

LAB REPORTER

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HOME KITCHENS FLUNK HEALTH INSPECTION

Also in This Issue: Pretzel-Shaped Molecules Could be the Future of Antibiotics, Brain Organoids Usher in New Research Era, Mass Spectrometry: Then and Now, New Stem Cell Technique For Faster Growth, Handheld Analyzers Make Drug Identification Safer

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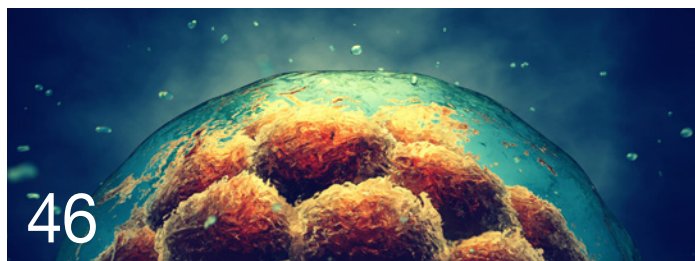
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PRETZEL-SHAPED MOLECULES COULD BE THE FUTURE OF ANTIBIOTICS

By Mike Howie

Chemists from the Van 't Hoff Institute for Molecular Sciences at the University of Amsterdam took a major step toward synthesizing lasso peptides earlier this year by creating a new class of molecules called quasi[1]catenanes. The new molecules are shaped like nanoscopic pretzels, with two molecular rings oppositely coupled at a central carbon atom. PhD student Luuk Stemers led Professor Jan van Maaseveen's Synthetic Organic Chemistry research group in the study, which took five years to complete and was published in *Nature Communications* in May 2017.

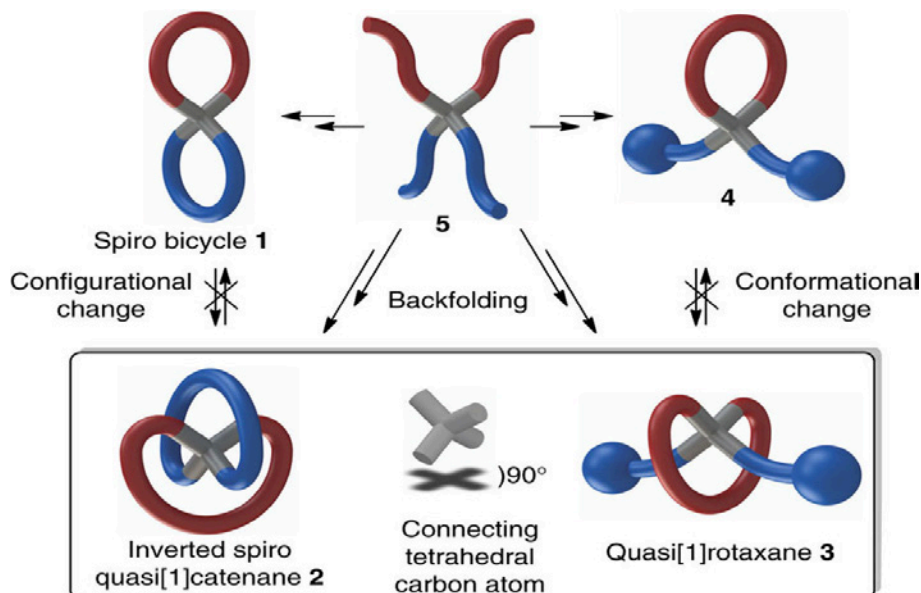
Lasso peptides, first discovered more than 25 years ago, are small ribosomally assembled and post-translationally modified strings of amino acids (RiPPs) that act as antibiotics in bacteria, protecting them against other microorganisms. Although they have the potential to be used as antibiotics in humans, their structural complexity has prevented chemists from developing a strategy to reliably synthesize and replicate their molecular architecture.

Synthesizing the Structure

Lasso peptides consist of a "rope" or tail (C-terminal) with one end enclosed in a "loop" (a macrolactam ring at the N-terminal) so that it resembles a lariat or slipknot. The loop is kept in place by two residues attached above and below the ring. The structure itself is extremely resistant to thermal, chemical, and proteolytic degradation, making it a promising option for therapeutic peptide applications.

In an attempt to recreate the unique "lasso" structure, the research team wanted to force the loop to close around the tail in precisely the right place. Eventually, Stemers created a molecular scaffold that helped to correctly form the loop, and then created a second loop by forcing the end of the rope to close. This created the quasi[1]catenanes structure. The name is derived from the loosely intertwined, ring-like molecular structures called catenanes that were developed by French chemist Jean-Pierre Sauvage, Scottish chemist Sir Fraser Stoddard and Dutch chemist Ben Feringa. These three chemists won the 2016 Nobel Prize in chemistry for their work with catenanes.

In a continuation of their research, Stemers and team are hoping to add breakable bonds to the quasi[1]catenane structure that would allow the rings to be unlocked.



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Hydrochloric Acid, >30-35%	96208-500ML	60-047-781	500mL	\$466.71
Nitric Acid, >65-71%	02650-500ML	60-011-10	500mL	\$400.91
Perchloric Acid, 67-72% (T)	12415-500ML	60-044-734	500mL	\$480.59
Phosphoric Acid, >85% (T)	64957-1L	60-011-45	1L	\$1,331.26
Sulfuric Acid, >95% (T)	77239-500ML	60-047-546	500mL	\$721.66
TraceSELECT Acids and Bases				
Ammonium Hydroxide Solution, ≥ 25% in Water (T)	09857-500ML	60-044-623	500mL	\$166.02
Formic Acid, ≥ 88.0% (T)	06454-250ML	60-044-585	250mL	\$92.83
Hydrochloric Acid, ≥ 30% (T)	08256-1L	60-044-609	1L	\$117.71
Hydrochloric Acid, ≥ 37% fuming (T)	84415-500ML	60-007-78	500mL	\$128.50
Nitric Acid, > 69.0% (T)	84385-2.5L	60-011-08	2.5L	\$382.93
Potassium Hydroxide Solution, ≥ 30% in Water (T)	30955-250ML	60-045-868	250mL	\$177.33
Sulfuric Acid, ≥ 95% (T)	84716-1L	60-047-674	1L	\$406.63
Water, ≥ 25% in Water (T)	95305-1L	60-047-765	1L	\$49.34
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Ammonium Phosphate Monobasic, ≥ 99.9999%	09726-100G	60-044-613	100g	\$344.89
Lithium Carbonate, ≥ 99.998%	62462-100G	60-047-218	100g	\$712.40
Potassium Chloride, ≥ 99.9995%	05257-100G	60-018-47	100g	\$182.99
Potassium Phosphate Monobasic, ≥ 99.995%	60216-100G	60-027-663	100g	\$145.46
Potassium Hydroxide Hydrate, ≥ 99.995%	60371-25G	60-047-178	25g	\$95.81
Sodium Acetate, ≥ 99.999%	59929-100G	60-027-56	100g	\$169.61
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Sodium Hydroxide Monohydrate, ≥ 99.9995%	01968-25G	60-013-99	25g	\$60.24
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Description	Mfr. No.	Cat. No.	Quantity	Price
ProteoSpec LC/MS Grade Acetic Acid	RMB11201	RMB11201101	10mL	\$88.00
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ProteoSpec DSG Crosslinker	RMB13301	MB1330150CM	50mg	\$130.00
ProteoSpec Biotin-Hydrazide	RMB14201	MB14201100C	100mg	\$105.20
ProteoSpec Sulfo-NHS-SS-Biotin	RMB14207	MB14207100C	100mg	\$290.00
ProteoSpec SATA Protein Modifier	RMB14102	MB1410250CM	50mg	\$176.00
ProteoSpec CHCA MALDI Matrix	RMB15101	MB15101510C	50mg	\$126.00
ProteoSpec Heptafluorobutyric Anhydride, HFAA	RMB12203	MB122031012	10g	\$137.00
ProteoSpec BSTFA with 1% TMCS	RMB1202T	MB1202T1012	10g	\$118.00
ProteoSpec MES, Molecular Biology Grade	RMB19101	MB1910125C2	25g	\$55.00

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Use the decision tree (shown on the page) to help you identify the best analytical method for your particular needs.

Regardless of the method used, most analytical methods for trace elements include similar steps:

Sample Preparation

Collection: Samples for trace metal analysis must be properly collected, usually using pre-cleaned or certified containers to eliminate external contamination.

Digestion: Some materials may need to be physically modified by grinding or chemically treated to release the trace substances to be measured.

Filtration: Pre-analysis sample filtration reduces extraneous materials and particulates that may damage chromatography columns.

Dilution: Concentrated samples may require dilution before assay.

Sample Analysis

Calibration: Most analytical instruments require calibration before use to ensure result accuracy.

Assay: Sample testing may require the use of in-assay standards that can be used to validate results.

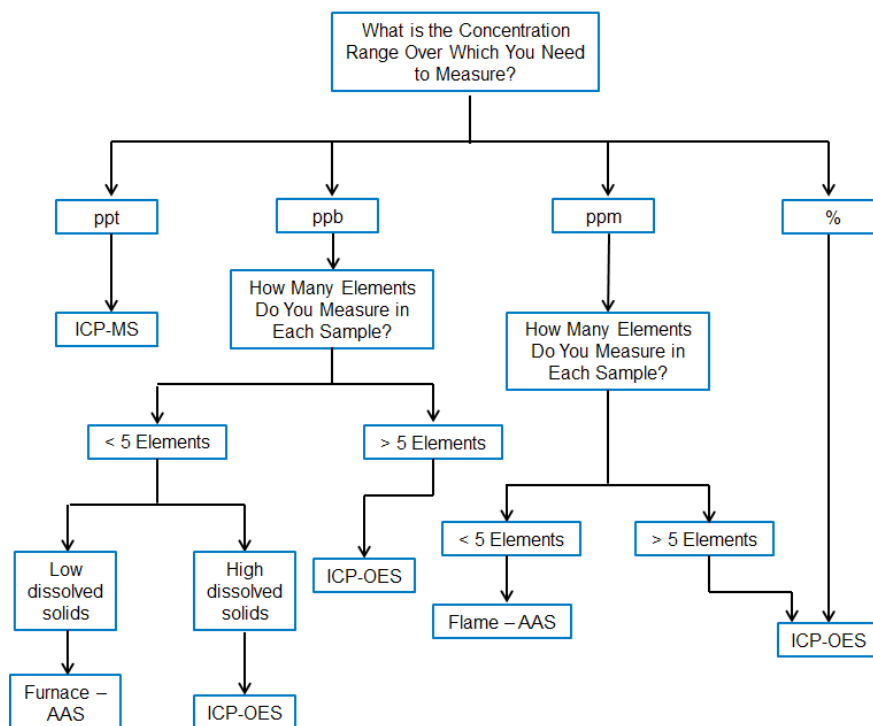
Data Analysis and Interpretation Results

Software: Programs are available to assist scientists with calculating results that can be used to determine industry or regulatory compliance.

Making the Best Selections

Chemicals play a vital role in many steps of these analyses, and selecting the right grade or purity level can help to ensure that your results are reliable and repeatable, and that the data is valid. Proper sample preparation can also protect your instruments from damage that can shorten their work lifespans.

Choose the right grade of acids, bases, water, standards, solvents, buffers, solutions or other reagents to make your analyses successful.



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Element	Description	Mfr. No.	Cat. No.	Quantity	Price
Lead for AAS	1000ppm in 2% HNO ₃	RV010039	RV010039100	100mL	\$35.60
Zinc for AAS	1000ppm in 2% HCl	RV010062	RV010062100	100mL	\$35.60
Arsenic for AAS	1000ppm in 2% HNO ₃	RV010065	RV010065100	100mL	\$35.60
Cadmium for AAS	1000ppm in 2% HNO ₃	RV010069	RV010069100	100mL	\$35.60
Manganese for AAS	1000ppm in 2% HNO ₃	RV010078	RV010078100	100mL	\$35.60
Lead for ICP	1000ppm in 2% HNO ₃	RV010301	RV010301100	100mL	\$61.20
Mixed Anion Standard for IC	100ppm in H ₂ O: Br ⁻ , Cl ⁻ , F ⁻ , NO ₂ ⁻ , NO ₃ ⁻ , PO ₄ ³⁻ , SO ₄ ²⁻	RV010741	RV010741100	100mL	\$236.15
Chloride (Cl-) for IC	1000ppm in H ₂ O	RV010911	RV010911100	100mL	\$55.00
Fluoride (F-) for IC	1000ppm in H ₂ O	RV010915	RV010915100	100mL	\$55.00
Sulfate (SO ₄ ²⁻) for IC	1000ppm in H ₂ O	RV010943	RV010943100	100mL	\$55.00

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BRAIN ORGANOIDS USHER IN NEW RESEARCH ERA

By Kevin Ritchart

A new method of developing brain organoids from pluripotent stem cells could prove to be an important step forward in the study of human neurological disorders. Researchers from the University of Bonn in Germany published a study in a recent issue of *Cell Reports* that outlined a unique approach to examining a rare congenital brain defect.

The German team took skin cells from patients and converted them into pluripotent stem cells. From these stem cells, they grew three-dimensional brain organoids or “mini-brains” that mimic the structure of the human brain.

Overcoming Historical Barriers in Human Brain Research

The ability of scientists to perform meaningful research on the human brain using human cells has been limited to date. Typically, cells in culture grow in a flat, two-dimensional layer. Without a three-dimensional model, researchers cannot accurately determine cellular changes when outside stimuli are introduced.

While some testing is done on the brains of mice and other animals, there are problems with the reliability of the results

of such research. The human brain is much more complex than an animal’s, so human developmental disorders can only be studied on a limited basis while using animal brain models.

Watching Cells Get Organized

The new brain organoids can show scientists how nerve cells organize themselves into highly complex brain tissues. “The method thus opens up completely new opportunities for investigating disorders in the architecture of the developing human brain,” said Dr. Julia Ladewig, who leads a working group on brain development.

Dr. Ladewig and her colleagues used brain organoids to study Miller-Dieker Syndrome, a hereditary disorder that’s believed to be caused by a chromosomal defect. Patients with this disease present with malformations in vital parts of the brain.

Surprised by Signs of Cell Disruption

Researchers used skin cells from Miller-Dieker patients to create brain organoids to observe how the cells would react. Instead of seeing the organization and multiplication patterns of healthy cells, these processes were disrupted in the cells from Miller-Dieker patients.

In healthy patients, specific proteins are responsible for the dense and even packing of cells. The cells from Miller-Dieker patients are much more loosely packed and less organized, which leads to cell differentiation at an earlier stage. This particular behavior was not evident in previous two-dimensional cell culture growth.

While no new treatments are available at this time, researchers are hopeful that more work in this area will result in breakthroughs to help patients with Miller-Dieker Syndrome and other neurological disorders.

“We are undertaking fundamental research here,” Dr. Ladewig said. “Nevertheless, our results show that organoids have what it takes to herald a new era in brain research. And if we better understand the development of our brain, new treatment options for disorders of the brain can presumably arise from this over the long term.”

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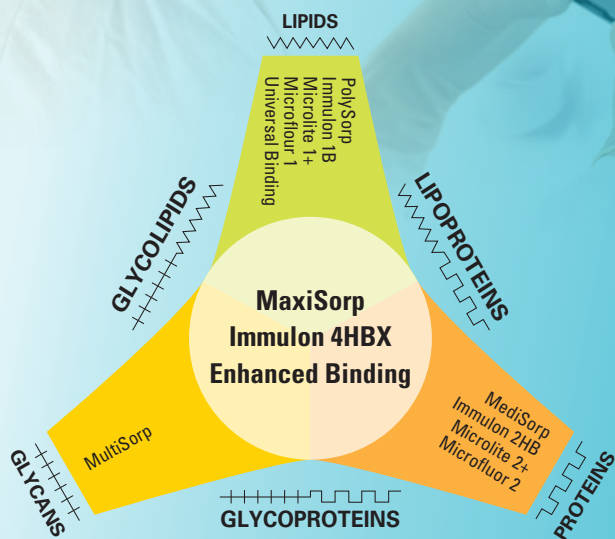


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Gosselin Round HDPE Storage Bottles, Red Screw Caps, Sterile

Capacity	Cap Size	Mfr. No.	Cat. No.	Quantity	Price
50mL	27mm	LR50A-18	07-202-544	600/Case	\$333.72
100mL	37mm	LC250-06	07-202-547	335/Case	\$374.92
150mL	37mm	LR150A-14	07-202-549	250/Case	\$365.65
250mL	37mm	LR250-09	07-202-545	145/Case	\$194.67
500mL	58mm	LR500-04	07-202-546	140/Case	\$301.79
1L	58mm	LR1000-08	07-202-548	68/Case	\$231.75



Gosselin Square HDPE Storage Bottles, Graduated Screw Caps, Sterile

Capacity	Cap Size	Mfr. No.	Cat. No.	Quantity	Price
150mL	37mm	LC150A-05	07-202-023	300/Case	\$317.78
250mL	37mm	LC250-06	07-202-022	210/Case	\$290.88
500mL	58mm	LC500-11	07-202-020	175/Case	\$310.13
1L	58mm	LC1000-13	07-202-021	90/Case	\$172.33
2L	58mm	LC2000-03	07-201-998	50/Case	\$168.71
2.5L	77mm	LC2500A-07	07-201-999	35/Case	\$154.50



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- Single-channel models with a volume range from 0.2µL to 10mL
- Multichannel models with a volume range from 0.5µL to 300µL
- Fixed-volume models are also available



Single-Channel Pipettes

Model	Volumes	Color Code	Cat. No.	Price	Cat. No.	Price
			SS Ejector		Plastic Ejector	
P2L	0.2 to 2µL	Orange	FA10001MG	\$399.36	FA10001PG	\$393.25
P10L	1 to 10µL	Red	FA10002MG	\$399.36	FA10002PG	\$393.25
P20L	2 to 20µL	Pale Yellow	FA10003MG	\$399.36	FA10003PG	\$393.25
P100L	10 to 100µL	Salmon	FA10004MG	\$399.36	FA10004PG	\$393.25
P200L	20 to 200µL	Yellow	FA10005MG	\$399.36	FA10005PG	\$393.25
P1000L	100 to 1000µL	Blue	FA10006MG	\$399.36	FA10006PG	\$393.25
P5000L	500 to 5000µL	Purple	FA10007G**	\$393.25		
P10mL	1 to 10mL	Pale Blue	FA10008G**	\$393.25		

**No ejector

Multichannel Pipettes

Model	Volumes	Color Code	Channels	Cat. No.	Price
L8x20	2 to 20µL	White	8	FA10009G	\$393.25
L12x20	2 to 20µL	White	12	FA10010G	\$393.25
L8x200	20 to 200µL	Yellow	8	FA10011G	\$393.25
L12x200	20 to 200µL	Yellow	12	FA10012G	\$393.25
L8x10	0.5 to 10µL	Red	8	FA10013G	\$393.25
L12x10	0.5 to 10µL	Red	12	FA10014G	\$393.25
L8x300	20 to 300µL	Green	8	FA10015G	\$393.25
L12x300	20 to 300µL	Green	12	FA10016G	\$393.25

Versatility and Reliability

WHEATON

Wheaton Media Bottles

WHEATON media bottles are manufactured from borosilicate glass that conforms to USP Type I requirements and has a low alkali content to help prevent pH changes that can affect content purity.

These media bottles feature sloping shoulders to facilitate pouring and include attached pour rings to eliminate dripping.

Other options:

- Ungraduated or graduated (with a marking patch)
- Clear or amber glass (amber in 125mL size only)
- With or without attached black phenolic caps
- Choice of cap liners (rubber, PTFE-faced rubber or LDPE)



Description	Capacity	Mfr. No.	Cat. No.	Quantity	Price
Clear Glass					
Ungraduated, Without Caps	125mL	219415	06-407	48/Case	\$223.34
	250mL	219417	06-408	48/Case	\$340.10
	500mL	219419	06-409	24/Case	\$239.51
Ungraduated, LDPE-Lined Caps	125mL	219495	06-411	48/Case	\$312.69
	250mL	219497	06-412	48/Case	\$437.64
	500mL	219499	06-451-278	24/Case	\$290.64
Ungraduated, Rubber-Lined Caps	125mL	219575	06-414	24/Case	\$277.31
	250mL	219577	06-415	48/Case	\$380.73
	500mL	219579	22-263008	24/Case	\$276.15
Graduated, Rubber-Lined Caps	125mL	219755	06-404A	48/Case	\$277.67
	250mL	219757	06-404B	48/Case	\$347.75
	500mL	219759	06-404D	24/Case	\$275.50
Graduated, PTFE-Faced-Rubber-Lined Caps	125mL	219815	06-404F	48/Case	\$323.23
	250mL	219817	06-404G	48/Case	\$408.82
	500mL	219819	02-940-20	24/Case	\$325.00
Graduated, Without Caps	125mL	219435	03-439-67D	48/Case	\$245.54
	250mL	219437	03-439-67E	48/Case	\$352.35
	500mL	219439	03-439-67F	24/Case	\$260.21
Graduated, LDPE-Lined Caps	125mL	219715	06-451-281	48/Case	\$348.50
	250mL	219717	06-451-282	48/Case	\$469.77
	500mL	219719	06-451-283	24/Case	\$350.17
Amber Glass					
Graduated, LDPE-Lined Caps	125mL	219855	06-451-287	48/Case	\$753.80
Graduated, PTFE-Faced-Rubber-Lined Caps	125mL	219875	06-451-289	48/Case	\$769.97
Graduated, Without Caps	125mL	219885	06-451-290	48/Case	\$463.79

Comprehensive Qualification Support

WHEATON

DURAN PURE Bottles

From R&D through Phase III trials, the task of selecting and validating biologic intermediate packaging is a complex matrix of requirements. DURAN PURE offers a complete, USP-compliant range of bottles from 25mL to 20L. These validation ready sizes are scalable from pilot to production volumes, with the added durability to go from hot “sterile” fills to cold storage.

The DURAN PURE bottle and closure combination provides moisture permeation rates that support bottle closure integrity for process biologics — it's the protective environment for long-term stability assurance.



Volume	DIN Thread	Mfr. No.	Cat. No.	Quantities	Price
25mL	25	81 806 1406	02-913-014	10/Case	\$353.86
100mL	45	81 806 2402	02-913-015	10/Case	\$404.84
250mL	45	81 806 3604	02-913-016	10/Case	\$486.45
500mL	45	81 806 4403	02-913-017	10/Case	\$531.32
1000mL	45	81 806 5408	02-913-018	10/Case	\$750.34
2000mL	45	81 806 6301	02-913-019	10/Case	\$1,048.19
5000mL	45	81 806 7306	02-913-020	1/Case	\$337.57
10000mL	45	81 806 8602	02-913-021	1/Case	\$580.61
20000mL	45	81 806 9101	02-913-022	1/Case	\$1,381.14

Description	DIN Thread	Mfr. No.	Cat. No.	Quantity	Price
DURAN PURE Premium Screw Caps, Fluoropolymer	GL 25	89 806 1306	13-710-921	5/Case	\$79.29
DURAN PURE Premium Screw Caps, Fluoropolymer	GL 45	89 806 8679	13-710-922	5/Case	\$136.92
DURAN PURE Premium Lip Seal Caps, Fluoropolymer	GL 45	89 886 2802	13-710-922	5/Case	\$176.41



HOME KITCHENS FLUNK HEALTH INSPECTION

By Mike Howie

You may think the kitchen in your home is the picture of cleanliness, with a place for everything and everything in its place. But just because it's neat and tidy doesn't mean that it reaches the same level of sanitation as professional kitchens. In fact, of 100 Philadelphia homes surveyed by researchers from Drexel University, the vast majority would have violated at least one of the highly regulated standards to which restaurants are held.

Drexel associate professor Jennifer Quinlan, who teaches in the university's College of Nursing and Health Professions, teamed up with former Drexel graduate students Patricia Borrusso and Shauna Henley (who now works at the University of Maryland) to conduct two studies published in *Food Protection Trends* and the *Journal of Food Protection*.

The first of the two studies was a visual audit based on a checklist similar to those used by health inspectors. In the second study, the researchers collected samples from various locations within the kitchens and tested them for indicator organisms and pathogens. These studies are both unusual and important — most studies about food safety examine restaurant kitchens, not home kitchens.

The Violations

Many of the code violations were related to food storage. Raw meat was improperly stored in a staggering 97 percent of homes, placed above food that was ready to eat and, in some cases, dripping juices onto other foods. In 43 percent of homes, refrigerators were warmer than the recommended 41 degrees Fahrenheit that limits bacterial growth. Six percent of homes even stored raw meat and poultry at room temperature.

Other violations pertained to general kitchen upkeep and cleanliness, including the use of worn or cracked wooden cutting boards that could harbor bacteria (found in 76 percent of homes), a lack of available soap (in 2 percent of bathrooms and 4 percent of kitchens), no towels in the kitchen (9 percent of homes), animals in areas used for food preparation and consumption (27 percent of homes), evidence of pest infestations (65 percent of homes), and more.





The Pathogens

All of these violations contributed to the variety of foodborne pathogens that the team found in their second study. At least one pathogen was found in 45 percent of the homes tested, and more than one type of pathogen was present in 12 percent of homes. Fecal coliforms were present in 44 percent of homes (usually found in sinks or on sponges and dishcloths, and associated with a lack of cleaning materials).



Staphylococcus aureus, also associated with a lack of cleaning materials, was found in 39 percent of homes, most frequently on countertops and refrigerator door handles. *Listeria* — which can be particularly harmful to pregnant women — and *Escherichia coli* were found in 15 percent of homes. Of the surfaces tested, the researchers found that sponges and dishcloths were by far the most likely to be contaminated (at 64 percent). Bacteria grow on the soft, damp surfaces and are then spread throughout the kitchen.

Perhaps it's not surprising that home kitchens don't compare to restaurant kitchens — they're not held to the same standards. Animals aren't allowed in most shops and restaurants, and they'd certainly never be found on a kitchen counter while a chef prepares a five-star meal. Professional kitchens also mandate things like hair nets, separate sinks for hand washing, and cleaning cloths soaked in a sanitary or disinfecting solution.

Borrusso and Quinlan suggest that better education is the key to safer practices in the kitchen, and that our modern technologies can play a key role in spreading that education. "For example, if I am searching for a recipe for chicken, have something appear with safe handling

techniques for chicken," Quinlan suggested. Their study is the first step in that education: even with a small sample size, it shows just how prevalent these issues can be. Sharing their findings with the world may encourage people to be more mindful about how they run their kitchens.

Food Safety at Home: The Basics

- Use one sink for washing food, utensils and cookware and another for hand washing
- Keep your refrigerator temperature at or below 41 degrees Fahrenheit
- Store raw meat in a refrigerated drawer and away from ready-to-eat foods
- Sand or replace grooved or cracked wooden cutting boards
- Keep dish towels clean and dry, or use paper towels
- Keep pets away from surfaces that are used to prepare or consume food

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Model	Chemical Compatibility	Special Features
Dispensette S	General applications	<ul style="list-style-type: none"> • PFA-coated piston • Platinum-iridium valve springs
Dispensette S Organic	<ul style="list-style-type: none"> • Organic solvents • Concentrated acids • Peroxides 	<ul style="list-style-type: none"> • Glass piston • Tantalum valve springs
Dispensette S Trace Analysis	<ul style="list-style-type: none"> • Hydrofluoric acid • High-purity reagents 	<ul style="list-style-type: none"> • Dispense acids, bases and hydrogen peroxide in the 1 to 10mL volume range • Fluid path comprised of high-purity materials (fluoroplastics, sapphire) • Available with either platinum-iridium or tantalum valve springs

Visit fishersci.com for Dispensette S Organic and Dispensette S Trace Analysis catalog numbers and pricing.

Volume Range	Cat. No.	Price	Cat. No.	Price
Dispensette S, Analog-Adjustable			Recirculation Valve	
	Standard Valve			
NEW SIZE! 0.1 to 1mL	13-689-019	\$433.51	13-689-012	\$453.91
0.2 to 2mL	13-689-020	\$433.51	13-689-013	\$453.91
0.5 to 5mL	13-689-021	\$433.51	13-689-014	\$453.91
1 to 10mL	13-689-022	\$433.51	13-689-015	\$453.91
2.5 to 25mL	13-689-023	\$606.91	13-689-016	\$627.31
5 to 50mL	13-689-024	\$622.20	13-689-017	\$642.60
10 to 100mL	13-689-025	\$969.00	13-689-018	\$989.40
Dispensette S, Digital				
NEW SIZE! 0.1 to 1mL	13-689-006	\$494.71	13-689-000	\$525.31
0.2 to 2mL	13-689-007	\$494.71	13-689-001	\$525.31
0.5 to 5mL	13-689-008	\$494.71	13-689-002	\$525.31
1 to 10mL	13-689-009	\$494.71	13-689-003	\$525.31
2.5 to 25mL	13-689-010	\$668.11	13-689-004	\$698.71
5 to 50mL	13-689-011	\$678.31	13-689-005	\$708.91

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Qorpak White Polypropylene Jars

These white polypropylene jars can be used to collect and store laboratory specimens or other dry materials. A wide neck and straight sides allow contents to be easily retrieved.

The polypropylene material has better high-temperature tolerance than HDPE, and the attached white PP caps are cost-effective, with good impact strength and pliability. Choose jars with unlined or SturdeeSeal PE foam-lined caps.



Capacity	Closure Size	Mfr. No.	Cat. No.	Quantity	Price
30mL (1 oz.), Foam-Lined Caps	43-400	PLC07184	02-991-728	72/Case	\$72.96
60mL (2 oz.), Foam-Lined Caps	53-400	PLC07185	02-991-653	48/Case	\$51.01
120mL (4 oz.), Foam-Lined Caps	53-400	PLC07186	02-991-654	36/Case	\$38.63
240mL (8 oz.), Foam-Lined Caps	70-400	PLC07187	02-991-630	36/Case	\$78.60
240mL (8 oz.), Foam-Lined Caps, Bulk	70-400	PLC07461	02-991-160	336/Case	\$398.85
480mL (16 oz.), Foam-Lined Caps	89-400	PLC07188	02-991-632	24/Case	\$61.81
480mL (16 oz.), Foam-Lined Caps	89-400	PLC03714	02-991-910	112/Case	\$238.09
960mL (32 oz.), Foam-Lined Caps	120-400	PLC07189	02-991-626	24/Case	\$88.39
960mL (32 oz.), Foam-Lined Caps, Bulk	120-400	PLC07197	02-993-246	60/Case	\$190.33
480mL (16 oz.), Unlined Caps, Bulk	89-400	PLC07196	02-992-291	112/Case	\$178.87

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Fisher Scientific TraceableLIVE Barometric Pressure Monitor

Be notified whenever there is a change in barometric pressure, humidity or temperature in your work environment.

The TraceableLIVE Barometric Pressure Monitor connects to existing WiFi to provide up-to-date remote measurements sent to you via mobile push, email or text message. Alerts include low battery, interrupted connectivity and changes in customer-established parameters for temperature, relative humidity and barometric pressure.



- **Multiple point calibration** — traceable to NIST
- **Ambient measurements** (via dongle) — place the entire unit inside a chamber or other environment
- **Continuous data transmission and monitoring** — uses SSL-encrypted secure connection
- **Cloud-based data interface** — no local software required; web, Android, Apple iOS data visibility
- **Unlimited scalability** — use TraceableLIVE in respiratory labs or network facilities where barometric pressure is critical

Parameter	Range	Accuracy	Resolution	Cat. No.	Price
Barometric Pressure	500 to 1100mbar	±4mbar	1mbar	15-079-664	\$295.00
Temperature	0 to 55°C (32 to 131°F)	±0.4°C	0.01°		
Relative Humidity	0 to 100% RH (Non-Condensing)	±3% RH (5-75%); Otherwise ±5% RH	0.01% RH		

Low Retention, Tight Fit



Biotix xTIP Low-Retention Pipette Tips

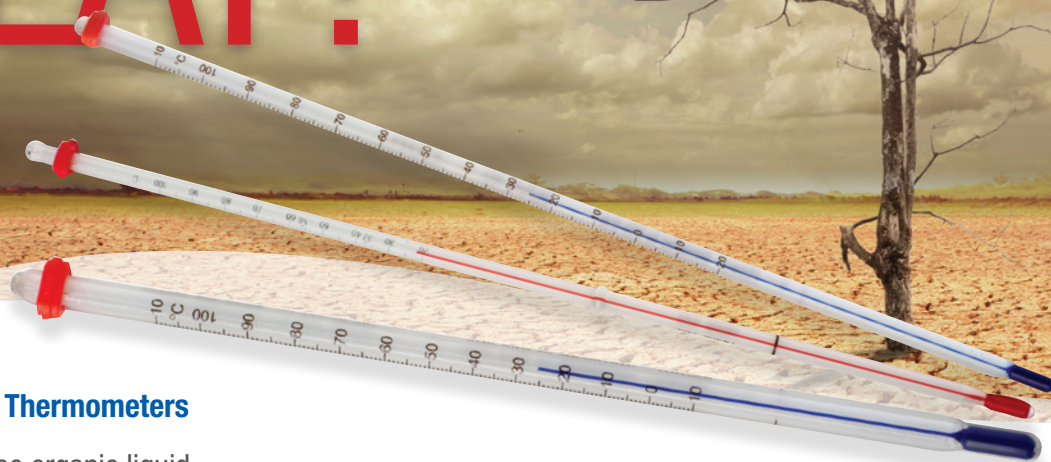
Biotix xTIP Low-Retention Pipette Tips are designed with Flexfit to create a secure seal while reducing the force needed for insertion and ejection.

- Designed for use with Rainin LTS-Style Pipettes
- X-Resin polypropylene can significantly reduce sample retention (for tighter CV values)
- Blade technology eliminates the need to remove that last drop by touching the tip
- Graduated and sterilized
- Available with or without filters
- Certifications: ISO 9001, FDA Class I



Description	Mfr. No.	Cat. No.	Quantity	Price
Filtered				
20µL, 96 Tips/Rack	R-0020-9FC	12-111-033	960 Tips/Pack	\$99.00
			5 Packs/Case	\$495.00
200µL, 96 Tips/Rack	R-0200-9FC	12-111-034	960 Tips/Pack	\$99.00
			5 Packs/Case	\$495.00
1000µL, 96 Tips/Rack	R-1000-9FC	12-111-035	960 Tips/Pack	\$124.00
			4 Packs/Case	\$496.00
Unfiltered				
20µL, 96 Tips/Rack	R-0020-9FC	12-111-033	960 Tips/Pack	\$99.00
			5 Packs/Case	\$495.00
200µL, 96 Tips/Rack	R-0200-9FC	12-111-034	960 Tips/Pack	\$99.00
			5 Packs/Case	\$495.00

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- CELLSTAR Adherent and Suspension TC for classical methods
- CELLSTAR Cell-Repellent Surface for spheroid and 3D cultures
- Advanced TC and CELLCOAT biological coatings for primary, sensitive or stressed cells

Microplates

- Options in 1- to 1,536-well formats for cell-based, biochemical, immunoassay and genomic methods
- Microplates in well densities of 96 or more for UV/VIS spectroscopy, fluorescence, and luminescence testing
- A complete line of products for compound library management

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Fisherbrand Class A Volumetric Flasks with Stoppers

Fisherbrand Class A Volumetric Flasks feature a single graduation ring blasted on the neck.

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- Calibrated “To Contain”
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- Available in sizes from 10 to 2000mL
- Meet requirements for ASTM standard E 288 (for Class A)



Capacity	Cat. No.	Quantity	Price	Quantity	Price
10mL	FB40010	N/A	N/A	12/Case	\$364.48
25mL	10-205A	Each	\$120.17	12/Case	\$1,004.51
50mL	10-205B	Each	\$143.23	12/Case	\$1,214.29
100mL	10-205C	Each	\$139.49	12/Case	\$1,183.72
200mL	FB400200	6/Pack	\$337.38	12/Case	\$536.05
250mL	10-205D	Each	\$163.32	12/Case	\$1,365.99
500mL	10-205E	Each	\$266.10	12/Case	\$2,223.72
1000mL	10-205F	Each	\$320.52	6/Case	\$1,339.25
2000mL	FB4002000	Each	\$115.26	4/Case	\$367.15

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UNIVERSITY OF MINNESOTA ARCHIVES

MASS SPECTROMETRY: THEN AND NOW

By Kevin Ritchart

Since its inception more than 100 years ago, mass spectrometry (MS) has been an important tool in the study of matter. The concept of isotopes, the determination of atomic weights, the identification of new elements and quantitative gas analysis are just some of the discoveries made possible by the development of MS.

While many people consider MS to be a chemical process, it is actually rooted in physics. As with many scientific discoveries, J.J. Thomson, the man credited as its inventor, was looking for something else. The 28-year-old had received the prestigious Cavendish Professorship and was studying the transmission of electricity through gases at Cambridge University.

In 1897, Thomson's assistant, E. Everett, built an apparatus to measure the magnetic deflection of cathode rays, which Thomson used to measure the charge-to-mass ratio (known as e/m) of electron particles (e). Two years later, their collaboration resulted in an instrument that could quantify both e/m and e to indirectly measure electrons' mass.

Award-Winning Work

Thomson's work earned him the 1906 Nobel Prize for Physics and laid the foundation for further growth. Thomson and Francis Aston (who won the 1922 Nobel Prize for Chemistry) built what

is considered to be the first mass spectrometer. To measure the mass of charged atoms, ions were generated by gas discharge tubes. The ions were then passed through parallel electric and magnetic fields, which deflected them into parabolic trajectories, and the results were captured on photographic plates.

Later, Aston and other scientists redesigned the instruments to improve resolution and used them to isolate and prove the existence of elemental isotopes, an understanding that was critical to the development of the atomic bomb by the Manhattan Project during World War II.

By the 1940s, chemists in the petroleum industry began to use MS to measure the levels of small hydrocarbons. Although the technique was well established and mass spectrometers were being commercially produced, the actual process and the best way to leverage the data were not well understood.

Further Development

In the 1960s, chemists began to really understand how complex molecules were fragmented by the instrument, which led to new applications. Three chemists — Fred McLafferty, Klaus Biemann and Carl Djerassi — performed MS experiments with different classes of organic molecules, which gave chemists a way to determine the structures of unknown molecules.



By the 1980s, the use of MS to analyze small organic molecules had become routine. The development of Electro-Spray Ionization (ESI) and Matrix Assisted Laser Desorption Ionization (MALDI) techniques in 1988 revolutionized MS.

Other MS-related techniques include: inductively coupled plasma-MS (ICP-MS), accelerator MS (AMS), thermal ionization-MS (TIMS) and spark source MS (SSMS). MS is also commonly used in conjunction with various separation methods like gas chromatography (GC/MS), liquid chromatography (LC/MS or LC-MS) and ion mobility spectrometry (IMS/MS or IMMS).

With its rich history, future uses for MS may very well be limitless.

INCREASE YOUR PROTEOMICS WORKFLOW EFFICIENCY

Increase Throughput, Protect Samples

Solvent removal is often the limiting step in a proteomics process and can affect the overall throughput in a laboratory. While there are several methods for removing solvent, vacuum centrifugal concentration is the method of choice.

With this method, centrifugation minimizes violent boiling (“bumping”) that may cause sample loss and cross contamination between vessels. The boiling point of the solvent is reduced by the vacuum; solvent evaporation also removes heat and causes sample temperatures to drop significantly. The application of heat to the system counteracts these cooling effects and speeds the drying process.

Researchers may be reluctant to use heat in vacuum concentration because of concerns about viability of the product. Continued heating after the evaporation is complete will raise the temperature of the remaining sample and can cause thermal degradation.

The Thermo Scientific Savant family of vacuum concentrators offers different models for this application. The model selection will depend on the type of solvents and format being used.

For a medium capacity system, the Savant vacuum concentrator kit SPD111V P1 is recommended. For larger capacity samples, two different systems can be used depending on your needs. The Savant SPD1010P1 is an integrated system with a built-in vacuum pump; the Savant SC250 EXP P1 is a modular system.

Enrich Protein Samples

Immunoblotting allows the precise identification of the electrophoretic band for a particular protein in complex samples. The total amount of protein loaded per gel lane is limited, which in turn restricts detection of low-abundance proteins¹.

Membrane proteins in particular may be concentrated by isolation of the membrane fraction of cell lysates by centrifugation in a Thermo Scientific Sorvall Legend Micro 21R Microcentrifuge. A membrane fraction suitable for analysis by immunoblotting can be obtained from by centrifugation at 15,000-21,000xg for 1-2 hours at 40°C, depending on the sample type.

Compared with other routine methods of cell lysate preparation (such as boiling in the regular SDS electrophoresis sample buffer after breaking cells with glass beads or after alkaline treatment) centrifugation may produce better immunoblotting results for membrane-associated proteins.

Preserve Samples, Save Energy

Storing biological samples in an ultra-low temperature (ULT) freezer set at -80°C is something of a laboratory custom: lab personnel will even refer to their ULT freezer simply as the “minus 80”. But, raising your freezer cabinet temperature by just 10°C can lead to significant energy savings which, as every laboratory manager knows, can have a huge impact on both energy consumption and environmental footprint.

Most biological material does not have to be kept at -80°C. Proteins, as well as nucleic acids, bacteria and viruses will remain fully viable when stored at -20°C or -70°C (depending on the intended duration of storage).

Many laboratories today are seeking ways to reduce energy expenditure. Not only does this reduce the impact that the research may be having on the environment, but also reduces the associated energy costs, which can be especially high for continuously running equipment like freezers. While increasing the freezer set point to -70°C can reduce energy usage by up to 30%, ensuring that your lab is outfitted with the most up-to-date equipment is also important. Manufacturers are responding to ever increasing regulations with technological advances to ensure that systems operate more efficiently, and are manufactured in a more environmentally friendly manner.

By using this higher temperature set point, you can substantially reduce energy costs, and by choosing freezers that use natural, SNAP-compliant² refrigerants, your lab will ultimately be responsible for fewer greenhouse gas emissions, and will help to contribute to the preservation of the environment and the continuation of sustainable science.



Content provided by:

thermoscientific

1) A simple enrichment procedure improves detection of membrane proteins by immunoblotting; Azamat Karginov and Michael Agaphonov, *Bach Institute of Biochemistry, Research Center of Biotechnology of the Russian Academy of Sciences BioTechniques* 61:260-261 (November 2016)
2) United States Environmental Protection Agency (EPA) Significant New Alternatives Policy (SNAP)

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- No compressor: unique dual refrigeration system combines the benefits of cold wall and fan-assisted recovery
- Tight internal air circulation eliminates the risk of freezing
- Sustainable design: SNAP-compliant refrigerants and low noise (35dBA)
- No internal protrusions such as overhead fans, allowing up to twice the storage capacity



Door Style	Plug Type	Electrical Requirements	External Dimensions	Cat. No.	Price
Solid	NEMA 5-15P	100-240V, 50-60Hz	26 x 23.6 x 31.8 in. (66 x 60 x 81cm)	TSX505SA	\$5,400.00
Solid	NEMA 6-15P	100-240V, 50-60Hz	26 x 23.6 x 31.8 in. (66 x 60 x 81cm)	TSX505SD	\$5,400.00
Glass	NEMA 5-15P	100-240V, 50-60Hz	26 x 23.6 x 31.8 in. (66 x 60 x 81cm)	TSX505GA	\$5,700.00
Glass	NEMA 6-15P	100-240V, 50-60Hz	26 x 23.6 x 31.8 in. (66 x 60 x 81cm)	TSX505GD	\$5,700.00

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Introducing the NEW Thermo Scientific TLE Series of ultra-low-temperature freezers.

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Description	Capacity	Voltage	Cat. No.	Price
Model TLE400 Freezer, with 8 sliding drawer racks and 200 boxes*	400 Boxes	110V	TLE40086APM	\$8,719.94
Model TLE400 Freezer, with 8 sliding drawer racks and 200 boxes*	400 Boxes	220V	TLE40086DPM	\$8,719.94
Model TLE600 Freezer, with 12 sliding drawer racks and 300 boxes*	600 Boxes	110V	TLE60086APM	\$9,751.67
Model TLE600 Freezer, with 12 sliding drawer racks and 300 boxes*	600 Boxes	220V	TLE60086DPM	\$9,751.67

*Fiberboard boxes, L x W x H: 5 x 5 x 2 in., With 100-count cell dividers

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Bead Mill 4 Homogenizer

- Small footprint requires minimal bench space
- Broad performance range: 1 to 5m/s
- Process up to four samples per cycle



Bead Mill 24 Homogenizer

- Processing range is ideal for all tissue types
- Highest power: 0.8 to 6m/s
- Simultaneously homogenize up to 24 (0.5 or 2mL)



Description	Cat. No.	Price
Bead Mill 4 Homogenizer	15-340-164	\$1,995.00
Bead Mill 24 Homogenizer	15-340-163	\$6,900.00
Fisherbrand Bead Mill Tubes*		
Tubes for Soft Tissue Homogenization, 2mL, Pack of 50	15-340-153	\$150.00
Tubes for Hard Tissue Grinding, 2mL, Pack of 50	15-340-151	\$150.00
Tubes for Hard Tissue Homogenization, 2mL, Pack of 50	15-340-154	\$150.00
Tubes for Lysing Microorganisms, 2mL, Pack of 50	15-340-152	\$150.00

*Fisherbrand Bead Mill Tubes are compatible with all other bead mill homogenizers.

Power Tracking for Light or Heavy Loads

BRANSON

Branson Ultrasonic Baths

Constant activity/power tracking automatically maintains the ultrasonic power by adjusting for changes in liquid level or temperature. Applications include the cleaning of general lab implements and instruments as well as sample preparation, mixing and homogenization, dissolving solids and dispersion of particles.

CPX Bath Features:

- 99-minute digital timer with continuous ultrasonic operation
- Extended de-gas time setting up to 99 minutes, allowing for “beyond cleaning” applications such as sample preparation

CPXH Bath Features:

- Automatic ultrasonic activation: When the process temperature reaches the programmable set point, the ultrasonic cycle begins
- Can be heated up to 69°C/156.2°F and set for either Fahrenheit or Celsius

M and MH Series Feature:

- 60-minute mechanical timer and continuous operation with or without heat



Model	External Dimensions	Capacity	Mfr. No.	Cat. No.	Price
M Series					
M1800	15 x 14 x 10cm (6 x 5.5 x 4 in.)	1.9L (0.5 gal.)	CPX952116R	15-336-100	\$455.50
M2800	23 x 14 x 10cm (9.5 x 5.5 x 4 in.)	2.8L (0.75 gal.)	CPX952216R	15-336-101	\$615.00
M3800	29 x 15 x 15cm (11.5 x 6 x 6 in.)	5.7L (1.5 gal.)	CPX952316R	15-336-102	\$915.50
M5800	29 x 24 x 15cm (11.5 x 9.5 x 6 in.)	9.5L (2.5 gal.)	CPX952516R	15-336-103	\$1,259.00
M8800	49.5 x 29 x 15cm (19.5 x 11.5 x 6 in.)	20.8L (5.5 gal.)	CPX952816R	15-336-104	\$2,030.00
MH Series					
M1800H	15 x 14 x 10cm (6 x 5.5 x 4 in.)	1.9L (0.5 gal.)	CPX952117R	15-336-110	\$505.00
M2800H	23 x 14 x 10cm (9.5 x 5.5 x 4 in.)	2.8L (0.75 gal.)	CPX952217R	15-336-111	\$683.00
M3800H	29 x 15 x 15cm (11.5 x 6 x 6 in.)	5.7L (1.5 gal.)	CPX952317R	15-336-112	\$1,030.00
M5800H	29 x 24 x 15cm (11.5 x 9.5 x 6 in.)	9.5L (2.5 gal.)	CPX952517R	15-336-113	\$1,351.00
M8800H	49.5 x 29 x 15cm (19.5 x 11.5 x 6 in.)	20.8L (5.5 gal.)	CPX952817R	15-336-114	\$2,300.00
CPXH Series					
CPX1800H	15 x 14 x 10cm (6 x 5.5 x 4 in.)	1.9L (0.5 gal.)	CPX952118R	15-336-120	\$634.50
CPX2800H	23 x 14 x 10cm (9.5 x 5.5 x 4 in.)	2.8L (0.75 gal.)	CPX952218R	15-336-121	\$789.00
CPX3800H	29 x 15 x 15cm (11.5 x 6 x 6 in.)	5.7L (1.5 gal.)	CPX952318R	15-336-122	\$1,185.00
CPX5800H	29 x 24 x 15cm (11.5 x 9.5 x 6 in.)	9.5L (2.5 gal.)	CPX952518R	15-336-123	\$1,497.00
CPX8800H	49.5 x 29 x 15cm (19.5 x 11.5 x 6 in.)	20.8L (5.5 gal.)	CPX952818R	15-336-124	\$2,580.00
CPX Series					
CPX1800	15 x 14 x 10cm (6 x 5.5 x 4 in.)	1.9L (0.5 gal.)	CPX952119R	15-336-130	\$576.00
CPX2800	23 x 14 x 10cm (9.5 x 5.5 x 4 in.)	2.8L (0.75 gal.)	CPX952219R	15-336-131	\$719.00
CPX3800	29 x 15 x 15cm (11.5 x 6 x 6 in.)	5.7L (1.5 gal.)	CPX952319R	15-336-132	\$1,097.00
CPX5800	29 x 24 x 15cm (11.5 x 9.5 x 6 in.)	9.5L (2.5 gal.)	CPX952519R	15-336-133	\$1,386.00
CPX8800	49.5 x 29 x 15cm (19.5 x 11.5 x 6 in.)	20.8L (5.5 gal.)	CPX952919R	15-336-134	\$2,390.00

Note: Accessories sold separately. Visit fishersci.com for more information

Oil-Free, Low Maintenance

Fisher Scientific MaximaDry Pumps

No more downtime to add or change pump oil. Enjoy quiet, reliable operation without the mess of oil or the operating costs and environmental problems associated with water aspirators.

- **Corrosion-resistant materials** — The thick, solid PTFE resin heads will not peel or corrode when exposed to most aggressive solvents. The sturdy FFPM valve system handles occasional liquids without degrading performance.
- **Quick and easy setup** — Be up and running in minutes. Everything connects together without tools or fittings. Just add 3/8-inch I.D. tubing.
- **Compact, stylish design** — For convenient access, your MaximaDry oil-free pump fits easily where you need it — on your bench or inside your fume hood.



13-880 Series

Head Configuration	Capacity	Vacuum	Pressure	Motor	Dimensions (L x W x H)	Cat. No.	Price
Single Stage	20L/min.	75 torr	15psig	1/8hp	13 × 6.5 × 8.5"	13-880-14	\$1,610.00
Single Stage	40L/min.	65 torr	15psig	1/8hp	15 × 6.5 × 8.5"	13-880-16	\$2,170.00
Two Stage	20L/min.	6 torr	15psig	1/8hp	15 × 6.5 × 8.5"	13-880-18	\$2,080.00
Two Stage	35L/min.	6 torr	15psig	1/8hp	16 × 7 × 9"	13-880-20	\$2,760.00
Two Stage	35L/min.	1.5 torr	15psig	1/8hp	16 × 7 × 9"	13-880-22	\$3,925.00

Oil-Free, Corrosion-Resistant

KNF LABOPORT Vacuum Pumps

LABOPORT pumps from KNF Neuberger are maintenance-free and chemically resistant — the perfect choice for your lab.

These compact and lightweight portable pumps are excellent for general lab use and applications employing rotary evaporators and gel dryers, as well as vacuum concentrators, ovens and filtration devices. Whether your application requires distillation of solvents with high, medium or low boiling points, there's a LABOPORT pump for you.

Pumps for Evaporation

- Pumps are virtually indestructible
- Maintenance-free, ball-bearing motors require no lubrication
- Premium, corrosion-resistant pump heads and PTFE diaphragms protect against corrosive gases and vapors

Pumps for Filtration

This inexpensive, chemical-resistant line of diaphragm vacuum pumps is designed to provide a clean, economical vacuum source for a variety of filtration jobs including bottle-top and manifold filtration, as well as vacuum degassing and desiccation.



13-878-27
For evaporation

13-878-38
For filtration

Recommended for Distillation of	Flowrate	End Vacuum	Cat. No.	Price
High Boiling Point Solvents, Reflux Reactions	34L/min.	1.5 torr	13-878-35	\$5,631.83
High/Medium Boiling Point Solvents, Reflux Reactions	34L/min.	6 torr	13-878-29	\$3,752.44
Medium/Low Boiling Point Solvents	20L/min.	6 torr	13-878-27	\$2,790.32
Low Boiling Point Solvents	34L/min.	75 torr	13-878-44	\$2,706.60

Flowrate	End Vacuum	Pressure	Cat. No.	Price
5.5L/min.	120 torr (25.2 in. Hg)	35psi	13-878-38	\$734.69
13L/min.	75 torr (27 in. Hg)	15psi	13-880-34	\$853.109
16L/min.	15 torr (29.3 in. Hg)	7.4psi	13-880-30	\$1,291.43
30L/min.	120 torr (25.2 in. Hg)	7.4psi	13-880-32	\$1,337.21

Adjustable Ultrasonic Frequency and Power

fisherbrand

Fisherbrand Ultrasonic Cleaners

De-gas, mix, and clean at multiple frequency and power levels. Get maximum versatility with one ultrasonic cleaner.

- Easy-to-operate with organized, clear display of all set and actual parameters
- Low frequency (37kHz)/high energy for standard use
- High frequency (80kHz) for sensitive or small items (low noise)

Special Features:

- Pulse (all units): Activates additional power when needed
- Sweep (all units): Distributes power evenly throughout the tank
- De-gas: For de-gassing samples and HPLC solvents
- Power Control: Optimized power for special cleaning applications
- Pause: Interrupts operation
- Auto Start: Starts automatically when the set temperature is reached

Accessories (sold separately) include:

- Plastic or stainless-steel covers
- Beakers with lids
- Acid-resistant plastic tubs with covers
- Stainless-steel baskets, immersion baskets
- Cooling coils (for FB-11201, FB-11203, FB-11205, FB-11207, FB-11209, FB-11211)
- Tool and test tube ttt holders
- Clamps for Erlenmeyer flasks



Model	Capacity	Cat. No.	Price
FB-11201	0.7 gal. (2.75L)	FB11201	\$1,095.00
FB-11203	1.5 gal. (5.75L)	FB11203	\$1,570.00
FB-11205	1.8 gal. (6.9L)	FB11205	\$1,632.00
FB-11207	3.3 gal. (12.75L)	FB11207	\$2,681.00
FB-11209	4.75 gal. (18L)	FB11209	\$2,930.00
FB-11211	7.3 gal. (28L)	FB11211	\$3,308.00

Flexible Temperature Control

BriskHeat®

BriskHeat Heating Tapes and Mantles

BriskHeat Heating Tapes and Mantles easily conform to many shapes and can be used to heat irregularly-shaped lab vessels, objects or tubing. These bundles include the heating element, a temperature controller and a temperature sensor.

- **Silicone Heating Tapes (BS0) with X2 PID Control and K-Type Sensor**

The flexible design and high-temperature capability of these silicone rubber heating tapes provide heating for flat or curved surfaces; they provide fast and efficient direct-contact heating to temperatures up to 450°F (232°C).

- **XtremeFLEX Heavy Insulated Heating Tapes (BWH) with X2 PID Control and K-Type Sensor**

These high-temperature heating tapes have a maximum exposure temperature of 1400°F (760°C); they are covered with a Samox insulating sheath for safe use with electrically conductive surfaces.

- **Lower Hemispherical Heating Mantles with X2 PID Control and J-Type Sensor**

These offer safe, efficient and uniform heat distribution for round-bottom flasks; a uniform, low-watt density knitted and braided heating element provides temperatures up to 842°F (450°C).

- **The BriskHeat X2 Benchtop PID Digital Temperature Controller**

For general purpose automatic control for indoor environments, these controllers have a simple three-key user control and plug-and-play set-up. They are programmable for temperatures from 32 to 1400°F (0 to 760°C) and can be used with Type J or K temperature sensors.

For custom sizes or designs, contact your **Fisher Scientific Sales Representative to request a quote.**



Heating Tapes	Dimensions (L x W)	Wattage	Mfr. No.	Cat. No.	Price
Silicone Heating Tapes, with X2 PID Controller, K-Type Sensor	2 ft. x 0.5 in. (0.6m x 13mm)	52W	X2KBS0051020L	10-068-331	\$773.00
	4 ft. x 0.5 in. (1.2m x 13mm)	104W	X2KBS0051040L	10-068-332	\$787.00
	8 ft. x 0.5 in. (2.4m x 13mm)	209W	X2KBS0051080L	10-068-334	\$821.00
	12 ft. x 0.5 in. (3.7m x 13mm)	313W	X2KBS0051120L	10-068-336	\$869.00
XtremeFLEX Heavy Insulated Heating Tapes, with X2 PID Controller, K-Type Sensor	4 ft. x 0.5 in. (1.2m x 13mm)	313W	X2KBWH051040L	10-068-355	\$766.00
	8 ft. x 0.5 in. (2.4m x 13mm)	627W	X2KBWH051080L	10-068-357	\$811.00
	2 ft. x 1 in. (0.6m x 25mm)	313W	X2KBWH101020L	10-068-358	\$766.00
	4 ft. x 1 in. (1.2m x 25mm)	627W	X2KBWH101040L	10-068-359	\$794.00
Heating Mantles	Capacity	Wattage	Mfr. No.	Cat. No.	Price
Lower Hemispherical Heating Mantles, with X2 PID Controller, J-Type Sensor	50mL	60W	X2KHM0050HS1	10-068-305	\$867.00
	250mL	180W	X2KHM0250HS1	10-068-308	\$901.00
	500mL	270W	X2KHM0500HS1	10-068-309	\$945.00
	1,000mL	380W	X2KHM1000HS1	10-068-310	\$978.00

SIMPLIFYING THE MICROSCOPE BUYING PROCESS

Purchasing a microscope may seem complicated, but understanding a few key concepts can simplify the process. Microscopes can be grouped under two major categories: stereo and compound microscopes. The differences are based on optical design and application, and the main features of each are shown below.

Compound Microscopes

- Optical system comprised of objective (primary) and eyepiece (secondary) magnifications
- Single light path produces two-dimensional image
- High magnification (40x to 1,000x)
- Short working distance
- Upright configuration for viewing prepared slides; inverted design for viewing culture vessels
- Also called optical or light microscopes



Stereo Microscope

- Available in fixed magnification and zoom versions
- Independent right and left light paths
- Three-dimensional image (stereoscopic)
- Low magnification (2x to 300x)
- Longer working distance
- Designed for viewing larger “macro” objects (insects, plants, etc.)
- Also called dissecting microscopes



Digital Microscope Capabilities

When you determine the right microscope category for your application, consider whether a digital camera or digital microscope system is right for you. Features of these increasingly popular integrated systems include:

- Built-in camera for image capture
- Touchscreen or integrated screen
- Multiple users can view samples simultaneously
- Send output to external monitors for training and teaching
- Connections via Wi-Fi and Bluetooth
- Cloud-based image storage and sharing options

Other Key Considerations

Consider these details and options when making your purchasing decision.

- Illumination source: LED, halogen and others
- Contrast technique: brightfield, phase contrast, darkfield, polarization or fluorescence
- Lens/Objectives: achromat, plan achromat or plan fluor optics
- Customization
- Ergonomics
- Price



Contact your Fisher Scientific Sales Representative if you need help navigating the microscope buying process.



A Microscope for Everyone

SeBaPro4B

Microscopy Refocused

Touchscreen Display

Traditional Eyepieces



- **MULTI-VIEW OPTIONS**

Comfortably view your sample through traditional eyepieces, a large touchscreen display, or project them to a screen via HDMI

- **CAPTURE and SHARE**

Quickly capture images and upload them to the SeBaShare cloud or save to a USB drive

- **COLLABORATE ONLINE**

Our SeBaShare cloud allows users to easily share images with colleagues, labs, and collaborators anywhere online

Other Traditional Microscopes from LAXCO Inc.

Laxco also offers a complete line of traditional microscopes including LMC Upright, LMI Inverted, and LMS Stereo Microscopes.

Visit fishersci.com/laxco for more information.





LAXCO™

A Microscope for Everyone

LAXCO has been a leading provider of high-precision, cutting-edge optical instruments and microscopes for over 20 years. Our products span a complete range of applications including education, clinical, life science research, and industrial. Our commitment to engineering excellence, breakthrough innovations, and cost-effective solutions make us one of the most reliable suppliers in the industry.

Our products come with a heritage of technical strength, manufacturing discipline, and a prominent reputation of advanced engineering. Our designs incorporate numerous innovative features, address issues others may overlook, and come with a strong industry-proven reputation.

LAXCO offers a complete line of microscopes and optical instrumentation.

Contact your local Fisher rep or visit www.fishersci.com for more information.

SeBa Series



- SeBa2 and SeBa3 models for Education
- SeBa Pro4 and SeBa Pro5 models for Research
- Integrated eyepieces on SeBa Pro4B
- Brightfield, phase contrast, and polarization illumination
- Retina touchscreen display
- 5MP or 16MP color camera
- Individual user login via SeBaAccess card(s)
- Easily capture, review, measure, and annotate images
- Upload images to SeBaShare or save to USB drive

LMI Series



- Ideal for cell culture applications
- Brightfield, phase contrast, and LED fluorescence configurations
- Eco-friendly LED illumination
- Mechanical stage available
- 5-position nosepiece
- Integrated camera port
- Infinity corrected optical system
- Eco-friendly LED illumination
- Plan achromat and plan fluor optics

LMS Series



- Complete line of stereo microscopes for all applications
- Excellent optical performance
- Binocular, trinocular, and digital head options
- Brightfield, darkfield, and fluorescence illumination options available
- Fixed magnification, standard zoom (7x - 45x), and broad range zoom (6.5 to 60x) optics available

LMC Series



- Complete line of traditional upright microscopes to meet all education and research applications
- Brightfield, phase contrast, darkfield, polarization, and fluorescence illumination
- Excellent optical performance
- Binocular, trinocular, digital, and multi-observation configurations
- Infinity corrected optical system
- Eco-friendly LED illumination
- Plan achromat and plan fluor optics

Maximize Your Hotplate Space



Heidolph Hotplates and Accessories



13-889-335

Heat-On Blocks

The safest, fastest and most efficient way to heat and stir round-bottom flasks (in sizes from 10mL to 5L).



Description	Cat. No.	Price
Multi-Well Basic Package, Includes Holder, Adapter, and Inserts for 25, 50 and 100mL Flasks	05-404-152	\$1,449.50

Heidolph Magnetic Stirring Hotplates

Choose a premium magnetic stirring hotplate and then maximize it by adding any of the convenient available accessories.

- Hermetically sealed housing protects all mechanical and electronic components
- Fire-resistant, die-cast housing
- Three-year warranty

Model	Speed	Display	Cat. No.	Price
MR Hei-Standard	100 to 1400rpm	Analog	13-890-120	\$1,102.00
MR Hei-Tec	100 to 1400rpm	Digital	13-889-335	\$1,182.00
MR Hei-Connect	100 to 1400rpm	Digital	NC1303871	\$1,598.00
MR Hei-End	100 to 1400rpm	Digital	13-889-336	\$2,281.00

Carousel

The patented Carousel 6 Plus Reaction Station simultaneously heats, stirs and refluxes multiple samples under an inert atmosphere. Holds round-bottom flasks (sizes 5, 10, 25, 50, 100, 170 and 250mL).



Description	Cat. No.	Price
Carousel 6 Plus	13-889-503	\$6,482.09

Rapidly Concentrate Heat-Sensitive Samples



Labconco CentriVap Vacuum Concentrators

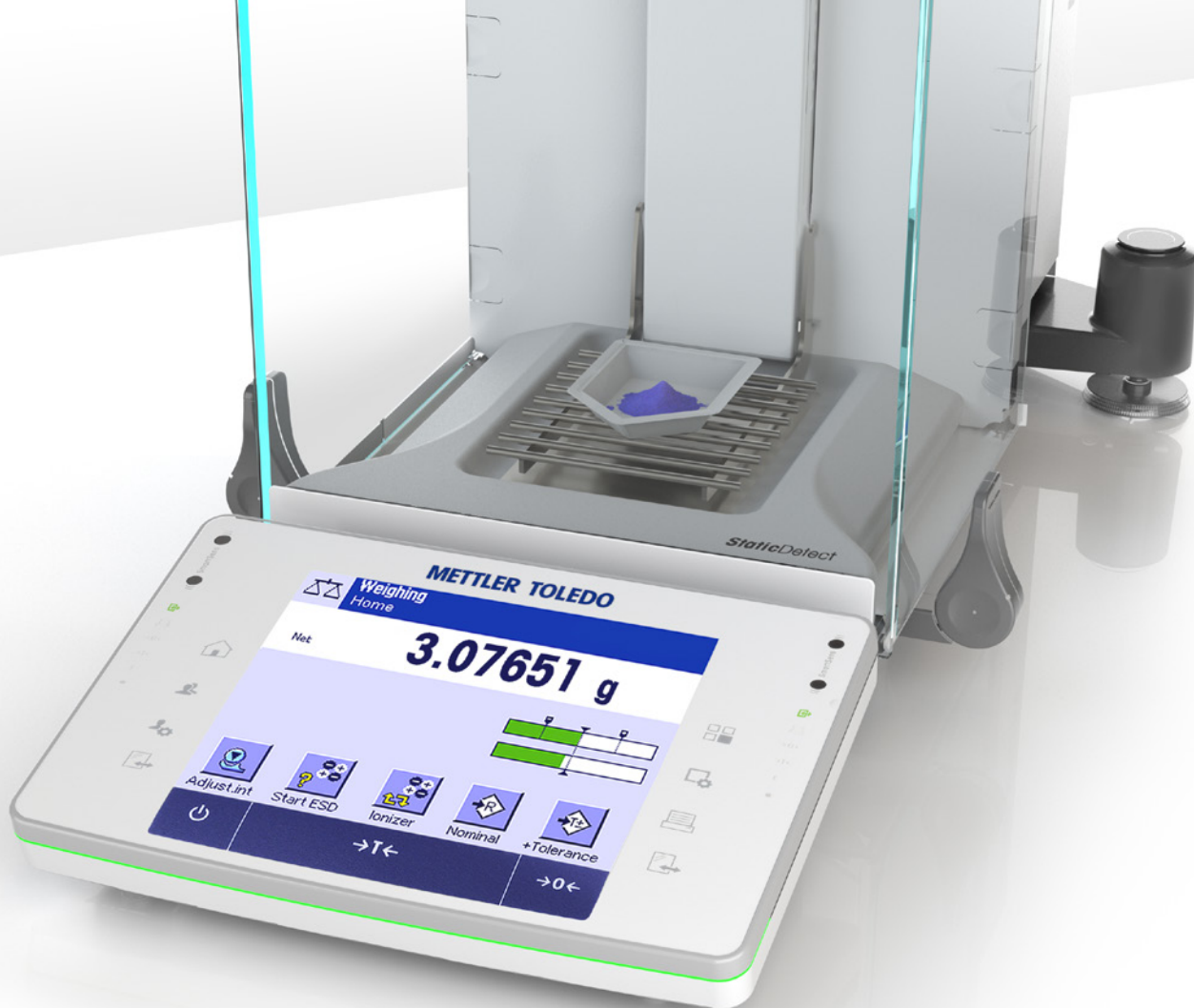
Labconco Refrigerated CentriVap Vacuum Concentrators are designed to concentrate multiple small heat-sensitive samples, such as RNA and proteins.

These are the only commercially available concentrators that use both a refrigeration system (that cools to -4°C) and a heater (that warms to +100°C) to ensure that samples are not heat damaged at any point during evaporation.

- Combines centrifugal force, controlled temperatures and vacuum with built-in delay
- Two timed temperature settings maximize the evaporation rate while protecting samples
- Memory stores nine user-set programs
- Large chamber holds multiple samples for maximum throughput
- Vacuum pump, rotor and sample tubes are required (all sold separately)



Description	Speed	Cat. No.	Price
Refrigerated CentriVap	7310020	16-108-442	\$10,114.98
Refrigerated CentriVap with Glass Lid	7310021	16-108-443	\$10,108.89
Refrigerated CentriVap with Glass Lid & Acid Resistance	7310022	10-269-602	\$13,922.21



Reliable Results Begin with Accurate Weighing

Whether you want to weigh several kilograms or just a few milligrams, XPE weighing solutions offer you outstanding performance and innovative technologies to help make your daily tasks easier, error-free and compliant.

Purchase an XPE balance and **receive \$1,350 in Fisher Scientific Buck\$** to use on your choice of Fisher Scientific products.

Visit fishersci.com/mettlertoledo to learn more today.

METTLER TOLEDO



AC600 Series Ductless Chemical Workstation

The AC600 Series ductless chemical workstation is an economical solution for protection of the operator and environment from toxic vapors, gases, fumes and particulates. Ships fully assembled and can be configured in a variety of common applications.

Standard Features:

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

Description	Cat. No.	Price
AC632A 32" Workstation	36-100-4271	\$3,577.65
AC632TA 32" Workstation, Tall Version	36-100-4272	\$3,991.30
AC648A 48" Workstation	36-100-4274	\$4,808.26
AC648TA 48" Workstation, Tall Version	36-100-4275	\$5,027.03

* Filters sold separately, application worksheet required

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 with 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

Description	Cat. No.	Price
ACPT3000 36" Ductless Fume Hood*	36-100-0059	\$7,286.25
ACPT4000 48" Ductless Fume Hood*	36-100-0063	\$8,569.25
ACPT5000 60" Ductless Fume Hood*	36-100-0067	\$9,159.47
ACPT6000 72" Ductless Fume Hood*	36-100-0069	\$10,294.37

* Filters sold separately, application worksheet required



PowderSafe Type C Enclosure

The PowderSafe Type C balance enclosure incorporates the airflow dynamics and HEPASafe features of the PowderSafe Type B with the user-friendly features and chemical fume containment capabilities of the ductless fume hood. Thermally fused polypropylene makes the PowderSafe Type C 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

Description	Cat. No.	Price
AC760C 36" Type C Enclosure	36-101-8906	\$9,167.61
AC770C 48" Type C Enclosure	36-101-8908	\$9,768.31
AC780C 72" Type C Enclosure	36-101-8910	\$13,728.75



Adjustable and Easy To Assemble

fisherbrand

Fisherbrand Class 1 Cleanroom Tables

Fisherbrand Class 1 Cleanroom Tables are made from Grade 304 stainless steel with #4 brushed finish.

- Adjustable height: from 30 to 36 in. (in 2 in. increments)
- Maximum weight capacity: 5,600 lb.
- Manufacturing lead time: 5 to 7 business days
- 25-year unconditional warranty

Contact your Fisher Scientific Sales Representative for custom sizes, wheels, shelves, drawers, built-in power strips and other accessories.



Description	Surface Dimensions (L x D)	Cat. No.	Price
4 ft. Tables	48 x 24 in.	25-100-470	\$1,065.60
	48 x 30 in.	25-100-473	\$1,193.76
	48 x 36 in.	25-100-476	\$1,349.28
5 ft. Tables	60 x 24 in.	25-100-471	\$1,199.52
	60 x 30 in.	25-100-474	\$1,349.28
	60 x 36 in.	25-100-477	\$1,500.48
6 ft. Tables	72 x 24 in.	25-100-472	\$1,330.56
	72 x 30 in.	25-100-475	\$1,503.36
	72 x 36 in.	25-100-478	\$1,676.16

Reliability Meets Comfort

fisherbrand

Fisherbrand Mesh Office Chairs

With Fisherbrand Mesh Office Chairs, you get:

- Foam cushion with durable black nylon fabric cover
- Adjustable armrests (2-way or 3-D) with polyurethane pads
- Mesh back, 360° rotation
- Durable, five-leg, nylon-reinforced fiberglass base
- Black, rolling, non-marring casters
- Five-year limited warranty; lifetime warranty on the pneumatic lift

Additional features:

Fisherbrand Executive Mesh Office Chair

- Tilting and locking functions
- Optional headrest

Fisherbrand Modern Mesh Office Chair

- Adjustable lumbar support
- Optional synchro tilt adjustment



Description	Cat. No.	Price
Executive Mesh Office Chair		
Executive Chair with 2-Way Adjustable Arms, with Headrest	14-400-440	\$340.00
Executive Chair with 2-Way Adjustable Arms, without Headrest	14-400-441	\$316.00
Executive Chair with 3-D Adjustable Arms, with Headrest	14-400-442	\$344.00
Executive Chair with 3-D Adjustable Arms, without Headrest	14-400-443	\$318.00
Modern Mesh Office Chair		
Modern Chair with 2-Way Adjustable Arms, Standard Lift Control	14-400-444	\$249.00
Modern Chair with 3-D Adjustable Arms, Standard Lift Control	14-400-445	\$252.00
Modern Chair with 2-Way Adjustable Arms, Synchro Tilt Control	14-400-446	\$277.00
Modern Chair with 3-D Adjustable Arms, Synchro Tilt Control	14-400-447	\$280.00

Fisherbrand Isotemp CO₂ Incubators

Value for everyday cell culture

Choose a CO₂ incubator you can trust.

Fisherbrand Isotemp CO₂ incubators provide an ideal growth environment, simple touchscreen technology, and easy cleaning with high-temperature decontamination.

Features include:

- Polished stainless steel interior chamber; Stackable; 150L Capacity
- Established direct heat technology for a reliable, uniform culture environment
- Gentle, fan-assisted air circulation designed to ensure homogeneous conditions
- Effective against a wide-range of contaminants, (bacteria, mold, fungal spores, bacteria mycoplasma) the on-demand 90°C moist-heat high-temperature decontamination cycle does not require the removal of components or sensors
- Interactive, instinctive at-a-glance monitoring with touchscreen controller
- Integrated humidity reservoir for rapid recovery after a door opening
- Avoid dry-outs with built-in water level sensor with on-screen prompts
- Two-year warranty, parts and labor



At-a-glance performance monitoring featuring on-screen menu prompts, error logs, and multiple language selection

Ordering Information

Description	Cat. No.
Fisherbrand Isotemp CO ₂ incubator, thermal conductivity (TC) CO ₂ sensor	11-676-604
Fisherbrand Isotemp CO ₂ incubator, infrared (IR) CO ₂ sensor	11-676-605

Specifications

Fisherbrand Isotemp CO ₂ Incubators			
Construction		Humidity	
Chamber Type	Direct Heat	Type/Source	3L pan-less reservoir
Chamber Capacity	150L (5.3 cu. ft.)	Range	> 90% at 37°C
Internal Dimensions (w x h x d)	47 x 60.7 x 53cm (18.5 x 23.9 x 20.9 in.)	High-Temperature Decontamination	
External Dimensions (w x h x d)	63.7 x 86.7 x 76.6cm (25 x 34 x 30.2 in.)	On-demand High-Temperature Cycle	Standard
Operating Weight	70kg/154 lbs.	Cycle Temperature	90°C
Shelf Dimensions	42.3 x 44.5cm (16.7 x 17.5 in.)	Cycle Length	25 h
Number standard/Maximum	3/10	Electrical	
Access Port	Standard	Display Type	Touchscreen
Temperature		Voltage/Frequency	120V 50/60Hz
Range	0.3°C above ambient to 55°C	Alarm Contacts	Standard
Control	±0.1°C	Data output	RS232
Uniformity	±0.5°C		
CO₂			
Range	1-20%		
Control	±0.1%		
Type	TC or IR		

Visit fishersci.com to learn more.

Extend Service Intervals

Welch Vacuum Pumps

These pumps have been designed with features that allow for less-frequent service. They run cooler (which slows corrosion inside the pump); they have a larger oil capacity (which dilutes any aggressive chemicals in the pump oil) and the pump module and oil case have a protective coating.

- Ideal for use with freeze dryers, vacuum ovens, Schlenk lines, glove boxes
- Standard features include: gas ballast, forced oil lubrication, anti-suck-back mechanism, and thermal overload protection
- Pumps include two liters of oil, line cord, and adaptor (for NW16 to 0.75 in. ID hose)
- One-year warranty on materials and workmanship



Model	Free Air Displacement L/min. (cfm)	Ultimate Vacuum Pressure	Electrical	Oil Capacity	Mfr. No.	Cat. No.	Price
CRVpro4	78 (2.8)	5x10 ⁻⁴ mbar (4 x 10 ⁻⁴ torr)	110V/60Hz	1150mL	3041-01	01-184-151	\$2,475.00
	67 (2.3)		220V/60Hz		3042-01	01-184-152	\$2,475.00
CRVpro6	118 (4.2)	5x10 ⁻⁴ mbar (4 x 10 ⁻⁴ torr)	110V/60Hz	1150mL	3061-01	01-184-153	\$2,730.00
	100 (3.5)		220V/60Hz		3062-01	01-184-154	\$2,730.00
CRVpro8	158 (5.6)	5x10 ⁻⁴ mbar (4 x 10 ⁻⁴ torr)	110V/60Hz	1060mL	3081-01	01-184-155	\$2,995.00
	133 (4.7)		220V/60Hz		3082-01	01-184-156	\$2,995.00

For Large-Volume Applications

Kinematica Autoclaves

Compact floor device with a rectangular or round sterilization chamber and automatic locking door for easy handling.

The square BoTec chamber system allows for compact overall size of these units, and an interior chamber height of 800mm makes it possible to sterilize large or bulky items such as fermenters. Take advantage of the removable shelves or use optional transport or loading cars to facilitate loading and unloading.

Choose chambers from 72 to 200L capacity. Units with chamber volumes greater than 145L have a space-saving vertical automatic door with a low-maintenance door seal that meets DIN and TRB 402. All models are equipped with a fully automatic microprocessor control with LCD display and foil keyboard.



Chamber Capacity	Chamber Shape	Exterior Dimensions (H x W x D)	Interior Dimensions
80L	Rectangular	57 x 23.6 x 33.5 in. (145 x 60 x 85cm)	H x W x D 13.75 x 12.6 x 24.8 in. (35 x 32 x 63cm)
150L	Circular	71 X 31.5 x 37.5 in. (180 x 80 x 95.5cm)	Dia. x D 19.7 x 29.5 in. (50 x 75cm)
200L	Circular	71 x 31.5 x 47.5 in. (180 x 80 x 120.5cm)	Dia. x D 19.7 x 39.4 in. (50 x 100cm)

Autoclaves can be configured to meet your specifications. Contact your Fisher Scientific Sales Representative to arrange for a quote.

Everything You Need for HPLC Sample Prep



Sartorius Chromatography Products

From balances and pipettes to filtration and water systems, trust Sartorius for all your HPLC sample prep needs.

Cubis MSA Balances

Description	Capacity (Readability)	Mfr. No.	Cat. No.	Price
Top Loading balances				
Model 4202S	4200g (10mg)	MSA4202S100D0	14-557-027	\$5,810.00
Model 8202S	8200g (10mg)	MSA8202S000D0	14-557-029	\$7,125.00
Analytical Balances				
Model 124S, Manual Doors	120g (0.1mg)	MSA124S100DU	14-557-254	\$7,075.00
Model 224S, Manual Doors	220g (0.1mg)	MSA224S100DU	14-557-021	\$8,230.00
Model 224S, Automatic Doors	220g (0.1mg)	MSA224S100DI	14-557-014	\$11,535.00
Model 324S, Manual Doors	320g (0.1mg)	MSA324S100DU	14-557-022	\$9,015.00
Model 324S, Automatic Doors	320g (0.1mg)	MSA324S100DI	14-557-016	\$12,320.00
Model 524S, Automatic Doors	520g (0.1mg)	MSA524S100DI	14-557-018	\$13,135.00
Precision Balances				
Model 623S, Short Draft Shield	620g (0.001mg)	MSA623S100DE	14-557-023	\$6,900.00
Semi-Micro Balances				
Model 225S, Manual Doors	220g (0.01mg)	MSA225S100DU	14-557-019	\$13,310.00
Model 225S, Automatic Doors	220g (0.01mg)	MSA225S100DI	14-557-010	\$16,615.00
Microbalances				
Model 2.7S0TRDM	2.1g (0.1µg)	MSA2.7S0TRDM	14-557-804	\$34,775.00
MSA6.6S-0TR-DM	6.1g (1.0µg)	MSA6.6S0TRDM	14-557-811	\$27,525.00
Ultra Micro Balances				
Model 2.7S	2.1g (0.1µg)	MSA2.7S0TRDF	14-558-123	\$35,675.00

Claristep Filtration Products

Description	Mfr. No.	Cat. No.	Quantity	Price
Claristep Filters, 9.7mm Dia., Cellulose Membrane, Pore Size: 0.2µm, Nonsterile	17C07FT96	14-556-010	96/Pack	\$248.00
	17C07FT480	14-556-011	480/Pack	\$1,064.00
Claristep Filters, 9.7mm Dia., Cellulose Membrane, Pore Size: 0.45µm, Nonsterile	17C06FT96	14-556-012	96/Pack	\$249.20
	17C06FT480	14-556-013	480/Pack	\$1,064.00
Claristep Filtration Station and Tray	17CM8	14-556-014	Each	\$352.70
Claristep Single Tray	17CS1	14-556-015	96/Pack	\$82.00

arium Ultrapure Water System

Description	Mfr. No.	Cat. No.	Price
arium mini plus System	H2OMAT	14-557-751	\$4,019.00
arium mini plus System with Integrated UV Lamp	H2OMAUVT	14-557-750	\$5,396.00
arium mini Compact System	H2OMMT	14-557-753	\$3,336.00
arium mini Compact System with Integrated UV Lamp	H2OMMUVT	14-557-752	\$3,813.60
Accessories for arium mini plus system			
Storage Bag	H2OCBS5S	14-557-756	\$40.00
Scientific Kit (Deionization Cartridge)	H2OSPACK	14-557-755	\$311.55
Pre-Treatment Cartridge	H2OCPR	14-557-754	\$380.00
UV Lamp	H2OCEL1	14-557-757	\$460.00

Tacta Mechanical Pipettes

Volumes	Channels	Mfr. No.	Cat. No.	Price
0.1 to 3µL	1	LH729010	14-577-793	\$404.01
0.5 to 10µL	1	LH729020	14-577-794	\$404.01
2 to 20µL	1	LH729030	14-577-795	\$404.01
10 to 100µL	1	LH729050	14-577-796	\$404.01
20 to 200µL	1	LH729060	14-577-797	\$404.19
100 to 1000µL	1	LH729070	14-577-798	\$404.19
500 to 5000µL	1	LH729080	14-577-799	\$404.19
1000 to 10000µL	1	LH729090	14-577-800	\$404.19
0.5 to 10µL	8	LH729120	14-577-801	\$1,010.00
5 to 100µL	8	LH729130	14-577-802	\$1,015.05
30 to 300µL	8	LH729140	14-577-803	\$1,015.05
0.5 to 10µL	12	LH729220	14-577-804	\$1,195.95
5 to 100µL	12	LH729230	14-577-805	\$1,195.95
30 to 300µL	12	LH729240	14-577-806	\$1,195.95

HPLC QUALITY DEPENDS ON YOUR SAMPLE PREP QUALITY

HPLC Sample Preparation Starts with Sartorius

HPLC is one of the most common and precise analytical methods in use today, and can generate reproducible and accurate results. To accomplish this, your sample must be free of particles that can cause interference during detection and block the flow of sample through your column.

Sample prep is typically a labor-intensive, time-consuming and often tedious task. Problems that originate with sample prep can become immediately visible on the chromatogram and may require that the entire chromatography run be repeated.

Sartorius products can help to address these problems and help you to achieve higher analytical accuracy.

Water Quality

Approximately 80% of the problems that occur during HPLC runs can be attributed to inadequate water quality. Even water sold as “HPLC-grade” can be found to have high total organic carbon (TOC) levels.

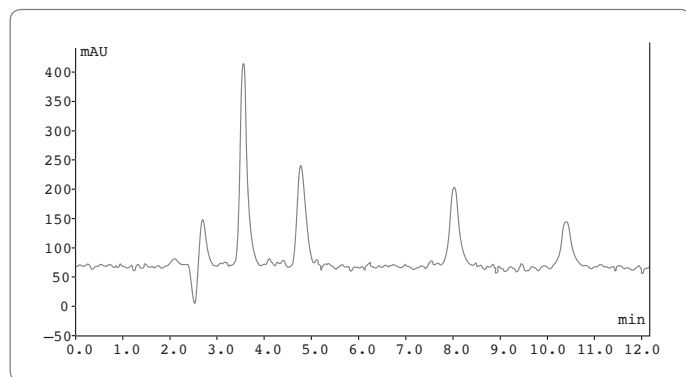
The HPLC mobile phase must be especially pure in terms of physical and chemical properties and should not contain organic impurities or particles.

You can rely on the arium mini plus UV ultrapure lab water system with its unique Bagtank system to deliver consistently high water quality. The closed Bagtank system reliably protects the pure water from secondary contamination by atmospheric components and also prevents the formation of a permanent biofilm.

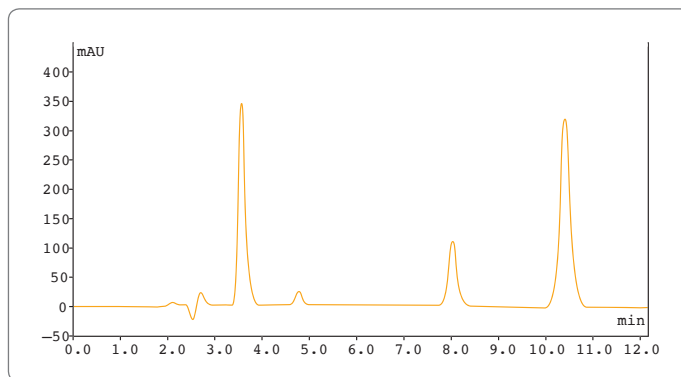
The arium mini plus can be used to produce Type 1 or Type 3 water for use with SPE, IC, LC-MS, GS-MS and HPLC testing methods.

Accurate Weights

For quantitative HPLC, standard series must be prepared with defined



Chromatogram with pronounced background noise and peak tailing



Chromatogram with a stable baseline and symmetrical peaks



concentrations. Solids can be difficult to weigh, and calculating the correct dilution can become time-consuming and another source of error.

Cubis MSA laboratory balances can now be converted into individual instruments when you download Q-Apps applications to your balance. These apps are integrated into the balance software to guide you step by step through the weighing process selected. Simply select the Q-App for HPLC Standards (or choose from many other options) to increase efficiency and reliability and eliminate the middleware.

Repeatable Pipetting

Pipetting is a key step in preparing solvents for filtration, and the Tacta mechanical pipette with low retention tips can help.

Even this routine aspect of the sample prep process can be improved by using quality equipment that makes a positive impact on your lab budget and provides a perfect balance of convenience, dependability and intelligence.

Tacta pipettes have an ergonomic design and are lightweight for easy and convenient handling.

The Optilock feature provides both volume adjustment flexibility and protection against accidental changes during pipetting.

Pipettes may need to be adjusted frequently for various viscosities, and low retention tips feature a repellent surface to minimize residual liquid retention.

Reliable Filtration

Clarification by filtration removes particles from samples, which impacts the efficiency of your HPLC column and the related reliability of your results. Typically, syringe filters are used for this step; for more than just a few samples, this process can quickly turn into a tedious and hand-straining and strenuous chore.

Use the Claristep filtration system to simultaneously filter multiple HPLC samples. The patented station is designed to filter up to eight 60 to 600 μ L HPLC samples without the need for power, pumps or syringes, and you only need one hand!

Claristep filters have regenerated cellulose membranes (in 0.2 or 0.45 μ m pore sizes) and are optimized for organic and aqueous solutions and provide maximum chemical resistance and compatibility.

Simply pipette your samples into the filter reservoirs, press to close the station lid and the samples will pass through the filters and directly into your sample HPLC vials.

Clean Sample = Clean Results

These and other Sartorius products can help to improve your HPLC sample prep and offer:

- Reduced HPLC column blockage
- Improved HPLC column sensitivity
- Better accuracy
- Fewer false-positive peaks
- Less background noise
- No leachables

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sartorius

NEW STEM CELL TECHNIQUE FOR FASTER GROWTH

By Ralph Birch

Scientists from the Wellcome Trust Sanger Institute and the University of Cambridge have developed a new technique for creating human brain and muscle cells from stem cells. This new method can produce millions of functional cells in just a few days and opens the door to the possibility of creating many more cell types for the study of diseases.

The findings, published earlier this year in *Stem Cell Reports*, describe the ability to turn human pluripotent stem cells into any type of tissue. Being able to replicate hard-to-access brain cells, for example, may give researchers a new way to study human development and the effects of cancer, Alzheimer's and other diseases at the cellular level.

Normally, it takes approximately nine to twelve months for a single human brain cell to become fully formed. In the past, scientists could generate brain cells from pluripotent stem cells in three to 20 weeks. But this method is complicated and time-consuming and often results in a culture of mixed cells. With the new OPTi-OX protocol, viable cells are produced much more quickly.

The OPTi-OX Method

The name for the new OPTi-OX method stands for OPTimised inducible OvereXpression. OPTi-OX hinges on a method of switching “on” the right genes in human stem cells. In addition to producing grey matter (neurons), white matter (oligodendrocytes) and muscle cells, scientists believe OPTi-OX can be used to create any cell type — at high purity and in a shortened time frame.

Scientists have used OPTi-OX to produce neurons, oligodendrocytes and muscle cells by altering the DNA of the stem cells. By selecting and activating the correct genes, the cells were essentially reprogrammed, creating a large and nearly pure group of identical cells.

Hope for the Future

In addition to shortening the timetable for cell creation, scientists can also use OPTi-OX to produce as many cells as they need for their research at a given time. Researchers will be able to test drug therapies and other applications and observe the effects sooner, which may lead to advancements in the treatment of a variety of diseases. OPTi-OX may even be used to create cells for inclusion in the Human Cell Atlas, yet another way that this new technology is expected to facilitate additional avenues of research.

Once created, the Human Cell Atlas will be a collection of cellular reference maps that characterizes each of the thousands of cell types that make up the human body and identifies where they're found. The atlas should prove to be a valuable tool for the global research community in its effort to study the reactions of different cell types.

“When we receive a wealth of new information on the discovery of new cells from large-scale projects, like the Human Cell Atlas, it means we'll be able to apply this method to produce any cell type in the body, but in a dish,” said Daniel Ortmann, one of the authors of the study



First in Dependability and Data Integrity



New BioTek 800 TS Absorbance Reader & 50 TS Washer

BioTek, the most trusted name in plate readers and washers, introduces the 800 TS & 50 TS reader/washer series. The 800 TS offers both affordability and proven performance for microplate-based assays used in a variety of research and clinical applications. A color touchscreen and USB flash drive make programming simple with convenient data export. Incubation to 50°C and shaking are available.

The 50 TS for 24-, 96- and 384-well plate washing automates ELISA and cell-based assay washing along with biomagnetic separation and vacuum filtration assays. It is a welcome upgrade from manual processing, bringing convenience and consistently high-quality results to your laboratory's plate washing workflows.



Model	Description	Cat. No.	Price
800 TS	For 6- to 96-Well Plates; 400 to 750nm Detection; With Shaking	BT800TS	\$6,250.00
50 TS	For 96-Well Strip or Full Plate Washing; With 8-Well Manifold	BT50TS8	\$6,250.00

Affordable Microscopy and Multi-Mode Detection

New BioTek Cytation 1 Cell Imaging Multi-Mode Reader

The BioTek Cytation 1 combines fluorescence and high-contrast brightfield imaging with conventional multi-mode detection without the expense and complexity commonly associated with other digital microscopy systems.

- Patented design provides both quantitative phenotypic cellular information with well-based quantitative data
- Augmented Microscopy using Gen5 software for seamless image capture to quantitative publication-ready data with minimal training
- Fluorescence and high-contrast brightfield imaging from 1.25x (for imaging larger samples) to 60x (for intra-cellular details)
- Automated XY stage, focus, exposure, image capture and LED intensity
- Live cell-friendly design: 4-zone incubation to 45°C with Condensation Control, CO₂/O₂ control, angled injectors and lidded plate handling



Description	Cat. No.	Price
Fluorescence and High-Contrast Brightfield Imaging; Includes Imaging System Controller and Gen5 Software	BTCYT1V	\$35,900.00

*Catalog numbers shown may not reflect all product features listed.
Contact your Fisher Scientific Sales Representative to learn more about other available configurations.*



Stunningly Easy Western Blot Imaging

invitrogen

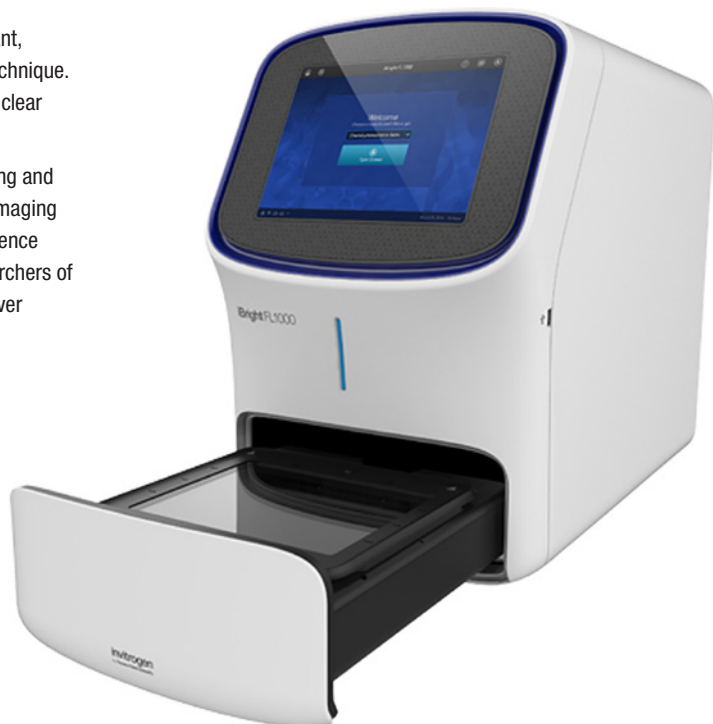
Invitrogen iBright CL1000 and FL1000 Imaging Systems

Modern life sciences research is moving at a rapid pace. What has remained constant, however, is the importance of the simple Western blot as a foundational research technique. Western blotting is often the compass that guides the start of a research project — clear results can pave a path to move a project forward.

The team of scientists at Thermo Fisher Scientific spent thousands of hours designing and refining the imaging experience of our new Invitrogen iBright CL1000 and FL1000 Imaging Systems. These high-performance instruments enhance the Western blotting experience through advanced automated features and an interface that is easy to use for researchers of all experience levels. Be empowered to take on your research challenges and discover Western blot imaging designed to work for you.

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HANDHELD ANALYZERS MAKE DRUG IDENTIFICATION SAFER

By Rita Waimer

The world of illicit drugs has changed immensely over the past 30 years. In the past, only a few substances were sold on the street — namely marijuana, cocaine, heroin and methamphetamine — and they were all easy to visually identify. Today, there's a far larger variety of drugs to be found, and most of them are white powders. Cannabinoids (like K2 and spice), cathinones (like bath salts), opioids (like fentanyl and W-18), and hundreds of other new street drugs are indistinguishable in appearance and can pose a threat to law enforcement officers.

The methods for identifying these drugs have, of course, also advanced with time. Police departments once used wet chemistry tests to identify substances in the field and bulky, expensive equipment to run tests in the lab. While both methods worked, neither was ideal: the chemistry tests required large samples (which could have affected the amount for which a trafficker was charged), and the lab tests could only be run by trained technicians. Today, officers can use a portable, handheld device to scan, identify and log illicit substances quickly and safely from anywhere.

The Handheld Alternative

One common device is the Thermo Scientific TruNarc Handheld Analyzer, which uses Raman spectroscopy to test for the presence of multiple controlled

substances simultaneously. The device uses a laser to non-destructively scan the sample through glass or plastic without contact, protecting the officer from exposure and preserving the evidence. The data is automatically stored and can be used to identify dozens of narcotics based on a library of more than 370 suspected drugs, precursors and cutting agents.

TruNarc is currently being used in more than 35 U.S. states and in 35 other countries around the world. In October 2016, the Martin County Sheriff's Office in Florida used the device to identify the substance that allegedly sent a teen on a drug-fueled rampage. The drug was determined to be dibutylone, a psychedelic drug related to bath salts, which was so new at the time that investigators couldn't otherwise identify it. "It's pretty remarkable," said a Martin County detective. "Typically a lot of synthetics we can't identify. If we can't identify that substance, we're turning them loose."

Fast, Efficient, Safe

The device has also found use in Suffolk County, New York, where the police department purchased two TruNarc devices as part of a pilot program. "Officers don't have to open up bags, take out a sample of a substance and test it," said

Police Commissioner Timothy Sini. "It's very accurate, it's very efficient." Since using the device, the department has issued 22 narcotic search warrants, made 39 arrests and recovered more than 100 grams of fentanyl, 350 grams of powder cocaine, 35 grams of crack cocaine and four kilograms of marijuana. In total, the department seized over half a million dollars of illicit drugs.

As narcotics continue to evolve, handheld devices like the TruNarc are helping police departments stay ahead of the curve, work more efficiently, and remain safe in the field.

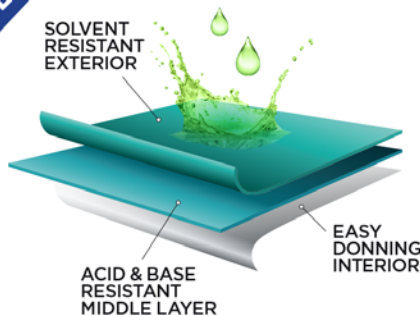


Prices are U.S. list prices — pricing in Canada may vary

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Meet the new glove that's changing the face of chemical hand protection. With an innovative three-layer design*, Microflex 93-260 offers the reliable protection workers need when handling chemicals. And because it's the thinnest chemical-resistant disposable glove available – it goes beyond protection to offer the comfort, dexterity and tactility workers need to be their most productive

Microflex 93-260. Beyond Protection.

For more information call 1-800-766-7000
or visit fishersci.com/ansell/93-260

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fishersci.com/gloves

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WONDERING WHAT TO WEAR?

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Fisherbrand Safety Apparel

- 1 Bouffant caps** offer basic protection and feature an elastic headband encapsulated in soft poly thread for a comfortable fit. (Catalog Number 17-100-920)
- 2 Single-use beard covers** are made from 10gsm spunbonded polypropylene and are latex free. (Catalog Number 17-100-925)
- 3 Safety glasses** provide economical lightweight protection and feature a one-piece lens that absorbs >99.9% of harmful UV light, plus adjustable spatula temples and molded-in sideshields and browguards. (Catalog Number 19-130-2088)
- 4 Disposable facemasks** feature a nonwoven polypropylene outer layer and a thermally bonded nonwoven polypropylene inner layer for advanced protection. Available with your choice of ear loops or a tie closure. (Catalog Number 17-100-896)
- 5 General protection lab coats** are made with a latex-free, three-layer SMS construction for high durability and protection against splash and dust and feature three roomy pockets. (Catalog Number 17-100-841)
- 6 Polyethylene sleeve covers** feature elastic cuffs and measure 18 in. long by 6mil thick. (Catalog Number 19-170-904)
- 7 Extended-cuff nitrile exam gloves** are extra thick, providing exceptional durability and added protection, and are tested for use with exposure to chemotherapy drugs. (Catalog Number 19-041-170B)
- 8 Shoe covers** are made from polypropylene, protect against dirt, grime and certain dry particulates, and are available with or without an anti-skid sole. (Catalog Number 17-100-903)
- 9 Anti-static shoe covers** feature a carbon strip that helps eliminate static buildup and are made from 42gsm polypropylene. (Catalog Number 17-100-917)

Visit fishersci.com/fisherbrand to see the complete offering.

NEW

SafeTouch Advanced Force

Nitrile Examination Gloves



- Premium strength nitrile offers increased puncture and tear resistance for reliable performance every day
- Advanced stretchy technology reduces hand fatigue for a conforming fit

Powder-Free & Textured

200 gloves/box **Blue**

Available in XS to XL

SafeBasics True Fit Thin

Nitrile Examination Gloves

Your everyday necessities,
our #1 priority

- Unrivalled strength of nitrile delivers enhanced barrier protection
- Increased tactile sensitivity



Powder-Free & Textured

300 gloves/box **Blue**

Available in XS to XL



Powder-Free & Textured

300 gloves/box **Pink**

Available in XS to L

Meet OSHA and Fire Protection Regulations



Justrite Sure-Grip EX Safety Cabinets

Fully compliant, FM-approved steel cabinets feature a fire-resistant design with double-walled, all-welded, 18-gauge steel construction for safe storage of flammables.

High-performance features include:

- U-Loc handle with cylinder lock and key set that accepts optional padlock
- Three-point stainless-steel bullet latching system
- Leak-proof 2 in. bottom sump
- Haz-alert reflective warning labels are visible under fire conditions



Description	Capacity	Dimensions (H x W x D)	Cat. No.	Price
2 Manual Doors, 1 Shelf	30 gal. (114L)	30 gal. (114L)	19-120-2333	\$1,300.00
2 Self-Close Doors, 1 Shelf	30 gal. (114L)	30 gal. (114L)	19-120-2334	\$1,447.00
2 Manual Doors, 2 Shelves	45 gal. (170L)	65 x 43 x 18 in.	19-120-2335	\$1,654.00
2 Self-Close Doors, 2 Shelves	45 gal. (170L)	65 x 43 x 18 in.	19-120-2336	\$1,844.00
2 Manual Doors, 2 Shelves	60 gal. (227L)	65 x 34 x 34 in.	19-120-2337	\$1,758.00
2 Self-Close Doors, 2 Shelves	60 gal. (227L)	65 x 34 x 34 in.	19-120-2338	\$1,998.00

Protect Yourself from Splashes and Spills

fisherbrand

Fisherbrand Disposable Frocks and Isolation Gowns

Disposable Frocks

These 58gsm polypropylene and polyethylene frocks create a barrier against particles, microorganisms, and nonhazardous liquids. Features include a front zipper closure, elastic cuffs and a snap-closure collar.

Polypropylene Isolation Gowns

Durable, spunbond polypropylene isolation gowns provide protection from common dirt, dust and grime, minor splashes and particulates. Gowns also feature elastic wrist cuffs and easy neck and waist ties.



Description	Cat. No.	Quantity	Price
Disposable Frocks: Knee-Length, Elastic Cuffs, Front Zipper Closure			
White, X-Small	17-100-960	25/Case	\$225.00
White, Small	17-100-961	25/Case	\$225.00
White, Medium	17-100-962	25/Case	\$225.00
White, Large	17-100-963	25/Case	\$225.00
White, X-Large	17-100-964	25/Case	\$225.00
White, 2X-Large	17-100-965	25/Case	\$235.00
White, 3X-Large	17-100-966	25/Case	\$245.00
White, 5X-Large	17-100-967	25/Case	\$255.00

Description	Cat. No.	Quantity	Price
Polypropylene Isolation Gowns: Knee-Length, Elastic Cuffs, Neck and Waist Ties			
White, Large	17-100-408	10/Pack	\$9.50
		5 Packs/Case	\$45.00
White, X-Large	17-100-409	10/Pack	\$9.50
		5 Packs/Case	\$45.00
White, 2X-Large	17-100-410	10/Pack	\$9.50
		5 Packs/Case	\$45.00
Blue, Large	17-100-411	10/Pack	\$9.50
		5 Packs/Case	\$45.00
Blue, X-Large	17-100-412	10/Pack	\$9.50
		5 Packs/Case	\$45.00
Blue, 2X-Large	17-100-413	10/Pack	\$9.50
		5 Packs/Case	\$45.00
Yellow, Large	17-100-414	10/Pack	\$9.50
		5 Packs/Case	\$45.00
Yellow, X-Large	17-100-415	10/Pack	\$9.50
		5 Packs/Case	\$45.00
Yellow, 2X-Large	17-100-416	10/Pack	\$9.50
		5 Packs/Case	\$45.00

Buy a Pipette Starter Kit, Get a Carousel



Gilson PIPETMAN L and PIPETMAN G Pipettes

Gilson's most popular pipettes are now available in starter kits of four pipettes.

PIPETMAN L features a lightweight body, low pipetting forces and a lockable volume to eliminate accidental volume changes.

Description	Accessories (Included)	Cat. No.	Price
PIPETMAN L Starter Kit	<ul style="list-style-type: none"> • Single Pipette Holders (4) • Gilson Guide to Pipetting • Inspection Poster • User Guide 	F167370G	\$1,160.00



Special Offer: Receive a pipette carousel stand at no extra cost when you buy a Gilson starter kit.*

PIPETMAN G combines lower pipetting and purge forces with the same Pipetman Classic body.

Description	Accessories (Included)	Cat. No.	Price
PIPETMAN G Starter Kit	<ul style="list-style-type: none"> • Single Pipette Holders (4) • Comfort Handles (4) • 12 Stickers • Gilson Guide to Pipetting • Comfort Handle Leaflet • Inspection Poster • User Guide 	F167360G	\$1,040.00

*Expires December 31, 2017. Not valid with other discounts. No adjustments on previous purchases. U.S. and Canada customers only.



For Healthcare customers, please note that the value of the special offer that the Customer may receive under this program is a "discount or other reduction in price" to Customer under section 1128B(b)(3)(A) of the Social Security Act [42 U.S.C. 1320a-7b(b)(3)(9a)]. Accordingly, Customer shall disclose this and any other discounts or other reductions in price received under this program under any state or federal program which provides cost- or charge-based reimbursement to Customer for the products or services purchased under this program. Please contact your Fisher Scientific Sales Representative for cost savings.

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