LAB REPORTER

Innovative Products and Science News
NO. 2, 2019

Safety Compliance

A Team Effort at Texas A&M

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Solvent Exposure Can Lead to Hearing Loss

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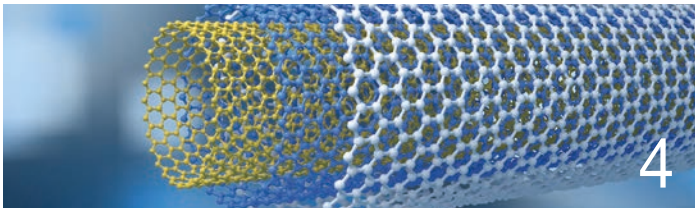
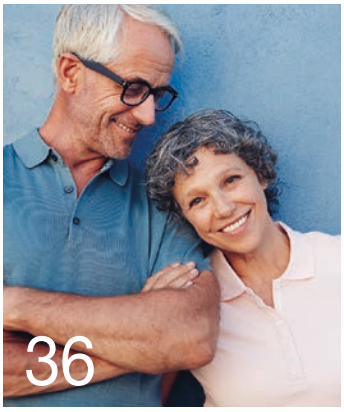
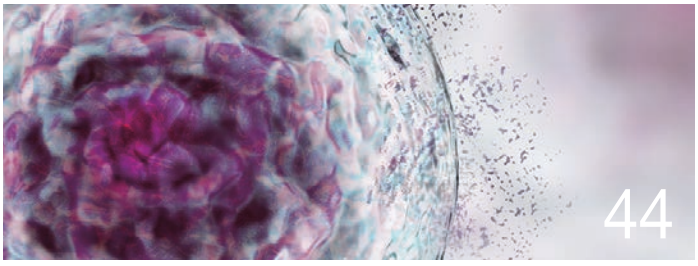
Brain Metabolism Study Reveals Age Difference Between Sexes







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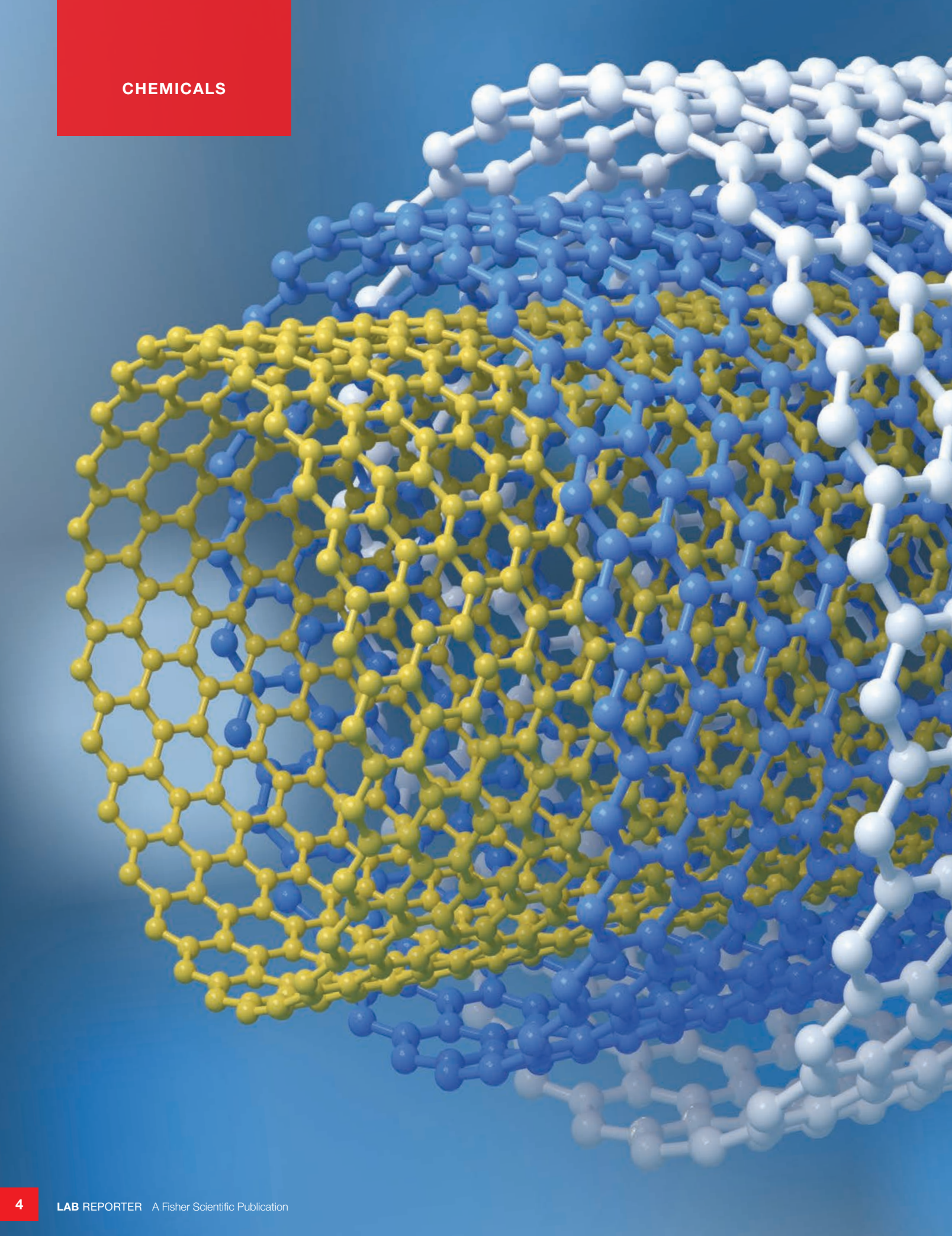


Adaptive Fabric Responds to Changes in Body Temperature

By Kevin Ritchart

Researchers at the University of Maryland, College Park, have developed a self-regulating fabric from infrared-sensitive yarn that responds to changes in temperature and humidity.

The Maryland team, led by YuHuang Wang and Ouyang Min, claims to have created the first textile that automatically changes its structure in response to the environment. The textile is made of synthetic fibers with coatings that wick away perspiration thanks to their loose, breathable weaves. Their research was published earlier this year in the journal *Science*.

A Better Way

Our bodies trap and release heat primarily via infrared radiation. In the winter, we layer textiles to keep heat from escaping, then switch to more breathable fabrics in warmer conditions to allow heat to get away from our skin.

The development of a single garment that would adapt to both ends of the temperature spectrum would be more practical — and hopefully more comfortable — than the current approach.

Despite recent advances in moisture-wicking technology, the development of a single, dynamic fabric that can shed infrared energy when the wearer is hot and retain it when the wearer is cold has remained elusive until the Maryland team's recent work.

"Our breakthrough is creating a dynamic effect for getting heat away from the body," Wang said. "The fabric responds to your personal needs."

> "The fabric responds to your personal needs."

The new fabric's enhanced responsiveness comes from its coating. The polymer fibers are covered in a thin layer of carbon nanotubes. When the wearer is subjected to hot conditions, the carbon layer tightens, drawing the strands closer together and creating gaps in the fabric. The result is a more breathable construction that allows heat to escape and lets the wearer cool down. Conversely, if the environment surrounding the wearer becomes cooler, the fibers expand to help capture heat.

Researchers have reported that the new, adaptive textile fabric has altered heat radiation by over 35 percent.

"Now you can have one base-layer garment that can keep you comfortable in a wider range of temperatures and a wider range of activities," Wang said.

Other Attempts

Apparel brands that specialize in sports and other forms of outdoor recreation have been trying to develop textiles that regulate body temperature for a long time. Most of these materials accomplish this in two ways: increased breathability to let heat escape and quickly pulling moisture away from the body after periods of intense physical activity.

Textile manufacturers, including Schoeller Textil of Switzerland, are among the companies that are trying to develop garments with cooling effects built into the yarn, knit construction, and coating.

"People are more active than they have ever been. Having clothing that allows them to take off an outer garment and not be completely wet is a big advantage," said Stephen Kerns, North American president of Schoeller Textil.

Large-Scale Production

While Schoeller was not involved in the University of Maryland team's research, Wang said experts from other companies (including Milliken and Under Armour) did contribute to their work along with chemists, physicists, and experts from other scientific disciplines.

Taking this technology from the lab to the racks at your favorite sporting goods retailers could prove to be more difficult. More testing is needed, but Wang is hopeful that large-scale production could be feasible later this year.

The new textile can be dyed, knitted, and washed with the methods currently used to produce other performance fabrics, and estimates indicate that the cost of production will be comparable to existing garments.

Protecting n-Butyllithium from Air and Moisture

Alkyllithium compounds such as n-butyllithium are versatile organometallic reagents that give chemists access to a diverse range of transformations. However, these compounds are corrosive and pyrophoric, igniting spontaneously in air.

Meticulous protection from the atmosphere during preparation, handling, and storage is essential for their safe and successful use in synthesis. Here is a look at an industry-leading packaging design that is helping chemists get the most from these important reagents.

N-Butyllithium in Organic Synthesis

Alkyllithium compounds are strongly basic and nucleophilic reagents due to the highly polar nature of their carbon–lithium bond. A commonly used alkyllithium reagent is *n*-butyllithium, a strong base with a pKa of approximately 50.

Like other alkyllithium reagents, *n*-butyllithium is valued for its ability to generate other functionalized organolithium compounds by metalation. Metalation reactions rely on the ability of the alkyllithium reagents to deprotonate weakly acidic protons present in aldehydes, ketones, sulfones, nitriles, and other compounds.

The carbanions generated by deprotonation are valuable intermediates for a wide range of chiral transformations and other organic reactions. Stabilized organolithium compounds generated by metalation can also react as nucleophiles in a wide range of transformations: reactions with alkyl and allyl-halogenides,

Figure 1

addition to carbonyl compounds, conjugate addition, and epoxide ring opening.

Organolithium reagents are also used to prepare other metalorganic compounds by transmetalation, a highly useful technique for producing organocopper and organotitanium compounds, which may have a higher selectivity than organolithium compounds.

Industrially, *n*-butyllithium is widely used as an initiator for anionic polymerization reactions for molecules like butadiene, isoprene, and styrene. These processes are essential for manufacturing a diverse range of goods, such as rubber tires and various plastics and packaging materials.

Safe Handling Methods

N-butyllithium is a pyrophoric reagent and must be handled under rigorously dry conditions to prevent it from igniting upon exposure to air. Typically, solutions of *n*-butyllithium are transferred from their original container to flame-dried reaction vessels under an inert atmosphere (nitrogen or argon) via syringe or cannula technique.

To prevent the *n*-butyllithium solution still inside the original bottle from also being exposed to the atmosphere, the volume of reagent removed is replaced with nitrogen or argon gas. Anhydrous solvents may also be used with reactions of alkyllithium compounds to minimize degradation of the reagent due to water present in the solvent.

When *n*-butyllithium is exposed to air or moisture during preparation or storage, its concentration can be diminished, leading to an inaccurate amount being used in a reaction. The use of partially degraded *n*-butyllithium solutions can cause poor yield, create a greater number of byproducts, require more complicated and time-consuming purification, and potentially produce a failed synthesis.

The packaging of *n*-butyllithium should be robust enough to protect the material during transport while also allowing the reagent to stay as dry as possible during repeat uses. Common laboratory attempts to maintain the quality of air- and moisture-sensitive reagents include:

- Adding rubber bungs to opened reagent bottles
- Sealing lids and caps with paraffin film wrap
- Storing bottles in bags that contain desiccant
- A combination of these and other tactics

These methods have serious limitations and are not adequate for the safe, long-term storage of organolithium reagents.

Packaging Improvements

Modern advances in packaging design help today's chemists benefit from high-quality *n*-butyllithium that maintains its original reactivity. Acros Organics Anhydrous Alkyllithium Reagents are packaged in sturdy borosilicate bottles with special AcroSeal caps that offer increased protection against air and moisture.

Acros Organics Alkyllithium Reagents are packaged when the chemical is as dry as possible to deliver optimal reactivity, and the innovative AcroSeal system helps the reagent stay dry. And it can be handled safely during repeated use without compromising ease.

AcroSeal packaging provides a safe and effective way of handling *n*-butyllithium and other air- and moisture-sensitive organolithium reagents. It allows removal of the reagent from the bottle under an inert atmosphere. Caps are fitted with a wider septum (Figure 2) that is conveniently large and can be punctured up to 20 to 30 times and in multiple locations, letting you avoid entering the same hole twice (a common source of atmospheric exposure). The wide septum also makes it easier to keep the reagent dry when transferring it to dry labware. The multi-layered septum is lined with a polymeric elastomer with an inert fluoropolymer-coated surface, which improves resistance to damage from the reagents in the bottle.

Acros Organics Organolithium Reagents come in a range of sizes, helping to minimize waste and ineffective reagents by providing the precise amount that you need. In the end, there are no unused reagents sitting on the shelf — a common sight in many laboratories.

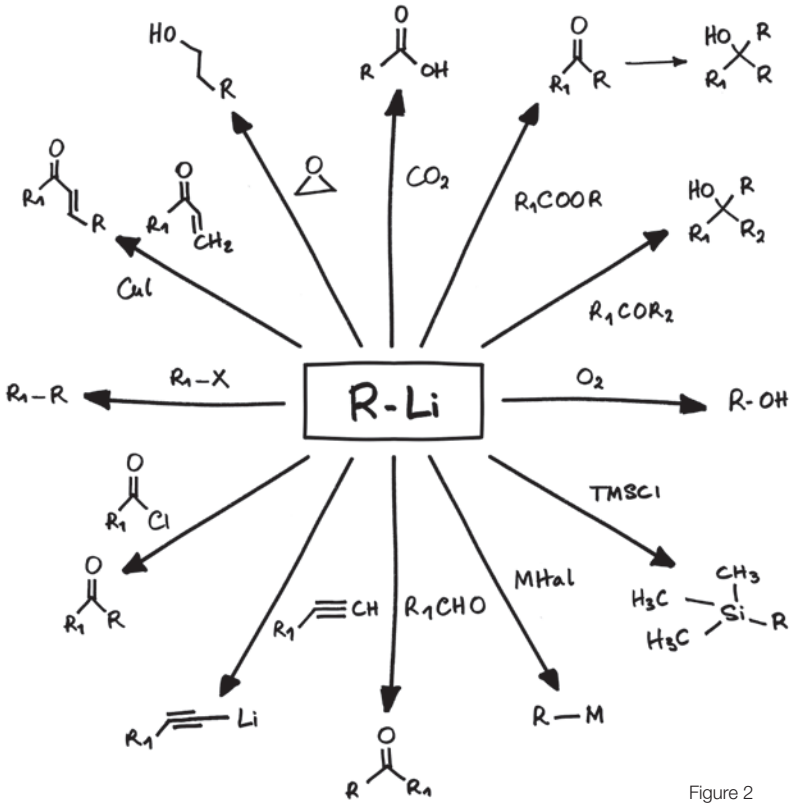


Figure 2

High-Quality Organolithium Reagents for High-Quality Syntheses

Unlocking the full potential of alkyllithium compounds requires the use of high-quality anhydrous reagents and solvents that haven't been impaired by exposure to air or moisture. To allow all chemicals that are added to reaction vessels to be as dry as possible, the Acros Organics brand uses AcroSeal packaging to protect a comprehensive range of reagents and solvents. AcroSeal packaging facilitates the safe transfer of those reagents into the reaction vessel while allowing chemists to get the most from their reactions.

The Acros Organics brand offers many popular butyllithium products in AcroSeal packaging. Visit **fishersci.com/organometallics** or **fishersci.ca/organometallics** to view our complete offering of alkyllithium products.

Content provided by:

ACROS ORGANICS

Figure 1. AcroSeal packaging protects organolithium reagents from degradation by air and moisture.
Figure 2. Organolithium compounds can be used in an extensive range of chemical transformations.

TCI: Innovating to Improve Lab Safety

Safely and Easily Use Nickel Catalysts in Your Reactions

At TCI, we know safe chemistry is paramount. That's why we are always researching and developing new methods and delivery mechanisms that improve laboratory safety.

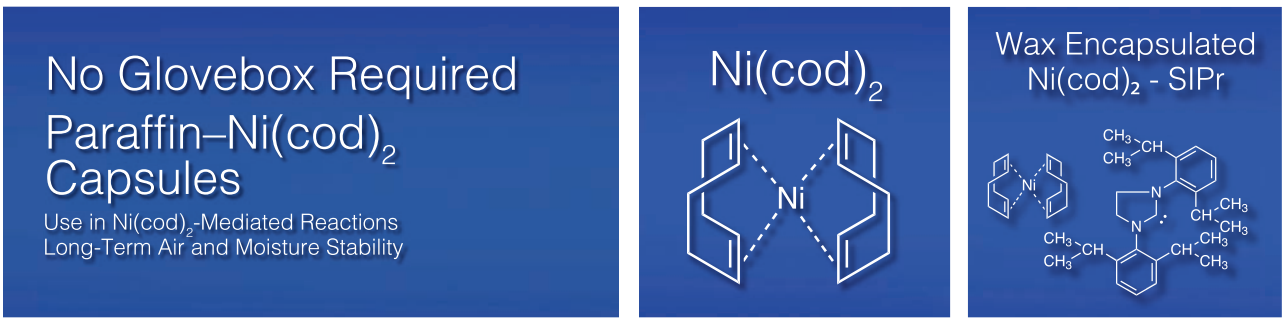
Professor Neil Garg at University of California, Los Angeles (UCLA) is performing research that includes the development of catalytic methodologies to activate amide C–N bonds. One particular method involves a nickel-catalyzed amide activation reaction to access esters, other amides, and ketones from this traditionally inert functional group.

Generally unstable and difficult to handle, $Ni(cod)_2$ is commonly used in chemical synthesis to catalyze the formation of a variety of carbon-carbon bonds — the heart of organic chemistry transformations. Noteworthy examples include cycloadditions of 1,3-dienes, cross-coupling reactions, and esterifications.

However, the use of these methodologies has been fettered by the need to handle the synthetically important, air-sensitive $Ni(cod)_2$ precatalyst in a glovebox.

To eliminate these handling challenges, TCI partnered with Garg to develop a long-term air- and moisture-stable paraffin–$Ni(cod)_2$ capsule. These capsules let chemists perform transformations on the open benchtop and have been successfully used for amide activation reactions and a number of other $Ni(cod)_2$-mediated cross-coupling reactions.

These innovative capsules are expected to broaden the use of nickel catalysis in both academia and industry.



TCI's DualSeal: Air-Free Reagent Containers for Safer Handling

Sealed, air-free products are packaged in TCI's patented DualSeal reagent bottles. The two-cap design enables safe, air-free transfer of highly sensitive reagents. Additionally, DualSeal containers are self-sealing even after the septum has been pierced and are easily discarded. Lastly, DualSeal bottles can maintain consistent air-tightness over repeated usage and maintain nominal O_2 and H_2O concentrations.

Please contact your Fisher Scientific sales representative or chemical specialist if you need more information, are interested in Paraffin–$Ni(cod)_2$ capsules, or would like to see a list of products available in DualSeal containers.

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TCI


Septum Cap


Cover Cap


Final Product


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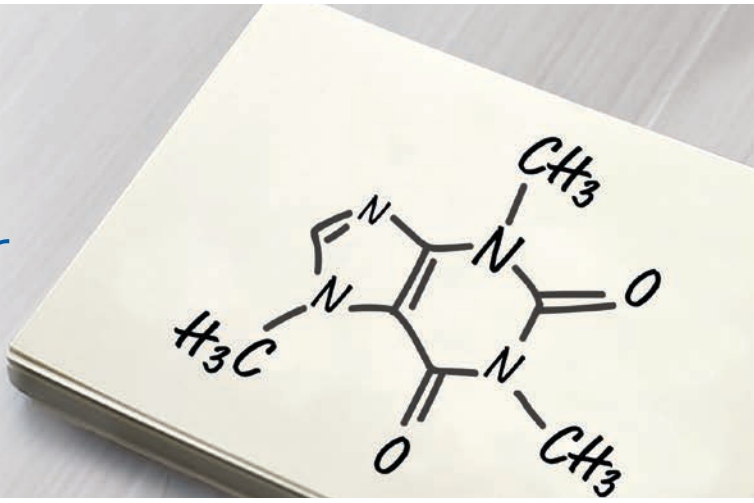

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Microplastics: Investigating Risk and Understanding Evidence

By Kylie Wolfe

Scientists recently found evidence of microplastics in the human body, making them pause and ask: Is this harmful? While this question requires additional research, the presence of microscopic particles in our food and water sources is a reality.

Plastic Paradise

In a society that's slowly becoming more eco-conscious, plastic pollution continues to impact the world's water sources. Roughly eight million metric tons reach the oceans each year, ultimately breaking into particles ranging from 100 nanometers to five millimeters in size.

According to a new pilot study, these tiny pieces have made their way into the food chain. Philipp Schwabl, a scientist and physician at the Medical University of Vienna, partnered with Bettina Liebmann, an analytical chemist at Environment Agency Austria to test stool samples from eight individuals. They found a variety of common plastics in each, this being the first study to verify that humans are, in fact, consuming microplastics.

Since the sample size was so small, researchers are hoping to widen their studies to learn whether or not these foreign fragments are damaging people's gastrointestinal tracts.

Laying the Groundwork

Though microplastics are microscopic, they have hazardous potential. Not only do they contain chemicals, but they can carry contaminants, including bacteria like *Escherichia coli*.

To learn more, a number of organizations in Europe are beginning to fund more investigatory research efforts. An initial analysis from Science Advice for Policy by European Academies (SAPEA) totaled 173 pages and found that microplastics do not appear threatening at this time.

"Of course, a lack of evidence for risk does not mean we should assume there is no risk," said Bart Koelmans from SAPEA. The study also noted that if pollution continues to rise at the current rate, SAPEA's conclusion could change.

Diving Deeper

Toxicologist Heather A. Leslie from Vrije Universiteit Amsterdam is an expert in microplastics who's concerned with the possible health impact. She suggests that shellfish could be a warning sign of the effects of said pollutants.

A study published in *Environmental Science and Technology* found that shellfish accrue billions of plastic particles in only a few hours, revealing a clear source of microplastics in a popular food item.

"I don't see any evidence at present of concern for human health in eating seafood," said Richard C. Thompson, a contributor to the study and a professor of marine biology at the University of Plymouth.

To date, scientists have found microplastics in the air, soil, and water, proposing that food packaging, in addition to litter, cosmetics, and paints, could be a source. They also note that ingesting chemicals can have a more harmful effect than if they were inhaled.

Future Exploration

As research on the topic gains traction, Schwabl hopes to raise enough money for a second round of his initial study, this time with more participants. He would like to examine if microplastics affect individual cells or the intestinal tract and whether or not there's a tie to gastrointestinal disease.

> "We are still at the initial stages of understanding human exposure and what the threat may be."

To spearhead the cause, the Europen Chemical Industry Council (Cefic), set aside the equivalent of 680,000 USD for two studies: one to research potential hazards and the other to understand how microplastics travel in our oceans. The council received nearly triple the normal number of research applicants for these studies, showing how eager scientists are to begin exploring such an under-investigated topic.

How to Choose the Right Desiccator

Desiccators are an economical and reliable way to maintain dry, dust-free storage and organization of reagents or electronics that are sensitive to humidity. Proper storage conditions can be optimized by selecting the desiccator size, shape, and control mechanism best suited to your application, space requirements, and the items that you store.

But how do you know which desiccator is right for your work? Kathleen Hanek, Portfolio Management Leader for Bel-Art – SP Scienceware Secador, Space Saver, Techni-Dome, Dry-Keeper, and Lab Companion brand desiccators, offers her thoughts:

Q: With so many desiccators to choose from, how do I narrow down my options?

A: First, decide which of the four basic methods of desiccation best suits your needs. Each method has its unique advantages and trade-offs.

- Standard desiccators typically use cartridges and are economical, but they require monitoring and occasional cartridge changes to maintain a continuous dry environment.
- Automatic desiccators regenerate the desiccant as needed and require minimal monitoring, but are generally more expensive than standard desiccators.
- Vacuum desiccators remove air and moisture using an in-house system or vacuum pump; the vacuum can easily be restored after opening and they can be used for degassing.
- Gas purge desiccators achieve ultra-dry environments using argon, nitrogen, or other gases, but require special equipment and a source for the gases.

Q: How do style and size affect my choice of desiccator?

A: Both round and cabinet-style desiccators range in size from quite small to very large. Determine the sizes of the items and the quantities that you need to store. Also consider where the desiccator will be placed, its interior volume, and shelving options.

- Round desiccators typically have a single shelf and a domed top for extra vertical space, and they're less likely to implode.
- Cabinet desiccators are easy to access, have more storage capacity, may be stackable to save space, and often have multiple adjustable shelves.
- Vacuum desiccators were traditionally available only in a round shape because the square shape could implode under vacuum.
- Lab Companion desiccators are designed to withstand a vacuum and combine the benefits of vacuum desiccation with a larger capacity, easier access, and reduced space requirements.

Q: What are the benefits of upgrading to a newer desiccator model?

A: Newer desiccators may include digital hygrometers, the ability to hold a vacuum longer, and better gaskets and seals for an airtight environment without the need for vacuum grease. Plastic desiccators offer the same strength as glass, but at a fraction of the cost and weight.

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Application Focus

Easy access refrigerator desiccator saves space and valuable reagents

Challenge:

Easy access to chemicals and reagents stored between 2°C and 8°C

Application:

Biochemistry and Cytochrome Research

In most laboratories, refrigerator space is at a premium. The use of traditional bell-shaped or standard cabinet-style desiccators for refrigerator storage of temperature- and moisture-sensitive samples is impractical and inefficient, requiring much of the refrigerator contents to be rearranged or the whole desiccator to be removed from the refrigerator for access.

Example: A lab requires the use of 1 – (11-Mercaptoundedcyl Imidazole) (MUI) during cytochrome research. MUI requires cold storage between 2°C and 8°C to maintain activity. Due to the deliquescence of the chemical, it becomes "soggy" when stored in the refrigerator. When stored in a desiccator, the chemical retains its powdery form, but storing on the bench at the higher ambient temperature causes degradation and activity loss.

Solution:

Secador Refrigerator-Ready Desiccator F42011-0000

The Secador Refrigerator Ready Desiccator was specifically designed for cold storage of hygroscopic chemicals and reagents. The slim, long design maximizes refrigerator space, and the pull-out shelves provide easy access to all contents. A downward swinging door with a locking latch that can be operated with one hand eliminates the need to pull the desiccator out of the refrigerator or to rearrange other refrigerator contents to access the chemicals.

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Description	Includes	Mfr. No.	Cat. No.	Quantity
Class B Cylinders, Single Metric Scale, with Bumpers	• 10mL • 25mL • 50mL • 100mL • 250mL	2002401	**03-340-197**	5 Pieces/Pack
Griffin Beakers, Low Form	• 50mL • 100mL • 250mL • 600mL • 1000mL	1408001	**02-555-2**	5 Pieces/Pack
Griffin Beakers, Heavy Duty	• 250mL • 400mL • 600mL • 1000mL	1408501	**02-555-101**	4 Pieces/Pack
Erlenmeyer Flasks, Wide Mouth	• 50mL •125mL • 250mL • 500mL •1000mL	265201	**02-543-21**	5 Pieces/Pack
GL 45 Media Bottles	• 2 x 100mL • 3 x 250mL • 3 x 500mL • 2 x 1000mL	1439501	**02-542-355**	10 Pieces/Pack
Lab Starter Kits	• Class B Cylinders: 1 x 100mL, 1x 250mL, and 1 x 500mL • Griffin Beakers: 3 x 50mL, 3 x 100mL, and 6 x 250mL • Erlenmeyer Flasks: 3 x 250mL, 6 x 500mL, and 3 x 1000mL • GL 45 Media Bottles: 2 x 100mL, 3 x 250mL, 3 x 500mL, and 2 x 1000mL	375000000	**12-141-460**	37 Pieces/Kit

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Corning's polyethylene terephthalate (PET) disposable bottles are designed for safe, secure storage of tissue culture media, sera, buffers, and other aqueous solutions.

PET resin makes the bottle lightweight, break resistant, and as transparent as glass. The HDPE screw cap is designed to ensure leak-proof performance and meets International Air Transport Association (IATA) requirements for primary packaging used in air transportation.

- Choose from four sizes: 125, 250, 500, and 1000mL
- Break-resistant, ergonomic, and easy to handle
- Molded graduations for accurate measurements
- Validated USP Class VI, non-cytotoxic, non-hemolytic, and non-pyrogenic
- Sterility assurance level (SAL): 10^{-6}
- Packaged in shrink-wrapped trays and an outer bag to ensure cleanliness

Chemical Resistance

	Recommended	Not Recommended	Sterilization	Thermal Durability
Polyethylene Terephthalate (PET) Bottles	Weak Acids	Strong Acids, Ketones, Aliphatic, Aromatic, and Chlorinated Hydrocarbons	Do Not Autoclave	50ºC

Capacity	Mfr. No.	Cat. No.	Quantity
125mL	432331	**07-201-023**	48/Case
250mL	432332	**07-201-024**	48/Case
500mL	432333	**07-201-025**	24/Case
1000mL	432334	**07-201-026**	24/Case

Save Incubator Space with Round Multilayer Devices

Mass cell culture is used to produce large quantities of cells for industrial or clinical applications.

A variety of systems and products are available to support mass cell culture. Your choice will depend upon multiple factors, including the cost and efficiency of your scale-up processes. When evaluating multilayer devices like the Greiner Bio-One CELLdisc, consider not only the growth area and number of cells per device but also the most effective use of available incubator space.

The ergonomic round design of the innovative CELLdisc is different from the mostly rectangular devices currently sold. The dimensions and shape of the rectangular devices imply optimal usage of the cubic space of an incubator. However, the size of such devices does not directly correlate with the dimensions of standard incubators, which can leave a significant amount of space unused. Furthermore, rectangular devices should not be positioned too closely to each other to ensure optimal thermal distribution.

Because of their round design, CELLdisc devices do not require additional space for thermal equilibrium, even when they are in close proximity (see Fig. 1b). This fact and the 40 percent higher surface/volume ratio than standard competitive systems make the use of incubator space much better for CELLdisc than for rectangular devices (see Table 1).

Greiner Bio-One Cell Culture Plastics can be tissue-culture treated to make the surface hydrophilic, which is ideal for cellular adhesion.

The Advanced TC polymer modification changes the plastic surface in a way that increases primary and long-term cell adhesion and positively influences cell-dependent features and function. Enhanced cell attachment and higher proliferation rates facilitate rapid cell expansion even under restricted growth conditions. The cultivation of sensitive cells is improved, and transfected cells exhibit higher transgene activity when grown on Advanced TC surfaces.

The plastic modifications are readily reproducible, which helps maximize product quality. In addition, room-temperature transport and storage simplify handling.

Key Features:

- Minimum space required for device handling
- 40 percent higher surface/volume ratio than conventional multilayer systems
- Surface treatment for optimal cell attachment
- Optimal ventilation through central gas support channel
- Gas inlet and outlet equipped with filters
- Easy accessibility due to wide opening port
- Predictable scale up within one format (250cm² to 10,000cm²)
- Suitable for basic research as well as industrial applications

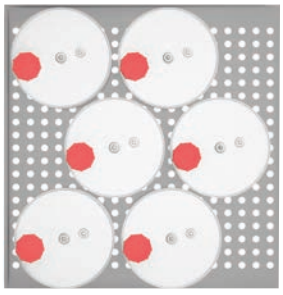
Content provided by:

greiner BIO-ONE

	CELLdisc	Product A	Product B (High-Density)
Shape	Round	Rectangular	Rectangular
Layers	16	10	10
Dimensions (including screw cap)	Dia. x H: 20 x 22cm	L x W x H: 33 x 20 x 20.5cm	L x W x H: 33 x 23 x 21cm
Growth Surface/Device	4,000cm³	6,360cm³	8,216cm³
Max. Devices/Shelf	6	2	2
Max. Devices/Incubator	12	4	4
Total Growth Surface/Incubator	48,000cm³	25,440cm³	32,684cm³
Utilization (vs. CELLdisc)	100%	53%	68.47%

Table 1: Utilization of incubator space – examples of other comparable multilayer devices

1a



1b

Figure 1a: Front view, with rectangular devices (upper shelf) and CELLdisc devices (lower shelf)
Figure 1b: Overhead view of incubator shelf with CELLdisc devices

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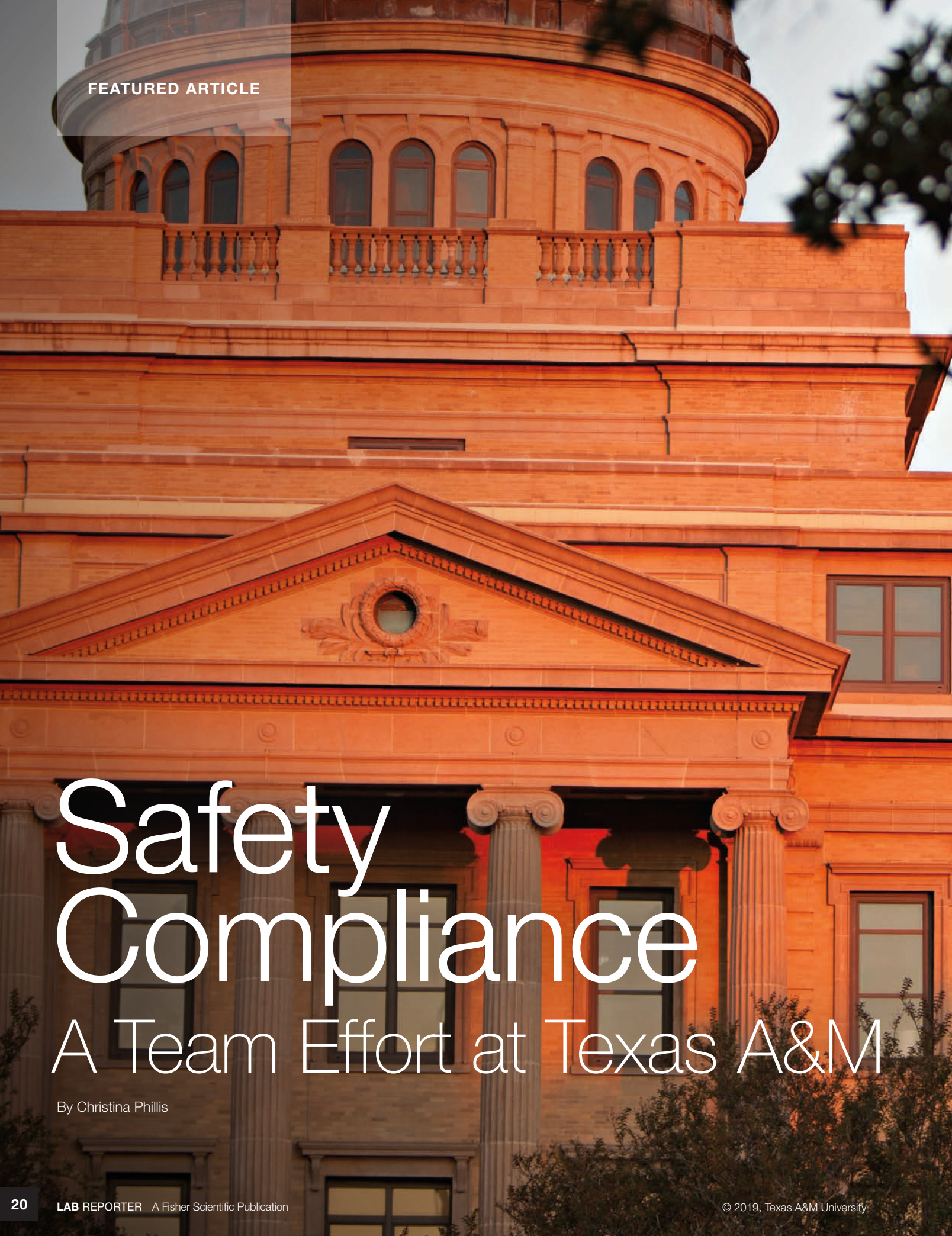
Greiner Bio-One Erlenmeyer shaker flasks are ideal for suspension cultures of mammalian cells, plants, microbes, and microorganisms.

The flasks feature a patented 2-in-1 DuoCAP for both vented and non-vented applications. Each flask is made from an optically clear, inert polycarbonate resin and can be used once or autoclaved for reuse.

- 2-in-1 DuoCAP offers sterile air exchange or a tight seal
- Optically clear polycarbonate is lighter and safer than glass
- Molded-in graduations for easy volumetric reference
- Non-pyrogenic, non-cytotoxic, and nuclease-free
- Individually packaged; sterile to SAL 10^{-6}
- Choose flat base or baffles for increased agitation and aeration

Capacity	Mfr. No.	Cat. No.	Mfr. No.	Cat. No.	Quantity
Bottom Style	**Flat**		**Baffled**		
125mL	679501	**07-001-064**	679511	**07-001-070**	24/Case
250mL	679502	**07-001-065**	679512	**07-001-071**	12/Case
500mL	679503	**07-001-066**	679513	**07-001-072**	12/Case
1000mL	679504	**07-001-067**	679514	**07-001-073**	6/Case
2000mL	679505	**07-001-068**	679515	**07-001-074**	6/Case
3000mL*	679506	**07-001-069**	679516	**07-001-075**	3/Case

**Fernbach style*



Safety Compliance

A Team Effort at Texas A&M

By Christina Phillis

On any given day, the Environmental Health and Safety (EHS) team at Texas A&M University encounters a variety of potential hazards. As the largest university in Texas and one that offers nationally recognized research centers, labs, and institutes, it's something that comes with the territory.

Situated right in the heart of the Texas Triangle in College Station, a former railroad town, Texas A&M was established as the first public institution of higher education in Texas. Its main campus, referred to affectionately as Aggieland, takes up 600 acres and is home to 64,126 students. Ensuring a safe place for all of these students to learn and 3,750 faculty members to work is the goal of the roughly 60 safety personnel that make up their EHS department. It's a responsibility the team takes very seriously and accomplishes by working with faculty, staff, and students.

"Texas A&M is committed to excellence. Providing a safe environment in which faculty can perform their research, students can learn, staff can work, and visitors can enjoy themselves is foundational to that excellence," said Erich H. Fruchtnicht, MS, CHMM, assistant radiation safety officer and senior health physicist.

For a university of this size, EHS involves everything from food and radiological safety to indoor air quality and hazardous material shipping. When a researcher is working with a new laser system, for example, they go to the EHS team for help determining the setup that will provide the highest level of safety while still allowing researchers to accomplish their work.

The team not only observes university rules and standards, but also regulations from government institutions. These include the Texas Department of Transportation and the Texas Fire Marshall at the regional level and the Centers for Disease Control and Prevention and the U.S. Environmental Protection Agency nationally.

Safety compliance is integral to their success as a research university. To acquire grants from the National Institutes of Health (NIH), researchers often must demonstrate compliance with applicable safety regulations. EHS provides that compliance support, enabling research teams to acquire NIH grants, and providing appropriate safeguards for the hazardous materials or substances being used in the research attached to those grants. Even when no incidents have occurred, compliance can be a reputational risk.

"EHS at Texas A&M minimizes this risk through our cooperative relationships with every operational unit at Texas A&M and the other university system agencies with whom we have partnerships," said Fruchtnicht.

Amid these competing interests, Texas A&M has developed a robust, multi-faceted safety program that addresses the many roles and functions at their university. It involves communicating with and educating everyone on best practices, securing the best safety equipment and supplies available, and establishing processes that continually reinforce safety concepts.

Leveraging Communication

To maintain a strong safety program, Texas A&M EHS personnel work with various departments to communicate and educate faculty, staff, and students on government regulations and relevant risks and hazards.

"We want all of our research staff to be able to go home to their families confident they have an EHS team at work that sincerely cares about their health, well-being, and the success of their research," said Fruchtnicht.

The line of communication starts with department heads. Getting their buy-in and perspective on safety compliance is a critical first step in maintaining the relationships that help enforce this program.

"Department heads act as CEOs of their respective departments. They are where the buck stops for all the faculty and research teams under their department's purview," said Fruchtnicht.

The department heads understand the importance of maximizing safety compliance to get the most from their research. Much like Texas A&M's top-ranked football team, the entire lab group is affected if a team member is injured or equipment malfunctions.

Principal investigators (PIs) and lab managers are next in the line of communication and are a great source of information about present hazards. They have a great deal of influence over research assistants and post-docs, and must set the tone and communicate the importance of safety compliance to their lab groups. In turn, EHS can help them find and purchase the most appropriate safety equipment based on the group's specific research projects. EHS can also facilitate on-campus demonstrations with safety suppliers of the newest, most up-to-date personal protective equipment (PPE). This encourages conversation, and helps lab groups open up about their specific work experiences.

"Working with the Fisher Scientific channel and our safety specialists, Michael Dupree and Ben Kaster, has been great. Their willingness to work closely with EHS to disseminate safety and compliance information just expands on the work EHS is already doing and increases our ability to reach an even broader audience on campus with our cooperative message," said Fruchtnicht.

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Safety Compliance A Team Effort at Texas A&M

EHS is also involved with the larger campus. Their staff members sit on campus-wide committees that involve university employees from other departments to help facilitate communication. They disseminate safety information to the entire university via Facebook, Twitter, and the "Safety Dispatch," an electronic newsletter. University-wide email lists are used for quickly sharing critical policy updates. All of these efforts combined serve as a means to reach people wherever they are.

Facilitating Training

In addition to broadcasting safety information, EHS provides training programs for different functions. Depending on what's needed, they'll set up hands-on exercises, online modules, lecture-style in-class trainings, and one-on-one sessions. They'll even meet with lab groups to show them how they can better ensure safety in their specific lab spaces. Their annual "Dorm Burn," where they ignite a trailer that's set up like a dorm, is just one example of the demonstrations they use to communicate the importance of safety rules.

Checks for up-to-date training procedures are included during annual inspections. All EHS-delivered training is tracked electronically, and lab-specific training offered by PIs or lab managers is documented on site. Before students are allowed to work with equipment requiring specialized training, embedded safety personnel verify their training statuses.

Performing Audits

At a major university like Texas A&M, safety compliance is a continual process. There may be a change in regulations, or new hazardous materials or equipment may be introduced. And there are always new students, faculty, and staff who need help learning their safety compliance responsibilities. In addition to communicating best practices, the EHS team also performs audits and inspections to ensure that regulations are being followed and to recognize new situations.

Formal checklists are used for audits and inspections to identify "hot-button" issues that vary based on the lab type. A radiation lab might require inspection of radioactive materials, x-rays, and lasers. One audit revealed a lab that had difficulty clearly identifying which refrigerators were for research use only, a definite safety risk. The EHS team was able to rapidly assist with appropriate labels and signage to indicate "non-food use" and "no chemical storage" to eliminate the risk.

After any audits and inspections are performed, EHS communicates their expectations about changes that need to happen, and follows up to make sure corrections are implemented. Deficiencies identified are re-evaluated to see what progress has been made. EHS can then offer additional help or escalate the issue to the PI or the department head as necessary.

Preparing for Emergencies

In case of an emergency, university teams and technology are integrated with local police, fire, and EMS. Within EHS, there are 24-hour on-call emergency response teams and emergency management plans for all the safety disciplines that they cover. There is also a separate university emergency management team that works closely with EHS and interacts with local municipal and regional emergency management groups.

As for technology, emergency generators are available to support many buildings in the event of a power loss, and uninterruptable power supplies can be deployed to support sensitive equipment as needed.

Looking to the Future

New hazards are constantly emerging, so the EHS team invests in professional development for their personnel. They receive up-to-date training and information on the latest trends in university research, regulatory updates and their implications, and best practices. Dedicated team members keep tabs on the Federal Register, Texas regulation publications, and other resources to stay current with applicable updates.

Fruchtnicht expects interdisciplinary research to play a much bigger role in their safety program in the future. Within a single research project, faculty, staff, and students may be working with multiple biological, chemical, and radiological hazards. As research evolves at their university, the Texas A&M EHS team is well positioned to advance with it.

Solvent Exposure Can Lead to Hearing Loss

By Ralph Birch

While exposure to noise has been identified as the most significant contributor to occupational hearing loss in the lab, recent European studies have shown that exposure to organic solvents can also lead to hearing disorders.

Animal and human studies over more than four decades have revealed disturbances in both the central auditory and vestibular systems, and other ototoxic effects from industrial solvents.

Exposure to both solvents and noise results in a synergistic effect between the two, enhancing the pattern of the trauma. Despite these findings, few measures have been taken to limit exposure to noise or solvents in laboratory settings.

Balancing Act

Research has definitively shown industrial solvent ototoxicity in rats. Most solvents caused a loss of auditory sensitivity in the mid-frequency range due to changes in outer hair cells. (Inner hair cells were generally unaffected.) Researchers have also found that spiral ganglion cells are vulnerable to trichloroethylene.

Along with producing neurotoxic effects, solvent exposure can influence the vestibulo-oculomotor system in both animals and humans. Humans may also experience postural sway, defined as horizontal movement of the body's center of gravity when one is standing still.

Studies of humans have shown ototoxicity even at low exposure levels, and disturbances in peripheral and central auditory pathways. Hearing loss in humans can occur in a wide range of frequencies or just in the high-frequency region.

As a result of these findings, employers are looking for effective ways to encourage safety and hearing conservation in workplaces.

The Need for More Research

Hearing loss among workers is generally attributed to a combination of age and noise exposure. But evidence continues to emerge that suggests exposure to industrial solvents and the combination of chemicals and noise has an adverse and permanent effect on auditory sensitivity and the vestibular system in rats.

Animals show varying levels of susceptibility to solvent exposure between species, and human study results vary by individual. These differences are not well understood but could help determine which individuals are more prone to adverse effects from solvent exposure.

Balance disturbances from solvent exposure have been largely neglected, but evidence suggests that the incidence may be significant. Research in this field has been limited, which makes the need for further study even more important.

Future Prevention

In many countries, protection against ototrauma is limited to reduced exposure to high-intensity noise. But solvent exposure is significant and is estimated to affect as many as 10 million European workers every day.

Few workers who are exposed to solvents are currently required to have hearing tests if their noise level exposure is not considered to be hazardous. And, while it is now recommended that workers exposed to solvents have their hearing tested periodically, there are no regulations requiring that testing.

Regular testing to examine both the peripheral and central elements of hearing and balance would be an effective means of monitoring the impact of solvent exposure. These tests would need to be quick, easy to administer, and acceptable to the workforce.

If sufficient work practice and exposure protocol changes are the ultimate goal, solid evidence regarding the effects of exposure to solvents is critical for industry decision makers. Gathering that evidence will require a standardized approach to the assessment of hazards in both animal and human studies.

Reduce Strain with Ergonomically Certified Gloves

Q: What are ergonomics?

A: Ergonomics refers to the interaction between one's musculoskeletal system and one's workspace. The musculoskeletal system includes muscles, bones, ligaments, and other connective tissue that allows the body to move.

Q: Why are ergonomics important?

A: Work can add serious strain to the musculoskeletal system, especially with repetitive tasks, working at awkward angles, moving heavy objects, or other actions that require a high degree of hand force. This can lead to the development of musculoskeletal disorders (MSDS), including carpel tunnel, tendinitis, and trigger finger.

Q: How can using the wrong glove negatively impact musculoskeletal health?

A: Glove stiffness and poor grip increase the force needed to perform tasks, especially those requiring repetitive motion or prolonged exertion. More force means more strain, which can eventually lead to muscle fatigue, pain, and injury.

Q: What is Ergonomic Product Certification?

A: According to U.S. Ergonomics, "A product that has received certification provides measurable ergonomic benefits to the user by improving comfort and fit and by minimizing the risk factors that may cause injuries." An ergonomically certified glove is rigorously tested in controlled laboratory tests and used extensively in actual working environments.

Q: What are the characteristics of an ergonomically certified glove?

A: Ergonomic gloves are made of strong yet elastic materials, provide optimal fit and comfort, and are textured or formulated for a confident grip.

Q: How are ergonomic gloves tested?

A: Measurements are both objective and subjective. The former may include electromyography measurements of the amount of effort exerted by individual hand muscles while performing assigned tasks. The latter may be gathered through controlled user surveys of comfort and user experience before and after tasks are completed.

Q: What is Ansell ERGOFORM technology?

A: ERGOFORM design technology enables Ansell to develop hand protection that supports musculoskeletal health during repetitive tasks and improves worker performance. Over time, the use of ERGOFORM gloves may lead to less work loss, fewer injuries, and more consistent quality and productivity. Products with these certifications have been tested in state-of-the-art ergonomics laboratories and have been shown to provide measurable advantages to user comfort and long-term hand and arm muscle health.

Which ANSELL gloves incorporate ERGOFORM technology?

- MICROFLEX XCEED XC-310
- MICROFLEX Ultraform UF-524
- MICROFLEX Neogard C52
- TouchNTuff 73-300 & 73-500
- AlphaTec 58-128

Content provided by:

Ansell

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Spillfix® Granular Absorbents
Lightweight, easy to deploy, 100% all-natural alternative to silica based clay granular and extremely effective in absorbing harsh chemicals

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Signage and absorbent in one that picks up a wide range of aggressive chemicals while remaining chemically inert

Spill Kits
Get everything to respond to spills quickly in one convenient kit

Visit fishersci.com/Brady for more information

How to Guard Against Cleanroom Contamination

By Anita McLean, Scientific Category Manager
Kimberly-Clark Professional

Where purity is paramount, contamination is bad for business — especially for labs, cleanrooms, and pharmaceutical manufacturing.

To protect your processes from contamination, look at the main source. People are the greatest contributor and account for 46 percent of all particle contamination.[1]

Skin flakes, oils, perspiration, and hair can all contribute to cleanroom contamination. And even the most carefully manicured person generates a shroud of particles every day.[2]

Did You Know?

- People shed 1 billion skin cells per day[3]
- Five million particles larger than 0.3 microns are generated when people move[4]
- One milliliter of saliva contains 100 million microbes[5]

To help increase the visibility of these invisible contaminants, Kimberly-Clark Professional launched the Dressed For Success program.

How It Works

Dressed For Success uses sterile single-use apparel and gloves to reduce contamination from both viable particles (bacteria and yeast) and non-viable particles (hair, dead skin cells, and dandruff).

Sterile Single-Use Garments

Kimtech apparel and other sterile single-use garments are designed to reduce contamination risk and offer significantly higher bacterial filtration efficiency (BFE) ratings than laundered reusable apparel. These nonwoven garments also provide a strong barrier against particles and liquids, and they're guaranteed to be sterile every time.

How do they compare to reusables? Laundered garments can degrade after multiple laundry and sterilization cycles. Testing conducted by Kimberly-Clark Professional revealed BFE can decline more than 25 percent after an average of five washes.[6] That's equivalent to one out of four workers not wearing sterile garments at all — a real, yet invisible, contamination risk.

Other Benefits

- Apparel features that lower the risk of contamination during the donning process
- A sterility assurance level of 10^{-6}
- Breathable, cloth-like comfort

Remember, not all garments perform equally when it comes to restricting particles. That's why it's essential to choose a garment that controls contamination and gives workers the assurance to do their best work.

Gloves

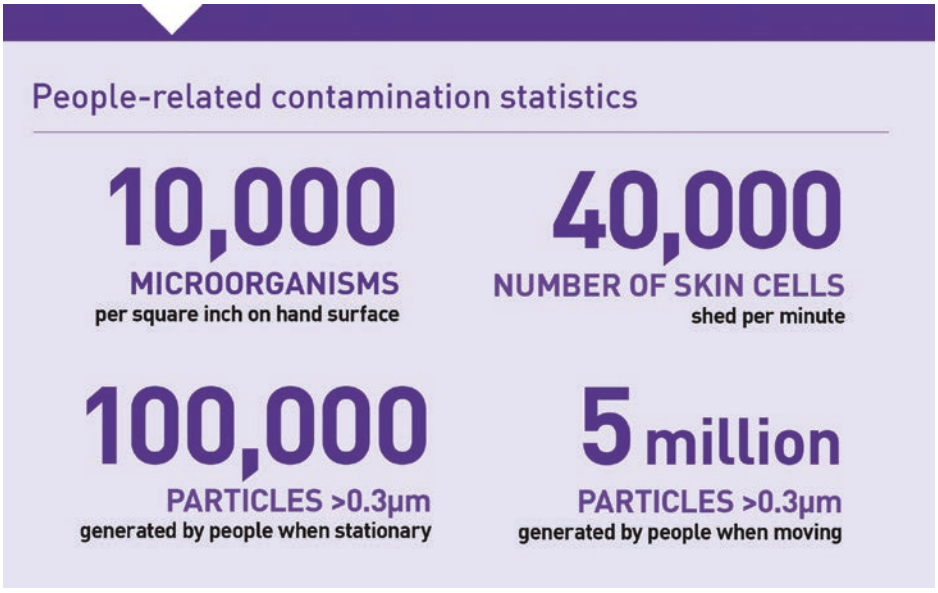
Have you thought about how your choice of gloves could be putting your research at risk? Products as simple as exam gloves can compromise the quality and integrity of your work in several ways:

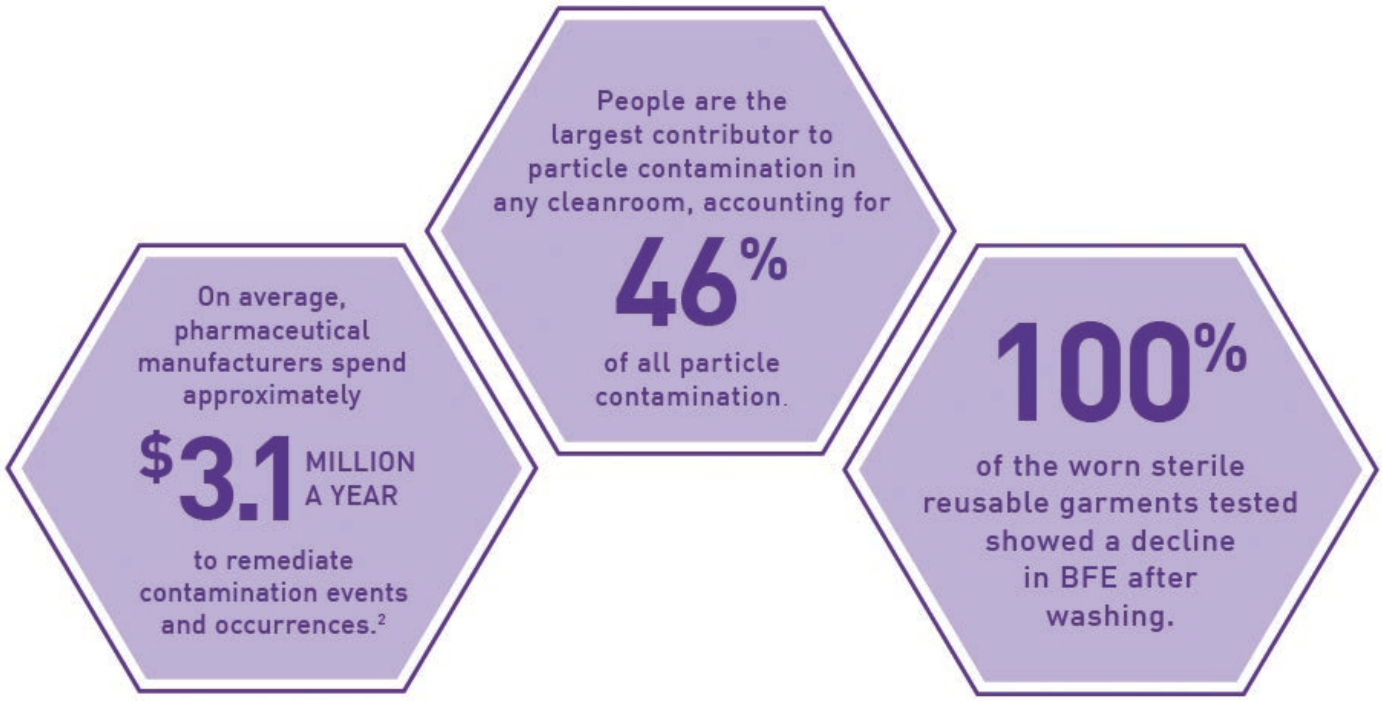
- **Contamination**

The tearing of low-quality gloves can lead to process contamination, ruining days, weeks, or even months of painstaking work. Compromised gloves also increase the risk of contamination and injury to the user.

- **Excessive Consumption and Cost**

A low-quality glove may be compromised too quickly, resulting in the use of multiple pairs during even short periods of time.





What Does All of this Mean?
A **25 percent drop in BFE** is comparable to 1 out of 4 workers not wearing sterile garments in a cleanroom. Keep in mind, too, that 5 million particles greater than .3 microns are generated just by walking.

- **Landfill Waste**

All of these used gloves must go somewhere. Nearly a third of a university's solid waste comes from labs and research buildings, and disposable gloves compose 22 percent of that waste.

While they may look alike, not all gloves can protect the integrity of your science like Kimberly-Clark Purple Nitrile Exam Gloves — the glove of choice since 1999. Purple Nitrile Exam Gloves are up to 50 percent stronger than typical exam gloves[7] and deliver proven chemical splash and biological protection. They are tested against the highest safety and quality standards in the research industry[8] and provide the tactile sensitivity and grip of much thinner gloves.[9]

Environmental Benefits

In addition to these benefits, Kimtech apparel, gloves, and safety eyewear are recyclable through The RightCycle Program. This is the first large-scale recycling initiative for non-hazardous lab, cleanroom, and industrial waste. The program diverts these products from your waste stream and turns them into new consumer goods. That's good for the planet and good for business.

Visit **fishersci.com/kimberlyclark** or **fishersci.ca/kimberlyclark** to learn more about Kimtech products, Dressed For Success, and The RightCycle Program.

Anita McLean is a Category Manager with the Kimberly-Clark Professional Global Scientific Business.

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Ansell

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GREATER PRODUCTIVITY

MICROFLEX® XCEED® XC-310 WITH ERGOFORM™ ERGONOMIC DESIGN TECHNOLOGY

MICROFLEX XCEED XC-310 disposable gloves are designed with ERGOFORM™ Ergonomic Design Technology to support musculoskeletal health during repetitive tasks and improve overall worker performance.

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Contact Decon Labs to request custom proofs and sizes.

		200 Proof (100%)		190 Proof (95%)		140 Proof (70%)	
Container Type	**Quantity**	**Mfr. No.**	**Cat. No.**	**Mfr. No.**	**Cat. No.**	**Mfr. No.**	**Cat. No.**
Plastic Bottle	24 x 1 pt.	2716TP	**04-355-450**	2816TP	**04-355-453**		
Glass Bottle	1 pt.	2716GEATP	**07-678-007**				
Glass Bottles	24 x 1 pt.	2716GTP	**07-678-006**				
Plastic Bottle	1 gal.	2701TP	**04-355-451**	2801TP	**04-355-454**		
Glass Bottles	4 x 1 gal.	2701GTP	**04-355-721**	2801GTP	**04-355-723**	2401TP	**07-678-001**
Plastic Bottle	5 gal.	2705TP	**04-355-452**	2805TP	**04-355-455**		
Poly Bottle*	5 gal.	2705SGTP	**22-032-104**	2805SGTP	**22-032-106**	2405TP	**04-355-351**
Drum	55 gal.	2755TP	**04-355-456**	2855TP	**04-355-457**		
Metal Container	55 gal.	2755MTP	**04-355-460**	2855MTP	**04-355-461**		

*Use with spigot (Cat. No. 02-991-362; sold separately)

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METRO®

Chemical Accelerators

the Glove-Related Allergen of the 21st Century

Do you wear disposable gloves every day and have dry, itchy, irritated skin or blisters on your hands?

Dermatitis is a widespread workplace problem. Skin diseases compose up to 35 percent of all occupational diseases, with contact dermatitis the problem in the majority of those cases. In 2005, the Society for Investigative Dermatology and the American Academy of Dermatology reported that contact dermatitis was associated with more than 9 million physician office visits, resulting in more than $1.4 billion spent on treatment.

Allergic contact dermatitis (a type IV allergy) occurs when a substance triggers an immune response in your skin. It can appear as a red rash with bumps and sometimes blisters. In laboratories, it is most often caused by exposure to natural rubber- or sulfur-based chemical accelerators used to make common non-latex gloves.

The Real Culprits

If an individual wearing nitrile gloves develops dermatitis, they may believe that they have a nitrile allergy. In most cases, however, the allergy is not to the nitrile co-polymer, but another chemical in the gloves: the accelerators.

Type IV allergies represent up to 28 percent of glove-related allergic reactions, and 90 percent of these allergies are due to accelerators.

Chemical accelerators are used in glove manufacturing to hasten the linkage of molecules in natural rubber latex or in synthetic rubber latex like nitrile and vinyl. The accelerants transform the liquid materials into thin, strong, and elastic glove films.

Sulfur-based chemical accelerators include dithiocarbamates, thiurams, and mercaptobenzothiazoles (MBT.) Thiuram allergies are the most frequent, followed by reactions to dithiocarbamates. According to a study in the United Kingdom, allergies to carba mix and its constituents have increased significantly from 1996 to 2012, increasing an average of 10.1 percent annually.

In their search for a solution, individuals with glove-related dermatitis often switch from nitrile to polychloroprene gloves. These gloves contain residues of mixed dialkyl thioureas (MDTU), another known allergen group. By changing to these gloves, they unknowingly increase their risk of developing additional allergies.

Fortunately, new technologies for glove materials can help reduce exposure to allergens.

A Better Alternative

Gloves made from patented[1] LOW DERMA technology nitrile carry the FDA-approved Low Dermatitis Potential claim. These gloves are made using a breakthrough cross-linking technology that does not require sulfur-based accelerators or MDTU. The gloves also undergo additional testing to ensure that they are free of chemical accelerator residue and will not cause skin irritation or allergies.

How well do these gloves work? When a group of healthcare workers with hand eczema (determined to be allergic contact dermatitis caused by accelerators) switched to accelerator-free medical gloves, they all showed improvement, and more than two-thirds became completely free of symptoms.

"My allergy on my hands was so bad, it was like poison ivy blisters and my hands were raw. Now [LOW DERMA technology gloves] my hands are completely healed." –

Terry Heckman, Laboratory Research Assistant, University of Texas, Austin

"Every day we are contacted by individuals suffering from glove-related dermatitis and many believe it is an allergy to nitrile," says Stephen J. Atwood, President of Hourglass International, Inc. "They're relieved to learn that it is most likely not nitrile but the sulfur-based accelerants in the nitrile gloves causing the problem. The best part is that we have accelerator-free gloves with LOW DERMA technology that offer exceptional hand protection that will relieve their agony. Two of our nitrile exam gloves, FreeStyle1100 and Scion700 are chemotherapy drug permeation tested, and the LOW DERMA technology they're made from is the only nitrile glove U.S.

FDA 510(k) cleared for protection against Fentanyl. Our HandPRO glove brand also includes accelerator-free nitrile gloves for controlled environments and cleanrooms."

Focus on Prevention

Because skin is an important barrier to bloodborne pathogens and disease, broken skin puts individuals at higher risk of infections and other diseases. A chronic skin condition can also be painful and may cause some people to abandon their career choices.

Even individuals without allergic contact dermatitis should consider switching to an accelerator-free glove. According to NIOSH, "Because the prognosis of occupational irritant and allergic dermatitis is poor, prevention is imperative. One study found that 75 percent of patients with occupational contact dermatitis later developed a chronic skin disease."

Thousands of potentially harmful chemicals are introduced to workplaces each year, so it is important to reduce your exposure whenever possible. New materials like LOW DERMA technology nitrile with Low Dermatitis Potential makes it possible to wear comfortable gloves that provide the protection you expect from nitrile — without the allergens.

Content provided by:

HOURGLASS INTERNATIONAL INC

LOW DERMA
Technology In Skin Protection
Patented Technology[1]

PROTECTION AGAINST FENTANYL

1. Patent LowDerma.com/patents
2. >240 minutes; granted by U.S. FDA 510(k).

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Versatile and Reliable

Fisherbrand Plastic Bottles and Jars

Fisherbrand Wide Mouth Natural HDPE Bottles with White PP/PE Foam-Lined Caps

Provide good chemical resistance for general lab use with solids, powders, water-based chemicals, and some foods. They feature a wide mouth opening ideal for storing solids.

- Use for high-speed filling, demanding pharmaceutical specifications, and rough handling during shipping
- Translucent and impact resistant with an excellent moisture barrier
- Closures offer chemical resistance against acids, alcohols, alkalis, aqueous products, cosmetics, household oils, and solvents
- Available in round or oblong varieties that save space

Fisherbrand Straight Sided Polypropylene Jars with White PP Caps

Use to collect and store specimens and lab supplies. Designed with straight sides, they allow for complete removal of contents.

- Ideal for large solid samples
- Translucent and durable
- Polypropylene offers greater high-temperature tolerance than HDPE

Fisherbrand Clear Straight Sided Polystyrene Jars with White PP Caps

Made from clear, rigid polystyrene that offers glass-like clarity. Plus, the smooth surface is slip resistant.

- Wide mouth accommodates large solid samples
- Straight sides allow for complete removal of contents

Capacity	Cat. No.	Quantity
Round Natural HDPE Bottles		
60mL (2 oz.)	**FB02912031A**	48/Case
120mL (4 oz.)	**FB02912032A**	48/Case
250mL (8.5 oz.)	**FB02912034A**	48/Case
950mL (32 oz.)	**FB02912038A**	12/Case
2000mL (67 oz.)	**FB02912033A**	6/Case
3840mL (128 oz.)	**FB02912036A**	4/Case
Oblong Natural HDPE Bottles		
125mL (4.2 oz.)	**FB02911952A**	48/Case
250mL (8.5 oz.)	**FB02911957A**	48/Case
500mL (17 oz.)	**FB02911960A**	24/Case
1000mL (34 oz.)	**FB02911949A**	12/Case
1250mL (42 oz.)	**FB02911950A**	6/Case
Natural Polypropylene Jars		
30mL (1 oz.)	**FB02912025A**	72/Case
60mL (2 oz.)	**FB02912026A**	48/Case
120mL (4 oz.)	**FB02912028A**	36/Case
240mL (8 oz.)	**FB02912029A**	36/Case
480mL (16 oz.)	**FB02912024A**	24/Case
Clear Polystyrene Jars		
30mL (1 oz.)	**FB02911792**	72/Case
60mL (2 oz.)	**FB02912267**	48/Case
120mL (4 oz.)	**FB02912268**	36/Case
240mL (8 oz.)	**FB02912269**	36/Case
480mL (16 oz.)	**FB02912265**	24/Case
950mL (32 oz.)	**FB02912266**	24/Case

Brain Metabolism Study

Reveals Age Differences Between Sexes

By Mae Pyer

A new study may have found a scientific reason for women's cognitive sharpness later in life. Researchers discovered that, in terms of brain metabolism, women's brains appear three years younger than men's.

Discovering the Difference

Manu Goyal and his colleagues at Washington University School of Medicine recently published their findings in *Proceedings of the National Academy of Sciences*, comparing the brain metabolism of both sexes with their participants' actual ages.

"We're just starting to understand how various sex-related factors might affect the trajectory of brain aging and how that might influence the vulnerability of the brain to neurodegenerative diseases," said Goyal, assistant professor of radiology, neurology, and neuroscience. He noted that brain metabolism might provide the answers needed to understand these differences.

It's known that the brain requires sugar to function properly, a good portion of it being used for aerobic glycolysis where glucose is converted to lactate with oxygen present. This process, linked to brain development and growth, is most active in babies, children, and adolescents and slows with age.

Sugar that's not used in this process is used to fuel everyday tasks. But the brain changes as the body grows, using less and less sugar for aerobic glycolysis and more for day-to-day function.

Brain Metabolism and Age

A total of 205 people, including 121 women and 84 men, participated in Goyal's study. The group ranged in age from 20 to 82, providing an opportunity to learn how brain metabolism changes with time.

Each participant underwent a PET scan to measure oxygen and glucose activity in the brain. Researchers were able to find the amount of sugar each person was using for aerobic glycolysis. Then, using a machine-learning algorithm, they entered metabolism data for both male and female participants, and the actual ages of the former, asking the program to calculate the brain age of the latter.

The algorithm determined that the women's brain ages were an average of 3.8 years younger than their actual ages. The same analysis was performed on male participants, their brain ages averaging 2.4 years older. These variances were seen in participants of all ages, even those in their 20s.

> The algorithm determined that the women's brain ages were an average of 3.8 years younger than their actual ages.

Goyal commented that while this is both significant and reproducible, "It's nowhere near as big a difference as some sex differences, such as height."

What It Means

Until this study, not much was known about brain metabolism in both sexes. Scientists believe this research is only the beginning and that there is more to uncover.

Researchers have seen that older women tend to outscore men of the same age on reasoning, memory, and problem-solving tests. As a result, Goyal and colleagues plan to continue their studies by tracking a group of adults over time to see if there's a correlation between brain age and cognitive problems.

"I think this could mean that the reason women don't experience as much cognitive decline in later years is because their brains are effectively younger, and we're currently working on a study to confirm that," said Goyal.

Laboratory Safety Solutions

AC600 Series Ductless Chemical Workstation

The AC600 Series Ductless Chemical Workstation is an economical solution for protecting operators and the environment from toxic vapors, gases, fumes, and particulates. It ships fully assembled and can be configured for a variety of common applications.

Standard Features:

- Microprocessor controller with audible and visible alarms for both airflow velocity and filter change
- 360° visibility
- Ideal for low-volume chemical applications

Model	Width	Mfr. No.	Cat. No.
Workstation	32 in.	AC632A	**36-100-4271**
Workstation, Tall Version	32 in.	AC632TA	**36-100-4272**
Workstation	48 in.	AC648A	**36-100-4274**
Workstation, Tall Version	48 in.	AC648TA	**36-100-4275**

Endeavour Ductless Fume Hood

The Endeavour Ductless Fume Hood is designed to provide superior operator protection from potential toxic fumes, vapors, and particulates. AirSafe NXT provides simple and effective user interaction within fume hood operational parameters.

Standard Features:

- Microprocessor controller has audible and visible alarms for both airflow velocity and filter change
- Bonded carbon filters — no dust
- Polypropylene construction — excellent chemical resistance

Model	Width	Mfr. No.	Cat. No.
Ductless Fume Hood*	48 in.	ACPT4000	**36-100-0063**
Ductless Fume Hood*	60 in.	ACPT5000	**36-100-0067**
Ductless Fume Hood*	72 in.	ACPT6000	**36-100-0069**

*Filters sold separately; application worksheet required

PowderSafe Type B Enclosure

Seamless polypropylene construction provides vibration resistance crucial for accurate powder weighing, while the AirSafe automatic safety controller monitors airflow and filter condition. HEPASafe technology allows filters to be safely and easily changed under negative pressure.

Standard Features:

- Horizontal, HEPA-filtered airflow pattern
- HEPASafe filtration system for simple and easy maintenance
- Thermally fused design for vibration reduction and balance stability

Model	Width	Mfr. No.	Cat. No.
Type B Enclosure	32 in.	AC730C	**36-100-4292**
Type B Enclosure	48 in.	AC740C	**36-100-4293**

Horizontal Clean Bench

AirClean Systems manufactures a complete range of horizontal and vertical ISO 5/Class 100 laminar flow clean benches. Application-specific plastics allow for easy cleaning and sterilization, which helps prevent cross contamination.

Standard Features:

- Seamless polypropylene construction
- ISO 5 or better air quality
- Microprocessor controlled
- Available in widths of 4, 5, 6, and 8 feet

Model	Width	Mfr. No.	Cat. No.
Horizontal Clean Bench	48 in.	AC4000HLF	**36-100-4381**
Horizontal Clean Bench	60 in.	AC5000HLF	**36-100-4382**
Horizontal Clean Bench	72 in.	AC6000HLF	**36-100-4383**
Horizontal Clean Bench	96 in.	AC8000HLF	**36-100-4384**

Combination PCR Workstation

The AirClean Systems Combination PCR Workstation combines an ISO 5/Class 100 clean air environment with UV light sterilization for optimal protection from sample contamination. The UVTect microprocessor constantly monitors workstation functions.

Standard Features:

- Class 100 clean vertical laminar flow air
- Polycarbonate and polypropylene design to reflect UV energy
- Digital UV light time from 0 to 59 minutes
- UV shelf with integrated pipette holder

Model	Width	Mfr. No.	Cat. No.
PCR Workstation	32 in.	AC632LFUVC	**36-101-8894**
PCR Workstation	48 in.	AC648LFUVC	**36-101-8897**

PowderSafe Type C Enclosure

The PowderSafe Type C Balance Enclosure incorporates the airflow dynamics and HEPASafe features of the PowderSafe Type B Enclosure with the user-friendly features and chemical fume containment capabilities of the ductless fume hood. Thermally fused polypropylene makes the PowderSafe Type C Enclosure perfect for weighing powders or solvents.

Standard Features:

- Horizontal, HEPA-filtered airflow pattern
- HEPASafe filtration system for simple and easy maintenance
- Thermally fused design for vibration reduction and balance stability

Model	Width	Mfr. No.	Cat. No.
Type C Enclosure	36 in.	AC760C	**36-101-8906**
Type C Enclosure	48 in.	AC770C	**36-101-8908**
Type C Enclosure	72 in.	AC780C	**36-101-8910**

Multi Reax: A Game Changer for Vortexing

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Reax Vortexers

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- Modes: automatic or continuous
- Includes standard black rubber pad for 20mm diameter test tubes
- Analog speed control dial with accurate rpm number settings (Reax Control only)

Reax Control

- Analog dial speed control (rpm setting)
- Maintains constant rpm at very low speeds or with changing loads

Multi Reax — The Only Hands-Free Multi Vortexer

- Accommodates up to 26 vessels with various diameters
- Hands-free operation with use of secure rubber holder
- Speed: 150 to 2,000rpm
- Digital process timer from 1 to 999 minutes
- Includes one attachment to hold 26 vessels (10 to 16mm diameter) and one to hold 12 vessels (16 to 32mm diameter)

Multi Reax

Reax Top

Reax Control

Description	Mfr. No.	Cat. No.
Reax Top Vortex Mixer	03-613-0000	**13-889-310**
Reax Control Vortex Mixer	03-613-0020	**02-321-067**
Multi Reax Vortex Mixer	03-613-0040	**13-889-410**

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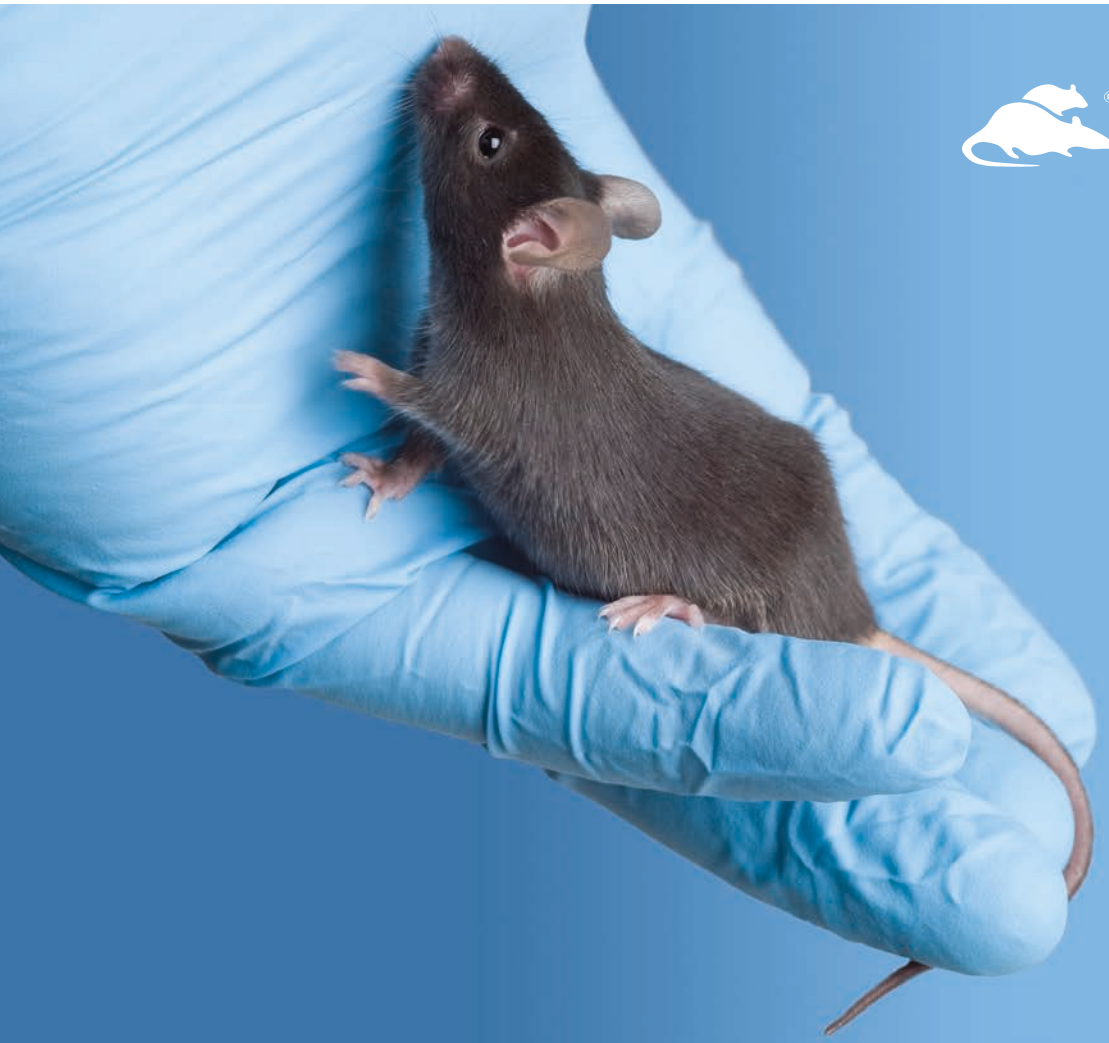
Model	Capacity	Readability	Cat. No.
Analytical Balances			
AX124	120g	0.0001g	**01-920-251**
AX224	220g	0.0001g	**01-920-253**
AX324	320g	0.0001g	**01-920-254**
AX223	220g	0.001g	**01-920-275**
Precision Balances			
AX523	520g	0.001g	**01-920-279**
AX622	620g	0.01g	**01-920-266**
AX2202	2200g	0.01g	**01-920-270**
AX5202	5200g	0.01g	**01-920-273**
AX4201	4200g	0.1g	**01-920-257**
AX8201	8200g	0.1g	**01-920-259**



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Ductless Fume Hood Safety
Protecting People and Processes

Ductless fume hoods are self-contained enclosures that filter air before returning it to the work environment. Typically used in locations where outside ventilation is not an option, these systems feature activated carbon and/or HEPA filters instead of being connected to an external exhaust. In addition to removing hazardous fumes, vapors, and particles from the air, ductless fume hoods offer convenience, mobility, energy and cost savings, and flexibility for facility planning while promoting a greener laboratory.

Protecting Operators

Ductless fume hoods protect the individuals who use them and people working in the same area from fumes, vapors, and particles that can result in injuries and possibly even death. If the intake airflow is not within a specified range, hazardous materials may flow out of the fume hood and cause harm.

The effectiveness of ductless fume hoods also depends on filters that can remove the hazardous materials in question. Users must be able to monitor both the airflow and filter conditions and respond quickly to adverse conditions. Work with the manufacturer to find the right hood for your specific needs.

Protecting Processes

Ductless laminar flow hoods can help protect precious samples and other materials. Optimal airflow prevents samples and materials from being contaminated by a user or substances present in the work environment. Avoid the risk of background or cross-contamination by using appropriate filtration and monitor to ensure that conditions in the hood remain safe for samples and experiments.

When selecting a ductless fume hood, consider the materials that will be handled. With this information, the manufacturer can recommend proper filtration, optimal construction materials, an appropriate filter monitoring package, and the correct size — all of which leads to a fume hood designed to meet your functional and safety needs.

Safety Features

Blower capabilities
Blowers must maintain face velocity (measured at the fume hood opening as air moves into the hood) at the optimum level for fume containment.

Vapor-proof illumination
Vapor-proof illuminators provide adequate lighting while helping to meet safety requirements for applications involving flammable dust or vapors.

Work area access
The opening should be large enough for you to have free and easy access to the work surface for safely setting up and running experiments.

Integral spill base
An integral spill base can effectively contain any accidental spills that may occur during use.

Monitor for carbon filter bed saturation
Per American National Standards Institute (ANSI) Z9.5 regulations for laboratory ventilation, carbon filters must be regularly monitored for saturation.

Reliable airflow measurement
The 29 CFR 1910.1450 Occupational Safety and Health Administration (OSHA) standard states that fume hoods must maintain an airflow capable of drawing air from the laboratory and preventing or minimizing the escape of air contaminants into the laboratory.

Appropriate materials for preventing hood deterioration
The interior of the hood must resist attack from any chemical fumes and tolerate the full range of temperatures to which it will be exposed.

Rear baffles
The baffles are moveable partitions that create slotted openings along the back of the fume hood to help maintain even airflow.

Safety Tips

Selecting the appropriate safety features for your ductless fume hood is key, but employees must also be trained in its correct use. OSHA offers the following safety tips for working safely with a fume hood:

- Make sure employees understand fume hood operation and are trained in its proper use
- Refer to the product safety data sheet (SDS) if you are unsure about the hazards and risks for any of the products with which you are working
- Turn the fume hood on and confirm that the airflow is within the required range
- Do not place your head inside the hood opening
- Always wear appropriate eye protection
- Check to see that nothing blocks airflow through the baffles or the baffle exhaust
- Elevate large equipment at least two inches above the base of the hood
- Keep materials inside the hood at least six inches away from the sash opening
- Keep the sash closed when the hood is not in use
- Do not store chemicals inside the hood

While conventional hoods are still the most common choice for ventilation, ductless hoods are gaining popularity thanks to their low installation cost, energy savings, design flexibility, and convenience.

But safety comes first, so consider the options and benefits of ductless fume hoods when purchasing a system. The features of a ductless hood combined with properly trained staff will equip you to protect your people and processes from injury or contamination.

Direct and Indirect Sonication

Fisherbrand Sonic Dismembrators

Fisherbrand Sonic Dismembrators create energy that is transmitted through a titanium probe into a liquid sample to create cavitation (the implosion of micro-bubbles with high shear forces).

Sonic dismembrators can be used with various accessories to process small (µL) to 1L sample volumes.

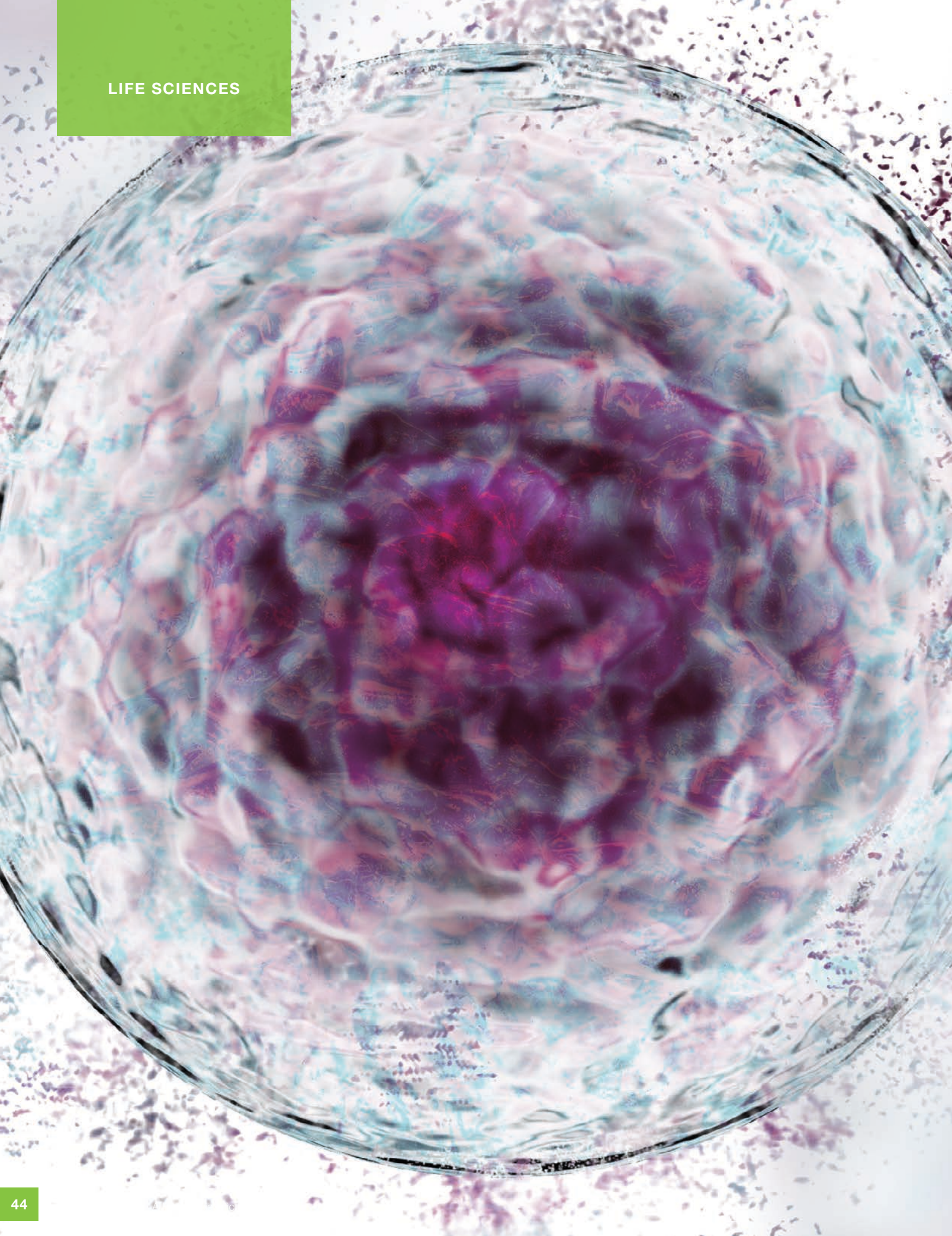
- Use any of the four models to process samples smaller than 50mL
- Choose a programmable unit for sample temperature control
- Use a 500w or 700w unit for samples larger than 50mL
- The 700w model is required for high throughput, extended programming times, and sample temperature monitoring

For direct sonication, immerse the probe directly into the sample vessel. Indirect sonication (using the cup horn accessory) can be performed with sealed tubes or vials since there is no contact between the probe and the sample.

Each Fisherbrand Sonic Dismembrator includes a generator, converter, cables, wrench set, and one probe. Other probes and accessories, including the stand and clamp shown here, are sold separately.

Model 505

Model	Applications	Capacity	Power	Cat. No.
50	• Basic Cell Disruption	0.2 to 50mL	50w	**FB50110**
120	• Cell Disruption • Protein Extraction • DNA Shearing/ChIP	0.2 to 50mL	120w	**FB120110**
505	• Cell Disruption • Nanoparticle Dispersion • Homogenization/Mixing	0.2 to 1000mL	500w	**FB505110**
705	• Cell Disruption • Protein Extraction • DNA Shearing/ChIP • Nanoparticle Dispersion • Homogenization/Mixing • Sonochemistry	0.2 to 1000mL	700w	**FB705110**



Second HIV Patient in Remission After Stem Cell Transplant

By Mike Howie

For the second time, a patient with HIV is in remission after receiving a stem cell transplant. The patient, who was treated by doctors from University College of London and prefers to remain anonymous, has been off medication for 18 months and is still in remission. The doctors caution, however, that it's too soon to declare that the patient is cured.

The patient received a stem cell transplant to combat a blood cancer, and doctors took the opportunity to simultaneously attack the HIV. They selected a donor with the delta-32 mutation, which leads to specific defective receptors (CCR5) and removes the entryway that HIV uses to attack cells. After the donor cells rebuilt the patient's immune system, doctors were unable to successfully infect the new cells in the lab using the same HIV. The virus completely disappeared from the patient's blood after treatment, and 16 months later they stopped taking antiretroviral drugs.

10 Years in the Making

The treatment was inspired by a similar transplant in 2009 with Timothy Ray Brown, who came to be known as the Berlin patient when doctors declared him to be the first person cured of HIV. Brown had been living with HIV for years when he was diagnosed with acute myeloid leukemia. When chemotherapy failed to treat the cancer, Brown underwent two stem cell transplants from a donor who had the delta-32 mutation. Brown's HIV quickly became undetectable after the treatment, and he remains free of the disease to this day.

In the 10 years since Brown was treated and entered remission, doctors tried multiple times to replicate the success. All of those attempts failed, and doctors began to wonder if the case was a fluke. But the newest success in London has reinvigorated interest in therapies targeting CCR5.

The fact that the London patient's treatment was less aggressive than Brown's is equally exciting. While Brown received chemotherapy and full-body radiotherapy, the new patient received chemotherapy and a drug that specifically targets cancerous cells. Radiotherapy can have severe side effects that make patients very sick, so removing it from the process makes treatment much easier to bear.

Limited Applicability

While exciting and informative, this treatment isn't appropriate for most people with HIV. It requires a bone marrow transplant, a serious procedure with a variety of risks, including death. It's far more dangerous than continuing an antiretroviral treatment that requires daily medication, which most HIV patients respond well to.

But for patients who need a bone marrow transplant to treat cancer or another disease, it's reasonable to seek a donor who has the CCR5 mutation. That in itself could be difficult — only about 1 percent of people of European descent have the mutation — but it doesn't increase the risk of the procedure.

> The virus completely disappeared from the patient's blood after treatment.

Researchers are now studying new gene-editing technology in search of a similar treatment that can be applied to more patients with fewer risks. These treatments would use a patient's own stem cells that are modified to mimic the delta-32 mutation and then returned to the patient's body. If successful, the new treatment would eliminate the need to find an appropriate donor and the risks of a stem cell transplant — making the process easier for patients and doctors alike.

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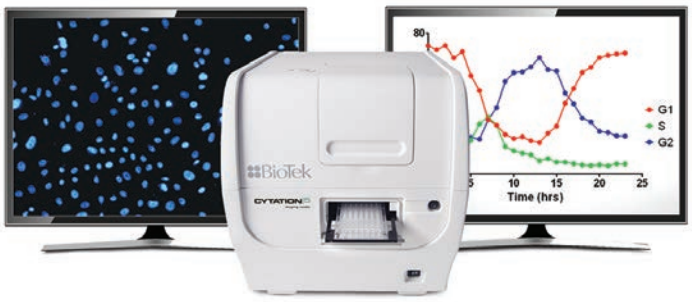

Model	Description	Cat. No.
Cytation 5	Fluorescence, Brightfield, Color Brightfield, and Phase Contrast Imaging; Fluorescence, Absorbance, and Luminescence Detection; Includes Gen5 Software	**BTCYT5MPV**

AutoScratch Wound Making Tool

Scratch Wound and Cell Migration

- Automatically creates reproducible scratch wounds in cell monolayers
- Simple push-button operation and tool-free scratch pin manifold exchange
- Calculates wound width, percent confluence, and maximum healing rate
- Onboard cleaning routine keeps scratch pins free of build-up

Model	Description	Cat. No.
AutoScratch	Automates Sample Prep for Migration and Invasion Assays, for 24- and 96-Well Microplates	**11-120-685**

BioSpa 8 Automated Incubator

Automated Live Cell Analysis

- Fully unattended workflow automation for up to eight plates
- Integrated temperature and CO_2/O_2 control, plus humidity monitoring
- Records environment conditions; automated alerts
- Compact for use in biosafety cabinets

Model	Description	Cat. No.
BioSpa 8	Automated Incubator; Environmental Control; Includes BioSpa Control and Monitoring Software	**11-120-550**

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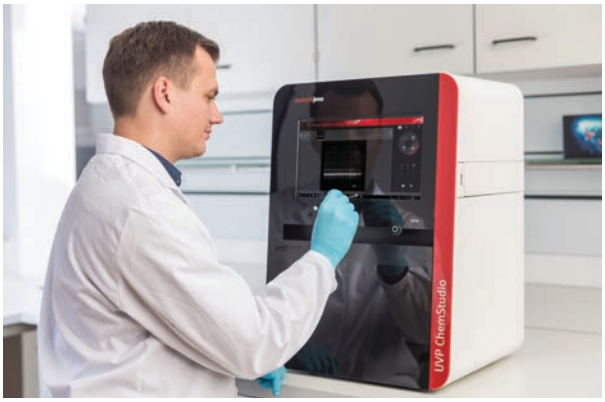

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Description	Mfr. No.	Cat. No.
ChemStudio *touch*, 815	SP-1082	**SP1082PM**
ChemStudio *touch*, 615	SP-1083	**SP1083PM**
ChemStudio PLUS *touch*, 815	SP-1084	**SP1084PM**

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- Low levels of interfering extractables; lot-to-lot certified
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- Use 0.2µm pore size filters for chromatography resin sizes less than 30µm

Diameter	Pore size	Mfr. No.	Cat. No.	Quantity
13mm	0.2µm	10463103	**45-550-003**	150/Pack
13mm	0.45µm	10463113	**45-550-004**	150/Pack
30mm	0.2µm	10463043	**45-550-002**	150/Pack
30mm	0.45µm	10463033	**45-550-001**	150/Pack

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Fisherbrand Maxima Rotary Vane Vacuum Pumps are durable and have superior vapor handling capability. Use these pumps for vacuum furnace evacuation, rotary evaporation, vacuum sterilization, mass spectrometry, freeze drying, vacuum centrifugal applications, vacuum distillation, and other processes that require a reliable vacuum.

The need to service these pumps is reduced by:

- Enhanced, corrosion-resistant coatings to protect from aggressive chemicals
- A large oil reservoir that dilutes harsh chemicals
- A cooling system that helps the pump run 10°C cooler than standard rotary vane pumps, which reduces chemical activity and slows the rate of oil consumption

Maxima pumps are also available in explosion-proof versions and with alternate voltages and plug types.

Model	Displacement (Flow Rate) at 60Hz	Ultimate Vacuum	Dimensions (L x W x H)	Shipping Weight	Cat. No.
M4C	2.7 CFM (78L/min.)	5 x 10^{-4} torr (4 x 10^{-4}mbar)	18.2 x 6.1 x 9.1 in. (46 x 16 x 23cm)	63 lb. (29kg)	**01-184-202**
M6C	4.2 CFM (118L/min.)			63 lb. (29kg)	**01-184-203**
M8C	5.6 CFM (158L/min.)			65 lb. (30kg)	**01-184-204**
M16C	12.8 CFM (363L/min.)	3 x 10^{-4} torr (2 x 10^{-4}mbar)	22.4 x 8.1 x 11.4 in. (57 x 21 x 29cm)	200 lb. (91kg)	**01-184-205**
M24C	18.3 CFM (519L/min.)			103 lb. (47kg)	**01-184-206**
M30C	22.1 CFM (627L/min.)			106 lb. (48kg)	**01-184-207**

All models include an exhaust filter, funnel, and hose clamp.

Avoid Harsh Chemicals and Reduce Waste

Fisherbrand Ultrasonic Cleaners

Fisherbrand Ultrasonic Cleaners allow you to clean discarded parts and restore them to working condition without the use of harsh chemicals. With a mild solution, they can clean a variety of items, including:

- Plastic cell phone cases
- Glass flasks with residual polymer, cannabis residue, and other stubborn substances
- Tips for paint spray guns

Before

After

Fisherbrand 112xx Series Advanced Ultrasonic Cleaners are more powerful than conventional cleaners. They feature a wide range of adjustable parameters for lab applications, including cleaning, mixing, and degassing.

- Maximum versatility: choose frequency, power level, time, temperature, and mode
- Modes: normal, pulse, sweep, and de-gas
- Six tank sizes: 0.7 to 7.4 gallons
- Compatible with multiple cleaning solutions
- Full line of accessories (sold separately)
- Products in stock and ready to ship

Model	Capacity	Cat. No.
FB-11201	2.75L (0.7 gal.)	**FB11201**
FB-11203	5.75L (1.5 gal.)	**FB11203**
FB-11205	6.9L (1.8 gal.)	**FB11205**
FB-11207	12.75L (3.3 gal.)	**FB11207**
FB-11209	18L (4.75 gal.)	**FB11209**
FB-11211	28L (7.3 gal.)	**FB11211**

Multiple Nitrile and Latex Options

Fisherbrand Disposable Gloves

Fisherbrand Disposable Gloves come in your choice of nitrile or latex, with or without aloe, and in a range of colors, textures, thicknesses, and sizes. These gloves are nonsterile, ambidextrous, and powder free.

Description	Cuff Length	Thickness: Palm and Fingers	Color, Texture	Sizes	Cat. No.	Quantity
Nitrile Exam Gloves	9.5 in.	3 and 4.3mil	Blue, Full	X-Small to 2X-Large	**19-130-1597A** to **19-130-1597F**	1,000/Case
Comfort Nitrile Exam Gloves	9.5 in.	3 and 3.5mil	Periwinkle Blue, Fingers	X-Small to X-Large	**19-041-171A** to **19-041-171E**	2,000/Case*
Black Nitrile Exam Gloves	9.5 in.	3.5 and 5.5mil	Black, Fingers	X-Small to 2X-Large	**19-156-300, 19-181-603** to **19-181-607**	1,000/Case
Dark Blue Nitrile Exam Gloves	9.5 in.	4.7 and 5.5mil	Cobalt Blue, Full	Small to X-Large	**19-181-608** to **19-181-611**	1,000/Case
Nitrile Exam Gloves, Extended Cuff	12 in.	6 and 7.0mil	Teal, Full	Small to X-Large	**19-041-170A** to **19-041-170D**	500/Case
Nitrile Exam Gloves with Aloe	9.5 in.	5.5 and 6.0mil	Green, Full	Small to X-Large	**19-050-550A** to **19-050-550D**	1,000/Case
Comfort Nitrile Exam Gloves with Aloe	9.5 in.	3.1 and 3.9mil	Blue Green, Full	X-Small to X-Large	**19-041-172A** to **19-041-172E**	1,000/Case
Comfort Nitrile Exam Gloves with Aloe	9.5 in.	2.8 and 3.9mil	Green, Fingers	X-Small to X-Large	**19-041-191A** to **19-041-191E**	2,000/Case
Latex Exam Gloves	9.5 in.	5 and 6.3mil	Natural, Full	Small to X-Large	**11-394-5A** to **11-394-5D**	1,000/Case
Latex Exam Gloves with Aloe	9.5 in.	6 and 6.5mil	Natural, Full	Small to X-Large	**19-050-548A** to **19-050-548D**	1,000/Case

**Size XL contains 180 Gloves/Box, 1,800/Case*

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Single Stage	40L/min.	65 torr	15psig	⅙ hp	13 x 6.5 x 8.5 in.	**13-880-16**
Two Stage	20L/min.	6 torr	15psig	⅙ hp	15 x 6.5 x 8.5 in.	**13-880-18**
Two Stage	35L/min.	6 torr	15psig	⅓ hp	16 x 7 x 9 in.	**13-880-20**
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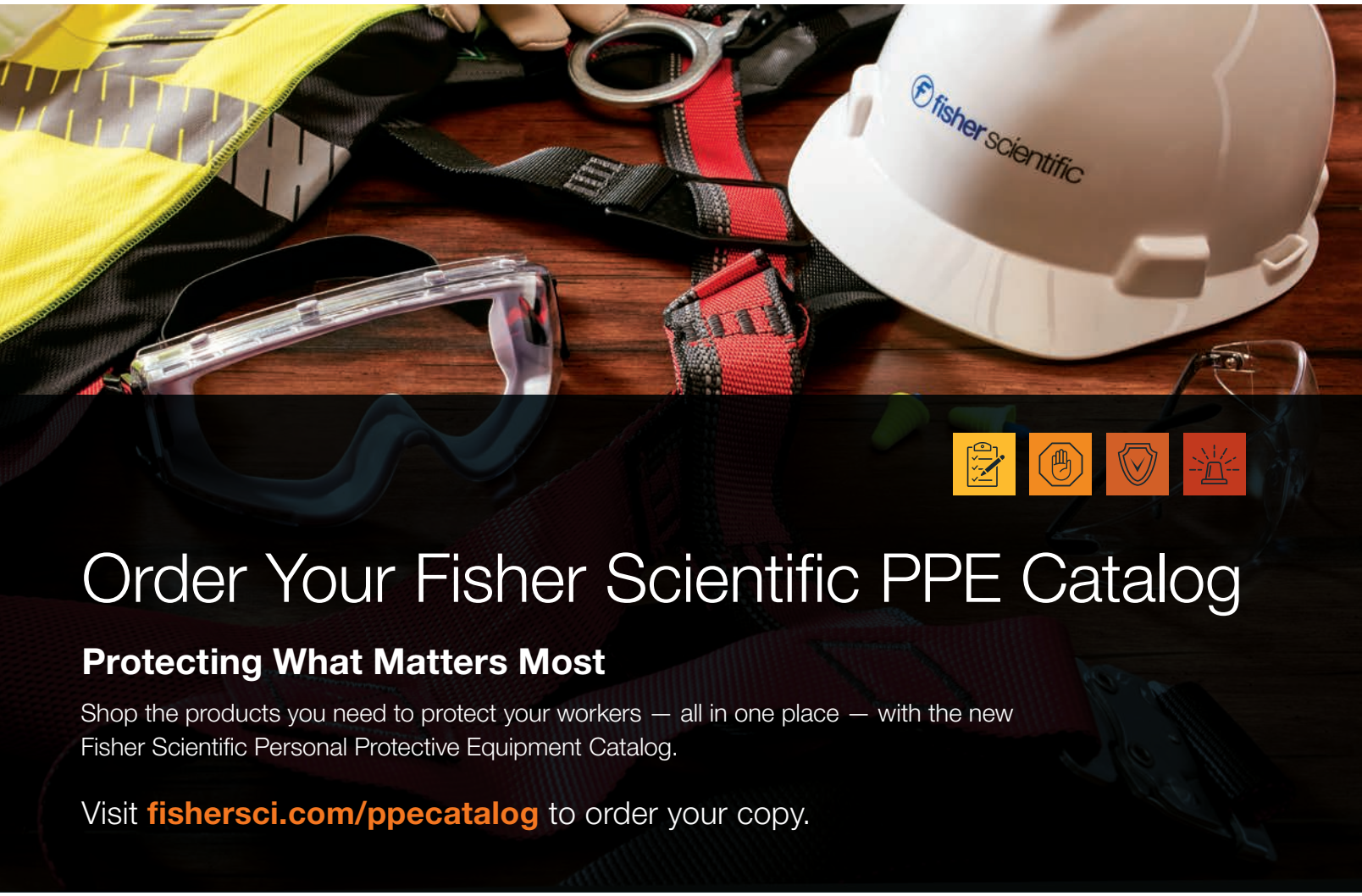

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Litho in U.S.A. 19-245-0282 03/19
BN20194001