

LAB REPORTER

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THE NORTHERN LIGHTS: A NATURAL SHOW

·Cranberry Compounds Exhibit Antibacterial Properties,
The Science Behind Atomic Clocks, Labware: From Benchtop to the Kitchen,
Happy 195th Birthday to Louis Pasteur, Cold Room Precautions:
Stay Warm, Stay Safe

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CRANBERRY COMPOUNDS EXHIBIT ANTIBACTERIAL PROPERTIES

By Kevin Ritchart

Researchers from Worcester Polytechnic Institute (WPI) have found that some compounds in cranberries can alter *Escherichia coli* bacteria in ways that make them unable to initiate infections.

The WPI research team, led by Associate Professor of Chemical Engineering Terri Camesano, focused its work on the biochemical and biophysical properties that produce the beneficial health effects of consuming cranberries and cranberry juice. While cranberry juice has long been used to help prevent and treat urinary tract infections (UTIs), scientists have been unable to pinpoint the exact mechanism that makes it work.

The most recent theory about the efficacy of treating UTIs with cranberry juice is that compounds in the fruit prevent bacteria from adhering to the lining of the urinary tract.

Bacterial Interaction

Camesano and her team utilized an atomic force microscope and other tools to examine how a group of tannins (proanthocyanidins or PACs) in cranberries interact with bacteria at the molecular level. The research showed that PACs do, in fact, prevent *E. coli* from sticking to cells in the body. The mechanisms include:

- Chemical changes caused by the cranberry juice create a barrier that keeps the bacteria away from the urinary tract lining.
- The adhesive forces between *E. coli* bacteria and urinary tract cells were significantly reduced in the presence of a 5% solution of cranberry juice.
- Using a strain of *E. coli* bacteria that is responsible for the most serious types of UTIs, cranberry juice caused tiny tendrils (or fimbriae) to form on the surface of the cells, reducing the bacteria's ability to attach to the urinary tract lining.
- *E. coli* grown in cranberry juice or in isolated PACs was unable to form biofilms. The formation of these clusters of bacteria growth is often the first step in infection development.
- When grown over long periods of time in various concentrations of either cranberry juice or PACs, *E. coli* cell membranes undergo changes that hinder their ability to attach to urinary tract cells.

The WPI team also found that cranberry juice inhibits the ability of *E. coli* bacteria to produce indole-3-acetic acid (IAA). Bacteria produce IAA to determine the presence and number of other bacteria, a function known as quorum sensing.

This enables organisms to sense their population density, a key factor in starting infections or biofilm formation. Researchers have posited that preventing bacteria from producing IAA could be another way that cranberry compounds hinder infections.

Next Steps

Camesano's team is now working to determine the minimum dose of cranberry juice (or tannins) and the optimum dosage frequency for warding off infections. In addition, the WPI team is working with Amy Howell of the Philip E. Marucci Center for Blueberry and Cranberry Research at Rutgers University to test whether the urine of patients who have consumed cranberry juice contains anti-adhesive properties.



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LC/MS Solvents and Blends

Liquid chromatography/mass spectrometry (LC/MS) methods require a different reagent purity than traditional HPLC — the solvents and blends listed below are ready to use and specifically verified for LC/MS analysis.

Description	Sizes	Cat. No.
Acetonitrile, Optima LC/MS, Fisher Chemical	500mL, 1L, 4L	A955
Acetonitrile, Optima UHPLC/MS, Fisher Chemical	1L	A9561
Acetonitrile, 80% with 0.1% FA, Optima LC/MS, Fisher Chemical	500mL	LS122500
Acetonitrile with 0.1% FA, Optima LC/MS, Fisher Chemical	500mL, 1L, 4L	LS120
Acetonitrile with 0.1% TFA, Optima LC/MS, Fisher Chemical	500mL, 1L, 4L	LS121
Ammonium Formate (10mM) in MeOH with 0.05% FA, UHPLC/MS, Thermo Scientific	1L	MB1221
Ammonium Formate (10mM) in Water with 0.05% FA, UHPLC/MS, Thermo Scientific	1L	MB1231
Methanol, Optima LC/MS, Fisher Chemical	500mL, 1L, 4L	A456
Methanol, Optima UHPLC/MS, Fisher Chemical	1L	A4581
Methanol, LC/MS, Acros Organics	2.5L	AC615130025
2-Propanol (IPA), Optima LC/MS, Fisher Chemical	500mL, 1L, 4L	A461
IPA/Acetonitrile/Acetone (9/9/2) Flush Solution, Thermo Scientific	1L	MB1241
Water, LC/MS, Acros Organics	2.5L	AC615150025
Water, Optima LC/MS, Fisher Chemical	500mL, 1L, 4L	W6
Water, Optima UHPLC/MS, Fisher Chemical	1L	W81
Water with 0.1% FA, Optima LC/MS, Fisher Chemical	500mL, 1L, 4L	LS118
Water with 0.1% TFA, Optima LC/MS, Fisher Chemical	500mL, 1L, 4L	LS119

Standards

Calibration with known and reliable mass spectrometry standards (like those listed below) gives you confidence in your test results.

Description	Sizes	Cat. No.
2,4,6-Tris(heptafluoropropyl)-1,3,5-triazine, Alfa Aesar	1g, 5g	AAL16883
2,4,6-Tris(perfluoroheptyl)-1,3,5-triazine, Alfa Aesar	100mg, 500mg	AAL16678
2,4,6-Tris(trifluoromethyl)-1,3,5-triazine, 98%, Alfa Aesar	1g, 5g	AAB22001
Bis(pentafluorophenyl)phenylphosphine, 97%, Alfa Aesar	0.25g, 1g	AAA11014
Perfluorokerosene-941, Alfa Aesar	1g	AAL16595
Perfluorokerosene-L, Alfa Aesar	1g, 5g	AAL16597
Perfluorotributylamine, Alfa Aesar	1g, 5g, 25g	AA19126
Tris(pentafluorophenyl)phosphine, 97%, Alfa Aesar	1g, 5g	AAL02748
Ultramark 1621, Alfa Aesar	250mg, 1g	AAL16698
Ultramark 1960F, Alfa Aesar	1g	AAL16695
Ultramark 2500F, Alfa Aesar	1g	AAL16696
Ultramark 3200F, Alfa Aesar	1g	AAL16697
Protein Mass Spec Certified Standards Assortment: Albumin, Carbonic Anhydrase, Cytochrome C, Lysozyme, Myoglobin, Alfa Aesar	1 Kit	AAJ67734QA
Protein LC/MS Standard, Certified: Ribonuclease A, Carbonic Anhydrase, Cytochrome C, Lysozyme, Myoglobin, Alfa Aesar	1 Vial	AAJ67628LPL
Reversed Phase LC/MS Peptide Retention Standard, Certified: Angiotensin I, Angiotensin II, Albumin Fragment LVAASQAALGL, Albumin Fragment TCVADESAENCDK, and Reference Peptide IAIANIDEIEK, Alfa Aesar	1 Vial	AAJ67668LPL

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Description	Grade	Mfr. No.	Cat. No.	Quantity	Price
Acetone, ≥99.9%	HPLC	650501-4X4L	60-002-09	4 x 4L	\$604.61
2-Butanone, ≥99.7%	HPLC	34861-4X4L	60-048-235	4 x 4L	\$675.52
Chloroform, ≥99.8%, amylene stabilized	HPLC	34854-4X4L	60-017-39	4 x 4L	\$715.85
Hexane, ≥97.0% (GC)	HPLC	34859-4X4L	60-010-51	4 x 4L	\$764.26
Methanol, ≥99.9%	HPLC Gradient	34885-4X4L	60-009-59	4 x 4L	\$498.01
2-Propanol, ≥99.9%	LC/MS	34965-4X4L	60-001-36	4 x 4L	\$625.96
Water with 0.1% acetic acid	LC/MS	34675-4X4L	60-048-248	4 x 4L	\$344.00
Acetone, ≥99.9%	GC	414689-4X4L	60-046-833	4 x 4L	\$515.03
Dichloromethane, ≥99.8% (GC)	Pesticide	34488-4X4L	60-005-02	4 x 4L	\$489.20
Toluene, ≥99.7% (GC)	Pesticide	34494-4X4L	60-017-15	4 x 4L	\$448.26

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Description	Mfr. No.	Cat. No.	Price
Water, LC/MS Grade, 1L	R91540001C	R91540001C	\$71.13
Water, LC/MS Grade, 4L	R91540004C	R91540004C	\$93.52

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- Includes a pre-labeled transfer/storage vial



SPEX Product	Optima Grade Chemical	Cat. No.	Price
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SPEX CertiPrep Pesticide Kit (SPXPRKIT)	Methylene Chloride, 1L (D1511)	SPXPRKITCPM	\$1,624.00
SPEX CertiPrep Pesticide Kit (SPXPRKIT)	Hexanes, 1L (H3031)	SPXPRKITHPM	\$1,624.00
SPEX CertiPrep Pesticide Kit (SPXPRKIT)	N-Hexane, 1L (H3061)	SPXPRKITNPM	\$1,624.00

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LABWARE: FROM THE BENCHTOP TO THE KITCHEN

By Ralph Birch

At its core, cooking is about finding the right chemistry. Through experimentation in the kitchen, novices and experts alike can learn how a pinch of this or a dash of that affects their recipe. And while their efforts may use grandma's chocolate chip cookie recipe as a jumping off point, some aspiring culinary masters are trading in traditional mixing bowls and measuring cups for tools more likely to be found on a lab benchtop than a kitchen cabinet.

Molecular gastronomy is a blend of physics and chemistry that transforms the tastes and textures of food, creating new experiences for both chefs and the dining public. By combining tools from the lab and ingredients from the kitchen, the chemical reactions that occur during the cooking process are coupled with the social, artistic and technical components of this culinary phenomenon.

Labware at Home

For those not quite ready to produce gels, foams and spheres made from their favorite flavors, using laboratory-grade glassware in a home kitchen is still a viable option. Many of the properties that make lab equipment so functional — a high melting point and resistance to strong acids, alkalis and thermal shock — can be quite useful in the kitchen as well.

Rise in Popularity

Some companies known for selling more traditional cooking and baking supplies are now stocking labware and equipment as fun and functional alternatives.

- Online sales of water baths and pre-assembled molecular gastronomy kits for home cooks of all ages have increased significantly in recent years.
- Beakers have a multitude of uses. They can serve as measuring cups, drinking glasses or vessels to display layered desserts, or use them for mixing and serving salad dressings.
- Test tubes can serve as makeshift shot glasses; filled and capped, they become a spice rack!
- Their larger size makes Erlenmeyer flasks popular with home-brewing enthusiasts, and the flasks can also be used as transparent storage for leftover soups and sauces.
- If you're making a delicate sauce but don't have the time or inclination to stand at the stove and stir, use a magnetic stirring hot plate and PTFE coated stir bar to blend the flavors for you.

Easy Cleanup

No matter what types of labware you bring into your kitchen or how many times you use each piece, they won't stain or retain the flavors from your previous culinary endeavors. Just place them in the dishwasher, and they'll be ready for your next gastronomic excursion.



SELECTING CRYOGENIC STORAGE TUBES

Although it may seem like a minor decision, tube and vial quality, material, and ease of handling can all have a significant impact on your precious samples.

When selecting a storage tube, consider the following criteria, depending on sample value, process compatibility, and specific storage needs:

- Tube construction and cryotolerance
- Ease of handling during stocking, retrieval, freezing and thawing
- Vial sterility
- Sample-resin compatibility
- Identification and traceability

Construction and Cryotolerance

Tube shape will affect storage and handling and must also be compatible with the cryogenic workstations, racks and trays that are being used.

When storing material in liquid nitrogen (LN₂), use tubes designed specifically for cryogenic conditions. Many tubes are appropriate for use in temperatures above -100°C, and tubes with gaskets will help to prevent evaporation.

Cryogenic tubes are usually made of polypropylene and come in many shapes and sizes, including the Thermo Scientific Nalgene, Thermo Scientific Nunc and Thermo Scientific Matrix lines of tubes and caps.

Handling Ease

Standardized and aseptic handling protocols are vital to a well-managed cryogenic sample storage program. Variations in processing and storage can affect the quality of biological samples.

Tube failure can result from overfilling or sample overflow onto the tube threads. Regardless of the tube size, do not fill the tube beyond approximately 85 percent of its nominal capacity — this allows room for aqueous components to expand as they freeze and helps to maintain seal integrity.

Sterility

Look for tubes that have undergone gamma radiation or other guaranteed sterilization during manufacturing to avoid sample contamination. A Sterility Assurance Level (SAL) of 10⁻³ is a typical standard. For highly valuable samples, use products with SAL of 10⁻⁶.

Thermo Scientific tubes are also available with pyrogen-free, nuclease-free and endotoxin-free certifications.

Compatibility

Thermo Scientific tubes are made with virgin-grade polypropylene resins, which are resistant to many chemical solvents, bases and acids and have fewer extractables and leachables.

Identification and Tracking

Use sample tracking to monitor samples during storage and to correctly identify them during retrieval.

Most tubes have white marking areas and/or color-coded caps and cap inserts to aid visual identification and reduce the risk of sample misidentification within the cryobox.

Laser-etched, two-dimensional barcoding provides highly reliable identification, while human-readable, one-dimensional barcodes remove the risk of errors during rapid manual identification. Barcodes can be customized to include varying amounts of data for more sophisticated sample tracking.

Options and Choices

Nunc, Nalgene and Matrix tubes and accessories offer storage solutions from basic repositories to fully automated biobanking environments.

Thermo Scientific tubes, plates and equipment are engineered and tested to work together to support sample traceability, sample security and optimal sample recovery. Made with high-purity resins, they conform to strict quality-control standards.

Barcoded readers, cappers and decappers, and plate sealers provide greater efficiencies for busy biobanking operations.



Content provided by:

thermoscientific

STANDARDS, QUALITY AND VOLUMETRIC GLASSWARE

Volumetric glassware is routinely used to transfer accurate liquid volumes or to prepare solutions of specific concentrations. Most chemistry labs use volumetric flasks, cylinders, pipets, and burets that have been calibrated according to international standards like those from ASTM International or ISO (International Organization for Standardization).

These standards provide clear manufacturing requirements for producing and calibrating products for use in a range of settings — from student labs to pharmaceutical production. The users of volumetric glassware depend on proper calibration to traceable standards and verification that the products meet or exceed the standards that help them to comply with regulatory requirements.

Choose products from an experienced volumetric glassware manufacturer and follow their recommended care and use guidelines to minimize accuracy losses and increase the lifetime of the product. With proper care, volumetric glassware can provide reliable service for many years.

	ASTM	ISO
To Contain	TC	IN
To Deliver	TD	EX

Figure 1: “To Contain” versus “To Deliver” designations.

Measurements and Errors

Calibrated volumetric glassware requires a designation of TC or TD (See Figure 1). “To Contain” (TC) vessels are typically used for creating solutions or dilutions.

The TC means that the total amount of liquid in the container is exactly as indicated. When emptied, vessels labeled “To Deliver” (TD) will dispense the exact amount of liquid specified for the container. TD vessels have an allowance for the small amount of liquid that is retained by the glassware surface.

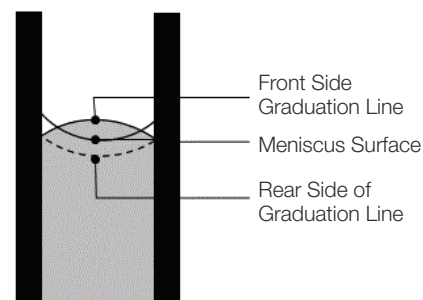
It is also necessary to read the meniscus of the liquid when using calibrated volumetric glassware. A meniscus is formed by the surface tension of the liquid and its attraction to the inside surface of the glassware. This creates a curved line between the liquid and the adjacent air. The curvature is more pronounced in smaller diameter vessels or tubing and can be more easily visualized if the meniscus is viewed against a dark background.

According to measurement practices described by NIST, there are two acceptable methods for reading a meniscus (See Figure 2). In the first technique, the observer sights the meniscus from slightly below the horizontal level of the graduation line. This creates an ellipse from the front and back of the graduation line and the meniscus is read midway between the front and rear lines. The second method requires the view of the meniscus at the same horizontal plane and read as the lowest point of the curve.

Kimble Brand Volumetric Glassware

Quality matters when it comes to volumetric precision. With over a hundred years of manufacturing experience, customers trust the quality and workmanship of the Kimble KIMAX brand. Make your next selection a brand you can trust — choose Kimble.

Method A



Method B

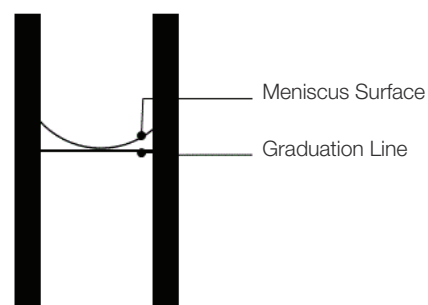


Figure 2: Methods for reading a meniscus

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250mL	20024-250	08-549-5G	2/Pack	\$137.90
500mL	20024-500	08-549-5H	1/Pack	\$96.45
1000mL	20024-1000	08-549-5J	1/Pack	\$145.17
Class A Volumetric Flasks, Blue Colorware				
100mL	28014B100	10-219	6/Case	\$301.73
250mL	28014B250	10-223	6/Case	\$392.54
500mL	28014B500	10-227	6/Case	\$494.08
1000mL	28014B1000	10-232	1/Case	\$94.33
Class A Volumetric Pipets, Unserialized				
1mL	370021	02-555-310	6/Case	\$128.15
2mL	370022	02-555-312	6/Case	\$128.15
5mL	370025	02-555-316	6/Case	\$124.00
10mL	3700210	02-555-321	6/Case	\$141.00
25mL	3700225	02-555-325	3/Case	\$84.25
50mL	3700250	02-555-328	3/Case	\$109.80
100mL	37002100	02-555-330	3/Case	\$156.45

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[†]Vacuum/pressure resistant from -1 to +1.5 bar due to modified geometry (based on ISO 4796-1).
With pressure loaded, thermal shock resistance is 30 K and maximum usage temperature is +140°C.



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Clear Glass					
100mL	56 x 100mm	218102406	14-209-168	10/Pack	\$128.38
250mL	70 x 138mm	1092234	09-841-001	10/Pack	\$186.72
500mL	86 x 176mm	1092235	09-841-002	10/Pack	\$255.06
1000mL	101 x 225mm	218105403	09-841-003	10/Pack	\$295.31
Clear Glass with Protect Plastic Coating					
100mL	56 x 100mm	218152402	14-209-170	10/Pack	\$835.72
250mL	70 x 138mm	1175925	14-209-174	10/Pack	\$456.00
500mL	86 x 176mm	1175926	14-209-175	10/Pack	\$573.90
1000mL	101 x 225mm	218155408	14-209-176	10/Pack	\$735.30
Amber Glass					
100mL	56 x 100mm	218162403	14-209-169	10/Pack	\$351.61
250mL	70 x 138mm	1094367	09-841-004	10/Pack	\$643.70
500mL	86 x 176mm	1094368	09-841-005	10/Pack	\$797.65
1000mL	101 x 225mm	218165409	09-841-006	10/Pack	\$865.72

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BrandTech BRAND Transferpette S Pipettes

BrandTech BRAND Transferpette S Single Channel Pipettes offer superior performance, comfort, and value.

Constructed with innovative composite materials, Transferpette S pipettes are fully autoclavable. The four-digit display is easy to read and is always visible during pipetting. Volumes range from 0.1 μ L to 10mL for single-channel pipettes (adjustable or fixed volume). Or choose a multichannel pipette, with volume options from 0.5 to 300 μ L.

- Thumb-tip volume selection for one-handed adjustments
- Lightweight with a very short pipette stroke to help reduce the risk of repetitive strain injuries
- Accepts tips from most manufacturers
- Performance certificate, operating manual, shelf mount, and three-year warranty included with each pipette



Description	Volume Range	Mfr. No.	Cat. No.	Price
Single Channel Adjustable*				
Model D-1	0.1 to 1 μ L	704768	03-837-317	\$459.90
Model D-2.5	0.1 to 2.5 μ L	704769	13-689-204	\$382.73
Model D-10	0.5 to 10 μ L	704770	03-837-318	\$428.40
Model D-20	2 to 20 μ L	704772	03-837-319	\$421.58
Model D-100	10 to 100 μ L	704774	03-837-320	\$428.40
Model D-200	20 to 200 μ L	704778	03-837-321	\$428.40
Model D-1000	100 to 1000 μ L	704780	03-837-322	\$421.58
Model D-5000	0.5 to 5mL	704782	03-837-323	\$421.58
Model D-10000	1 to 10mL	704784	03-837-325	\$428.40

*Single channel fixed volume, 8-channel adjustable, and 12-channel adjustable models also available.

Narrow- or Wide-Mouth Styles

fisherbrand

Fisherbrand Reusable Glass Erlenmeyer Flasks



Narrow Mouth

Fisherbrand Narrow-Mouth Erlenmeyer Flasks are useful for measuring and mixing solutions where a high degree of accuracy is not required. Long, tapered outside contour minimizes chipping.

- Reinforced top, tooled with a rounded finish
- Thick-walled body
- White ceramic enamel marking spot
- Designed to ASTM Specification E1404 Type 1, Class 1 requirements

Capacity	Cat. No.	Quantity
25mL	FB50025	12/Pack, 4 Packs/Case
50mL	FB50050	12/Pack, 4 Packs/Case
125mL	FB500125	12/Pack, 4 Packs/Case
250mL	FB500250	12/Pack, 4 Packs/Case
500mL	FB500500	6/Pack, 6 Packs/Case
1000mL	FB5001000	6/Pack, 4 Packs/Case
2000mL	FB5002000	4/Pack, 2 Packs/Case
4000mL	FB5004000	Each
6000mL	FB5006000	Each



Wide Mouth

Fisherbrand Wide-Mouth Erlenmeyer Flasks offer sturdy borosilicate glass construction with a heavy-duty, tooled-top finish. Design and material provide high resistance to heat, chemical attack, or mechanical shock.

- Capacity scales measure approximate volumes
- Matte-finish ceramic marking spots accept writing and erase easily
- Designed to ASTM Specification E1404, Type I, Class 2 requirements

Capacity	Cat. No.	Quantity
125mL	FB501125	12/Pack, 4 Packs/Case
250mL	FB501250	12/Pack, 4 Packs/Case
500mL	FB501500	6/Pack, 6 Packs/Case
1000mL	FB5011000	6/Pack, 4 Packs/Case
2000mL	FB5012000	4/Pack, 2 Packs/Case

Versatile Storage Solutions

fisherbrand

Fisherbrand Plastic Bottles and Jars

Round Plastic Bottles (Natural HDPE)

- For water-based chemicals and some food products
- Translucent; allows limited content visibility
- Wide-mouth opening is ideal for solids
- Impact resistant; include white PP/PE foam-lined caps

Capacity	Neck Finish	Cat. No.	Quantity
30mL (1 oz.)	28-400	02-912-037A	48/Case
60mL (2 oz.)	33-400	02-912-031A	48/Case
120mL (4 oz.)	38-400	02-912-032A	48/Case
250mL (8.5 oz.)	53-400	02-912-034A	48/Case
500mL (16 oz.)	53-400	02-912-030A	24/Case
950mL (32 oz.)	53-400	02-912-038A	12/Case
2000mL (68 oz.)	89-400	02-912-033A	6/Case
3785mL (128 oz.)	89-400	02-912-036A	4/Case

Oblong Plastic Bottles (Natural HDPE)

- For sampling solids and powders
- Space-saving shape; impact resistant
- Use for high-speed filling, demanding pharmaceutical specifications, interstate shipping
- White PP/PE foam-lined closures offer chemical resistance to acids, alcohols, alkalis, aqueous products, cosmetics, household oils, and solvents

Capacity	Neck Finish	Cat. No.	Quantity
125mL (4.2 oz.)	38-400	02-911-952A	48/Case
160mL (5.5 oz.)	38-400	02-911-954A	48/Case
250mL (8.5 oz.)	43-400	02-911-957A	48/Case
500mL (16 oz.)	43-400	02-911-960A	24/Case
1000mL (32 oz.)	53-400	02-911-949A	12/Case
1250mL (42 oz.)	53-400	02-911-950A	6/Case

Plastic Jars (Natural Polypropylene)

- Use for storing and collecting specimens and lab supplies
- Translucent and durable; includes white PP unlined caps
- Wide neck and straight sides for easier content recovery
- Tolerance for higher temperatures than HDPE

Capacity	Neck Finish	Cat. No.	Quantity
30mL (1 oz.)	43-400	02-912-025A	72/Case
60mL (2 oz.)	53-400	02-912-026A	48/Case
120mL (4 oz.)	58-400	02-912-028A	36/Case
240mL (8 oz.)	89-400	02-912-029A	36/Case
480mL (16 oz.)	89-400	02-912-024A	24/Case
960mL (32 oz.)	120-400	02-912-027A	24/Case

Plastic Jars (Clear Polystyrene)

- For storing and collecting specimens and lab supplies
- Sizes from 1 to 32 oz.; include white PP/PE foam-lined caps
- Wide neck and straight sides for easier content recovery

Capacity	Neck Finish	Cat. No.	Quantity
30mL (1 oz.)	43-400	02-911-792	72/Case
60mL (2 oz.)	53-400	02-912-267	48/Case
120mL (4 oz.)	58-400	02-912-268	36/Case
240mL (8 oz.)	89-400	02-912-269	36/Case
480mL (16 oz.)	89-400	02-912-265	24/Case
960mL (32 oz.)	20-400	02-912-266	24/Case
480mL (16 oz.)	89-400	02-912-024A	24/Case
960mL (32 oz.)	120-400	02-912-027A	24/Case

THE NORTHERN LIGHTS: A NATURAL SHOW

By Mike Howie

In the northernmost and southernmost reaches of our planet, there are light shows unlike any other, creating rings around the poles.

The Aurora Borealis, or northern lights, and Aurora Australis, the southern counterpart, dance across the sky in beautiful shades and combinations of colors. To the people of medieval times, the lights were seen as harbingers of war and famine. People around the world, including the Maori tribe of New Zealand, thought the lights were reflections of torches or campfires. While the auroras may seem otherworldly or look like a piece of art, their cause is a work of science.

A Trip from the Sun

The light displays actually begin with the sun, where gas molecules in its outer (corona) layer are heated to millions of degrees Celsius. The molecules collide and explode, releasing protons and electrons that form a gaseous flow known as the “solar wind,” which is pushed out into space by the rotation of the Sun.

When the solar winds come into contact with the Earth’s magnetic forces (the magnetosphere), most of the charged particles are deflected. However, some of these particles enter our atmosphere at the poles, where the magnetic field is weaker. There, the particles excite and ionize particles in our atmosphere, which release energy that produces the fascinating lights of the auroras. These lights can extend from 50 to 400 miles above the Earth’s surface.

Colorful Collisions

The visible colors depend on the elements in the gases that are excited and then release light at specific wavelengths. At 60 miles above the Earth, oxygen molecules produce a pale yellow-green, the most common color. Oxygen molecules at 200 miles above the Earth emit at a different wavelength that can produce rare all-red auroras. At lower altitudes, molecular and ionized nitrogen produces mostly blue, along with red and purple.

The lights may take on different shapes throughout the course of a night. In the earlier evening hours, they may appear to

be made of tall rays that look like window curtains and can form arcs that stretch across the sky. Around midnight, the arcs may look like they are moving as if blown by a wind and are known to fill the whole sky in a bright and active auroral substorm. In the morning, the lights become patchy and cloud-like, blinking on and off for hours before fading away with the rising sun.

Where to See the Show

On most clear nights, the northern lights are visible from the auroral zone, a horizontal band centered at a latitude around 66 degrees north. However, solar storms called coronal mass ejections (CME) can enhance the lights and make them visible over wider areas. In 2016, a CME produced an Aurora Borealis that could be seen as far south as Illinois and Ohio.

For many people in North America, seeing the aurora firsthand means taking a trip farther north. The far eastern portions of Canada tend to be too cloudy, but one can find a clear view from the auroral zone between James Bay and the west coast of Canada.



In Europe, the northern parts of Scandinavia are ideal. For example, Tromsø, Norway features beautiful scenery and guided tours in addition to the lights. And Abisko National Park in Sweden, which receives less precipitation than any other area in the auroral zone, is quickly becoming the world's most popular aurora-watching destination. A view from Russia will be harder to find: while much of the auroral zone is in the northern part of the country, it's a difficult area to reach and lacks a tourism infrastructure.

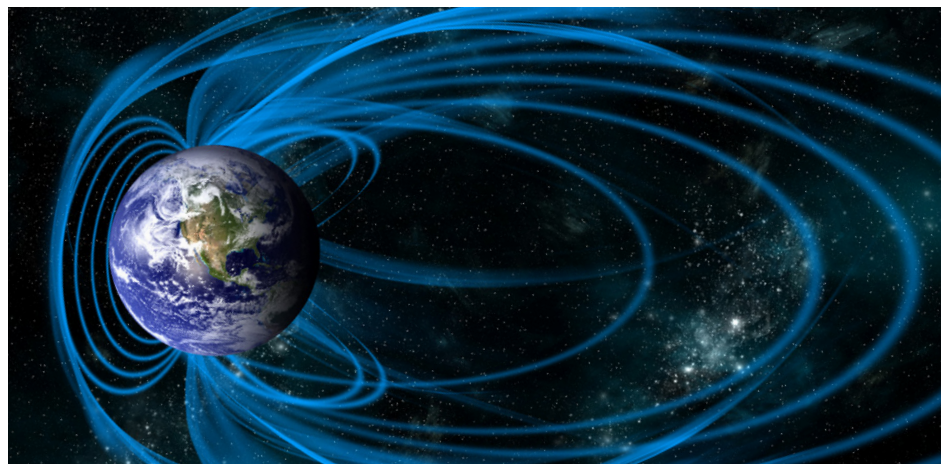
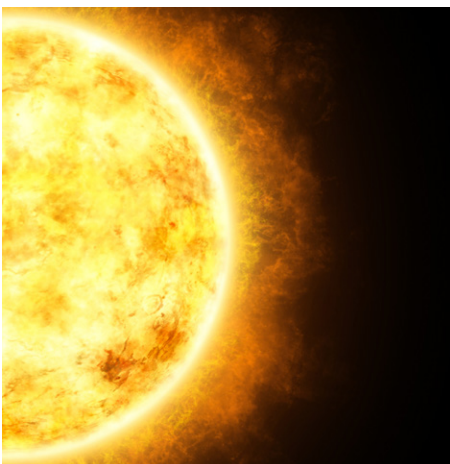
Those hoping to catch a view of the Aurora Australis also have limited options. Most of the southern auroral zone lies over Antarctica, although one can sometimes see the lights from New Zealand or Tasmania.

When to Watch

The months between December and April are the best time to get a glimpse of the northern show — the summer months don't provide enough darkness, and fall

months tend to be cloudy. While active periods can happen anytime during the dark hours, they're particularly likely between 10 p.m. and 2 a.m. local time and last for about 30 minutes.

The northern lights are a beautiful natural phenomenon. And for those who seek or stumble across them, they're unforgettable.



Engineered for Consistent Outcomes

Falcon Labware

Why do scientists trust the Falcon brand?

Falcon labware is thoughtfully designed and manufactured in ISO-certified facilities to meet superior quality standards. Falcon labware is tested for performance and to make sure that you experience consistent culture conditions and research outcomes.

That's why every lab needs Falcon. (But maybe not a real one.)



Falcon Serological Pipets

- Polystyrene with polyester fiber plugs
- “To Deliver”; accurate to +/- 2% at full volume
- Noncytotoxic, nonpyrogenic, sterile, individually wrapped

Volume (Increments)	Color Code	Packaging	Mfr. No.	Cat. No.	Quantity	Price
1mL (0.01mL)	Yellow	Advantage (All Plastic)	356521	13-675-46	1,000/Case	\$401.70
2mL (0.01mL)	Green	Advantage (All Plastic)	356507	13-675-47	1,000/Case	\$484.62
5mL (0.1mL)	Blue	Advantage (All Plastic)	356543	13-675-48	200/Case	\$143.69
10mL (0.1mL)	Red	Advantage (All Plastic)	356551	13-675-49	200/Case	\$138.02
25mL, Space Saver (0.25mL)	Purple	Advantage (All Plastic)	356525	13-675-50	200/Case	\$284.28
25mL, Extended (0.5mL)	Purple	Advantage (All Plastic)	356535	13-675-51	200/Case	\$306.00
50mL (1mL)	Black	Advantage (All Plastic)	356550	13-675-52	100/Case	\$315.18
100mL (1mL)	Black	Advantage (All Plastic)	357600	13-675-73	50/Case	\$334.67
1mL (0.01mL)	Yellow	Paper/Plastic	357521	13-675-15B	1,000/Case	\$374.00
2mL (0.01mL)	Green	Paper/Plastic	357507	13-675-17	1,000/Case	\$456.88
5mL (0.1mL)	Blue	Paper/Plastic	357543	13-675-22	200/Case	\$121.29
10mL (0.1mL)	Red	Paper/Plastic	357551	13-675-20	200/Case	\$125.36
25mL, Space Saver (0.25mL)	Purple	Paper/Plastic	357525	13-668-2	200/Case	\$263.89
25mL, Extended (0.5mL)	Purple	Paper/Plastic	357535	13-675-30	200/Case	\$264.70
50mL (1mL)	Black	Paper/Plastic	357550	13-675-27	100/Case	\$282.16



Falcon Conical Tubes

- High strength, state-of-the-art mold design
- High-clarity polypropylene
- Low protein binding
- Non-pyrogenic to less than 0.1EU/mL

Capacity	RCF Rating	Mfr. No.	Cat. No.	Quantity	Price
15mL, in Bags	12,000 x g	352096	14-959-49B	500/Case	\$264.94
15mL, in Racks	12,000 x g	352097	14-959-70C	500/Case	\$282.89
50mL, in Bags	16,000 x g	352070	14-432-22	500/Case	\$368.59
50mL, in Racks	16,000 x g	352098	14-959-49A	500/Case	\$382.13
175mL	7,500 x g	352076	05-538-62	48/Case	\$138.72
225mL	7,500 x g	352075	05-538-61	48/Case	\$152.37

Falcon Labware

Falcon Cell Culture Flasks



- Treated (vacuum-gas plasma) for consistent attachment and growth
- Vented with canted necks
- Sterile; non-pyrogenic to less than 0.1EU/mL

Capacity	Surface Area	Mfr. No.	Cat. No.	Quantity	Price
70mL	25cm ²	353109	10-126-10	100/Case	\$203.51
250mL	75cm ²	353136	13-680-65	60/Case	\$226.13
750mL	175cm ²	353112	10-126-13	40/Case	\$251.85
600mL	150cm ²	355001	08-772-48	40/Case	\$250.35
800mL	225cm ²	353138	14-826-80	30/Case	\$257.99

Falcon Cell Culture Inserts

- Individual permeable supports for 6-, 12-, and 24-well plates
- Sterile



Size	Membrane	Mfr. No.	Cat. No.	Quantity	Price
For 6-Well Plates	Transparent PET, 0.4µm	353090	08-771	48/Case	\$298.14
For 6-Well Plates	Transparent PET, 1µm	353102	08-771-7	48/Case	\$310.17
For 12-Well Plates	Transparent PET, 0.4µm	353180	08-771-10	48/Case	\$279.71
For 12-Well Plates	Transparent PET, 8µm	353182	08-771-12	48/Case	\$281.58
For 24-Well Plates	Transparent PET, 0.4µm	353095	08-770	48/Case	\$274.59
For 24-Well Plates	Transparent PET, 1µm	353104	08-771-9	48/Case	\$276.10
For 24-Well Plates	Transparent PET, 3µm	353096	08-771-4	48/Case	\$276.10
For 24-Well Plates	Transparent PET, 8µm	353097	08-771-21	48/Case	\$262.60

Support Companion Plates with Lids, Polystyrene, TC Treated

Size	Working Volume	Mfr. No.	Cat. No.	Quantity	Price
6-Well Plates	2.7 to 3.2mL	353502	08-771-24	50/Case	\$195.50
12-Well Plates	1.4 to 2.3mL	353503	08-771-22	50/Case	\$231.36
24-Well Plates	0.7 to 0.9mL	353504	08-771-25	50/Case	\$246.95

Falcon Bacteriological Petri Dishes



- Untreated; crystal-grade, virgin polystyrene
- Sterile
- With lids

Style	Culture Area	Diameter	Height	Mfr. No.	Cat. No.	Quantity	Price
Easy-Grip	11.78cm ²	35mm	10mm	351008	08-757-100A	500/Case	\$302.04
Standard	21.29cm ²	60mm	15mm	351007	08-757-100B	500/Case	\$212.79
	56.5cm ²	100mm	15mm	351029	08-757-100D	500/Case	\$160.56

Visit fishersci.com/falconvideo to see what happens when we set a falcon loose in the lab.

For Viscous or Volatile Liquids



Gilson MICROMAN E Pipettes

Gilson MICROMAN E Positive-Displacement Pipettes, equipped with capillary pistons, offer precision for transferring challenging samples like oils, cosmetics, blood, glycerol and radioactive samples. Viscous samples can be hard to aspirate and may stick to the inside of the tip, solvents like acetone and hexane can “leak” during pipetting, and cold or warm liquids may be over- or under-delivered, respectively.

The capillary pistons work like syringes, eliminating the air between the sample and the piston and providing complete protection against pipette contamination. The patented QuickSnap CP fitting system lets you add a capillary piston to your MICROMAN E as simply as adding a tip to a standard pipette. MICROMAN E capillary pistons are sold separately and come in various designs and volumes and in both nonsterile and sterilized versions.

The volume on the MICROMAN E Pipette adjusts easily and can be locked to minimize the risk of accidental changes.



Model	Volume Range	Cat. No.	Price
M10E	1 to 10µL	FD10001G	\$378.00
M25E	3 to 25µL	FD10002G	\$378.00
M50E	20 to 50µL	FD10003G	\$378.00
M100E	10 to 100µL	FD10004G	\$378.00
M250E	50 to 250µL	FD10005G	\$378.00
M1000E	100 to 1000µL	FD10006G	\$378.00

Built for Accurate, Precise Performance



Gilson PIPETMAN M Electronic Pipettes

PIPETMAN M Electronic Pipettes are designed for guaranteed accuracy and precision in both standard and repetitive pipetting modes.

- Comfortable: Lightweight with virtually zero pipetting forces
- Simple: Just two buttons for full operation
- Easy: Intuitive interface with five pipetting modes: pipette, repetitive, mix, reverse, and custom
- Guaranteed: Backed by the Gilson accuracy and precision guarantee for reliable results every time



Model	Channels	Volume Range	Pipette Tip Style Compatibility	Cat. No.	Price
Single Channel					
P10M	1	0.5 to 10 μ L	D10, DL10, DF10ST, DFL10ST	F81022G	\$633.10
P20M	1	2 to 20 μ L	D200, DF30ST	F81023G	\$633.10
P100M	1	5 to 100 μ L	D1000, D1200, DF1000ST, DF1200ST	F81013G	\$633.10
P200M	1	20 to 200 μ L	D200, D300, DF200ST, DF300ST	F81024G	\$633.10
P300M	1	20 to 300 μ L	D200, DF200, D300, DF300	F81014G	\$633.10
P1200M	1	100 to 1200 μ L	D1000, DF1000, D1200, DF1200	F81015G	\$633.10
P5000M	1	500 to 5000 μ L	D5000	F81016G	\$633.10
P10mLM	1	1 to 10mL	D10	F81017G	\$633.10
8 Channels					
P8x10M	8	0.5 to 10 μ L	D10, DL10, DF10, DFL10	F81025G	\$1,256.00
P8x20M	8	1 to 20 μ L	DL10, DF30ST, D200	F81027G	\$1,256.00
P8x200M	8	20 to 200 μ L	D200, D300, DF100ST, DF200ST, DF300ST	F81029G	\$1,256.00
P8x300M	8	10 to 300 μ L	D10, DL10, DF10, DFL10	F81031G	\$1,256.00
P8x100M	8	10 to 100 μ L	D200	F81018G	\$1,256.00
P8x1200M	8	50 to 1200 μ L	D1200	F81020G	\$1,256.00
12 Channels					
P12x10M	12	0.5 to 10 μ L	D10, DL10, DF10 or DFL10	F81026G	\$1,406.75
P12x20M	12	1 to 20 μ L	DL10, DF30ST, D200	F81028G	\$1,406.75
P12x200M	12	20 to 200 μ L	D200, D300, DF100ST, DF200ST, DF300ST	F81030G	\$1,406.75
P12x300M	12	10 to 300 μ L	D10, DL10, DF10 or DFL10	F81032G	\$1,406.75
P12x100M	12	10 to 100 μ L	DF100	F81019G	\$1,406.75
P12x1200M	12	50 to 1200 μ L	DF1200	F81021G	\$1,406.75

WHEATON COMPLETEPAK: ENHANCING THE EFFICIENCY OF DRUG DISCOVERY AND DRUG COMPOUNDING

DWK Life Sciences introduces the first stocked, ready-to-use or customizable vial assembly that can be configured for any application.

The lack of a single kit that includes ready-to-use vials, stoppers and seals can limit the small batch drug product packaging options available to drug manufacturers, developers, and compounders. Researchers and compounding pharmacies can face extended lead times when purchasing packaging that does not meet their project specifications, and as a result, project timelines suffer.

DWK Life Sciences presents Wheaton CompletePAK, a range of primary packaging components that are stocked ready-to-use and are customizable for most drug applications. This single source focus can reduce your supply chain delays and speed time to market. Batch-specific certificates of analysis that document compliance with relevant USP standards are included in each kit. The customizable features of CompletePAK allow you to focus on your core competencies: developing, manufacturing, and compounding drug products.

Product Benefits for Compounding Pharmacies

Following 64 deaths in 2012 that resulted from inadequate processing controls, the FDA tightened oversight of compounding

pharmacies. These new demands place additional burdens on pharmacy management and staff. Many of these facilities are working toward compliance with Section 503b of the Food, Drug and Cosmetic Act, which requires compliance with all cGMP requirements for large batch, sterile pharmaceutical drugs.

CompletePAK simplifies the sterile packaging supply chain by providing high-quality, ready-to-use drug packaging with complete manufacturing traceability, customized for your process.

Certificates of analysis in each kit document are compliant with:

1. USP <788> Particulate Matter in Injections
2. USP <85> Bacterial Endotoxin Test
3. USP <71> Sterility Test

Product Benefits for Research and Drug Discovery

Drug development can be delayed by the limited availability of sterile vials, stoppers, and seals in lab batch quantities; this can affect development costs and schedules. CompletePAK is a unique, sterile packaging solution for research and drug discovery stages, since it promotes cost control and improves time-to-completion scheduling.

Each kit component is cleaned of particulates, depyrogenated, and sterilized, and arrives ready-to-use in the lab. Vials are packed in sterile polypropylene trays, and can be used as filling aids. Kit packaging is sized to complement manual aseptic filling processes.

What is CompletePAK?

The CompletePAK consists of 13 components, including various sizes of vials, serum stoppers, lyo stoppers, and seals. By including specific components in a kit, you can configure the packaging solution that best fits your processing needs.

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For a limited time, buy one Kemtech America Synthware Flask and receive a second at no additional cost. Synthware flasks are hand-blown from tubing to ensure uniform, heavy walls. They meet all applicable ASTM standards for dimensions and standard taper joint finishes.



Style	Series	Capacities
Round Bottom Flasks	F30	5 to 2000mL
Pear Shaped Flasks	F32	5 to 200mL
Erlenmeyer Flasks	F66	5 to 1000mL
Flat Bottom Flasks	F12	50 to 1000mL
Recovery Flasks	F31	5 to 1000mL
Microscale Flasks (14/10)		5 to 25mL

Visit fishersci.com/synthware or fishersci.ca/synthware to save now.
Offer valid until December 31, 2017. Restrictions may apply. See page 52 for full details.

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Bel-Art-SP Scienceware EcoTensil Sampling Spoons

The EcoTensil Disposable Paper Sampling Spoon stores flat and folds easily into a functional spoon. Use it for everyday sampling and retrieval.

- Coated paper stands up to powders, semi-solids and gels
- Uses 50 to 90% less material and space than plastic spoons
- Compostable (ASTM D6868) and recyclable
- Can also be used as a weigh boat
- Approximate capacity 10mL



Description	Mfr. No.	Cat. No.	Quantity	Price
EcoTensil Disposable Paper Sampling Spoons	H367401030	03-990-265	416/Pack 6 Packs/Case	\$26.00 \$152.00

Visit fishersci.com/EcoTensilSample to request your sample.

Restrictions apply. This promotion is not available to current or potential healthcare customers. See page 52 for full details.

3, 2, 1...HAPPY NEW YEAR!

The Science Behind Atomic Clocks

By Horace Jenkins

We rely on the countdown to midnight every New Year's Eve to be 100 percent accurate. And it is, give or take a nanosecond, thanks to the precision of atomic clocks.

Why an Atomic Clock?

While all clocks tell time, how they do so varies by design. The functioning of traditional timekeeping devices is based on some measurable, repetitive movement or activity, like the back-and-forth motion of a pendulum. But pendulums and springs are affected by their physical environment, which introduces variables that make this traditional method for measuring time inherently imprecise.

How Does an Atomic Clock Work?

The natural oscillations (or resonant frequency) of atomic particles, which provide the basis for atomic clocks, essentially serve the same purpose as a pendulum — but with far greater accuracy. In an atomic clock, the negative subatomic particles (electrons) that orbit an atom's nucleus are subjected to a form of radiation, like radio waves, which causes these electrons to move back and forth between energy states. This energy change

or resonance occurs at very consistent and specific frequencies to deliver a level of timekeeping accuracy that's in a league of its own: Since 1967, the International System of Units (SI) has defined a second as the exact time required for a Cesium-133 atom to oscillate.

Types of Atomic Clocks

Atomic clocks come in several varieties. Cesium was used in the first atomic clocks, and is still in use today. Cesium atoms pass through radio waves and then into a detector that measures the microwave emissions that occur when the atoms return to their unexcited or ground state. Feedback from the detector is used to fine tune the radio waves and create a consistent flow of oscillating cesium atoms.

Rubidium atomic clocks utilize a glass vapor cell containing Rubidium-87 gas that both emits and absorbs light in reaction to microwave stimulation. These clocks are lower in cost (as little as 50 USD), smaller in size, and can last for about 10 years. Commercial, portable and aerospace applications often use Rubidium atomic clocks. Hydrogen clocks or masers (microwave amplification by stimulated emission of radiation) have

superior short-term stability compared to other standards, but lower long-term accuracy.

Keeping Standard Times

Amazingly precise timekeeping is vital to the operation of many features of modern life, including navigation (GPS), high-speed electronic communications, and electrical grids. Today, roughly 400 atomic clocks around the world contribute to the calculation of International Atomic Time (TAI), which helps to set Coordinated Universal Time (UTC) and local times worldwide.

In the U.S., both the U.S. Naval Observatory (USNO) in Washington, D.C. and the National Institutes of Standards and Technology (NIST) maintain atomic clocks against which other clocks are compared. The NIST-F1 cesium atomic clock has a daily error of a mere 0.03 nanoseconds, approximately, or a loss of one second every one million years!

So this New Year's Eve, as you reflect on the precious nature of time, remember that modern science is taking its measure of every special moment, too — but to a degree of precision even the most thoughtful individual cannot match.



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Heidolph Tuttnauer Sterilizers are preferred by research, pharmaceutical, food and beverage, cosmetic, brewery, wastewater treatment plant, and university laboratories. Tuttnauer has been designing and manufacturing laboratory sterilization equipment for more than 80 years and offers unmatched options for fast, safe, dependable, and convenient sterilization of liquids, media, instruments, biohazard waste, glassware, cloth, and more.



- Color touchscreen, Bacsoft software
- Preset temperatures: 134°C/273°F (instruments) and 121°C/250°F (liquids, other materials)
- Use pre-programmed parameters or customize your settings
- Includes a buck-boost converter to ensure proper voltage
- One-year warranty

Model	Capacity	Chamber (Dia. x D)	Electrical	Mfr. No.	Cat. No.	Price
Vertical, Top-Loading Sterilizers						
2840ELV (Mobile)	31L (1.1 cu. ft.)	28 x 46cm (11 x 18 in.)	220V	023210744	13-890-130	\$17,568.00
3870ELV (Mobile)	85L (2.8 cu. ft.)	38 x 70cm (15 x 27.6 in.)	220V (No plug)	023210745	13-876-750	\$28,116.02
5075ELV*	160L (5.6 cu. ft.)	50 x 75cm (19.7 x 29.5 in.)	220V (No plug)	023210990	13-900-103	\$40,624.00
Benchtop Automated Sterilizers with Printers						
2840ELP	31L (1.1 cu. ft.)	28 x 46cm (11 x 18 in.)	220V	023210671	13-890-131	\$13,538.00
3870ELP	85L (2.8 cu. ft.)	38 x 70cm (15 x 27.6 in.)	220V (no plug)	023210672	13-890-132	\$21,929.00
5075ELP	160L (5.6 cu. ft.)	50 x 75cm (19.7 x 29.5 in.)	220V (no plug)	023210675	13-876-712	\$36,785.00

*Must be connected to building utilities for water and drain.

Precision Through Advanced Controls



Branson SFX Sonifier Series Cell Disruptors

The SFX Series of cell disruptors provides a new level of ease, precision and repeatability with advanced energy and temperature control modes, process monitoring capabilities, and programming features.

Features:

- Precision energy input delivered in continuous or pulse modes
- True temperature control (temperature probe sold separately)
- Control modes for time, temperature and energy
- In-process feedback for key variables (power level, energy usage, sample temperature)
- Programmable controls with room for 20 stored programs

The SFX150 Sonifier comes with a recessed push button and LED display and either a traditional or handheld converter (designed for ergonomic comfort and easy control). A wide variety of probes/microtips and other Sonifier series accessories are also available to help meet your application needs.



Handheld Converter



Traditional Converter

Description	Sample Size	Power	Probe	Mfr. No.	Cat. No.	Price
SFX150 with Traditional Converter	0.2mL to 150mL	150W	1/8 in. Microtip	101-063-1096R	15-338-528	\$3,295.00
SFX150 with Handheld Converter	0.2mL to 150mL	150W	1/8 in. Microtip	101-063-962R	15-345-136	\$3,300.00
SFX250	0.2mL to 500mL	250W	1/2 in. Tapped	101-063-965R	15-345-138	\$3,850.00
SFX550	0.2mL to 1000mL	550W	1/2 in. Tapped	101-063-969R	15-345-141	\$4,850.00
SFX550	0.2mL to 1000mL	550W	3/4 in. Solid	101-063-968R	15-345-140	\$5,450.00



Durable Construction, Pinpoint Accuracy

OHAUS Explorer Series Balances

Featuring readabilities from 0.01mg to 0.1g and capacities up to 35kg, the OHAUS Explorer Series is a robust family of durably constructed balances specifically designed to offer outstanding accuracy and weighing performance. Fully featured to meet all of your weighing needs, the Explorer Series is outfitted with:

- A large color graphic touchscreen and intuitive user interface, available in 14 operating languages
- Measurement traceability for easy compliance with GLP and GMP standards
- 14 specialized applications, including formulation, dynamic (animal) weighing, and pipette adjustment
- RS-232, USB, and ethernet interfaces for printer or PC connectivity and system integration



Explorer Precision

Explorer Analytical

Description	Capacity	Readability	Cat. No.	Price
Model EX125D Semi-Micro Balance	52g/120g	0.01mg/0.1mg	01-919-370	\$5,125.50
Model EX225D Semi-Micro Balance	120g/220g	0.01mg/0.1mg	01-919-372	\$6,231.00
Model EX124 Analytical Balance	120g	0.0001g	01-920-232	\$4,043.26
Model EX324 Analytical Balance	320g	0.0001g	01-920-234	\$5,311.76
Model EX223 Precision Balance	220g	0.001g	01-920-235	\$2,680.10
Model EX623 Precision Balance	620g	0.001g	01-920-237	\$3,703.03
Model EX2202 Precision Balance	2200g	0.01g	01-920-239	\$2,901.32
Model EX6202 Precision Balance	6200g	0.01g	01-920-241	\$3,697.70
Model EX6201 Precision Balance	6200g	0.1g	01-920-243	\$3,024.52
Model EX12001 High-Capacity Precision Balance	12000g	0.1g	02-112-245	\$3,552.63

Enhance Quality Control

fisherbrand

Fisherbrand Traceable Excursion-Trac Datalogging Hygrometers/Thermometers

Fisherbrand Traceable Excursion-Trac Datalogging Hygrometers/Thermometers help you perform routine measurements, meet critical experimental requirements, and fulfill your quality-control needs. Use them in cleanrooms, hoods, environmental chambers, incubators, desiccators, and for other inside/outside air monitoring.

- Calibration: Multiple point; traceable to NIST
- Status indicators: Low battery, memory full, USB data transfer, and active-alarm state
- Smart-Alarm: Visual/audible alert continues until reset; stores up to 10 unique alarm events
- Data retrieval: Hassle-free — unit can be used even while downloading or analyzing data
- Rolling memory: Holds most recent 525,600 data points; data can be cleared after downloading



Parameter	Range	Accuracy	Resolution	Probes
Temperature	0 to 55°C (32 to 131°F)	±0.4°C	0.01°	Remote Sensor: 6' Cable
Humidity	0 to 95% RH (Non-Condensing)	±3% RH (5-75%), Otherwise ±5% RH	0.1% RH	

Description	Cat. No.	Price
Traceable Excursion-Trac Hygrometer/Thermometer	15-079-665	\$225.00

Strong Enough to Crush, Gentle Enough to Mix



Fisher Scientific Bead Mill Homogenizers



Use for a variety of applications that require grinding, lysing, and homogenization of biological samples to prepare them for molecular extraction.

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) tubes



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.

Efficient Glassware Cleaning

Labconco FlaskScrubber Glassware Washers

Thoroughly and quickly wash and dry all types of laboratory glassware — including Erlenmeyer and volumetric flasks — with Labconco FlaskScrubber Glassware Washers.

- Lower injection spindle rack (included) holds up to 36 pieces of flask-shaped glassware
- Up to six rinses with purified water (pump included)
- Forced-air drying — dries inside and out
- Optional upper racks and inserts for specialty glassware
- Racks are interchangeable with all Labconco washer models

Contact your Fisher Scientific Sales Representative for more information about Labconco glassware washers, optional racks, and other accessories.



Style	Maximum Temperature	Electrical	Mfr. No.	Cat. No.	Price
Undercounter*	180°F	110V, 60Hz	4420330	10-359-110	\$12,321.93
Undercounter*	199°F	220V, 50/60Hz	4420331	10-359-111	\$12,880.53
Freestanding*	180°F	110V, 60Hz	4420430	10-359-114	\$12,653.63
Freestanding*	199°F	220V, 50/60Hz	4420431	10-359-115	\$13,035.19

*With viewing window and light

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, 115V	7310020	16-108-442	\$10,114.98
Refrigerated CentriVap with Glass Lid, 115V	7310021	16-108-443	\$10,108.89
Refrigerated CentriVap with Glass Lid and Acid Resistance, 115V	7310022	10-269-602	\$13,922.21

Laboratory Safety Solutions



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
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 B Enclosure

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

Standard Features:

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

Description	Cat. No.	Price
AC730C 32" PowderSafe Enclosure	36-100-4292	\$7,119.68
AC740C 48" PowderSafe Enclosure	36-100-4293	\$7,770.75





Horizontal Clean Bench

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

Standard Features:

- Seamless polypropylene construction
- ISO 5 or better air quality
- Microprocessor controlled
- Available in 4-, 5-, 6- and 8-foot versions

Description	Cat. No.	Price
AC4000 48" Horizontal Clean Bench	36-100-4381	\$7,256.20
AC5000 60" Horizontal Clean Bench	36-100-4382	\$8,599.63
AC6000 72" Horizontal Clean Bench	36-100-4383	\$10,552.50
AC8000 96" Horizontal Clean Bench	36-100-4384	\$12,955.00

Combination PCR Workstation

AirClean Systems Combination PCR Workstation combines an ISO 5/Class 100 Clean Air Environment with UV light sterilization for optimal protection from sample contamination. The UVtect Microprocessor constantly monitors workstation functions.

Standard Features:

- Class 100 clean vertical laminar-flow air
- Polycarbonate and polypropylene design to reflect UV energy
- Full access folding sash
- Rolled plastic design — no joints or gaps in construction
- Digital UV-light timer, 0-59 minutes
- UV shelf with integral pipette holder

Description	Cat. No.	Price
AC632LFUVC 32" PCR Workstation	36-101-8894	\$3,396.63
AC648LFUVC 48" PCR Workstation	36-101-8897	\$4,528.84



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

Filtered Laboratory Safety Solutions

MYSTAIRE®

Mystaire manufactures fume hoods and laminar-flow hoods to provide operator or process protection from toxic fumes, vapors and particulates.



MY-PCR Workstations

MY-PCR Workstations establish an ISO 5 clean work area with timed UV light and clean work zone.

Standard Features:

- Combines vertical ISO 5 air with UV-light sterilization
- Safety switch to eliminate UV-light exposure
- Polycarbonate construction with polypropylene base

Description	Cat. No.	Price
MY-PCR24 24" PCR Workstation	15-338-365	\$2,554.29
MY-PCR32 32" PCR Workstation	15-338-366	\$3,202.93
MY-PCR48 48" PCR Workstation	15-338-960	\$3,850.00

MY-PCR Filters included in the purchase price.



Isola Vue Filtered Chemical Workstation

Isola Series Filtered Workstations provide chemical and particulate containment. Advanced monitoring and control are key components of each Isola Filtered Workstation.

Standard Features:

- EverSafe III Touch Control with electronic monitoring of face velocity, filter saturation, and temperature and humidity with audible and visible alarms
- Polycarbonate construction for 360° visibility — excellent for demonstrations
- Solid-state gas detection with three sensitivity set points

Description	Cat. No.	Price
MY-ISL36 36" Isola Workstation	15-338-900	\$4,522.50
MY-ISL48 48" Isola Workstation	15-338-901	\$5,628.00
MY-ISL72 72" Isola Workstation	15-338-902	\$7,236.00

Isola Filters sold separately — application dependent.

QUALITY SAFETY SERVICE

For Large-Volume Applications

Kinematica Autoclaves

Kinematica autoclaves are compact floor devices with a rectangular or round sterilization chamber and automatic locking door for easy handling.

The square BoTec chamber system allows for the 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.

Reliability Meets Comfort



Fisherbrand Mesh Office Chairs

With Fisherbrand Mesh Office Chairs, you get:

- Foam cushion with durable black nylon fabric cover
- Adjustable armrests (two-way or 3D) 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 Two-Way Adjustable Arms, with Headrest	14-400-440	\$340.00
Executive Chair with Two-Way Adjustable Arms, without Headrest	14-400-441	\$316.00
Executive Chair with 3D Adjustable Arms, with Headrest	14-400-442	\$344.00
Executive Chair with 3D Adjustable Arms, without Headrest	14-400-443	\$318.00
Modern Mesh Office Chair		
Modern Chair with Two-Way Adjustable Arms, Standard Lift Control	14-400-444	\$249.00
Modern Chair with 3D Adjustable Arms, Standard Lift Control	14-400-445	\$252.00
Modern Chair with Two-Way Adjustable Arms, Synchro Tilt Control	14-400-446	\$277.00
Modern Chair with 3D Adjustable Arms, Synchro Tilt Control	14-400-447	\$280.00

Next Generation of Precision Weighing

The New XPR and XSR Balances

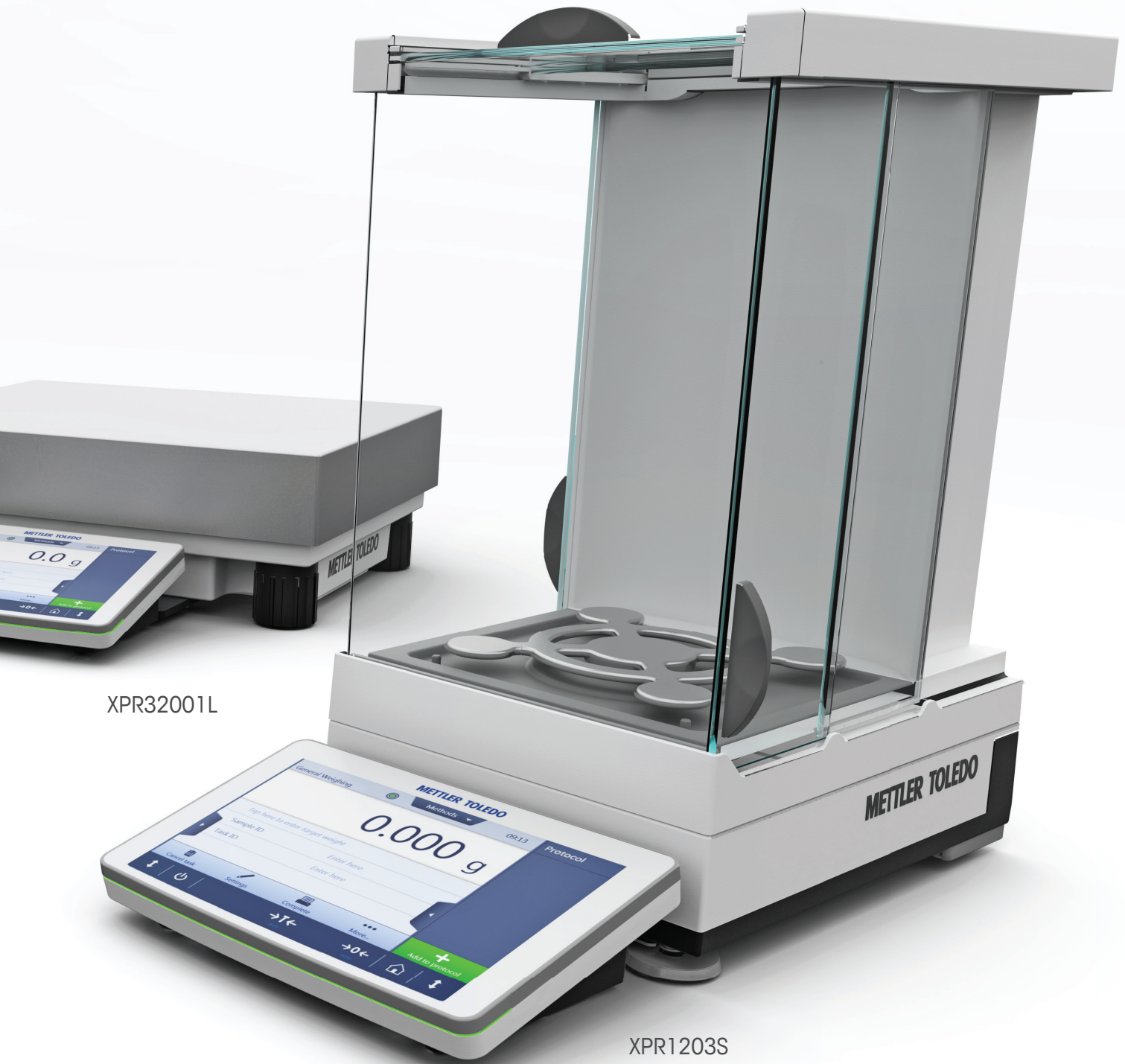
The XPR and XSR precision balances take weighing to new heights. Building off of the success of the XPE balance line, the XPR features a large, vibrant color touchscreen with a redesigned user interface. The platform provides essential user management options and a notepad for electronic documentation.

The XSR, successor to the XS balance line, boasts a new color touchscreen with the intuitive StatusLight. Combined with multiple interface options and method parameters, the XSR assures your balance is always connected and ready for use.

Visit fishersci.com/mettlertoledo to learn more about the next generation of precision weighing.



METTLER TOLEDO



XPR32001L

XPR1203S

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 and 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	1/6 hp	13 × 6.5 × 8.5 in.	13-880-14	\$1,610.00
Single Stage	40L/min.	65 torr	15psig	1/6 hp	15 × 6.5 × 8.5 in.	13-880-16	\$2,170.00
Two Stage	20L/min.	6 torr	15psig	1/6 hp	15 × 6.5 × 8.5 in.	13-880-18	\$2,080.00
Two Stage	35L/min.	6 torr	15psig	1/3 hp	16 × 7 × 9 in.	13-880-20	\$2,760.00
Two Stage	35L/min.	1.5 torr	15psig	1/3 hp	16 × 7 × 9 in.	13-880-22	\$3,925.00

Save 30% on accumet AB Meter Kits



Fisher Scientific accumet AB Benchtop Meters

Fisher Scientific accumet Benchtop Meter Kits are designed to deliver accuracy, versatility and simplicity. From their sleek, compact design to their oversized LCD readouts, these meters put a wealth of information at your fingertips.

- 500-point memory: log manually or at intervals; view, print or export data (USB or RS232)
- Advanced settings: programmable calibration reminders, audible/visual high/low alarms
- Compact size; large graphic backlit LCD
- Includes one three-position electrode arm (can accommodate a total of three electrode arms)
- Calibrate with one of six preset buffer groups or program custom pH buffer values

Get 30% off a new accumet AB Meter Kit between October 1, 2017 and December 31, 2017.



Description	Includes*	Cat. No.	Price
AB150 pH Kit	pH/ATC Electrode (13-620-631)	[13-636-AB150] 13AB150P	\$686.35
AB150 pH BioBasic Kit	accuTupH pH Electrode (13-620-183A), ATC Probe (13-620-19)	[13-636-AB150B] 13AB150BP	\$816.90
AB200 pH/Conductivity Kit	pH/ATC Electrode (13-620-631), Conductivity/ATC Probe (13-620-100)	[13-636-AB200] 13AB200P	\$1,059.31
AB250 pH/ISE Kit	pH/ATC Electrode (13-620-631)	[13-636-AB250] 13AB250P	\$686.35

*All models include an electrode arm, RS-232 and USB cables, and 100/240V power supply.

Visit fishersci.com/accumetupgradepromo for more information.

Restrictions may apply. See page 52 for full details.



Clean, Mix and De-Gas

Fisherbrand Ultrasonic Cleaners

- Maximum versatility — choose frequency, power level, time, temperature and ultrasonic mode
- Products in-stock and ready to ship
- 6 tank sizes: 0.7 to 7.4 gallons
- Full line of accessories available
- Multiple types of chemical solutions available

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

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part of Thermo Fisher Scientific



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HAPPY
BIRTHDAY!

HAPPY 195TH BIRTHDAY!

Louis Pasteur, the Father of Modern Microbiology

By Hamilton Waldron

Louis Pasteur, whose name is most associated with pasteurization, was one of the real icons of modern science. But in addition to making milk and other foods safer, he's also responsible for saving millions of lives thanks to his vaccination and microbial fermentation breakthroughs.

Born in Dole, France on December 27, 1822, Pasteur was slow to find his passion as a scientist. However, he became a professor of chemistry in 1848, which became the catalyst for a science career that was full of life-saving discoveries.

Contributions to Chemistry

One of Pasteur's first notable chemistry discoveries happened when he was just 26 years old and working in the crystallography field. Pasteur was using the rotation of plane-polarized light (now known as polarimetry) to study crystals; this discovery involved the compound tartaric acid, a chemical that forms crystals in the sediment of fermenting wine.

Although many of Pasteur's contemporaries had used the same approach, Pasteur keenly observed the crystals. His analysis brought him to the realization that, in addition to tartaric

acid, the compound "paratartaric acid" was also present in wine sediments.

Unlike Pasteur's colleagues who assumed that the two compounds were identical because of their composition, Pasteur disagreed and tasked himself with finding evidence to support his hypothesis that composition alone does not explain how chemicals behave. Ultimately, this became the foundation of stereochemistry, the study of the spatial arrangements of atoms in molecules, and a very important field in the current chemistry research world.

Pasteur Pipets

As Pasteur was developing his pasteurization process, the method used to kill microbes in food and drink, he soon realized the importance of keeping everything clean and germ free. This became the standard for all of his experiments, but at the time, there was no way to transfer liquids between vessels without contaminating them.

Pasteur created the pipet by dividing long, thin glass tubes into appropriate lengths. First, the two ends were plugged with cotton to prevent any contaminants from entering. Then the center of the tube was heated until it was molten, and the ends were pulled apart to form a long and narrow capillary tube. The capillary

was then snapped in half to form two pipets. This delicately constructed tool has been used in laboratories since Pasteur invented it; they are also called transfer pipets, bulb pipets, dropper pipets or teat pipets.

The Pasteur pipet has proven invaluable in biology and chemistry labs and experiments. Although he'd be turning 195 later this year, Pasteur's inventions and contributions to science and medicine will likely be utilized forever.

Happy birthday indeed, sir!



NEUROPROTECTION AND NEURODEGENERATION

MICROGLIA IN ACUTE AND CHRONIC INFLAMMATION

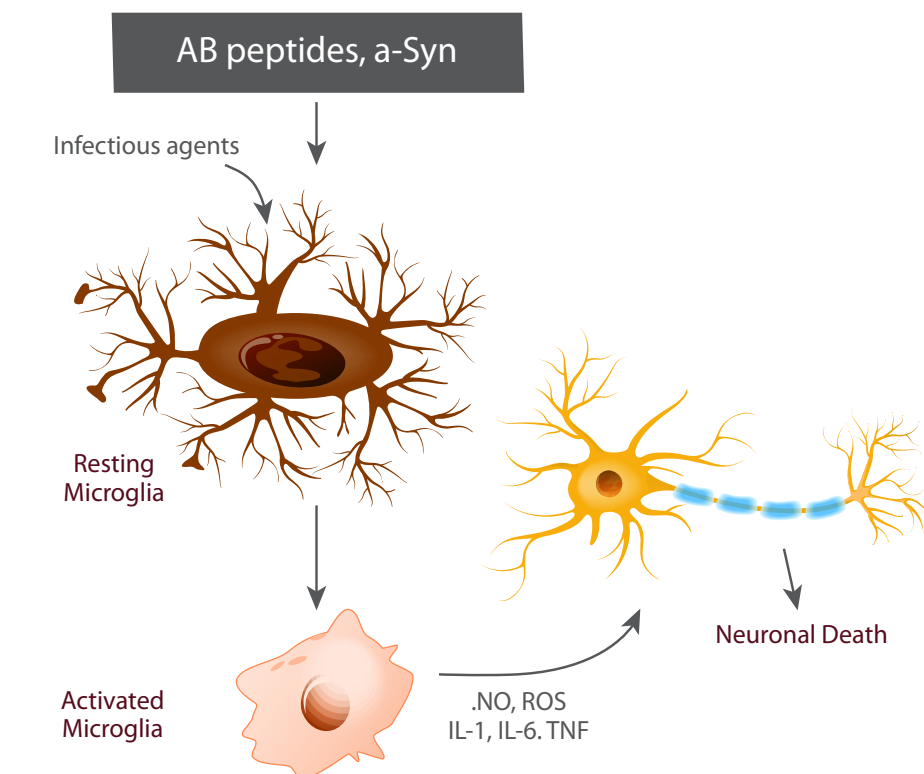
By Chandra Mohan, PhD, MilliporeSigma, Temecula, CA

The term neurodegeneration characterizes a chronic loss of neuronal cell structure and function leading to progressive mental impairments. Generally, the incidence of neurodegeneration increases with age, but infectious agents can also induce neuronal death via apoptosis. Research has linked neurodegeneration to neuroinflammation, which can be caused by microvascular damage, atherosclerosis, age-associated pro-inflammatory signals, and viral or bacterial infections that compromise the blood-brain barrier.

Most neurological disorders or damage causes inflammation, which can cause microglia cells to increase in number and change phenotypes. Microglia are a type of cell that is found throughout the brain and spinal cord and are the “first responders” in the active immune defense of the central nervous system. They protect against potential fatal damage by scavenging plaques, damaged or superfluous neurons and synapses, and infectious agents.

Microglia may comprise up to 15% of all brain cells and play a crucial role during brain development: They induce apoptosis of specific neuronal subpopulations and contribute to numerical control of neuronal cells. These cells also support synaptogenesis through the local synthesis of neurotrophic factors, and regulate synaptic transmission and remodeling. However, microglia may be detrimental to neurons when they establish a chronic inflammatory function and promote neuropathologies.

Acute neuronal damage that results from stroke, hypoxia, and neurotrauma can also compromise neuronal survival and

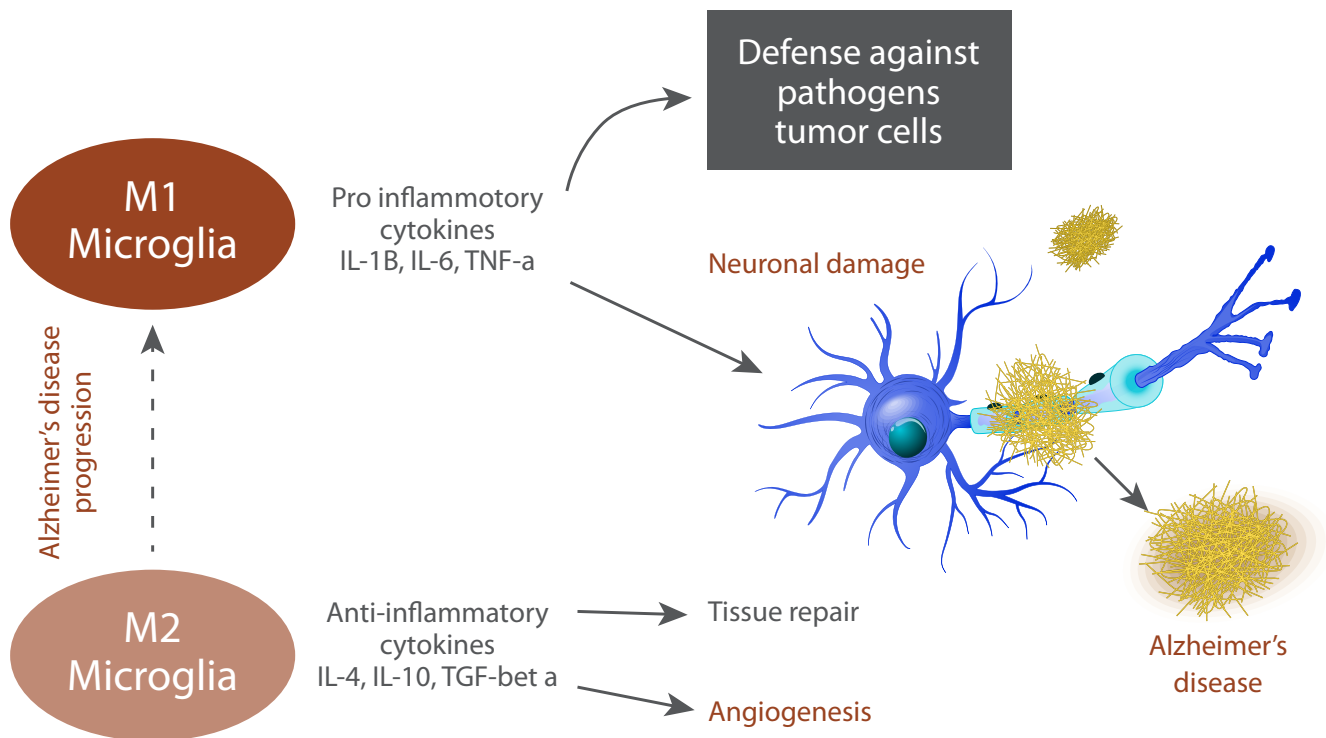


indirectly trigger neuroinflammation. In these latter cases, microglia are activated in response to the insult and adopt a phagocytic phenotype. They release inflammatory mediators such as cytokines and chemokines, which may be considered a protective response to limit further injury and initiate repair processes.

Neurodegenerative diseases — including Alzheimer’s and Parkinson’s diseases and multiple sclerosis — cause chronic neuroinflammation that persists long after the initial injury or insult and results in long-standing activation of microglia and sustained release of inflammatory mediators. These mediator molecules

increase oxidative stress and perpetuate the inflammatory cycle, activating additional microglia, promoting their proliferation, and causing the release of more inflammatory factors. With this chronic neuroinflammation, microglia activation has detrimental effects and forms the basis of the microglial dysfunction hypothesis.

During Alzheimer’s disease progression, the activation of microglia can either reduce the levels of A β peptides via phagocytosis, clearance, and degradation, or release pro-inflammatory cytokines that can contribute to neuronal damage and loss. Under physiological conditions,



active microglia generally maintain homeostasis and play a role in neuroprotection and repair by releasing growth factors, such as BDNF and TGF- β . However, under pathological conditions like infection, injury, and ischemia, they are activated, proliferate, and assume a macrophage-like morphology.

Activated microglia can produce both neurotoxic and neuroprotective effects. For example, microglia activated by lipopolysaccharides, IFN- γ or TNF- α , are known as “M1” or “classically activated” and play a vital role in defense against pathogens and tumor cells by producing pro-inflammatory cytokines, such as IL-1 β , TNF- α , and free radicals. The alternative “M2” type of microglia have an anti-inflammatory phenotype that promotes tissue remodeling and repair and angiogenesis via the release of anti-

inflammatory cytokines IL-4 and IL-10.

In murine models of Alzheimer's disease, increased numbers of both M1 and M2 microglia have been reported (compared to age-matched control animals) and microglia can switch from M2 to M1 type with the progression of disease. NALP3 inflammasome, a mediator of IL-1 β production, plays an important role in driving the innate immune response towards A β peptides and blocking NALP3 activity, which can induce microglial phagocytosis and a shift towards the M2 phenotype.

An early expression of pro-inflammatory cytokines by non-neuronal (including endothelial) cells in brains affected by Alzheimer's may also affect disease development. Compared to age-matched controls, microvessels in these brains can

release high amounts of pro-inflammatory cytokines. In addition, sustained inflammation from the periphery may contribute to the brain uptake of pro-inflammatory cytokines, mediated by receptors for advanced glycation end products (RAGE) and a compromised blood-brain barrier.

Increasing evidence supports the role of cytokines and other mediators in neuroinflammation and neurodegradation. Newer therapeutic approaches for treatment of stroke and debilitating neurodegenerative diseases may depend upon a better understanding of microglial physiology and the ability of resident microglia to initiate pro-inflammatory immune responses.

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Model	Description	Cat. No.	Price
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For a limited time, buy an 800 TS Reader and get 50% off a 50 TS Washer.

Contact your **Fisher Scientific Sales Representative** for details.

Restrictions may apply. See page 52 for full details. This promotion is not available to current or potential healthcare customers.

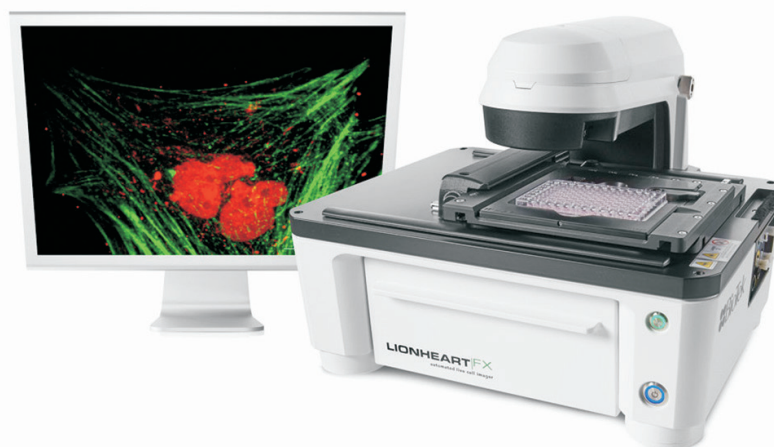
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Description	Cat. No.	Price
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This representative product may not include all of the product features listed above.

Contact your Fisher Scientific Sales Representative to learn about other available configurations.

COLD ROOM PRECAUTIONS: STAY WARM, STAY SAFE

By Rita Waimer

Cold rooms may be essential for preserving and storing samples, but they can also be a dangerous place for your employees to work. That's why it's important to have a comprehensive set of safety precautions for anyone who works in a cold room. While your cold room safety measures will be specific to your situation and the work being done, the following general precautions apply to all cold environments.

Stay Warm

Proper clothing and protective equipment are essential when working in a cold room. While the number and weight of clothing layers may vary, employees should generally wear a synthetic base, a middle layer made of wool or another lofty material, and a waterproof outer layer. For physically demanding work, employees should reduce the number or weight of layers to prevent perspiration, which can lead to hypothermia or frostbite. Employees should also wear gloves with thermal liners, thermal socks, insulated boots, and a wool cap or other type of ear-covering headwear.

These clothing items, as well as regular breaks to warm up, will help prevent

injuries and illnesses that can result from extended exposure to cold environments. In addition to frostbite and hypothermia, cold room employees are at risk of frostnip, chilblains (a circulatory problem caused by repeated exposure to freezing temperatures) and immersion injury (aka trench foot), which can permanently damage nerves and muscles.

Monitor Room Conditions

Continuously monitor cold room temperatures as well as air movement, which can produce a wind chill. Wind chill is the perceived temperature of cold and moving air — the combined effect increases the rate of heat loss from exposed skin. As an example, an air temperature of -5°F with a fan blowing air at 5 mph is equivalent to an air temperature of -16°F .

Watch for mold growth, which can both pose a health risk and contaminate samples. Mold growth can occur with condensation, spills, and the presence of materials like cellulose that easily grow mold. If you find mold in your cold room, use a wet cleanup method (a cloth dampened with a non-ammoniated soap or detergent). Sweeping or dusting can release spores into the air and spread them throughout the room.

Because the air in cold rooms is recirculated, be careful about how chemicals are used and stored in the room. Chemicals can vaporize and accumulate in the air, which can lead to inhalation exposure and the risk of explosion. If you must use chemicals in a cold room, use a fume hood, limit working amounts to 250mL or less, immediately clean up any spills, and do not store chemicals in wash bottles.

These guidelines offer a good start to staying safe in cold rooms, but be sure to address the specific concerns and considerations of your particular environment.



A SECOND LIFE: LAB AND CLEANROOM GLOVES

Choosing gloves, whether changing or upgrading them for your cleanroom, lab or controlled environment, is a process that takes time and careful consideration. The right decision can have a positive impact on both employee satisfaction and product and process yields, while the wrong decision can be costly when the gloves don't perform as expected or don't fit the task or hazard.

To minimize contamination risks and enhance individual protection, choose the right gloves by:

- Analyzing the process and any hazards or risks to products or personnel
- Looking for gloves designed specifically for your work environment
- Making sure that the gloves are comfortable and offer tactile sensitivity

Protection Against Harm

Did you know?

- An estimated 13 million U.S. workers are exposed to chemicals that are absorbed through the skin.¹
- Workplace exposure to hazardous drugs can cause acute and chronic health effects: skin rashes, adverse reproductive outcomes, leukemia and other cancers.²
- Most (9 out of 10) people who work with hazardous drugs are not familiar with glove testing standards.³

The right gloves protect hands and skin from lab or cleanroom hazards to help ensure operator and environmental safety. When working with hormones, chemotherapy or other hazardous drugs, make sure that the gloves you are using are certified for these substances, since there are no acceptable levels of exposure to them. Examples of certifications include:

- Kimberly-Clark Purple Nitrile-Xtra Exam Gloves (Tested according to ASTM D6978-05; protects against up to 33 hazardous drugs; 29 chemotherapy drugs and four hormones)
- Kimberly-Clark Sterling Nitrile Exam Gloves (Tested according to ASTM 6978-05; for use with 12 different chemotherapy drugs and four hormones)

Diverting Gloves from Your Waste Stream

Gloves are ubiquitous in labs and cleanrooms, and workers may use multiple pairs in the course of a workday. And although they are necessary, the amount of waste produced is significant. In fact, used nitrile gloves can make up nearly 25 percent of the solid waste stream of labs or research facilities.

But it doesn't have to be that way. The RightCycle Program offers an alternative way for labs and cleanrooms to recycle

non-hazardous gloves and single-use apparel to divert them from solid waste streams. The first large-scale recycling effort of its kind, this program has diverted more than 450 tons of waste from landfills since its launch in 2011.

Many labs and cleanrooms are already a source for primary recycled commodities (glass, plastic and aluminum). If gloves, garments and other accessories are not exposed to bio-hazardous materials, they can be safely recycled into items like totes, shelving, or lawn and garden furniture. Diversion of these secondary materials is the next step toward achieving the goal of zero waste.

That's just one reason why so many labs are participating in The RightCycle Program.

Here's another — it's the right thing to do.

Content provided by:



¹ Centers for Disease Control and Prevention Skin Exposures and Effects, The National Institute for Safety and Health (NIOSH)

² NIOSH, <http://www.cdc.gov/niosh/topics/hazdrug/>

³ Kimberly-Clark Professional survey, Nov. 2016



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Fisherbrand Lab First Aid/Burn Kit

Fisherbrand Lab First Aid/Burn Kits provide basic items to deal with the most common types of workplace injuries, including minor wounds (cuts and abrasions), burns and eye injuries.

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- For treating smaller cuts, burns, abrasions and injuries
- Metal container can be mounted on the wall for easy access



Description	Contents	Cat. No.	Price
Fisherbrand Lab First Aid/Burn Kit	<ul style="list-style-type: none"> • Bandages: Adhesive Bandages, Adhesive Tape, Gauze and Gauze Pads, Burn Dressing, Triangular Bandage • Eye Care: Eye Pads, Eyewashes • Medicinals: Triple Antibiotic Ointment, Burn Cream with Lidocaine, Liquid Skin, Burn Spray Pump, Calgonate, Antiseptic Wipes • PPE: CPR Mask, Hand Sanitizer, Disposable Vinyl Gloves • Other: Ice Pack, Scissors, First Aid Handbook 	19-090-860	\$200.00



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Available in XS to XL



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- Wraparound design
- Lightweight construction
- Anti-scratch lens coating
- ANSI Z87.1 certified
- CE approved



Description	Cat. No.	Quantity	Price
Fisherbrand Safety Goggles, Clear Lens, Clear Frame	19-181-512	Each	\$11.00
		12/Pack	\$121.44
Fisherbrand Safety Goggles, Clear Lens, Grey Frame	19-181-513	Each	\$16.00
		12/Pack	\$176.74
Fisherbrand Safety Glasses, Clear Lens (No Frame)	19-181-514	Each	\$3.50
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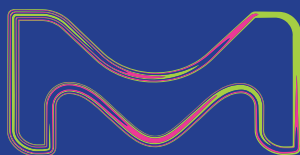
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