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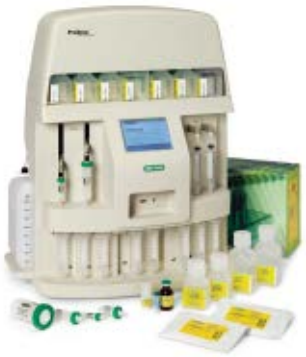

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Management Material

In this issue, the feature article by Ron Pickett, "Identifying and Selecting the Best Managers," addresses how to spot potential managers in your lab. Succession planning is the formal term and despite the association with royalty or CEOs of Fortune 500 companies, not all succession planning takes place at the highest echelons. In fact, for organizations or labs of any size, there is a tangible value in making sure that there is some leadership potential that is being recognized and developed at all levels.

Done correctly, succession planning is more than training someone to take over your job. A manager who sees something in a staff member is not merely training that person to step into his/her shoes. While that is a good idea, it also helps to throw in some "bigger picture" goals. Succession planning is more about knowing where the company is heading and making sure that the skills and talents of the management pool can bring your organization closer to the goals it has set out to achieve.

There are plenty of tools and even software to help track and chart the potential and progress of internal candidates for key supervisory or executive roles. A succession strategy does not have to be complex but there should be something in place in every organization that is looking to grow. And what company isn't?

Are you thinking, "This type of planning is great but who has time? Why not just hire the management talent we need?"

Hiring from the outside has value in certain situations. But like firing an employee, a new hire can be expensive. The recruiting expenses alone can add up significantly. There are cost savings in spotting potential in your staff. For every employee you invest some time in, whether all of them make the cut or not, it's still cheaper than hiring and potentially firing someone from the outside. It's worth measuring up current employees before the decision is made that a search has to go outside the company.

Succession planning is not a lonely task. A staff member who is looking for advancement can position themselves to learn and show off a few valued qualities. It's not only about how well you identify and groom them, it's a collaborative effort that can lead to positive career results for all involved.

AND DON'T MISS THE AUDIO VERSION…

In addition to the article, Ron will be giving two web conferences on this topic, "SPOT: Identifying and Selecting the Best Potential Managers from Your Technical Staff" will be held on July 26th and "DEVELOP and SUPPORT: Building on the Innate Skills of Your Staff to Prepare them for the Demands of Management" will be presented on September 13th. Go to www.viconpublishing.com for more information on these and other web conferences that are being offered.

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"…succession management is a journey, not a destination."

-Robert M. Fulmer Ph.D.

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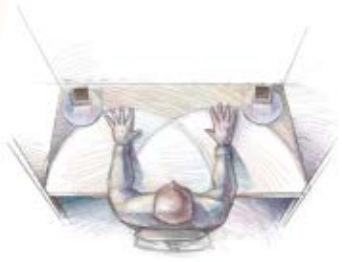

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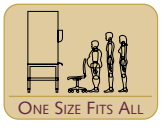

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Identifying and Selecting the Best Managers

MANAGERS NEED NOT THROW DARTS BLINDLY WHEN MAKING DECISIONS ABOUT PROMOTIONS INTO MANAGERIAL POSTS.

Let's say that you have an opening for a supervisor in your laboratory and you decide to promote an internal candidate into the position. Your choices are:

- Sally, who has worked for you for 17 years and is a great technologist — always prompt, current on the latest technology, easy to get along with, and good with customers
- Jane, who has worked for you eight years, is a competent technologist, sometimes challenges your positions, is a little too sociable for her own good, knows a lot of people in the organization, and has asked about becoming a supervisor

Based on those descriptions, most people would conclude that Sally is clearly the better choice for promotion — she is more experienced, well-liked by her colleagues, and an excellent technologist. However, managers often make the mistake of promoting people like Sally who appear to have excellent credentials as talented technologists without properly evaluating whether they would make talented managers as well. The best technologists are not always the best management prospects. In fact, sometimes when you promote your best technologist, not only do you run the risk of getting a poor manager, but you lose a great employee as well!

Think back to your first few days as a manager. How were you selected? How did you make the transition from the bench to your different responsibilities as a supervisor? What would have helped to ease the transition? What would your advice be to someone contemplating the change? What strengths did you bring — what skill deficits were the most challenging to fill?

WHAT DOES IT TAKE TO BE A GOOD MANAGER?

When it is time to promote someone from your laboratory into a management role, the first thing you should do is examine what it takes to be a good manager.

When you need to select and promote someone from your laboratory into a management role, the first thing to do is examine what makes a good manager. Many of the characteristics that make a great technical staff member will also lead to excellent managerial skills; however, many others do not exist in great technologists, or if they do we have not had the opportunity to observe them. In his book, *The Competent Manager*, Richard Boyatzis uses a Competency Model to guide hiring personnel through the management search.[1] He emphasizes problem solving, interpersonal influence, leadership, and personal/corporate effectiveness. I have provided a detailed explanation of some of the more salient characteristics laboratory personnel should be specifically evaluated on below (if you would like to see descriptions of full list of competencies, please visit http://www.gov.sk.ca/psc/MgmtComp/Mcdhmpg).

Problem Solving Cluster

- Conceptual Thinking
- Innovative Thinking
- Strategic Orientation — Demonstrates a working knowledge of the capabilities, goals, and vision of the department. Takes calculated risks based on economic, mission, and political issues, trends, and processes as they relate to the strategic objectives of the department and its linkages with the direction of the organization.

(Some of these competencies are naturals for technologists!)

Interpersonal Influence Cluster

- Impact and Influence

Ronald B. Pickett

- Listening, Understanding, and Responding
- Networking — Establishes and maintains a network of contacts to help understand emerging issues and make informed decisions. Identifies who to involve and when and how to involve them to accomplish objectives and minimize obstacles.
- Teamwork

(As you continue to review this list, think about the people who work for you and which of the competencies they have demonstrated.)

Trying to decide whether or not to move into a leadership role?

Ask yourself the following questions about the work experiences you have found most interesting and fulfilling:

- Do I like collaborative work?
- Do I tend to become the leader of groups in which I find myself?
- Have I ever volunteered to coach or tutor others?
- Do I find it intriguing to work on thorny, ambiguous problems?
- Do I cope well with stress (e.g., extended hours, tough personal decisions)?

If you cannot answer "yes" to most of these questions, you may not have the personal qualities, character, or motivation required to be an effective manager.

Source: Hill LA. Becoming a Manager: How New Managers Master the Challenges of Leadership. Boston; Harvard Business School Press: 2003

Leadership Cluster

- Change Leadership
- Sharing Responsibility — Shares responsibility with individuals and groups to increase their sense of commitment and ownership. Assists in the coaching, learning, and development of others.
- Holding People Accountable
- Team Leadership

(The personalities of the ideal technologist maybe quite different from the ideal managerial profile.)

Personal and Corporate Effectiveness Cluster

- Results Orientation
- Commitment to Learning
- Client Service Orientation
- Concern for Political Impact — Is aware of how departmental issues, program policies, and decisions impact others while being sensitive to the differing needs/agendas of various stakeholders.
- Flexibility
- Organizational Awareness — Acts with an understanding of the department and organizational purposes and processes and makes departmental changes to resolve issues or problems.
- Planning and Initiative

USING THE COMPETENCY MODEL

While most of these KSAs (formally, Knowledge, Skills and Attributes , although I sometimes like to substitute "Attitude" for Abilities) are important qualities for laboratory managers to have, five of them — Strategic Orientation, Networking, Sharing Responsibility, Concern for Political Impact, and Organizational Awareness — may be particularly helpful during the early stages of identifying potential supervisors or managers.

SETTING UP AD HOC AUDITIONS

It is advisable to give your employees managerial-type duties in which you can evaluate their potential as supervisors. Among the suggested possibilities:

- Assign staff members to committees, task forces, or projects.
- Give them leadership responsibilities at department-wide meetings.
- Ask them to attend a relevant association meeting.
- Since some people will have limited opportunity to demonstrate leadership potential on the job, discuss their off-the-job activities, including education, clubs, church, etc.
- Send them to a management development or training activity.
- Assign them a written project report on a topic related to the business of the lab.

WHAT TO OBSERVE

- Watch for the individual's level or intensity of involvement
- Observe nonverbal communication (such as body language indicating involvement, resistance, doubt, closure, etc.)
- Pay attention to the questions they ask.
- Set up challenging situations.
- Ask them what they think about management.

QUESTIONS TO ASK YOURSELF

- Do they participate in discussions during department meetings?

- Do they coach or teach new skills to others?
- Do they take a leadership position?
- Do they ask productive, facilitative "Why" questions?

EVALUATING POWER

Management involves the ability to get others to do something, but power is the attribute necessary to convince other people to do what you want them to do. It is important that you evaluate how your employees respond to and command power among their colleagues when deciding on their management potential. A few specifics to ask yourself:

- What is their attitude about power?
- Do they question authority? Is it done in a positive or negative way?
- Can they differentiate power that is necessary to be an effective manager from power that is purely for self-aggrandizement?

If you decide to evaluate your staff on their managerial abilities, it is wise to be clear about what you are going to do before the process actually begins. Keep in mind the following suggestions:

- Tell your staff that you are observing and assessing their management potential.
- Ask them if they want to be considered.
- Be particularly careful in your assessment of people who "look a lot like you." Research shows that we tend to favor individuals who share a lot of our characteristics from a physical, cultural, and personality perspective more highly than others of equal capability and performance.
- Mistrust glibness. Remember that the most articulate people in the world are con artists.
- Be wary of the "hungry" person. If they want the position too much, it may very well be for the wrong reason.
- Don't overvalue technical skill, but don't accept individuals with poor technical orientation.

PUTTING IN A COACH

Good coaches have a model of behavior that they drive others toward — the perfect golf swing, the correct serve, etc. Management coaches need a similar model, but a lot of executive coaches keep their model unstated, hidden, and obfuscated. That is unnecessary. Here is my model of a good managerial coach:

- Explain and coach your employees toward the management competency model.

- Be objective — site specific examples of behavior and areas for improvement.
- Reward achievement.
- Expect slow progress (it took us a long time to get the way we are).
- Describe what employees can expect if they do become a manager.2-3
- Hold rehearsals and practice sessions.
- Use performance appraisals to focus on future development.

SUMMARY

So getting back to the original scenario, which employee should you choose to promote? That's up to you to decide, but it is important to keep "The Peter Principle" in mind when considering promotions. It reads, "In a hierarchy, every employee tends to rise to his level of incompetence."4 People are often promoted into positions that require skills and personality traits that they lack. There is much more to selecting an appropriate candidate for a management post than at first appears. Good managers develop a pipeline they can use to evaluate and nurture potential candidates; it not only makes the selection process easier, but it also helps them delegate tasks effectively even prior to selecting a new supervisor so that they can see their employees display necessary managerial characteristics.

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High Purity Water for Inorganic Analysis

VARIOUS POSSIBILITIES EXIST TO ADDRESS THE SPECIFIC WATER PURITY REQUIREMENTS OF EACH LABORATORY AND FIELD. SOME OF THESE SOLUTIONS ARE IN RELATIONSHIP TO THE NEEDS OF VARIOUS LABORATORIES.

Environmental analysis, microelectronics, material chemistry, and clinical analysis all involve or rely on metal and ion analyses. However, the analytical laboratories in these fields are not all equipped with the same instruments and do not pursue the same analyses. Therefore, a variety of analytical tools and techniques are utilized for measuring various matrices at different concentrations and throughput. Due to the diversity of sample types, the analytical methods differ by the required sensitivity and sample preparation steps.

PURIFIED WATER IN THE ANALYTICAL PROCESS

Analytical methods may be divided into those employing water during the actual analysis phase (liquid chromatography-based techniques) and those without water during the analysis step (spectrometric and spectrophotometric techniques – ICP-OES, ICP-MS, and AA). In both cases, water is, or can be, used for sample preparation, standard dilution, blanking, and instrument rinsing (Figure 1). The amount of water added is so important that the presence of any water contaminants may generate interference in the detection range of the sample. In addition, water is the major component of mobile phases and buffers for liquid chromatography techniques (e.g., IC, IC-MS, and CE).

The amount of water added is so important that the presence of any water contaminants may generate interference in the detection range of the sample.

Figure 1. The role of water in analytical processes.

WATER QUALITY REQUIREMENTS

Since all the aforementioned techniques measure levels of inorganic analytes, it is important to select water with a high ionic purity. Resistivity has traditionally been a useful parameter to monitor the overall ionic purity of the water and is the basis to distinguish various water quality grades in norms, standards, and guidelines. The resistivity value is based on the sum of the contribution (concentration, valence, and mobility) of each ion present in the water. As the mobility is temperature-dependent, the resistivity value usually is given together with a temperature value. The maximum resistivity value of pure water, arising from water dissociation, is 18.2 MΩ·cm at

Stéphane Mabic,* Beatrice Gerion, Elodie Castillo, and Ichiro Kano

Table 1. Concentrations (ppt) of various elements measured using ICP-MS. The water was produced by a purification chain combining an Elix 5 and a Milli-Q Gradient system. ICP-MS data ware obtained on Perkin Elmer DRC and Agilent 7500 instruments.

Element	Concentration (ppt)
Li	0.01
Na	1.10
Mg	0.16
Al	0.31
K	6.90
Ca	19.00
Ti	3.90
Cr	0.54
Mn	0.13
Fe	2.40
Co	1.40
Ni	0.32
Cu	0.08
Zn	4.40
Cd	0.13
Pb	0.22

Table 2. Blank equivalent concentrations (ppt) of various elements measured using ICP-MS. The water was produced by a purification chain combining an Elix 5 system and a Milli-Q Element system operated in a clean room.

Element	Concentration (ppt)
Li	0.01
Na	0.22
Mg	0.18
Al	0.09
K	2.60
Ca	0.10
Ti	1.70
Cr	0.12
Mn	0.54
Fe	0.40
Co	0.04
Ni	0.20
Cu	0.10
Zn	1.20
Cd	0.11
Pb	0.09

25 °C.[1] This value ensures that the overall concentration of ions is below 1 ppb (1µg/L), in Type-I water.

Other parameters also are important to monitor. Bacteria, which can release ions and behave as particulates, should be minimized because they can spoil the nebulizers and ionization chambers. The organic contamination also needs to be controlled for avoiding spoilage of the instruments. Additionally, organics can make complexes with metals.

Water degrades very rapidly on storage not only due to carbonic acid formation but also because ions and organics from air and containers readily dissolve in high purity water. Bacteria quickly start growing when water remains stagnant in a container and bring additional contamination and issues. Therefore, it is crucial to use freshly produced, high purity water and minimize the storage time.

OPTIONS FOR SELECTING TYPE-I WATER

No unified solution exists for water consumption, utilized techniques, selected methods, required purity and methods for sample preparation. Various possibilities exist to address the specific requirements of each laboratory and field. Some of these solutions are discussed in relationship to the needs of various laboratories.

LOW WATER VOLUME NEED AND MID DETECTION RANGE

Some laboratories require a few liters of water per week only or use water sporadically for sample preparation and analyses campaigns. Others perform analyses at the ppm levels and focus more on flexibility and reliability of the analysis than on the sensitivity of the detection methods. For all these cases, there are simple water purification solutions. Compact and easy-to-operate systems that produce high resistivity water from tap water can be selected. Type-I water is always available and there is no need for water storage over extended periods of time. The purification process from tap to Type-I water may combine reverse osmosis, activated carbon, and ion exchange resins. Other possibilities exist to finalize the water purification only when pure water is available already in the laboratory or facility. These solutions are suitable for environmental laboratories using AA or ICP-OES.

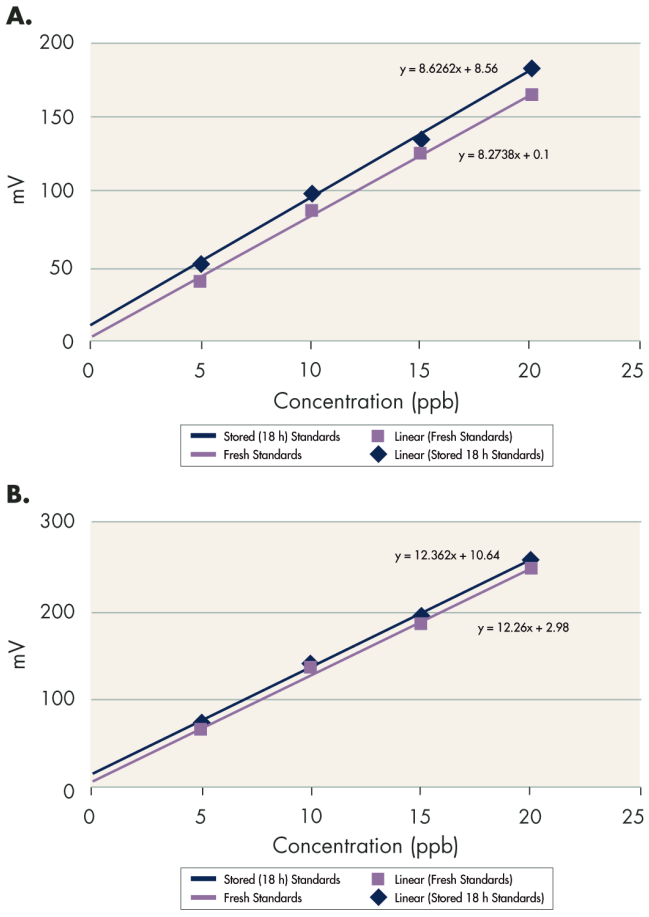
HIGH WATER VOLUME NEEDS AND LOW DETECTION RANGE

For higher sample numbers or higher purity, other combinations of purification technologies can be selected to deliver higher volumes per hour and consistent purity

for analysis in the low detection range. In addition to the resistivity, other parameters, such as the organic level (total organic carbon – TOC), become significant when water is used for chromatography purposes. The overall purity of the water (particulates, organics, ions, and bacteria) may affect the performances of IC and CE for example, and even more so if the chromatography instrument is hyphenated to MS. These contaminants also would affect ICP instruments by spoiling nebulizers, generating deposits on CCD imaging systems, or creating interferences.

The selection of purification technologies requiring low maintenance over a long period of time is recommended for laboratories requiring large volumes, whether it is for sample preparation, dilution of standards, or instrument rinsing. Expected levels of some elements in water produced by a purification chain combining reverse osmosis and electrodeionization followed by ion exchange resins are reported in Table 1.

Figure 2. Sodium (A) and Calcium (B) calibration curves obtained with fresh standards (magenta) and standards kept for 18 hours (blue).



ULTRA LOW DETECTION RANGE (PPT OR SUB-PPT)

Some fields require ultra low ion levels in the water at any time. ICP-MS instruments usually are operated in cleanrooms. A specific water purification system dedicated to trace elemental analysis was developed.[2,3] Design and material selection are important for optimizing the performance of the purification process and reducing water contamination with tubing and filters. The water system can be operated in clean environments (cleanrooms and clean hoods) using a foot-switched pedal to consistently deliver water with extremely low levels of ions. Typical concentrations of some elements are reported in Table 2. Most elements are present at a level below the ppt concentration.[4,5] This water is adapted for analyses in microelectronics, pure metals, as well as in certain research areas, such as glaciology and geochemistry.

UTILIZING HIGH PURITY WATER

Selecting a purification chain and using high purity water is important. The analytical method, including the selection and the cleaning of filters and sampling containers as well as the water handling and usage are just as crucial. These examples highlight the opportunities to add contamination in the analysis.

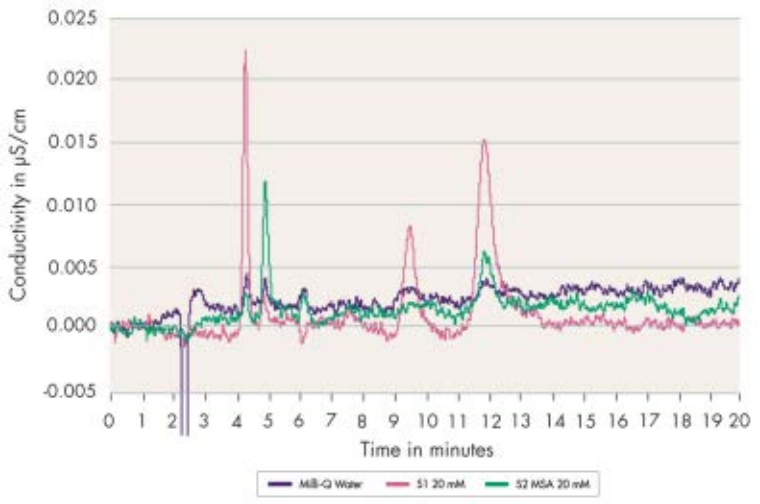
SAMPLE PREPARATION

The selection and the rinsing of good filters used to clean the samples are particularly important. All filters need to be cleaned with a few milliliters of water. Elements typically released by plastic filters include sulfate, chloride, calcium, potassium, and sodium.

STORAGE OF STANDARDS

In an experiment, Ca and Na standards were prepared using freshly produced Type-I water. The plastic vials containing the standards were installed onto an automatic sampler and IC was run. Standard curves were obtained (5–20 ppb) with high correlation coefficient for both elements. In both cases, the line goes through the

Figure 3. Superimposition of preconcentration chromatograms of Milli-Q water (blue) and two buffers prepared with methanesulfonic acid from two different suppliers (magenta and green).



origin. The vials containing the standards were left as is, and 18 h later, the calibration curve was built again (Figure 2).

As one can see, very straight standard lines were obtained with high correlation coefficients. However, both the Ca and Na standard curves were off and no longer going through the origin anymore. Overnight, Na and Ca from air had dissolved in the vials (it was checked independently that the vials were not the source of the contamination). The concentrations measured are off. This is a common phenomenon that usually is hidden when an autozero is applied on the IC before starting the measurements. Concentrations measured are not accurate, yet frequent. Reducing water storage, the standards, and samples after preparations should be a constant focus in the analytical process.

REAGENT SELECTION

In the course of IC experiments, we have been confronted with the presence of extraneous peaks on the chromatograms. In searching for the source of the contamination, it appeared that the ACS-grade methane-sulfonic acids used to prepare the mobile phase were not as clean as expected. Two well known brands

of acids were compared (Figure 3). It is clear that the reagents will contaminate the mobile phase.

SAMPLING PROTOCOLS

When trace or ultratrace levels of ions are being measured, it is recommended to have well defined protocols to prepare the containers receiving the samples and standards. Ultrapure water becomes an extremely powerful solvent and it can extract elements from any material it touches. Plastic containers should always be used to collect samples for ionic analysis, because glass releases silica, calcium, and sodium. Protocols have been developed in our application laboratories and can be provided.

DETECTING ISSUES

Recognizing and identifying the source of issues in an analytical process is not always an easy task. While water may sometimes be the cause, the few examples mentioned above show that other sources of contamination may impair the analysis. Water storage is certainly a major source of contamination. Using freshly produced water with a resistivity at 18.2 MΩ·cm at 25 °C ensures that the overall ionic contamination of the water is below 1 ppb. Consequently, ICP levels of Na at 35 ppb or an IC peak of Cl at 20 ppb are unlikely to originate from the water and other sources of contamination should be investigated.

CONCLUSIONS

The opportunity to have high purity water on demand is certainly one of the major assets of a purification system. There are various alternatives to having Type-I water in a laboratory and the selection of a purification chain is based on the needs and requirements of each laboratory. Good practices include reducing the storage times of standards and samples as well as carefully selecting the reagents and rinsing protocols. These are an inherent part of the analytical process and must be optimized to take full advantage of analytical instrumentation. In the laboratory, water is a chemical reagent and should be treated as such.

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Date: July 26, 2007
Time: 1:00PM ET

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Date: September 13, 2007
Time: 1:00PM ET

Ron Pickett *is a consultant with more than 30 years of experience. He has written a column for CLMA publications for more than 10 years and is a frequent speaker at national and state meetings. He has been closely involved in establishing formal and informal leader identification and development programs in large and small organizations. This challenging process will help you take a clear and honest look at your staff and develop quick and simple individualized development plans.*

Laboratory Environmental, Health, and Safety Compliance Strategies

Date: September 19, 2007
Time: 1PM ET

This web conference will review common US federal laws pertaining to the research and process laboratories and provide attendees with practical compliance solutions. The speaker will discuss laws and compliance solutions from OSHA, the EPA, the US Center of Disease Control and Prevention, US Nuclear Regulatory Commission, and the US Department of Homeland Security.

Topics discussed include:

- Whether lab safety or hazcom applies for occupational exposure to hazardous chemicals in laboratories
- Recording and reporting occupational injuries and illnesses
- Assessing need, selection, and training for personal protective equipment
- Storing, using, and the limitations on flammable and combustible liquids
- Regulated areas for carcinogens
- The Resource Conservation and Recovery Act and the Clean Water Act
- The approvals needed to work with select biological and toxic compounds
- The Standard for Protection against Radiation and the Chemical Facility Anti-terrorism Standard

George Bleazard *is currently the Corporate Director of Environmental Compliance, Health, Safety, and Security for Sigma-Aldrich where he is responsible for worldwide environmental compliance, occupational health and industrial hygiene, safety, and security functions. In 2003, he led the environmental waste minimization efforts resulting in the company's St. Louis facility receiving the EPA's Region Seven "2003 Pollution Prevention Award". He obtained his Bachelor of Science and Masters of Science from Central Missouri State University and has also worked for Pfizer, Hoechst-Celanese Corp., Monsanto, and the St. Louis County Health Department.*

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WEB CONFERENCES

How it Works

Automating Microbiology Specimen Set Up

Problem: Over the past 40 years, laboratory science has willingly embraced a high level of automation that over time has become increasing sophisticated. Bar-coded patient samples fly through a complex and variable analysis process in clinical chemistry, hematology, and most other lab disciplines. Results are reported as soon as they become available via LIMS that send the information to integrated patient information management systems.

The sole exception was microbiology — laboratory scientists and assistants continued to laboriously inoculate and streak plates with streak patterns specific to what they were trying to culture in a variety of media. This labor-intensive, pre-analytical phase preceded incubation and interpretation and, in spite of the mundane nature of the task, the variability involved seemed to mitigate for human intervention

Solution: In 1998, Canada's leading laboratory sciences company approached Dynacon to co-develop with them a system that would automate a substantial portion of the pre-analytical work common in the microbiology laboratory. Dynacon took on the challenge and set out to design a machine that would automate this complex and infinitely variable process. The approach taken was to design a versatile, but not universal, machine that would automate the highest volume studies that made up the bulk of the work in microbiology. The first InocuLAB (Figure 1) was completed in March 2000 and passed its first customer acceptance test in June 2001.

Figure 1: InocuLAB automates microbiology specimen set up.

InocuLAB receives the bar-coded samples presented to it, reads the barcode, prints the barcode on the plate(s) to be inoculated and streaked, uncaps the donor container, samples the liquid, recaps the donor container, inoculates and streaks the plate, and presents the streaked plates in an output stack ready for the incubator. Sophisticated software virtually eliminates errors and overall quality is improved in that every streak is exactly the same and reproducible. At 60–80 plates per hour, significant labor savings are captured and employee stress and injury are prevented.

Today Dynacon is approaching one hundred systems installed all over North America and Western Europe. Customers include large reference laboratories, hospitals, and teaching institutions, tissue banks, veterinary facilities, and regional laboratories. The reference site list contains some of the most prestigious teaching laboratories in the world and continues to grow each month. Geographic expansion has been limited by Dynacon itself to those areas where quality service will match the quality of the ISO 9001 built and CE-marked machine.

The future will bring on phased geographic expansion and some new automation products for the microbiology laboratory to complement the current LQ and LQ-H models.

For more information on InocuLAB, go to www.dynacon.ca.

How it Works

Real-time Analysis of Biological Samples

Problem: While the benefits of molecular diagnostics have been known for decades, its real potential has not been fully achieved. Slow, labor-intensive methods and the need for costly labs and the specially trained staff to run them have kept the technology out of reach for many organizations.

Solution: Today, barriers are being eliminated with Cepheid's GeneXpert® System. GeneXpert is a genetic testing platform that performs real-time analysis of biological samples by fully integrating and automating what have previously been complex and time-consuming manual laboratory procedures.

The GeneXpert® System fully integrates and automates the three processes required for real-time PCR-based (polymerase chain reaction) genetic testing: sample prep, amplification, and detection. Once a biological sample is loaded in a GeneXpert cartridge, the system does the rest:

• Sample preparation and extraction of nucleic acids. The GeneXpert® System completely automates sample preparation, performing all the complex steps of DNA extraction in its advanced "microfluidic" cartridges. The GeneXpert cartridges are designed to handle a variety of sample volumes, enabling them to obtain higher concentrations of starting target materials. Concentration and purification of the target further increases the sensitivity of the resulting test. Once the sample nucleic acid is extracted, it is moved into the cartridge reaction tube where amplification and detection take place (Figure 1).

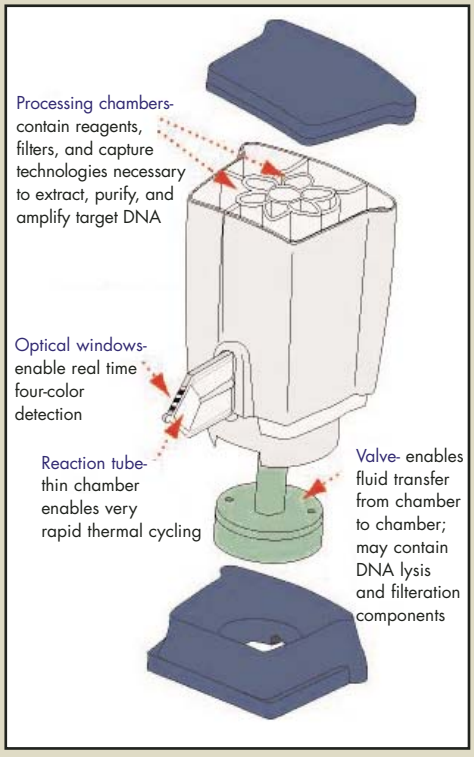

Figure 1: "Self Contained Cartridges"

• Amplification of extracted nucleic acids. The GeneXpert System solid state modules perform the extremely rapid heating and cooling cycles required for real time PCR. The modules continuously monitor the chemical reactions in each cartridge in order to quickly create enough copies of the sample nucleic acid for accurate measurement. Each of the modules works independently and can be used to conduct different tests simultaneously.

• Detection of a target gene sequence. The GeneXpert System's highly sensitive optics detect the presence of the target nucleic acid. Continuous optical monitoring allows the software to automatically stop the reaction as soon as the target is detected, further accelerating time to results.

GeneXpert's ability to rapidly and accurately identify a wide range of infectious diseases through their genetic fingerprint gives health care professionals powerful new ways to enhance patient management and care. With a level of sensitivity greater than any other test on the market, the GeneXpert System can be used to detect any genetic element in the genome — including DNA, RNA, chromosomal translocations, gene amplification and suppression — with the potential for single cell detection.

With the 2006 launch of its Xpert GBS in vitro diagnostic test, the GeneXpert System became the first molecular system to enable a "moderately complex" designation from the FDA, allowing non-laboratory professionals such as doctors and nurses to run Xpert GBS in near-patient environments.

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Applied Biosystems

How it Works

Accelerated Analysis

Problem: Contract laboratories are constantly faced with the challenge of running more samples and producing more data. One way to increase productivity is to accelerate separations.

Solution: The Dionex UltiMate 3000 LC system and Acclaim Rapid Separation LC (LCr) columns increase separation speed up to 15-fold, increase throughput up to 30-fold, save up to 85% of solvent, and consume up to 60% less sample. Acclaim columns operate precisely at higher temperatures to reduce viscosity and pressure. The column format is 3 mm ID and 33 mm or 75 mm length, packed with 3-µm stationary phases that increase robustness and separation speed without requiring new method development. LCr also requires a pump that consistently delivers precise, accurate flow at high pressure (5000 psi or greater). This flow results in very small delay volumes (rapid response to gradient changes and rapid reequilibration before each consecutive run) that is essential for accelerating separations. The accuracy of the pump also yields very low extracolumn variance to ensure column efficiency. Other instrument solutions include a detector with fast data rates and a fast time constant, a column oven, and a fast autosampler with overlapping preparation of injections.

To test these advances, food dyes in breakfast cereal were identified and determined using the Dionex UltiMate 3000 LC system and the Acclaim LCr 120 C18 column. The food dyes are anionic, with multiple sulfonate groups that not only inhibit their absorption in the digestive tract, but also make them challenging to analyze.

Chromatographic Conditions

- Column: Dionex Acclaim LCr 120 C18 3 µm, 3.0 75 mm

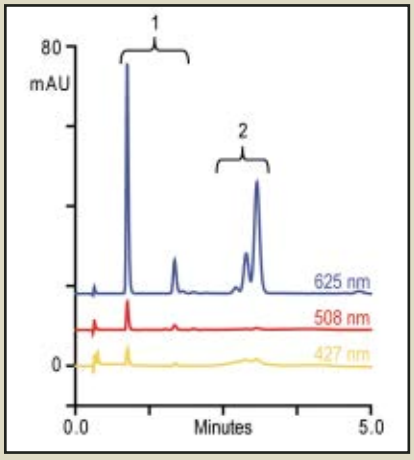

Figure 1: Analysis of food coloring standards used in breakfast cereal separated by the Acclaim Rapid LC column. Peaks: 1) FD&C Red #40; 2) FD&C Yellow #5; 3) FD&C Green #5; 4) FD&C Blue #1; 6.25 µg/mL each.

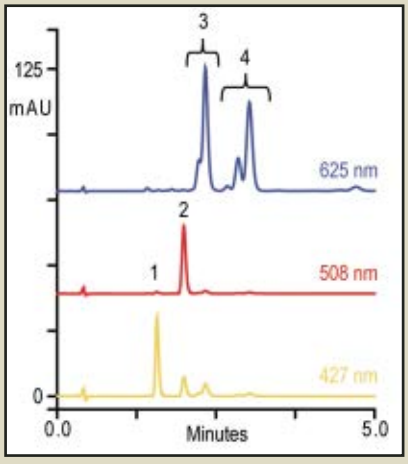

Figure 2: Extract of breakfast cereal. Peaks: 1) FD&C Blue #2 and 2) FD&C Blue #1.

- Mobile phase: water 677 g, Na2SO4 0.97 g, KH2PO4 2.24 g, 55% tetrabutylammonium hydroxide 2.30 g, and acetonitrile 250 g
- Flow rate: 1.00 mL/min, isocratic
- Temperature: 30 °C
- Injection: 8 µL
- Detection: Visible at 427, 508, and 625 nm; data rate 2.5 Hz, time constant 0.6 s.

Sample Preparation: Individual pieces of a children's breakfast cereal were separated by color and crushed. A 200-mg portion was extracted with 5.0 mL of mobile phase, and filtered through a 0.1-µm membrane. The mobile phase dissolved the dyes effectively and also prevented the starches from interfering with the sample preparation and analysis.

Results: Figure 1 shows the analysis of a mixture of commonly used dyes. In designing the mobile phase, the ion-pairing agent, ionic strength, and organic solvent were balanced to resolve the different colors from each other while grouping isomers together. Since the mobile phase was designed for optimum selectivity, a relatively short C18, 3 µm, 3.0 ? 75 mm rapid LC column provided sufficient resolution in a run time of 5 min. Calibration was linear from the quantification limit of 0.1 µg/mL, up to 250 µg/mL. Figure 2 shows the analysis of an extraction of "blueberry" flavored cereal sample.

Conclusion: LCr is a fast and convenient technique for determining food dyes using Dionex HPLC technology. When compared to traditional LC, LCr allows laboratories running dozens of samples to significantly ramp up productivity by accelerating separations up to 15-fold.

For more information, go to www.dionex.com.

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lab agenda

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American Association for Clinical Chemistry
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JULY 26, 2007
SPOT: Identifying and Selecting the Best Potential Managers From Your Technical Staff
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JULY 30 – AUGUST 3, 2007
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AUGUST 19–23, 2007
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American Chemical Society
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AUGUST 20–24, 2007
Forum on Laboratory Accreditation
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How it Works

Protecting Valuable Samples

Problem: High performance laboratory freezers are one of the most essential pieces of equipment in any laboratory, and researchers worldwide depend on them everyday to provide critical protection and storage for valuable samples, many of which are irreplaceable. Many biological samples, such as DNA, RNA, cells, and protein samples, must be stored at below-freezing temperatures in order to prevent degradation and preserve them for future reference, analysis or use. Therefore, protecting the integrity of research samples is very important.

When you are storing what could be your life's work, not just any freezer will do. A freezer door opened frequently or for extended periods of time could expose your samples to warm air, creating on opportunity for decreased sample integrity. It is critical to choose a unit that provides a constant temperature within the freezer and delivers rapid temperature recovery after accessing your samples to maintain sample integrity. Your freezer selection is one of the most important decisions you will make in your lab.

Solution: A series of freezers of different capacities that combine reliability and performance with cost-effective operation and practical features. The Thermo Scientific Revco® PLUS series of upright -86°C freezers are designed for maximum performance and are suited for all laboratories. All Thermo Scientific Revco PLUS models: Revco Ultima® PLUS, Revco Elite® PLUS, and Revco Value® PLUS, feature the same advanced patented refrigeration technology and a new robust electronics platform. Valuable samples are protected by combining great rapid temperature recovery, temperature stability, and operational efficiency, all in a productive and comfortable lab environment. In addition, programmable, easy-to-use microprocessor controls provide real-time monitors and precise temperature settings, power and other critical parameters, further ensuring the security of samples.

Figure 1. Thermo Scientific Revco PLUS -86°C upright freezers include three models: Revco Ultima PLUS, Revco Elite PLUS and Revco Value PLUS

Figure 2. Thermo Scientific Revco PLUS -86°C upright freezers protect valuable samples by combining temperature stability, maximum recovery time, and energy efficiency.

The new Thermo Scientific Revco PLUS upright freezers feature advanced refrigeration technology that provide more heat removal capacity ensuring rapid temperature recovery after door openings. This also decreases the risk of sample degradation created by the freezer door being open for extended periods of time and protects the integrity of valuable samples. Thermo Scientific Revco PLUS freezers also feature various rack configurations to ensure the easy retrieval of precious samples and minimize exposure to ambient conditions.

Thermo Scientific Revco PLUS freezers require less power to efficiently maintain cabinet temperature. This reduces heat emissions into the lab environment, meaning that Thermo Scientific Revco PLUS freezers reduce air conditioning and energy costs and maximize operational efficiencies. Thermo Scientific Revco PLUS freezers have minimal noise output due to advanced noise abatement technology and insulation. This allows the units to reside directly in the lab, which speeds sample preparation and minimizes sample exposure to ambient air. Researchers, who spend many hours surrounded by lab equipment, will also benefit from a quieter and more productive, efficient, and comfortable working environment.

For more information on Thermo Scientific Revco PLUS freezers, visit www.thermo.com/revcoplus.

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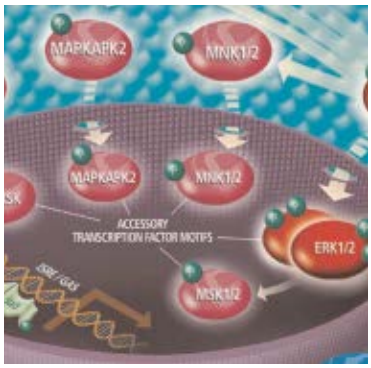

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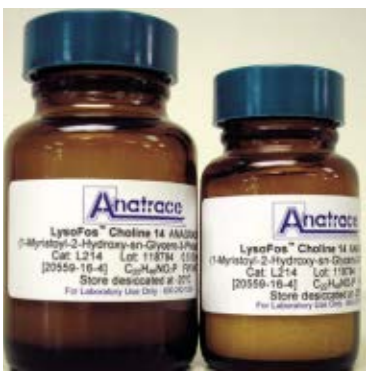

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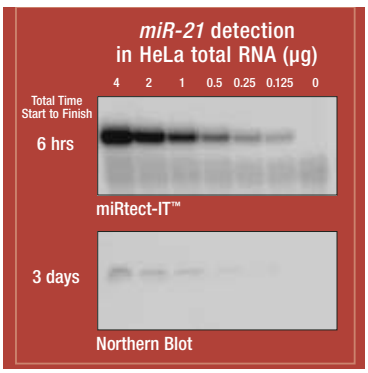

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www.semrock.com

ULTRA-HIGH PURITY WATER SYSTEM

The Gemini High Purity Loop incorporates a patented system called the "multipass" UV, a microprocessor with resistivity display, dispensing functions, and an integral drain basin. Aries Filterworks offers a wide range of water purification systems whether it is a Type I water system or general deionization.

Aries Filterworks
www.ariesfilterworks.com

PURGE AND TRAP AUTOSAMPLER

The EST Centurion 100 position water purge and trap autosampler is designed for high throughput environmental and municipal laboratories. The Centurion was developed to give maximum sampling flexibility at an affordable price. The ability to process and deliver samples to two different concentrators and the unique and precise Internal Standard delivery system make the Centurion the a technically advanced purge and trap autosampler.

EST Analytical
www.estanalytical.com

MICROWAVE PREPARATION SYSTEM

The MARST system can be configured for digestion, extraction, synthesis and other applications. The system features pressure and temperature control technology as well as an array of vessel designs. Solid-steel cavity construction, a high-impact flex and reseal door, and continuous internal reaction control provide safety during operation.

CEM Corporation
www.cem.com

POLYPROPYLENE PRODUCTS

NuAire offers a complete line of polypropylene products including vertical laminar airflow fume hoods, conventional and by-pass fume Hoods, polypropylene casework, acid storage cabinets, countertops, and accessories. This equipment is designed for the corrosive, semi-conductor, or metal free laboratory, constructed from all stress-relieved, fully seam-welded, white polypropylene.

NuAire
www.nuaire.com

CELL DENSITY TUBES

VoluPAC™ tubes provide an alternative method to determine the cell density in a cell culture suspension. The volume of the cell pellet relates to the complete sample volume and expressed as % PCV (packed cell volume) which results in an absolute value, corresponding to parameters like cell count, protein content, metabolic activity, etc.

Sartorius
www.sartorius.com

FILTER MICROPLATE WASHER

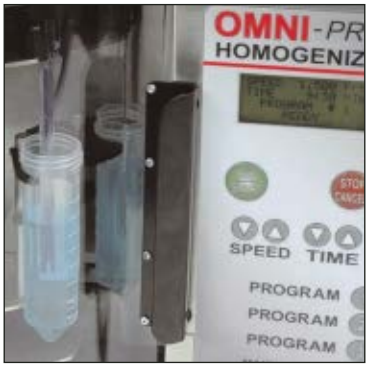
The ELx50 filter microplate washer features a syringe drive fluid-delivery system with an automated vacuum filtration solution for unattended processing of 96-well filter bottom plates. Its aspiration carrier may be adjusted with a variety of filter pore sizes, fluid viscosities, and plate designs. The modular platform allows for processing of standard solid bottom microplates.

BioTek Instruments
www.biotek.com

MULTI-SAMPLE HOMOGENIZING SYSTEM

The programmable Omni Prep™ is designed to homogenize 6 samples per cycle and up to 250 samples per hour. Operation with disposable probes eliminates cross contamination and cleaning. The system utilizes brushless motor technology. Features include a removable clear door and positive airflow that can be exhausted to a HEPA-filter or fume hood.

Omni International
www.omni-inc.com



LABELING SYSTEM

The v2.0 LABEXPERT™ laboratory labeling system can be used to produce labels for lab samples, small custom safety labels, and other general laboratory ID labels. The labels can withstand exposure to solvents, moisture, and low temperature. The system features vial size templates, one touch time and date stamp, and 140 Greek and laboratory symbols.

Brady
www.bradyid.com

LAMINAR FLOW STATION

The TerraFlo™ horizontal laminar flow station was designed for use in the pharmaceutical, biotech, electronics, and semiconductor industries. It features filter/blower and filter/fan modules in order to provide a back-to-front laminar flow of filtered air, an adjustable multi-speed, direct-drive blower to control air speed, and your choice of HEPA or ULTA filters.

Terra Universal
www.terrauniversal.com

THERMAL CYCLER

The Veriti™ 96-Well Thermal Cycler with VeriFlex™ Blocks uses six separately controlled alloy blocks which allows users to set specific temperatures within a zone. The cycler features a touch screen interface to control temperature zones and operate the instrument system. Users can run pre-programmed or custom methods using fast or standard chemistries.

Applied Biosystems
www.appliedbiosystems.com

CELL DISRUPTOR

The Disruptor Genie provides multi-directional action, which simultaneously agitates and vortexes at high speed, increasing cell disruption or sample re-suspension efficiency. An alternative to ultrasonic disruptors, it can hold up to twelve 1.5- or 2.0-mL microtubes. In addition, a supplied pop-off cup easily attaches for use as a standard single-tube vortex mixer.

Scientific Industries
www.scientificindustries.com

GEL-BASED BEAD FOR PCR

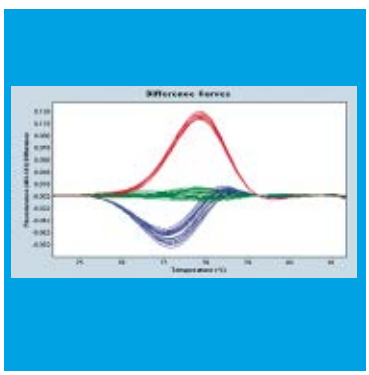
The ReaX Mastermix Lab-in-a-Bead range includes all the reagents required to perform PCR. This allows even untrained operators to set up PCR reactions. They can be used for end-point, qPCR and RT-PCR, and with multiple fluorescent chemistries. The beads can be stored and shipped at ambient temperature.

Q Chip
www.q-chip.com

VACUUM GAUGES

The CMR/CCR capacitive transmitters offer vacuum measurement to cover all applications from 10^{-5} to 1100 mbar. The gauges feature a ceramic technology sensor which prevents memory effective, provides resistance to corrosive gases, and temperature compensation. They can be operated with an ActiveLine controller and can be used as a drop-in replacement for older gauges.

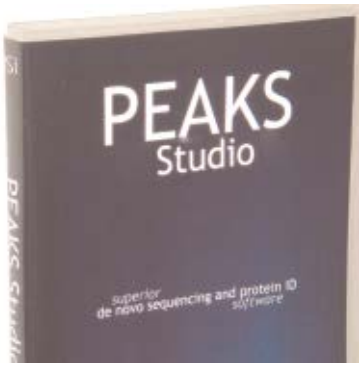
Pfeiffer Vacuum
www.pfeiffer-vacuum.com



REAL-TIME PCR SYSTEM

The LightCycler® 480 Real-Time PCR System features integrated support for high-resolution melting based mutation scanning, enabling analysis of genetic variations (SNPs, mutations, methylations) in PCR amplicons prior to or as an alternative to sequencing. The new DNA dye and Gene Scanning software tool help create melting curves whose shape can be analyzed and interpreted.

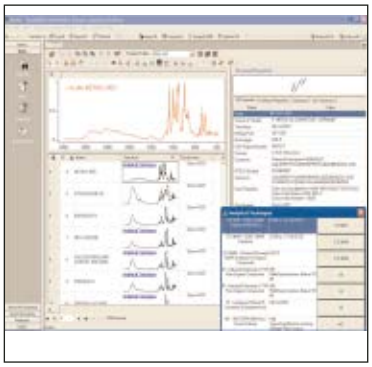
Roche
www.roche.com



MASS SPECTROMETRY SOFTWARE

PEAKS is an software solution for peptide sequencing and protein identification from tandem mass spectrometry (MS/MS) data. It can perform de novo sequencing, which is providing the sequence of a peptide or a protein without the aid of a protein sequence database.

Bioinformatics Solutions
www.bioinfor.com



INFORMATICS SYSTEM

The KnowItAll informatics system is a fully integrated software package that offers solutions for centralizing, securing, and accessing your IR, NMR, MS, Raman, UV, and chromatographic data resources (including structures and properties) — from the laboratory to the global enterprise. The software can also be complimentary to other systems in your laboratory.

Bio-Rad
www.bio-rad.com

SOLID PHASE EXTRACTION SOFTWARE

Trilution® LH offers one software package to control all liquid handling and solid phase extraction instruments maximizes. The drag-and-drop functionality enables users to both set-up instrument configuration and define bed layouts. The software has an application run screen that provides complete control over the users run and features and import/export functionality.

Gilson
www.gilson.com

PROCESSING SYSTEM

By combining aspects of laboratory and on-line systems, the ProcessLab is a fully customized, automated system for analytical testing with up to 16 places for measuring instruments, sample loops, pumps, stirrers and other accessories. It features application-specific modules to perform titration, conductivity UV/VIS, ion selective measurements, and more.

Brinkmann
www.brinkmann.com

TEST AUTOMATION SOFTWARE

The software plug-ins are used as an adjunct and interface to Fluke and Metron analyzers and simulators in order to perform medical device inspections, whether for preventive maintenance or post-repair testing. The design ensures a consistent user interface for every test device used.

Fluke Corporation
www.fluke.com

TITRATION SOFTWARE

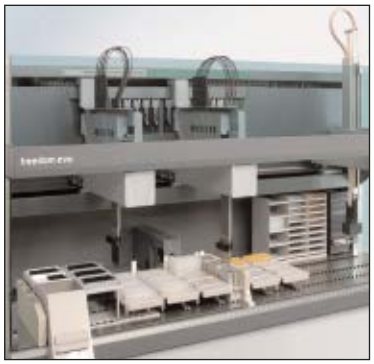
LabX pro titration software v2.5 features dual mode, which allows parallel work at the instrument, from the titrator terminal, or both. The software can connect remotely over an Ethernet connection—allowing one user to operate the instrument while others use the software for analysis, compliance practices, and to back up paper reporting.

Mettler Toledo
www.mt.com

HIGH-PERFORMANCE PIPETTE

The Transferpette® S provides comfort and performance with traditional design. It is lightweight, yet robust with one-handed operation and autoclavability. Eight adjustable models cover volumes from 0.1µL to 10mL. Compatible with leading brands of tips. Available singly and in sets from laboratory dealers.

BrandTech Scientific, Inc.
www.brandtech.com



AUTOMATED LIQUID HANDLING AND ROBOTICS

The Freedom EVO® liquid handling workstation is fully customizable for the automation of genomic, proteomic, drug discovery and development, and other life science applications. This platform can be integrated with a wide choice of robotic arms, high precision pipetting tools, and application modules, including 96- or 384- multi-channel pipetting and barcode sample identification.

Tecan
www.tecan.com

HANGING DROP AUTOMATION

The mosquito® uses the same technique for both screening and scale-up and was designed for membrane protein crystallographers. It features accurate positioning, the ability to miniaturize crystallography set-ups (with drop volumes of only 50nl to 1200nl), and disposable pipettes for zero-cross contamination of samples.

TTP LabTech
www.ttplabtech.com

PLASMA CLEANING FOR PIPET TIPS

The TipCharger® System uses room temperature atmospheric pressure plasma to clean and sterilize pipet tips by removing contaminants at the molecular level without liquids. This plasma cleaning technology, speeds run time, and improves assay productivity. The system can be integrated into both new and existing workstations.

Cerionx
www.cerionx.com

MANUAL AND ELECTRONIC PIPETTES

The range of Sarpette® M manual and E electronic pipettes are available in single, 8, and 12 channel configurations. The manual pipettes feature continuously adjustable volumes from either the dispenser button or thumbwheel. The electronic pipettes feature operation modes that include various mixing, dispensing, and sequential aspiration options.

Sarstedt
www.sarstedt.com

VERIFICATION SYSTEM

Capable of accurate volume verifications of multichannel and automated liquid handlers, the Multichannel Verification System produces traceable accuracy and precision measurements in one simple experiment. The system is able to verify liquid handlers with up to 384 channels using aqueous and non-aqueous solutions for volumes as small as 0.03 microliters.

ARTEL
www.artel-usa.com

PH AND CONDUCTIVITY TESTERS

The PHH-7000 series of testers are microprocessor-based. These handheld devices feature a special viewing angle, large LCD which displays pH, conductivity, and temperature simultaneously, and rugged IP67 rated waterproof housing. They include replaceable sensors and a convenient carrying case with buffer or standard solutions for easy calibration.

Omega Engineering
www.omega.com

LOW FLOW MASS FLOW METER AND CONTROLLER

The Micro-Trak™ flow meter and controller is designed for flow ranges under 4 sccm (smlm). Its all-stainless-steel flow path is suitable for most clean gases including corrosives and toxics. The meter has a small footprint (3.0" x 1.0"), 24 VDC power, and choice of multiple communications.

Sierra Instruments
www.sierrainstruments.com

HANDHELD METER

When connected to a multiparameter sensor (MPP 350), the Multi 3500i can measure and display four parameters simultaneously on the backlit graphic display. Other features include GLP-compliant calibration recording capability, 1800 data set memory, time-controlled datalogging, and bidirectional RS232 interface.

Nova Analytics
www.novaanlaytics.com

PH GLASS FORMULA

This pH glass formula, GXV, works in low ionic strength solutions as well as high pH applications. The sample pH is registered in less than 20 seconds and the pH value is reproducible over the entire pH range from 0 to 14.

Van London – pHoenix Co
www.vl-pc.com

BENCH CONDUCTIVITY METER

The Traceable® bench conductivity meter allows users to fulfill all official lab analysis regulations and reagent-grade water standards for CAP, ASTM, NCCLS, and ACS. A microcomputer program and software program allow four calibration points to ensure accuracy over the entire range. Readings are displayed in conductivity, resistivity, total dissolved solids, salinity, concentration, and temperature.

Control Company
www.control3.com

ELECTROCHEMICAL SENSORS

The InLab® pH electrode sensors measure pH, ORP, conductivity, and dissolved oxygen measurements. They were designed for use in the chemical, pharmaceutical, food technology, and biological industries. Part of the line was even designed for use in highly viscous samples.

Mettler Toledo
www.mt.com

MICROPLATE CYTOMETER

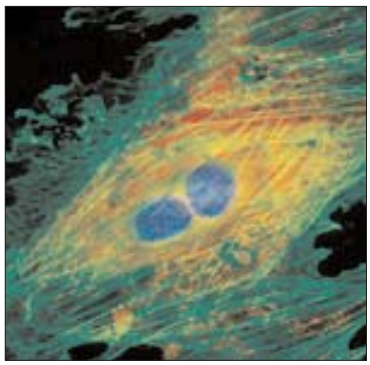
The Acumen® eX3 microplate cytometer is equipped with up to three lasers at 405, 488, and 633 nm. It is compatible with a variety of fluorescent reagents. It delivers the object recognition of CCD Imagers combined with the fast reads of bulk fluorescence readers.

TTP LabTech
www.ttplabtech.com

LED MICROSCOPE

The DM1000 LED was designed for cytology, histopathology, and other clinical and biomedical laboratory applications. The microscope incorporates LED illumination which provides color neutral illumination and rarely needs lamp replacement. An optional portable solar power supply is available for field-based applications. Eyetubes can be individual adjusted or configured with an ergonomic 15° viewing angle.

Leica Microsystems
www.leica-mycrosystems.com



FLUORESCENT PROTEIN FILTER SETS

Filter set solutions are available for Invitrogen's Vivid Colors, Clontech's Living Colors, and MBL's Coral Hues as well as the fluorescent proteins developed at the University of California San Diego. All of the filter sets produce steep slopes and accurate band placement, for maximizing excitation and emission energy and for minimizing background.

Omega Optical
www.omegafilters.com

OPTICAL BOTTOM PLATES

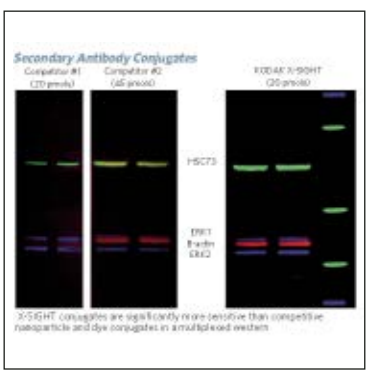
The NUNC brand 96- and 384- well optical bottom plates combine an upper structure bonded to a clear base that provides superior optical clarity in imaging applications using microscopes or plate readers. The plates are available with upper structures in black for fluorescence studies or white for luminescence assays.

Thermo Fisher Scientific
www.thermofisher.com

FLUOROMETRIC IMAGING PLATE READER

The FLIPR Tetra® fluorometric imaging plate reader features an aequorin option. This option includes a camera that can detect both fluorescence and aequorin luminescence and a new cell suspension option. The system can measure up to 1536 kinetic measurement simultaneously.

Molecular Devices
www.moleculardevices.com



IMAGING AGENT ANTIBODY CONJUGATES

The KODAK X-SIGHT imaging agent antibody conjugates were designed for in vitro imaging applications. They are designed to be biocompatible and non-toxic. They are available conjugated to a variety of secondary antibodies in four distinct excitation and emission wavelengths, spanning just above UV to near IR.

Carestream Health
www.carestreamhealth.com

MANUFACTURING SERVICES

The integrated contract development and manufacturing services include instrumentation, disposables, and custom automation. These services were designed for specialist applications, such as handling magnetic beads, microarrays and glass slides, heating and cooling, image acquisition and analysis, and design of highly integrated optics.

Invetech
www.invetech.us

LAB REFRIGERATORS AND FREEZERS

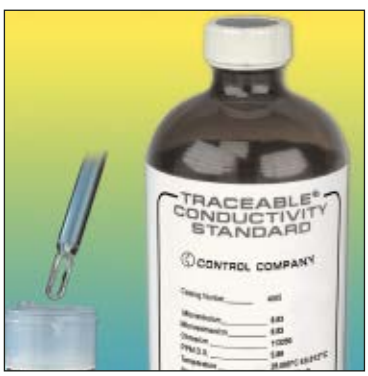
An upgraded line of value-based refrigerators and freezers has been developed for general purpose applications in clinical, life science, and industrial laboratories. The product line includes 23-cu. ft. (single door), 40-cu. ft. (double door) models and 61-cu. ft. (triple door) models with stainless steel interior and exterior surfaces, microprocessor controls, and digital temperature displays, available with solid or glass doors.

Sanyo
www.sanyobiomedical.com

COMFORTABLE SYNTHETIC GLOVES

Synthetic Neogard™ chloroprene gloves stretch and conform to your hands for a comfortable fit and feel. The special formulation reduces the hand fatigue associated with some synthetic gloves.These powder-free gloves are latex-free and are textured for enhanced wet grip and sensitivity. They are more puncture resistant than latex and have a chemical resistance similar to nitrile.

USA Scientific, Inc.
www.usascientific.com



CONDUCTIVITY STANDARDS

Traceable® Conductivity Standards calibrate all conductivity meters and probes for maximum accuracy. Accuracy at 25 °C is ± 0.25 micromhos for 1, 5, and 10 micromho solutions and ± 0.25% for other solutions or the uncertainly shown on the certificate, whichever is greater. Standards are 100% compatible with all makes of equipment.

Control Company
www.control3.com

CUSTOM AUTOMATION

TTP LabTech's custom automation business provides practical and innovative integrated automation across a number of industry sectors. Recent projects include: automating a chemical synthesis process for increased production efficiency; the development of a novel tablet-coating system with a capacity of 250,000 tablets an hour.

TTP Labtech
www.ttplabtech.com

MODULAR GENERATOR

The 491M/B/SD modular gas standards generator dynamically blends precisely known VOC/TOC gas standards with parts-per-billion (ppb) and parts-per-trillion (ppt) analyte concentrations. The geneartor uses dynamic blending to circumvent the common problems with ppb and ppt standards. The modular, two-stage dilution approach uses permeation tubes with measurable rates to control analyte flow.

KIN-TEK Laboratories, Inc.
www.kin-tek.com

MASS SPECTROMETRY SYSTEM

The Synapt™ High Definition MS™ (HDMS)™ System is the first mass spectrometer to employ technology to analyze samples and differentiate sample ions by their size and shape and charge, as well as their mass. This new capability increases specificity and sample definition beyond that achieved by conventional commercially-available mass spectrometers.

Waters
www.waters.com

GAS CHROMATOGRAPH/ MASS SPECTROMETER

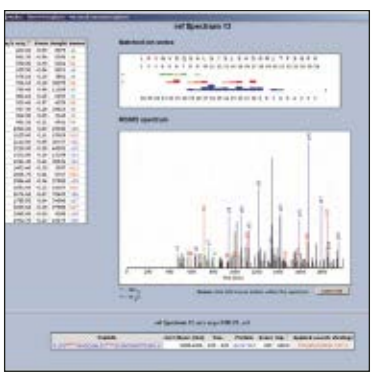
The Clarus 600 Gas Chromatograph/ Mass Spectrometer combines the Clarus 600 Gas Chromatograph (GC) with multiple pumping options in our Clarus 600 Mass Spectrometer (MS). This combination offers increased sample throughput and sample-centric, application-focused software. Multiple pumping options meet a variety of laboratory needs.

PerkinElmer Life and Analytical Sciences
www.perkinelmer.com

TEMPERATURE SPRAY CHAMBER

The IsoMist Programmable Temperature Spray Chamber provides the benefits of a temperature-controlled ICP sample introduction system in a compact, convenient package. The temperature is electronically controlled using a powerful built-in Peltier device. Any temperature between –10 °C and +60 °C can be selected.

Glass Expansion Inc.
www.geicp.com



SPECTROSCOPY REFERENCE DATABASE

A new spectroscopy reference database and software product, KnowItAll®U, for academic research and teaching represents a powerful combination of reference data, tools, and technologies that will assist faculty, staff, and students in their scholarly research. In addition, this product can be used to train students in the skills and technologies they will need once they leave academia.

Bio-Rad
www.bio-rad.com

SPECTROSCOPY SOFTWARE

Modiro™ is a novel software tool enabling rapid, automated detection of true post-translational modifications in MS/MS datasets. It was developed to discover PTMs, which cannot be detected by any other software. It allows the investigation of the large amounts of valuable information hidden in acquired MS/MS data and overcomes the tremendous amount of manual analysis time.

Protagen AG
www.protagen.de

GAS CHROMATOGRAPH/ MASS SPECTROMETER

The GC/MS-QP2010 Plus features a mass range of 1.5 to 1090 m/z, an ion source temperature range from 100 °C to 300 °C, and dual turbo pumps. It also features automatic adjustment of retention time (AART), fast automated scan/SIM type (FASST), and creation of automatic SIM tables (COAST).

Shimadzu Scientific Instruments
www.shimadzu.com

New Modular Detection Platform is User-Configurable

Unique Cartridge Design Delivers Flexibility to Meet Changing Application Needs

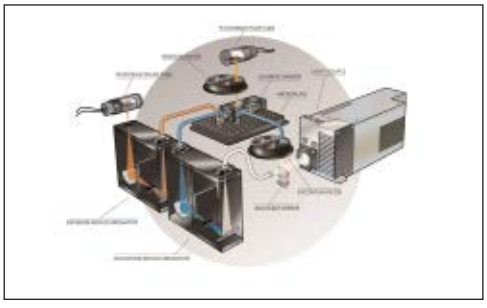
Beckman Coulter, Inc. in 2007 introduces the PARADIGM™ Detection Platform, a unique, modular system that allows quick and easy configuration by the user. The platform features a selection of cartridges that can be interchanged in less than five minutes to meet different assay needs, making this the first user-upgradable and -configurable multimode reader. It is ideal for labs with multiple users and applications. The high-throughput detector reads on the fly, in formats from 6 to 1,536 wells.

Eight different cartridges will be available, based on detection modes including fluorescence polarization, time-resolved fluorescence, dual-label fluorescence (including FRET) and luminescence. A monochromator-based absorbance cartridge will also be offered. Future cartridges, including models specifically designed for the new BioRAPTR FRD™ microfluidic workstation, are in development. Beckman Coulter will also provide custom-labeled cartridges for these read modes, to meet unique user needs. The cartridges contain application-specific elements, including wavelength-tuned light sources and optics that can be interchanged on the detector.

The PARADIGM system software comes with a portfolio of generic protocol templates, for the most common detection measurements to streamline user start-up and operation. Assay protocols for third-party chemistry kits are also included, allowing the user to simply enter the number of samples and read the plate. The menu of kit-specific assay protocols will be expanded through ongoing development with several reagent partners. An Auto Update software feature will allow the user to preview available assay protocols and install them with a single click.

www.beckmancoulter.com

Synergy™ 4 with Hybrid Technology™ Redefines Multi-Detection Microplate Reader Market



The new patent-pending Synergy™ 4 Multi-Detection Microplate Reader is the first multi-mode reader capable of performing an unlimited number of microplate-based assays. Synergy 4's Hybrid Technology™ redefines versatility by combining the sensitivity and speed of filter-based fluorescence technology and the flexibility and convenience of a monochromator-based fluorescence system. This means that microplate assay choice is no longer restricted by the technology of the microplate reader, and endless flexibility is available for both current and future microplate-based assay choice.

A wide range of measurement techniques include Fluorescence Intensity, Luminescence, Fluorescence Polarization, Time-Resolved Fluorescence, UV-Visible Absorbance, FRET, TR-FRET, BRET, well area scanning and spectral scanning. The Synergy 4 has high throughput capacity for optimized screening assays, including 1536-well read mode, along with built-in temperature control, shaking and optional dual reagent injectors for enhanced microplate-based applications. In addition, integrated Gen5™ Data Analysis Software provides the most powerful and efficient microplate control, data collection and data analysis on the market today.

HTRF® certification from Cisbio International and DLReady™ certification from Promega Corporation guarantee that Synergy 4 provides the highest performance levels and standards for HTRF and Dual-Luciferase® Reporter assays respectively.

The modular design of Synergy 4 allows for acquisition cost savings and future upgrades as experimental requirements change, and by designing a multi-detection microplate reader that combines the best of filter-based and monochromator-based fluorescence systems, customers will benefit from increased control in assay selection for current as well as future demands.

www.biotek.com/synergy4.

A Smart Connection

Applied Biosystems Smart Services

Continuing to deliver the highest level of service and support for your Applied Biosystems instruments, we bring you our award-winning Smart Services.

These remote services can help the high-availability lab increase efficiency, improve utilization, and significantly reduce costs.

•Smart Monitoring – Increase instrument uptime with remote instrument troubleshooting and diagnostics

•Smart Reporting - Improve efficiency with automatic custom reporting, including reports on instrument productivity and performance history

•New AB Smart Center – Improve your lab's productivity by viewing detailed instrument status information online and chat with Applied Biosystems Technical Assistance Center (TAC).

When one of your instruments is down or not functioning at peak performance, you lose valuable data and time. Our Smart Monitoring Service remotely tracks critical system parameters and identifies potential instrument problems before they affect your lab's efficiency.

•Automatically monitor performance trends in your system and receive notification of instrument errors

•Identify and respond to existing and potential problems quickly and easily

•Avoid time spent with trial-and-error troubleshooting by your staff

•Avoid unscheduled visits and overtime charges when service representatives proactively diagnose problems and arrive on site with the right parts

•Avoid loss of samples and critical data

Make life in the lab a little easier with Applied Biosystems Smart Services.

Smart Services are available on selected Applied Biosystems genetic analysis, instruments and Sequence Detection Systems, and Applied Biosystems/MDS SCIEX mass spectrometers. The service is included in our most popular service plans, our AB Complete and AB Assurance Service Plans, and as part of the instrument warranty.

To learn more about Applied Biosystems Smart Services, contact your local Applied Biosytems sales representative, e-mail servicecontractsales@appliedbiosystems.com, or call 800.345.5224,options 1, 4.

http://info.appliedbiosystems.com/globalservice

Thermo Scientific Barnstead™ Pure Water Systems

Thermo Fisher Scientific Inc., the world leader in serving science, now offers the most comprehensive line of laboratory water purification systems available from one company. These products incorporate adsorption, deionization, distillation, filtration, reverse osmosis, and UV oxidation technologies, providing scientists with high-purity water for critical analytical and research applications, including molecular biology and cell culture in life science.

Thermo Scientific Barnstead High Purity Lab Water Systems feature state-of-the-art purification technologies, integrated within ergonomic, user-friendly designs.

The Thermo Scientific Barnstead NANOpure® water system offers a unique combination of reliable, ultrapure water with easy operation and maintenance and low operating cost. Our application-specific models utilize cartridge packs tailored for specific feed water types and end uses. They provide the ideal water for the most sensitive requirements, including: IC, ICP/MS, HPLC, GC/MS, HPLC and TOC determinations. These advanced systems produce water that consistently achieves 18.2 megohm-cm resistivity and TOC (Total Organic Carbon) values of < 1 ppb. Our high-capacity cartridge packs, filters and UV lamps provide the lowest operating cost of any lab water system available. Furthermore, accurate TOC monitoring is available on all systems.

Providing purified water for general lab use, the Thermo Scientific Barnstead Dlamond™ RO reverse osmosis system is easy to operate and maintain. This system combines multiple purification steps in a single unit, incorporating the latest advances in both pretreatment and membrane technologies.

Our wide selection of distillation equipment includes glass stills, bi-distillers, electric and steam powered classic stills, and cabinetized units. We also offer a range of storage reservoirs.

In addition, our experienced technical support team offers advice and troubleshooting, along with services such as a cartridge recycling program and technical application briefs to validate specific contaminant removal.

www.thermo.com/purewater

How can I get more value from my Sigma-Aldrich purchases?

Easy to Join | **Fun to Participate** | **Name Brand Rewards**

EARN SUPPLY REWARDS.com

Because we're listening being a Sigma-Aldrich customer has never been more rewarding. We're offering a program designed to thank you and *reward you each time you purchase select products* from us.

With our Supply Rewards® program, you earn rewards for yourself or your laboratory every time you purchase from select research lab products. It's easy to join, just visit supplyrewards.com to get started.

We're committed to providing you with even more reasons to choose Sigma-Aldrich as your primary source for your essential research products.

We understand you have choices. Our extensive product lines, dedicated quality assurance teams, unrivaled technical support, state of the art warehouses and our ability to deliver our products on time and under the proper storage conditions are just some of the many reasons to choose Sigma-Aldrich.

Contact us at **supplyrewards@sial.com** with any questions.

Offer void where prohibited by company policy or state law. Available in the U.S. only.

SIGMA-ALDRICH

Delivering Science Through Business Understanding

sigma-aldrich.com/rewards

Bar Codes
as a Powerful Automation Tool

It is a question that is all too familiar in today's labs. *"We have to automate our laboratory, but how?"*

The benefits of automation are profound. Productivity and accuracy improvements can be significant. However, some labs still rely on old-world methods of manual data tracking because they don't think they can justify the investment or time commitment to automate. In reality, a simple bar-code scanner — a proven and reliable technology — holds the answer to automation.

Bar codes are a cost-effective technology available to automate many of the time-consuming and error-prone processes taking place daily in your facilities. In fact, laboratories can scarcely automate today without bar codes. While other technologies may someday offer more cost-effective identification, bar codes are essential to automation efforts in today's lab setting. Many labs are not only integrating bar-code scanning and printing to satisfy a customer requirement, but to streamline and improve their own operations.

When a national research project to investigate adolescent AIDS cases needed to manage numerous samples from multiple locations, it looked to bar codes to improve test data collection and track test results. Sixteen clinical sites in 13 cities were part of the study, feeding samples to two central laboratories for testing or storage. Each sample, typically blood or a gynecological specimen, needed to be uniquely identified as study participants make multiple visits per year where similar samples are taken.

A bar-coded identification system was implemented to track each person throughout the duration of the study with labels that identify the site, the subject number, the visit number, the nature of the sample, and similar samples from the same visit. Because of the complexity of information required to track the samples, the study would have been "virtually impossible without the bar codes," said a key member of the research staff.

Table 1. Comparison of manual data entry vs. bar-code data entry (12-character alphanumeric message)

	MANUAL ENTRY	BAR CODE SCANNING
TIME REQUIRED	4 to 6 seconds	1 to 2 seconds
ACCURACY	1 error/300 characters	1 error/10 million characters

Bruce Wray

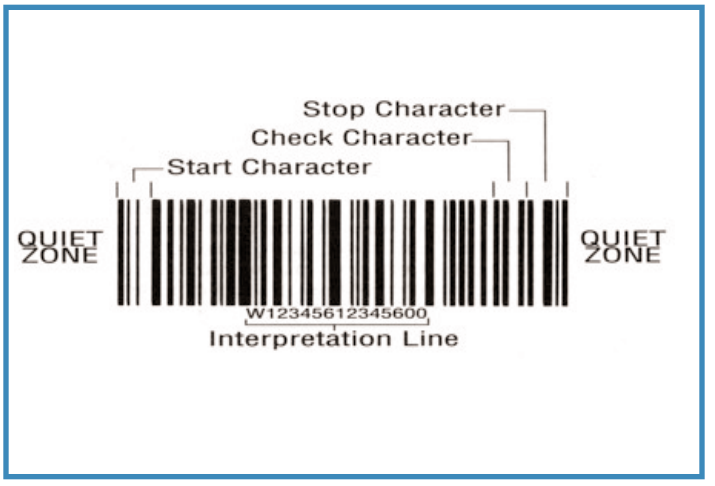


Figure 1. Commonly used terms to identify bar-code features.

WHY BAR CODES?

The use of bar codes has proliferated because it is both fast and accurate (see Table 1). While not the only method of data collection available, bar codes don't necessitate a trade-off between speed and accuracy. Equally important is the ease of use. Add to that the performance increases and cost decreases of microprocessors, and the rationale for bar-code technology becomes compelling. Bar codes are fast, accurate, easy-to-use, and inexpensive.

BREAKING DOWN BAR CODES

While bar codes have been a part of our lives for years, not everyone understands the technology. Bar-code scanning is based on a simple principle — light is reflected in different amounts by different colored surfaces. To decode the information in a bar code, a small spot of light is passed over the bars and spaces via a scanning device. This bar-code scanner can be a hand-held wand, a fixed-beam device, or a moving-beam device. The bar code will reflect the spot of light back into the scanner in varying amounts. That is, the dark bars of the bar code will absorb light, while the white spaces will reflect light. These differences in reflectivity are translated into electrical signals by a light detector inside the scanner. The signals are converted into binary ones and zeros; these are used in various combinations to stand for specific numbers and letters.

To be an educated consumer of bar-code technology, it's important to know some commonly used terms to identify important features of the bar code itself (Figure 1).

The quiet zone: This is the area immediately adjacent to the beginning and the end of the bar code symbol. These zones define the parameters of the code. They are not merely aesthetic, but are required for the scanner to determine background reflectance, which enables the device to differentiate between bars and spaces.

Start and stop characters: Found at the beginning and end of each bar-code symbol, these characters tell the scanner from which direction information is being received and which symbology is being used. These characters also provide for "bi-directional scanning," which means that both left-to-right and right-to-left scan patterns will result in identical decodes.

Check character: Usually the next-to-last character in a bar-code message, this character derives its value from an algorithm that runs on the other characters in the message. The check character ensures the entire message has been decoded correctly.

Interpretation line: This is the line above, beneath, or adjacent to a bar-code symbol where human-readable information appears. It may not exactly match the data encoded; there is no "rule" about what information must appear in the eye-readable unless there is a specification that outlines such a requirement.

PRINTING BAR CODES

Beyond the decision to implement a bar-code identification system, selecting the right label or printing method for bar-code labels is equally important. In the case of the AIDS project, the bar-code labels needed to withstand extreme temperature variances as samples go through five freeze/thaw cycles, going from -70 °C to room temperature and back again. It is imperative that the bar-code labels are read correctly every time, stay adhered to the sample container, and can endure harsh chemicals or extreme temperatures in order to survive in the end-use environment.

Bar-code symbols can either be provided on pre-printed labels or printed on-demand. There are advantages and disadvantages to each approach. Some users go through a formal "make vs. buy" exercise to determine the best option for their application.

Pre-printed labels: Microwell plates, glass or plastic vials, slides, and other lab containers can be pre-labeled for maximum convenience. The data required can be printed and/or encoded on the item to exactly meet specifications. Guarantees are available that preclude duplicate numbers and ensure sequence integrity.

On-demand: The most common on-demand bar-code label printing technology in the lab is thermal transfer. Printers of this type produce images on label stock by selectively heating or not heating tiny sections of a thermally sensitive ribbon passing over the print head. When the heat element (called a "pixe") is turned on, the heat it generates causes the ribbon to transfer its image to the label stock moving beneath it. Each of these tiny heaters is controlled by logic in the printer and is a rectangular dot or bar shape. The same printer logic that controls the heating elements also controls the movement of the label stock past the printhead, permitting the printing of a complete label.

There is a wide variety of label stocks available for thermal transfer printers. Many of the non-paper materials (polyester, polyolefin, etc.) will withstand chemical spills and other harsh conditions they might encounter in a lab environment. That means bar-code labels can be used in a lab without concerns about durability and long-term scannability.

Below are some of the features of thermal transfer printers important to labs in making product selections. There are many makes and models available from low-cost desktop units for under $1000 to more feature-rich and costly models.

- Maximum print width—The widest image that can be printed.
- Maximum label width—The widest label stock that can be accommodated.
- Maximum roll size—The outside diameter of the largest roll of label stock the printer can handle. The larger the roll of stock, the less often the roll must be replaced. This can be an important issue for high-volume printing, but is not as critical for medium- and low-volume applications.
- Maximum print speed—How fast the label is printed.
- Rewind and dispense mode—Internal rewind means that the printer will do batch printing and then wind the printed stock onto a take-up roll insider the printer. A more common use of on-demand printers in health care is the print-and-dispense mode, in which the label is printed and partially ejected from the front of the printer as the release liner is wound up inside the printer for later disposal.
- Resolution—Measured in dots per inch (dpi), this is the feature that determines the bar code

densities that can be printed. Printers used in healthcare are typically 203 dpi, 300 dpi, or 600 dpi. The higher the resolution — the more dots per inch — the smaller the narrow elements that can be printed. Beyond bar-code density, another reason to use a high-density printer is enhanced readability of smaller text.

WHAT'S NEXT IN AUTO ID FOR LAB AUTOMATION?

Bar codes are not the only method of automated data collection. While they have advantages over, for example, to Optical Character Recognition and manual data entry, linear bar codes have inherent limitations that other, newer technologies do not have. While technology is changing at an ever-increasing rate, the following summary highlights the major identification technologies that may replace or enhance the scanning of a simple bar code.

Stacked bar codes are a series of linear bar codes stacked directly on top of one another that form one continuous message. Advantages include higher capacity than linear codes, read by conventional laser scanners, error detection/correction in most symbologies, and printed similar to linear.

Matrix codes are made up of a block of cells that are filled or unfilled to represent binary data, generally arranged on a square grid. Advantages with matrix codes include large data capacity, well-founded optical technology, error detection/correction, and printed similar to linear. Disadvantages include they must be read by image processors (2-D array of CCD sensors), read-only.

While many of these newer technologies offer great promise, the standard against which they all must be measured is the simple linear bar code — the easiest and most cost-effective method for automated data collection available today.

Note: The table and figure are from Roger Palmer's "The Bar Code Book" (4th Edition), Helmers Publishing Company, Peterborough, New Hampshire, 2001.

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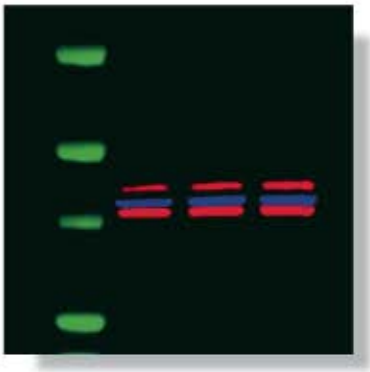

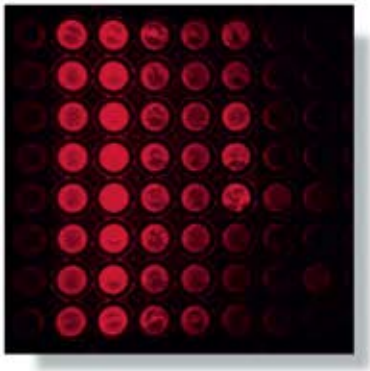

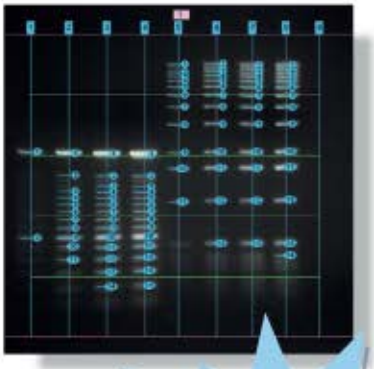

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