and research labs,” says William N. Bernstein, AIA, president of Rx3D.

“If a fume hood is in the lab’s main traffic flow, the air currents generated by that traffic may compromise the unidirectional airflow from the room into the fume hood and then from the fume hood to the exterior,” says Bernstein. “By locating the fume hood out of this main traffic, we can help prevent the air within the fume hood from migrating back into the room.” Even if people walking through the lab go too close to the fume hood, that can affect the flow. To prevent this problem, Bernstein suggests putting the fume hood back in a corner of the lab.

Also, a lab’s fume hoods should be considered early in the design process. “It’s an integral part of the overall project design and construction,” says Bernstein. “The fume hoods should be part of the contractor’s work, not considered as equipment that’s furnished separately [and they] should be purchased and installed by the contractor.”

Like others interviewed here, Bernstein noted the trend of reducing the energy used by fume hoods. Although high-tech solutions exist, lab designers should also consider simpler solutions for energy efficiency. For example, Bernstein says, “The easiest way to reduce fume-hood energy is to have less of them.”

Regardless of the energy-reducing approach selected, anyone can surpass Edison’s fireplace-chimney hood for efficiency. Moreover, today’s fume hoods also consist of longer-lasting mate-

rials. Consequently, a fume hood installed today could perform effectively for years to come. This proves especially true for properly placed fume hoods that are installed correctly.

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## EMPLOYMENT TRENDS, MODULARITY, UHPLC, AND NEW LIFE FOR LIQUID CO<sub>2</sub>

by Angelo DePalma, Ph.D.

Many labs today face downsizing, a trend that began before the economic downturn of 2008. “Employers are more likely to retain analytical scientists who can not only press buttons and achieve the appropriate results, but who can also quickly perform unaided troubleshooting, develop methods, and generate consistently reliable data,” says Ade Kujore, marketing specialist at Cecil Instruments (Cambridge, UK). HPLC systems offering ease of control, diagnostics, repair, maintenance, and system testing help scientists meet these goals.

Modular HPLC systems provide versatility in terms of troubleshooting and repair as well as choice of mobile phase (through the ability to swap out columns rapidly). Consequently, some experts predict a decline in the all-in-one instruments that have dominated HPLC for the last two decades. The downside for vendors, says Ms. Kujore, will be higher expectations for customer support.

She suggests that before purchasing a new system, users consider:

- Service response time and average downtime
- Detector specifications, such as low drift, noise, and stray light

- Pump specifications, such as low pump pulsation and speedy and accurate gradient mixing
- Autosampler specifications, carryover, injection precision, and availability of accessories
- Column heater/chiller specifications; for example, compartment size, temperature ranges, speed of temperature changes, and the accuracy and stability of required temperatures
- Modularity, including for third-party autosamplers and liquid handling systems
- Frequency of routine maintenance, time involved in mobile phase or column changes, and cost of consumables

### The eternal question

The dilemma over HPLC versus UHPLC has not disappeared, despite some vendors declaring the matter settled and a few stragglers insisting that anything that occurs on UHPLC is achievable at five microns or higher.

While column particle diameters of three to five microns still dominate, the lures of high sensitivity, speed, and low sample/injection volumes tug at every chromatographer’s heart. UHPLC involves more complex sample preparation, more frequent maintenance, and a greater attention to detail than conventional LC. Methods do not often transfer faithfully

between the platforms. Laboratories—particularly those with legacy HPLC systems and methods—should ask, frankly, whether they have the time and the will to switch over and revalidate all their critical methods.

The introduction of superficially porous (“core shell”) particle columns promising UHPLC performance on an HPLC-class instrument has further complicated purchase decisions. Columns based on superficially porous materials may not be available in all separation formats, however, and they do require tweaking the instrument for optimal performance.

Finally, some experts, who will remain unnamed due to their dwindling numbers and influence, still believe that anything that occurs on a UHPLC is achievable on an ordinary HPLC.

Bottom line: conventional supra-2-micron HPLC and UHPLC are both here to stay and are still vying to find their optimal niches.

### Gaining momentum

According to Simon Robinson, HPLC product manager at Shimadzu (Columbia, MD), the switch to UHPLC is gaining momentum. “People are putting in the time and doing the transition,” he says.

But Robinson warns that method transfer remains an issue that will not go away “with a couple of mouse clicks.” The issue is not so much difficulty as it is the time investment, which Robinson describes as a “hardship” whose rewards are speed and throughput. Users can get lucky and scale directly to fast LC, but most of the time this will involve “some degree of method development.”

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### “Some experts predict a decline in the all-in-one instruments that have dominated HPLC”

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Several systems today provide software and other tools that ease method transfer. At Pittcon last year, Agilent introduced ISET (Intelligent System Emulation Transfer), which promises seamless transfer of methods between LC and UHPLC systems. At the time, Christian Gotenfels, Agilent’s 1290 Infinity LC product manager, predicted that ISET would “revolutionize LC method transfer” by minimizing cost and effort involved in development, validation, and execution of UHPLC/HPLC methods.

Many labs in regulated industries still employ old columns and systems that occasionally become scarce, even in the used equipment marketplace. The large, concentrated injections made on older LC systems can hide a mul-

titude of sample preparation and matrix effects, while exceeding a certain volume or concentration on UHPLC results in “a lot of tailing and some ugly-looking chromatography,” Robinson says. Achieving the superior results promised by UHPLC “requires a change in mentality. Analysts need to be more precise and careful with sample prep.”

### Another go at CO<sub>2</sub> mobile phases

Waters (Milford, MA) first commercialized sub-2-micron particle HPLC in 2004 and remains a leader in both UPLC® (its trademark) and larger particle technologies. Senior product manager David DePasquale tells *Lab Manager Magazine* that adoption of UPLC was slow at first but is picking up. “Only a few vendors took the holistic approach to sub-2-micron, where modules were specially built to handle the high back pressures.” Today, with nearly every manufacturer offering UHPLC (the generic term for sub-2-micron), DePasquale believes that instruments claiming pressures significantly higher than 15kpsi to 18kpsi will face diminishing returns for the back pressures involved.

One factor fostering adoption of small particle LC is the appearance of verifiable methods in the U.S. Pharmacopeia, as well as among food and environmental methods. Before these methods arose, users had to choose between older tech-

nology and the burden of validating methods.

At Pittcon 2012 Waters introduced a new twist on UHPLC that uses supercritical CO<sub>2</sub> as the primary mobile phase. Ultraperformance Convergence Chromatography™ (UPC<sup>2</sup>™) separates nonpolar molecules that would normally be candidates for normal phase. Many companies are reluctant to run these, however, due to the flammability and purchase/disposal costs of hydrocarbon solvents.

Waters prefers not to use the term “supercritical” when discussing the system because of supercritical CO<sub>2</sub>’s reputation of being difficult to work with. But DePasquale offers assurance that “we’ve solved all the issues with liquid CO<sub>2</sub>.” Waters hopes that the new format will achieve greater acceptance than supercritical LC because it tackles both chiral chromatography and more conventional normal phase separations.

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THERMAL CYCLERS

EXPANDING USES SPAWN THE NEED FOR MORE DEVICES

by Mike May, Ph.D.

This year marks the 25th anniversary of commercial thermal cyclers for the polymerase chain reaction (PCR). In brief, this technology amplifies segments of DNA. In such a device, PCR tubes go in holes in a thermal block. With everything loaded, the instrument runs the sample through cycles of temperature increases and decreases. Each cycle makes more nucleic acid.

**“Given such a broad range of uses, scientists may have to sign up to use the thermal cycler in the lab.”**

As explained by Trisha Dowling, director of product management for PCR at Life Technologies (Carlsbad, CA), “Thermal cyclers use Peltier-based heating and cooling, and there’s not much variation across instruments outside that core technology for thermal cycling.” She adds, “Thermal cyclers are workhorse instruments and every molecular biology lab has at least one.”

Although the basic technology seems fairly stable among thermal cyclers, some trends keep pushing this technology to new capabilities. In large part, those trends push for faster speed in a variety of ways.

**Increasing access**

“One challenge for researchers using thermal cyclers today,” says Dowling, “is that they can be a bottleneck in their research.” This happens because these instruments make up an integral step of much of modern molecular biology’s workflow. “A thermal cycler is used for PCR, which is required in numerous genomic techniques including cloning, genotyping, and sequencing,” she says. “Given such a broad range of uses, scientists may have to sign up to use the thermal cycler in the lab.” So a waiting line of sorts can form at the thermal cycler.

Dowling notes that the throughput issue does not lie in individual thermal cyclers. Instead, the problem comes from so many users sharing them. She points out that users don’t always fill the block. “Someone might only run 10 or 20 samples, leaving significant capacity underutilized,” she says. “It’s like putting half a load of laundry in a washing machine. It still runs just as long to get done.” Depending on the manufacturer, thermal-cycler blocks come in a wide range of sizes, including 24-, 96-, 384-, and 1,536-well designs. Some blocks even include less common formats, such as 60 wells. At any block size, though, other scientists wait in line while a partial PCR load processes.

To make better use of the space in blocks, some thermal cyclers can run more than one proto-

col in the same block. So some samples can be treated differently from others in the same run. This helps a lab make more efficient use of even a single thermal cycler.

Even when putting thermal cyclers through grueling schedules, including frequent use over many years, researchers demand that the instrument remains accurate. “Researchers see thermal cyclers as part of a very routine step, and the instrument needs to be very reliable,” Dowling says. “Scientists expect it to work the same every time.”

Perhaps because of the reliability of thermal cyclers, some researchers like to stick with an old favorite. “Some scientists like to use one specific block in one particular thermal cycler, or use the same thermal cycler every time,” Dowling says.

**The need for speed**

At the real-time PCR research and diagnostic core facility of the School of Veterinary Medicine at the University of California, Davis, director Emir Hodzic, D.V.M., Ph.D., often gets requests for fast turnarounds on samples. “Sometimes our clients ask for results within a couple of hours,” he says. “To go that fast, we need to change the thermal cycler’s block. That’s an obstacle to speed, and then you need to do some optimization.”

Dowling points out that “there are differences in thermal cyclers that are optimized for faster PCR reactions.” For example, she says, “Our Veriti thermal cycler is optimized to run both standard and fast PCR protocols at a range of volumes. Our GeneAmp PCR System 9700 offers multiple block choices of different alloys for faster sample ramp rates.” To run the process faster, the thermal-cycler block needs to accommodate faster temperature changes and the enzyme must also work at the new rate. By using a smaller volume, the sample’s heat can be changed faster and the enzymatic reaction works faster across the sample, too. “All those components must work together,” she says.

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**“Researchers see thermal cyclers as part of a very routine step, and the instrument needs to be very reliable.”**

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Another key factor to faster reactions is ease of setup and programming. As Dowling says, “Our Veriti thermal cycler has an intuitive touchscreen that makes it very easy to input and quickly start your PCR protocol, or to easily access one of the many pre-programmed methods.”

## Seeking standardization

Today’s thermal cyclers offer many user benefits. In terms of actually running the device, Hodzic says that it’s so simple a child can do it.

“It’s very easy,” he says, “like using a Mac.” The complexity arises in designing the experiments and determining what samples to test and when. “With Lyme disease, for example, you cannot get blood and look for the presence of infection at all time points, because it’s a very short time window.”

Standardization would also improve thermal cyclers, according to Hodzic. “There are so many different thermal cyclers from different companies,” he says, “and they all have different software.” He adds that some PCR master mixes work for one thermal cycler but not another.

Continuing to make thermal cyclers faster and more efficient will improve the vast range of genomic technologies that rely on this platform. As genomics itself expands into an increasing range of basic research and clinical applications, the need for thermal cyclers will grow even more intense. Beyond improving the data produced with thermal cyclers, Hodzic sees an even bigger goal. “We are here to help human health, animal health, and the environment,” he says. To do that, thermal cyclers must produce consistent results that can be compared from one experiment to another and between labs around the world.

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# LIMS

## EXPANDING INTEGRATION AND CAPABILITIES

by Mike May, Ph.D.

A laboratory information management system (LIMS) consists of software with the ability to perform a wide variety of tasks. This technology can help a researcher develop the workflow for a new experiment or high-throughput assay; control the steps of the process as it runs; integrate a collection of laboratory platforms; and collect, store, and analyze the results. A LIMS can also use the results from one run to modify future runs. By automating laboratory workflows, organizations realize significant productivity and efficiency gains that also facilitate faster, more informed decisions.

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**“People usually don’t understand the cost of managing a paper-based system.”**

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In many cases, the task at hand dictates the needed features in a LIMS. For example, Borries Demeler, Ph.D., associate professor at The University of Texas Health Science Center at San Antonio, developed the UltraScan analysis software, which works with data generated from an analytical

ultracentrifuge to examine features of macromolecules. “The analysis is quite complex,” says Demeler. Moreover, grabbing the most information from these data depends on computer modeling that requires a supercomputer. So UltraScan helps users around the world deliver analytical-centrifuge data to a supercomputer for analysis, and that requires a LIMS.

Given the unique demands of working with data from analytical ultracentrifuges, Demeler and his colleagues developed their LIMS from scratch. Still, this example reveals information that applies to many other situations. For one thing, UltraScan must work easily, even for people with limited computer experience. “It works off of a web interface,” Demeler explains, “and a user submits a job through a regular web form to a supercomputer infrastructure.” He adds that this software must “manage diverse experiments and do everything from data storage and management to data analysis, visualization, and report generation—all while keeping all the information together in a well-organized fashion.” On top of all that, UltraScan—like other LIMS systems—helps scientists collaborate.

### Getting together

Through expansion of its integration and capabilities, a LIMS can bring people together from different laboratories, geographies, and businesses to col-

laborate and share information. “When planning a LIMS implementation, people usually intend to integrate all systems and all instruments, but that effort is often forgone once the LIMS is in use,” says Trish Meek, product strategist for life sciences at Thermo Fisher Scientific (Waltham, MA). Without that complete integration of systems and instruments, she adds, they don’t see as much return on investment as they could. “To get that benefit, they need to eliminate the manual steps in the process, which is why we are launching Thermo Scientific CONNECTS Suite for the paperless lab,” she says.

When a LIMS automates everything from process planning and control to data capture and archiving, a lab can go paperless. In addition to the convenience and efficiency, using a LIMS to eliminate paper can prove cost effective. “People usually don’t understand the cost of managing a paper-based system,” says Colin Thurston, product strategist for process industries at Thermo Fisher Scientific. “If paper is used for compliance, that requires a costly infrastructure to manage the paper and authenticate it.”

Making everything in a lab work together sounds easy enough, except for one thing: heterogeneity. “Platforms in labs come from different vendors with a whole host of data formats and ways and methods of doing things,” says

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Kim Shah, director of marketing and business development for informatics at Thermo Fisher Scientific.

So getting all those platforms working with the LIMS demands some way to integrate everything. “Thermo Scientific Integration Manager,” says Meek, “transforms data from any system into the LIMS and back.” Since there is no industry standard for data formats, Meek and her colleagues developed their own vendor-neutral XML standard to convert the data to make them compatible with the LIMS and to visualize the data from any instrument.

To really push collaboration between instruments within a lab and between enterprise systems outside the lab, scientists need vendor-neutral data management and visualization tools to manage the variety of data formats and processes. Only then can a wide range of systems provide laboratory information management for a variety of circumstances.

### Going mobile

Despite the ongoing battle to make all instruments pump out standardized data formats, scientists keep raising the bar for LIMS applications. As Thurston points out, “We’re seeing a number of customers wanting to take lab operations to the field, say, for samples in the environmental space.” Doing that means connecting a LIMS to some mobile device, such as a smartphone or iPad. The mobile

device could be used to collect data in the field, as Thurston notes, or to alert operators to problems on instruments running in a lab. For example, if the results from a device start running outside of specifications, a LIMS could push an alert message to the operator’s mobile device for instantaneous feedback.

At STARLIMS (Hollywood, FL), an Abbott Company, senior product manager Jay Ross also sees the interest in mobile connections. “People want to access their LIMS from anywhere,” he says. He adds that LIMS vendors are exploring the best ways to use mobile devices.

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**“The LIMS software of tomorrow will integrate more systems and control them from more locations.”**

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For example, he says that customers want to use a LIMS on an iPad. “We’re going in that direction,” Ross says, “but the first assumption that you have to make is that what you have today won’t work well on iPads, because today’s systems are made for a full keyboard.” He adds, “You just can’t port apps to the mobile or tablet platforms.” Instead, developers must decide which of the hundreds or even thousands of features in some modern LIMS software make the most sense for

development in mobile versions. No matter what developers select, one thing will not change: The LIMS software of tomorrow will integrate more systems and control them from more locations. That is inevitable.

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# SURVEY SAYS: ARE YOU IN THE MARKET FOR AN ELN?

Electronic Laboratory Notebooks (ELNs) are software programs that replace paper notebooks in the lab, but they are also more than that, helping to close the electronic gaps among and between data systems. Recently, ELNs have been part of the informatics convergence trend in laboratories, which has become particularly important in QA/QC labs where ELNs can streamline data review as well as help reduce mistakes and expensive retesting. Another current change going on is the addition of more functions to ELNs, especially in the areas of sample management and inventorying. However, these products have remained application-specific over the years with no universal ELN that can serve chemistry, biology, and quality workflows. We recently surveyed our readers about ELN use in their labs.

Readers were also asked what the primary purposes for their ELNs are. Here's how they answered:

Centralized data repositories	<b>16%</b>
Improved communication between instruments and related software	<b>5%</b>
Accelerating the documentation and reporting of experimentation	<b>21%</b>
Workflow coordination across geographic and business boundaries	<b>5%</b>
Intellectual Property (IP) Protection	<b>26%</b>
All of the above	<b>26%</b>

The biggest challenges our surveyed readers faced in purchasing their ELNs were:

Investing in software that will become obsolete	<b>19%</b>
Data migration into the new system	<b>8%</b>
Staff adoption and training	<b>26%</b>
Demonstrating ROI	<b>13%</b>
System selection	<b>7%</b>
Gaining user buy-in	<b>8%</b>
Integration with other systems	<b>15%</b>
Other	<b>3%</b>

Most important features that impact our readers' decisions to buy an ELN system:

	Important	Not Important	Don't Know
Ease of use	<b>99%</b>	<b>1%</b>	<b>0%</b>
Training	<b>98%</b>	<b>2%</b>	<b>0%</b>
Versatility	<b>97%</b>	<b>1%</b>	<b>2%</b>
Security	<b>94%</b>	<b>3%</b>	<b>3%</b>
Price	<b>94%</b>	<b>4%</b>	<b>2%</b>
Customization	<b>94%</b>	<b>5%</b>	<b>1%</b>
Service and Support	<b>92%</b>	<b>5%</b>	<b>3%</b>
Scalability	<b>91%</b>	<b>7%</b>	<b>2%</b>
Multi-Platform	<b>89%</b>	<b>9%</b>	<b>2%</b>
Ease of Installation	<b>88%</b>	<b>9%</b>	<b>3%</b>
Remote Access	<b>81%</b>	<b>15%</b>	<b>4%</b>
Web-based access	<b>80%</b>	<b>14%</b>	<b>6%</b>

Our respondents are most interested in speeding up the reporting and documenting of experiments in their labs. Here are the other main reasons they decided to purchase an ELN:

Upgrading existing ELNs	<b>4%</b>
Addition to existing systems, increase capacity	<b>10%</b>
Setting up a new lab	<b>11%</b>
Centralized data repositories	<b>8%</b>
Infrastructure for capturing, accessing and sharing experimental information	<b>11%</b>
Improved communication between instruments and related software	<b>7%</b>
Accelerating the documentation and reporting of experimentation	<b>21%</b>
Enabling scientists to collaborate effectively on multi-stage projects	<b>4%</b>
Workflow coordination across geographic and business boundaries	<b>4%</b>
Streamlined regulatory compliance	<b>7%</b>
Web-based access	<b>10%</b>
Other	<b>3%</b>

There are four main types of ELN installations; here are the kinds that our surveyed readers use in their laboratories:

Web-based	<b>26%</b>
Stand-alone	<b>11%</b>
Thin client/server	<b>21%</b>
Client/server	<b>42%</b>

The number of users who access the ELNs in our respondents' labs:

1 to 10	<b>33%</b>
11 to 25	<b>28%</b>
26 to 50	<b>17%</b>
51 or more	<b>42%</b>

The vast majority of our readers are buying an ELN for the first time.

Is this your first-time purchase of an ELN?

Yes	<b>90%</b>
No	<b>10%</b>



For more information on ELNs, visit [www.labmanager.com/eln](http://www.labmanager.com/eln)

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# SURVEY SAYS: ARE YOU IN THE MARKET FOR A WATER PURIFICATION SYSTEM?

Designing a new lab water system or retrofitting an existing system requires a thorough understanding and working knowledge of contaminants, purification technologies, industry standards, user requirements, and water distribution options.

A successful water system design begins with a clear and precise definition of user needs throughout the facility. The purity level and volume of water required at each point of use can vary considerably and therefore must be fully assessed in order to properly inform the designer of the water purification system. Once water purity requirements are defined, it is essential to calculate the volume of water that will be required at each use point. This calculation must take into consideration all use points requiring pure water including sink faucets and instruments such as glassware washers. Timing of water usage must also be determined. Is the expected usage relatively consistent over a typical workday or are there times of peak demand? Will water be used over a 24-hour period or be limited to an eight-hour workday? Will there be demand for water on the weekend? When assessing volume requirements, it is also important to estimate the maximum simultaneous usage when there are multiple points of use. This information provides guidance as to the proper size of equipment, flow rates and pressure requirements of the water system designed for the facility.

The top 10 factors/features in our readers' decisions to buy a water purification system included the following:

	Important	Not Important	Don't Know
Performance of product	<b>95%</b>	<b>4%</b>	<b>1%</b>
Durability of product	<b>94%</b>	<b>1%</b>	<b>5%</b>
Low maintenance/easy to clean	<b>92%</b>	<b>7%</b>	<b>1%</b>
Availability of supplies and accessories	<b>90%</b>	<b>5%</b>	<b>5%</b>
Ease of use	<b>90%</b>	<b>9%</b>	<b>1%</b>
Value for price paid	<b>89%</b>	<b>9%</b>	<b>2%</b>
Total cost of ownership	<b>88%</b>	<b>10%</b>	<b>3%</b>
Low operating costs	<b>87%</b>	<b>11%</b>	<b>2%</b>
Service and support	<b>84%</b>	<b>14%</b>	<b>2%</b>
Warranties	<b>80%</b>	<b>17%</b>	<b>4%</b>

Deionization was the most common technique our readers used to remove relevant contaminants, with reverse osmosis and ultrafiltration coming second and third.

Distillation	<b>11%</b>
Deionization	<b>27%</b>
Reverse osmosis	<b>20%</b>
Activated carbon filtration	<b>10%</b>
Microporous filtration	<b>6%</b>
Ultrafiltration	<b>18%</b>
Ultraviolet oxidation	<b>3%</b>
Other	<b>5%</b>

Most of our readers use raw potable as their feed source for their principal water purification systems with deionized being the second most popular source out of those we surveyed:

Raw potable	<b>41%</b>
Deionized	<b>25%</b>
Distilled	<b>10%</b>
Reverse osmosis	<b>15%</b>
Di/RO	<b>7%</b>
Other	<b>3%</b>

The purity levels of ASTM Standards lab water required by survey respondents:

ASTM Type I	<b>52%</b>
ASTM Type II	<b>30%</b>
ASTM Type III	<b>9%</b>
Other	<b>9%</b>

The water purification system components survey respondents are using in their labs:

Storage tank	<b>21%</b>
Dispensing points	<b>18%</b>
UV sterilizer	<b>15%</b>
Distiller	<b>11%</b>
Polisher	<b>12%</b>
Water quality monitor	<b>17%</b>
Water softener	<b>5%</b>
Other	<b>1%</b>

The different types of contaminants our readers tend to find in their water include:

Particulates	<b>27%</b>
Dissolved inorganics (solids and gases)	<b>27%</b>
Dissolved organics	<b>21%</b>
Microorganisms	<b>17%</b>
Pyrogens	<b>5%</b>
Other	<b>2%</b>



**For more information on water purification systems, visit [www.labmanager.com/water-purification](http://www.labmanager.com/water-purification)  
COMPLETED SURVEYS: 293**

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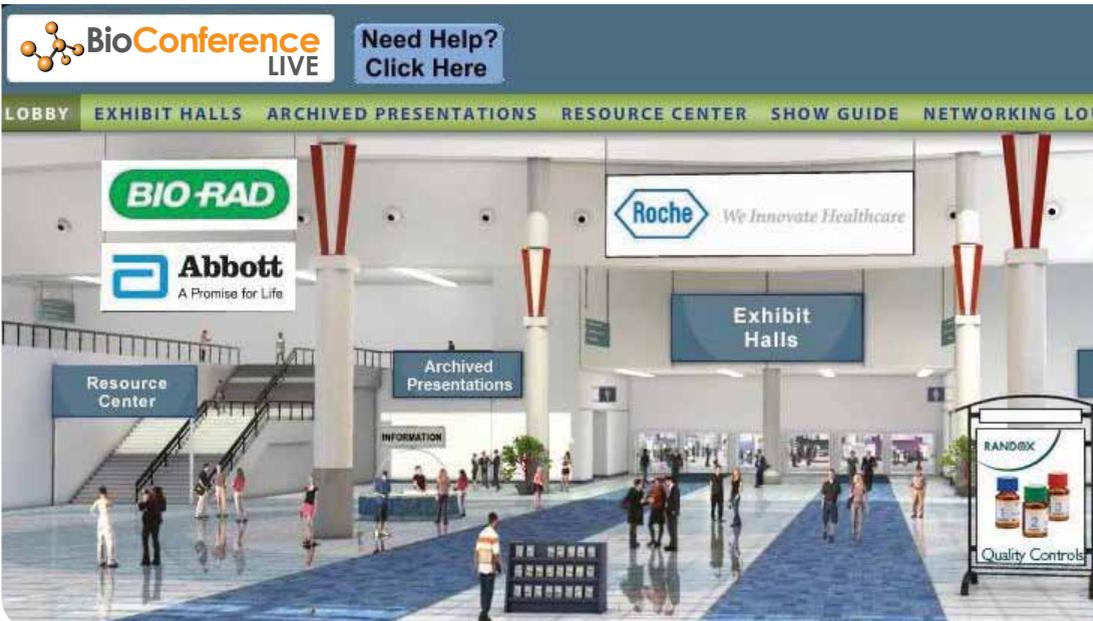
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This event will bring together clinicians, medical experts and professionals from around the world to learn about recent advances in clinical diagnostics and medicine. This conference offers an amazing opportunity as it is free to participants, and there will be no out-of-pocket expenses for travel. However, participants will still benefit from interacting with a global community of like-minded colleagues, without leaving the comfort of their office or home.





# SURVEY SAYS: ARE YOU IN THE MARKET FOR HPLC COLUMNS?

Column technology has been a rich area for HPLC R&D. As reasonably expensive consumables, columns are a significant factor in LC operating costs and performance—in other words, key value drivers. Superficially porous particles (SPPs) represent a true breakthrough in column technology. SPPs go by different names depending on the vendor and consist of a solid silica core surrounded by a porous shell. Conventional particles are porous throughout. The basis for SPPs' enhanced performance is more rapid mass transfer through the particle bed, which occurs at the expense of binding capacity. Most SPP sizes are in the 2.6µ range. However, SPPs will not provide significant performance enhancements unless one addresses the system contributions to band broadening.

The top 10 most important factors in our readers' decisions to buy HPLC columns included:

	Important	Not Important	Don't Know
Technical performance of HPLC columns (e.g. peak shape)	<b>93%</b>	<b>5%</b>	<b>2%</b>
Ruggedness / durability of HPLC columns	<b>90%</b>	<b>9%</b>	<b>1%</b>
Lot to lot reproducibility of HPLC columns	<b>82%</b>	<b>14%</b>	<b>4%</b>
Initial purchase price of column	<b>69%</b>	<b>29%</b>	<b>2%</b>
Reputation of column manufacturer	<b>64%</b>	<b>32%</b>	<b>4%</b>
Applications support	<b>62%</b>	<b>36%</b>	<b>5%</b>
Breadth of HPLC column offering (Selectivity)	<b>58%</b>	<b>35%</b>	<b>7%</b>
Available applications literature	<b>55%</b>	<b>40%</b>	<b>5%</b>
Method validation / compliance support	<b>55%</b>	<b>40%</b>	<b>5%</b>
Specials and promotions	<b>48%</b>	<b>40%</b>	<b>12%</b>

The types of columns our surveyed readers are using for their liquid chromatography work include:

Large ID (> 10 mm dia)	<b>12%</b>
Analytical scale (~4.6 mm dia)	<b>54%</b>
Narrow-bore (1 to 2 mm dia)	<b>21%</b>
Capillary columns (< 0.3 mm dia)	<b>9%</b>
Chip-level (microfluidic)	<b>1%</b>
Other	<b>2%</b>

Our readers' current column usage within their departments:

0 - 1 per month	<b>38%</b>
2-5 per month	<b>28%</b>
6-10 per month	<b>10%</b>
10-50 per month	<b>9%</b>
50+ per month	<b>7%</b>
Don't know	<b>7%</b>

Requiring higher quality data was our readers' number one reason for purchasing LC columns:

Trying to reduce operating costs	<b>7%</b>
We require more precise and accurate flow rates	<b>8%</b>
Setting up a new lab / developing a brand new method	<b>11%</b>
Require shorter run times / increased lab throughput	<b>13%</b>
Require higher quality data	<b>14%</b>
Addition to existing systems, increase capacity	<b>6%</b>
Upgrading existing HPLC system to UHPLC	<b>5%</b>
Reduce solvent usage and waste	<b>8%</b>
Reduce sample prep steps and time	<b>6%</b>
Increase column life	<b>10%</b>
Working with more difficult samples that cause column clogging	<b>8%</b>
Require a special size LC Column	<b>2%</b>
Other	<b>3%</b>

The most common HPLC separation modes our readers are using or plan to use in their labs are reversed phase, followed by normal phase and ion exchange.

Reversed phase	<b>27%</b>
Normal phase	<b>15%</b>
Hydrophilic interaction (HILIC)	<b>10%</b>
Ion exchange	<b>12%</b>
Chiral	<b>4%</b>
Gel permeation (GPC)	<b>6%</b>
Gel filtration (GFC)	<b>6%</b>
Ion exclusion	<b>4%</b>
Ion chromatography	<b>10%</b>
Affinity	<b>4%</b>



For more information on HPLC columns, visit [www.labmanager.com/hplc-columns](http://www.labmanager.com/hplc-columns)  
**COMPLETED SURVEYS: 209**



# HPLC Polymers 101

The power of polymeric columns

Polymer HPLC columns have a lot of benefits. They don't require any functionalization for reversed-phase separations, and rigid polymeric supports intrinsically resist chemical and pH degradation, a fundamental problem with silica columns. Plus, polymer's inertness to most chemical environments makes it a robust and economical solution.

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- ✓ Longest average life span

To learn more about how polymer columns can perform for you, visit [www.ham-info.com/0522](http://www.ham-info.com/0522) or call toll free 1-888-525-2123.

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**HAMILTON** 





# SURVEY SAYS: ARE YOU IN THE MARKET FOR A MICROPLATE READER?

Microplate readers are used to discern either physical, chemical, or biological events in microtiter plates and are common in academia and the biotech, pharmaceutical, and drug discovery industries, as well as in research. These instruments are continuing to progress towards better throughput, flexibility and functionality as users demand even greater instrument reliability, easy-to-use software and a short learning curve. In academic research, 96-well plates are the most common, while in industry, 384-well plates are the norm. The latest microplate readers have also been affected by the need to use fewer reagents and consume less sample. Those looking to buy a new microplate reader should consider their current vs. future needs and whether or not they require single or multimode reading capabilities.

## The primary applications readers are using their microplate readers for in their labs include:

Assay development	<b>18%</b>
Authenticity and traceability	<b>1%</b>
Bioassay validation	<b>10%</b>
Biomarker research	<b>7%</b>
Biomolecule concentration measurement	<b>13%</b>
Cell biology	<b>12%</b>
Compound investigation	<b>4%</b>
Disease studies	<b>6%</b>
DNA quantification	<b>7%</b>
High-throughput drug screening	<b>3%</b>
In vitro fertilization (IVF)	<b>1%</b>
PCR setup and cleanup	<b>2%</b>
Proteomics	<b>4%</b>
Quality control	<b>7%</b>
Stem cell research	<b>3%</b>
Other	<b>2%</b>

## Our survey respondents are using the following microplate reader components in their labs:

Additional stacker cassettes	<b>5%</b>
Barcode scanner	<b>7%</b>
Bulk dispensing	<b>9%</b>
Centrifugation	<b>15%</b>
De-lidding stacker cassettes	<b>1%</b>
High-speed robot	<b>4%</b>
Labeling and sealing	<b>6%</b>
Microplate washers	<b>22%</b>
Microplate handlers	<b>7%</b>
Microplate stackers	<b>6%</b>
Microplate robotics	<b>5%</b>
Microplate sealers	<b>10%</b>
Other	<b>2%</b>

Although a mature product category, microplate readers are evolving towards greater functionality, flexibility, and throughput. All top instrument makers are focusing on at least some efforts on multiplexing. Users want a short learning curve, user-friendly software, and instrument reliability, while vendors are introducing evolutionary improvements in performance, reliability, user interface, and support. There are more than 25 vendors. With so many vendors competing for modestly growing research and high-throughput markets, there has been a steady stream of technologic innovation and price reductions.

Users are also big on ease of use, reliability, robustness, validation capabilities, throughput, automation, and service. Ease of use includes the user interface and software; validation capabilities, once solely the domain of environmental, forensics, and pharmaceutical labs, are gaining popularity among non-regulated industries as well. Automation and throughput are significant factors for medium- to high-throughput labs, but not to academic and basic research organizations.

## The top 10 factors/features that had the biggest impact in our readers' decisions to buy microplate readers include:

	Important	Not Important	Don't Know
Ease of use	<b>94%</b>	<b>4%</b>	<b>2%</b>
Sensitivity	<b>93%</b>	<b>6%</b>	<b>1%</b>
Product performance for intended application	<b>90%</b>	<b>5%</b>	<b>5%</b>
Price	<b>87%</b>	<b>6%</b>	<b>7%</b>
Low maintenance/ operating costs	<b>83%</b>	<b>11%</b>	<b>6%</b>
Service and support	<b>82%</b>	<b>10%</b>	<b>7%</b>
Flexibility (available detection modes)	<b>78%</b>	<b>15%</b>	<b>7%</b>
Software for data collection/analysis	<b>78%</b>	<b>13%</b>	<b>10%</b>
Warranty	<b>78%</b>	<b>16%</b>	<b>6%</b>
Add-on functionality and upgrade capability	<b>75%</b>	<b>17%</b>	<b>8%</b>

## The types of microplate reader detection modes our readers are currently using or planning to purchase for their labs include:

	Currently Using	Planning to Purchase
Absorbance	<b>90%</b>	<b>10%</b>
AlphaScreen	<b>64%</b>	<b>36%</b>
Fluorescence polarization	<b>81%</b>	<b>19%</b>
Time-resolved fluorescence (TRF)	<b>70%</b>	<b>30%</b>
Time-resolved fluorescence energy transfer (TR-FRET)	<b>65%</b>	<b>35%</b>
Luminescence reader	<b>77%</b>	<b>23%</b>
Multi-mode reader	<b>70%</b>	<b>30%</b>
Microplate spectrophotometer	<b>77%</b>	<b>23%</b>
Other	<b>78%</b>	<b>22%</b>



For more information on microplate readers, visit [www.labmanager.com/microplates](http://www.labmanager.com/microplates)  
**COMPLETED SURVEYS: 242**

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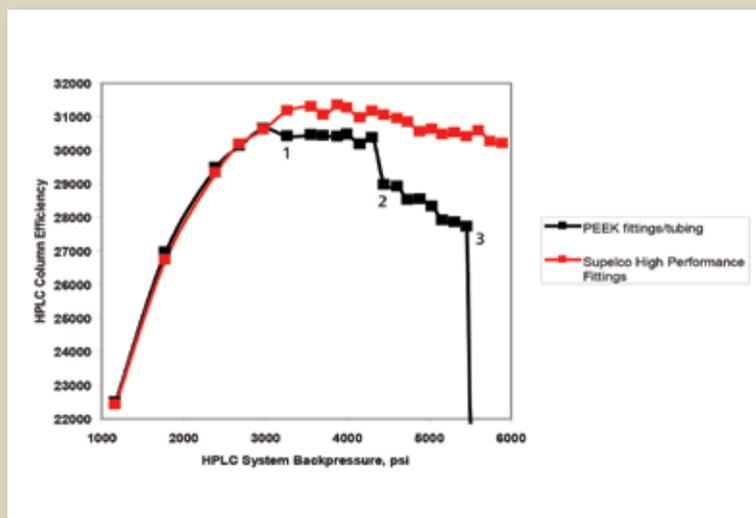
## High Performance Fittings for HPLC & UHPLC

**Problem:** HPLC systems are forced to their pressure limits under fast HPLC and high resolution HPLC conditions. System back pressure issues can arise from efforts to increase efficiency and resolution such as increasing flow rates and column lengths, as well as reducing particle size. PEEK is the traditional tubing material of choice for most applications but it is no longer suitable for high performance HPLC. The PEEK tubing can slip or become distorted under high pressures, causing poor resolution, diminished efficiency and system failures. High performance HPLC requires a more advanced type of fitting—one which can handle the higher pressures without failing, while still eliminating dead volume that contributes to band broadening and decreased resolution.

**Solution:** One such option is a line of high performance fittings from Supelco that maintains the integrity of HPLC systems up to 15,000 psi with finger tightening. In particular, the Supel-Connect High Performance Fittings and Interconnects are made of 316 stainless steel and use a sliding ferrule design to allow for installation into any port. A design like this allows the user two degrees of freedom in compressing the ferrule. Partial separation of radial and axial tightening forces allow the fitting to withstand pressures greater than 15,000 psi, while providing strong elimination of dead volume. Figure 1 shows the HPLC column efficiency as a function of system backpressure. The system equipped with PEEK fittings illustrates gradual loss of efficiency starting at 3,000 psi with an eventual catastrophic failure at 5,500 psi. However, the Supelco high performance fittings show no performance loss as a function of pressure.

High performance interconnects can be used on most HPLC systems. They are available in various configurations, with either flexible or rigid stainless tubing. With the right configuration of fittings and nuts, they can also be used with PEEK, PEEKsil™, or the stainless steel tubing of the user's choice to extend the pressure limits of standard tubing.

For more information and to see a video demonstrating the Supel-Connect high performance fittings, visit [www.sigmaaldrich.com/hplc](http://www.sigmaaldrich.com/hplc) or check out the product specs at [www.sigmaaldrich.com/analytical-chromatography/analytical-products.html?TablePage=19820794](http://www.sigmaaldrich.com/analytical-chromatography/analytical-products.html?TablePage=19820794)



Is it that simple for DNA?



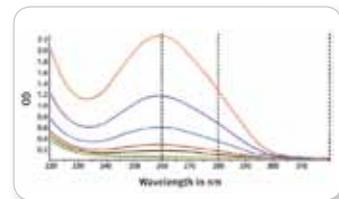
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DNA concentrations are automatically determined with the SPECTROstar<sup>Nano</sup>. Collect all wavelengths simultaneously.



LVIS Plate for low volume measurement

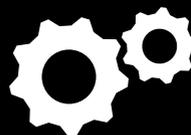


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The Microplate Reader Company



## Affordable, High Density -80°C Biobanking

**Problem:** Since the early 1990s, biobanking has been evolving as a key resource, increasing the availability and use of biological material such as DNA, RNA, tissues and cells for biomedical research.

Aside from large biobanking schemes set up by national and institutional biobanks (e.g. the genome project and the National Cancer Institute), there are a growing number of smaller research groups and companies needing low cost, compact, automated and secure biobanking facilities as their sample libraries increase.

At present, these smaller research groups employ traditional storage methods, using freezers and liquid nitrogen dewars which require manual labelling, rack organization, logging and placement. With vast numbers of biological samples, this process can become time-consuming, labour intensive, and open to error. In addition, sample placement and retrieval can result in significant temperature fluctuations as a result of freezer doors being opened or dewar lids being removed and racks being taken out. This process can result in the unnecessary partial thawing of unpicked samples, potentially affecting sample stability and quality.

Small pharma companies and research groups are unable to commit both the space and the finances to invest in the large automated -80°C storage platforms currently available on the market. It would therefore be advantageous to have an efficient, small and robust automated -80°C biobanking store providing secure tube placement and sample tracking. Furthermore, the ability to retrieve or “cherry-pick” individual samples would minimize disturbance to other samples within the store.

**Solution:** With increasing numbers of biological samples, such as *ex-vivo* materials (e.g. tissue, blood and organs), genetic material or cell lines, biobanking has become a major area of growth across the biomedical research industry. As a result, small, high density, automated biobanking stores have become important for the increasing number of small research groups, enabling them to manage sample storage effectively.

For example, arktic, the -80°C biobanking option from TTP Labtech, was introduced as a natural progression from the company’s small footprint, modular comPOUND, launched for the automated storage of compound libraries and samples between ambient and -20°C. Incorporating comPOUND’s pneumatic transport technology, arktic offers affordable, compact and high density automated storage at -80°C. With the intelligent software and secure bar-code based sample tracking systems such as the arktic provide, automated and fast sample placement and retrieval is easily achieved.

The arktic in particular provides compact storage under nitrogen or dry air in a hermetically sealed environment, as well as the ability to cherry-pick individual microtubes for delivery within 60 seconds, ensuring the integrity of valuable biological samples is maintained within the store. Connecting easily to database and Laboratory Information Management Systems (LIMS), the technology allows the pre-sorting of tubes within the -80°C environment, enabling “sets” of samples to be readied for fast delivery, when required. This ability to sort samples within the -80°C store enables the removal of complete sets, as well as individual tubes from the store for

analysis. Moreover, the absence of moving internal parts addresses concerns arising from the robustness of internally functioning robotics in such a low temperature environment.

With the capacity to hold up to 95,000 0.5mL tubes, the arktic modular store can fit neatly into a bench-sized space in the laboratory, making stores like this ideal for research groups with limited space. As biobanking requirements increase, additional modules can be easily linked together to provide the flexibility for an almost unlimited library capacity.

For further information, please see <http://www.ttplabtech.com/new/arktic.html> or contact [sales@ttplabtech.com](mailto:sales@ttplabtech.com)



▲ TTP Labtech's arktic -80°C biobank



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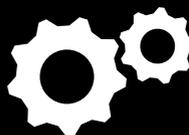
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## A New Approach to Western Blotting

**Problem:** A mainstay in life science research, western blotting is commonly used to assess relative protein expression differences, such as when investigating cellular signaling pathways. Accurate quantification requires careful attention to procedural details and normalization. Traditionally, western blotting is a two-day process with many steps: electrophoresis, transfer, blocking, primary and secondary antibody application and detection. Optimization is often challenging because when blots fail, it's difficult to determine whether it was a result of the steps leading to antibody binding and detection, or whether the problem was due to the antibody itself.

**Solution:** One system that may help is the V3 Western Workflow™ from Bio-Rad Laboratories, Inc., which uses stain-free technology to confirm that protein separation and transfer performed as expected and that subsequent immunodetection will result in high quality western blot data. This new system cuts the workflow time in half, while stain-free technology ensures faster, more accurate quantitation of protein expression levels.

The V3 Western Workflow combines Bio-Rad's TGX Stain-Free™ precast gels, TransBlot® Turbo™ transfer system and the ChemiDoc™ MP imaging system into an integrated solution.

A system like this can deliver considerable time-savings through the electrophoresis and transfer steps. For example, running times on TGX Stain-Free gels are 15 minutes versus 45 minutes for traditional mini gels. Meanwhile, the TransBlot Turbo achieves protein transfer in seven minutes, compared to one hour or overnight for traditional tank methods. Transfer efficiency is comparable.

Embedded stain-free technology in the gels adds confidence to the western blotting process by allowing easy quality control. Using the ChemiDoc MP imaging system and TGX Stain-Free gels, researchers can visualize post-electrophoresis gel results in one minute to ensure the sample is not degraded. This represents a significant advance over traditional Coomassie gel staining methods that can take up to two hours to complete and are not western blot compatible. The ChemiDoc MP also allows researchers to check the membrane prior to blot detection and instantly visualize protein transfer. The gel can be subsequently re-imaged to establish if any proteins remain.

Importantly, stain-free imaging enables total protein normalization for more accurate quantitation. Total protein normalization has been shown to be more consistent than conventional housekeeping proteins, which perform variably under certain experimental conditions or sample types. Stain-free technology can therefore reduce the four-hour western blot normalization process by eliminating sequential probing or stripping and re-probing steps necessary for housekeeping protein detection.

Whereas faster processes can often come at the cost of data quality, systems like the V3 Western Workflow provide more rapid results while increasing confidence that those results are valid.

For more information, please visit [bio-rad.com/ad/V3pr](http://bio-rad.com/ad/V3pr) or e-mail [Ryan\\_Short@bio-rad.com](mailto:Ryan_Short@bio-rad.com)



- ▲ *The V3 Western Workflow consists of five steps, with each step enabled by Bio-Rad's family of blotting instruments and/or products:*
1. Protein separation: Bio-Rad's Criterion™ and Mini-PROTEAN® TGX Stain-Free™ precast gels
  2. Visualize protein: ChemiDoc™ MP imaging system
  3. Transfer protein: TransBlot® Turbo™ transfer system
  4. Verify transfer: ChemiDoc MP imaging system
  5. Validate western blot: ChemiDoc MP imaging system

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## A Microfluidic Valve

**Problem:** Strong growth in healthcare spending, especially in emerging economies, is driving increased demand for medical testing, drug discovery, genomics, and proteomics, as well as the instruments used to carry out these processes. To address this market growth, equipment manufacturers are introducing devices that are easier and more cost effective to deploy in small laboratories, clinics, and physician's offices. This new generation of equipment must also be suitable for the remote locations that are often found in emerging markets, with a lack of infrastructure and limited technical resources that make service and maintenance more difficult and costly than in traditional markets.

To meet these requirements, designers and manufacturers must find a way to reduce the complexity and size of their instruments while increasing reliability and serviceability. Integral to the function and performance of diagnostic and analytical devices are the microfluidic valves that control the dispensing of blood, reagents, and other fluids within the instrument.

**Solution:** In diagnostic instruments, the most important performance parameters for microfluidic valves are flow, pressure resistance, and accuracy. Until the introduction of dual-solenoid valves, these performance characteristics were directly related to the physical size of the valve. The new Twin Power valve technology from Burkert Fluid Control Systems breaks this correlation, offering the same performance in a smaller footprint.

Rocker type solenoid valves are commonly used in life science applications due to their separating diaphragm, which allows the use of aggressive media and provides excellent cleanability of the fluid path. In the normally closed configuration, rocker valves are designed with a spring that closes the valve and an electrical solenoid that acts against the spring to open the valve when a current is applied. It is this action that allows fluid to flow through the valve. In this single-solenoid and spring configuration, the amount of back pressure that the valve can withstand while remaining closed is limited by the strength of the spring to resist the pressure.

The Twin Power design from Burkert employs two solenoids—one for closing the valve and one for opening it. This higher power density—a solenoid, rather than a relatively weak spring, is now keeping the valve closed—allows the valve to withstand higher pressure and higher flow rates. This means that a 10mm valve using the Twin Power principle has the same performance as a traditional 16mm valve, while reducing space by 54 percent.

Reliability is addressed by choosing a valve with wetted parts such as PEEK, FFKM, FKM, and EPDM, that can withstand harsh media. Integrated power-reducing “hit and hold” electronics reduce heat transfer from the solenoid coils to the media, further ensuring reliability and performance of the valve and the system as a whole.

For more information, visit [www.burkert-usa.com](http://www.burkert-usa.com)

▶A valve with two solenoids, which provides the same flow and pressure resistance in a smaller valve.



▶The areas that are easily flushed and cleaned (all except the small orange/red areas) in the valve's fluid path.



▶Burkert's 10mm Twin Power valve has the performance of a traditional 16mm valve, but takes up 54 percent less space and has a 75 percent lower power consumption.



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# PITTCON POWER PRODUCTS

SYSTEMS ANNOUNCED IN ORLANDO COULD MAKE A BIG DIFFERENCE IN THE LAB

by Rachel Muenz

While most new products were introduced before this year's 2012 Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy in Orlando, Florida, a few notable instruments made their debut at the event.

Waters' ACQUITY UPC<sup>2</sup>™ system claimed the 2012 Pittcon Editors' Choice Gold Award for the best new product and looks to be a big step forward in chromatography. The system brings "ultra-performance convergence chromatography" to the market—a new form of chromatography meant to push the limits of gas and reverse phase liquid chromatography separations while offering a replacement for normal phase chromatography.

"ACQUITY UPC<sup>2</sup> took on every challenge we threw at it. At one point, we ran a very challenging 18-compound mixture that included amines, vitamin isomers, steroids, and antibacterial agents," said Waters division UPC<sup>2</sup> program director Harbaksh Sidhu. "The results were astounding. We saw repeatability and narrow, consistent peak widths, all in a gradient mode of operation that had extremely low baseline noise. The low system volume along with small-particle-size column is the result of

a holistic design that unlocks the benefits of using compressed CO<sub>2</sub> and has never been realized before. As someone who's been working with this technology for more than 18 years, I had never witnessed this level of performance before."

The industry-first system aims to help laboratories dealing with difficult-to-analyze compounds such as chiral and hydrophobic compounds as well as polymers, thermally labile samples, and lipids.

Waters also announced its new analytical standards and reagents business for LC and LC-MS, which offers more than 200 ready-to-use reagents and standards worldwide, along with its NuGenesis<sup>®</sup> 8 software. The software is a workflow and data management solution designed to better connect labs' business information technology systems to their analytical laboratory data systems.

Bruker also won a couple of awards at the event, taking the 4th Annual Reader's Choice Award for Gas Chromatography Products and the 2012 Pittcon Editors' Choice Silver Award for its new GC-MS platform, SCION TQ.™ You can read more about

both the SCION TQ and SCION SQ GC-MS systems in our September 2011 issue, in which we discuss the systems' cost-saving lens-free technology, higher levels of sensitivity and precision, and small footprint in our Technology News product spotlight.

Representatives also spoke at Bruker's Pittcon 2012 press event about how the company is growing, mentioning its focus on nanoscience research in Mexico along with a planned NMR product line expansion and a strategic expansion of the company's X-ray diffraction and scattering product portfolio.

The company unveiled its Compass CDS 3.0 software for GC labs that operate 24/7 and a new ion source, ionBooster, which was developed to meet the need for greater sensitivity in forensics, food testing, and environmental analysis.

Another notable Pittcon 2012 product release was CEM Corporation's Mars6 microwave sample preparation system with patent-pending OneTouch technology. The system is the result of three years of development and aims to eliminate the sample prep bottleneck in the lab with its simple OneTouch operation, advanced sensors, and training videos included in the instrument.

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◀*Bruker's Scion TQ GC-MS won both the 4th Annual Reader's Choice Award for Gas Chromatography Products and the 2012 Pittcon Editors' Choice Silver Award.*



◀*The Mars6 microwave sample preparation system from CEM is like a "chemist in a box" in the way it automates the sample prep process.*



◀*Waters' ACQUITY UPC2 ultra-performance convergence chromatography system claimed the 2012 Pittcon Editors' Choice Gold Award for best new product at the event.*

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"It represents a quantum leap in terms of technology," said CEM president and CEO Michael J. Collins about the Mars6, which is the sixth generation of such instruments from CEM.

The biggest leap forward is likely the instruments' sensors and algorithms, which allow the Mars6 to gather enough data to automate sample prep tasks for chemists and make decisions on its own. Mr. Collins said this "chemist-in-a-box" part of the system is something that has never been done before.

"The knowledge built into this system allows it to understand what is being done and apply the right conditions," he said.

That means the system is able to choose the proper vessel type, number of vessels, temperature, speed to temperature, time, and power for the sample prep the chemist is performing. All the chemist needs to do is pick the sample type with one touch.

The Mars6 includes more than 80 applications in its library, representing about 95 percent of what most people would want to do with the system, with key markets being environmental, food, pharmaceutical, consumer products, and bioscience.

In other notable news, Torion is working with the University of Waterloo on the CUSTODION-NT needle tap syringe for the collection of high-volume samples. JEOL recently released its PCSEM Imaging Montage for large-area field stitching and also unveiled its SEM Navigator, which is for any JEOL microscope with a motorized stage. Alpha MOS announced the latest version of its Heracles E-nose for high-speed GC analysis and that it will also be working on a number of other new products in the future, including mini E-noses for the medical, airline, and auto industries.

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## PRODUCT SPOTLIGHT

### DOUBLE THE CHROMATOGRAPHY, DOUBLE THE INFORMATION CONTENT SYSTEM COMBINES SFC AND UHPLC FOR ADDED SPEED

The first commercial instrument that performs both super-critical fluid chromatography and ultra high-performance liquid chromatography recently hit the market with Agilent Technologies' 1260 Infinity Hybrid SFC/UHPLC system.

Agilent liquid phase separations product manager Martin Vollmer said customers have been loving the new system so far.

"Customers are excited that they—for the first time—can run LC and SFC on a single instrument and basically double their information content without changing systems," Mr. Vollmer said. "They also love the unique flexibility and modularity; if they buy a Hybrid system they are prepared for future changes."

Users are also pleased that the system easily converts to either a standalone SFC or UHPLC or can integrate modules into pre-existing systems, he added.

"They [customers] like that they can easily expand their detection capabilities with an additional detector [and] integrate full-blown method development and column and solvent screening," Mr. Vollmer said, adding the system's 600 bar capability is another thing users are pleased with.

Mr. Vollmer said the Infinity is especially suited to the pharmaceutical industry but is also useful for food or environmental applications since everything can be done on one system, meaning speedier production over normal phase methods.

"A Hybrid system provides much more confidence for the user who can still run those validated methods but at the same time, on the same instrument, he can peer-to-peer develop faster methods with SFC," he said.

He added the system can also be built up using pre-existing 1100, 1200 and 1260 Agilent modules, meaning customers can save a lot of money.

For more information, visit [www.agilent.com/chem/infinity-sfc](http://www.agilent.com/chem/infinity-sfc)



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## PRODUCT SPOTLIGHT

### GETTING THE FULL SPECTRUM OF ASSAY-BOOSTING FEATURES

#### NEW MICROPLATE TECH SIMPLIFIES LAB APPLICATIONS

BMG LABTECH's SPECTROstar Nano microplate reader is the only instrument of its kind that can capture a full UV-Visible spectrum (220 to 1000 nm) in less than 1 sec/well. The instrument also allows users to perform assays quickly and easily in both microplates or by the built-in cuvette port.



That means users don't need to use a separate cuvette absorbance reader with a spectrometer and then adapt the assay to a microplate reader, said Ph.D. and BMG's international marketing director Edward Dell.

"[With older instruments] only one or two different wavelengths could be used in the microplate format because fast, full spectrum analysis was not possible on a microplate reader," Mr. Dell explained. "Now with the SPECTROstar Nano, assay development and throughput can be done on the same instrument without having to limit the assays to certain wavelengths, and thus compromising data."

He added the system has all of the standard absorbance applications programmed as quick start app-style buttons, including DNA, RNA, protein, NADH, ELISA, BCA, and cell growth. The reader is particularly suited to multi-wavelength, enzyme kinetic assays and assays where the peak absorbance wavelength shifts, Mr. Dell said.

"However, full spectrum analysis will greatly improve all absorbance assays," he said, adding that the instrument got a good response from attendees at ARABLAB 2012 in March.

"Many of the visitors there were starting new labs and/or were looking to purchase a microplate reader for the first time," he said. "These visitors were very intrigued with this new technology and how it could improve their assays in their laboratories."

For more information, visit [www.bmglabtech.com](http://www.bmglabtech.com)

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- Countertop or floor models available
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## PRODUCT SPOTLIGHT

## TAKE CONTROL IN THE LAB

## PERISTALTIC PUMP LASTS LONGER AND IS EASIER TO USE

In response to customer demand for independent-channel control in a peristaltic pump, IDEX Health & Science recently released its new Ismatec® Reglo ICC for laboratory use.

"Virtually all our customers—laboratory users, distributors, and instrument manufacturers—clearly asked for independent channel control," said Ismatec product manager, George Bednar. "Prior to this time, no other pump maker had been willing to make the substantial engineering commitment required to bring the ICC to market."

The pump also offers one-, two-, or three-channel configurations and features a re-engineered, long-life drive mechanism, a space-efficient footprint, and digital software control from the keypad or computer.

Mr. Bednar added that customers have shown high interest in the pump so far and the company expects an interim ramp-up period to build sufficient shelf stock for rapid delivery. However, that doesn't mean customers won't be able to get a good deal on the instrument.

"Through September 1st, we're offering the ICC at a one-time, introductory price equal to our standard Reglo digital pump—so you can essentially buy three pumps for the price of one," he said.

For medical applications, Mr. Bednar explained the pump is best suited to ADME Tox applications, dialysis, electrophysiology, organ and tissue perfusion, and physiology. The pump is also suited to food and beverage production, agriculture and industry, and more.

"Because of the low-flow accuracy of Ismatec pumps, we're seeing the greatest interest from laboratories that need to dispense discreet buffers and reagents for automated or sequential analysis such as batch-fed fermentations, liquid-phase reactor systems, or controlled feeding distribution," he said.

For more information, visit [www.idex-hs.com](http://www.idex-hs.com)



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- Also includes PID temperature control and a built-in dust extraction and collection system
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- Does not need a compressed air supply to operate
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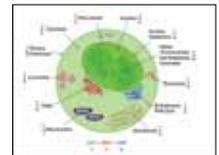
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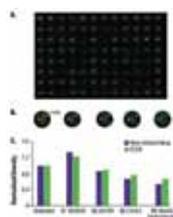
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# ADAM EQUIPMENT'S PMB 53 MOISTURE ANALYZER CLEARLY SHINES IN GLASS MANUFACTURING APPLICATIONS

It has become crystal-clear to most of us that glass is something we just can't live without. Scientists use glass beakers for measuring chemicals. We wear eyeglasses to improve our vision or to make a fashion statement. Glass windows protect us from the elements. And we raise our glasses to propose toasts and pay homage to friends, family and special events.



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But what exactly goes into producing this incredibly useful material? It's a mixture of mostly silicon dioxide (sand) with some sodium silicate and calcium silicate thrown in for good measure.

It takes 10 tons of sand to make up one ton of glass. That's a lot of sand, and the quality of the sand must be just right. Too little moisture in the sand means more sand is needed, increasing the cost. Too much moisture in the sand can lower productivity and cause quality issues, also boosting expenses.

With the huge quantity of sand involved in glass production, it's critical to ensure that the sand contains the correct amount of moisture. That's why glass manufacturers rely on Adam Equipment's PMB 53 moisture analyzers to verify and maintain proper moisture levels in their sand supplies.

Adam's PMB 53 can accurately and quickly analyze the moisture content in sand in less than five minutes. And using the PMB 53 is easy. Simply place the specimen into the heating chamber and apply heat to the sample using the PMB's energy-efficient halogen lamp. The lamp evaporates moisture and calculates the amount of moisture weight loss to get the moisture content. After testing the moisture content of several batches of sand, it's simple to monitor and control the amount of sand going into the production of each batch of glass.

Lixia He, quality control manager of a leading glass manufacturer in Hebei, China, says her company uses the PMB 53 for numerous reasons — primarily speed, accuracy and efficiency in the production process.

"It's very easy to use, and we quickly can get accurate test results on our sand moisture content," she said. "More importantly, we are assured of the moisture content going into each batch. This tells us how much sand to use in production, so we're able to control the cost of our materials and maintain the quality of our glass at the same time."

In fact, operating the PMB 53 is very simple. Just set the heat to 120 degrees Celsius and then add about 5-10 grams of sand sample, spreading it evenly over the aluminum tray. Close the chamber cover and the PMB 53 will start automatically, showing the results of the moisture analysis. Once you have your results, you can calculate the amount of sand needed for glass production.

A benefit of the PMB 53 is its ability to retain and store set-up information, saving the time and effort of having to re-enter the information in the next analysis. This is a handy feature, used widely in glass manufacturing. Often, glass companies run multiple PMB 53 units simultaneously, so they can quickly and expeditiously determine the moisture content of sand in large quantities, keeping production running smoothly and efficiently. That's especially important, as the amount of sand used is enormous, and the proportional specifications vary widely, depending on the type of glass being produced.

Numerous useful features include a brightly backlit display that shows all of the data in one place. The USB port and RS-232 cable interface make connecting with computers and printers a breeze. Its internal memory stores up to 99 test results, and additional test results can be stored quickly onto a flash drive or a computer. This helps users keep records close at hand, facilitating the sought-after consistency in the glass production process.

The PMB 53 boasts a capacity of 50g and readability of 0.001g/0.01 percent. Its pan lifter makes placing and changing samples fast and effortless. The large, circular heating chamber is designed for even heating with a single 400-watt halogen lamp. Its ergonomic design has handles on both sides for easy access. Color-coded keys highlight important functions, and an intuitively designed keypad makes operation simple.

When it's important to maintain quality and consistency in production, choose Adam Equipment's PMB 53 to completely and affordably suit all your needs. Adam also offers the PMB 202, which features a higher capacity of 200g and readability of 0.01g/0.05 percent.

## ABOUT ADAM EQUIPMENT

Adam Equipment manufactures and distributes a full selection of precision balances and scales for the lab, education, industrial, food, health/fitness, animal/veterinary and jewelry markets. The company is headquartered in England and has offices in the United States, South Africa, Australia and China. Founded in 1972, Adam is proudly celebrating its 40th anniversary in 2012. Since its inception, Adam has provided its customers with the winning combination of speed, performance and value. For more information about the company and its products, go to [www.adamequipment.com](http://www.adamequipment.com).



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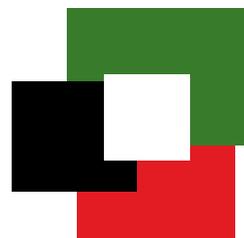
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Biological safety cabinets are critical in the protection of personnel from exposure to harmful particulates within the cabinet and the protection of product from contaminants outside the cabinet environment. Type B2 total exhaust biosafety cabinets are designed to exhaust all HEPA-filtered air through the building exhaust system. This exhausted air must be replaced by the laboratory's air supply system and is typically heated or cooled.

A significant amount of energy is required to maintain the necessary airflow, so total exhaust cabinets can incur major operating costs for a facility. Because BSCs are often operated continuously, hot or cold conditioned air adds considerable costs for a laboratory, typically ranging anywhere from \$4-\$8 per cubic feet per minute (CFM) per year.

The BioChemGARD e3, a revolutionary Type B2 total exhaust BSC from The Baker Company, couples a change in airflow throughout the cabinet with many unique energy-saving features, including a patent-pending sealed-access filter-exchange system, a motor/blower system with variable frequency drive technology and a low-flow operating mode.

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for most facility exhaust systems of up to 23%, providing a potential for annual operational cost savings of up to 49% over traditional Type B2 total exhaust cabinets. Performance and productivity remain high, while protection for both the product and personnel exceed NSF standards. Download our full white paper online at [www.bakerco.com/biochemgard](http://www.bakerco.com/biochemgard).

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# HOW TUBES AND PLATES CAN AFFECT YOUR EXPERIMENTS

By Matthew Lieber, Dr. Lars Borrmann, and Daniela Marinto

It has been known for several years that chemicals (e.g., BPA and phthalates) can leach out of the plastic, such as toys and baby bottles. The impact of these chemicals on human health is well known. Recent scientific reports have now noted that chemicals used in the manufacturing of disposable plastic labware, such as slip agents or plasticizers, can leach out of the plastic and affect laboratory experiments leading to erroneous results.<sup>1-4</sup>

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## WHAT COMES OUT OF YOUR TUBES AND PLATES

During incubation (e.g., enzymatic assays at 37°C or DNA denaturation at 95°C) chemicals used in the manufacturing process can leach out of the plastic and contaminate your sample.<sup>3</sup> Figure 1 shows the absorbance spectra of water after incubation in tubes from several different manufacturers. As you can see, in contrast to other brand tubes, the water incubated in Eppendorf tubes (blue line) shows no significant UV/VIS absorbance. This suggests that no UV/Vis active substances are released from the tube into the water. In addition, deepwell plates from different manufacturers incubated with water shows significant UV/VIS absorbance but not in Eppendorf Deepwell Plates (not shown). This is one of the examples of Eppendorf's commitment to minimize sample contamination. Besides highly automated manufacturing under clean-room conditions and purity testing of each production lot, Eppendorf doesn't use any slip agents, plasticizers, or biocides during the tube and plate manufacturing process (certificate upon request).

The next question to ask is how does leaching affect my experiment?

## HOW THE TYPE OF TUBE CAN AFFECT YOUR ASSAYS

It has been shown in several publications that the chemicals used during manufacturing of plastic consumables can affect assay results from DNA quantitation<sup>3</sup> to enzymatic assays.<sup>1,2</sup> In a Science paper from 2008, researchers showed that chemicals released from plastic tubes inhibited the activity of to note that the researchers used an amber-colored Eppendorf tube in that paper. When they switched to a clear Eppendorf tube, the results showed an absence of significant inhibition of hMAO-B.<sup>2</sup> Another important example is mass spectrometry. In a 2010 paper, researchers showed that Tinuvin-622 leaches from laboratory polypropylene and interferes with mass identification after MALDI-TOF.<sup>5</sup> Another common lab application is sample concentration. When samples need to be concentrated, it is common to use a vacuum concentrator to accelerate the evaporation of aqueous solutions. Figure 2 shows how incubating water in different brands of tubes can affect the evaporation rate of water. Samples incubated in Eppendorf tubes had the highest evaporation rate, consistent with the data shown in Figure 1. Both of these experiments and the Science paper lead you to the same conclusion: If you have a leachate you never know where it will affect you.

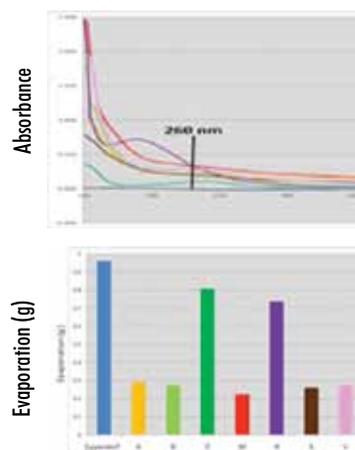
## CONCLUSION

Not all tubes are created equal. If a chemical leaches out of the tube or plate, it can carry over to all of your downstream applications and you will never know when it might affect your assays. One good summary on the importance of leaching comes

from Reid et al. (2009): "There are several steps researchers can take to minimize the likelihood of their data being compromised by leachates. Some manufacturers provide information on the additives content of their plastics; for example, Eppendorf use virgin polypropylene for their colorless pipette tips and microfuge tubes, and no slip agents or other additives are present. Although the associated costs may be slightly higher, researchers should purchase plastic ware from a manufacturer that does not use additives and avoid buying from suppliers that refuse to confirm the absence of additives."<sup>2</sup>

## REFERENCES

1. McDonald G.R. et al., Science 322, 917 (2008)
2. Reid G. et al., GIT Laboratory Journal 9-10, 2-4 (2009)
3. Lewis, L. K. et al., BioTechniques 48, 297-302 (2010)
4. Watson J. et al., J Biomol Screen 14(5), 566-572 (2009)
5. Sachon E. et al., J. Mass. Spec. 45, 43-50 (2010)



◀ Figure 1. Chemicals released from different brands of 1.5mL tubes can contaminate your sample. Shown are UV absorbance spectra of pure water incubated (30min, 95°C, 1,400 rpm mixing) in tubes from different manufacturers.

▲ Figure 2. The brand of tube can affect evaporation rates. Chemicals, for example oily slip agents, released from the tube plastic can slow down evaporation. Some of these slip agents (e.g., oleamide) have also been shown to negatively affect the outcome of biological tests like enzyme activity or receptor-binding assays.<sup>1,2,4</sup> Shown are the evaporation volumes (in grams of water) after 3 h incubation in a vacuum concentrator. Pre-incubation for 1 hr at 70°C.

## EDTA BY ANION EXCHANGE HPLC

Hamilton Company is best known for manufacturing precision fluid measuring products, including syringes for HPLC and GC. For the last 30 years Hamilton Company has manufactured HPLC resins and columns while developing separations for customers. Two of the separations are highlighted below.

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EDTA is a chelating agent added to processed foods, pharmaceuticals, soaps, cosmetics, textiles, and household cleaners. An HPLC method was needed for the determination of EDTA in a company's product. A search of the literature turned up a few references for the separation of EDTA on reversed phase columns. These methods required the use of ion pairing reagents or amperometric detection. Hamilton's goal was to develop a method that utilized a simple mobile phase, easy sample preparation, and UV detection.

### EXPERIMENTAL CONDITIONS

**HPLC Column:** Figure 1, PRP-X100 anion exchange, 10  $\mu$ m spherical particles, 4.6 X 150 mm (PEEK) (Part Number 79354).

Figure 2, PRP-X100 anion exchange, 10  $\mu$ m spherical particles, 4.1 X 250 mm (stainless steel) (Part Number 79433).

### MOBILE PHASE:

In Figure 1, hydrocortisone cream, a 30:70 3 mM sulfuric acid:methanol mobile phase was used for two reasons. First, the 3 mM sulfuric acid provided a strong driving ion to elute the EDTA copper complex in less than 3 minutes. Second, methanol is a strong enough solvent to elute the hydrophobic compounds present in the hydrocortisone cream.

In Figure 2, nasal spray, a 65:35 1.5 mM sulfuric acid:methanol mobile phase was used.

### DETECTION METHOD

The detection method was chosen because of simplicity. UV detection at 254 nm is easy to use, with good sensitivity.

**Detector:** Milton Roy SpectraMonitor 3100 variable-wavelength UV detector.

### SAMPLE PREPARATION AND INJECTION SIZE

In Figure 1, 8 g of cream was dispersed in 100 mL of deionized water. Four milliliters of this solution was mixed with 6 mL of 0.05 M cupric sulfate. This solution was filtered and 100  $\mu$ L was injected into the column.

In Figure 2, 4 mL of nasal spray was mixed with 6 mL of 0.05 M cupric sulfate. This solution was filtered and 100  $\mu$ L was injected into the column.

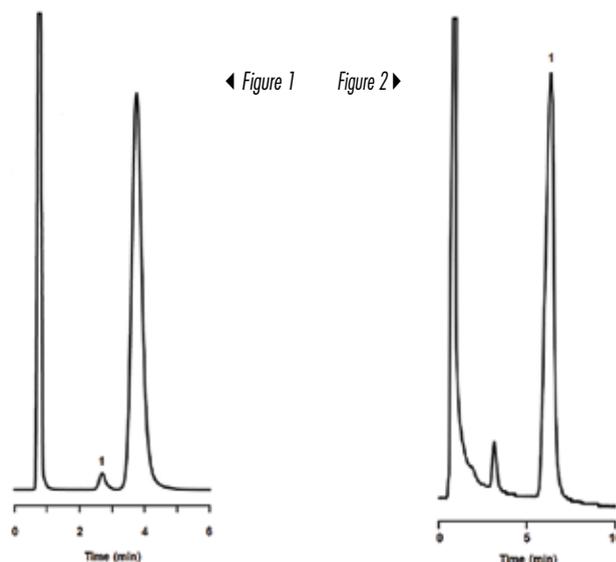
### RESULTS

The use of the PRP-X100 anion exchange column allows the rapid quantitation of EDTA. The sulfuric acid mobile phase works well in these applications, as no interferences are seen. Organic solvent compatibility from 0 to 100% allows samples containing hydrophobic compounds to be analyzed with simple dilute, filter, and shoot methods. In Figures 1 and 2 the hydrophobic compounds elute at the column void.

### CONCLUSIONS

For this application it was possible to improve upon the published methods and meet our goal of a robust method that utilizes a simple mobile phase, easy sample preparation, and UV detection.

For more information about Hamilton HPLC columns, contact the Hamilton Company or visit our website.



## DETERMINATION OF TRACE LEVEL BROMATE IN DRINKING WATER (TAP AND BOTTLED)



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Currently, the most common disinfection process in water and wastewater treatment plants currently uses chlorine gas. A process of ultraviolet (UV) disinfection is being increasingly used in many European countries but in many circumstances, ozonation is preferred. Ozonation is an ozone (O<sub>3</sub>) based disinfection process used to inactivate pathogens and oxidize organic compounds in drinking water from both municipal drinking water supplies and bottled waters. Ozonation not only kills bacteria and viruses, it also improves the taste while removing odorous compounds at the trace level.

A problem with ozone is it reacts with bromide (Br<sup>-</sup>, a common anion found in most water sources) to form bromate (BrO<sub>3</sub><sup>-</sup>). Bromate is a "possible human carcinogen" according to the World Health Organization (WHO) and termed a disinfection by-product (DBP). Researchers believe bromate is estimated to cause an excess life time cancer risk of 1:10<sup>4</sup> at 5 µg/L. The current regulatory limit for bromate in water however is 10 µg/L; the reason for this high concentration is based on the current analytical capabilities. The limit used to be 25 µg/L, but analytical improvements have enabled it to be monitored at its current lower

level. The U.S. Environmental Protection Agency has set a maximum contaminant level goal of zero. Hence, there is a need for more simple, yet advanced technologies in order to enable quick and reliable determinations at the sub µg/L levels. The application work AW US6-141-012010 describes a simple ion chromatographic determination of bromate using suppressed conductivity detection at sub µg/L levels.



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Field certification of Biological Safety Cabinets (BSC's) is regulated by the NSF/ANSI 49 Standard, Biosafety Cabinetry: Design, Construction, Performance, and Field Certification, Annex F Field Tests. Section F.1, Field Certification Preconditions and Intervals, discusses when it is necessary to certify BSC's. In the second paragraph it states,

*"To ensure that all cabinet operating criteria contained in this annex continue to be met, each cabinet should be field tested at the time of installation and at least annually thereafter. In addition, recertification should be performed whenever HEPA/ULPA filters are changed, maintenance repairs are made to internal parts, or a cabinet is relocated. More frequent recertification should be considered for particularly hazardous or critical applications or workloads. It is customary for the person conducting the designated tests to affix to the cabinet a certificate of satisfactory performance when the cabinet meets all field test criteria."*

On this same topic, the CDC/NIH guideline document Bio-Safety in Microbiological and Biomedical Laboratories (BMBL), 5th Edition, Appendix A, Section VII, Certification of BSC's, states,

*"The operational integrity of a BSC must be validated before it is placed into service and after it has been repaired or relocated. Relocation may break the HEPA filter seals or otherwise damage the filters or the cabinet. Each BSC should be tested and certified at least annually to ensure continued, proper operation."*

Both of the above references use the term "Relocated" as the measure of requiring recertification. Vertical up and down BSC movement on a motorized basestand is not relocation as intended by either of these documents. The height adjustment up and down movement does not cause the vibration necessary to harm or breach the integrity of the HEPA filters. The height adjustment up and down movement is a very slow and smooth movement typical driven by a hydraulic system. If the height adjustment is used in conjunction with an exhausted BSC (i.e. type B1/B2 or canopy

connected type A2), the site assessment certification test should include airflow verification throughout the range of motion. The duct connection itself should be made with flexible PVC duct material.

NuAire has been offering both electric and hydraulic adjustable basestands for well over 15 years with no reported issues of HEPA filter leaks during routine field certification. The use of height adjustment for BSC's has many proven ergonomic benefits to aid in reducing workplace injuries. The NIOSH Report, HEPA 95-0294-2594 from the National Cancer Institute specifically recommends the use of adjustability of height on BSC's as an engineering control to reduce Cumulative Trauma Disorders (CTD's). Height adjustment allows the individual researcher to set the BSC height to an optimal position for maximum ergonomic benefit.

If further questions arise regarding this topic, please contact NuAire technical service at 763-553-1270 or visit [www.nuaire.com](http://www.nuaire.com).

Annex F, Section F.1." NSF/ANSI 49 Standard-2011. Vol. 2011. Ann Arbor, 2011. F1. Print.

Chosewood, L. Casey, and Deborah E. Wilson., eds. "Appendix A, Section VII." Biosafety in Microbiological and Biomedical Laboratories. 5th ed. Atlanta: U.S. Department of Health and Human Services, 2009. 308. Print.



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# MEASUREMENT OF GOLD NANOPARTICLE SIZE AND CONCENTRATION BY SPECTROPHOTOMETRY

By Andrew F. Page Ph.D.

Although gold nanoparticle production can be controlled to yield specific size ranges, both the concentration and size of nanoparticles must be checked following production. UV-Vis spectrophotometry is an established QC method for this; however cuvette spectrophotometers often require dilution of the nanoparticle solution before measuring, and volumes up to 3 mL. The Thermo Scientific NanoDrop 2000 spectrophotometer presents the advantages of variable pathlength and low sample volume, circumventing the problems of traditional spectrophotometers.

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## INTRODUCTION

The ease, speed and cost of UV-Vis spectrophotometry make the technique frequently the first used to judge the success of nanoparticle (NP) production. The use of traditional spectrophotometers is still inconvenient, however, as the use of cuvettes presents several inherent drawbacks.

Nanoparticles are often produced in high concentrations, and have large extinction coefficients, resulting in the need for dilution prior to measurement. In addition to this, the concentration of solutions may vary widely, requiring measurement of multiple dilutions in order to find one within the spectrophotometer's dynamic range. Colloidal metal NP size can also be assessed using UV-Vis spectrophotometry, as the wavelength of the absorbance peak is dependent on the size and shape of the particles because of the surface plasmon resonance effect as light strikes them.

Recent work<sup>1</sup> has shown that a NanoDrop™ 2000 presents a low volume alternative to the use of cuvettes. The pedestal technology used requires only 2 µL, saving samples which may be especially precious following a lengthy functionalization. The variable pathlengths (0.05 - 1.0 mm) also negate the need for dilutions by extending the instrument's dynamic range.

## EXPERIMENTAL PROCEDURES

Gold NPs with diameter 13 nm were synthesized via a sodium citrate reduction of gold (III) chloride.<sup>2</sup> The NanoDrop 2000 was first used to determine the approximate NP size by verifying the wavelength of the absorbance peak (fig. 1a).

The NPs were then purified and concentrated before a serial dilution was created and measured (fig. 1b). Between measurements, the NanoDrop 2000 optical surfaces were simply cleaned using a standard laboratory tissue.

## RESULTS

As shown in figure 1a, spectra are highly reproducible, with high signal to noise ratios. Peak absorbance was measured at 520 nm, as previously reported.<sup>3,4</sup> The solutions were successfully measured over a wide concentration range (1~150 nM, fig. 1b).

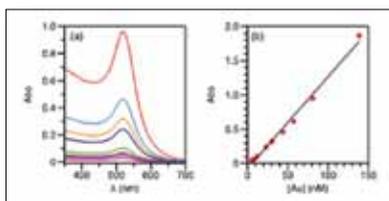


Fig. 1 (a) UV-Vis spectra for a dilution series of gold NPs; (b) corresponding 1 mm Abs vs concentration plot showing the linearity over a large concentration range.

## CONCLUSION

The NanoDrop 2000 was found to be very versatile in the analysis of gold NP size and concentration. Given the ability to measure NP concentration over large concentration ranges, as well as the small volumes required, the NanoDrop 2000 is an ideal instrument where very small amounts of concentrated particles are produced.

## REFERENCES

1. Hamner, K.; Maye, M.M.; Ash, D.L.; Page, A.F. Quantification of Gold Nanoparticles Using the Thermo Scientific Nano Drop 2000 Spectrophotometer <http://www.nanodrop.com/Library/T130-Quantification%20of%20Gold%20Nanoparticles%20Using%20the%20Thermo%20Scientific%20NanoDrop%202000%20Spectrophotometer.pdf> (accessed Apr. 18, 2012).
2. Maye, M.M.; Nykypanchuk, D.; Van Der Lelie, D.; Gang, O.A. "Simple Method for Kinetic Control of DNA-Induced Nanoparticle Assembly" *J. Am. Chem. Soc.* 2006, 128, 14020-14021.
3. Burda, C.; Chen, X.; Narayanan, R.; El-Sayed, M.A. "Chemistry and Properties of Nanocrystals of Different Shapes" *Chem. Rev.* 2005, 105, 1025-1102.
4. Concurrent Analytical Inc.: Nanopartz <http://nanopartz.com> (accessed Sep. 26, 2011).



## POSITIVE DISPLACEMENT PUMP AND TURBINE PUMP ATTRIBUTES

Rotary vane Positive Displacement (PD) pumps may be the most commonly used pumps in re-circulating chillers today. Performance and low cost have made them the favored pumps for a variety of applications. Turbine (TU) pumps are also used in re-circulating chillers, however, due to their higher initial cost often times PD pumps are selected over TU pumps where flow and pressure requirements can be met by a PD pump.

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### INTRODUCTION

With the requirement for increased productivity across the business landscape, recirculating chillers are now relied on to operate more hours per day. The reliability and life of re-circulating chillers are critically important to supporting the needs of today's complex applications and operational demands. Pump selection is now more important than ever to ensure that re-circulating chillers are able to meet the demanding needs of today's operating environment.

Considerations include but may not be limited to:

- Equipment usage - daily operating hours
- Preventative maintenance programs
- Wetted materials in the re-circulating chiller and application
- Water types such as deionized, filtered, distilled and reverse osmosis
- Additives such as freeze point suppressants, biocides, algaecides and inhibitors
- Pressure variations (pump pulsations) for applications that are sensitive to vibrations

Due to the stringent requirements of today's most complex applications, the Thermo Scientific ThermoFlex re-circulating chiller platform is available with a wide variety of pumps to meet the most demanding application needs.

### METHODS

#### MTBF vs. Life

Definitions:

- **Life** = the expected time that a product can be used as intended, measured in hours.
- **MTBF** (Mean Time Between Failure) = how many combined hours of run time the installed population of a product will operate until there is a failure that falls within the stated life of the product.

For example, a battery may have a useful life of 1 hour and an installed population of 1,000,000 batteries.

If 10 batteries fail to reach their 1 hour life out of the installed population, the batteries would have an MTBF of 100,000 hours.

$1,000,000 \text{ hours} / 10 \text{ failures} = 100,000 \text{ hours MTBF}$ .

What this teaches us is that component life is what matters the most when selecting equipment, i.e., we want to know how long we can expect the battery to last. MTBF speaks more to the quality of the battery, that is, it tells us the likelihood that the battery will last the full life of 1 hour.

So how does this relate to Positive Displacement pumps (PD) and Turbine pumps (TU). They both share a similar long MTBF; however, the Turbine pump has a life that is three times that of the Positive Displacement pump. This means that while they share a similar reliability during their stated life, the TU pump will run longer before wearing out. Based on life or product uptime, the TU pump seems the obvious choice. While there are other considerations for users who do not run their re-circulating chillers 24 hours a day, 7 days a week, the PD pump may have an acceptable life at a lower cost.

### MATERIALS OF CONSTRUCTION

PD pumps are contact pumps that have pump vanes and an inner shell that the vanes contact which both are made of carbon. Carbon is desirable in several ways; it is a low cost, low friction material that is easy to manufacture. Carbon also provides a positive seal capable of creating the high pressures required by many applications. Alternatively, carbon also has some undesirable characteristics. During the break-in of a new pump head the carbon on carbon contact causes fine carbon particles to be released into the recirculating flow, this is known as carbon shedding. Carbon shedding may result in a grey discoloration of any filters in use. This is completely normal and is not an indication of corrosion, algae or other contaminants. The somewhat brittle nature of the carbon means that it cannot tolerate debris. Subsequently, to maximize PD pump life, the pumps should be protected by a full flow filter of 100 microns or finer. Full flow filters are standard on all ThermoFlex re-circulating chillers.

Corrosion caused by dissimilar wetted metals, pump cavitation and non-compatible fluids can all cause damage or increased wear to the carbon. If the carbon becomes damaged, it is possible for the larger released pieces of carbon to damage the pump vanes leading to rapid failure of the pump head.

Turbine pump construction does not contain carbon. They are a close tolerance pump that requires filtration, but other than the pump shaft riding in the pump seal, there is no direct contact between moving parts which is why the life of the TU pump exceeds that of the PD pump.

### APPLICATION CONSIDERATIONS

Applications that require high duty cycles of the re-circulating chiller or are run 24/7 should consider using a TU pump because of its longer life. While the TU pump can be more expensive than a PD pump, the additional life and increased uptime can easily offset the additional cost for many applications. For applications with mixed metals such as aluminum and copper, where electrolysis between the metals may release abrasive aluminum oxide into the re-circulating flow, the TU pump is a better choice because the abrasion to the carbon components in the PD pump may cause the fluid to turn black and lead to premature pump failure. For applications that are sensitive to hydraulic pulsations within the re-circulating flow the TU pump may be a better choice than the PD pump. This is because the PD pump with 4 vanes delivers 4 separate volumes of fluid with each rotation. As each pump vane delivers its volume of fluid a pressure wave is sent through the fluid that may still be measured at the application. Conversely, with the TU pump for a given pump speed and application pressure loss, a continuous flow is delivered.

### CONCLUSION

There is more to pump selection than just matching up the flow and pressure requirements of the application; pump life, MTBF, wetted materials, duty cycle, sensitivity to down time, cost of ownership and fluid pulsations should all be considered when selecting a pump. While the PD pump continues to be suitable for many applications, longer life as well as other performance related characteristics of the TU pump make it the obvious choice for today's complex and challenging applications where productivity and uptime are paramount.

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# UPLC SCREENING TO PREPARATIVE HPLC USING CSH COLUMN TECHNOLOGY AND FOCUSED GRADIENTS

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## INTRODUCTION

Reaction screening and purification are essential steps in small molecule pharmaceutical discovery labs. Cleaner samples for subsequent synthesis can reduce reaction by-products and facilitate the critical final purification of material for pharmaceutical profiling and toxicology studies.

In this application, we demonstrate a rapid UPLC screening protocol using high and low pH on a charged-surface hybrid (CSH) column and subsequent scale-up to preparative HPLC using focused-gradients. The CSH column is chosen for its improved peak shape for basic compounds, pH range, and retention time stability with routine pH switching. The use of the same stationary phase on the preparative scale maintains the selectivity from the UPLC® screening run, alleviating the need for method re-development. After calculating the focused gradient from the UPLC screening run, the separation is directly transferred to preparative HPLC for rapid purification of the compound of interest. The use of focused gradients in preparative HPLC allows for cleaner purification of the target compound in a shorter run time compared to the full gradient, resulting in higher sample purification throughput.

## INSTRUMENTATION & CONSUMABLES

Samples representative of synthetic reaction products were prepared by acetylating 18 different compounds using pyridine and acetic anhydride.

LC Conditions

Instrument: ACQUITY UPLC® with ToF-MS

Column: ACQUITY UPLC CSH C18 2.1 x 30 mm, 1.7 µm

Part Number: 186005295

Instrument: Autopurification Preparative HPLC system

Column: XSelect™ CSH C18 OBD 19 x 100 mm, 5 µm

Part Number: 186005421

## RESULTS/DISCUSSION

The reactions were first analyzed using a 3-minute UPLC screening protocol at high and low pH, on an ACQUITY UPLC CSH C18 column (Figure 1). Successful reactions were selected for further purification of the target compound using the modifier that was identified as giving the best

separation. The retention time of the target compound was then used to calculate the focused gradient for preparative HPLC.

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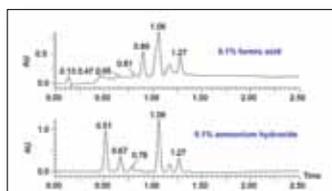


Figure 1. A UPLC screening result at high and low pH. The high pH separation is selected for purification of the target peak at 1.06 min.

By altering the original screening gradient to a shallower 'focused' gradient around the peak of interest, impurities can be selectively pulled away to generate a cleaner purified sample (Figure 2). The use of focused gradients minimizes preparative HPLC runtimes as time is spent on the separating the peak of interest rather than the entire sample.

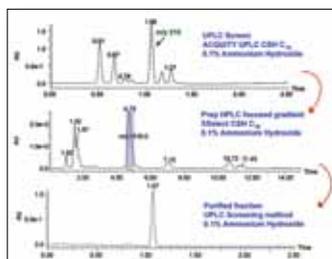


Figure 2. The target peak at 1.06 min was transferred from UPLC to prep HPLC using a focused-gradient. Mass-directed purification of the target peak results in a pure product, confirmed using UPLC.

## CONCLUSION

A 3-minute UPLC-MS method that reliably screens at high and low pH was developed using an ACQUITY UPLC CSH C18 column. The separation was transferred to preparative HPLC using the same stationary phase, alleviating the need to re-develop the method at the preparative scale. The use of focused gradients shortens runtimes and increases sample throughput by selectively focusing the separation around the peak of interest.

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# PARTING POINTS

## Takeaways from this month's issue:



### "APPIFYING" THE LAB

Recently, highly functional and specialized apps for the research lab have gained the acceptance and even gratitude of a broad spectrum of laboratory managers, research scientists and bench technologists. Areas of use include:

- UV-Vis spectroscopy
- Selection of lab supplies
- Drug discovery
- Research management

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### GOT ETHICS?

Ethics and data integrity should be an integral part of your laboratory's quality program; however, it is a concept that is too often overlooked in the field of science. Here's how to avoid ignoring this important part of lab processes:

- Make sure your staff have a strong work ethic
- Train staff in how to correctly produce and review data
- Enforce ethics/data integrity by always following lab policies
- Managers must get involved

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### MODULAR AND FLEXIBLE

Automated biological testing can take on many forms, one of which includes simple modular automated systems designed to automate a select series of tasks necessary for a specific assay technology. Advantages of these systems include:

- Increased throughput
- Unattended operation
- Maximum individual instrument usage
- Improved data quality

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### ALL KEYED UP

There is a good chance you spend many hours at a computer workstation entering data and researching databases. Here are some ways you can reduce the chance of an ergonomic injury:

- Aim for a balanced, neutral overall working posture
- Set up your keyboard/other technology to fit your posture
- Develop a computer workstation policy and training program
- Consult OSHA and other documents on ergonomics

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### PERSPECTIVE ON: AN ENVIRONMENTAL RESEARCH LAB

Clean Harbors of Baltimore, Inc., is a transfer storage and disposal facility and part of the largest hazardous waste disposal company in North America. Some quick facts about Clean Harbors' Baltimore lab:

- Encompasses 1,500 square feet
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- Provides recycling, treatment and disposal of hazardous and nonhazardous wastes

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