

Lab Manager[®] MAGAZINE

Run Your Lab Like a Business

December 2011

Volume 6 • Number 10

CHANGING SPACES

HOW WORKPLACE TRENDS ARE RESHAPING RESEARCH FACILITIES TODAY & TOMORROW

THE PATENT BUSINESS:

MORE THAN JUST BORING LEGAL DOCUMENTS

FREE AGENCY

Is It Part of Your Workforce Strategy?

INDEPENDENT
GUIDE TO BUYING
A THERMAL CYCLER
INSIDE!
WWW.LABMANAGER.COM

VISIT LAB MANAGER MAGAZINE'S NEWLY REDESIGNED WEBSITE, WWW.LABMANAGER.COM

The more
you investigate,
the better
STARLINE Plug-In
Raceway looks.

Sure, it may look like other raceway products. But STARLINE® Plug-In Raceway has the unique ability to add or relocate plug-in modules anywhere on the raceway quickly and easily, eliminating panel boards and the associated costs of reconfiguring circuits, receptacles and wiring. To learn how we can meet the power distribution needs of universities, labs and research environments, visit uecorp.com/raceway.

STARLINE®
PLUG-IN RACEWAY



PURELAB flex..

Innovating water purity

ELGA



Tap to ultrapure in one step

- Absolute water purity of up to 18.2 MΩ-cm
- Ergonomic handset shows your essential water purity information
- Real Time TOC monitoring
- Unique choice of water dispense options
- Perfect for your analytical and lifescience applications



Now available through

VWR
1.800.932.5000 **vwr.com**

Find out more or request a demo:
www.vwr.com/elga

VEOLIA
WATER

Solutions & Technologies

10

Changing Spaces

Over the last decade, traditional office and R&D designs have failed to serve new business models and employment arrangements; the results have been visible at the bottom line of balance sheets. The real bottom line is this: Better workplaces make for better business.

Barry Svigals, Jay M. Brotman, and Robert B. Skolozdra

66

Perspective On: A Food Testing Lab

Developers of analytical instrumentation for food laboratories are constantly being kept on their toes—foremost by the competing technical advancements and expanding market demands inherent in their business, and also by the need to help customers comply with changing and more stringent regulatory requirements worldwide.

Bernard Tulsi



LEADERSHIP & STAFFING

18 Free Agency

It's a common refrain heard within nearly every business circle today, but only because it's true: The world of work has changed. Nowhere is this more evident than in the use of contingent workers, or "free agents," across nearly every global industry. The practice isn't new, but the attention it gets today is. **Alan Edwards**

TECHNOLOGY & OPERATIONS

24 Clean Chemistry Tools

The application of instruments and strategies to reduce the sample prep blank is often called the application of Clean Chemistry techniques. Learn the factors impacting blank quality, in particular when microwave digestion is used, and about some Clean Chemistry products and technologies designed to help the analyst generate superior analytical data. **Tim Michel and Don Potter**

28 Integrated Tools Harmonize Disparate Datasets

Consolidation, collaboration and configurability seem to be the three C's driving the need for more tightly integrated lab workflows and systems, especially in the life science market. The challenge now is integrating data coming from many different sources and to decipher patterns that lead to insight and innovation. **Tanuja Koppal, Ph.D.**

LAB DESIGN & FURNISHINGS

32 Office Space

Want to build a lab? Think you don't have the space or the funds to do so? Think again! You can place high-technology research space in your current office building. All it takes is a good plan up front and creative thinking from an integrated team.

Mark Paskanik

LAB SAFETY

38 LEED the Way to Safety

We have written previously on LEED (Leadership in Energy and Environmental Design), the U.S. Green Building Council's (USGBC) certification program for green buildings. In this column, the Safety Guys will look at some of the potential health and safety issues involved when building green. **Vince McLeod**

42 Centrifuge Safety

Keeping track of the maintenance and safety of lab equipment used in performing laboratory tasks can be a challenge for lab managers. One piece of equipment deserving special attention when it comes to ensuring the safety of laboratory employees is the centrifuge. **Christopher Crews**

BUSINESS MANAGEMENT

54 The Patent Business

Patents are more than just boring legal documents. They are the links between the legal processes and research and development and can be used for many important business purposes beyond just protecting new inventions. **John K. Borchardt**



Unfortunately, a common theme that has been in many of our articles in *Lab Manager Magazine* lately is how the current tough economy has affected laboratories and the lab equipment market as labs all over the world are forced to cut costs and become more efficient. Right now, we're gathering more information on that very topic with our Investment Confidence Survey which focuses on how things have changed in our readers' labs over the past year, in terms of business. Find out if business conditions for laboratories are better or worse than they were last year when we publish those survey results in our March 2012 issue. We'll also share how confident our readers feel about the future of their labs, how their budgets have changed over the past year and if they expect their budgets to increase or decrease over the coming year.



Karl Fischer Invented It METTLER TOLEDO Perfected It **AGAIN!**



Continuing to make Karl proud.

We've come a long way in the 75+ years since Dr. Karl Fischer (1901-1958) formulated his revolutionary method of water determination while looking to eliminate water in oil pipelines.



It's this same chemistry that is the basis for modern-day Karl Fischer titration. Compact Karl Fischer titrators make water content determination simple for the first time user, yet are flexible enough to meet demanding applications. Whether your lab runs only a couple samples a day, or has more complex requirements such as instrument qualification, managing multiple applications or networking several units and their workflows to a central PC, it's all as easy as One Click™.

Learn more about how METTLER TOLEDO can help you with your Karl Fischer applications by calling 800-METTLER or visiting our website link below.

► www.mt.com/makekarlproud

METTLER TOLEDO



Speed, Performance, Value

The Highland® Precision Balance is a fully featured balance with a rechargeable battery, removable anti-static draft shield and stainless steel pan. Fifteen weighing units make the Highland® a versatile balance. Calibration is a breeze with the built-in HandiCal™ feature, while ShockProtect™ overload protection is provided internally.

The RS-232 and USB interfaces for communication to computers and printers, weigh-below hook for density and specific gravity measurements make the Highland® the perfect choice.

In addition, the Highland® is stackable, allowing for convenient, compact storage in tighter quarters.



Learn more:



BEADAM

Adam Equipment, Inc.
26 Commerce Drive
Danbury CT 06810

Tel. 203 790 4774 | 203 792 3406
sales@adamequipment.com

Lab Manager[®]

MAGAZINE

Run Your Lab Like a Business

LAB MANAGER ACADEMY	20
KEEPING YOUR TEAM MOTIVATED Jeff Tobe	
SCIENCE MATTERS	22
ADAPTING TO SCIENTIFIC MOBILITY Alan Edwards	
EVOLUTION OF FUME HOODS	36
PURCHASING A THERMAL ANALYZER	46
PRODUCT FOCUS	
THERMAL ANALYZERS	48
FREEZERS AND REFRIGERATORS	50
TITRATORS	52
THE RIGHT CHOICE	59
ROTARY EVAPORATORS	
SURVEY SAYS, ARE YOU IN THE MARKET FOR...	
A TITRATOR?	58
FREEZERS & REFRIGERATORS?	60
ASK THE EXPERT:	62
IMPLEMENTING AND MAINTAINING LAB SAFETY PROGRAMS	
James Gibson, Ph.D., Director of the Office of Environment, Health and Safety (EH&S), and Nancy Wayne, Ph.D., Professor of Physiology and Associate Vice Chancellor for Research at the University of California, Los Angeles (UCLA), talk about the recently formed UC Center for Laboratory Safety. Tanuja Koppal	
MINDMAP	72
IMPROVE THE PURITY OF WATER IN YOUR LAB	
HOW IT WORKS	
SAMPLE SECURITY IN CO ₂ INCUBATORS	82
NMR IN PHARMACEUTICAL ANALYSIS	84
LIMS IN TRANSLATIONAL SCIENCE	86
TECHNOLOGY NEWS	74
The latest equipment, instrument, and system introductions to the laboratory market.	
PRE-OWNED EQUIPMENT MARKETPLACE	89
ADVERTISERS INDEX	88
PARTING POINTS	90

Lab Manager Magazine® (ISSN: 1931-3810) is published 10 times per year; monthly with combined issues in February/March and July/August, by LabX, P.O. Box 216, 478 Bay Street, Midland, ON Canada L4R 1K9. USPS 024-188 Periodical Postage Paid at Fulton, MO 65251 and at an additional mailing office. A requester publication, Lab Manager, is distributed to qualified subscribers. Non-qualified subscription rates in the U.S. and Canada: \$120 per year. All other countries: \$180 per year, payable in U.S. funds. Back issues may be purchased at a cost of \$15 each in the U.S. and \$20 elsewhere. While every attempt is made to ensure the accuracy of the information contained herein, the publisher and its employees cannot accept responsibility for the correctness of information supplied, advertisements or opinions expressed. POSTMASTER: Send address changes to Lab Manager Magazine®, P.O. Box 120, Georgetown, CT 06829.

©2011 Lab Manager Magazine® by Geocalm Inc. All rights reserved. No part of this publication may be reproduced without permission from the publisher.

WDS Canadian return: P.O. Box 216, 478 Bay Street, Midland, ON Canada L4R 1K9.



Lab Manager Magazine® is audited by BPA

Here's proof that big things do come in small packages

Introducing Ti-Touch for routine titrations.

- Burette, stirrer and full-color touch control all in a single, tiny footprint
- No-Touch reagent exchange on Karl Fischer models for maximum safety
- Networking, remote printing and paperless PDFs – no PC needed!
- Hundreds of pre-programmed methods included
- Direct access to 14 methods and common functions

www.metrohmusa.com

 **Metrohm**

866-METROHM (638-7646)





Space Cases

When you walked into your lab today, did you notice your environment? Or did you take for granted the open, airy spaces, floor-to-ceiling windows, fabulous views of the outdoors, art work and potted plants? Or maybe that doesn't exactly describe the place you work. In either case, the current state-of-the-art lab design model advocates environments that are responsive to current and future needs; foster interaction and team-based research; balance the need for open and closed spaces; can accommodate ever more complex technology; and are environmentally sustainable. A tall order to be sure, but one that promises to deliver greater productivity, a happier and more creative workforce, and the ability to attract top talent. "Research scientists and technicians are more productive in labs that are efficient, healthy and inspiring. Improve the workplace, and the work results too will improve," say the authors of this month's cover story, "Changing Spaces." Hopefully that's the kind of space you're working in right now.

While the labs featured in our cover story have obviously been created from the ground up with very deep pockets of funding, that is not the case for all research facilities. For those with more constrained budgets, this month's Lab Design & Furnishings article on page 32 provides two case studies in which existing office spaces were transformed into high-technology laboratories. "Although additional revenue was needed to upgrade the existing office space, it was still less costly than purchasing or leasing new lab space. It can be done. Start with a good plan and an initial study to determine if it is viable for you," says author Mark Paskanik.

This month's Perspective On article (page 66) looks at developments in the tools and technologies used in a food testing lab. Author Bernard Tulsu tells us, "There seems to be a general global consensus supporting more testing, evaluation and control, and greater care being taken within food-based facilities." And Dr. Paul Young, director, chemical analysis operations, Waters Corporation, says, "We are starting to see a significant movement toward mass spectrometric methods because of their ability to generate robust and unequivocal results." All of which promises improved food safety in the future "once we accomplish our technical mission of creating effective detection and measurement systems — and the legal and regulatory missions."

Meanwhile, John Borchardt's article, "The Patent Business," (page 54) provides a detailed explanation of the various ways and reasons a company can use patents for business purposes. Among those are: to gain clues to competitors' business strategies; to locate experts to serve as consultants or expert witnesses in patent litigation; to avoid duplicating the research of others; and to avoid infringing on other organizations' patent rights, to name just a few. "In today's knowledge-driven economy, effective use of patent information contributes to the success of many companies," says Borchardt. Good information for anyone looking to stay competitive.

Outside the pages of *Lab Manager*, our umbrella organization, LabX Media Group, is pleased as punch to have recently purchased *The Scientist* magazine. We look forward to working with our new sister publication and sharing some of their unique content with the readers of this magazine.

Wishing you a healthy and joyful holiday season!

Pamela Ahlberg
Editor-in-Chief

Correction: The July/August 2011 Lab Manager's Independent Guide to Purchasing a Mass Spectrometer incorrectly depicted the AB SCIEX 5500 system as a GC-MS-MS instrument. In truth, AB SCIEX offers two unique 5500 LC/MS/MS Systems: The AB SCIEX Triple QuadTM 5500 LC/MS/MS System and The AB SCIEX QTRAP® 5500 LC/MS/MS System. It should be noted that AB SCIEX also offers additional LC-MS/MS technologies for quadrupole, ion trap, and time-of-flight systems not identified in the guide. Those offerings, as well as an overview of the company, can be found at www.absciex.com.

Publisher Mario Di Ubaldi
mariod@labmanager.com
203.227.1390

Editor-in-Chief Pamela Ahlberg
pam@labmanager.com
973.729.6538

Assistant Editor Rachel Muenz
rachelm@labmanager.com
888.781.0328 x233

Contributors John K. Borchardt, Ph.D.
John Buie
Angelo DePalma, Ph.D.
Alan Edwards
Sara Goudarzi
Tanuja Koppal, Ph.D.
F. Key Kidder
Joe Liscouski
Vince McLeod, CIH
Ronald B. Pickett
Bernard Tulsu

Account Managers June Kafato — International
junek@labmanager.com
705.812.2332

Ashley Munro — West Coast
ashleym@labmanager.com
888.781.0328 x228

Edward Neeb — Midatlantic
edwardn@labmanager.com
860.350.2761

Larry Frey — Midwest & Southeast
larryf@labmanager.com
845.735.5548

Art Director & Production Manager Gregory A. Brewer
gregb@labmanager.com
888.781.0328 x241

Graphic Designer Danielle Gibbons
danielleg@labmanager.com
888.781.0328 x231

List Rental Jen Felling — Statlistics
203.778.8700

Custom Article Reprints The YGS Group
labmanager@theygsgroup.com
800.290.5460
717.505.9701 x136

Subscription Customer Service info@labmanager.com

Published by LabX

President Bob Kafato
bobk@labmanager.com
888.781.0328 x223

General Manager Ken Piech
kenp@labmanager.com
888.781.0328 x226

888.781.0328

P.O. Box 216, 478 Bay Street
Midland, ON, Canada L4R 1K9



A member of the Panasonic Group

PRESERVE MORE WITH LESS

*The industry's leading energy efficient
and compact -86°C ultra-low freezer.*



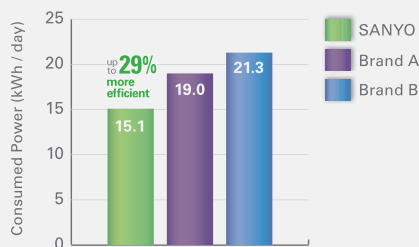
MORE CAPACITY
[25.7 cubic feet]

LESS ENERGY
[15.1 kWh / day]

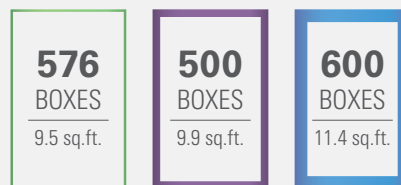
LESS SPACE
[9.5 square feet]



MORE SAVINGS, LESS ENERGY



MORE CAPACITY, LESS SPACE



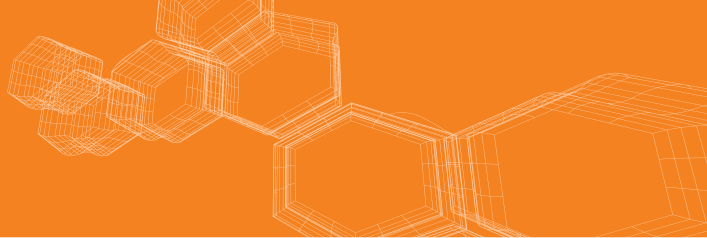
SANYO Brand A Brand B

VIP® PLUS SERIES
MDF-U76VC

UPGRADE YOUR
SAMPLES



Visit www.greenfreezers.com to learn more!
And to take advantage of special offers.



CHANGING SPACES

HOW WORKPLACE TRENDS ARE RESHAPING RESEARCH FACILITIES TODAY AND TOMORROW by Barry Svigals, Jay M. Brotman, and Robert B. Skolozdra

Architecture and industry professionals have witnessed a deep paradigm shift in workplaces over the last decade. Traditional office and R&D designs have failed to serve new business models and employment arrangements; the results have been visible at the bottom line of balance sheets. Because workspaces couldn't adequately serve their occupants and research teams, productivity and morale have suffered.

The real bottom line is this: Better workplaces make for better business. New workplace models today are more suited to current work modes and needs for enhancing creativity; attracting talent; and increasing collaborative, efficient approaches to breakthrough science. Ideas like hoteling (unassigned workspace sharing), co-working (workstations for visitors or consultants) and swing spaces are built into corporate and institutional business plans. Laboratory flex-space is also seen as an answer to evolving research programs.

As the workplace design shift continues, savvy researchers and laboratory managers have taken note, adopting novel work arrangements, workplace layouts, and furnishings. These lessons learned with a variety of best-in-class workplaces offer important guidance. Research scientists and technicians are more productive in labs that are efficient, healthy and inspiring.

Improve the workplace, they say, and the work results too will improve.

Workplace inspiration

The research facilities achieving the best results are those that have been designed with valuable innovations in workplace design, but even more so with *humanistic innovations*. These design elements and amenities nourish organizational and individual endeavor by understanding what lab users need as human beings.

Research indicates that workplaces incorporating natural daylight and views to the outdoors demonstrate reduced absenteeism, higher productivity and better overall employee health. Adding works of art or similar flourishes—as well as natural materials and finishes, such as wood panels—is also known to affect worker attitudes and output. Likewise, updated approaches to office plans and

facility layouts that increase interdisciplinary interaction and time spent in collaborative settings also improve productivity, morale and creativity. As an added bonus, these same design ideas help corporations and institutions attract and retain the top producers.

Let's face it: Lab facilities are more than mere workplaces. Scientists and technicians may spend more time at work than at home—so the workplace *is* home. Furthermore, many technical environments do not naturally ease the senses.

Many will argue that research and lab spaces cannot easily be built this way. Yet, such spaces already ex-

“It not only makes the most of a facility in terms of dollars per square foot, it also tends to improve the results of research and clinical teams.”



Watch for
new products
coming in
Fall 2011!

POST A 24/7 **SENTRY** OVER YOUR CRITICAL SUBSTANCES

- Dependable
 - Stable Temperatures
 - Available with Locks
- ☐ Interior mounted electronic controls with temperature display for convenient monitoring.
 - ☐ User-programmable temperature set point, high/low alarm values and alarm delay period.
 - ☐ Integral remote alarm interface.
 - ☐ High/low temperature history record, periodic maintenance notifications and built-in diagnostics.



With the **MicroSentry™ Scientific** refrigeration control, you have the ability to control, confirm and capture temperature performance, giving you the ultimate confidence in your refrigeration.



MicroSentry™ Scientific controls enhance what are already high-performance products. Each general purpose, FMS and EP Marvel Scientific refrigerator has been designed specifically for the lab with a **Commercial UL Listing** for your peace of mind. To learn why Commercial UL is so important, visit: www.marvelscientific.com/standards



refrigeration for health, science and industry
Marvel Scientific • Toll Free: 800-962-2521 • www.marvelscientific.com

SERIOUS ABOUT STANDARDS



▲ *Workplace trends are influencing laboratory environments. Outside the clinical laboratories at 55 Park Street in New Haven, Conn., Svigals + Partners and Bebnisch Architekten developed a large, sun-drenched atrium to encourage meetings and relaxing break areas.*

ist—such as the novel and sun-drenched labs at 55 Park Street in New Haven, with its reclaimed wood, colorful panels and lush planters—and they already outperform their more traditional counterparts. Labs in outmoded or standard workplaces will soon find themselves at the short end of the paradigm shift.

Nurturing the human spirit

Art is a simple and cost-effective addition to any lab design, and it's even more effective when incorporated into the design process from the beginning. Research has shown that when integrated into the facility environment, art has a powerful effect on human interaction and the lab occupants' sense of well-being. It even boosts scientific creativity, say many lab operators.

A recently completed lab facility for PepsiCo's product research team offers several examples of humanistic amenities. An employee break area, for instance, is a playfully branded space, emblazoned with familiar Pepsi logos and snack themes in mind; the area is friendly, familiar and cheery, and popular with the staff. Designed by architecture firm Svigals + Partners, the new PepsiCo research facility in New Haven, Conn., benefited from this visual and artistic relief, because this enhances learning and improves creative thinking for the facility's occupants.

▼ *Humanistic amenities in labs can include employee break areas like this one for a PepsiCo product development lab, with playful branding, cheery colors and flexible, movable furnishings.*



Properly integrated, artistic and natural elements can engender respect for the workplace while at the same time promoting creativity; the branded PepsiCo lab break area is only one such example. For the Yale University biology department, an old carriage house converted to a lab for the study of butterflies incorporates butterfly-themed art glass in the doors of the main entrance. The lobby of a new science building at Albertus Magnus College features a two-story water wall engraved with the titles of all the books written by Albertus Magnus. The flow of the water is synchronized to match the ebb and flow of the tide in New Haven Harbor. All of these features enhance the sense of place and purpose while nourishing that all-important human spirit.

Spaces to congregate, meet up and collaborate are also essential to nurturing our energy, imagination and resourcefulness. Recent lab workplaces have eliminated private offices, shrunk individual workstation sizes and increased common areas. An example is Pepsi's advanced research facility in Valhalla, N.Y., which eliminated all

Water Purification

Pure and Simple



Simple to install,
operate and maintain
while costing you much less than
competitive lab water systems.

(800) 458-2021

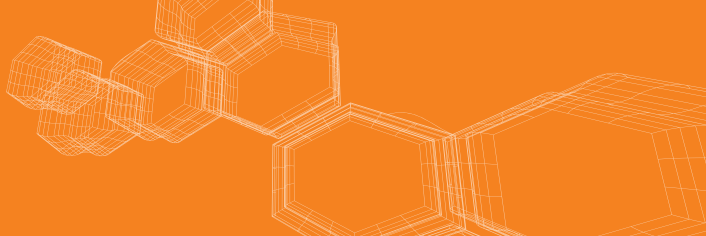
Just one call to our
LIVE Water Wizards
will immediately help you
reduce your costs, or
visit us online at



 AquaA.com/simple



Simply the best choice in lab water systems since 1987



but two individual offices and utilized the recovered space for an expansion of its mission-critical sensory lab. Similarly, an increase in dedicated collaborative work-space is an essential trait of tomorrow's best clinical and research environments.

Wide-open spaces

This also increases the potential for interaction. Traditional lab workplaces have often separated co-workers from one another in the name of efficiency, individualism or seniority. The most modern workplaces present a blistering counterargument: Open-plan offices, elimination of fixed walls and high partitions at lab benches, and increased collaborative space have proven to be more productive—and, when done right, more enjoyable.

The underlying idea of this new paradigm is to cultivate *groupthink*; while Americans typically embrace the culture of the individual effort, the spaces in between individuals drive the collective endeavor. It is there, in the in-between spaces, that a company or research group can gain a competitive edge.

In the lab, this new paradigm radically rethinks traditional floor plans and layouts. Meeting and collaborative spaces use a greater percentage of space, to the point that some lab owners have inverted the traditional ratio of office space to meeting space. Savvy lab managers frequently come to such decisions about cutting individual office space as part of a plan to add equipment or reduce square footage. It not only makes the most of a facility in terms of dollars per square foot, it also tends to improve the results of research and clinical teams.

This unintended convergence of economic and workplace trends is vital to an optimally functioning lab facility. PepsiCo's international beverage R&D facility offers another vivid example, featuring multiple collaborative and break spaces to foster team spirit and interaction, and meeting rooms enclosed in glass—affording acoustic privacy blended with a visual sense of community.

Similar spaces abound at the 300 George Street Technology Center, also in New Haven. 300 George has more than a half million square feet of multi-tenant office and research space, with a powerful infrastructure capable of supporting the needs of biotechnology firms. What makes the space truly effective, however, is the maximizing of collaborative spaces, views of the outside, and glass-enclosed private spaces.

▼ *Material choice is vital for effective, enjoyable workplaces. For the Park Street clinical labs, the atrium features reclaimed wood, colorful wall panels and lush planters. The space has become a favored meeting place for scientists and researchers.*



◀ *Busy work areas like the one at 300 George Street require good ambient lighting, ample clearances and good visibility. Note the glass vision panel behind the lab worker.*



Getting the team on board

One often meets resistance when implementing new workplace models. Workstation walls, for instance, cater to our desires for privacy and individual space. But by reducing cubicle wall heights significantly, we allow lab occupants to experience a greater sense of community and improved access to natural daylight and outside views.

Adopting novel workplace standards can be tricky, however, with some potential for conflict. As a best practice, lab managers evolving their laboratory workplace layouts should encourage all users and researchers to participate in the design process early on. The project design team will benefit by understanding intimately what the researchers hope to accomplish, what they typically do day-to-day and how they allot their time. This information tells the architect and lab consultant how best to optimize space for the occupants.

In addition, face time with the new lab occupants will start to educate them on how the new space will benefit their individual and collective efforts, for example by visiting an open workstation plan to see firsthand how best to make use of collaborative and meeting spaces. Hoteling, in which users must reserve the use of unassigned lab bays, work areas and equipment, works especially well in multi-tenant labs or institutional labs where expensive specialized equipment can be shared, as in flow cytometry and confocal microscope core facilities. But a lack of familiarity on the part of one group of users can cause the system to break down—again pointing to the importance of having the research groups participate in the design process.

Projects at PepsiCo's R&D facility, Yale University's research labs and 300 George have benefited from a pro-



▲Furniture on casters, lightweight materials and low-VOC finishes along with glass partitions help create a friendly, productivity-enhancing ambience at 300 George Street Technology Center. The friendly look belies the powerful research infrastructure within.

“Increased collaborative space has proven to be more productive—and, when done right, more enjoyable.”

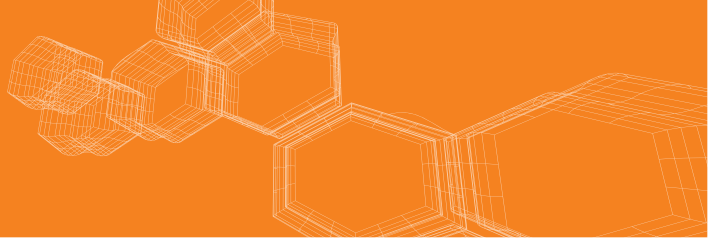
prietary lab-design method created by Svigals + Partners called *Phusion*, which anticipates and plans for these kinds of workplace innovations. The key to the process is getting feedback early and often to inform downstream design decisions.

The holistic lab

If the experts are right, any dominant workplace design trends will eventually inform laboratory spaces. And so they should: labs are workplaces, and the benefits are there for the taking.

Sustainability should be a cornerstone of any new laboratory project or renovation work. HVAC and MEP systems should make efficient use of energy and water, and the interior should incorporate low-VOC materials and finishes.

Also crucial is a lighting and fenestration scheme that makes the best use of natural daylight. Occupancy sensor controls for lights and climate systems can also achieve the parallel goals of energy efficiency and workplace comfort. Furthermore, care taken to specify casework and other hardware can pay dividends. Attractive, sustainably sourced furnishings can enhance workplace atmosphere while scoring points toward LEED certification.



▲ *The entry to the Park Street Clinical Laboratory in New Haven reveals a very open atrium used as an informal meeting area, break zone, and a way to impress visitors. Designed by Svigals + Partners and Bebnisch Architekten.*

This is not only energy-efficient, but also worker-optimal; study after study shows that natural daylight in the workplace increases productivity and reduces absenteeism. Since true sustainable design is as focused on the health of the occupant as it is on saving the planet, green labs also mean more satisfied employees.

Modern workplace setups also tend toward the flexible, and labs should be no exception. Just as open office plans provide the opportunity for rearranging a space without the need to knock down walls and build new ones—and to rewire and re-plumb as well—so too can a flexible lab plan furnish a research group with a space

that can adapt to changes in research strategy, or the means to sublease a space on a temporary basis.

The flexibility of a lab space is dependent on the placement of core elements such as water and electricity, and how far into the space they penetrate. Built-in-place, fixed systems require a construction crew and infrastructure professionals to move, remove or replace. Keeping the core elements available through plug-and-play pods in the floor and ceiling allows the option of a table system, or even a rolling cart system, providing exceptional flexibility.

“It not only makes the most of a facility in terms of dollars per square foot, it also tends to improve the results of research and clinical teams.”

Last, it bears mentioning that an approach to lab design that creates a high-functioning and desirable workplace will also help a research organization attract the best possible pool of talent. All things being roughly equal in terms of salary and benefits, a top candidate for a research position may make her decision in part based on the facility she'll call home.

Remember, many who work in labs spend more time there than at their actual home. And a candidate worth her salt will look for a workplace with as much of the above as possible: inspiring atmosphere, natural daylight, views of outside, sustainable design, and open and flexible plans.

And since she'll be commanding a top salary, it would be best if she's attracted to the place—and surrounded by amenities and elements that inspire her creativity and optimize her performance—don't you think?

Barry Svigals, FAIA, is founder of Svigals + Partners, an integrated architecture and art provider specializing in research and educational facilities. Jay Brotman, AIA, is a partner and director of laboratory planning and design, and Robert Skolozdra, AIA, LEED AP, is a partner and LEED design specialist. The company is based in New Haven, Conn. All photos courtesy of Olson Photographics.



Good for you, good for the environment.

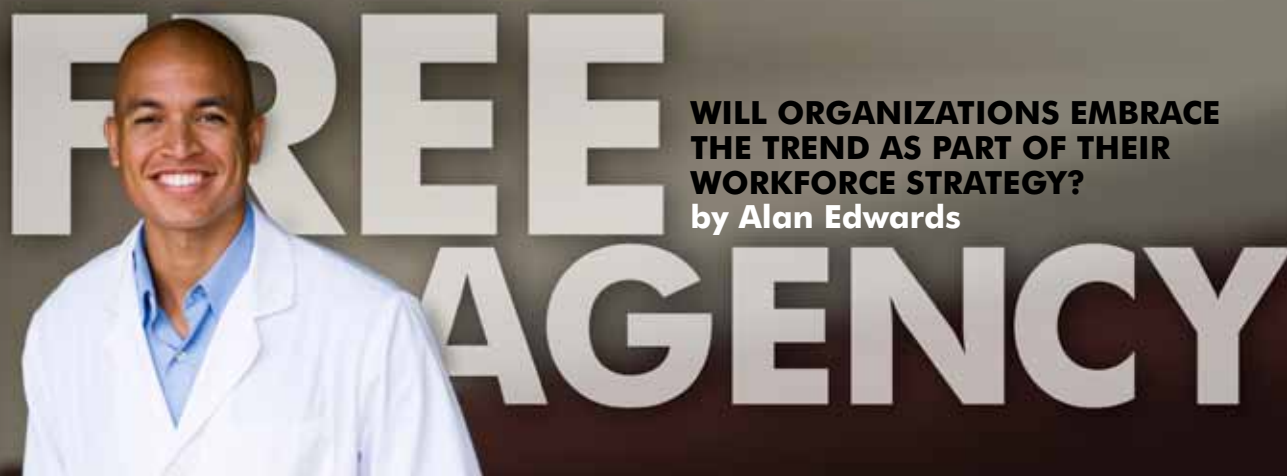
Find out why thousands of laboratories worldwide agree that the Thermo Scientific brand is their only choice for biological safety cabinets:

- **Reduces operating costs up to 75%** over traditional biological safety cabinets with AC motors
- **Increases comfort and encourages safe working habits** with the sloped front, bright workspace, and low noise level
- **Maximizes safety** through our innovative SmartFlow™ design with Digital Airflow Verification

Choose the cabinet that is good for you and the environment!
www.thermoscientific.com/bsc



Visit www.thermoscientific.com/bsc to learn more about the broadest selection of energy saving biological safety cabinets for any application or budget.



WILL ORGANIZATIONS EMBRACE THE TREND AS PART OF THEIR WORKFORCE STRATEGY?

by Alan Edwards

It's a common refrain heard within nearly every business circle today, but only because it's true: The world of work has changed.

Nowhere is this more evident than in the use of contingent workers, or "free agents," across nearly every global industry. The practice isn't new, but the attention it gets today is.

In reality, the rise of the free agent has been a slow-burning, yet powerful, trend. More than a decade in the making, it's at the heart of this new world of work. Extreme global competition and a new economic reality will keep it going. The use of contingent labor, however, will ultimately thrive because of the potential advantages it provides to both employers and the people who have the skills to take control of their careers.

As a manager in the sciences, perhaps you are seeing firsthand the value of contingent labor. The science industry, after all, is uniquely positioned to benefit from the free-agency culture—and not just because of the greater efficiency and cost savings that come with it.

The latest research into the culture of free agency bears this out.

Consider first the broad picture. Contingent opportunities are increasing across all business sectors. As a result, approximately 44 percent of American workers across all industries classify themselves as free agents today, according to the latest research from Kelly Services®. That's a 70 percent increase since 2008.

Many organizations are embracing the trend as part of their overall workforce strategy, as free agents now account for more than four out of every ten workers employed in the U.S. Kelly research estimates that the free

agent population is at least 20 to 30 percent of the entire global workforce—and growing.

One of the main reasons for this shift is that workers' attitudes simply have changed when it comes to the notion of a traditional career. Flexibility in work options and the freedom to chart one's own path, it seems, may really be more attractive than the security that can come from traditional employment.

But now look at who in the jobs marketplace is taking

advantage of contingent opportunities. Forget the stereotypes of the past, which cast contingent workers as inferior compared with traditional employees. Research has shown the opposite—that free agents are highly educated, highly skilled, and aware of how much they bring to the table. They also are aware that if they concentrate solely on securing full-time work, they could see other, more

"Forty four percent of American workers across all industries classify themselves as free agents today."

lucrative contingent opportunities evaporate. So many are choosing "free agent" status not because they can't find traditional employment, but because they value the freedom and professional possibilities that come with that choice.

Scientists with advanced degrees and highly specialized skills fit into this category and are increasingly seeking out contingent opportunities, similar to their counterparts in engineering and other high-tech fields. The last ten years, in fact, was the initial growth phase of the science-based free agency culture, and experts agree that we haven't begun to see the potential of this spike. Contingent opportunities in the sciences and the amount of companies doling them out will grow exponentially over the next ten years and beyond.

This offers strategic advantages for scientific compa-

nies around the world when it comes to meeting their business goals. Worries over confidentiality and intellectual capital in the sciences have given way to networks between companies and a project-oriented atmosphere in order to gain a competitive edge. To do this, scientific companies must continually seek out scientists with specialized skills. The free agent work style complements this competitive atmosphere by giving managers access to a new pool of highly qualified talent that can add concentrated value when and where it is needed most.

Scientists who deliberately seek out contingent opportunities are also getting more experience across a broad range of fields, which adds to their knowledge base and marketability. It makes them more enticing to employers who can hire them with confidence knowing that they'll be able to hit the ground running when presented with a new project or challenge.

Utilizing contingent workers is a way of transferring knowledge that is more efficient and more beneficial to the progress of science as a whole. But there's another reason behind the trend. Real-world scientific advancements aren't stuck in an ivory tower. They are part of big business, and dollars and cents are driving the free-agent culture as much as the need for specialized knowledge.

Why? Because along with progress is a terrible uncertainty in the sciences. Companies are still trying to figure out how to compete on a global scale—but with far less economic resources than before. It's affecting the largest scientific companies in particular, whose products are extremely expensive to develop and manufacture. In one stark example, the world's biggest drug companies will soon lose the patents for their biggest moneymaking drugs and will need to find new ways to make up the revenue loss. Add to this an increasingly complicated set of regulations on the domestic and global fronts, and it's easy to see why the science industry would be open to new ways of doing business.

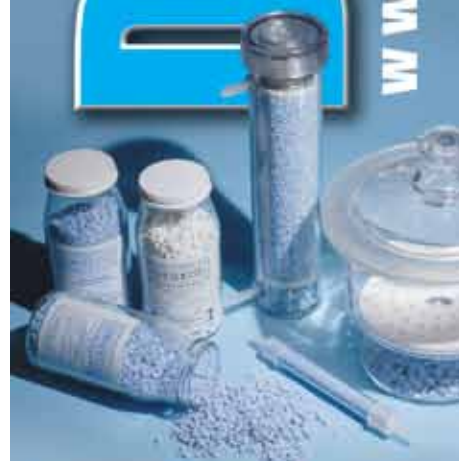
While the great recession might have brought many companies to their knees, others, including scientific ones, realize now that it has also meant the freedom to concentrate on core competencies. By exploring new hiring strategies such as contingent labor, science companies can avoid the costly infrastructure of the full-time hire, allowing them to procure the kind of intellectual capital needed in order to do what scientific companies do best. The result is that companies get the most highly qualified people for the highly specialized projects that are crucial to their bottom line. Non-core tasks, like regulation, can be addressed by free agents as well on an as-needed basis for far less than hiring them full time.

Free agency in the scientific workplace is here to stay. It benefits both employers and the thousands out there who have the knowledge and experience to contribute their skills across the scientific spectrum. Knowledge sharing, project-driven work, coming to grips with a new economy—this is the new reality of the scientific industry, and free agency in hiring is helping it all make sense.

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. Alan can also be followed on LinkedIn.com.

DRIERITE

www.drierite.com



Desiccants to dry solids,
liquids and gases.



W.A. Hammond
DRIERITE CO., LTD.,
937-376-2927
www.drierite.com



KEEPING YOUR TEAM MOTIVATED

FIRST TRY TO UNDERSTAND WHY THEY DO WHAT THEY DO By Jeff Tobe



In these do-more-with-less downsized times, the number one question I get asked by lab professionals is, "How do we motivate our people and keep them motivated to do more?" I have thought a lot about motivation because it is not uncommon for someone to introduce me as a 'motivational' speaker. Something about that appellation has bothered me since I first got into professional speaking. Then it struck me one day during a presentation with a large pharma company... **YOU CAN'T MOTIVATE YOUR PEOPLE!**

There are 5 things that I have learned about what motivates people.

1) YOU CANNOT MOTIVATE OTHER PEOPLE!

Motivation is a fire from within. If someone else tries to light that fire under you, chances are it will burn very briefly.

- Stephen Covey

What we have to realize is that we can give people incentives to perform better and encourage and support their efforts but, the basic motivation for their behavior must come from within. People motivate themselves. All we can do as a leader is create an environment that aids in motivating someone to do something. For example, I recently spoke to one of

the administrative assistants at a large corporation here in Pittsburgh. She explained to me that her boss was a wonderful leader who kept her motivated at all times. I probed deeper and found that, in fact, this leader just understood his people's individual likes and dislikes and structured an environment around those things that turned his people on. How can you create the environment to motivate yourself?

2) ALL PEOPLE ARE MOTIVATED!

This is probably the most controversial thing I share with all effective leaders. Most of you probably know someone that you feel just isn't motivated at all. Maybe it's one of the people with whom you just can't find the right 'button' to push. Maybe it's a co-worker with whom you have tried dangling the proverbial 'carrot' with no response. Actually, research indicates that all people are motivated, no matter how they're behaving! Say, for example, Joan is working at a slow pace. Her manager may assume Joan is lazy or 'unmotivated'. But she actually may be motivated by a desire to achieve perfection. If the task requires speed instead of perfection, Joan's manager needs to coach her to help her adapt her behaviors, but there is no need to motivate her. Even when someone is inactive, they are

still motivated. In this case, they are motivated to do nothing!

3) PEOPLE DO THINGS FOR THEIR REASONS, NOT YOURS!

Getting down to the nitty-gritty, most people are motivated by unconscious motives most of the time.

-Richard J. Mayer

Although this may seem selfish, we have to realize that self-interest is simply a question of survival for many people. Even if we can't directly motivate others, we can better relate with people if we approach them with the desire to find out their reasons for doing what they do—or not doing what you would like them to do. In this new 'relationship' world in which we operate, putting yourself in your followers' shoes will better help you understand their reasons for behaving the way they do. There is a saying that I share in all of my training: "See the world through their eyes and you'll see the way they buy!"

4) TOO MUCH OF ONE MOTIVATION CAN BECOME A LIMITATION!

Tom, a computer programmer and friend, recently received a promotion to division head. His analytical programming skills were highly touted throughout his international firm. In his new position, Tom applied the

LABCAST

Be sure to attend Jeff Tobe's Lab Manager Academy webinar, "Conflict Resolution: Who Are You Dealing with Anyway?" on Wednesday, January 4th, or afterwards at www.labmanager.com/conflictres

same painstaking care and deliberation to minor administrative issues as he did to his programming projects, and as a result, he was perceived as slow and often indecisive. Because of his tendency to research everything, some workers felt he didn't trust their judgement. His strength had definitely become a limitation. When dealing with certain people, our strengths—i.e. the gift of gab, the ability to analyze—may just become our limitations even though that is what motivates us on a daily basis. Our role, in this new environment, is to identify THEIR style and adapt to that.

5) IF I KNOW MORE ABOUT YOU THAN YOU KNOW ABOUT ME, I CAN MANAGE THE SITUATION!

This goes against the old follower's credo, "Thou shalt not out talk the lead-

er." As I share in my books, we need to ask more questions of those who work with/for us. We have to establish (and for many it's a case of re-establishing) our role as the seeker of information. Once we truly understand the power of controlling communication in creating a motivational environment, we can understand how we can also influence the entire process.

Many of us think we know ourselves pretty well, and yet we still are surprised by the way people react at times to the things we do or say. Our challenge is to recognize both our strengths and limitations so that we remain in control of our own motivation, particularly in those situations where we find ourselves typically uncomfortable or ineffective. We all know that we cannot change someone's behavior unless they are will-

ing to change it themselves. When it comes to conflict, we cannot change another's motivation, but we can simply provide them with an environment that makes it easier to work with us. Is motivation permanent? I think Zig Ziglar, the guru of motivation, answers that best: "Of course motivation isn't permanent. But then, neither is bathing; but it is something you should do on a regular basis."

Certified Speaking Professional
Jeff Tobe is the regular host of *Lab Manager Academy*—a monthly webinar series offered by Lab Manager Magazine. For more information about Jeff, visit www.JeffTobe.com



Your health could be in danger

if you breathe small quantities of ordinary chemicals every day
(Hydrochloric acid, acetone, acetonitrile, xylene, dichloromethane, tetrahydrofuran...)

Total protection is possible with Captair® Ductless filtering fume enclosures

- Ready to use in minutes (no tools required)
- Energy Saving (Save up to \$4,300/year)
- Flexible / Mobile
- Inexpensive
- No HVAC Connection



CaptairFlex®
Ductless Fumehood



CaptairStore®
Filtering Storage Cabinet



Visit www.captair.com for more info or call 1-800-964-4434



ADAPTING TO SCIENTIFIC MOBILITY

This column over the last year has dealt with many lab-related workforce issues, but one constant running through them has been the need for versatility™—not just when it comes to the people managers hire, but in every aspect of a lab's business.

After all, the big business of science is no longer sustained by the work of solitary chemists or biologists cooped up in their own worlds of specialized research. A Northwestern University analysis in 2009 of close to 20 million research papers archived in the Institute for Scientific Information database proves it: Faculty there found that all scientific fields are increasingly relying on teamwork to meet modern business goals.

That spirit of teamwork has led to a more creative way of doing business all around, from the development of specialized technology that enables scientists to share information quickly and efficiently to the management of complex endeavors entirely online.

Failing to become versatile and flexible in the sciences, then, means a company might not be able to enjoy all the benefits that come from such advances in the scientific workplace.

One high-profile area contributing to this new workplace reality is the use

of mobile analytics and remote facilities. Anything you once could do only in a lab can now often be done in the field. And remote facilities are critical in their ability to provide specialized services for projects that might span a few U.S. states or even several continents. So where companies might have been unable to provide a service before, they now can with these remote capabilities—and along with it, increase their business.

“Scientific endeavors are happening more and more in a networked environment.”

The benefits of using mobile analytics and remote facilities have been clearly established, and nearly every scientific company now takes advantage of them. It's an indication that scientific endeavors are happening more and more in a networked environment. In fact, your lab might be serving in this mobile capacity. The versatility that these labs must maintain when it comes to serving their customers only underscores even more strongly the need to hire the best and most versatile scientists.

Labs like this are more independent,

and processes must be consistent with fluid standard operating procedures so that service and regulatory compliance are not compromised. From an employment standpoint, hiring processes must be just as consistent and must be maintained at a higher level to ensure continued high-quality service.

Managers should look for people with documented experience in current good practices, such as current good laboratory and clinical practices. Except for those who have only worked in academia, where additional regulation may be required as in commercial endeavors, not every scientist has this critical experience in adhering to mandated standards.

But having this experience will affect everything, from the way scientists write down information to how often they test their equipment to make sure it is calibrated correctly. Is a candidate comfortable with sample preparation, with method development, with validation? All of this sizes up a candidate's ability to deliver value to your lab. Recruitment, then, must focus on seasoned scientists with documented experience in good practices to ensure a company is able to deliver the best results to their clients.

With mobile analytics and remote labs, the environment also tends to be

a very multitasking one. The shift in projects is likely to happen quickly. Sometimes there is also a high volume of projects happening simultaneously.

This underscores the need in contract research organizations to employ people who have the kind of soft skills required to assimilate into a multitasking environment. Employees must be flexible and capable in their abilities to understand drastically different analytical environments. Yes, it runs almost contrary to their training because scientists are trained to be specialized. But the big business of science now dictates that scientists must be able to go beyond specialization in order to compete in the new scientific work environment.

“With mobile analytics and remote labs, the environment also tends to be a very multitasking one.”

The ability to work in a team environment is also crucial. Research and development is incredibly competitive as well as collaborative, and those working on a team often have a significant advantage when it comes to producing results ahead of the competition. Hire researchers who are ego-driven but who are also open to collaboration.

As always, by employing the right people with versatility, highly collaborative labs will always provide a competitive edge in the new scientific workplace.

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. Alan can also be followed on [LinkedIn.com](https://www.linkedin.com/in/alanedwards).

PROGRAMMABLE DISPENSING

At the touch of a finger.



Introducing the new TOUCH SCREEN GEMINI SERIES

- Fully programmable dispensing
- Customize & Automate batches
- Bright user friendly touch display

Call or click for details



Aries FilterWorks, your lab water specialists

856•768•9600

www.ariesfilterworks.com

Made in USA

CLEAN CHEMISTRY TOOLS

WHAT IT TAKES TO ACHIEVE THE LOW ANALYTICAL BLANKS NECESSARY TO PRODUCE GOOD ICP/ICP-MS DATA

by Tim Michel and Don Potter

In recent years there have been continued developments in instrumentation for trace metals analysis—particularly in ICP-OES and ICP-MS. Current ICP-OES instruments are capable of ppt level detection limits for many elements, while the development of collision/reaction cells (CRCs) in ICP-MS has greatly reduced spectral interferences, enabling ICP-MS to be applied to the most complex sample types and to a wider range of digestion acids. Both of these developments have, in turn, placed greater demands on the sample preparation step, especially on microwave digestion, which is being used more widely as a sample digestion technique for ICP-MS. The greater sensitivity of ICP-MS in particular means that the quality of the analytical blank is critical to generating high-quality data. The application of instruments and strategies to reduce the sample prep blank is often called the application of Clean Chemistry techniques. This article highlights the factors impacting blank quality, in particular when microwave digestion is used, and reviews some Clean Chemistry products and technologies designed to help the analyst generate superior analytical data.

“The significant role of the analytical blank in chemical analysis of trace metals cannot be overemphasized. Sensitive instrumentation such as ICP-MS, ICP-AES, and GFAA requires that sample preparation be at least as sophisticated as the instrumentation used in analysis. ... Trace analysis is as dependent on control of the analytical blank as it is on the accuracy and precision of the instrument making the measurement.”

- US EPA SW-846, Chapter 3, Update IVB

Sources of contamination: Sample prep to analysis

Considering a routine lab (non-cleanroom environment) performing microwave digestion prior to trace metal analysis, there are a number of potential sources of contamination that can be broken down generally into the following:

ITEM/STEP	SOURCE
Reagent Purity	Deionized water and digestion acid quality
Vessel Cleaning	Cleanliness of digestion vessels, sample intro components
Microwave Digestion	Vessel/vial material, acid volume

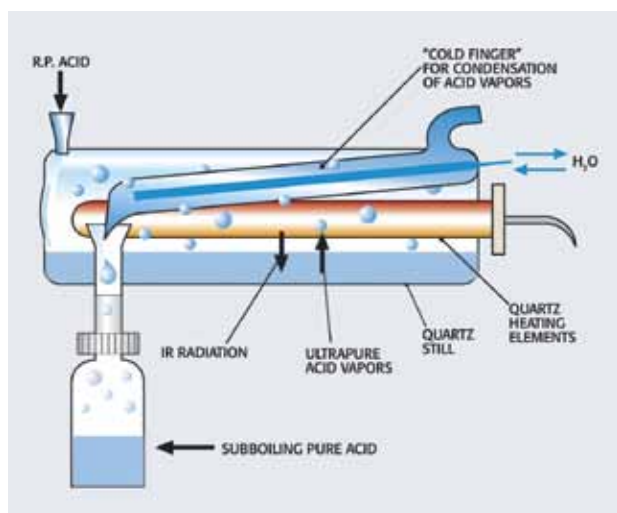
Reagent purity

Blank contribution due to impurities in the reagents used—deionized water (DIW) and digestion acid—is well known. For DIW, a modern DI water system with a reverse osmosis column should be used. The system should be well maintained and preferably fitted with a footswitch for easy operation and to avoid contamination of the tip of the water dispenser. Monitoring the boron blank is a good way to check the condition of the column because boron breakthrough occurs first as the column reaches the end of its useful life. Correct choice of digestion acid grade (and the acid used to prepare standards and rinse solution) is a more challenging issue. Traditionally, trace metal (TM) grade acid, which typically contains impurities of 1ppb or less, has been used for acid digestion and also generally for preparing dilute stock solution for sample dilution and standards prep in ICP-OES. ICP-MS users typically use high-purity-grade acid (typically 10-50 ppt impurities) for sample dilution and standards prep. At around \$500 for 500mL, however, high-purity-grade acid is expensive. TM grade, at \$50 for 500mL, is reasonably priced, but not quite clean enough for acid digestion when ICP-MS is used to measure the digests. Part of the problem is the packaging used for TM grade, which is polypropylene-lined glass. TM grade acid is specified at 1ppb for most elements *at the point of bottling*—it can be significantly higher after bottling. An alternative to buying high-purity acid is to apply Clean Chemistry principles and purify TM grade acid using a sub-boiling still such as the proprietary SubPUR or DuoPUR.

DuoPUR and SubPUR

Sub-boiling distillation is recognized as the best method to obtain high-purity reagents and the lowest blank values for ultra trace analysis. Sub-boiling distillation vaporizes a liquid by gentle infrared heating of its surface, avoiding boiling. This prevents the formation of aerosol or droplets. In conventional distillation, violent boiling action generates aerosolized droplets, resulting in contamination of the distillate. Surface evaporation by sub-boiling distillation prevents this, yielding a much higher purity distillate. The DuoPUR consists of two high-purity quartz distillation units (Figure 1), each comprising a heating element, water cooled condensers and a PFA collection bottle. The SubPUR is the same system, but with only one sub-boiling distillation unit. Distillation time and power level is selected. Infrared heating gently vaporizes the surface liquid, which condenses on an inclined cold finger and is collected in a PFA bottle.

Starting with low-cost reagent-grade acid, the DuoPUR can produce 1 liter of high-purity acid in approximately six hours, and the total cost of producing 5 liters of high-purity acid is around \$90—a significant savings. Thus the lab has an on-demand supply of high-purity acid, at a price that makes it viable for use in microwave digestion for ICP-MS and ICP-OES use, and even for cleaning components. When ICP-MS is used to measure microwave digested samples, the use of high-purity digestion acid will significantly reduce the analytical blank.



◀Figure 1.
Schematic diagram
of Milestone
SubPUR/DuoPUR.

Vessel cleaning

To achieve high-quality blanks when using microwave digestion, pre-cleaning the vessels is critically important. It is not sufficient to wash or soak vessel liners in dilute acid. The surface of PTFE is porous and will take up trace amounts of digest solution at elevated temperatures, especially as it “ages” with continued use. Running a blank in a vessel previously used to digest a sample, without thorough cleaning, will lead to blank contamination. There are two ways to thoroughly clean a microwave digestion vessel. The traditional method is to perform a cleaning run (with blank acid) in

NEW!

BRAND

Precise, Light & Dependable

BRAND HandyStep® S Repeating Pipette

The NEW HandyStep® S provides unprecedented versatility in a mechanical repeating pipette, with accuracy, precision and dependability.

- Comfortable, light weight, and well balanced
- Easy one handed volume selection
- Flexible; accepts third party tips – no more being locked into a sole source
- Tip ejection system allows tip removal without user handling.



Economical BRAND PD-Tip™ syringe tips fit all repeating pipettes using non-proprietary designs.

Looking for an electronic repeating pipette? Try the rapid, relaxed and reliable HandyStep® electronic.



Lab Rats Trust BrandTech!

BRANDTECH®
SCIENTIFIC, INC.

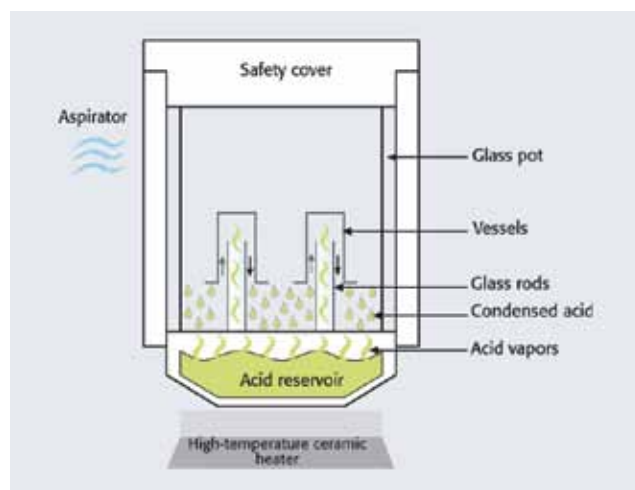
Toll Free: (888) 522-2726
www.brandtech.com

the microwave prior to each sample digestion run. The downside is that this reduces the sample processing capacity of the microwave by approximately 50 percent. The Clean Chemistry approach, which is more productive and efficient, involves placing the vessels in a closed system containing high-purity acid vapor.

“Sub-boiling distillation is recognized as the best method to obtain high-purity reagents and the lowest blank values for ultra trace analysis.”

TraceCLEAN

TraceCLEAN is an automated acid reflux system that thoroughly and safely cleans microwave digestion vessel liners. The system comprises a heated acid reservoir with a metal-free cleaning chamber above it (Figure 2). TraceCLEAN, like DuoPUR, uses the principle of sub-boiling distillation: only high-purity acid vapor comes into contact with the items to be cleaned. Trace metal contaminants present in the cleaning acid remain in the reservoir and do not come in contact with the cleaned items. Built-in exhaust/cooling prevents operator exposure to acid vapors, and the system is fully safety interlocked for unattended running. A cleaning run typically takes one hour, and cleaned items are cooled inside the system, preventing airborne contamination. TraceCLEAN can be used for the unattended cleaning of all TFM, PFA, glass, and quartz digestion vessels, and also for ICP sample introduction components such as spray chambers, torches, etc.



▲ Figure 2. Schematic diagram of the TraceCLEAN.

Microwave digestion

Traditional closed vessel microwave digestion instruments, such as the Milestone ETHOS EZ and the Single Reaction Chamber microwave digestion instruments UltraWAVE and UltraCLAVE, all feature Clean Chemistry technology, but applied in different ways.

Quartz inserts for closed vessel microwave digestion

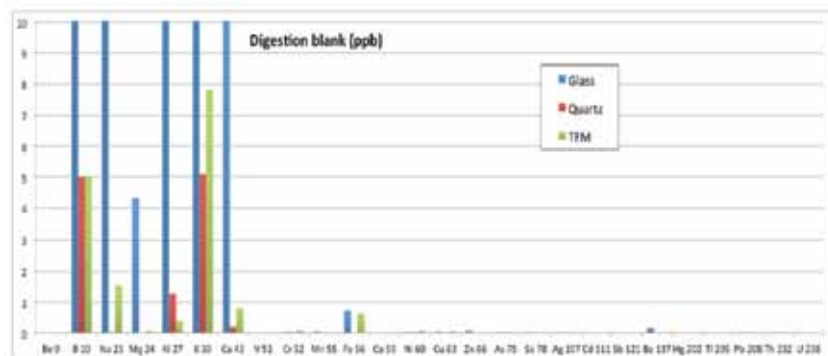
All ETHOS EZ rotors feature vessel liners manufactured from high-purity TFM, a high-density form of PTFE, which are able to withstand higher temperatures (up to 300°C). High-purity TFM is preferred to PFA for high-temperature digestions because its surface is more resistant to absorption of acid vapor and liquid. Absorption of vapor and liquid over time increases the digestion blank. However, the ultimate vessel material for producing low digestion blanks is quartz. Quartz has a very low level of metal impurities, does not absorb vapor or liquid, and is easy to clean. The high-pressure SK rotor is often used with 35mL quartz inserts that fit inside the standard TFM vessels. The sample is weighed into the quartz insert, and acid is added. Due to the smaller volume, less digestion acid can be used (only 2-4mL), which reduces the digestion blank. Since the sample is digested in the quartz insert, the TFM vessel does not need to be cleaned and also lasts longer. An additional benefit of using quartz inserts is the ability to use higher weights of organic samples. The insert sits in 10mL of water/H₂O₂ mixture. During the heating cycle, the H₂O₂ reacts with the gases CO₂ and NO_x produced during digestion, greatly reducing pressure buildup in the vessel. This allows higher weights of organic samples to be digested, especially with challenging samples such as oils.

Quartz vessels

An alternative to the use of quartz inserts is to manufacture the vessel liner itself in quartz. The ETHOS EZ Q-16 quartz rotor holds 16 high-purity quartz vessels and is ideally suited to ultratrace analysis. The benefits of lower acid volume, elimination of vapor and liquid absorption by the vessel walls, and easy cleaning all apply equally well to the Q-16 rotor. The Q-16 rotor also has an additional benefit: all vessels have indirect temperature control via IR sensor, and because quartz is transparent and has excellent heat-conduction properties, IR temperature monitoring is both very accurate and very fast. With the Q-16 rotor, direct temperature measurement is not necessary.

Single Reaction Chamber (SRC) microwave digestion vials

The UltraWAVE and UltraCLAVE are both SRC microwave digestion systems. Clean Chemistry technology has been incorporated in the SRC through the design of its sample vials. Unlike closed-vessel digestion, where samples are digested in individually pressurized vessels, with SRC the reaction chamber itself is the pressure vessel. Samples are weighed into simple autosampler-type vials and placed in a rack. The rack is lowered into the chamber, and all samples are digested together. Vials are available in glass, TFM, or quartz. The benefit of glass is that it is disposable, but for the lowest digestion blanks, TFM and quartz should be used, both of which give extremely low blanks. Digestion acid volumes of only 1–4 mL further reduce digestion blank. Also, since the vials are not pressurized, absorption of vapor or liquid by the walls of the TFM vial is virtually eliminated. Vials have TFM caps to prevent airborne contamination during transfer. Figure 3 shows UltraWAVE digestion blanks (4 mL high-purity HNO_3 diluted to 20 mL with DIW) obtained for 26 elements in both quartz and TFM vials, measured using an Agilent 7500cx ICP-MS. Both digestion and measurement were performed in non-cleanroom conditions. The trace metal content of the digestion blank arises from impurities in the acid and water, contribution from the vial, airborne contamination, and finally, contribution from the ICP-MS sample introduction system. Only four elements were found to be greater than 1 ppb. The highest levels were for B and K, which were present in both vials, suggesting the source is not the vial material.



▲ Figure 3. SRC digestion blank data obtained from quartz and TFM vials.

Summary

By applying the principles of Clean Chemistry, excellent analytical data can be generated from digested samples in a non-cleanroom environment using a microwave—even at ICP-MS levels, provided the necessary steps are taken. In addition to good technique and careful handling, the use of high-purity acid for digestion, correct choice of digestion vessel material, and care in vessel cleaning are all key to achieving the low analytical blanks necessary to produce good analytical data.

Tim Michel, National Sales Manager, Milestone Inc., can be reached at mwave@milestonesci.com or by phone at 203-925-4240. *Don Potter*, Business Development Manager, FullQuant Inc., can be reached at don_potter@fullquant.com.

ULTRA-TURRAX® Tube Drive control

Mixing
Dispersing
Homogenizing
Milling

- ✓ High level of user safety
- ✓ Hermetically sealable disposable sample tubes
- ✓ No possibility of cross-contamination
- ✓ Reproducible tests
- ✓ No cleaning required
- ✓ Suitable for individual use and use in series



Step 1
Application: Dispersing of mint leaves.

Step 2
The tube is attached onto the drive system.



Step 3
The mint leaves are homogenized by the rotor-stator unit in the DT Tube.



Step 4
Test result: The mint leaves are dispersed homogeneously. The tube is removed from the drive system.



Step 5
If required the sample can be extracted for analysis with a syringe through the pierceable membrane of the tube lid.



Step 6
The tube is labeled and stored as a reference sample.

To learn more visit www.ika.com/uttd_en
Email: sales@ika.net · Tel.: 1-800-733-3037

IKA®

INTEGRATED TOOLS HARMONIZE DISPARATE DATASETS

**SUCCESSFUL ADOPTION OF INTEGRATED
RESEARCH MANAGEMENT SYSTEMS IN THE
LIFE SCIENCE MARKET** by Tanuja Koppal, Ph.D.

Consolidation, collaboration and configurability seem to be the three C's driving the need for more tightly integrated lab workflows and systems, especially in the life science market. Increased consolidation in the pharmaceutical and biotechnology industries has resulted in organizations with many different research management tools and silos of data that make it challenging (if not impossible) to effectively collaborate across the enterprise. Similarly, the need to communicate across multiple sites and different organizations has intensified as pharma and biotech companies are now outsourcing more to specialized vendors to reduce costs and improve results. "We are seeing increased collaboration not just within an organization but between organizations," says Mark Everding, managing partner for LabAnswer. Various groups working from different locations are now expected to share more information and leverage resources and expertise on a routine basis.

With the increased use of sophisticated genomics and proteomics tools, there is certainly no dearth of information. The challenge now is being able to integrate, visualize and interpret data coming from multiple sources, and to decipher patterns that lead to insight and innovation. "Companies want a broader view into their data in order to make good decisions," says Everding. This requires effective handling of massive amounts of diverse datasets and making it accessible in a fast, convenient format, preferably using a common interface. But the question is whether this data integration can lead to better data interpretation, thereby enabling better decision-making.

To integrate or not to integrate

According to Everding, system integration within labs is inevitable. "There is no doubt that systems in life science

research are going to be integrated. However, are we going to have one system, three systems, or ten systems? How many systems are we going to have to integrate together? Are we going to have a fully integrated single system or are we going to use best-in-breed?" Getting answers to these questions is not quite that simple. It calls for a careful scrutiny of the organization's legacy systems, their use of terminology and ontologies, their need for data model flexibility, and ultimately an examination of the strategic and operational needs of the enterprise, down to individual user.

Every industry seems to start with the best-in-breed approach in selecting IT systems. Organizations identify their needs in specific operational or functional areas and then

pick the best products available in the market to fulfill those needs. Only later do they try to integrate them to work together. Inevitably, this approach falls short of the organization's productivity expectations. "It hasn't worked in any other industry and it

doesn't seem to work in life sciences," says Gary Kennedy, founder and chief executive officer at RemedyMD. "That is not because any of the systems were bad, or that people made bad choices, but because they spent all their time integrating and none of their time realizing productivity benefits." Hence, individuals and companies have started gravitating towards integrated product offerings. "Even if each of the modules isn't necessarily the best in the industry, people don't have to spend time on integration and instead can spend their time solving the problem at hand," says Kennedy.

The obvious downside to selecting an integrated approach over a best-in-breed approach is that you don't always get the best product features available in every niche of the marketplace. For example, a standalone electronic lab notebook (ELN) may have more features than the ELN

"Various groups working from different locations are now expected to share more information and leverage resources and expertise on a routine basis."

functionality that's part of an integrated package. A more fundamental and increasingly more serious drawback in trying to integrate best-in-breed systems is that you can never fully integrate the data from different systems. This limits the types of queries you can run and ultimately the types of hypotheses that you can test. (See sidebar below for more details on advantages of integrated systems.)

In essence, the trade-off organizations face is balancing the enterprise's productivity needs against the individual's preference for particular features or functionality. With a single integrated system, organizations typically sacrifice some of the requirements of individual users, unless the system is highly configurable so that the organization or its users can adapt it to meet their specific needs. "What it comes down to with the best-in-breed systems versus a single integrated system, is balancing the needs of the organization against the needs of the individual," says Everding. "If the tool is flexible enough, you can configure it such that it meets individual needs within a job category and still have a common enterprise database. Now you've got the best of both worlds."

Ontology-driven data harmonization

That desire to meet the needs of both the organization and its scientists is what drove RemedyMD to develop the Investigate™ Integrated Research Management System. "The only way we felt we could get data together was to build integrated systems from the outset," says Kennedy. "We basically made a bet on this happening four or five years ago and so we started building all these integrated applications on the Mosaic Platform." The Mosaic Platform™ offers a common architecture for a laboratory information management system (LIMS), an ELN, a biospecimen management system, a reporting engine, and a data visualization system. "The reason we call it Mosaic is that we're able to aggregate different pieces of data from disparate sources, like you would in a mosaic, and then see a pattern emerge. The pattern could be a variety of things, but it's impossible to recognize the pattern until you aggregate the data from a variety of sources and harmonize it via an ontology," says Kennedy.

These integrated tools share a common user experience and underlying data model. "Then we built an ontology to help harmonize and link disparate data into a single format that can be queried," says Kennedy. The reporting system, the electronic data capture forms, the data visualization tools and other parts of the system were now under the control of the same master ontology, which eliminated

the need to push data back and forth between applications and prevented spurious data from getting into the system. "When you visualize data, you know that it's harmonized with other data elements in the system and that was the hardest thing for us to build," says Kennedy. "One of the most difficult things we have built is the ability to extend the ontology so you can add new concepts on the fly. This means that your ontology never gets out of sync with your data model as you encounter new concepts or terminology in your research."

Selecting the right system

Given the diversity in size and type of information being generated, the key question is how do you decide which data management tool is right for you. It's not as simple as picking up a third-party report and finding who has the best software. "The first thing we have to do is understand the high level requirements of the organization," says Everding. The enterprise has requirements for security, for collaboration with other organizations and for reducing overall costs. The individual researcher has a completely different set of requirements. "In today's world, there are a lot of different tools that are very specific to what a researcher wants to do. So the organization has to balance the need for a niche tool against the needs of the organization and that balance is incredibly important."

After identifying those needs, you have to assess the environment where your data originates. How is it generated? Is it clean and can it be integrated? Once you understand the environment and the business and individual requirements, then it's time to start discussions with prospective vendors. "When there is a disciplined approach to selecting what tools you're going to use, it pays huge dividends," says Everding.

As part of the selection process, it's important to build use cases and ask the software vendors to demonstrate to a particular use case. "Rather than saying, 'come demonstrate your software to us', we first describe our environment and our requirements and then let the vendors demonstrate to those," says Everding. "Otherwise, you get a marketing pitch and a little bit of smoke and mirrors."

SAIC-Frederick Inc. and RemedyMD recently entered into a collaboration in which researchers at the National Cancer Institute's (NCI) Advanced Technology Program in Frederick, Maryland will implement RemedyMD's Investigate Integrated Research Management System to help store, query, analyze and report data generated from their research in cancer and AIDS. "We needed something that can handle diverse workflows and also something that

Automated Sample Prep in Minutes

- Processes samples directly from original sample bottle
- Automatically delivers required solvents, rinses bottle, extracts analytes from the SPE disk
- Preprogrammed EPA Methods
- Reduces solvent use
- Lowers operating costs
- Increases productivity and efficiency
- Improves quality/consistency

**Automated Sample Preparation
for GC/MS & HPLC/MS**

**Extraction
Drying
Concentration**



Telephone: 1.603.893.3663
Email: info@horizontechinc.com
Web: www.horizontechinc.com

would be able to manage and interface with the tsunami of -omic data that is coming our way," says Bruce Crise, Ph.D., director, business development, scientific and technical operations with the Advanced Technology Partnerships (ATP) Initiative at SAIC-Frederick Inc. "We were looking for an ontology-based system that would be capable of asking integrated questions across the different areas of expertise that the ATP is involved in."

SAIC-Frederick expects RemedyMD's Investigate™ application built on its Mosaic Platform to improve workflows in the nine laboratories of the NCI Advanced Technology Program and in NCI's Patient Characterization Center by offering researchers access to a fully web-enabled solution for biospecimen management, instrument integration, data visualization, and project review and approvals. "For us, our selection criteria centered around (system) scalability, the enablement of the end-user to build workflows, and accessibility," says Crise. In essence, SAIC-Frederick has decided to integrate the research systems across the NCI Frederick laboratories to achieve its organizational productivity goals while relying on Investigate's highly configurable platform to empower its researchers to customize the application to suit their specific needs.

In the two months since the partnership was announced, Crise believes they now have a very active and engaged set of end-users. "I believe that what we'll build will be more streamlined and more user-friendly and that will well make up for any developmental hurdle or cost that might be involved." The other upside is that the people who are building it will actually be the people who are using it. "They're ultimately vested and responsible for the outcome," says Crise.

The integration of a system into the workplace and its adoption by the end-user is the ultimate yardstick for success. "If we build a system on time and on budget, and with the functionality that you asked for, do we have a success?" asks Everding. "The answer is maybe. But if no one uses the system, it's a failure. So you have to have a system that people will use."

Next generation of integrated systems

"I think the future is moving inexorably toward pattern recognition and toward self-monitoring systems," says Kennedy. "So one thing that we don't do, and I don't think anybody does, is to have the system recognize patterns and intervene to make some changes. So they ought to be self-monitoring and self-adapting." But for that to happen everything has to be integrated, has to be flexible and it must be ontology-driven. "If you want the system to make those adjustments, the only place you can make it would be in the ontology because that would force the adjustments throughout your integrated system," says Kennedy.

Although they do have all the building blocks required for the next generation of applications, it's going to be at least five to ten

years before there's massive adoption of self-learning systems. "Right now, if people can adopt something that's integrated, has an ontology, and is able to recognize patterns, even if the pattern recognition has to be manual, that's a great step forward."

Tanuja Koppal, Ph.D. is a freelance writer based in Randolph NJ.

ADVANTAGES OFFERED BY INTEGRATED SYSTEMS

- **Increased Productivity:** You spend your time conducting research, not on complex system or data integration.
- **Improved Collaboration:** Integrated systems operate in a browser-based environment over the cloud. Authorized users in different locations can collaborate on the same project by accessing the system through the cloud (Internet), entering their data, issuing their queries and then visualizing their data.
- **Consistency:** Since all data and tools are controlled by the ontology, you're guaranteed consistent results. There's nothing more frustrating than using one tool and getting one result and then using another tool and getting a different result for the same experiment.
- **Ease of Data Retrieval:** The integrated system allows a scientist to retrieve and compare data no matter what part of the system it's in.
- **Flexibility:** A system that is highly flexible is extremely valuable for researchers who aren't exactly sure what patterns they're looking for. In a highly configurable, integrated system, you only have to make the change once and the behind-the-scenes work is all done dynamically, preventing any inconsistency.
- **Improved Pattern Recognition:** An integrated system will allow you to aggregate and harmonize all of your data. This 360° view of your data allows researchers to see patterns you would never be able to see when only one or two datasets are available.
- **Common User Experience:** An integrated system enjoys a common User Interface that provides users with a consistent experience throughout the application, accelerates end-user adoption and minimizes the learning curve.

SPE Disks

Process Larger and Dirtier Samples

- Pesticides and Herbicides
- Pharmaceutical By-Products
- Personal Care Products
- Hormones/Endocrine Disruptors
- Bisphenol A/Nonyl Phenol
- Oil & Grease/1664A
- Semi Volatile Organics
- TPHs, PAHs, PCBs
- Emerging Contaminants
- EPA Methods 525.2, 8270, 1694 ... many more

Extraction Solutions for
GC/MS & HPLC/MS

Aqueous and Environmental Applications



 **Horizon**
technology

Telephone: 1.603.893.3663
Email: info@horizontechinc.com
Web: www.horizontechinc.com

OFFICE SPACE

MOVING A HIGH-TECHNOLOGY LAB INTO AN EXISTING OFFICE BUILDING

by Mark Paskanik

Want to build a lab? Think you don't have the space or the funds to do so? Think again! You can place high-technology research space in your current office building. All it takes is a good plan up front and creative thinking from an integrated team.

When the economy was rolling, constructing a high-technology building with all the bells and whistles was commonplace. In today's age of tight belts and clamped wallets, newly constructed lab space may be financially unattainable. What about your existing office space? You may already own the asset or be paying rent on space that is not in use. Why not leverage that space and build your lab where you already have occupied space? It can be done, even with labs that have complicated high-technology needs.

In this article, we will look at two case studies:

1. **MeadWestvaco headquarters:** Placing an SEM (scanning electron microscope) above a ground floor in a developer office building
2. **Duke University cGTP (current good tissue practice) Clean Rooms:** Placing class 10,000 clean rooms on the 9th floor of an office building within a sea of cubicle spaces

The vibration challenge

MeadWestvaco Corporation (MWV) is a global leader in packaging and packaging solutions. The headquarters building is on a beautiful site next to the James River in Richmond, VA. The challenge for this company was to relocate the research lab to Richmond. Colocating the research staff with the company was viewed as a good opportunity, especially with the 2nd and 3rd floors unoccupied. But how would this work in a typical developer office building?

In a typical developer building, the structural system is not designed to support a laboratory. In fact, the building itself is only designed for typical office space. In the case of MeadWestvaco, analysis was done to confirm the structural load requirements and to see if any additional structural support was



▲ Open adaptable laboratories with views to the James River.

PHOTO COURTESY OF LEE BRAUER.

needed. Fortunately, the concrete structure had sufficient loading capability for the new laboratory space.

A small penthouse was constructed on the adjacent parking deck, which provided a good location for the air handling unit (AHU) and supporting lab utilities. A short penetration through the existing wall to the adjacent labs was all that was needed. With the space's tight floor-to-floor heights, chilled beams were used to help clear ceiling plenum space for the fume hood exhaust. The exhaust for the fume hoods required a new series of chases to be cut within the existing floor slabs. These chases were located in the core area of the floor plate to minimize duct runs and to lessen the impact of potentially occupied space. Most of the areas affected were storage rooms, which minimized the amount of disruption during the renovation. These solutions allowed the lab space to be accommodated within the existing office building and MWV could

“In today’s age of tight belts and clamped wallets, newly constructed lab space may be financially unattainable.”



▲ Fume hood alcove to the right with chilled beams in upper left.
PHOTO COURTESY OF LEE BRAUER.



▲ ISO-7 manufacturing clean room with view to the Duke campus beyond. PHOTO COURTESY OF MARK HERBOTH.

realize the benefits of colocation. The final challenge involved the SEM.

Traditionally, an SEM microscope is placed on grade. This alleviates the problems with vibration. In this case, locating the SEM far from the research labs was not an option. So how was this done?

1. A vibration consultant was hired to study the existing vibration on-site. Multiple points were measured at different times throughout the day to allow for potential interference from elevators and footfall traffic.
2. The resulting information was provided to the structural engineer. The walls constructed around the SEM room were concrete masonry unit (CMU) block walls, and this additional weight lessened the transfer of vibration.
3. Finally, an isolation pad was provided with the SEM. The vibration consultant was able to verify

that the system would work once installed. With the passing of each year, new technology is greatly improving the use of vibration-sensitive equipment.

Through careful analysis, the design team was able to provide the client with the peace of mind that comes from knowing that the outcome would meet the needs of the project.

As a result, MWV was able to leverage its existing unoccupied leased space and colocate the research staff within the headquarters building.

Good Tissue Practice (GTP) cleanrooms in a cubicle farm

Duke University was looking to add GTP manufacturing space. The 9th floor of the North Pavilion building had available space, but it was located in an office building with a sea of open office cubicles. The solution—part with the sea of cubicles and



▲ *Materials prep laboratory with incubators on quick disconnects on right.* PHOTO COURTESY OF MARK HERBOTH.

place the clean rooms on the 9th floor, close to the roof. This allowed for direct access to a newly dedicated AHU. For utilities, CO₂ gas was needed to serve the incubators. To keep the CO₂ tank farm footprint to a minimum, liquid CO₂ was used in lieu of multiple CO₂ gas tanks. The CO₂ was connected at the ceiling with quick disconnects to limit areas for particles to build up. The walls were smooth and free of any services except the power and electrical wire mold.

Pressure differential is critical for the suite. Within the class 10,000 (ISO 7) clean rooms, all the air recirculates through ULPA (ultra low penetration air) filters every two minutes. The metal stud/drywall wall construction methods were modified to carefully seal the space tightly.

1. Silicone sealant was used extensively at the corners, from stud to drywall face and at the floors and deck above. Any potential location for air to travel at the seams and openings was sealed.

2. Metal studs were 18 gauge to provide a stiffer structure with less movement and spaced 12" on center. This provides for a more rigid construction that creates an airtight seal.

3. Aluminum flashing was installed at all corners to receive sealant. This reinforced the corner condition and provided a surface to apply the sealant.

4. All existing and new penetrations in the walls above the plenum space were detailed with flashing, sealant, backer rods, and Acrovyn. Special consideration was given to the existing ducts. Portions of the wrapped insulation were removed and replaced with rigid insulation to provide a surface to which the new walls could be sealed.

5. All wall devices were sealed with sealant



RDM INDUSTRIAL PRODUCTS, INC.
 Manufacturer-Direct & Distributor for Peripheral Products...
 Custom Built Laboratory Furniture & More !!



Many Styles Available ...

- Industrial-Duty
- Custom & Standard Designs
- Laboratory Tables
- Exhaust Fume Hoods
- Laminar Flow Workstations
- Cleanroom Furniture
- Static Control Furniture
- Cleanroom Furnishings
- Mobile Carts
- Laboratory Casework

SINCE 1977
www.labspacesolutions.com
 877-777-9130

Manufacturer-Direct !!!!



Wood or Steel...



Stainless/ Custom...




QUALITY • SERVICE • TIMING
 We also offer Seating, Carts, Shelving, Cabinets and Much More...

or neoprene gaskets. A majority of leaks are typically found in these areas, including the actual opening in a plug where a device is plugged in.

In essence, the space was constructed to be an airtight thermos. During commissioning, the door sweeps were raised to allow for airflow, as the space was constructed too tightly. This allowed the air balancing to be done without increasing operating costs by running the AHU at higher speeds.

This state-of-the-art CT2 fa-

through the design and budgeting process, a dashboard can be used to help realize cost drivers and benefits. A dashboard is an interactive visual tool that can assist teams in making decisions and achieving consensus in real time. As questions and challenges are raised, the team can make adjustments to the dashboard and immediately see the effects. In the long run, it may be the operating cost, not the construction cost, that is the driver for the project. These decisions need to be determined early and receive buy-in from the team.

placed in an existing office building. Although additional revenue was needed to upgrade the existing office space, it was still less costly than purchasing or leasing new lab space. It can be done. Start with a good plan and an initial study to determine if it is viable for you.

Mark Paskanik, AIA, NCARB, CDT, LEED AP BD+C, senior associate Perkins+Will, can be reached at mark.paskanik@perkinswill.com or by phone at 919-433-5309.

“By leveraging existing space, the project costs were within the range needed for the projects to go forward.”

cility provides the opportunity to find cures and heal those in need, while occupying space in an office building.

Securing funds for a large-scale project is always one of the top priorities in the planning process. In both of these case studies, the budget was very limited, even with funds provided by a donor. Other potential locations for the projects would have exceeded their budget. By leveraging existing space, the project costs were within the range needed for the projects to go forward.

When considering choices

You can build a lab in an office building

As shown in these two case studies, there are ways that a high-technology lab can be



The SC920 series lab vacuum system brings a new level of precision to your applications at the touch of a button, including auto-BP detection, sequence programming, evacuation and recording functions.

- A quiet, smooth running oil-free vacuum system.
- You control everything from up to 60 ft away.
- Features an intuitive, one touch knob control.
- Control and monitor your process without opening the sash

Pressure sensors enable a run to be completed without user input.

You don't even have to be there, freeing you up for more important things.



609-890-8600

Check out our new web Pump Finder at labpumps.com.

EVOLUTION OF FUME HOODS

BY JOHN BUIE

A fume hood is an essential piece of equipment found in almost all laboratories, from teaching labs to research labs to industrial labs. The fume hood limits exposure to hazardous or noxious fumes, vapors or dusts by safely removing these substances from the immediate working environment. The fume hood also serves to protect the sample from the external environment.

Fume hoods may either be ducted or recirculating. Both types operate by allowing air to be drawn in from the front (open) side of the cabinet, and either expelled outside the building or made safe through filtration and recirculated back into the room.

The history of fume hoods can be traced back to the days when Thomas Edison used his fireplace chimney to exhaust fumes from his laboratory.

EARLY TWENTIETH CENTURY – THE ORIGINS OF FUME HOODS

Working in around 1900, Thomas Edison seems to have been one of the first scientists to be concerned about laboratory ventilation. Edison used the fireplace chimney in his lab to exhaust noxious fumes and odors from his experiments into heated rubber compounds, using the natural draft of the chimney to expel the gases.

In 1923, one of the first recognizable fume hoods in the modern sense of the word was in use at the University of Leeds. This unit consisted of a large cupboard standing at working height and incorporating vertical rising sashes arranged like parallel windows.

In 1936, Labconco, one of the pioneering manufacturers of fume hoods, developed its first fume hood for sale commercially. This unit incorporated the now-familiar sash fronted design, allowing a single operator to work safely by placing his hands within the "cabinet."

WORLD WAR II

Considerable advances in fume hood technology were made during the second world war in response to the fear of exposure to highly toxic chemicals and radioactive materials. Against this catastrophic backdrop, significant progress in safety, ventilation, and fume hood design was made.

Also during the war years, the high-efficiency particulate air (HEPA) filter was developed by the body which later became the Atomic Energy Commission. The development of the HEPA filter had a dramatic effect on the effectiveness of fume hoods and biological safety cabinets, greatly increasing protection for users.

In 1943, John Weber, Jr. working at the Ames Laboratory in Ames, Iowa, developed the concept of a constant face velocity, variable exhaust flow fume hood control. This design was applied to a vertical rising sash hood served by a dedicated hood exhaust fan. The concept eventually became a standard feature employed on many fume hoods at that time in atomic laboratories, especially where ventilation containment within the hood was critical.

The greatest innovation enjoyed during the **1970s** was the development of auxiliary air fume hoods, which conserved energy by introducing outside air into the hood, reducing the loss of tempered air from the laboratory. This type of fume hood requires the use of two duct and blower systems.

During the **1970s**, Labconco developed the fiberglass walk-in fume hood, allowing the researcher more room to operate, and enabling work with larger pieces of apparatus in a safe environment. Walk-in fume hoods are a common feature in many laboratories today.

In the late **1970s**, the HOPEC Hood was introduced, which rationalized that by lowering the vertical sash to the half opened position and establishing it as the face opening criteria while maintaining the 100-FPM face velocity, one could cut their hood's exhaust capacity and related energy consumption in half (650 CFM in lieu of the traditional 1300).

In **1997**, Lab Crafters introduced their patented, high-performance Air Sentry fume hood, the first high-performance fume hood to be introduced to the market. This fume hood offered an efficient and quiet operation designed to operate in the 'real world' conditions of cross-drafts and temperature and pressure fluctuations, for example. More than 1200 Air Sentry fume hoods are currently installed across the country.

In **1998**, Erlab expanded its Captair product range to meet the demands of the modern laboratory. New instruments included the CaptairStore (a vented filtering storage cabinet), the CaptairBio (a PCR workstation), and the CaptairFlow.

Also in **1998**, Labconco introduced its PCR enclosures, Protector XL Benchtop and Floor-mounted hoods.

One important milestone to occur during the **2000s** was the development of low-flow fume, high-performance hoods operating at 50-60 fpm. These instruments allowed considerable cost and energy savings, while still delivering the performance of earlier models.

1950

1960

1970

In the early **1950s**, John Turner, working in the Engineering Department at Oak Ridge National Laboratory (ORNL), suggested replacing vertical rising sashes with horizontal sliding sashes in order to reduce energy consumption. He also introduced the use of a mechanical damper that worked off the imbalance between external and internal hood pressures.

Around the same time, Weber also recognized that best containment in a fume hood was achieved with minimum sash opening when he developed the emergency quick close feature incorporated as a part of his system. The exhaust fans used as a part of Weber's system were never turned off.

In **1951**, H.W. Alyea, Chief Field Engineer, Johnson Service Co. (now Johnson Controls, Inc.), realized that keeping the door of a fume hood closed as much as possible, and certainly when not in use, resulted in considerable savings in the amount of air supplied, with proportional reduction in cooling demand, improved filter life, and considerable energy savings.

In **1961**, Labconco introduced its first one-piece molded fiberglass-line fume hood, the Fiberglass 47. Fiberglass was chosen to line the fume hood as it offers durability, cleanability, high-light reflectivity, fire resistance and chemical resistance. The one-piece, fiberglass liner has been a signature feature of Labconco's general chemistry fume hoods since this time.



▲ Labconco's Fiberglass 28 fume hood.

In **1968**, Francois-Pierre Hauville created the company Erlab and began selling the first Captair ductless fume hood in the same year. Erlab continues to develop and market the Captair range of fume hoods today.

In **1985**, ASHRAE 110-85 test was developed, standardizing chemical fume hood test method.

1988, Labconco developed the first internal VAV hood.

An important milestone achieved during the **1990s** was the development of the sash-limiting device designed to limit the amount the sash could open without hindering access, and reduce the energy consumption of the fume hood.

In **1996**, the AFNOR AF X 15 211:1995 standard was introduced, allowing the performance of a ductless fume hood to be evaluated based on strict criteria. This standard is used today as the reference standard for all fume hoods.

Also in **1996**, Labconco introduced the Paramount filtered enclosure, featuring a ductless hood design that used less electricity per day than a 60-watt light bulb.

In **2000**, Lawrence Berkeley National Laboratory in cooperation with Labconco, developed and patented a promising new technology - the Berkeley Hood - which uses a "push-pull" approach to contain fumes and move air.

Later that same year, Labconco introduced its high-performance XStream hood which, due to its energy conservation, was able to contribute to LEED credits.



► Labconco's Protector XStream high performance fume hood.

In **2005**, Flores Valles introduced Adiprol, a new fume hood providing high chemical resistance and a total fire proof property designed specifically for use in schools and universities.



► Flores Valles' Adiprol fume hood for use in schools and universities.

In **2007**, Lab Crafters introduced the Air-Prentice fume hood, a variation of the Air Sentry fume hood specifically designed for academic science laboratories. This fume hood was designed to offer excellent performance at a price appropriate for academia.



▲ Lab Crafters Air-Prentice

In **2008**, Erlab presented their new Greenfumehood technology for the first time at Pittcon. Greenfumehood technology marked a new generation of ductless fume hoods designed primarily to be safe, energy-efficient, cost effective and environmentally friendly.

In **2009**, Thermo Fisher Scientific introduced its own energy-efficient fume hoods, the Hamilton Infinity fume hoods. These fume hoods incorporated an AutoSash feature designed to maximize laboratory safety by ensuring correct sash positioning with an extra trough positioned at the front of the unit to catch any spills.



▲ Thermo Fisher Scientific's Hamilton Infinity fume hood with AutoSash safety feature.

In **2010**, Air Science introduced a new series of Enhanced Filtration Technology (EFT) carbon filters for use in the company's line of ductless fume hoods. Enhanced Filtration Technology, was a universal filtration system developed for use with a wide range of core chemicals including organic acids, alcohols, aliphatic hydrocarbons, aromatic hydrocarbons, esters, aldehydes, ketones, ethers, halogens, as well as inorganic acids.

In the same year, Air Science also introduced the Purair ECO line of energy-saving ductless fume hoods designed for both chemical and particulate protection over a broad range of laboratory and industrial applications and based on the use of EFT filters. The Purair ECO was developed in response to an increasing worldwide demand for safe, cost-effective and energy-efficient ductless containment cabinets that minimize stress on facility HVAC systems without compromising protection for personnel and the environment.



▲ The Purair ECO energy-efficient ductless fume hood.

1980

1990

2000

2010

Also in **2009**, AirClean Systems began selling the Independence ductless fume hood. This device incorporated a Silconazne filtration system that offered advances in gas phase filtration, filtration monitoring, airflow control and monitoring, and user-friendly operator interaction to make the unit one of the safest in the world.



▲ Air Clean Systems' Independence ductless fume hood.

In **2011**, Air Science introduced the mobile ductless fume hood providing all-around visibility for classroom demonstrations and industrial training. The unit was designed to be self-contained and easily moved from laboratory to laboratory.



▲ Air Science mobile ductless fume hood

Fume Containment that evolves with your needs.



Independence™ Ductless Fume Hoods

Next-generation filtration, gas detection, monitoring and control technology. Available exclusively from AirClean® Systems.

AirClean®
Systems
The Fume Control Experts.

aircleansystems.com

FUTURE OF FUME HOODS

The driving force behind further innovation in the field of fume hoods in the near future is likely to be the demand for increased energy efficiency and reduced running costs. High-performance fume hoods promising a reduced environmental impact are likely to become standard, and further advances are likely to be based around fume hoods offering low-flow performance and smart mechanical systems.



LEED THE WAY TO SAFETY

HEALTH AND SAFETY CONSIDERATIONS WHEN BUILDING GREEN by Vince McLeod

We have written previously on LEED (Leadership in Energy and Environmental Design), the U.S. Green Building Council's (USGBC) certification program for green buildings. Now that we know what building green means and how to do it, are there any drawbacks? What does the research laboratory manager really need to know? In this column, the Safety Guys will look at some of the potential health and safety issues involved when building green.

Review of "building green"

The U.S. Green Building Council was founded in 1993 and now represents more than 20,000 organizations from every sector of the building industry. The USGBC and its LEED initiative aim to move construction toward environmental responsibility and sustainability. In 2000, the USGBC introduced LEED, a nationally recognized rating system for design, construction and operation of high-

"If you are building a project on a brownfield, then you had better make sure you have all the information available."

performance green buildings. First implemented for new commercial construction, LEED rating systems are now in place for existing buildings, schools, retail and healthcare, as well as systems under development for laboratories.¹

The LEED rating systems measure performance in seven key areas and award four levels of certification based on the aggregate scores achieved. The areas scored are sustainable site development, water efficiency,

energy and atmosphere, materials and resources, indoor environmental quality, innovative design, and regional priority. The four levels of LEED accreditation, ranked in order, are Certified, Silver, Gold and Platinum.

The reasons to "build green" and obtain LEED certification by following the rating system requirements are convincing. These projects, according to USGBC research, can generate up to 30 percent energy savings and 35 percent reduction of carbon emissions, use 30 to 50 percent less water, and generate 50 to 90 percent waste cost savings. All these benefits and more are realized for only a 1 to 7 percent increase in construction costs.²

How is health and safety impacted?

Designing and building green mainly focuses on minimizing environmental and resource impacts. It is exciting to see that building occupant health and productivity are also being considered. But is enough done, and are the approaches the most effective or desirable? And what about the construction worker's health and safety?

In working through the LEED rating system requirements, there are particular areas to which the health and safety manager should give consideration. Granted, there are many positives to building green and obtaining LEED certification. But potential negatives exist, as well. By increasing our awareness and thinking about these issues at the beginning, we can minimize or possibly eliminate them from our green building project.

Considerations for the construction workers

Three of the key performance areas contain potential pitfalls for construction workers. We'll discuss

Your success circulates

Thermo Scientific temperature control systems deliver the perfect fit: reliable, accurate and stable heating and cooling for virtually any application. From immersion circulators and refrigerated/heated bath circulators to chillers and heat exchangers – your yields and processes are optimized. You can work with complete confidence, knowing our solutions deliver the precise temperatures you require, exceptional consulting expertise, and Global Support. So when temperature control means everything, it's easy to keep your cool.

at every degree

• Learn more at www.thermoscientific.com/tc



STANDARD, ADVANCED and PREMIUM
Series Immersion Circulators



ARCTIC series Refrigerated/Heating
Bath Circulators



SAHARA series
Heating Bath Circulators

SAFETY TIP

REQUIRE GROUNDED PLUGS ON ALL ELECTRICAL EQUIPMENT AND INSTALL GROUND FAULT INTERRUPTERS (GFI'S) WHERE APPROPRIATE

By James A. Kaufman

The National Safety Council reports that about 1000 people are electrocuted each year in the United States. In 2005, a biology professor at Cleveland State University died as the result of an electrical shock in the lab.

OSHA specifies that all equipment in the workplace be grounded to avoid shock and possible electrocution. Removing or breaking off the ground pin is a bad and potentially fatal idea.

Most people are not aware of the danger associated with ungrounded equipment. This danger is compounded when the plug is a two-prong unpolarized type. If inserted backwards, the case of the appliance can be electrically hot. We find many in labs that are 50 to 120 volts hot.

This same problem can be caused by two other circumstances: (1) the electrician wires the receptacle backwards or (2) the appliance manufacturer does not follow the convention. In any of these three cases, if one is near a ground,

serious or fatal shocks can occur. Make sure that the ripple side of the appliance cord is connected to the wider side of the receptacle.

A ground monitor or circuit analyzer can be used to ensure that the receptacle is correctly wired. An AC-sensor can tell you if the case of the appliance or device is electrically hot or not. A Tension Tester will indicate if the receptacle is holding on to the plug's prongs with sufficient force to meet electrical code specifications. All three tests should be performed annually on receptacles and electrical equipment in the lab.

The use of Ground Fault Interrupters (GFI's) can provide significant shock protection. They should be installed in any location where the receptacle is within six feet of a ground or water is likely to be present on the floor or surfaces.

Source: Kaufman, James A., *Laboratory Safety Guidelines - Expanded Edition*, The Laboratory Safety Institute, www.labsafetyinstitute.org.

them in the order encountered under "LEED for New Construction." First, in the section on sustainable site development, Credit 3 is for brownfield redevelopment. A "brownfield," for those unfamiliar with the term, means "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant."³ The intent is to rehabilitate damaged

"Collecting and storing recyclables leads to additional material handling."

sites, a good idea. But if you are building a project on a brownfield, then you had better make sure you have all the information available and have incorporated it into a comprehensive health and safety plan for use by all the various contractors and their construction crews.

The Materials and Resources section is another area with potential health and safety issues for construction crews. This section includes a requirement for a construction waste management plan and deals with recycling and material reuse. Collecting and storing recyclables leads to additional material handling (as much as two or three times more than usual)⁴ and the potential for increased sprains, strains and puncture injuries. The

need for more dumpsters and containers on site can create congestion, resulting in traffic accidents, trips or falls. On the other hand, if waste management is set up logically and maintained properly, the result is better general housekeeping and a cleaner, more organized construction site.

A third area affecting workers during construction is under the Indoor Environmental Quality section. Credit 3.1 requires the development of an Indoor Air Quality (IAQ) management plan for the construction and preoccupancy phase. The purpose of this plan is to prevent IAQ problems resulting from construction activities by controlling pollutant sources; using low-emitting adhesives, sealants, paints and finishes; and protecting materials from moisture. This benefits both the construction workers and the building occupants.

LEED, building green and the building occupant

LEED for New Construction impacts building occupants directly in two key areas. The first is Building Commissioning, contained in the Energy and Atmosphere section. Commissioning is the process by which the building systems are verified as installed, calibrated and operating according to design. Because this includes the heating, ventilating and air conditioning system, it is important that a knowledgeable person review the test and balance and commissioning reports.

The entire Indoor Environmental Quality section is aimed at providing for the well-being of the building occupant. Two prerequisites must be met: minimum IAQ performance and control of environmental tobacco smoke. Additional credits are awarded for using low-emitting materials, controlling indoor chemical and pollutant sources, and implementing an IAQ management plan prior to occupancy.

Industrial hygienists and consultants have worked to solve indoor environmental quality problems since the late 1980s. We still face architectural features and design issues that lead to IEQ problems on a regular basis. Flat roofs, internally insulated ductwork, porous wall finishes in high-moisture areas, improperly installed (or missing) vapor barriers and poor access to ventilation equipment for maintenance are a few of the most common ones. Unfortunately, IEQ experts, and industrial hygienists in particular, have had little, if any, input into developing the LEED rating systems. Therefore, although the premise of LEED certification is a very good first step, we should continue striving to improve this process. Industrial hygienists and IEQ experts need to be involved in your construction or renovation project.

Conclusions

We have presented a brief overview of building green and LEED certification. We touched on the health and safety issues facing both construction workers and building occupants. We mentioned the need for the health and safety manager to raise his or her level of awareness and pointed out the major concerns to watch for during a green build (or any construction) project. In future articles, we plan to discuss these issues in more detail and present positive actions to incorporate into your management plan checklist. Until next time, remember, Safety First!

References

1. U.S. Green Building Council. Washington, D.C. 2007. <http://www.usgbc.org/>
2. U.S. Green Building Council, LEED Resources. Washington, D.C. 2007. <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=75&>
3. "Small Business Liability Relief and Brownfields Revitalization Act," Public Law 107-118 (H.R. 2869), January 2002.
4. "Green Design & Construction: Understanding the Effects on Construction Worker Safety and Health," by John A. Gambatese, Sathyanarayanan Rajendran and Michael G. Behm. *Professional Safety*, May 2007.

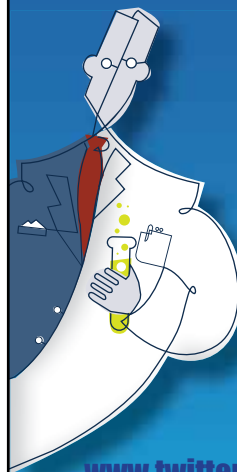
Vince McLeod is an industrial hygienist certified by the American Board of Industrial Hygiene and the senior industrial hygienist in the University of Florida's Environmental Health and Safety Division. He has 22 years of occupational health and safety experience at the University of Florida, and he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

FOLLOW US ON twitter



twitter.com/labmanager

HEY THERE! LABMANAGER MAGAZINE IS USING TWITTER JOIN US TODAY!



CENTRIFUGE SAFETY

ROUTINE CHECKS, CLEANING AND PREVENTIVE MAINTENANCE ARE KEY

by Christopher Crews

The modern research lab is filled with equipment helping researchers to harvest, chop, boil, homogenize, and crystallize materials of all types. Keeping track of the maintenance and safety of lab equipment used in performing these tasks can be a challenge for laboratory managers. One piece of equipment deserving special attention when it comes to ensuring the safety of laboratory employees is the centrifuge.

The laboratory centrifuge, an instrument designed to spin and separate liquids at high speeds, has come a long way from the days of the older models, which required the units to be spun by hand. New and updated models now allow researchers many options for spinning and separating materials. Nevertheless, without proper preventive maintenance and good laboratory procedures, the centrifuge can become a safety hazard to laboratory workers. Improper use can potentially expose lab workers to hazardous materials as well as severely damage a costly piece of equipment. The risk of your centrifuge becoming a safety hazard can be mitigated through proper preventive maintenance and strict adherence to manufacturer procedures and your internal laboratory safety procedures.

The heart and soul of any centrifuge is its rotor (the component of the centrifuge that contains and spins the material). This part will eventually wear down after continuous use. A routine visual check of your rotor is necessary to detect any type of rotor fatigue (cracks, bulges, or corrosion) that can lead to the eventual failure of the rotor and significant damage to your centrifuge.

“A routine visual check of your rotor is necessary to detect any type of rotor fatigue.”

One way to ensure that all the moving parts in your unit remain at optimal performance is preventive maintenance (pm). Recommended by nearly all centrifuge manufacturers, pm may include a detailed cleaning, lubrication, and calibration of your unit. No big deal right? Well, before you brush this recommendation off

completely, keep in mind that a properly functioning centrifuge will provide your researchers with consistent and reliable performance and accurate results, and drastically reduce your chances of accident and/or costly repair.

In addition to having your centrifuge units on a routine pm schedule, it's important to have internal laboratory policies in place to help ensure that all employees are using the same procedures for centrifuge safety. These policies can include the following.

Centrifuge use log

A good practice for tracking the amount of time your centrifuge and rotors are accruing is the use of a centrifuge use log. This log can help researchers and lab managers balance the amount of time the rotors are being used as well as provide data on the wear and tear each rotor is receiving. The log can also be used to track the cleaning schedule of the equipment.

Procedure for cleaning rotors

One way to help extend the life of your rotors is to adopt policies to ensure they are cleaned and/or rinsed after a prescribed amount of time or at the end of each



**WHY STORE DANGEROUS GASES
WHEN YOU CAN MAKE GAS ONSITE AS YOU NEED IT**

➤ TO FIND OUT HOW VISIT
ProtonOnSite.com



PROTON

THE LEADER IN **ON SITE** GAS GENERATION.

ProtonOnSite.com

Call us at 203-949-8697 | Sarah@protononsite.com

EVERYONE CAN SELL ON LABX.COM

LAB GLASSWARE AND SUPPLIES HOLIDAY
LISTING EVENT—SELL YOUR SURPLUS AND
UNUSED GLASSWARE AND SUPPLIES.

RECYCLE & CREATE ROOM IN YOUR BUDGET

With the Holiday season approaching, be sure to get your excess Lab Glassware and Supplies on the market for the 10th Annual Holiday Listing Event. Starting December 1st, you'll be able to list items for sale in the Lab Glassware or Lab Supplies categories for 75% off of the regular listing fee! All you have to do is Run an Ad in these categories at any point in December and you will automatically qualify for the listing fee discount.

BUY & SELL EQUIPMENT • ONLINE AUCTIONS
NEW PRODUCT INTRODUCTIONS • GREAT DEALS

WWW.LABX.COM

LAB SAFETY

day. Periodic and scheduled cleaning of rotors can help to keep them free of dirt and other particles or debris that could lead to damage and future accidents. Always refer to the manufacturer's instructions for specific information on how your centrifuge should be cleaned.

Procedure for handling biological spills in the centrifuge

Even with the best policies and procedures in place, accidents can still happen on occasion. In the event of a biological spill inside the centrifuge, employees should have a standardized procedure for minimizing aerosol exposures, decontaminating the spill, cleaning the area with an approved disinfectant, and properly removing potentially contaminated waste. Lab workers, for example, should be trained on procedures to allow aerosols to settle for at least 30 minutes prior to cleaning any infectious material that has been released into the centrifuge. Ensuring that employees follow standard company procedures for a safe spill response will reduce the chance of causing another incident while trying to clean the spill.

“A good practice for tracking the amount of time your centrifuge and rotors are accruing is the use of a centrifuge use log.”

In summary, there are many things involved in properly maintaining a laboratory centrifuge besides loading and spinning. Managing the preventive maintenance and safety of the centrifuges at your facility will help ensure the accuracy of your data, help extend the life of your centrifuges, and improve the safety culture within your lab.

Christopher Crews is an Environmental Health and Safety consultant with Focus Safety Consulting who has more than ten years' experience working in the biotechnology field. Chris has worked as a lab manager in a former position, but currently provides EHS consultation to small and midsize biotech companies. He can be reached at ccrews@ehsfocus.



It's Really More of a Giant Leap... The New Flash DSC 1

The Flash DSC 1 represents a giant leap in Thermal Analysis technology and revolutionizes fast-scanning Differential Scanning Calorimetry (DSC). Its incredibly high heating and cooling rates enable exploration of exciting new applications under exactly the same conditions that occur in your existing process.

An ideal compliment to the conventional DSC, the Flash DSC 1 heats samples so quickly that recrystallization and reorganization processes can be suppressed and studied — like walking on the moon, it was once thought impossible.

For 50 years, we have been committed to providing technology leading solutions and striving to expand the boundaries of instrumentation.

It's what you should expect from The Technology Leader in Thermal Analysis.



Heating rates up to 2,400,000 °C/min (40,000 °C/sec)
Cooling rates up to 240,000 °C/min (4,000 °C/sec)



www.mt.com/us-giantleap

Experience the Flash DSC 1 in action!

METTLER TOLEDO



2011 Winner of the
R&D 100 Award

LAB MANAGER'S INDEPENDENT GUIDE TO PURCHASING A THERMAL ANALYZER

INTRODUCTION:

Thermal analysis is the study of a material's properties when it changes with temperature. Different types of thermal analyzers are available depending on the specific measurement required. The first thing to consider when purchasing a thermal analyzer is what type of measurement is of interest.

START
HERE

DYNAMIC MECHANICAL ANALYSIS (DMA) (MECHANICAL STIFFNESS & DAMPING DIFFERENCE)

DMA measures a material's response to temperature, stress and frequency by applying small deformations in an oscillating manner. There are two main types of DMA, stress control and strain control.

A Stress Control

A stress controlled instrument, ideal for stiff samples, applies a sinusoidal stress (force) to a sample and records the strain in micrometers (displacement), allowing one to determine the complex modules. These instruments can also vary frequency, temperature, time and sample deformation geometry.



Mettler Toledo
DMA/SDTA861e



Mettler Toledo
TTDMA



Netzsch
DMA 242 C



PerkinElmer
DMA 8000



TA Instruments
Q800

B Strain Control

A strain controlled instrument, ideal for softer samples, applies a sinusoidal strain (displacement) to a sample and records the stress in millinewtons (force), allowing one to determine the complex modules. These instruments can also vary frequency, temperature, time and sample deformation geometry.



Mettler Toledo
DMA/SDTA861e



Netzsch
DMA 242 C



TA Instruments
RSA-G2

DIFFERENTIAL THERMAL ANALYSIS (DTA) (TEMPERATURE DIFFERENCE)

These instruments measure temperature differences between a reference and a sample by heating both under an identical temperature program. Classically, DTA pre-dated current DSC technology.



Setaram Instrumentation
LABSYS evo



Setaram Instrumentation
SETSYS Evolution DTA/DSC



Shimadzu
DTG-60/DTG-60A



Shimadzu
DTA-50



Instrument Specialists
DTA 120



Instrument Specialists
DTA 160

THERMOGRAVIMETRIC ANALYSIS (TGA) (MASS DIFFERENCE)

TGA instruments measure the change in mass of materials as a function of a defined temperature program.



Instrument Specialists Inc.
TGA 1000 iseries



Instrument Specialists Inc.
TGA 1500 iseries



LECO Corporation
TGA701



Netzsch
TG 209 F3 Tarsus



Netzsch
TG 209 F1 Iris®



PerkinElmer
Pyris 1 TGA



PerkinElmer
TGA 4000



Shimadzu
TGA-50/50H And TGA-51/51H



TA Instruments
Q50



TA Instruments
Q500



TA Instruments
Discovery TGA

DIELECTRIC THERMAL ANALYSIS (DEA) (DIELECTRIC PERMITTIVITY & LOSS FACTOR DIFFERENCE)

DEA measures the maintained electrical current of a sample when there is a change in temperature. The sample is placed in a furnace between metal plates while an alternating voltage is applied across them.



Netzsch
DEA 231 Epsilon



Netzsch
DEA 230 Epsilon

THERMOMECHANICAL ANALYSIS (TMA) (DIMENSION DIFFERENCE)

TMA measures the dimensional change (micrometers) in a sample when exposed to a defined temperature program. Various probes are utilized to measure expansion, contraction, penetration, softening of the sample as well as glass transition.



Mettler Toledo
TMA/SDTA841e



Mettler Toledo
TMA/SDTA840



Netzsch
TMA 402 F1/F3 Hyperion®



Shimadzu
TMA-60/60H



Shimadzu
TMA-50/50H



TA Instruments
Q400

● SIMULTANEOUS THERMAL ANALYSIS (STA)

STA is a combined method of measuring weight loss (TGA) and heat flow (DTA/DSC) simultaneously within the same instrument. The simultaneous measurement of heat flow compliments the mass loss data by providing information on transitions that do not result in a mass change.

 Instrument Specialists Inc. STA 650 series	 Instrument Specialists Inc. STA 1000 series	 Instrument Specialists Inc. STA 1000 series	 Mettler Toledo TGA/DSC 1 - SF1100
 Mettler Toledo TGA/DSC 1 - LF1100	 Mettler Toledo TGA/DSC 1 - LF1600	 Netzsch STA 449 F1 Jupiter®	 Netzsch STA 429 CD
 Netzsch STA 449 F3 Jupiter®	 PerkinElmer STA 6000 Simultaneous	 Setaram Instrumentation LABSYS evo	 Setaram Instrumentation 96 Line
 Setaram Instrumentation SETSYS Evolution DTA/DSC	 Setaram Instrumentation Sensys evo	 Setaram Instrumentation TAG	 Shimadzu DTG-60/DTG-60A
 TA Instruments Q600			

● DIFFERENTIAL SCANNING CALORIMETRY (DSC) (HEAT FLOW)

The most commonly used technique in thermal analysis is Differential Scanning Calorimetry (DSC). These analyzers are designed to measure the physical and chemical transitions that take place in materials when exposed to a defined temperature program. There are two different classes of DSC analyzers: The Heat Flux DSC and the Power Compensated DSC.

A Heat Flux DSC

The heat flux DSC uses a common heat flux plate in which there is a sample and reference position. A common furnace heats both the sample and reference though the desired temperature profile. Temperature sensors under each position monitor and record the differential temperature. This data is converted into energy units (milliwatts) by the computer and this is the calorimetric heat flow signal.

 Instrument Specialists DSC iseries	 Instrument Specialists DSCe	 Instrument Specialists PDSC	 Mettler Toledo HP DSC 1
 Mettler Toledo DSC 1 FR55	 Mettler Toledo DSC 1 HSS8	 Netzsch DSC 404 F3 Pegasus®	 Netzsch DSC 404 F1 Pegasus®
 Netzsch DSC 204 F1 Phoenix®	 Netzsch DSC 204 HP Phoenix®	 Netzsch DSC 200 F3 Maia®	 PerkinElmer DSC 6000
 PerkinElmer DSC 4000	 Setaram Instrumentation DSC131 evo	 Setaram Instrumentation SENSYS evo DSC	 Setaram Instrumentation SETSYS Evolution DTA/DSC
 Setaram Instrumentation Labsys evo	 Setaram Instrumentation 96 Line	 Shimadzu DSC-60 Series	 TA Instruments Q20 Series
 TA Instruments Discovery DSC	 TA Instruments Q2000		

B Power Compensated DSC

Power compensated DSC uses independent furnaces and sensors for both the sample and the reference position. As sample transitions occur, the instrument responds by either applying or removing power to keep both furnaces equal. This power in milliwatts is the calorimetric heat flow signal.

 Mettler Toledo Flash DSC 1	 PerkinElmer DSC 8500	 PerkinElmer DSC 8000
---	---	---

Author: Kylie Sauvé

VERSATILE, DIVERSE INSTRUMENTATION AND METHODS

by Angelo DePalma, Ph.D.

Thermal analysis, or calorimetry, correlates temperature-dependent events to physical characteristics of a sample, such as mass, structure, strength, brittleness, elongation, decomposition, evolved gases, oxidation, reduction, or physicochemical structure. Any property that changes with temperature lends itself to some variant of thermal analysis.

Every industry concerned with the relationship between energy and how their products behave in the real world uses thermal analyzers. Thermal measurements provide food companies with values for caloric (energy) content, materials manufacturers with phase transition temperatures, and academic researchers with insights into phases of matter.

Thermal measurements are relevant in every phase of a product's life cycle, from development to manufacturing, quality control, and release. "Everything you do to a material, everything you add to it, how you formulate it, where you store it, and how you beat up on it, all affect the final deliverable property," notes Michael Zemo, a market manager at Mettler-Toledo (Columbus, OH). And all these are related to how the material or finished product handles heat.

Thermal analysis is not only about high temperatures. Some instruments have a cooling function that enables monitoring of low-temperature events such as glass transition in polymers.

Workhorse instruments

Differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA) are two specialties of Particle Technology Labs (Downer's Grove, IL), a contract analytical services lab.

"Every industry concerned with the relationship between energy and how their products behave in the real world uses thermal analyzers."

Particle Technology uses DSC to measure glass transitions, melting temperatures, and crystallization. "It can also determine the enthalpy of endothermic and exothermic events," comments Dave Jovanovic, a fine particle analyst at the company.

TGA, a complementary technique, measures heat associated with gain or loss of mass resulting from evapora-

tion, oxidation/reduction, or decomposition. Analysts often use TGA as a pre-test for DSC, to determine the sample's heating limits before DSC analysis.

Pharmaceutical and polymer industries are increasingly interested in both TGA and DSC. Drug companies use these techniques to test for drug stability and crystalline state (or lack thereof). For example, some medicines work better in a particular crystalline polymorph, and others are more effective in an amorphous state.

Polymer companies are interested in measuring numerous properties associated with heat, such as mechanical dimensions and stability, chemical stability, and physical states (e.g., glass transition) related to mechanical performance.

"Calorimetric profiling [thermal analysis] is a very powerful technique," says Mr. Zemo, and not for just large changes like solid-to-liquid or liquid-to-gas transitions. "If there's a physical or chemical change, you can pick it up."

Yet thermal analysis works best when investigators know what they're looking for, or at least know the identity of the sample. "You see a lot of weird things happening in TGA when you

heat a sample to one thousand degrees celsius,” Mr. Jovanovic tells *Lab Manager Magazine*. Dehydration is an easy one because it occurs at 100° C, but often you can only speculate as to what is occurring.”

“Thermal analysis works best when investigators know what they’re looking for, or at least know the identity of the sample.”

To reduce that uncertainty, some thermal analyzers incorporate a spectrophotometer in the mix. These techniques, known collectively as thermo-optical analysis, include thermospectrometry, thermorefractometry, thermoluminescence, and thermomicroscopy.

All work on the principle that a sample’s interaction with light changes with temperature. Numerous discrete and continuous thermally relevant events can be measured this way, including crystallization, melting, corrosion, phase transitions, drying, and polymorphism.

Two other limitations are related: accuracy and hysteresis. According to Mr. Jovanovic, typical DSCs can err in measuring even familiar events like water boiling or freezing by +/- 0.5° C. Micro-DSC is somewhat more accurate because it heats samples much more slowly. Again, it helps to know what to look for, particularly when heat capacity or process-related hysteresis is known to occur.

Market differentiation

From his perspective as a thermal instrument manufacturer, Don Miller, president of Instrument Specialists

(Twin Lakes, WI), sees the market as “quite a bit off” from its heyday 15 years ago. “Thermal analysis is a mature market with slow growth if any,” he says, “and a much smaller dollar share than other types of instrumentation.”

To differentiate itself, the company provides upgrades for older systems, regardless of the manufacturer, as well as maintenance and repair. These services are all the more interesting since vintage thermal analyzers tend to be proprietary in terms of both hardware and software. “Today, nobody cares if they buy somebody else’s HPLC pump or detector, but thermal analysis wasn’t like that. If you bought an instrument, you were limited to the original manufacturer’s parts and software.”

Instrument Specialists produces and sells a very broad range of analyzers, including common TGA and DSC models, but it also offers an STA (simultaneous thermal analyzer) that combines TGA and DSC in a single instrument, a high-pressure DSC,

and an instrument that allows users to swap out TGA and DSC cells. Some systems have the capability of adding mass spectrometry or Fourier-transform or infrared capabilities.

“But DSC is by far the number-one seller, with TGA coming in second,” Mr. Miller says. The two methods, moreover, are complementary, measuring fine or subtle properties and gross properties, respectively.

Thermal analysis may be a mature science, but that has not stopped manufacturers from tweaking it. In response to customer requests for faster heating and cooling, Mettler-Toledo introduced “flash” DSC in 2010. Mr. Zemo describes the flash variety as “not a replacement for, but complementary to, conventional DSC.” In the more common variety, materials are temperature-scanned slowly at around 0.2° per second, which gives them time to react to the heat input. With flash, temperatures rise by hundreds or thousands of degrees per second. “The material can’t adapt,” says Mr. Zemo. “You get a freeze-frame of how it really reacts to heat.”

Flash DSC provides insights into the world of rapid thermal processing, for example, molded plastic parts that cool from processing to room temperature in a second. It helps answer questions about why product batches fail.

Angelo DePalma is a freelance writer living in Newton, NJ. You may reach him at angelo@adepalma.com.



METTLER TOLEDO

1900 Polaris Parkway
Columbus, Ohio 43240
Tel: 1-800-METTLER
Fax: 1-866-602-9287
www.mt.com

NEW TECHNOLOGIES ARE MAKING AN IMPACT

by Angelo DePalma, Ph.D.

Lab refrigerators and freezers must be versatile enough to serve diverse markets because a great deal of feature overlap exists within the lab refrigeration market. Yet significant differentiation exists as well.

Clinical labs, which are regulated and accredited, handle valuable patient samples and are increasingly subject to cost pressures; the emphasis is on value. "Among our customers, clinical labs need refrigerators that meet their needs, are supported by a reliable service organization, and have reduced cost of ownership," observes Alex Esmon, Ph.D., global commercial manager for laboratory refrigerators and freezers at Thermo Fisher Scientific (Asheville, NC).

Value-seeking is not unique to clinical laboratories, but pricing and reimbursement pressures make it more prevalent than in other markets. Concerns for costs over the product's typical life are causing labs to scrutinize energy rates and consumption, heat and noise generated in small areas, sample compatibility, and storage capacity. Lab managers are becoming adept at assessing the relative benefits and drawbacks of having two smaller units versus one larger one.

"Energy savings is not only a function of power consumption coming out of the wall, but of heat being thrown into the room, which causes the air conditioners—another source of energy consumption—to work harder," says

Dan Hensler, VP of sales and marketing at So-Lo Environmental Equipment (Cincinnati, OH).

Basic research and academic labs have operational requirements and workflows radically different from those of clinical labs, but tight funding has pushed them into a similar value-seeking mode. A major departure is that academics tend to be more conscious of environmental issues, which might cause a shift in purchase strategy, away from pure economics to energy consumption. Ironically, this philosophical shift rarely accounts for the energy footprint of manufacturing a new refrigerator or freezer.

With pharmaceutical and biotech labs, the emphasis is less on price or value and more on maintaining a high performance level. The U.S. Food and Drug Administration's recent emphasis on quality is often perceived as beginning and ending with manufacturing. In fact, FDA guidelines stress quality as an evolving philosophy, beginning with early-stage research and extending through development and production. "Price is not usually a factor for these businesses, because the pressures on them relate to qualification expectations and making the most of billion-dollar investments in capital equipment and drug development," says Dr. Esmon.

Chemical, manufacturing, and industrial cold storage purchasers may require

hazardous storage capability for flames or fumes, but even in this market segment vendors see more value-hunting based on the cost of ownership over the unit's life. They are also interested in energy savings and must follow internal standard operating procedures, but they are not burdened by heavy regulation.

Managers of academic labs or at companies in unregulated industries have been known to head to the nearest department store and order a kitchen model for cooling "nonessential" samples and ingredients. The temptation, based on sticker price, is natural and intuitive.

Those who have considered sneaking a home fridge into a hallway or some dark corner of their facility in the dead of night, however, should remember the single word that explains why those units are so much less expensive than refrigerators or freezers purchased from our advertisers: performance. Kitchen units chug along for 20 years without maintenance or repair because their operating specifications are much broader than a lab- or industrial-grade fridge/freezer.

Remember that head of lettuce that froze in the crisper, or those leftovers that got moldy on the top shelf? Temperatures vary widely within home refrigerators, much more so than many samples or reagents can tolerate. And when you open and close your home refrigerator's door to fetch the milk, the

box takes its time to return to its specified temperature range.

These defects are magnified by typical laboratory usage patterns, where a dozen or more people access a refrigerator or freezer multiple times per day. Home refrigerators are not optimized for segregating samples and accessing them easily. It's no tragedy to spill a bit of gravy on the apple pie, but comingling lab samples or reagents can lead to many hours of lost effort.

Finally, there is the quality most important to Dr. Esmon: ease of ownership, which often comes down to energy consumption. Vendors of lab refrigerators are keenly aware of the trade-off between efficiency and performance, and they have designed their products to ensure maximum end-user benefit. "We still need the same cooling specifications, but we need to achieve them

with less energy," observes Mr. Hensler.

Experts will tell you that, except for environmental considerations and data logging capabilities, laboratory refrigerators and freezers have not changed much in the last decade. That is not to say refrigeration *technology* has remained stagnant. Numerous technologies, for both small- and large-scale refrigeration, are slowly making their way into products. These include thermoacoustic refrigeration, magnetic cooling, and phase-change gels. Two of the most promising techniques, the Stirling engine and ejector-expansion refrigeration, are already commercial. These technologies promise some combination of lower energy usage and higher efficiency, but most have issues.

"The Stirling engines are quite expensive," observes Buckner Richerson, VP of international sales at NuAire (Plym-

outh, MN). "Our units use tried-and-true 'cascade' design, employing high- and low-stage compressors to maintain minus-85-degree temperatures reliably and quietly." Mr. Richerson claims his company's freezers put out 47 decibels—less than a biosafety cabinet. "Freezer noise can drive you bonkers," he says.

Sound-sparing designs prove that innovation is alive and well in the world of refrigerators and freezers. NuAire achieves its quiet operation by balancing the operations of its high- and low-stage compressors. "When they don't fight each other, they work naturally, in sync, and they don't generate that extra noise," Mr. Richerson adds.

Angelo DePalma is a freelance writer living in Newton, NJ. You may reach him at angelo@adepalma.com.

Environmentally Friendly Refrigerated Incubators

Environmentally Friendly
Reduces Air Conditioning Loads
Consumes Less Power

Thermoelectric Cooling
Temperature Range 15-40°C
Uniformity ± 0.5 at 20°C

High Capacity LI20P
Holds up to 300 BOD bottles
Five Heavy Duty Adjustable Shelves
20 Cubic Feet Capacity

Compact Over or Undercounter LI6P
Holds up to 120 BOD bottles
Two Heavy Duty Adjustable Shelves
6 Cubic Feet Capacity

Available in two sizes
LI20P & LI6P



A water treatment laboratory manager reports "retirement" of two, two-year old compressor based BOD incubator units to use a single SHEL LAB LI20P incubator exclusively. The better temperature uniformity in the SHEL LAB LI20P permits the full use of chamber capacity.



SHEL LAB
Energy Savings
Calculator

How much will a new LI20P
SHEL LAB B.O.D. Thermoelectric
Cooled Incubator save you in
annual energy costs?

Visit www.shellab.com to learn more.

SHEL LAB
www.shellab.com
(800) 322-4897

MYRIAD METHODS FOR QUANTIFYING UNKNOWNNS

by Angelo DePalma, Ph.D.

Those whose only brush with titration came in a freshman chemistry lab may be surprised to learn the significance of titration in companies that manufacture materials, drugs, foods, and beverages.

David Minsk, president of Hanna Instruments (Woonsocket, RI), defines a titrator as “a sophisticated delivery system that performs stoichiometry. It’s a tool that provides better repeatability, accuracy, and efficiency than manual titration.”

“Select your titrator with current needs in mind, and perhaps with a thought toward expanding future capabilities.”

There are two major titrator types: potentiometric acid-based designs and Karl Fischer titrators. Those in the first group, which use a pH or redox probe, resemble pH meters in their ability to derive acid strength and total acidity; Karl Fischer titrators measure water content in foods, materials, biofuels, etc.

Most titration work occurs in quality control (QC) laboratories. A survey found that 75 percent of titrators are

used in QC, 20 percent in research, and 5 percent in clinical labs. More than half of those surveyed had more than one titrator, with 10 percent owning four or more. Of specific titration modes, more than half fall under the “potentiometric” category, and 21 percent each for volumetric and coulometric Karl Fischer titrations.

All those surveyed considered instrument cost during the purchasing process. This is not unusual when you consider that everyone who performs

service, support, and ease of use when purchasing a titrator. Experience with a particular vendor or product line was the number-one factor (53 percent) in selecting a specific instrument.

Bucking the trend

Don Vreeland, president of Analyticon Instruments (Springfield, NJ) sums up developments and trends in titration as “flexibility and versatility.” Different industries have different titration needs, Mr. Vreeland explains. “These range from low-cost, easy-to-use, single-type titrations to complex, multi-chemistry, multi-electrode, multi-sample, and multi-reagent analysis.” The point: Select your titrator with current needs in mind, and perhaps with a thought toward expanding future capabilities.

A major trend for lab instruments in general, and titrators in particular, has been to supply each instrument with a computer for data acquisition, logging, and massaging. Not all companies have gone along with this approach. “There is no need to have a computer attached to each instrument in the lab,” Mr. Vreeland says. “Our instruments come with software for downloading and archiving data through an RS-232, a LAN, or USB

titration professionally has at one time done it on the cheap with a burette, an Erlenmeyer flask, and either a colorimetric indicator, pH paper, or a pH meter. Dedicated titration systems range in price from about \$5,000 to more than \$100,000. Yet only 10 percent of those surveyed listed instrument cost as the top reason for choosing one titrator over another.

After price, our readers considered performance, reliability/maintenance,

performance, support, and ease of use when purchasing a titrator. Experience with a particular vendor or product line was the number-one factor (53 percent) in selecting a specific instrument.

interface, but the computer is not required to operate the instrument.”

There are good arguments for not computerizing. Barring regulatory requirements, controlling all functions from the instrument itself minimizes cost and footprint, flattens the learning curve, and lowers costs. For those so inclined, complex, multi-chemistry titrations may be fully automated through standard, off-the-shelf equipment without customized software or programming – that is, provided the titrator possesses some “smarts.” Analyticon’s instruments store up to 80 pre- and user-defined methods that range from simple pH adjustment and pH microtitration to automated calibration, blank determination, and subsequent sample analysis, all from a built-in keypad.

When packaged with methods targeted to specific industries, titrators are a convenient way to consolidate several analyses with one investment. Because wineries are significant purchasers of Hanna Instruments’ titrators, the company has bundled methods for analyzing pH and sulfur, two components that affect a wine’s taste and longevity. “We market these instruments as multi-parameter analyzers for wine,” says Mr. Minsk. Hanna similarly packages methods for food – for example, a leading ketchup manufacturer owns several instruments that it purchased “for test frequency and analyzing two or three core quality parameters.”

Methods are of varying value to customers, says Mr. Minsk. About one-third of customers use their

own methods; the remainder rely on vendor-supplied methods and training. The challenge is providing an instrument that cuts through widely disparate skill sets. “You have to reassure customers that the instrument will not intimidate them,” he adds.

Versatility is key

George Porter, titration product manager at Metrohm USA (Riverview, FL), observes that “the days of single titrator analysis are fading fast. Purchasers want to maximize their investment and get as much as possible out of the instrument.” Major vendors have overhauled user interfaces to include touch screens, and even stand-alone titrators can benefit from automation and sample prep tools, particularly in high-throughput settings (e.g., QC for foods or chemicals). Up to 40 percent of surveyed users employed an auto-sampler; leading sample preparation methods were homogenization (27 percent), drying (18 percent), and evaporation (12 percent). “Workloads are not going down, and companies are not adding staff,” Porter adds.

Within the automation categories, sample changers and liquid handlers are the most common features. Some titrators come equipped with pipetting and dosing technology (in addition to the titrator itself), but add-ons like ovens are usually purchased separately.

Decisions to automate operations like dispensing and sample prep are not made lightly, because this equipment

can be expensive. One tends to think of throughput as a crossing point: The more samples run per unit time, the greater the need to automate. A natural expectation from this line of thinking is that automation is always faster. That is not true. Sample prep and automation require some user input and have learning curves of their own, while some technicians are very fast.

The best arguments for automation and for sophisticated data acquisition tools are consistency, data quality, and data integrity. Instruments perform repetitive tasks faithfully and accurately, and they never tire of recording and tracking samples as even the best technician sometimes does.

Automated titrators deliver precise volumes of titrant through “step pumps.” Hanna Instruments offers Karl Fisher titrators with 40,000-step pumps. “That level of accuracy provides fine-tuning and repeatability that is impossible with a human operator,” says Mr. Minsk.

Angelo DePalma is a freelance writer living in Newton, NJ. You may reach him at angelo@adepalma.com.

FOR ADDITIONAL RESOURCES ON TITRATORS INCLUDING USEFUL ARTICLES AND A LIST OF MANUFACTURERS, VISIT WWW.LABMANAGER.COM/TITRATORS.

THE PATENT BUSINESS

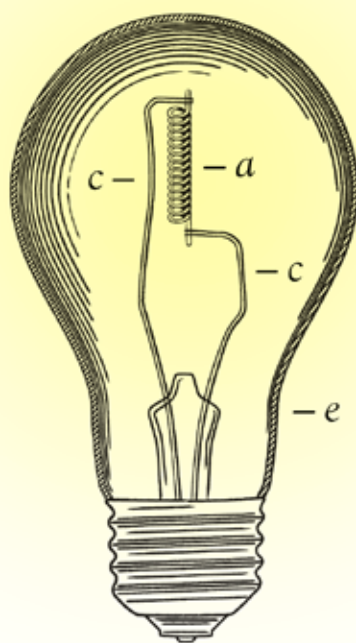
MORE THAN JUST BORING LEGAL DOCUMENTS by John K. Borchardt

Patents are more than just boring legal documents. “A patent is the link between R&D and the legal processes,” notes Pierre Buffet, executive vice president of intellectual property information firm Questel. “Patents can be used for various interesting business purposes outside of simply protecting a new invention,” says Director Ronald Kaminecki with Dialog LLC, an information services firm. In each of the past three years alone, about 1.8 million new patent applications were filed worldwide, adding to the more than 60 million patent records existing online. So, the amount of information available in patents is enormous.

Soonwoo Hong, counselor of the World Intellectual Property Organization, credits the development of customized, computerized databases of patent information with today’s strategic use of patent information. WIPO is the organization through which applications may be filed for patents in more than one foreign country under the Patent Cooperation Treaty (PCT).

Most countries, including the U.S., require that patent applications disclose the invention sufficiently, clearly and completely for it to be carried out by a person skilled in the relevant technology field (the “art”). Therefore, patent applications and issued patents present much more detailed information about an invention than

other types of scientific or technical publications. In addition, about 70 percent of the information disclosed in patents is never published anywhere else, according to Hong.



Patent applications and issued patents can also provide clues to your competitors’ business strategies. These strategies can include mergers and acquisitions. Because they indicate which companies are working in a particular technology field, patents and patent applications can indicate which companies are most likely to license one of your firm’s patents or are most likely to initiate

legal action against your employer over an invention, says Kaminecki. Issued patents and patent applications also may be useful in locating experts who may be free to serve as consultants for your firm or expert witnesses knowledgeable in a given technology field who can appear in patent litigation, working either for your employer or for the opposing party in the litigation.

Patent attorney Michael Brodowski, a partner in K&L Gates LLP, notes that firms can conduct patent clearance (freedom-to-operate) studies to determine whether others’ patent rights may impact their own business plans. A patent landscape is a survey of patent and non-patent literature that seeks to answer one or more business objectives, according to Matthew Luby, director of patent analysis at intellectual property firm Landon IP. The parameters of the patent landscape are really defined by the individual objectives of the project. A patent landscape study can identify any potentially problematic patent(s). It can also be used to identify areas of opportunity in support of R&D planning, said Robert Stembridge of Thomson Reuters IP Solutions. Citation mapping can be used to identify potential partners and licensees in support of technology licensing and commercialization of an invention. Citation mapping links patents and patent applications to the previously issued patents that they cite.

Better Than Hot

Citation mapping can enable one to understand what, where, when, and why research was patented and identify the key competitors who are driving research trends. It can also indicate which inventions are the key ones in developing and commercializing a new technology.

Who conducts patent landscape surveys? Typically, they are done by patent attorneys or patent agents, often in consultation with information scientists, staff researchers working in the technology field in question, and their research managers. Business managers supervising businesses using the technology in question may also be involved. At larger companies, the patent attorneys work in the corporate legal department. Smaller and midsize firms typically hire patent law firms to conduct these surveys. However, even large companies may contract work out to external law firms if the workload of company attorneys is too heavy to conduct the surveys in-house.

“About 70 percent of the information disclosed in patents is never published anywhere else.”

Guiding future research

To obtain a patent, the invention must be described fully in the patent application. This full disclosure means that patents and patent applications contain a wealth of valuable technical information, observes Robert Stembridge of Thomson Reuters IP Solutions.

Wise lab managers encourage staff members to begin their research projects with a prior art search of the patent literature. Reading patents can help researchers understand the state of the art in their field and aid in designing their own experiments and projects. This can help companies file their own patents in the area of an already patented invention. Doing so can give rise to cross-licensing opportunities (see below).

However, most patents, about 85 percent, have expired. Thus, a huge number of inventions are available to be used for free without having to license the patents or pay royalty fees.

Many companies disclose technical details for their inventions only in their patent applications and issued patents, nowhere else. Conducting patent searches is an efficient way to avoid duplicating the research of others. It has been estimated that up to 30 percent of research funds are inadvertently spent redeveloping existing inventions. Imagine how much more productive your lab would be if these funds were spent on new inventions rather than on “reinventing the wheel.” Searching the patent literature, lab managers and bench researchers can learn what technology already exists and build on it rather than wasting time and money simply repeating someone else’s work.

Patent information can also help your employer avoid infringing on other organizations’ patent rights.

Consistent, uniform temperatures protect your samples.

BINDER Ovens offer:

- ▶ Homogenous conditions via APT.line™ preheating technology.
- ▶ Temperatures from 5 °C above ambient to 350 °C.
- ▶ Capacities from 20 to 720 liters.
- ▶ Gravity and forced convection, vacuum and drying ovens.
- ▶ Tested to 27-point DIN 12880 standard.

Warm up to BINDER ovens at www.binder-oven.us.

BINDER Inc. | Toll Free 866 885 9794
sales@binder-world.us | www.binder-world.us



BINDER
Best conditions for your success

Competitive Intelligence

Thus, lab managers and researchers can use patent information to find out what technology already exists and build on it. Kaminecki notes, “Patents are a not only a great source of information about technology trends, including up-and-coming areas of research, but also competitive information, including which companies are working in an area and also which companies are most likely to license a patent, which ones are most likely to sue about an invention, and which ones are most likely to scoop you with an improvement to your invention.” This information is available because patents must include a technical description of the invention and claims that define exactly what the invention is. Patents also provide the name of the inventor(s) and the owner of the

patent (usually the employer of the inventor).

In particular, periodic current awareness patent searches can enable patent attorneys and researchers to monitor the patent activity of competitor firms and others working in given technology fields such as universities and national laboratories, observes Brodowski. This monitoring can include both issued U.S. patents and patent (PCT) applications. This permits early notice of competitive activity. Patent attorneys, researchers, and lab managers can react knowledgeably when applying for their own patents and in modifying product development plans. In addition, if appropriate, they can chal-

lenge the validity of patents (or parts of them) that may be problematic in view of previously issued patents, published papers, or papers presented at conferences.

Patents also can provide clues about the long-term strategies of competitors and potential targets of mergers and acquisition. They can also be used to help identify experts and expert

“The amount of information available in patents is enormous.”

witnesses who could become involved in patent litigation.

Patent citation analysis enables one to identify which patents are strong ones. If a patent is widely cited in other patents, it is likely to be a strong patent playing a key role in developing a new technology. This can help in choosing which patents to license. The ability to make wise choices in this regard can enhance R&D output and accelerate the commercialization of profitable new products and processes.

Citations can also indicate the speed at which a company is innovating. Companies whose patents cite recent patents are likely to be innovating faster than companies whose patents cite older patents.

Patent information also can be used to track globalization of a particular technology, reports Yali Friedman of thinkBiotech LLC. Knowing where innovations are developed can help influence plant site selection decisions. It can also help predict global future developments in an industry.

To add complexity to the globalization concept, a single invention may result from the work of more than one inventor working at more than one R&D lab located in more than one country.

AQUACOUNTER® Titrators

Color touch screen, built-in printer, enhanced data storage & analysis available on select units.

Karl Fischer Titrators AQ/AQV-2200

- Run 2 titration stations in parallel (any volumetric & coulometric combo)
- Advanced functionality & detection methods
- Uses less KF reagents

Potentiometric Titrator COM-1700

- GLP compliant
- Run 4 independent titration stations in parallel
- Stand-alone or PC-controlled

Potentiometric Titrator COM-300A

- Performs pH, acid/base, complexometric, redox, KF, non-aqueous titrations & ISE measurements
- Over 30 files of built-in method memory, including KF
- Expandable & flexible



Ph 800.495.1678
or 716.774.8706

www.jmscience.com
sales@jmscience.com



Cross-licensing patents

A cross-licensing agreement is a contract in which two or more organizations grant a license to each other for the exploitation of the subject matter claimed in one or more of the patents each owns. Frequently, each organization owns patents covering different essential aspects of a given commercial product. Thus, by cross-licensing, each party maintains their freedom to manufacture and market the commercial product. The term “cross-licensing” implies that neither organization makes royalty payments to the other.

Some companies file patent applications primarily to cross-license the resulting patents, as opposed to trying to stop a competitor from bringing a product to market. For example, Company B may patent an improvement to an existing patent held by another firm, Company A, in the hope that the two firms will cross-license their patents. Cross-licensing enables Company B to market a product without having Company A sue them for patent infringement.

This research and the resulting patent activity can result in a “patent thicket,” an overlapping network of several or more patents covering a basic technology and improvements to it. In this case, often it is not one patent that a firm must license to obtain freedom to commercialize an invention but multiple patents often owned by multiple companies. The cost and time required to negotiate with these various intellectual property owners can impede innovation and obstruct, or at least delay, a firm commercializing new technology.

Some experts have strongly criticized patent thickets as inhibiting innovation and economic growth. However, intellectual property expert Sir Robin Jacob has pointed out that “every patentee of a major invention is likely to come up with improvements and alleged improvements to his invention” and that “it is in the nature of the patent system itself that patent thickets should happen and it has always happened.” (As Lord Justice Jacob, Sir Robin served as a judge in the Court of Appeal of England and Wales.)

Other documents

Edlyn Simmons of Simmons Patent Information Service LLC notes that documents that are not actual patents can also provide useful information. He notes, “Patent databases contain millions of records for patent documents that are not legally enforceable patents. These include pending patent applications, lapsed or abandoned applications, and patents that have expired.”

Press releases can indicate where technology described in one or more patents is being commercialized. This information is usually of most use to business managers. Ideally, press releases list the country where the patent was issued and the patent number.

Wrap-up

Chemical and pharmaceutical companies, biotechnology companies, analytical instrument companies, and many other types of firms are knowledge driven. In today’s knowledge-driven economy, effective use of patent information contributes to the success of many companies.

Dr. John K. Borchardt is a consultant and technical writer. He is the author of Career Management for Scientists and Engineers and often writes on career-related subjects. He can be reached at jkborchardt@hotmail.com.

CRITICAL ENVIRONMENT SPECIALIST



Terra helps protect your contamination-sensitive processes

Aseptic Designs

easy-to-sterilize furnishings, pass-throughs, enclosures

Particle Control

HEPA/ULPA-filtered laminar flow cleanrooms and hoods

Humidity Control

desiccators and glovebox isolators extend shelf lives

Chemical Vapor Removal

charcoal-based ductless hoods

ESD Control

static neutralizers protect against electro-static discharge

Call to discuss custom projects
Complete pricing at TerraUniversal.com

TERRA
UNIVERSAL.COM
Critical Environment Solutions

To order: 714-578-6000
Fax: 714-578-6020

Low-Cost Solutions for High-Tech Industries



SURVEY SAYS: ARE YOU IN THE MARKET FOR A TITRATOR?

Titration is a common laboratory procedure used to quantify a substance that is in aqueous solution. This method's origins can be traced back to early publications by Karl Friedrich Mohr in 1855. The general practice involves using a known concentration of a standard reagent, called the *titrant*, which then reacts with an unknown concentration of an analyte, known as the *titrand*. The typical titrator setup has a precise volume of the titrand and indicator placed under a burette of titrant, which is then added in small volumes until the equivalence point is reached. There are several common forms of titration including acid-base titrations, Redox titrations and the Karl Fischer titration method used to analyze the amount of water in a substance. We asked readers about titrator use in their labs. Here's what they said:

Do you have a titrator or are you planning to purchase a titrator for your lab?

Yes	49%
No, but planning to purchase	14%
No, and no plans to purchase	37%

Which titrator brands are currently in your lab? (Check all that apply)

Metrohm	39%
Denver Instrument Company	2%
Hach Company	2%
JM Science	2%
Lab Synergy (Schott)	5%
Man-Tech	0%
Mettler Toledo	29%
Radiometer Analytical	9%
Hanna Instruments	0%
Thermo Fisher Scientific	6%
Other (please specify):	8%

Which type(s) of titrator are currently being used in your lab? (Check all that apply)

Potentiometric	44%
Karl Fischer Coulometric	31%
Karl Fischer Volumetric	21%
Other (please specify):	4%

Which of the following titrator components are you also using? (Check all that apply)

Evaporator	27%
Karl Fischer oven	20%
Autosampler	27%
Homogenizer	17%
Other (please specify):	10%

Which of the following titration methods do you use in your lab? (Check all that apply)

Manual titration	41%
Automated titration	59%

Which of the following errors does your lab experience with your titrators? (Check all that apply)

Measurement of the titrant aliquot	13%
Indicator variability	17%
Operator fatigue and computation error	13%
Anomalies in composition of the standard solution	8%
Accuracy of the delivery system	18%
Systemic and nonsystemic errors	23%
Other (please specify):	8%

What are your purchasing plans for a new titrator?

Starting the review process	13%
Plan to purchase in the next 1 to 6 months	8%
Plan to purchase in 6 to 12 months	11%
Plan to purchase in 12 + months	11%
No current purchasing plans	48%
Don't know	9%

What is your budget range for this titrator purchase?

Less than \$1,000	13%
\$1,000 - \$5,000	48%
\$5,000 - \$15,000	26%
\$15,000 - \$30,000	10%
\$30,000+	3%

Please rate the following titrator features/benefits based on their importance in your decision-making process.

Feature/Benefit	Important	Not Important	Don't Know
Ability to run several titrations for multiple analytes in a single sample	39%	52%	10%
Accuracy	97%	3%	0%
Data management	72%	25%	3%
Ease of installation	63%	25%	13%
Ease of use	82%	12%	6%
Flexibility of automation	56%	34%	9%
Integration of spectrophotometric or other measurement techniques for advanced analysis	44%	38%	19%
Low maintenance	79%	15%	6%
Onboard computers for storing and accessing methods	66%	25%	9%
Operating cost	77%	13%	10%
Price	88%	9%	3%
Reliability	97%	0%	3%
Service and support	88%	9%	3%
Small footprint/size	38%	47%	16%
Speed	63%	22%	16%
Sample changers	44%	44%	13%
Touch-sensitive flat panel displays	24%	58%	18%
Warranty	78%	13%	9%
Other	8%	8%	85%



For more information on titrators, visit www.labmanager.com/titrators

COMPLETED SURVEYS: 108

ROTARY EVAPORATORS

by Rachel Muenz

Rotary evaporators have been around for quite some time now, having been developed over 50 years ago to deal with problems faced with standard chemical distillation devices. Those issues included annihilation of the substances being distilled and slow boiling. Rotary evaporators prevent such problems through the spinning motion of the vessel, which speeds distillation by increasing the surface area of the liquid. This type of evaporator also provides a gentler, higher quality distillation process than standard procedures, according to a white paper from IKA. All basic rotary evaporators are made up of a vacuum source, collection flask, rotating flask, temperature bath and condenser. While oil may be used for the bath in order to reach temperatures of 180 C, water is the most commonly used substance. If you're looking for a rotary evaporator, it's important to think about whether or not you need automated options and what cooling option is best for you. Vacuum control is also crucial as vacuum that is achieved too quickly can cause foaming and bumping. As always, consulting your vendor can help you make the right choice of rotary evaporator for your lab.

APPLICATIONS

ROTARY EVAPORATORS

- Flavor extraction/food industry
- Solvent removal/separation and recycling
- Chemical/educational/fuel/environmental
- Sample concentration
- HPLC and natural product sample prep
- Drying down powders (using test tube adapter)
- Trapping hazardous waste liquid

IKA RV 10 SERIES ROTARY EVAPORATOR

WWW.IKA.COM



◀ Despite retaining the same basic principle, there have been numerous technical advancements over the years. With the RV 10 Rotary Evaporators, IKA® is now able to offer a range that sets new standards in safety, efficiency and usability. The line of devices comprises three different systems: the RV 10 control, RV 10 digital, and RV 10 basic.

- Features a user-friendly water/oil bath that includes a powerful 1300 Watt heater
- Comes with a drive capable of right-left interval operation
- Highly solvent-resistant PTFE seals also ensure safe operation of the system
- All variants, from basic upwards, are supplied complete with a Woulff bottle
- A wide range of accessories are available for all models

EYELA N-1200 SERIES

WWW.EYELAUSA.COM



◀ The EYELA N-1200 rotary evaporator is designed to minimize solvent retention while the condenser is being inclined. The structure has been developed to prevent the reverse flow so the condensed solution will not drop onto the capillary feed tube and can trap the solvent vapor more efficiently.

- Effortless manual lift jack and motorized jack types offered
- Three types of baths available
- Equipped with newly-developed Teflon® vacuum seal
- Includes a hose holder to bundle hoses and keep lab table neat
- Features speed rotation range of 5 to 280 rpm

MODULAR SFC CENTRIFAN PE PERSONAL EVAPORATOR

WWW.MODULARSFC.COM



◀ Increase the evaporation capacity of your lab by moving the time-consuming and tedious 20mL vial drying jobs off the rotovaps. A great companion for rotovaps, the Centrifan PE dries six 20 mL vials at once, off-loading this finishing step from your rotovap resource. The instrument is also a useful companion for purification chemists using Flash LC equipment.

- Simple, robust and safe for users and samples
- Easy to use and low cost of operation
- Replaces polluting nitrogen blow down set ups
- No vacuum pump or continuous supply of gas required
- Works well with all solvents



SURVEY SAYS: ARE YOU IN THE MARKET FOR FREEZERS & REFRIGERATORS?

Freezers and refrigerators are an integral part of any laboratory that requires temperature controlled storage. Maintaining samples at an optimal temperature while in storage is vital for many lab professionals and this makes choosing the right freezer or refrigerator a crucial task. While the average kitchen freezer operates at about -20°C, laboratory variants have a much wider range of options depending on the storage conditions needed. For example, low-temperature laboratory freezers will achieve temperatures of -40°C to -85°C, much lower than their kitchen-based counterparts. When selecting a freezer or refrigerator for your lab, it is important to know what specific storage requirements you'll need, such as the temperature range or space available. We asked readers about lab freezers and refrigerators in their labs. Here's what they said:

Which type of lab freezer are you currently using or planning to purchase? (Check all that apply)

	Currently Using	Planning to Purchase
Blood bank and plasma	94%	6%
Explosion-proof	94%	6%
Flammable materials storage	89%	11%
Upright general purpose lab freezers	91%	9%
Under-counter general purpose lab freezers	94%	6%
Low temperature chest lab freezers	86%	14%
Low temperature upright lab freezers	88%	12%
Upright ultra-low temperature freezers	89%	11%
Chest ultra-low temperature freezers	82%	18%
Other	50%	50%

Do you have a lab freezer or are you planning to purchase a lab freezer for your lab?

Yes	86%
No, but planning to purchase	5%
No, and no plans to purchase	9%

What temperature range (in degrees Celsius) is the lab freezer that you currently use or will the lab freezer be that you plan to purchase?

0° to -20°C	26%
-20° to -30°C	16%
-30° to -45°C	5%
-45° to -85°C	40%
Colder than -85°C	7%
Other (please specify):	5%

Which lab freezer brands are you currently using or planning to purchase for your lab? (Check all that apply)

	Currently Using	Planning to Purchase
Angelantoni	0%	0%
Darwin Chambers	0%	0%
Freezer Concepts	0%	0%
Kelvinator Scientific	5%	0%
Marvel Scientific	2%	0%
New Brunswick Scientific	5%	2%
Norlake	2%	0%
NuAire	2%	0%
Ontario Ovens	0%	0%
Sanyo	12%	2%
So-Low	6%	0%
Thermo Fisher Scientific	35%	6%
Other	19%	1%

For the service and repair of the lab freezer in your laboratory, what type(s) of service do you use? (Please select all that apply)

Instrument manufacturer time/material	8%
Third-party contract	18%
Third-party time/material	21%
In-house service department	32%
Our department	5%
Multi-vendor service provider	5%
Instrument manufacturer service contract	7%
Don't know	2%
Other (please specify):	2%

If you are planning a purchase of a new lab freezer, are you considering an ultra-low freezer?

Yes	62%
No	38%

What is your annual budget for supplies, accessories, maintenance, repairs, etc.?

\$0 - \$1,500	25%
\$1,501 - \$3,000	10%
\$3,001 - \$5,000	8%
\$5,000+	34%
Don't know	24%

What are your purchasing plans for a new lab freezer?

Starting the review process	10%
Plan to purchase in the next 1 to 6 months	12%
Plan to purchase in 6 to 12 months	6%
Plan to purchase in 12 + months	8%
No current purchasing plans	62%
Don't know	3%

If you are planning a purchase of an ultra-low freezer, what are your reasons? (Check all that apply)

Addition to existing systems, increase capacity	37%
Current ultra-low freezer is nearing end of lifespan	30%
New application requires an ultra-low freezer for high value sample	7%
Require the protection of back-up ultra-low freezer	7%
Setting up a new lab	11%
Other (please specify):	9%

What is your budget range for this lab freezer purchase?

Less than \$5,000	33%
\$5,000 - \$15,000	50%
\$15,000 - \$30,000	14%
\$30,000+	3%



For more information on refrigerators and freezers, visit www.labmanager.com/fridges&freezers

COMPLETED SURVEYS: 215

ultimate protection

The world leader in sample protection never rests. Based on feedback from customers like you all over the world, we're proud to present our newest innovation. Touch-screen control panels offer 24/7 health monitoring and a detailed event log. Our efficient cabinet design fits more samples in a smaller footprint. Reliable temperature uniformity, recovery and back-up systems assure protection. All for one reason: your samples are our obsession.

optimum capacity

• thermoscientific.com/revcouxf

Thermo
S C I E N T I F I C

**Introducing the new
Thermo Scientific Revco UxF Series**

- intuitive touch-screen controls
- maximum storage capacity
- 24/7 health monitor
- event log
- fast recovery rates
- energy efficiency



James Gibson, Ph.D.



Nancy Wayne, Ph.D.

ASK THE EXPERT

IMPLEMENTING & MAINTAINING LAB SAFETY PROGRAMS

by Tanuja Koppal, Ph.D.

James Gibson, Ph.D., Director of the Office of Environment, Health and Safety (EH&S), and Nancy Wayne, Ph.D., Professor of Physiology and Associate Vice Chancellor for Research at the University of California, Los Angeles (UCLA), talk to contributing editor Tanuja Koppal, Ph.D., about the recently formed UC Center for Laboratory Safety, its mission and its goals. They emphasize the fact that there is not much peer-reviewed literature available and no easy access to information and guidance on laboratory safety. Hence, one of the goals of the Center is to address important questions concerning lab safety, and to create lab practices based on empirical data, which will then be made available online for researchers to study and implement.

Q: Can you give me some background on how and why your Center for Laboratory Safety was created earlier this year?

A: [Gibson]: Chancellor Gene Block, here at UCLA, issued a challenge for us to be best-in-class in laboratory safety. As I started speaking with principal investigators (PIs) to figure out how to meet that challenge, many of them asked to see the data showing that the things we were putting in place were actually going to be effective at protecting the health and safety of the researchers. As I looked into the data, I found there really wasn't much out there, and the more I dug, the more I realized that there was a need for research in this area. Data was really going to be effective in convincing PIs to

change behaviors or to make sure that certain things are being applied in the laboratories. So the chancellor's challenge, along with the curiosity of the researchers here at UCLA, convinced me that there needs to be some entity that really focuses on research into laboratory safety. That's really what brought this idea together in creating the Center.

A: [Wayne]: There have been a lot of questions on what evidence there is that certain regulations and lab safety protocols actually make researchers safer. It's been very difficult to find answers to these questions in peer-reviewed literature. There really isn't much on laboratory safety, like there is on hospital safety, aviation safety and food safety. So the UC Center for Laboratory Safety was created in order to address really

important questions concerning lab safety, and to create safety programs based on empirical data rather than developing them solely on what makes sense.

Q: What types of studies are you looking to design to create these best practices around lab safety?

A: [Gibson]: So much of this is behavioral, and I think initially what we're going to be looking at is how to effect changes in behavior. So we're going to be looking at designing surveys to find out what the current perceptions are, what the current behaviors associated with laboratory safety are and what interventions we can put into place that might improve laboratory safety.

A: [Wayne]: The first project that we're designing is a safety culture and risk perception survey. That's to get some foundational information about how researchers view lab safety, the safety culture at their place of work, and risk perception in academic settings and in industry. We want to make this a comparative study so that we can understand how people are thinking about lab safety and lab safety practices in very different environments. The assumption is



LABMANAGER

www.labmanagerbootcamp.com

2012 BOOTCAMP

WORDS MATTER

EFFECTIVE COMMUNICATION IN YOUR LAB

with Pamela Jett

Discover startling facts about how most professionals are sabotaging their **communication success** and reap the rewards of learning remarkable communication techniques proven to **better relationships at work and at home.**

Have you ever been at a loss for words? How often do you find yourself saying "I wish I knew how to communicate with more confidence"? Do you frequently wonder what to say—especially when you feel pressured? If so, be among the professionals who dare to communicate better! This is not the same tired communication advice you've heard before. We will turn some traditional notions about "good communication" upside down so you can take advantage of remarkable communication techniques that will, flat out, make work (and home life) easier, more productive and more rewarding.

**2:00pm Monday,
March 12, 2012**
Orange County Congress Center,
Orlando, FL USA

ATTENDEE LEARNING CONCEPTS:

www.labmanagerbootcamp.com

1. Discover how easy it is to build professional relationships with one great question.
2. Uncover self-sabotage & retrain your brain to think & communicate positively.
3. Acquire remarkable words and phrases to communicate with even the most difficult people and to put an end to toxic relationships.

Pamela Jett is a communication skills expert who believes that "words matter." As a speaker, trainer, coach, and author she helps professionals communicate in positive ways that increase employee engagement, reduce conflict, and enhance teamwork. With an emphasis on the actual words to choose (not simply theory or feel good fluff), Pamela provides leaders and team members alike with language patterns and templates that make difficult conversations easier, communication tools to help everyone feel respected and appreciated, and useful knowledge on how to avoid the perils and pitfalls created by choosing the wrong words. Pamela is known for her high energy, her innovative techniques, and her unique blend of humor and practical application. Her programs will leave audiences well equipped to use remarkable communication to achieve remarkable results.

James Gibson, Ph.D., is the Director of the UCLA Office of Environment, Health and Safety, which is responsible for ensuring the health and safety of faculty, students and employees on campus. He is also the Executive Director of the UC Center for Laboratory Safety, whose mission is to sponsor and support research to improve laboratory safety. Prior to joining UCLA in 2008, he was the Director of Public Health for Princess Cruises, Cunard, Seabourn and Carnival Australia and worked closely with health ministries throughout the world. From 2000 to 2004, he served as Assistant Commissioner for the New York City Department of Health. Dr. Gibson has also worked for the U.S. Environmental Protection Agency and the Environmental Defense Fund. He received his M.A. in Public Health from the Johns Hopkins University Bloomberg School of Public Health and his Ph.D. in Environmental and Occupational Health from the University of Illinois, Chicago.

Nancy Wayne, Ph.D., is a Professor of Physiology at the David Geffen School of Medicine at UCLA. As Associate Vice Chancellor for Research, she focuses her portfolio on laboratory safety. She is responsible for communicating with the faculty to enhance the effectiveness of laboratory safety programs and policies. She works closely with the Office of Environment, Health and Safety and other groups on campus to improve compliance with state- and federally mandated safety regulations. Dr. Wayne received her B.A. from Northwestern University and Ph.D. from the University of Michigan, and did her postdoctoral training at the University of Virginia. She joined the UCLA faculty in 1992.

that risk perception and lab safety culture are much more attuned and in a more advanced state in industry than in academia. But we could be totally wrong, or there could be a lot of variability that puts that assumption into question. But we need the data in order to address that.

Q: What are some of the tools currently developed and available to the users?

A: [Gibson]: We put together a laboratory hazard assessment tool that looks at all the risks associated with the laboratory and must be completed by every PI on campus. It's a survey to identify all the hazards that are present in their laboratories, which are divided into chemical, biological, radiological, physical, laser and nanomaterials. We then rank them according to quantitative analysis of the risks associated with those laboratories, and determine which ones are at the highest risk. We go back to those laboratories and provide additional oversight to make sure that they are functioning and operating safely. This tool is online and must be updated annually or whenever there are additions or changes to the activities that occur in that laboratory.

Q: What are the actions to be taken if you find some labs are at risk or noncompliant?

A: [Gibson]: If we find the lab is noncompliant, then we identify what the issues are. During the course of the inspections, our inspectors provide a lot of training, guidance and consultation on how to make improvements. Depending on the severity of the issue, the lab is given 48 hours to make that change, if it's a critical deficiency. If it is less critical, then it is given 30 days to make the correction.

Q: What has really changed with lab safety in recent years, say in the past five years?

A: [Gibson]: I think that there's been a lot more awareness over the last few years about the importance of laboratory safety, not only from a standpoint of protecting the health and safety of the laboratory workers, but also from an operational efficiency standpoint. Obviously, a safe and efficient lab improves operations. There's been a huge amount of interest in the Center's activities from research institutions both private and public, biopharmaceutical companies, manufacturers, and regulatory

agencies because obviously safety impacts institutions throughout the world.

A: [Wayne]: There has been an incredible enhancement in awareness of PIs, lab managers and researchers as to what the safety regulations are. Up until recently, we were fairly naïve and thought that we were managing our laboratories in a safe way, but we weren't really getting optimal guidance on this. Very quickly we started getting enhanced guidance on lab safety regulations that are both state and federally mandated. And I think that we're ahead of the game compared to other universities because we have this close working relationship between our laboratory inspectors and the lab managers, which makes a difference.

Q: Has technology played a role in these changes?

A: [Gibson]: Technology is obviously making things a lot easier. The laboratory hazards assessment tool is now Web-based. We're beta testing electronic lab inspections, whereby we take computers and tablets into the field and perform inspections electronically so that information can be downloaded via the Web and can populate

a database, which then automatically puts in recommendations for corrective action. It really streamlines the inspection process and makes it much shorter, which allows us to do more inspections and to interface more with our researchers. We're hoping to develop some applications for laboratory safety that people can use on mobile devices and smart phones. Also in our training we're developing videos and making them available through YouTube for institutions throughout the world. We're trying to make these really interesting and innovative so that they capture the interest of the researchers and students. We want to make as much use of technology as we possibly can.

A: [Wayne]: One of the things that I've been working on is creating a campus-wide researcher database that will have everything a PI, lab manager and researcher needs to know. All the information on training—what you need, how to get it, where to get it, if it's offered online or in a class, what training you have done, when you did it, and when you need to do it again—all this will be logged in there. We're designing it so that it can be tailored for each laboratory, and we're hoping to beta test that in a few months. We're going to be publishing our studies in the peer-reviewed journals and then putting links to that information on our website so that people can find it more readily.

Q: Where do you see your Center two or three years from now?

A: [Gibson]: The way we're going to measure success is through publications, and we're certainly hoping to have some very good publications out there regarding laboratory safety and effective programs. We can put those into practice and eventually have an impact on the safety culture and on reducing the potential for injuries and accidents in laboratories. Once the literature's out there, researchers are going to be reviewing this and recognizing that these things are, in fact, more than anecdotal evidence. They're actually empirically based, and we think that's going to be effective at creating change.

A: [Wayne]: The long-term goal of the Center is to be a repository for peer-reviewed data and best practices, not just coming out of UCLA, but globally. We really want it to be a global resource for best practices based on empirical information so that there's easy access to this material. What I keep hearing over and over again is that different institutions around the country, around the world, have a lot of data that has not been mined or analyzed. We want to make information available so that people can make more intelligent decisions about how to protect themselves from potential hazards and risks in the laboratory.

CryoClear™ Cryogenic Tubes



Innovative Screw Caps Eliminate Leakage and Contamination.

CryoClear™ screw caps are co-molded with a thermoplastic elastomer (TPE) layer and are 95kPa certified to provide a 100% leak-proof seal. This proprietary molding process eliminates the risk of contamination associated with brands that use separate silicone o-rings.

- Certified by an independent laboratory to be free of Human DNA, DNase, RNase, Pyrogen and ATP
- Manufactured in a Class 7 (Class 10,000) cleanroom in accordance with FDA, GMP and ISO quality guidelines (ISO 13485:2004, ISO 14644 and ISO 14698)
- Each tube is clearly printed with a unique barcode and graduation marks
- Temperature range: -196° to +121°C
- For use in the gas phase of LN2 only

**New
Manufacturing
Technology**

Tel: 1-201-599-1400
www.globescientific.com

globe®
SCIENTIFIC INC.

610 Winters Avenue
Paramus, NJ 07652 • USA



NEW-GENERATION LAB INSTRUMENTATION REDUCES BUSINESS RISKS AND INCREASES FOOD SAFETY

by Bernard Tulsi

Developers of analytical instrumentation for food laboratories are constantly being kept on their toes—foremost by the competing technical advancements and expanding market demands inherent in their business, and also by the need to help customers comply with changing and more stringent regulatory requirements

food recalls—most recently, deadly *Listeria*-contaminated cantaloupes. As a result, technical change and innovation have made steady strides.

“We now have a good probability of mitigating business risks for food producers and manufacturers and minimizing safety risks to consumers,” says Paul Zavitsanos, worldwide food industry manager at Agilent, which holds a substantial global market share

of creating effective detection and measurement systems—and the legal and regulatory missions, if accomplished, will actually make food safer,” he says

While the new United States Food Safety Modernization Act has been passed, and what it intends to regulate is known, its accompanying regulations are still part of a developing scenario. Title I of the Act covers improvement of the capacity to prevent food safety problems. Title II covers expansion of the capacity to detect and respond to food safety problems—greater testing frequency, considerably more foreign testing facilities, and an increase in the numbers of inspectors, periodic reevaluations and laboratory accreditation. Recall fees are also covered under this title, which also

“Globalization has increased food safety risks on the consumer side but it has also increased the business risks of producers globally.”

worldwide. Also requiring their rapt attention is a relentless tide of contaminations, outbreaks and

in food lab instrumentation. “The future seems bright in food safety once we accomplish our technical mission



makes it clear that the costs for recalls and investigations are to be borne by the food producers involved. This is an important change, and in addition authorities now have the power to issue recalls as well as to charge food producers and collect fees for any tests. Title III covers improvements to the safety of imported food.

According to key industry experts such as Zavitsanos and Dr. Paul Young, director, chemical analysis operations, Waters Corporation, the U.S. is not alone in the implementation of new food safety laws. Fast-growing, large-scale food producers and consumers such as China and India also have new laws, and Europe has also instituted new food regulations. There seems to be a general global consensus supporting more testing, evaluation and control,

and greater care being taken within food-based facilities.

“This means that globalization has increased food safety risks on the consumer side but it has also increased the business risks of producers globally,” says Zavitsanos. “Agilent takes the position that chemical, biological and physical measurements of products represent mitigation against business risks. This is clear from the law, from lab management and from the executive perspective in the food business. That is good news for instrument suppliers,” he adds.

Young also sees this as an opportunity for increased testing. He cautions, however, that this creates challenges such as large volumes of samples, the number of analytes to be tested in any given sample and

the increased potential for false positives—resulting in the need for more confirmatory testing. In such a scenario, the goal should be to generate robust and definitive results that reduce or eliminate the need for confirmatory testing. For this reason, he says, “We are starting to see a significant movement toward mass spectrometric methods because of their ability to generate robust and unequivocal results.”

Food safety risks fall into two broad categories. Biological risks are more prevalent. Chemical risks are targeted by the most technologically advanced tools, which is likely the reason for fewer safety issues in the chemical area. Chemical contaminants include a large number of offending target compounds—pesticides, veterinary drugs, trace metals, emerging

contaminants, steroids and allergens, among others. Both Young and Zavitsanos point to well-established analytical methodologies and versatile instrumentation in their companies' quivers to meet the still-challenging testing needs on the chemical side, both organic and inorganic.



▲ *Agilent's Triple Quadrupole GC/MS pesticide analyzer.*

Chemical analyses are typically the subject of target compound detection programs in which analysts know or suspect what compounds they are investigating. Exciting new contaminant discovery techniques such as Q-TOF, LC-TOF and GC-TOF enable the investigation of samples without any *a priori* understanding of what dangerous contaminants may be in them. For example, if an analyst did not know there was melamine in milk, under target detection programs, the melamine would not be targeted, at least in the past, and hence not detected.

"This represents tremendous progress in identifying compounds that are not on target lists. It is still labor intensive and requires a lot of work by knowledgeable people, so it is expensive. Nonetheless, the technology is there and is widely available in research labs, audit facilities and

contract labs," says Zavitsanos, who believes that in about five years both time to answer and cost will decrease sufficiently so that these systems would be used routinely by medium-sized labs, at least.

In the food safety area, Agilent's Triple Quadrupole 6490 series, and its 7000 series GC Triple Quadrupole in GC-MS, are used heavily in target compound analysis. Waters offers the XEVO mass spectrometer, a highly sensitive instrument capable of targeting hundreds to thousands of analytes, depending on the requirements for a particular sample. For unknown or unsuspected contaminants, Agilent offers models such as the 6540 for Q-TOF, an LC-MS instrument, as well as the new Agilent GC-Q-TOF, which is analogous to the LC-Q-TOF but on the GC side. With respect to testing for unknowns, Young says, "We are developing clever software tools, using a mass spectrometry approach, to take one sample and compare it with another that is known to be of good quality. Our work in this area is currently on the XEVO G2 TOF."



▲ *Waters' XEVO G2 TOF.*

Young also does not believe that these advanced systems for detecting unknowns will become widely used in the next few years. He notes, however, that many food industry laboratories and several contract labs are showing interest. "A lot of customers are quite interested in acquiring the ability to quickly screen between good and bad food," he says.

Recalls for biological contaminants (bacteria and virus) far exceed those for chemicals, especially in the United States. Biological testing is not as instrument-intensive as chemical testing. Over the last 30 years, the instruments used in microbiology have not been on the same trajectory as those used for chemical analysis, according to Zavitsanos.

Agilent is focusing on the rapid and comprehensive evaluation of food-borne pathogens in food samples. The targets are both bacterial and viral, at both the species and strain levels, so that point of entry into the food chain could be detected, according to Zavitsanos. "If this could be done at sufficient throughput with appropriate instrumentation, the reliance on epidemiological analysis of outbreaks could be minimized, and it becomes possible to measure the point of entry faster and with greater precision," he says.

The methods currently available for biological testing are onerous, time-intensive and costly. "Agilent is exploring the possibility of introducing more instrumentation into food microbiology, such as new Q-PCR technology, which allows Multi Matching and Mass Codes techniques, and which uses mass spectrometry to identify known sequences of DNA out of samples and encode the information as

experience

[rust free long lasting environments]

FUMEGARD

Metal Free Polypropylene Fume Hoods

Durable Polypropylene Construction

NuAire® polypropylene Fume Hoods are constructed from stress-relieved, fully seam-welded, and reinforced white polypropylene for a long lasting, rust free product life.

Virtually Metal Free

All FumeGard™ cabinets are virtually metal free and do not use nylon components. "Double Wall" construction forms the plumbing chase for the routing and connection of all services required. This compartment is constantly under negative pressure to minimize any fume build up. Access panels are provided for front maintenance of HEPA filters, services, electronics system, and view screen counterweight balance system. Hinges, handles, screws, bolts, sinks, and miscellaneous items are also constructed of polypropylene.

Designed to Capture, Contain, and Exhaust

NuAire's HEPEX™ Zero Leak Airflow System maintains quiet uniform airflow. The HEPEX™ System also prevents uneven particulate loading by eliminating direct blower blasts to the HEPA filter and dispensing air over 100% of the HEPA filter surface.



NUAIRE, INC.
40TH ANNIVERSARY

Controlled Environments for Optimum Protection

2100 Fernbrook Lane | Plymouth, MN 55447 | U.S.A.
763.553.1270 | WWW.NUAIRE.COM

Find, Follow, Enjoy:



POST YOUR OPINION

POST COMMENTS TO ARTICLES YOU READ ON THE LAB MANAGER WEBSITE.



Have an opinion, idea, or input pertaining to something you have seen or read in our print or digital publication? Let us know and post a comment today.

www.labmanager.com

Connect with other Lab Managers by expressing your opinions.



Post a Comment

mass spectrometry data. This is new and emerging technology, as microbiology is still largely based on isolating colonies of organisms in a Petri dish. It will, however, take a while to develop and validate, and to get the buy-in of the larger community," says Zavitsanos.

On the biological side, proper preparation of food samples and periods of incubation to increase the organism count are important for identifying and determining the viability of pathogens. Now, there are sensitive technologies for use in environments where bacterial counts are sufficiently high to identify organisms without the 12 to 24 hours typically needed for such sample enrichment, according to Zavitsanos.

Stuart Ray, technical director, Seward Limited, says that his outfit works exclusively in the area of sample preparation for food testing in shelf life and safety analyses. Ray says that its Seward Stomacher paddle blender sample-preparation units are used for a range of pathogen testing, such as *E. coli*, *Salmonella* and *Listeria*, in the food industry. He says that more than eight million samples per day are prepared on Stomacher paddle blender units worldwide. "Our machine is relied on to produce a representative sample from a foodstuff for subsequent analysis, so it stands at the front end of the process to detect pathogens," he says.



▲ The Seward Stomacher® 400 circulator.

"The main benefit from using the Stomacher Circulator is that a representative sample is produced. In microbiological food testing, a representative sample is important because the living organisms involved tend to behave differently from the test targets in chemistry," says Ray. "This eliminates the need for analysts to make judgments and rely on the integrity of the samples that are being subjected to differing test methods. If you start with a poor sample, no matter how sophisticated the test methods, the results are likely to be poor also."

3M Food Safety, which has served the food business for the past 25 years, made the decision in 2009 to broaden its product offerings beyond the field of microbiology. Kevin McGoldrick, 3M Food Safety's technical services and regulatory affairs global manager, says that more awareness and greater testing have created safer food. "So the challenge becomes how to do it more efficiently and more cost-effectively in a very competitive marketplace," he says.



▲ 3M Petrifilm aerobic count plates.

McGoldrick says that the company's primary products are on the microbiology side. Among these are its Petrifilm Aqua Plates, a microorganism testing tool used by food processors worldwide for

the past 25 years. Petrifilm, which is used by water and beverage processors to detect contaminants, offers the advantage of increased worker productivity, according to McGoldrick. Petrifilm also offers faster end-product screening results. The company also makes and sells Clean-Trace Surface ATP

► 3M
Clean-Trace
Surface
System



for the validation of the sanitation process, a critical control point in food manufacturing, which helps ensure that processing equipment is sanitized and free of bacteria before operations are started.

Carolyn Otten, senior director, specialized services, at Chemir Analytical Services, is involved in nonroutine food safety testing. "This includes preventative measures; companies seek our services to ensure that their food products are safe before they put them out on the market. They may also approach us when they have a contamination or off-odors or off- flavors to their food."

Otten says clients proactively seek their services when developing new packaging systems for their foods, or when they are making important changes in the types of food they are offering, often out of market necessity. They want to ensure that materials used in the package in which the food will be cooked do not migrate under variable conditions into the food, creating a safety issue.

"One common scenario is that they would send us the food and new or competing packaging systems they want to evaluate. Our evaluation entails cooking the food first in a neutral glass container, where it is not exposed to the packaging, as a control. Then the food is cooked in the packaging system according to the directions.

"After cooking, the foods cooked in the package and the controls are compared with a view to finding any chemical differences. We then verify that anything found in the food cooked in the packaging system did come from the packaging materials. If required, we quantify the extraneous materials, and if the customers want it, we send the

samples and data to a toxicologist for additional safety analyses," she says.

In an ironic way, the deliberate melamine contamination a few years ago in China may have provided the impetus for the widespread improvement in the quality of food testing instrumentation such as mass spectrometry seen under way today. "Over the next five years, there will be a significant drive toward mass spectrometry in the food safety area. Mass spec generates higher-quality data that is more instructive on what is in a sample, and we will have greater confidence in the results," says Young.

Bernard Tulsi is a freelance writer based in Newark, Del. He may be contacted at btulsi@comcast.net or by phone at 302-266-6420.



Miniature, Regulated High Voltage Modules 100v-8kV

THE **C & CA SERIES** PROVIDE CLEAN, RELIABLE HIGH VOLTAGE IN A SHIELDED, PC MOUNT PACKAGE. FEATURING PRECISION 0 TO 100% PROGRAMMABILITY, VERY LOW RIPPLE AND EMI/RFI, THESE COST-EFFECTIVE POWER SUPPLIES ARE IDEAL FOR INTEGRATION INTO COMPACT, SENSITIVE EQUIPMENT.



<http://emcohighvoltage.com>

MINDMAP: IMPROVE THE PURITY OF WATER IN MY LAB

By John Buie

Lab water, purified by any of a number of means, is a vital resource in most laboratories. Purified lab water ranges from Type I, which is suitable for analytical tests requiring minimal interference and maximum precision and accuracy, through Type II for analytical tests in which the presence of bacteria can be tolerated, to Type III, which is suitable for general washing and for use as feedwater for producing higher grade water, as well as bacteriological media preparation. A fundamental principle when seeking to improve the purity of your lab water is to ensure that the correct grade of water is used for the appropriate application.

This MindMap explores some of the different options available for improving the purity of lab water by taking into account the specific needs of your own lab and that of the labs around you.

CONSIDER CONTAMINATION POST-DISPENSING

The purest water instantly becomes at risk of contamination once it is exposed to the air. As well as considering the water purification system itself, consideration should be given to techniques to maintain water purity once it is in use, otherwise all the effort expended in attaining high-purity water is wasted.

For example, pure water should always be used in glassware that has itself been cleaned thoroughly to remove contamination, then rinsed with pure water; it should be used in a closed environment to prevent contamination from the air; and it should be used quickly once it has been dispensed to reduce the risk of contamination.

CONSIDER DESIRED APPLICATION

Common lab applications tend to have their own requirements in terms of purification. For example:

Polymerization of PTFE requires removal of particulates

HPLC requires removal of all dissolved organics

Healthcare and pharmaceutical applications require removal of all microorganisms and pyrogens

GC-MS requires ultrapure water for trace analysis

DNA/RNA applications require ultrapure water

FOCUS ON CONTAMINATES OF GREATEST CONCERN

The five types of contaminants that may be found in water are:

1. Particulates
2. Dissolved inorganics (solids and gases)
3. Dissolved organics
4. Microorganisms
5. Pyrogens

Ensure that the water purification system you employ in your lab is designed to eliminate those contaminants that are of major concern in the particular techniques and processes common in your lab.

UNDERTAKE A SPECIALIST LAB AUDIT

Installing a new water purification system is a costly enterprise and can be time-consuming and complex. Most suppliers of pure water systems offer a consultancy service to help you select the appropriate system for your own needs and to suit your own budget.

Treat the advice of sales reps from large catalogue distribution companies with caution as they tend not to know the system as well as the manufacturers themselves. Also, avoid becoming tied into proprietary technology when purchasing a new system, as the processes used are standard across all systems and need not be complex.

TAKE EXTRA CARE WHEN PURE WATER IS USED SPORADICALLY

Always allow the pure water to run for a certain period of time after inactivity. For example, allow at least 5 liters of purified water to drain after the weekend or holidays, particularly when using the water for critical applications.

CHOOSE APPROPRIATE PURIFICATION TECHNIQUE

Most water purification systems use a combination of processes to remove relevant contaminants:

1. Distillation - Excellent for removing particulates, microorganisms, pyrogens
2. Deionization - Excellent for removing dissolved solids, dissolved gases
3. Reverse osmosis - Excellent for removing particulates, microorganisms, pyrogens
4. Activated carbon filtration - Excellent for removing dissolved gases, dissolved organics
5. Microporous filtration - Excellent for removing particulates, microorganisms
6. Ultrafiltration - Excellent for removing particulates, microorganisms, pyrogens
7. Ultraviolet oxidation - Excellent for removing particulates, microorganisms, pyrogens

SELECT APPROPRIATE WATER PURITY

Water purification is a costly business, and the lowest acceptable level of purification should be used for all applications to save wastage. For example, all glassware rinsing should be performed using Grade III water.

UNDERTAKE REGULAR SERVICE AND MAINTENANCE

All water purification systems require some form of ongoing maintenance, from the cleaning and changing of filters to the replacement of larger parts. Some systems require servicing from an outside expert, while others can be maintained by users by simply replacing cartridges, for example.

USE A MULTI-STAGE PROCESS

Most water purification systems rely on more than one process to achieve the desired level of purity. Installing a system that uses a primary treatment followed by a 'polisher' is a common method of achieving water of the required purity. Water should be constantly circulated through the entire system to avoid recontamination.

REDUCE STORAGE TIMES

Pure water that is not recirculated is at risk of significant deterioration in quality and bacterial growth. Storage of pure water should be kept to an absolute minimum in order to reduce this risk.

IMPROVE THE PURITY OF WATER IN MY LAB

UPGRADE OR INVEST IN NEW

Most labs have some form of water purification already installed. One of the fundamental questions when seeking to improve water purity is whether to upgrade the existing system, which can be cost effective, or whether to install a completely new system, which may give more satisfactory results.

CENTRALIZED OR POINT-OF-DELIVERY SYSTEM

If the decision is made to invest in a new system, the next decision should be whether this will be a centralized system or a point-of-delivery system, which delivers pure water as required on-tap.

POINT-OF-USE SYSTEM

Point-of-use systems are gaining in popularity due to lower installation costs and the greater control and flexibility offered. These systems also tend to require less lab space, typically operating from a small tank stored under a bench.

OPT FOR A REGULAR MAINTENANCE CONTRACT

Arranging a contract with a supplier for regular servicing of a water purification system is a cost-effective way to ensure that the system performs optimally at all times and is likely to give more years of service.

CHOOSE A SYSTEM THAT REQUIRES MINIMUM SERVICING

Some systems are designed so that they can be easily maintained by users or lab managers with minimum input from outside experts. These systems use cartridges, for example, that can easily be changed to provide new filters.

REPLACE PARTS AS NECESSARY

Although water purifiers do not have moving parts, some components such as filters, UV lamps, and extraction filters will need to be changed periodically to maintain optimum performance.

REPLACE CONSUMABLES

Consumables that need to be replaced on a regular basis to ensure optimum performance include filter units and cartridges.

PURCHASE SPARE PARTS

Spare parts for water purifiers can be purchased new from the manufacturer. Although the trade in second-hand parts for water purifiers is not on the same scale as for some other laboratory instruments, it is possible to buy used parts in some cases as a cost-effective alternative to new parts.

IMPLEMENT STAFF TRAINING

All staff who need pure water as part of their everyday tasks should be trained on whatever system is available in the lab to make sure that they are using it properly and obtaining the necessary level of purification every time.

Training in the effective use of pure water is provided by a number of commercial training companies, either as part of a general laboratory training program or as a specific course in water purification. Many of the larger manufacturers of water purifiers also supply training in their systems, either on site or on-line.

MONITOR WATER PURITY REGULARLY

Water purity should be measured routinely using specialized monitoring kits. This allows any deviation away from the required standard to be quickly identified, preventing contamination of experiments and allowing the problem to be rectified before it escalates. NIST standards specify a resistance of >1 , >18 , and $>18,2$ megohm.cm for water Types II, I and I+ (ultrapure water), respectively.

CENTRALIZED SYSTEM

Centralized systems can be costly to install and, because they operate all night and over the weekend, can be expensive to run. In addition, it can be difficult and costly to maintain a high level of purity in a central system, the water quality can deteriorate over time and if the system goes down, the whole floor or building's purified water supply goes down.

ANALYTICAL

Handheld Raman Spectrometer

NanoRam™

- Support a broad range of applications in multiple industries
- Easy to use and operates single-handedly
- Allows rapid development of standardized and validated methods to facilitate 100% inspection for purity and quality
- Includes CleanLaze® technology for exceptional laser stabilization and narrow linewidth



B&W Tek, Inc.

www.bwtek.com

Micro Volume Spectrophotometer

NanoPhotometer™ P-Class

- Includes NanoVolume (0.3µl) analysis, cuvette capability, built-in vortexer, and standalone operation
- Offers the smallest sample requirement, widest dynamic range, fast scan times, and lifetime accuracy without need for recalibration
- A good fit for small volume analysis



Implen

www.implen.com

Radio Scanner/Detector

Scan-RAM

- Money-saving 'two in one' device combines Radio-TLC scanner and Radio-HPLC flow through detector
- Saves bench space and improves workflow
- Features easy-to-learn and use Laura software



LabLogic

www.lablogic.com

Shimadzu Adapter Kit for Merlin Microseals™

P/N 61-12

- Allows Microseals to be used with Shimadzu GC-2010 and GC 2025 gas chromatographs (GC)
- Available for immediate shipment
- The Microseal is a microvalve replacement for conventional injection port septa, providing longer lifetimes and improved chromatographic performance



Merlin Instrument Company

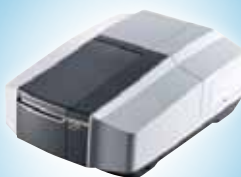
www.merlinic.com

PRODUCT SPOTLIGHT

HIGH ABSORBANCE LEVEL, ULTRA-LOW STRAY LIGHT

NEW COMPACT, RESEARCH GRADE UV-VIS INSTRUMENTS LAUNCHED

Shimadzu Scientific Instruments has launched the compact UV-2600 and UV-2700 UV-Vis spectrophotometers, which feature advanced optical systems and proprietary "Lo-Ray-Light" diffraction gratings. The systems substantially reduce stray light, which is great for routine analysis and demanding research applications.



In response to feedback that typical spectrophotometers are too large, the design of the UV-2600 and UV-2700 reduces required installation space by 28 percent, while maintaining the same sample compartment size.

"Overall size reduction of the UV-2600/2700 instruments was achieved by the use of Shimadzu's patented Lo-Ray-Light gratings and a re-design of the monochromator system," a Shimadzu product manager said.

With that double monochromator design and diffraction gratings, the UV-2700 achieves ultra-low stray light of 0.00005 %T at 220 nm. Its photometric performance range has been expanded to 8 Abs, with a transmittance value of 0.000001%. This eliminates the need to dilute samples and allows the measurement of low transmittance samples.

In addition, power consumption has been reduced to 170 VA for a 10-percent energy savings.

"A reduction in power consumption ... over the previous series of UV-visible instruments was achieved by incorporating modern surface-mount electronic technology in the design of the processing and control electronic hardware," a Shimadzu representative added.

Equipped with a single monochromator, the UV-2600 features a measurement wavelength range to 1400 nm, using the ISR-2600Plus two-detector integrating sphere. This ultra-wide range permits measurements in the near-infrared region, and expanded research of photovoltaics and other materials.

For more information, visit

http://www.ssi.shimadzu.com/products/product.cfm?product=uv2600_2700.

GC Column Range and Toolkit

BPX-BIOD

- Strong performance in achieving separations for biodiesel analysis
- All ASTM International and European National (EN) biodiesel methods have been evaluated to demonstrate the suitability of BPX-BIOD GC columns to achieve optimal separation



SGE Analytical Science
www.sge.com

Handheld EDXRF Spectrometer

xSORT

- Delivers grade identification and material verification within two seconds of clicking its trigger for metals and most alloys
- Offers exceptionally low detection limits
- Lightweight, compact design makes it easy to use in the field



SPECTRO

www.spectro.com



 **GILSON®**

Increase Productivity *Without Sacrificing Comfort!*

You asked, we delivered. PIPETMAN® L was designed with you in mind pairing legendary PIPETMAN robustness with new features to help you increase productivity and pipette longer without sacrificing comfort.

Lockable Volume Ensures No Accidental Volume Changes

Lightweight Body for Comfortable Pipetting All Day

Low Pipetting & Tip Ejection Forces



pipetman® 

www.PipetmanL.com

Restrictions apply. Void where prohibited by law or institution.

TN/TS Analyzer

iPRO 5000 Series

- Features an innovative direct injection design providing the capacity to analyze both heavy and light hydrocarbons without changing introduction modules
- Reduces the time spent from analysis to viewing results
- Ensures high accuracy, as well as reproducibility and repeatability



Thermo Fisher Scientific

www.thermoscientific.com

GC Column with SafeGuard

TraceGOLD

- Combines an analytical gas chromatography (GC) column with a built-in guard column
- SafeGuard feature extends the life of the analytical column without compromising its chromatographic performance
- Available in a range of guard column lengths and analytical column specifications



Thermo Fisher Scientific

www.thermoscientific.com

BASIC LAB

Fume Hoods

New 36" Deep Models

- The new 36" depth is available in AirClean Systems 3-, 4-, 6- and 8-foot wide folding-sash ductless fume hood models
- Use a unique gas phase bonded carbon filter which eliminates filter dusting and dead zones associated with traditional granular carbon filters
- Seamless polypropylene construction is chemically resistant and will not rust



AirClean Systems

www.aircleansystems.com

Ductless Fume Hood

PURAIR 5

- Exceeds OSHA, ANSI and all relevant international standards
- Ductless design eliminates installation costs
- Three models available with a choice of 24", 36" or 48" widths
- Operate at low noise levels
- Face velocity of 100 fpm ensures containment of fumes and particulates



Air Science

www.airscience.com

Test Tube Capper

Scienceware®

- Reduces finger soreness and hand stress
- Features a vinyl covered handhold that fits comfortably in the palm of the hand while a polypropylene tip presses down on the cap to securely position it within the test tube
- Capping can be performed on glass or plastic test tubes using recessed center test tube caps



Bel-Art Products

www.belart.com

Automated Lab Management System

Element ID

- Makes compliance with NELAP, ISO, and GLP easier by recording user badge, timestamp, and automatically identifying samples
- Allows users to create safety & environmental audit records
- Creates a paperless audit trail without adding time-consuming steps
- Ensures that each sample is tested within holding limits



Element ID

www.element-id.com

Water Purification Systems

PURELAB Flex 3 & 4

- Ensure accurate, consistent results
- Both systems deliver up to 10 liters of ultrapure water per day and up to 2 liters per minute
- The Flex 3 delivers ultrapure water direct from potable tap water and the flex 4 requires a pre-purified feed



ELGA

www.elgalabwater.com

Potentiometric Titrator

COM-1700

- Can run four titrations and stirrers that easily allow end user to do different types of titration
- Has reliable high-speed communications with no response time lag and results appear in real-time
- Compact design reduces bench space by 25 percent



JM Science

www.jmscience.com

Benchtop Meters

SevenCompact™

- For measurement of pH, ion concentration, ORP or conductivity
- Comes in pH/Ion S220 and Conductivity S230 models
- Easy to operate; menu guidance is available in 10 different languages
- Two display layouts available

Mettler Toledo

www.mettlertoledo.com



pH Buffer Standards

Traceable® One-Shot™

- 100% compatible with all instruments and probes
- Accuracy at 25°C is ± 0.010 pH
- Certified Reference Materials meet Federal/State/local agencies' strictest mandates and deliver exact calibration results for any pH meter



Control Company

www.control3.com

Supercritical Fluid Extractor

SFT-250

- Simple to operate and easy to modify for evolving applications needs
- Extraction vessel is forged from durable stainless steel; vessels can range in size from 100 mL to 5 liters
- Includes a wide range of operations pressures (up to 10,000 psi) and temperatures (ambient to 200°C)



Supercritical Fluid Technologies

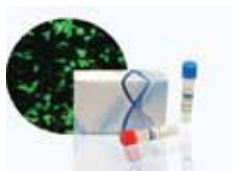
www.supercriticalfluids.com

CHEMICALS, KITS & REAGENTS

Transfection Reagent

Genel™

- Designed to transfect stem cells and primary cells
- Provides excellent transfection efficiency with minimum cytotoxicity
- Formulated from proprietary compounds that are chemically defined and are of animal-free origin
- Offers minimal optimization to achieve superior expression results



AMSBIO

www.amsbio.com

DNA & RNA Isolation Kits

MO BIO

- Developed specifically for use with biofilms
- Full range of nucleic acid isolation and purification products in mini, midi, maxi and 96-well formats available
- Provide a typical yield of over 95%
- Contain everything needed for analysis



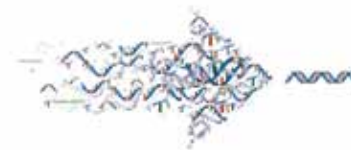
Cambio

www.cambio.co.uk

Enzymatic PCR Clean-Up Kit

illustra™ ExoStar

- Provides a high performance and cost effective product for the enzymatic removal of unincorporated primers and nucleotides from PCR and sequencing reactions
- Enables efficient primer digestion with no degradation of target PCR products
- Contains two enzymes that have been expressly designed to work together



GE Healthcare

www.gelifesciences.com

Cytoskeleton Enrichment Kits

ProteoExtract®

- Enables enrichment of cytoskeleton-associated proteins in as little as 20 minutes
- Maintains actin cytoskeleton and associated proteins in their native, adhered conformations
- Significantly reduces background signal, while allowing for improved detection of low-abundance cytoskeleton-associated proteins



EMD Millipore

www.millipore.com

SPE Solutions

Servo and Servo+

- Enable analysts to isolate drug compounds from complex biological samples
- Servo offers a fast and effective resource for high sample throughput
- Servo+™ provides greater selectivity, higher loading capacity and increased robustness
- Are a complete workflow enhancement for dealing with difficult sample matrices



Thermo Fisher Scientific

www.thermofisher.com

LAB AUTOMATION

Vial Handling Instrument XL100

- Decaps and recaps vials for downstream processes
- Performs data collection of sample ID and volume of incoming samples
- Consolidates racks of sample tubes to save space in freezers
- Rearranging sample tubes for efficient liquid handling operations
- Weighs tubes for sample volume tracking



BioMicroLab

www.biomicrolab.com

Automated Aliquoting Liquid Handler CV2000

- Enhances laboratory efficiency through workflow automation
- Can accurately dispense liquid volumes from 100-875 μ L and process up to 1000 samples per hour
- Compatible with a wide variety of sample management software, but can also be used as a stand-alone instrument



Thermo Fisher Scientific

www.thermofisher.com

High-Throughput Targeted Sequencing System

ThunderStorm™

- Enables researchers to process 96 samples per day
- Quickly generates high-quality data
- Supports a range of targeted sequencing applications
- Simultaneously processes millions of individual single molecule PCR reactions by encapsulating each reaction in separate aqueous droplets



RainDance

www.RainDanceTech.com

PRODUCT SPOTLIGHT

PREVENT HUMAN ERROR AND STRESS

AUTOSAMPLER PROVIDES RELIABLE UNATTENDED OPERATION

Designed to provide exceptional repeatability and reliability, Thermo Fisher Scientific's TriPlus™ RSH Autosampler delivers high-quality analytical results and features precise built-in automation to improve productivity and prevent human mistakes.

Thermo's new system also offers unattended operation over the weekend.

"The majority of autosamplers available will complete running the available sample positions within 24-36 hours after the sequence begins," said Massimo Santoro, Thermo's GC Product Manager. "This translates in the whole system (usually consisting of an autosampler, GC and mass spectrometer) being idle and not producing data for up to a day and a half during weekends. For some laboratories, this represents a big loss in terms of productivity and often money."

He added Thermo's new autosampler enhances productivity and versatility of laboratories running multiple methods requiring different injection techniques.

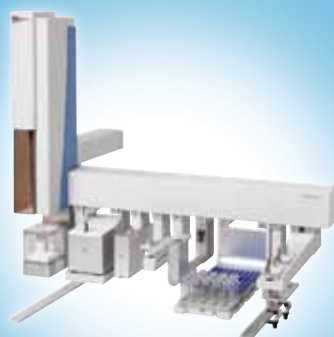
"Its extended sample capacity and innovative capability of changing injection technique while unattended during a single sequence allows the running of, for example, liquid samples followed by headspace or SPME injections," Santoro said of the machine.

There are also several other features users are particularly pleased with so far.

"Early-adopters are impressed by the system's unique ability to handle low-sample volumes (as low as 5 microliters), providing reliable and dependable results," Santoro said. "This, for example, allows food, environmental and forensic laboratories performing trace analyses to achieve higher sensitivities, while also saving precious and expensive internal standards."

The system saves time and prevents those potential human errors, thanks to its ability to automatically perform some standard and sample preparation, such as internal standard addition or dilutions and derivatizations, Santoro added.

For more information, visit: www.thermoscientific.com



LIFE SCIENCE

Antibody Panels

Custom Design Services

- Work with a wide variety of proprietary or customer-supplied human and non-human antibodies
- Two- to 10-color panels can be composed using a comprehensive array of fluorochromes to meet specific experimental requirements
- Panels are packaged in exclusive black vials to protect against photobleaching



Beckman Coulter

www.beckmancoulter.com

Isoelectric Focusing (IEF) System

PROTEAN® i12™

- Designed to simultaneously run up to 12 immobilized pH gradient (IPG) strips in 12 independently programmed lanes
- Controls lanes separately, allowing researchers to set precise current limits for each lane
- Allows researchers to test several optimization conditions simultaneously and run samples from different experiments together



Bio-Rad

www.bio-rad.com

Lentiviral Biosensors

LentiBrite™

- Pre-packaged lentiviral particles containing GFP- & RFP-tagged proteins of cell structure, autophagy, apoptosis and neuroscience
- Detects the presence or absence of proteins and their subcellular location in live cells
- Enables real-time visualization and tracking of protein movement



EMD Millipore

www.millipore.com

One-Step RT-qPCR System

GoTaq®

- Gives a brighter signal for earlier quantification of low and high copy RNA targets
- Compatible with all real-time PCR instruments in both fast and standard cycling conditions
- Engineered to enable simple reaction setup and provide consistently efficient, sensitive, broad range and robust performance in all standard or fast instrument platforms



Promega

www.promega.com

CMOS Camera

Rolera Bolt

- Designed for low-light imaging
- Features an aggressive price point
- Includes a high quantum efficiency 1.3 mega-pixel sensor (3.63 μm x 3.63 μm pixel size) combined with low read noise ($\sim 3e^-$) and high-speed (30 fps full resolution) simultaneous readout



QImaging

www.qimaging.com

Online qPCR Tool

OligoArchitect™

- Simplifies compliance with Minimum Information for Publication of Quantitative Real-Time PCR Experiments (MIQE) guidelines
- New features include primer and probe homology searching, template secondary structure analysis, the ability to design across exon splice sites, and more
- Free, robust design tool is easy to use for both novices and experts

Sigma Life Science

www.sigma-aldrich.com

Microplate

$\mu\text{Drop}^{\text{TM}}$

- Allows quick and easy measurement of samples down to 2 μL
- Provides a straightforward way of analyzing up to 16 microliter-scale samples simultaneously
- Lets users detect dsDNA from a few micrograms to a few milligrams per milliliter, without needing to perform any dilutions



Thermo Fisher Scientific

www.thermofisher.com

LIMS & SOFTWARE

Chemistry Applications

Cheminformatics Suite

- Allows users to register, search, mine and analyze information on chemical structures and reactions, chemically modified sequences and associated data
- Features an all-new web-based chemical registration system
- Includes HEOS® by SCYNEXIS, a proven Software-as-a-Service (SaaS) workspace that supports real-time data sharing across multiple organizations

Accelrys

www.accelrys.com

ADME/Tox Software

Percepta

- Accurately predict physicochemical properties, ADME characteristics, and toxicity endpoints
- Optimize candidate characteristics and endpoint with Structure Design tools
- Easily share and report data with streamlined interface



Advanced Chemistry Development Inc. (ACD/Labs)

www.acdlabs.com

Informatics Software

KnowItAll 9.0

- Includes unlimited spectral range and resolution feature
- Allows users to store spectra in a user database at the precise range and resolution at which each spectrum was measured
- Features new structure drawing tools to comply with IUPAC structure drawing guidelines
- Provides higher resolution spectra in HavelItAll® IR, NIR, Raman database subscriptions

Bio-Rad Laboratories

www.bio-rad.com

Flow Meters/Controllers Software

BSI 0260

- Provides a turnkey solution for monitoring and controlling up to 30 mass flow meters or mass flow controllers
- Eliminates the need for multiple secondary electronics boxes
- Software allows users to display the full-scale flow rate and measured flow rate
- Includes the ability to create automated process recipes

Brooks Instrument

www.BrooksInstrument.com

Calorimetry Software

MicroCal™

- Enables early characterization of the stability of molecules in solution
- Minimizes the data analysis bottleneck and simplifies experiment design and setup
- Provides a single, intuitive graphical user interface for selecting and entering all sample and experiment run parameters

GE Healthcare

www.gehealthcare.com

ADME LIMS

Debra 6

- Users can import both current and legacy Version 5 study data for further reporting, PK analysis, pooling of samples and metabolite profiling
- Allows the consolidation of all data into a single database
- Barcode label printing facility now includes 2D barcodes that can carry much more information

LabLogic Systems

www.lablogic.com

LIMS

Scientific Water and Environmental

- Allows users to establish protocols and documentation methods that meet NELAC compliance requirements and ISO 17025 guidelines
- Automates reports and records to ensure full traceability
- Improves lab and workflow efficiencies



Thermo Fisher Scientific

www.thermoscientific.com

SUPPLIES & CONSUMABLES

Pipette Tips

BRAND

- Feature a patented surface treatment which makes them extremely liquid repellent
- Provide a highly homogeneous surface free of defect sites, preventing nonspecific binding
- Available in nano-cap™, ultra-micro, 200µL, 300µL, 1000µL and 1250µL, non-sterile, BIO-CERT® sterile, and Filter tip BIO-CERT® sterile versions



BrandTech® Scientific

www.brandtech.com

Solvent-Resistant Labels for HPLC Columns

CILS-8200S Series

- Designed to permanently adhere to all surfaces and withstand aggressive HPLC cleaning agents
- Printable straight from a standard desktop printer
- Variable data (batch numbers, barcodes etc) can be added 'at the click of a button'



CILS International

www.cils-international.com/usa

Reagent Reservoir System

VIAFLO

- Economically and environmentally friendly due to reusable base
- Unique design enhances the visibility of the selected volume line
- Pour back spouts control liquid flow and enable easy, spill-free return of excess reagent into its original container
- EZ Peel paper lids ensure sterility with less expense and waste



INTEGRA

www.integra-biosciences.com

Cell Culture Flasks

TC Plastics

- Allow cells to adhere more efficiently to the surface
- Ensure perfect visualization every time
- New features include molded graduations in the flask walls, opaque areas for laboratory markers and sector division marks on the dishes
- All products free from DNA/RNA, DNase/RNase and Pyrogen contamination



Porvair Sciences

www.porvair-sciences.com

2D Barcoded Tubes

Matrix Amber

- Available in 0.5 and 1.0 mL sizes
- Sterile, DNase/RNase-free
- Safeguard samples from potentially detrimental ultraviolet (UV) light while still allowing users to gauge liquid levels inside the tube
- Work with 2D barcode readers, handheld de-cappers, freezer racks and automated instruments



Thermo Fisher Scientific

www.thermofisher.com

Permeation Tubes

Dynacal®

- At a constant temperature, the device emits the compound through its permeable portion at a constant rate
- Accurate, stable concentrations range from PPB to high PPM
- Rates can be certified using standards traceable to NIST
- Useful for any situation requiring a stable concentration of a specific trace chemical



VICI Metronics

www.vicimetronics.com

Sample Vials

TruView™

- Certified for LC/MS/MS analyses where analyte concentrations are on the order of ng/mL or pg/mL and where analytical sensitivity and accuracy are critical
- Manufactured under tight controls using a proprietary process that limits the concentration of free ions on the surface of the glass
- Dramatically lowers analyte adsorption



Waters

www.waters.com



GET Connected



PITTCON
CONFERENCE & EXPO
ORLANDO • MARCH 11-15 **2012**

PITTCON,
the world's largest annual
conference and exposition
for laboratory science...

Offers a unique opportunity to get a hands-on look at the newest instrumentation from nearly 1,000 exhibitors. Get connected with experts in your field while learning about the latest scientific developments presented in a diverse Technical Program, high-quality Short Courses, and interactive Conferee Networking Sessions.

**Orange County
Convention Center
Orlando, FL, USA**

Visit www.pittcon.org.



Sample Security in CO₂ Incubators

Problem: Contamination in cell culture is a time-consuming, costly and ongoing problem. Research can be invalidated, valuable cell lines lost and weeks and even months of work ruined. Many labs have rigorous processes in place to protect cells, yet still have occasional problems with contamination. As important as processes are, the incubators used to house cultures should be designed to perform in ways that protect samples and allow them to flourish.

Solution: It should be noted that concern about contaminants and requirements for level of protection depend on the sample and experiment. Are you culturing pond water for the presence of *E. coli*, or growing an irreplaceable line of cancer cells? In this article, it will be assumed that the highest level of sample security is required.

Incubator interiors provide an environment in which atmosphere, temperature and humidity interact to provide a suitable place for cells to grow. Unfortunately, the conditions that make research samples happy are also conducive to the growth of contaminants such as mycoplasma.

Seamless interiors are preferred in the incubator's construction. Seams and rough spots from the manufacturing process provide all that is needed for infectious agents to avoid wipe downs and cleanings and to gain a foothold in the incubator. Shelves, probes, ports and all additions to the interior should be incorporated in a way that makes cleaning easy and leaves little to no room for infections to establish themselves.

HEPA filters do catch some airborne contaminants (although most contaminants are not airborne) but they also harbor the very organisms they snare. They can be expensive and time-consuming to change and disposal can be costly if infectious agents are involved. Consider the level of threat airborne contaminants pose and the ways other incubators deal with this. If your incubator has a HEPA filter, do change it regularly.

The way gases are mixed and introduced can have an impact on environmental conditions throughout the chamber. Premixing before injection provides greater control and distributes gases evenly throughout the

chamber. The proper gas mixture is also critical in maintaining pH, a vital factor in cell health.

Interior heating by water or air jackets should provide uniform temperatures



A seamless interior and an inner glass door are features that help maintain a healthy environment for cells in culture. Photo courtesy BINDER Inc.

throughout the chamber, and maintain temperature consistently. Be wary of units that have hot spots, in which heating elements contact the chamber.

Doors should seal tightly and be easy to open and close. Locks prevent accidental openings. Inner doors should be used to reduce exposure of the chamber to outside conditions. It is helpful to organize and plan the location and number of plates being accessed and what will be done with them before accessing the chamber. This will limit the amount of time the door is open and thus provide a more stable environment.

The CO₂ sensor and the technology it uses are extremely important in determining the stability of the environment. Look for a model that provides the desired degree and kind of control; for most cells, more is better. Sensors also help the incubator return to set-point after a door-opening, and thus, sensitivity and responsiveness are paramount.

Humidification is tricky. While cells like varying degrees of humidity, pooled

water on culture dishes or in corners of the incubator can play host to unwanted and potentially harmful organisms. It is important that not only is the proper amount of humidity maintained, but that the resulting condensation is controlled. Different incubators try to accomplish this in varying ways, but directing condensation to a pan in the bottom of the unit that is easy to remove, sterilize and replace is optimal.

Available incubators offer various levels of self-cleaning. Disinfection temporarily eliminates or inactivates infectious agents; decontami-

nation is the elimination or irreversible inactivation of all pathogenic germs; sterilization inactivates or eliminates all vital microorganisms. Those incubators that do not offer sterilization cycles will have a decontamination cycle or must be manually disinfected, an imprecise and time-consuming chore. A self-sterilizing incubator offers many and obvious advantages and ensures the best possible conditions for incoming experiments.

For more information, visit www.binder-world.com or contact David Craig, North American sales manager for BINDER, at David.Craig@binder-world.com.

NOR-LAKE® SCIENTIFIC

LABORATORY AND SCIENTIFIC EQUIPMENT

For Life Science, Hospital, Clinical, Biomedical, Scientific and Industrial Applications

Environmental Rooms Stability Chambers

- Suitable for Research, Biological Studies, Shelf Life, Stability Testing, Blood and Plasma Storage, and General Life Science Applications

- Mini-Rooms Available in standard Sizes and Temperature Ranges



- Custom Rooms Available to Suit Specific Storage and application Requirements
- Modular Construction for Easy Installation and Relocation
- Available Microprocessor Controllers, Alarms, Monitors, Temperature and Humidity Chart Recorders, Shelving, Ramps, Lighting, Humidification and Dehumidification



Nor-Lake® Scientific Stability Test Chambers BOD Refrigerated Incubator CO₂ Incubators Lighted Chambers Warming Cabinets

- Various Models with Temperature only or Temperature and Humidity Control
- Available with 1, 2, and 3 Doors with 24, 33, 52 & 80 ft.³ storage capacity
- Programmable Microprocessor Controller, LCD Digital Display, Hi/Lo Audible & Visual Alarms with Remote Alarm Contacts, Key door lock, casters, Shelves, Stainless Steel Interior
- Options: Chart Recorder, Access Port, Internal Electrical Outlet, Extra Shelves, RS485, Stainless Steel Exterior
- UL, CUL Listed



Nor-Lake® Scientific Select™ and Premier Laboratory & Pharmacy Refrigerators and Freezers

- Available in 1, 2 and 3 Glass or Solid Door Models with 24, 33, 52 & 80 ft.³ Storage Capacity
- Pass-Thru: Chromatography - and Sliding Glass Door Models Available
- Microprocessor Controller, Digital Display, Hi/Lo Audible & Visual Alarms with Remote Alarm Contacts, Key Lock Doors, Shelving, Casters
- Options: Internal Electrical Outlet, Temperature Recorder, Stainless Steel Interior and Exterior, Access Ports, Drawers
- UL/CUL Listed



Nor-Lake® Scientific Undercounter Refrigerators, Freezers Combination Refrigerator/Freezer

- Models available for +4°C, -20°C & -30°C temperature ranges for general purpose, blood or plasma storage
- UL, CUL Listed



Nor-Lake® Scientific Blood Bank Refrigerators Plasma Freezers

- Meets AABB, ANRC and FDA Blood Storage Requirements
- Available in 1, 2 and 3 Glass Door Models with 24, 33, 52 & 80 ft.³ storage capacity
- Microprocessor Controller, LCD Digital Display (Air and Product) Password Protection, Hi/Lo Audible & Visual Alarms with Remote Alarm Contacts, Temperature Chart Recorder, Drawers, Glass Doors, Key Lock Doors, Casters
- UL/CUL Listed



NORLAKE® SCIENTIFIC

727 Second Street
Hudson, WI 54016
800-477-5253
715-386-2323
715-386-4290 FAX

www.norlakescientific.com



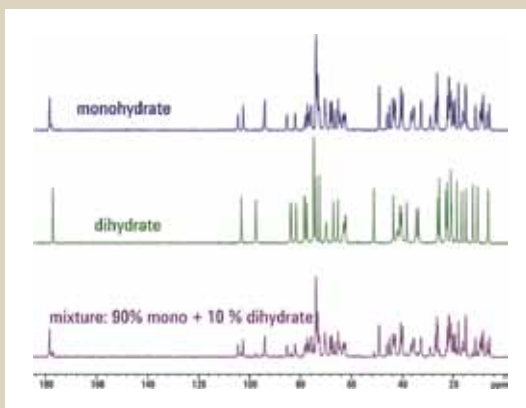
NMR in Pharmaceutical Analysis

Problem: Crystallization is the most common method used for final purification and isolation of the active pharmaceutical ingredient, or API, when synthesizing a drug at commercial scale. Molecules can and do adopt more than one type of crystal structure upon precipitation. These different crystal structures are known as polymorphs when they differ only in the relative orientation of one molecule to another, or pseudopolymorphs when there is a change in the chemical make-up of the unit cell, such as the inclusion of a different number of solvent molecules or a different counter ion.

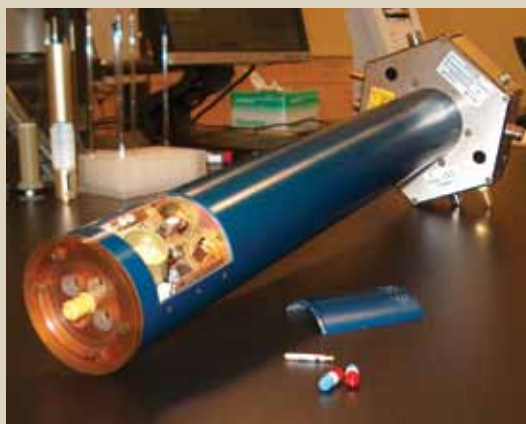
While the formation of more than one polymorph is not a big concern when the only desire is to isolate a pure substance, the physical properties associated with two different crystal forms are usually different. This can cause serious issues in the pharmaceutical industry where changes in chemical stability, the proclivity to absorb water, the rate of dissolution, etc., are required to be measured, understood, and controlled for any marketed drug. The situation gets even worse when one considers that manufacturing processes such as milling, mixing, pressing and drying can cause a compound to change its polymorphic state. Just testing for the desired polymorph in the bulk drug substance used to start the manufacturing process isn't good enough to control the polymorphic state of the final product.

Characterization of pharmaceutical polymorphs also plays an important role in the procedures of legal approval for novel drugs.

Solution: Because the packing energy and close contacts are unique for each different crystal form of the same compound, the electronic environment for each atom is also unique. Nuclear Magnetic Resonance (NMR) spectra are exquisitely sensitive to changes in the



▲ Solid-state NMR spectra for monohydrate and dihydrate pseudopolymorphs of a sample analyte
SAMPLE COURTESY - APL RESEARCH CENTRE, HYDERABAD, INDIA



▲ Shown is a NMR probe (blue component) alongside a rotor (white oblong piece in foreground) containing the sample. Two capsules typical of the types of substances that would be tested this way are shown for perspective. The rotor is inserted into the probe, which is then lowered into the center of the solid-state system's magnet for analysis.

local electronic environment around every NMR active atom in a molecule. Changes in the NMR resonance frequency even as small as 1 part per billion are readily detected. If molecular crystal has more than one unique asymmetric position of the molecules in the crystal structure, then NMR lines are likely to split according to the number of magnetically non-equivalent molecules, providing a unique NMR spectrum for every polymorphic form.



▲ Typical solid-state NMR equipment. Shown is the 600 MHz NMR system with Direct Drive 2 console, an Agilent solid-state NMR machine.

This sensitivity to local structure makes solid-state NMR the definitive tool for testing and measuring the polymorphic state of pharmaceutical compounds. Each polymorph yields a distinctive spectrum that can be used as a fingerprint for that specific crystal form. When combined with quantitative solid-state NMR experiments, this technique can be used to directly investigate drug substance or drug product materials, up to and including the final pills, for polymorphic integrity.

As seen in top graphic, the solid-state NMR spectra

collected for the monohydrate and dihydrate pseudopolymorphs of the analyte are distinctly different. It is easy to distinguish the presence of both forms, a 90/10 mixture of the two and, as all NMR signals yield a unit response factor, quantification of such mixtures is robust and reliable.

For more information, visit www.chem.agilent.com.



1st annual CONFERENCE & EXHIBITION

Short Courses: February 4–5
Conference: February 6–8
Exhibition: February 6–7



San Diego Convention Center
San Diego, CA, USA | February 4–8, 2012

Scan the code with your smart phone
to go directly to SLAS2012.org.

SLAS2012: Collaborate | Innovate | Dominate

Collaborate with 5,000+ innovative scientists, engineers, researchers and technologists from academic, government and commercial laboratories around the globe to **inaugurate** the First Annual SLAS Conference and Exhibition in San Diego, CA, February 4–8, 2012.

Stimulate your scientific creativity through 130+ outstanding educational presentations. **Investigate** new and emerging technologies from 275+ exhibitors. **Calibrate** your personal goals, **accelerate** your professional success and **dominate** the field of laboratory science and technology.

The SLAS2012 Scientific Program Crosses a Diversity of Industries:

- Drug Discovery and Development
- Clinical Diagnostics
- Food and Agricultural Sciences
- Forensics and Security Sciences
- Petrochemicals and Energy
- Consumer Products

SLAS2012 Educational Tracks:

- Assay Development and Screening
- High-Throughput Technologies
- Drug Target Biology
- Micro- and Nanotechnologies
- Bioanalytical Techniques
- Informatics
- Diagnostics

Annual Conference Program Committee Co-Chairs:

- Daniel Sipes, M.S.
*Genomics Institute of the
Novartis Research Foundation*
- Frank Fan, Ph.D.
Promega

Premier Sponsor:  **Agilent Technologies**

View the Complete Preliminary
Program and Register to Attend
at **SLAS2012.org**

slas 2012 MOVE TO THE MOMENT

What's Moving You to SLAS2012?

"I really value the sense of community that SLAS fosters and meeting colleagues I have known through the years. Of course the scientific program and the exhibition are also key components of the event; I look for new technologies to help with my work."

*Marcie Glicksman, Ph.D., Co-Director
Laboratory for Drug Discovery, Harvard
NeuroDiscovery Center, Neurology,
Brigham and Women's Hospital*

Full Listing of Scientific Sessions at SLAS2012.org

View the full listing of scientific sessions comprising the powerful SLAS2012 scientific program, now online in the SLAS2012 Preliminary Program. In addition, look for details on the exhibition, strategic alliance meetings, SIG offerings, career advisory and networking events, student workshops and special sessions, awards programs, exhibitor workshops and tutorials, networking events and social activities that make up SLAS2012 @Night, and so much more.





LIMS in Translational Science

Problem: Translational science is a relatively simple concept. By taking a targeted point of view, the biomedical community can translate what it has learned in the laboratory into the diagnosis and treatment of patients. However, while this bench to bedside method will provide future innovative and personalized medical treatments, there are still challenges today. For information to be translated from the clinic to the laboratory and back again, researchers and clinicians have to work together and share information from pharmaceutical and biotechnology companies, hospitals and academia. The growing amounts of data associated with this research have posed great challenges for laboratory information management.

Translational research is conducted across a variety of locations, involving collaboration between many different types of labs, including research hospitals and academic consortiums, clinical testing, contract research and pharmaceutical companies. The data management needs at each of these organizations are unique as the work being done to improve human health differs greatly. Hospitals need to ensure that the patient's needs come first during the study, academic consortiums want to ensure that they are doing novel research, CROs need to ensure quick turnaround of samples, and pharmaceutical companies need to ensure they are gathering all the information necessary to ensure their drug candidates are safe and effective. Despite such differences, when involved in translational research studies, each organization has the common need to perform sample collection and analysis that will yield quality samples and results, ultimately leading to new advancements in personalized medicine.

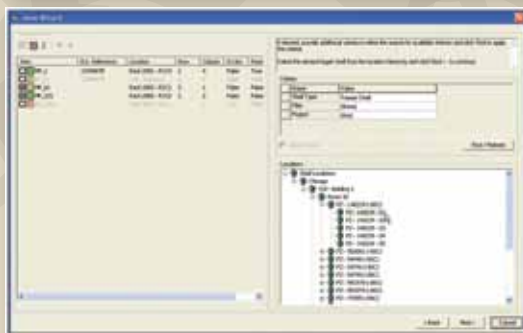
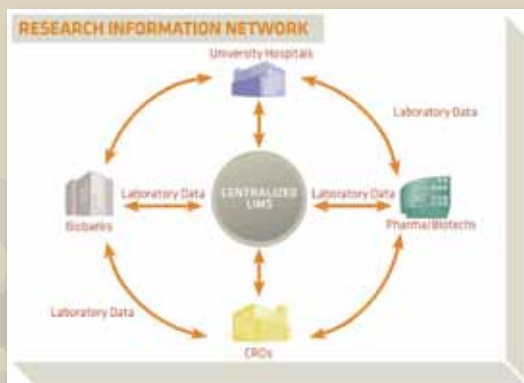
With the unique working environments, laboratory workflow and data management needs at each organization, it can be difficult to manage all the data and people involved in such collaboration in order for proper results to be communicated to the correct audience at the correct time.

Solution: A laboratory information management system (LIMS) is able to address all of these challenges. Doctors and nurses are able to find the samples to collect and process in an intuitive manner. This enables them to focus on the patients and follow the study protocol. With biospecimens, traceability is critical. Once the sample reaches the laboratory, the LIMS tracks and displays the location of every sample, and is able to monitor their parent-and-child relationships from the freezer to individual plate well. All information that has been collected on either the primary sample or any of its aliquots is linked and can be viewed in the system. It also monitors equipment and personnel in the laboratory, enabling scientists to better prioritize workloads and improve turnaround time. Once final results are collected, information is visible across the study, allowing for real-time trending of study results for sponsors and principle investigators locally or from remote locations.

When a single LIMS deployment is used across a wide variety of research teams, users across multiple sites can access data at any time, allowing disparate groups within a research environment to work and share information. The connectivity between data sources results in a centralized approach to administration, offering great economies of scale for research organizations. A LIMS is a vital part of the integration efforts that result in collaboration between all participants in a study. Of course, all access in the system can be controlled to ensure that data is only seen by the appropriate team members. This allows one system to be used internally and with multiple collaborators.

Translational science is an evolving science, and one of the key challenges is how to balance the best possible patient care with furthering science in clinical research. LIMS is a critical tool for combining the needs of these different objectives.

For more information about Thermo Scientific Informatics solutions, please call +1 866 463 6522 (US), +44 161 942 3000 (Intl) or email marketing.informatics@thermofisher.com or visit www.thermoscientific.com/informatics



◀*Translational science is reliant on the integration of informatics solutions with other technologies and instruments and a LIMS can enable organizations to overcome barriers, communicate and share valuable information with other areas.*

◀*Samples often move between the hospital and the pharmaceutical company during the study. Thermo Scientific Nautilus LIMS tracks samples from the building, to the freezer shelf, down to the individual well position of the plate.*

Know why Metrohm titrators are lab favorites?

Because they give you everything you want, and do everything you need.

WHAT YOU NEED:

- Precision — check
- Accuracy — check
- Reproducibility — check
- High quality — check

WHAT YOU WANT

- Ease of use — check
- Affordable — check
- Reliable — check
- Great support — check

Metrohm has long been pioneers in ion analysis; in fact, our piston burette of 1956 laid the foundation for automatic titration (a design that's still in use today), and we've been innovators and groundbreakers in the field ever since.

We offer a full line of titration systems — from simple, stand-alone units to fully automated, high-capacity models. You'll find them hard at work in any testing lab, in any industry.

FOR TITRATIONS THAT ARE BASIC AND BEYOND, WE'RE SURE TO HAVE THE PERFECT MODEL FOR YOU:

- Titrimo Plus models are great for labs where the techniques are basic or budgets are tight
- Titrimo models are the best of the best: packed with convenience features, these "intelligent" systems practically run themselves!
- Thermometric titrators are ideal for difficult sample and matrices — and if you need TRUE sodium numbers, these guys are worth their weight in salt!
- New conductivity titrators handle the most difficult to measure endpoints
- And when productivity and throughput rule your day, there's Metrohm automation to speed your work and ease your load

Introducing the new Ti-Touch titrators for routine analysis.

Taking simplicity to a whole new level, never before has such a little titrator offered so much convenience! Simplicity for other brands may mean basic, but these models are far from that. What we mean by simplicity is a titrator that makes your work simple, yet still offers you the best that technology has to offer. Two models are available for Karl Fischer and potentiometric analyses.

KEY FEATURES OF TI-TOUCH INCLUDE:

- Truly compact and space-saving footprint
- Complete network integration — WITHOUT a PC
- 14 user-defined programmable shortcuts
- Built-in intelligence — smart components that track and monitor key parameters for you
- Contact-free reagent exchange in our KF model ensures your safety
- Safety-stop function even prevents the titration cell from overflowing during conditioning in KF mode
- Rugged, chemical-resistant housing and touchscreen display — requires no replacement film and is very easy to clean

 **Metrohm**
USA Inc.

6555 Pelican Creek Circle
Riverview, FL 33578
866-METROHM (638-7646)
www.metrohmusa.com



See our complete line of titrators
at www.metrohmusa.com

Marketplace

Caframo

High Torque Stirrers
A Cosmetics Lab Essential



www.caframo.com/cosmetics (800) 567-3556

SONNTEK – “STAY FOCUSED”

Still the *Best Selection of*
Research Lamps *Anywhere!*

201-236-9300
www.sonnitek.com
sonnitek@aol.com

www.labwrench.com

**Ask
Questions**

**Post
Answers**

Lab Equipment Troubleshooting,
Recommendations, Tips and Tricks



LabWrench
Lab Equipment Information and Discussions.

ADVERTISER INDEX

Company	URL	Page	Company	URL	Page	Company	URL	Page
Adam Equipment Inc.	www.adamequipment.com	6	GenTech Scientific, Inc.	www.gentechscientific.com	89, 91	Nor-Lake Scientific	www.norlake.com	83
AirClean Systems, Inc.	www.aircleansystems.com	37	Gibson, Inc.	www.PipetmanL.com	75	NuAire Inc.	www.nuaire.com	69
Aqua Solutions, Inc.	www.Aqua4.com	13	Globe Scientific, Inc.	www.globescientific.com	65	Pittcon	www.pittcon.org	81
Aries Filterworks	www.ariesfilterworks.com	23	Horizon Technology Inc.	www.horizontechnic.com	30, 31	Proton Onsite	www.protononsite.com	43
BINDER Inc.	www.binder-world.us	55	IKA Works	www.ika.com/uttd_en	27	RDM Industrial Products, Inc.	www.labspace-solutions.com	34
BioSurplus, Inc.	www.biosurplus.com	89	JM Science Inc.	www.jm-science.com	56	SANYO Biomedical	www.greenfreezers.com	9
BrandTech Scientific, Inc.	www.brandtech.com	25	KNF Neuberger Inc.	www.labpumps.com	35	SHEL LAB	www.shellab.com	51
Caframo Limited	www.caframo.com/cosmetics	88	Lab Manager Magazine	www.labmanager.com	41, 47, 63, 70	SLAS	www.SLAS2012.org	85
Conquer Scientific	www.conquerscientific.com	89	LabWrench	www.labwrench.com	88, PRG	Sonnitek, Inc.	www.sonnitek.com	88
ELGA LabWater / Veolia Water	www.vwr.com/elga	3	LabX	www.labx.com	44, 89, PRG	Terra Universal, Inc.	www.terrauniversal.com	57, 92
EMCO	www.emcohighvoltage.com	71	Marvel Scientific	www.marvelscientific.com	11	Thermo Fisher Scientific Inc.	www.thermoscientific.com	17, 39, 61
EquipNet, Inc.	www.equipnet.com	89	Metrohm USA, Inc.	www.metrohmusa.com	7, 87	Universal Electric	www.uecorp.com/raceway	2
Erlab, Inc.	www.captair.com	21	Mettler Toledo Inc.	www.mt.com	5, 44, 49	W.A. Hammond Drierite company	www.drierite.com	19

Pre-Owned Equipment Marketplace

BIG

SAVINGS ON

LabX

AUCTIONS, CLASSIFIEDS & NEW PRODUCTS

BUY & SELL ON LABX TODAY

LabX

AUCTIONS, CLASSIFIEDS & NEW PRODUCTS

**BUY & SELL EQUIPMENT • ONLINE AUCTIONS
NEW PRODUCT INTRODUCTIONS • GREAT DEALS**

Register today to run ads, bid in LabAuctions, or contact buyers and sellers. LabX showcases over 190,000 listings of new, surplus and pre-owned lab equipment and supplies. Visit LabX today and get the product you've always wanted NOW!

WWW.LABX.COM



**Why not buy peace of mind?
Analytical Instruments with:**

- Warranty
- Installation
- Telephone Support
- Custom Training
- Technicians on Staff
- Hard to Find Parts

**sales@gentechscientific.com
(585) 492-1068**

GenTech
www.GenTechScientific.com
"Discover the Difference"
ANALYTICAL INSTRUMENTS
SALES, SERVICE, PARTS, TRAINING



Conquer
scientific

**Save up to 90% on
pre-owned instruments**



and more...

877-9CONSCI

www.ConquerScientific.com



EQUIPNET

www.EquipNet.com 888.371.6555
Sales@EquipNet.com 781.821.3482

PRE-OWNED LABORATORY & ANALYTICAL EQUIPMENT

EquipNet, Inc. runs the largest online Marketplace™ for pre-owned lab & analytical equipment in the world. We provide world-class manufacturers with software, inventory and appraisal services that facilitate the management of their idle assets.



US • Canada • Puerto Rico/Latin America • Europe • India • Asia/Pacific

**HAVE A LAB YOU
ARE NOT USING?**

**We can auction.
We can buy.
We can consign.**



Call or email us with your list of equipment.

BioSurplus
Maximizing Equipment Value for Life!

**Phone: 858-550-0800 x207
Email: sellyoursurplus@biosurplus.com**

PARTING POINTS

Takeaways from this month's issue:



CHANGING SPACES

Over the last decade, traditional office and R&D designs have failed to serve new business models and employment arrangements; the results have been visible at the bottom line of balance sheets. The real bottom line is that better workplaces make for better business. Workplaces achieving the best results:

- Have been designed with valuable innovations in workplace design
- Incorporate natural daylight and views
- Use lots of wide open spaces
- Encourage interaction and teamwork

10



38

LEED THE WAY TO SAFETY

We have written previously on LEED (Leadership in Energy and Environmental Design), the U.S. Green Building Council's certification program for green buildings. Here, the Safety Guys look at some of the potential health and safety issues involved when building green, such as:

- Forgetting about health and safety with the focus on being green
- Safety considerations for construction workers
- Requirements the building must meet for occupant safety
- Need for industrial hygienists and IEQ experts to be involved



54

THE PATENT BUSINESS

Patents are more than just boring legal documents. They are the links between the legal processes and research and development and can be used for many important business purposes beyond just protecting new inventions. Patents can:

- Give more information about an invention than other sources
- Provide clues to competitors' business strategies
- Determine whether others' patent rights may impact a company's business plans
- Guide future research



62

ASK THE EXPERT

James Gibson, Ph.D., Director of the Office of Environment, Health and Safety (EH&S), and Nancy Wayne, Ph.D., Professor of Physiology and Associate Vice Chancellor for Research at the University of California, Los Angeles (UCLA), discuss the UC Center for Laboratory Safety. They focus on:

- Why the center was created
- What types of studies they will design
- How lab safety has changed over the past five years
- The center's future plans



66

PERSPECTIVE ON: A FOOD TESTING LAB

Developers of analytical instrumentation for food labs are constantly being kept on their toes—foremost by the competing technical advancements and expanding market demands inherent in their business, among other things, including:

- Changing and more stringent regulatory requirements worldwide
- Increased testing
- A move to mass spectrometric methods
- Chemical and biological risks to food safety

Agilent 5975 Inert GC/MSD

GenTech Certified with ONE (1) YEAR WARRANTY

- Agilent 5795 inert MSD with LAN
- Agilent 6890N GC with S/S injector
- Electronic Pressure Control
- Fast Ramp GC Oven
- Mass range of 10-1050 amu
- Heated EI Ion Source
- Heated Transfer line
- Monolithic Hyperbolic Quadrupole Mass Filter
- Up to 10,000 u/s Scan Rate
- Brand New Mechanical Pump
- High Performance Turbo Pump
- G1701 Data System
- Installation



Item #: 10268

Teledyne Tekmar Stratum

Purge & Trap—Item #: 10707

Features Inert Heated Sample Path, Mass Flow Controller, Water Management, TekLink Stratum VOC Version 3.2, TekLink Cable and manual.

GenTech Certified with ONE (1) YEAR WARRANTY

Varian Archon Autosampler



Item #: 10741

- Tray holds 51 samples
- Set up for water and soil
- Includes Sample Heater
- Never ran samples!
- Manufactured in 2010

GenTech Certified with ONE (1) YEAR WARRANTY

Agilent 1100 LC/MSD SL

Item #: 10587

- Agilent 1100 LC/MSD Model G1946D
- Electrospray ionization Source
- Mass Range 2-3000 amu
- LAN Communications
- Roughing Pump
- G2710 Data system
- Installation

GenTech Certified with ONE (1) YEAR WARRANTY

Waters 2695 Separations Module with 2487 Dual Absorbance Detector—Item #: 10233

Includes solvent tray.

GenTech Certified with ONE (1) YEAR WARRANTY

Perkin Elmer

Optima 3000 DV ICP System

Item #: 10749

- 200-240 VAC Operation
- Wavelength Range of 167-782 nm
- Computer with Winlab32 ICP Software
- High Energy Echelle Based Polychromator
- Perkin Elmer SCD Detector
- Perkin Elmer AS 90 w/ Controller
- Perkin Elmer Peristaltic Pump
- DV Torch
- Chiller

GenTech Certified with ONE (1) YEAR WARRANTY

Perkin Elmer AAnalyst 800 System

Item #: 10593

Includes: Switchable Flame & Furnace in one AA, Autosampler for Flame & Furnace, and Data System w/AA WinLab software.

GenTech Certified with ONE (1) YEAR WARRANTY

CTC Analytics HTS PAL

Item #: 10562

Includes: 100 ul Syringe holder, 6 port LC Injection Valve Fast Wash Station, Stack for Deepwell Plates (3 drawers) & manual.

GenTech Certified with ONE (1) YEAR WARRANTY

GenTech Certified Agilent/HP 1100 HPLC with DAD

Item #: 10218

- 1100 Quaternary Pump
- 1100 Vacuum Degasser
- 1100 Autosampler
- 1100 Diode Array Detector
- G2170 Data System
- Manuals

ONE (1) YEAR WARRANTY



Agilent 5973N MSD with 6890 GC

Item #: 10517

GenTech Certified with ONE (1) YEAR WARRANTY

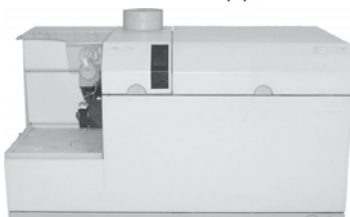
- Agilent 5973N MSD with EI Source
- Agilent 6890 GC with s/s injector
- Electronic Pressure Control
- LAN Communications
- MS features mass range of 10-800 amu
- Heated Source & Heated Transfer line
- Heated Hyperbolic Quadrupole Mass Filter
- High-Energy Dynode Detector
- Electron Multiplier Detector
- Diffusion Pump
- Roughing Pump
- G1701 Data System
- Installation



**“DISCOVER THE DIFFERENCE”
ANALYTICAL INSTRUMENT
SALES, SERVICE, PARTS, TRAINING
(585) 492-1068
sales@gentechscientific.com**

Agilent 7500C ICP-MS

GenTech Certified with ONE (1) YEAR WARRANTY.



Features:

- 2-260 amu Mass Range
- ShieldTorch System
- Peltier-cooled Spray Chamber
- Fully automatic, computer controlled torch position in all 3 axes
- Active Mass Flow Controllers for control of plasma gas
- Hyperbolic profile Quad rods
- Simultaneous dual mode detector with high-speed amplifier
- Autosampler
- G1834 Data System

Thermo Finnigan TSQ Quantum

- Mass Range: 30-3000 m/z
- Highly Selective Reaction Monitoring (H-SRM)
- HyperQuad Quadrupoles
- ESI Source
- Xcalibur Data System

GenTech Certified with ONE (1) YEAR WARRANTY



Glove Boxes



Smart Glovebox includes N₂ controller that auto-adjusts flow to maintain RH setpoint.
Starting at \$1,755



Series 600 stainless steel glovebox includes dissipative PVC viewing window. RH controls available.
Starting at \$8,000

Lab & Cleanroom Storage



Cleanroom supplies storage cabinets are available in several shelf and garment rod configurations, with HEPA filter module for optimal cleanliness of stored materials.
Starting at \$1,388

Vacuum Chambers



Many standard sizes and materials.
Starting at \$1,255

Low-Cost Solutions for High-Tech Industries

TERRA
UNIVERSAL.COM
Critical Environment Solutions

To order, call 714-578-6000 • Fax: 714-578-6020 Fullerton, CA

Desiccators



SmartDesiccator automates N₂ flow to maintain setpoint humidity level (ambient to 0%RH). Seconds to set up and program!
Starting at \$821

Vacuum Cleaners



Many standard models, including the portable ULPA-filtered MicroVac above.
\$955



Convert any space into a clean, aseptic facility



BioSafe™ Aseptic Cleanroom

Modular Cleanrooms

- Total Cleanroom Solutions—Terra designs, builds and equips to your specs!
- Cleanliness to Class 10 (ISO 3), BioSafe™ all-steel designs with antimicrobial surfaces for aseptic processing
- Free-standing structures require no external bracing
- Any size or floor plan, with pass-throughs and internal partitions
- A/C, temperature and humidity control, special lighting

Pass-Throughs



BioSafe™ Pass-Through Chambers feature no-lip, no-seam design for easy sterilization.

Starting at \$8,578

Garb & Parts Dispensers



Stainless steel dispenser is ideal for loose gloves, hair nets, shoe covers.
Starting at \$295



Safety Glasses Dispensers in acrylic or dissipative PVC, designs hold from 8 to 48 glasses.
Starting at \$232

Laminar Flow Hoods



Vertical Laminar Flow Station includes PLC control over motorized shield, FFU and lighting to meet Class 100 standards.
Starting at \$4,937



Lab Apparel



Advanced Vi-Gard® I polyester/cotton lab coat combines durability, comfort and static control. Wide range of sizes and colors.
Starting at \$29