

Fall/Winter 2017

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Flint Water Signals Dangers of Lead Contamination

By Mike Howie

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NEWPATH LEARNING

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In 2014, the city of Flint, Michigan stopped getting its water from Lake Huron (via the Detroit Water Department or DMD) and started using water from the Flint River - a source that was known to be of poor quality. Shortly after the switch, the city announced that the water contained bacteria and other contaminants, and several "boil orders" were issued. But in the months that followed, as scientists and reporters uncovered the true severity of the situation, national headlines sounded their alarm: Flint's water also contained elevated levels of lead, a toxic heavy metal.

Something in the Water

In February of 2015, the Environmental Protection Agency (EPA) detected 104 parts per billion

(ppb) of lead in the tap water at the home of Flint resident Lee-Anne Walters. That level was nearly seven times greater than the EPA limit of 15 ppb, and that was just the beginning. Later, scientists from Virginia Tech tested tap water from Walters' home and detected lead levels as high as 13,200 ppb and, in September of that year, the Virginia Tech team estimated elevated lead levels in the water delivered to 40 percent of Flint homes.

At the height of the crisis, Flint residents were forced to rely on bottled water for drinking and cooking. The situation has since improved: Flint once again supplies water from Lake Huron through the DMD and the EPA has granted the city \$100 million in assistance to upgrade its drinking water infrastructure. The state of Michigan is also now required to replace lead and galvanized steel water lines connected to 18,000 Flint households, a project that probably won't be completed until 2020.

So how did the situation become so dire? A main factor was the poor condition of water in the Flint River. In September 2015, the Virginia Tech team concluded that the water was 19 times more corrosive than the water in Detroit. The Flint

Water Treatment Plant had made no provisions for corrosion control, and, over time, the corrosive water leached lead from the aging pipes around the city, including those in residents' homes.

An Invisible Threat

People initially complained about the water's abnormal color and bad taste, but not about lead, which is colorless and odorless in water. Lead has no natural purpose in the human body and its accumulation can lead to a variety of health issues, especially in babies and young children. Lead poisoning in children can cause neurological problems, and childhood lead poisoning can lead to issues for adults like renal effects, hypertension, reproductive problems, and developmental problems in offspring.

While the case in Flint was especially bad, lead contamination can occur anywhere that corrosive water flows through lead pipes, fittings or faucets before being consumed. Although lead components aren't used in modern plumbing systems, they may still be found in older systems.

Avoiding exposure to lead is the best way to prevent lead poisoning, and there are a few ways to

determine whether or not the water in your home is contaminated. First, check the EPA's Consumer Confidence Reports for information about lead levels in water in your area - they're available on the EPA's website (epa.gov/ccr) and a copy is mailed to water customers every year. Second, test the water in your home. Some water-supply companies offer free lead testing, but you can test your own water by purchasing a lead test kit and sending the water sample to an EPA-certified lab.

As an extra precaution, purchase a water filter for your home. Look for one made to reduce lead content and certified by either NSF International or the Water Quality Association, and use it to filter the water you use for drinking and cooking.

[DISCUSSION QUESTIONS]

What could have been done to prevent the widespread lead contamination in Flint?

How can you make sure that the water you consume is safe?

[VOCABULARY]

CORRODE

EPA

PH



NEW

Furniture

Diversified Woodcrafts™ Augmented Reality Sandbox

Allows users to create topography models by shaping real sand, which is then augmented in real time.

- Uses 3D visualization in hands-on exhibit
- The resulting (AR) sandbox allows users to create topography models by shaping real sand, which is then augmented in real time by an elevation color map, topographic contour lines, and simulated water.
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- Comes complete with box, camera, projector, wire management, and laptop loaded with visualization software
- Solid oak and oak veneer construction
- Heavy duty locking casters
- Kit includes Microsoft Kinect 3D camera, powerful simulation and visualization software, and a data projector
- Sand required, not included



Cat. No.	Description	Price
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S07497ND	Carolina™ Elodea densa	\$21.25/Pack of 12
S07654ND	Carolina™ Terrestrial Isopods	\$43.00/Pack of 50
S07446ND	Carolina™ Basic Protozoa Set	\$28.75/Pack of 3
S07587ND	Carolina™ Sea Urchin Embryology Set	\$158.00/Pack of 14
S07705ND	Carolina™ Painted Lady Butterfly 5-Larvae Culture	\$28.25/Each
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- Organ Set S28075 includes simple dissection instructions for each organ
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Cat. No.	Description	Injection	Price
S28074	Brain in Cranial Case	No	13.50/Each
S28065	Brain, Dura Mater Intact	No	15.25/Each
S28071	Brain, Dura Mater Removed, Hypophysis Intact	No	13.00/Each
S28069	Brain, Dura Mater Removed	No	12.25/Each
S28070	Brain, Half	No	9.00/Each
S28072	Brain, Dura Mater Removed, Single Injection	Arterial system, red	21.50/Each
S28068	Eye	No	10.50/Pack
S28067	Heart, Plain	No	6.00/Each
S28073	Heart in Pericardium	No	12.00/Each
S28066	Kidney	Artery red, Vein blue	5.65/Each
S28075	Organ Set with Manuals	No	22.50/Each
S28064	Pluck	No	16.50/Each

Carolina™ Formalin Mink

Used in lab experiments which ensures safe and non-toxic environment. Carolina™ Formalin Mink are packaged in waterproof plastic bags.



- Ranch-raised, formalin-preserved mink
- 15 in. in length
- Waterproof student name tags are furnished free with each mink

Cat. No.	Injection Type	Price
S37304	Plain	15.75/Each
S37305	Double	16.25/Each
S37306	Triple	18.50/Each

Earth and Space

EISCO Mohs Hardness Kit

For use in field, laboratory, or for personal use to determine hardness of unidentified samples.

- Contains nine specimens with distinct hardness and key
- Numbered and stored in sturdy, sectioned container
- Includes: Talc, gypsum, calcite, fluorite, apatite, feldspar, quartz, topaz, corundum



Cat. No.	Description	Price
S24660	Mohs Hardness Kit	20.00/Each

EISCO Physical Properties of Minerals Kit

For study of color, luster, hardness, crystal habit, streak, specific density.

- Contains 12 specimens and key.
- Numbered and stored in sturdy, sectioned container
- Average specimen size: 2-3cm
- Explore rhombic cleavage of calcite, compare hardness of quartz and graphite, study pyrite's metallic luster
- Includes: Hematite, magnetite, biotite, gypsum, calcite, hornblende, augite, labradorite, microcline, muscovite, olivine, and quartz



Cat. No.	Description	Price
S24661	Physical Properties of Minerals Kit	40.00/Each

EISCO Introduction to Minerals Kit

Designed to act as gateway to wider world of mineralogy.

- Contains 12 specimens and specimen key.
- Average specimen size: 2-3cm
- Includes: Hematite, magnetite, biotite, gypsum, calcite, hornblende, augite, labradorite, microcline, muscovite, olivine, and quartz



Cat. No.	Description	Price
S24662	Introduction to Minerals Kit	22.00/Each

EISCO Metamorphic Rocks Kit

For study of foliation and alteration of these metamorphic rocks to understand the immense heat and pressure needed to form them.

- Contains 12 specimens
- Classroom tool for metamorphic rock classification and identification
- Numbered and stored in sturdy, sectioned container
- Average specimen size: 2-3cm

- Includes: Anthracite coal, banded gneiss, augen gneiss, fine and coarse marble, phyllite, white and pink quartzite, mica schist, garnet schist, serpentinite, and slate



Cat. No.	Description	Price
S24666	Metamorphic Rocks Kit	24.00/Each

EISCO Basic Rocks and Minerals Kit

For use in hands-on exploration of rocks and minerals.

- Contains 40 specimens and specimen key.
- Average specimen size: 2-3cm
- Contains rocks from inside of volcanoes, bottom of sea floor, from deep within earth's crust and more
- Includes: Pyrite, calcite, garnet, plagioclase, sulfur, granite, basalt, conglomerate, limestone, gneiss, and marble



Cat. No.	Description	Price
S24663	Basic Rocks and Minerals Kit	50.00/Each

EISCO Igneous Rocks Kit

For use in classification and identification.

- Contains 12 specimens and specimen key.
- Numbered and stored in sturdy, sectioned container
- Average specimen size: 2-3cm
- Igneous rocks form from cooling and crystallization of magma or lava
- Includes: Basalt, diorite, gabbro, granite, pegmatite, obsidian, peridotite, pumice, rhyolite, scoria, syenite, and tuff



Cat. No.	Description	Price
S24664	Igneous Rocks Kit	22.00/Each

EISCO Sedimentary Rocks Kit

For use in identification of depositional history of sedimentary rocks based on their grain size and composition.

- Contains 12 specimens and specimen key
- Numbered and stored in sturdy, sectioned container
- Average specimen size: 2-3cm
- Includes: Bituminous coal, breccia, conglomerate, dolostone, rock gypsum, gray and fossiliferous limestone, red and white sandstone, argillaceous and carbonaceous shale, and siltstone



Cat. No.	Description	Price
S24665	Sedimentary Rocks Kit	22.00/Each

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Stylish breathable mesh back

- Adjustable arm rests
- Height adjustable covered molded foam seat
- High back design with breathable mesh material and adjustable lumbar support
- Choice of Knee-Bend Control or Standard Control both of which are equipped with tilt locking
- Knee-Bend control has a forward pivot point for tilting



Cat. No.	Seat Tilt	Arm Style	Price
S36485	Standard locking backward tilt	3D adjustable arm rests	232.00/Each
S36358	Lockable knee-bend backward tilt	4-way standard adjustable arm rests	254.00/Each
S38699	Lockable knee-bend backward tilt	3D adjustable arm rests	257.00/Each
S35984	Standard locking backward tilt	4-way standard adjustable arm rests	228.00/Each

Fisher Science Education™ Executive Mesh Chair, Desk Height

High back chairs with adjustable lumbar support.

- Ergonomically contoured comfort molded seat and wide range of ergonomic adjustments can be easily customized to fit virtually any executive
- Ergonomic features include 360° swivel rotation control with tilting and tilt-locking function
- 4-way standard adjustable arm rests or 3D adjustable arm rests
- Standard adjustable arm rests move up, down, in, and out
- 3D adjustable arm rests move up and down, in and out, forward and backward, and twist towards and away from user



Cat. No.	Includes	Arm Style	Price
S36484	----	3D adjustable arm rests	293.00/Each
S36104	----	4-way standard adjustable arm rests	290.00/Each
S36105	Headrest	3D adjustable arm rests	316.00/Each
S36108	Headrest	4-way standard adjustable arm rests	312.00/Each

New Retinal Implants Change the Way We Look at Bionics

By Rita Waimer

Vanessa Restrepo-Schild, a 24-year-old PhD student and researcher at Oxford University's Department of Chemistry, recently developed a more comfortable retinal implant.

Retinal implants are used to help restore the function of light-activated cells in the back of the eye. These photoreceptor cells send an electrical signal to nerve cells that tell the brain to "see." If these cells have been damaged, but the nerve cells or ganglia that transmit the signal are still working, direct stimulation of the retinal cells can restore vision to people with age-related macular degeneration or *retinitis pigmentosa*.

Earlier retinal implants have been made with metal or other hard materials that can damage the eye and lead to inflammation and

scaring. The implant that Restrepo-Schild and her team have created is different, using softer biological materials that more closely match the natural human retina.

A Natural Fix

The new double-layered implant is designed to act like a camera. According to Restrepo-Schild, "the synthetic material can generate electrical signals, which stimulate the neurons at the back of our eye just like the original retina." Each cell in the implant detects and reacts to light, just like the pixels on a camera sensor, and together they create a grayscale image.

The team's implants are made entirely from biological cell membrane proteins and soft water droplets called hydrogels. These

natural, biodegradable materials don't contain foreign bodies or living cells, and are less invasive than mechanical devices. It's far less likely that the human body will have an adverse reaction to the implant, making its use easier for patients and doctors alike.

Looking to the Future

Once fully developed and tested, these devices could be a pivotal first step in creating retinal and other implants that are more bionic, less invasive and more closely resemble human body tissues.

Restrepo-Schild's study is published in *Scientific Reports*, and the team is already starting on the next phase of their work. The synthetic retinas have only been tested under lab conditions

to date, but the team will begin to explore their use with living tissues, a vital step in demonstrating how the materials will perform as bionic implants. Future plans include the development of retinal implants that can recognize different colors and shapes, and expansion of testing to animal models and human clinical trials.

[DISCUSSION QUESTIONS]

What other types of implants could be made with this technology?
What do you think bionic implants will be like 50 years from now?

[VOCABULARY]

- BIODEGRADABLE
- HYDROGEL
- IMPLANT
- RETINA

Turning Dirty Air into Clean Energy

By Kevin Ritchart

Scientists from the University of Antwerp and the University of Leuven in Belgium created a device that both purifies air and converts it into energy.

The device consists of two chambers separated by a membrane. Polluted air is purified on one side of the membrane, and stored as hydrogen gas — a byproduct of the degradation process — on the other. The hydrogen gas can be used as fuel at a later time.

"Our device is unique because it's an all-in-one system, which uses air as a source of water and directly produces hydrogen gas," said Johan Martens of the KU Leuven Centre for Surface Chemistry and Catalysis. "The system is also carbon neutral, and there is no net use of water. The device gets the water it needs from the air and

releases it back into the air again. In theory, this device could even be used in the desert, because there, too, every cubic meter of air contains about five grams of water."

Stepping on the (Hydrogen) Gas

Some hydrogen buses already utilize this type of technology. Hydrogen fuel cells convert hydrogen into energy that powers the bus. They can be recharged quickly and run for a long period of time. The exhaust from hydrogen buses is water rather than greenhouse gases.

Specific nanomaterials are used to construct the membrane, which spans just a few square centimeters. Researchers are hoping to increase the size of the device as they continue to refine the design. The technology being

employed to convert the purified air into energy is similar to the functionality of solar panels. The difference between the two is that the Belgian device doesn't produce energy directly, but rather stores it for future use.

Slowing the Effects of Climate Change

According to Martens, producing hydrogen gas through the use of this device could help in the fight against climate change.

"We live in a carbon world: there's no getting around that," Martens said. "We shouldn't ban carbon emission from our economy. Instead, we can collect the CO₂ that is produced and recycle it to obtain new fuel or usable chemicals. By adding hydrogen gas to CO₂ you can, for instance, produce synthetic natural gas."

While it's more difficult to reduce the carbon footprint of households, vehicles and other large-scale, industrial ventures, this method of producing hydrogen gas should prove useful in combatting climate change once more data is collected.

[DISCUSSION QUESTIONS]

What are some ways you could use this technology to reduce the carbon footprint of your household?

What about your school?

Would you feel comfortable riding in a bus powered by hydrogen fuel cells? Why or why not?

[VOCABULARY]

- DEGRADATION
- VECTOR
- NANOPARTICLE

STEM

Microscopes

Swift™ M3600 Series Compound Monocular Microscopes

New look and "student proof" design with curved handle, variable LED illumination and rounded stage.

- One-piece eyetube and illuminator are tamperproof
- Locked-on eyepieces, objectives and spring loaded "one touch" stage clips
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- Extra bright LED lasts up to 50,000 hours between replacements for minimum maintenance and downtime
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- Optional add-on mechanical stage available for models with standard stage clips
- **S19717K & S23866:** Includes 3.0MP+ built-in digital camera
- Warranties; Microscopes: Lifetime; Camera: one year



Cat. No.	Head Configuration	Condenser Type	Objective Types	Stage	Lighting Type	Price
S19617K	Digital monocular	1.25 N.A. Abbe spiral	4xD, 10xD, 40xRD, 100xRD achromatic	Built-in mechanical	Cordless LED with dimmer switch	908.00/Each
S19617C	Monocular	1.25 N.A. Abbe spiral	4xD, 10xD, 40xRD Achromatic	Built-in mechanical	Corded LED with dimmer switch	440.00/Each
S19617D	Monocular	1.25 N.A. Abbe spiral	4xD, 10xD, 40xRD, 100xRD achromatic	Built-in mechanical	Cordless LED with dimmer switch	500.00/Each
S19617G	Monocular	1.25 N.A. Abbe spiral	4xD, 10xD, 40xRD Achromatic	Built-in mechanical	Cordless LED with dimmer switch	450.00/Each
S19617H	Monocular	1.25 N.A. Abbe spiral	4xD, 10xD, 40xRD, 100xRD achromatic	Built-in mechanical	Cordless LED with dimmer switch	504.00/Each
S19617E	Monocular	Built-in 0.65 N.A.	4xD, 10xD, 40xRD Achromatic	Stage clips	Cordless LED with dimmer switch	393.00/Each
S19617A	Monocular	Built-in 0.65 N.A.	4xD, 10xD, 40xRD Achromatic	Stage clips	Corded LED with dimmer switch	383.00/Each
S23866	Digital monocular	Abbe 1.25 Spiral	4XD, 10XD, 40XRD	Built-in mechanical	Variable Cordless LED	838.00/Each

* With digital camera

Swift™ M2250 Series Microscopes

Compound student microscope designed specifically for intermediate-level microscopic applications.

- Inclined, smooth-moving 360° rotatable body provides comfortable viewing
- Tungsten illumination
- Illuminator vents assure “cool” illumination
- Separate coarse and fine focus system is easy to repair
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- LED illumination produces cool, white light that lasts up to 50,000 hours
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WARRANTY:

Limited lifetime warranty on all defective parts and workmanship

Cat. No.	Diaphragm	Lighting Type	Price	
S65202	Disc	Tungsten	262.00/Each	1310/Case

Ken-A-Vision™ EduCam™ WiFi Stand Alone Camera

Designed with unique broadcast algorithm for crisp clear images.

- Easy and simple package
- Total portability with eight hours+ operation
- Support up to 30 viewing devices such as smart phones, computers and tablets based on network
- Wi-Fi 802.11b/g/n enables both direct connect and network enabled connections
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- Designed to scale school’s ICT needs
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Cat. No.	Description	Price
S04726A	EduCam WiFi Stand Alone Camera	652.00/Each



Now with **camera port**, the M3700 Series is our **newest digital solution.**

Choose a Moticam™ that fits your needs and get started today.

Description	Cat. No.	Price
Swift M3702C-4	S04751	\$682.00
Swift M3702CB-4	S01896	\$807.00

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Choose between a 3.2 megapixel camera (2048 × 1536 output resolution) and a 2.07 megapixel camera (1920 × 1080 output resolution)

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- 94 in. (2.4m) USB cable connects to monitors, multimedia projectors and computers
- Resolution: 1280 × 1024 SXGA/HD 720P
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INCLUDES:

- Software: Ken-A-Visions integrating digital tools include EduCam Plus software. EduCam Plus shares to your entire classroom; Any Platform, Any device, Any subject, LIVE! Students can capture images throughout the lesson to empower reflection, use multiple annotation tools to complete assignment then share with their peers or turn in for assessment.
- Operating Systems: Windows 7+, MAC to run the camera. Share to PC, MAC, Android, Apple and Chromebooks

WARRANTY: One year

Cat. No.	Head Style	Includes	Pixels	Price
S04735	30mm Eyepiece	Microscope eyepiece adapter	3.2	590.00/Each
S04736	28mm Eyepiece	Microscope eyepiece adapter	3.2	569.00/Each

Ken-A-Vision™ FlexCam 2 Digital High-Definition Camera

Innovative, sleek document camera allows real-time streaming of camera images.

- Live teaching with superior image clarity
- Rugged, durable construction: rubber encased camera head, surgical steel flexible gooseneck, low-profile metal alloy base
- Simple, one-handed operation: auto focus, lights, and image orientation controlled by buttons on camera head
- 5.0 MP CMOS image sensor
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- Integrated lights and microphone
- UVC driverless camera works seamlessly with most third-party software applications
- Interactive whiteboard compatible

ORDERING INFORMATION:

Pro Eyepiece Adapter is also available (Cat. No. S04727). It is specially designed to easily align the document camera with either a compound or stereo microscope; fits 23 and 30mm eyepiece tubes.

INCLUDES:

- 28mm eyepiece adapter
- Software: Ken-A-Visions integrating digital tools include EduCam Plus software. EduCam Plus shares to your entire classroom
- Operating Systems: Windows 7+, MAC to run the camera. Share to PC, MAC, Android, Apple and Chromebooks



WARRANTY:

Five years

COMPLIANCE:

RoHS Compliant

CERTIFICATIONS:

CE, FCC marked

Cat. No.	Product Type	Price
S67919MPA1	Stand mounted camera	409.00/Each
S04727	FlexCam	39.00/Each
S04728	Furniture mounted camera	599.00/Each

Celestron™ TetraView LCD Touch Screen Microscope

Digital Desktop microscope with color LCD screen.

- Fully mechanical adjustable stage with metal clip, 88 x 88mm
- 5MP camera sensor, powers of 40x to 400x (1600x with digital zoom), 4X digital zoom
- LCD Monitor: 4.3 in. High definition touch, 320 x 240 pixel resolution, 3.5 in (90 mm) with 4X digital zoom, 262K colors
- Rotating LCD head
- Course and fine focus
- Memory: 2G SD card
- Illuminator: Lower- adjustable bright white LED
- Languages supported: English, German, French, Spanish, Italian, Portuguese, Japanese, Chinese Simple, Chinese traditional
- AC Adapter: Input Universal, 100 to 240Volt 50/60HZ, multi-country plug
- Dimensions: 178 x 140 x 330mm (7 x 5.5 x 13 in.)



Cat. No.	Description	Price
S05039	TetraView LCD Touch Screen Microscope	330.00/Each

Celestron™ CB2000C Compound Microscope

Professional-grade compound binocular microscope with 2000x power.

- Full-metal construction with fully mechanical stage
- mechanical stage has knobs to control both axes for easy centering
- Coaxial focus with coarse and fine focusing knobs
- Achromatic objective lenses
- Abbe condenser with iris diaphragm



Cat. No.	Description	Price
S13040	CB2000C Compound Microscope	349.95/Each

Cargille Immersion Oil

Finest immersion oil available. For use with 100X oil immersion objectives. Type B is recommended for most educational microscopy; contains no PCB compounds.

- Type B: Low fluorescence, high viscosity



Cat. No.	Quantity	Viscosity	Product Type	Price
S19314	1 oz.	1250 cSt	Type B	17.00/Each

Polar 3D Printer

For use with Polar 3D Printer

Printing

- Print technology: Fused filament fabrication
- Build volume: 20.3cm dia. x 15.2cm H (8.0 x 6.0 in.)
- Layer resolution: 50 - 400 microns
- Positioning precision: X Y: 10 microns, Z: 1 micron
- Filament diameter: 1.75mm (0.069 in.)
- Nozzle diameter: 0.4mm (0.015 in.)

Mechanical

- Frame: Powder coated 14 guage steel
- Build platform: Glass mirror
- Stepper motors: 1.8°; step angle with 1/16 micro-stepping

Electrical

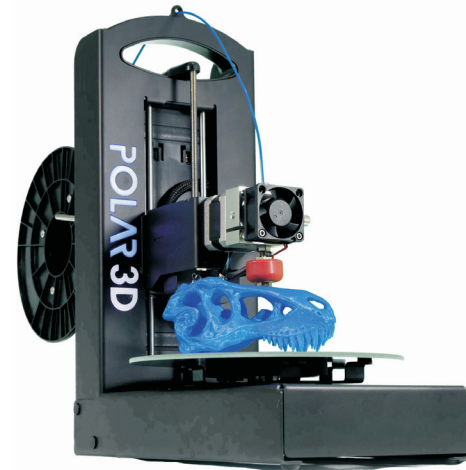
- AC input: 100 - 240V, ~2A, 50-60Hz
- Power requirements: 12V DC at 8A
- Connectivity: Wi-Fi (802.11 b/g/n), Ethernet, USB Serial, USB Thumb Drive

Software

- Software: Polar cloud
- File types: .stl, .obj, .p3d
- Supports: Windows, MAC OS X, Chrome books, Tablets, Smartphones

Dimensions

- Printer only: 31.7 x 20.3 x 35.5cm (12.5 x 8 x 14 in.)
- Shipping box: 53.3 x 40.6 x 22.8cm (21 x 16 x 9 in.)
- Weight: 4.8kg (10.6 lb.)
- Shipping weight: 7.7kg (17 lb.)



Printer Packages Starter Pack

- 1 Polar 3D Printer
- 6 rolls of 1Kg PLA filament

Lab Bundle

- 6 Polar 3D Printers
- 36 rolls of 1Kg PLA filament

Middle School Polar Pack

- 3 Polar 3D Printers + Polar Cloud
- Middle School Site License
- 3 Middle School STRAMtrax Kits
- 18 Rolls of Filament

Warranty:

1 Year Extended Warranty with Each Printer

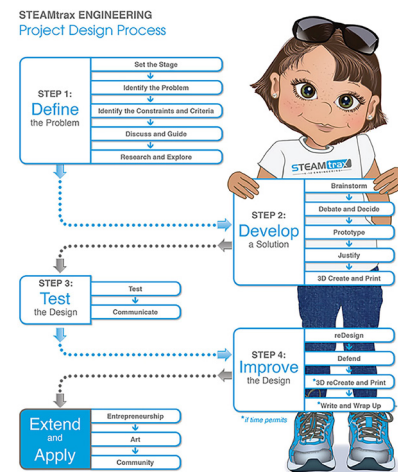
Cat. No.	Product Type	Price
S24020	Printer	899.00/Each
S24022	Starter pack	1167.00/Each
S24023	Lab bundle	6700.00/Each
S24024	Elementary School Pack	5737.00/Each
S24025	Middle School Pack	6890.00/Each
S24021	One Year Extended Warranty	149.00/Each

Polar 3D STEAMtrax Site Licenses

- Flexible modules easily align to Next Generation Science Standards (NGSS) or state standards
- Problem-based, thematic storylines make learning relevant and fun
- Hands-on learning stations clarify science concepts
- Integration of 3D design and printing built into each module
- Engineering Design Process encourages critical thinking
- Variety of formative and summative assessments, rubrics available in digital platform
- Renewal 1 Year Access

Cat. No.	Description	Price
S24027	Elementary Site License	1500.00/Each
S24028	Middle School Site License	2000.00/Each
S24029	High School Site License	5000.00/Each
S24030	Annual Site Renewal License - Elementary	750.00/Each
S24031	Annual Site License Renewal - Middle School	1000.00/Each
S24032	Annual Site License Renewal - High School	2500.00/Each

STEAMtrax curriculum has accompanying hands-on science kits available for each module. Each kit is sold separately.



EISCO NeuLog™ Panda

Multi-sensor module with 9 built-in sensors. Ideal for younger scientists and students who wish to seamlessly and easily collect data.

- Sensors built into unit: Ambient Temperature, Light Intensity, Sound, Barometer, Altitude, Humidity, Dew-Point, Acceleration, Magnetic Field
- 4 Color Touch Screen with USB Connectivity and built in battery, system can fully integrate with any NeuLog sensor
- USB connecting cable included, Panda can connect to PC or Mac
- Software is free to download at neulog.com
- Rugged plastic ergonomic case
- Temperature (12 bit): -13° to 140° F (can read Celsius or Fahrenheit)
- Light (16 bit): 1000 to 240,000 lux,
- Barometer (24 bit): 80 to 110 kPA (Can Read Kpa, atm, Hg, mmHg)
- Altitude (24 bit): -722 to 2000m,
- Sounds (12 bit): 40 to 110 dB,
- Humidity (16 bit): 0 to 100%
- Dew-Point (12 bit): 114° to 109° C,
- Acceleration (16 bit): 3 Axis -20 to 20 m/s², M
- agnetic Field (16 bit): 3 Axis -200 to 200 micro Tesla



Cat. No.	Description	Price
S13941	NeuLog Panda	299.00/Each

Bone-Inspired Steel Less Likely to Crack

By Kevin Ritchart

Steel is a symbol of strength. From the bridges that span our waterways to the buildings that dot the skylines of our cities to the nickname of one of DC Comics' most iconic superheroes, steel has quite a reputation.

But in reality, the internal makeup of steel is prone to cracking under repeated stress. That's why scientists and metallurgists are working together to develop a new type of steel with an internal structure that mimics the design of bones.

Strength Comes from Within

While bones are extremely light in weight, they don't crack easily because of their lattice-like internal structure. Bones are made up of tiny collagen fibers that are oriented in many different directions. This creates several different patterns

and connections inside the bone that make it resistant to cracking under stress.

Currently, the internal makeup of the steel used to build our bridges, skyscrapers and even spacecraft is linear in nature, which makes the accumulation of even the smallest cracks a danger to the stability of the overall structure.

The bone-inspired steel would be constructed using overlapping layers of varying levels of hardness, which increases the overall strength and reduces the chances of small cracks escalating into a catastrophic fracture.

Making steel in this bone-like manner can even result in roadblocks for any small inner cracks that may form — essentially "healing" it from sustaining further damage like its more traditional counterpart.

Barriers to Development

While this new steel is projected to be stronger than what's used today to form the infrastructure of massive bridges and buildings, there's no way for scientists to safely test it in a real-world environment. The risk of building a bridge, for example, out of the bone-like steel and subjecting it to public use — even for a limited period of time — would be too great.

Bone-inspired steel would be more expensive to produce than traditional steel, but if it performs as predicted, it would save money in the long run because it wouldn't have to be replaced as often. This approach to construction could lead scientists and engineers in other fields to use the structure of bones to strengthen the makeup of other materials as well.

It's doubtful that this new approach to steel-making is going to result in anyone tossing aside Superman's usual nickname in favor of "The Man of Bone," but the tall buildings he leaps in a single bound could someday be built a bit differently.

[DISCUSSION QUESTIONS]

What are some other large structures that could benefit from being constructed of materials with a bone-like interior?
Is there a material other than steel that could be used to build bridges and skyscrapers?

[VOCABULARY]

- METALLURGIST
- LATTICE
- INFRASTRUCTURE

Vernier Interfaces and Sensors

LabQuest™ Mini

- The perfect solution for educators collecting data with a computer
- Includes five sensor ports for use with 72 Vernier sensors
- Use with Logger Lite and Logger Pro software for unparalleled power, analysis and curricular support

Go!Link™

- This USB interface is a quick, affordable way to get started with data collection technology
- Single-channel interface connects to any one of 56 Vernier sensors to your computer or Chromebook's USB port

Sensors

- Outstanding performance, generous warranty
- Vernier sensors are designed specifically for education and are held to high standards for quality and durability. Rugged and equipped with classroom proven technology, Vernier sensors are well supported and easy to use.
- Buy with confidence. Most Vernier sensors are covered by a 5-year warranty. In nearly 40 years, Vernier has rarely charged a customer for a repair, no matter how old the equipment.
- More Vernier Interfaces, Sensors, Software, Lab Books and Wireless items are available at www.fisheredu.com.

"Vernier's range of compatible sensors available was extensive...we have found the equipment extremely useful in demonstrating how our simplistic experiments relate to, and might be conducted in industry. In some of our experiments, the equipment provided more teaching time without taking the practical element of the science away. The LabQuest 2 has also allowed us to carry out meaningful experiments that we have not been able to do before."

--Chris Jessop, AKB School, Lytham, United Kingdom



Cat. No.	Description	Price
S16050ND	Dual-Range Force Sensor	109.00/Each
S16052ND	Gas Pressure Sensor	83.00/Each
S16142ND	EKG Sensor	147.00/Each
S16055ND	CO2 Gas Sensor	259.00/Each
S16175ND	Hand Grip Heart Rate Monitor	119.00/Each
S16008ND	Colorimeter	115.00/Each
S16268ND	Stainless Steel Temperature Probe	29.00/Each
S16238ND	pH Sensor	99.00/Each
S16279ND	Photogate	45.00/Each
S16037ND	Go!Temp USB Temperature Probe	39.00/Each
S16192ND	Light Sensor	55.00/Each
S16259ND	Surface Temperature Sensor	23.00/Each
S16035ND	LabQuest Mini	149.00/Each
S16161ND	Go!Link Interface	61.00/Each

United Scientific Supplies Stethoscopes

- Ideal for the classroom, especially in the study of respiration and circulation
- Ford medical stethoscope has durable, flexible tubing for years of use
- Teaching stethoscope has 3.8cm Bowles chestpiece and two sets of binaurals joined together so the teacher and student can listen simultaneously
- Bowles-type stethoscope has adjustable, chrome-plated binaurals and PVC Y tubing

Cat. No.	Product Type	Includes	Price
S99444	Bowles Type Stethoscope	Adjustable chrome plated binaurals, PVC Y-tubing	9.55/Each
S11008	Dual Earpiece-Teaching Stethoscope	3.8cm Bowles chestpiece, two sets of adjustable chrome plated binaurals, PVC Y-tubing	32.25/Each
S11007	Ford Stethoscope	Adjustable chrome plated binaurals, PVC Y-tubing	20.25/Each



Medical Technology

3B Scientific™ CPR Lilly Pro™ Models

Reliable tool for professional CPR training courses.

- Software guides exercises and controls simulator
- Comes with Nexus tablet to monitor parameters
- Hygienic, disposable airbags and separate air chamber system
- Software control carotid pulse and eye movements
- Reacts by opening eyes when spoken to by trainee
- Upper body, shows all important anatomical reference points
- Correct head tilt, individual carotid pulse and moveable jaw to use jaw thrust maneuver, provide realistic scenarios
- Weight: 19.8lb (9kg)



Displayed training parameters

- Compression depth
- Compression frequency
- Hand position
- Head tilt
- Respiration volume/speed (combined)
- Respiration pressure

COMPLIANCE:

AHA and ERC guidelines

Cat. No.	Color	Price
S07929	Light	2408.00/Each
S07930	Dark	2408.00/Each

Life Science

Biology

Bone-Cutting Shears

Heavy-duty shears that cut through bones.

- Made of stainless steel
- The large shears cut large bones easily and cleanly



Cat. No.	Length (English)	Price
S17342	5.5 in.	39.00/Each
S17342A	7.5 in.	43.00/Each

Large Barn Owl Pellets

Students learn the nature of food chains and how to demonstrate the role of predators in the ecosystem.

- Pellets are collected from natural nesting and roosting sites of the barn owl
- Average size of pellet is 2.5 to 3 in. (6.3 to 7.6cm) long
- Heat sterilized and individually wrapped in foil



Cat. No.	Description	Price
S04621	Large Barn Owl Pellets	54.75/Each

Carolina™ Freshwater Aquarium Plants

Fill your classroom aquarium with these freshwater aquarium plants.

⚠️ ALERTS:
Because this item is a living or perishable material, a specified delivery date is required. Orders must be placed through Customer Service at 1-800-955-1177.



Cat. No.	Description	Price
S07491ND	Azolla	13.50/Pack
S07504ND	Marsilea	11.50/Each
S07490ND	Ceratophyllum; Pack of 12	23.75/Pack
S07492ND	Cabomba; Pack of 25	24.75/Pack
S07493ND	Duckweed	11.00/Pack
S07494ND	Elodea canadensis; Pack of 12	15.25/Pack
S07495ND	Elodea canadensis; Pack of 25	29.00/Pack
S07496ND	Elodea densa, Coupon; Pack of 12	20.50/Each
S07497ND	Elodea densa; Pack of 12	21.25/Pack
S07498ND	Elodea densa; Pack of 25	16.50/Pack
S07499ND	Elodea densa; Pack of 50	27.25/Pack
S07502ND	Ludwigia; Pack of 12	11.50/Pack
S07506ND	Oxygenating Plants Set	24.25/Pack
S07508ND	Sagittaria	18.00/Each
S07510ND	Salvinia	11.75/Pack

Classroom Owl Pellet Kit

For 30 students

Kit provides all of the materials necessary to perform an analytical analysis of the owl's habitat, its primary food source and its relationship in the food chain.

INCLUDES:

15 heat sterilized, individually wrapped barn owl pellets from the Pacific Northwest; poster depicting the food web in a typical barn owl community; poster of the skeleton of the vole (the most common food of barn owls); bone sorting chart; complete teaching guide containing background information, suggested teaching strategies, a laboratory guide, suggestions for collecting owl pellets and references



Cat. No.	Description	Price
S19366B	Classroom Owl Pellet Kit	86.00/Each

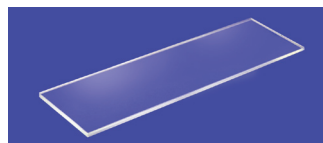
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MAKING SCIENCE MATTER

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Glass Microscope Slides

Pre-cleaned

- Plain glass
- Slide thickness: 1.0 to 1.2mm

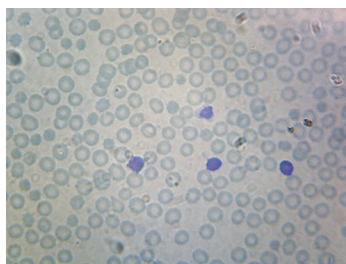


Cat. No.	Description	Length (Metric)	Width (Metric)	Price
S17466A	Microscope slides	75mm	25mm	15.00/Pack

GSC International Microscope Slides

Choose GSC prepared slides for your science classroom studies.

- Human blood WR stain smear



Cat. No.	Description	Price
S06326PS	Bacillus; Gram negative; Smear	6.00/Each
S06325PS	Bacillus; Gram positive; Smear	5.50/Each
S06317PS	Coccus; Gram positive; Smear	6.70/Each
S99032PS	Human blood; WR stain; Smear	6.35/Each
S99039PS	Mammal spongy bone; Section	6.35/Each
S99272PS	Onion mitosis; Lateral section	6.35/Each

Basic Prepared Slides



Set of 25 includes:

- Mitosis in Plants, cs
- Pollen Grains, wm
- Amoeba, wm
- Yeast Cells, wm
- Green Algae, wm
- Letter "e"
- Tape Worm, ts
- Silk Fabric, wm
- Lily Leaf, vs
- Mammal Lung, ts
- Meiosis in Animals
- Aves Feather, wm
- Lily Stamen, ts
- Mammal Hair, wm
- Mosquito Mouth Parts, wm
- Housefly Mouth Parts, wm
- Frog Blood Smear
- Human Blood Smear
- Onion Cells, wm
- Hibiscus Stem, ts
- Wool Fabric, wm
- Fish Scale, wm
- Skeletal Muscle, wm
- Herbaceous Stem, young, ts
- Skin Cells, vs

Cat. No.	Description	Price
S96420	Basic prepared slide set; 25/Pack	51.25/Each

ABO-Rh Combination Blood Typing Kit

- For classroom use, 32 students per kit
- Easy to use
- Affordable

Description	Cat. No.	Price
ABO-Rh Combination Blood Typing Kit	S67359	\$149.00
Basic Blood Typing Kit	S67356	\$107.00

Biotechnology

LAB-AIDS™ Immunology and Evolution Experiments

Use immunology to study developmental evolution.

- Uses synthetic blood serums
- Determine the evolutionary closeness of organisms based on antigen-antibody analysis

Topics discussed:

- Immunological comparison (homology) used to classify organisms
- Relationships among organisms
- Common ancestry
- Techniques of blood immunology
- Identification of blood from unknown sources

INCLUDES:

- 12 Chemplates with spatula
- Three each of drop-controlled bottles of synthetic rabbit blood serum and synthetic human blood serum
- Two each of drop-controlled bottles of blood serum test I, II, III, IV, and V
- 30 student worksheets and guides

Cat. No.	Description	Price
S19412	Lab-Aids™ Immunology and Evolution Experiments	97.00/Each



Using STEM Cells to Fight Lung Disease

By Kevin Ritchart

Everything is easier in 3D. That's the tack being taken by researchers from the Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research at UCLA who have created three dimensional lung organoids from stem cells.

These lab-grown tissues can be used to study lung diseases like idiopathic pulmonary fibrosis, which is difficult to do using conventional methods. Typically, scientists are forced to rely on two dimensional cell cultures to study the effect of genetic mutations or drugs on lung cells. But the flat cell cultures used in that approach appear healthy rather than showing scarring from the disease.

"Scientists have really not been able to model lung scarring in a

dish," said Brigitte Gomperts, MD, who is a member of the UCLA Broad Stem Cell Research Center. "While we haven't built a fully functional lung, we've been able to take lung cells and place them in the correct geometrical spacing and pattern to mimic a human lung."

How It Works

Getting stem cells to mimic the makeup of lung tissue begins with coating tiny gel beads with lung-derived stem cells and letting them assemble into the shape of air sacs found in human lungs. This approach to growing 3D stem cells into organoids (organ buds grown in vitro that contain realistic organ anatomy) for research began in 2010 and has been identified as one of the most important

scientific breakthroughs of this decade, according to The Scientist magazine.

"The technique is very simple," said Dan Wilkinson, one of the authors of the research paper on this subject. "We can make thousands of reproducible pieces of tissue that resemble lung and contain patient-specific cells." These patient-specific cells will help scientists hone in on the causes of diseases like idiopathic pulmonary fibrosis and aid in developing more effective treatment options.

The Next Steps

At this point, researchers don't know the cause of all cases of idiopathic pulmonary fibrosis. With the development of the new lung organoids, researchers will

be able to study the biological causes of diseases and identify the best courses of treatment. This would involve collecting cells from the patient, turning them into stem cells, forming them into 3D organoids and putting those organoids through a battery of tests. Because it's easy to create multiple organoids at once, researchers are able to test the effects of multiple drugs at the same time.

DISCUSSION QUESTIONS

Do you think this approach could be used to test for diseases in other organs? Why or why not?

VOCABULARY

STEM CELL ORGANOID

LAB-AIDS™ Rh Blood-Typing Kit

Determine the presence of the Rh inherited blood factor.

- Students mix a blood sample with the Rh serum and then observe the film for agglutination
- Test requires no warming, and no light box is necessary for viewing
- Contains individualized, sterile components
- Blood-typing serum is bottled in spillproof, drop-controlled vials
- Requires no refrigeration and has no expiration date
- Class size: 32 students



INCLUDES:

Vial of anti-Rh serum, 50 mixing spatulas, 50 presaturated alcohol pads, 50 sterile disposable blood lancets, 50 Lab-Aids Slide Guides™, complete instruction manual

Cat. No.	Description	Price
S67357	Rh blood typing kit for 32 students	73.75/Each



Innovating Science

by Aldon Corporation

"cutting edge science for the classroom"

Hands-on science for:

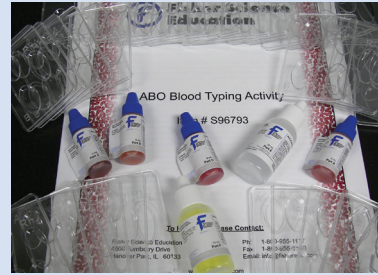
Elementary - Middle School - High School - College

Biology/Life Science • Chemistry • Earth Science
Environmental Science • Forensic Science

fisherbrand Blood Typing Kits with Simulated Blood

Determine the ABO or ABO/Rh blood type of four unknown samples.

Use hands-on activities to understand the nature and importance of antigen-antibody reactions.



- Provide accurate simulation of the blood typing procedure
- No toothpicks, stirring or waiting for results
- Kit contains materials for 10 groups

Kits use simulated blood only.

ORDERING INFORMATION:
Kit refills do not include blood typing trays.

INCLUDES:

- Four simulated blood samples
- One bottle each of simulated anti-A and anti-B serum
- 40 blood typing trays
- ABO/Rh kit also includes one bottle of simulated anti-Rh serum

Cat. No.	For Use With (Application)	Product Type	Price
S96792	For simulated abo/rh blood typing	Blood Type Kit	43.00/Each
S96792R	For simulated abo/rh blood typing	Refill	25.25/Each
S96793	For simulated abo blood typing	Blood Type Kit	36.00/Each
S96793R	For simulated abo blood typing	Refill	22.25/Each

Agar Powder Dehydrated Culture Media

For preparing culture media

- 500g

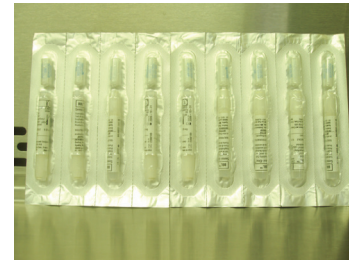


Cat. No.	Description	Price
S14153	Agar Powder	76.00/Each

Antibiotic Sensitivity Discs

Study antibiotic sensitivity and resistance.

- Vials are sealed for storage
- Designed to dispense one disc at a time, without contact or spoilage of remaining discs



ORDERING INFORMATION:

Vials and bottles are supplied in packs of 50.

Cat. No.	Antimicrobial Agents	Price
S70150A	Blank	15.50/Pack

Agarose

Cat. No.	Quantity	Description	Price
S25128A	5g	Powder	21.50/Each
S25128	25g	Powder	53.25/Each
S25130	200mL	2%	18.25/Each
S25129	200mL	0.80%	18.25/Each

This product is an Educational Grade Chemical — no C of A is available.

Innovating Science™ AP Biology Investigation Kit No. 8: Bacterial Transformation

Students genetically engineer bacteria through transformation with a plasmid that confers antibiotic resistance.

- Efficiency of the procedure is determined by examining the number of resistant bacteria
- Includes teachers manual and student study guide copymasters
- Meets AP Science Practices 1, 3, 5, 6, and 7, and Big Idea 3
- For eight lab groups

- Eight micropipets w/plunger (10µL)
- 16 Microcentrifuge Tubes (1.5mL)
- Eight sterile inoculating loops
- 40 Petri dishes
- Four Luria agar (200mL)
- One Luria broth tube (9mL)

Perishable materials are supplied via coupon redeemable by fax, phone or e-mail, and include:

- One E. Coli culture (freeze dried)
- Two bottles 0.02g Ampicillin
- 1000ng pUC 19 Plasmid
- One Tryptic Soy Broth tube (9mL)
- One Tryptic Soy Agar slant (6mL)
- One sterile, disposable pipet

Recommended: Incubator (37°C).
Requires: Large beaker, microwave (not necessary if melting agar in a waterbath), microfuge tube racks, hot plate or waterbath, markers, and container of ice.

INCLUDES:

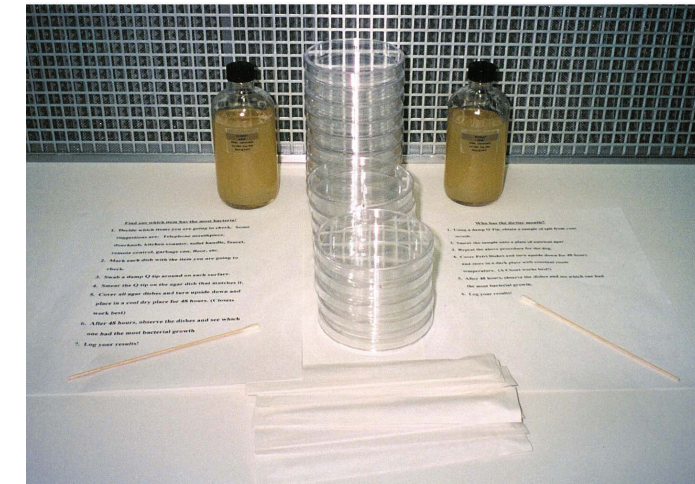
- Sterile Calcium Chloride 0.05M (30mL)
- 16 Sterile volumetric pipets
- Eight Pipet bulbs



Cat. No.	Description	Price
S07058	AP Biology Investigation Kit No. 8: Bacterial Transformation	199.00/Each

Student Bacteria Experiment Kit

Allows groups of students to culture their own bacteria without an incubator.



Melt the media in a microwave, pour it into media plates and test for growth in four popular experiments.

Experiments:

- Test-common use items such as bathroom handles, doorknobs and water fountains
- Clean hand/dirty hand test: How many bacteria does soap eliminate?
- Clean mouth/dirty mouth test: How many bacteria does mouthwash eliminate?
- Which mouth contains more bacteria: a human's or a dog's?

ORDERING INFORMATION:

Class size: Four groups of five to six students.

INCLUDES:

- Two 200mL bottles of prepared nutrient agar
- 20 radiation-sterilized Petri dishes
- 10 sterile swabs
- Four lab instruction sheets

Cat. No.	Description	Price
S68775	Bacteria Experiment Kit	49.25/Each

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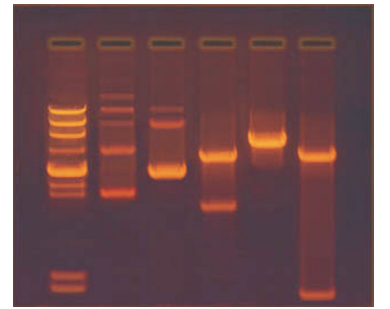
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Edvotek™ Construction and Cloning of DNA Recombinant

To study gene structure, function, and to enhance gene expression.

- Five modules
- Clones are constructed by ligation of a vector and a fragment insert
- The constructs are then transformed into competent cells and the cells are grown and selected for resistance
- Plasmid DNA is then isolated from the transformants, cleaved with restriction enzymes, and analyzed by agarose gel electrophoresis
- Requires wet ice shipment for next day delivery
- Time: Enzyme digestion 30 min., Gel preparation 30 min., Electrophoresis 45 min., Staining 15 min. and Destaining 20 min.



Unit comprises: Electrophoresis tank and power supply, automatic micropipet with tips, balance, microwave or hot plate, waterbath, large weigh boats for staining, UV transilluminator, floating racks for microtest tubes, pipet pump or bulb, 5 or 10mL pipets, laboratory glassware, metric rulers, distilled water and ice, enzymes, buffers and other chemicals

Cat. No.	Description	Price
S11301ND	Edvotek™ Construction and Cloning of DNA Recombinant	450.00/Each

Polypropylene PCR Tube

Thin uniform wall tube for efficient thermal transfer.

- Made of prime virgin polypropylene
- High light transmittance for optimal performance
- 0.2mL capacity

Cat. No.	Description	Price
S09606	PCR Tube	22.00/1 per Pack 220.00/10 Pack per Case

Edvotek™ Digital Shaking Water Baths

Offer exceptional temperature control from ambient to 99°C.

Designed for the precise sample incubation when aeration and agitation are required.

- Stainless-steel chamber
- Maximum temperature: 99°C (210°F)
- 10L chamber size: 12 × 9 × 6 in. (30.5 × 22.9 × 15.2cm)
- 20L chamber size: 19.5 × 11.5 × 6 in. (49.5 × 28.7 × 15.2cm)



Cat. No.	Description	Price
S05876	10L Digital Shaking Water Bath	1963.00/Each
S05981	20L Digital Shaking Water Bath	2855.00/Each

TRANSFORM YOUR CLASSROOM

...with Newly Redesigned Electrophoresis Equipment from EDVOTEK™
The Biotechnology Education Company™

HORIZONTAL AGAROSE ELECTROPHORESIS



EDVOTEK M36

M36 with six 7x7cm gel trays

S11515A \$411.00



EDVOTEK M12

M12 with one 7x14cm gel tray

S11502 \$266.00

M12 with two 7x7cm gel trays

S90242ND \$281.00

VERTICAL PROTEIN ELECTROPHORESIS

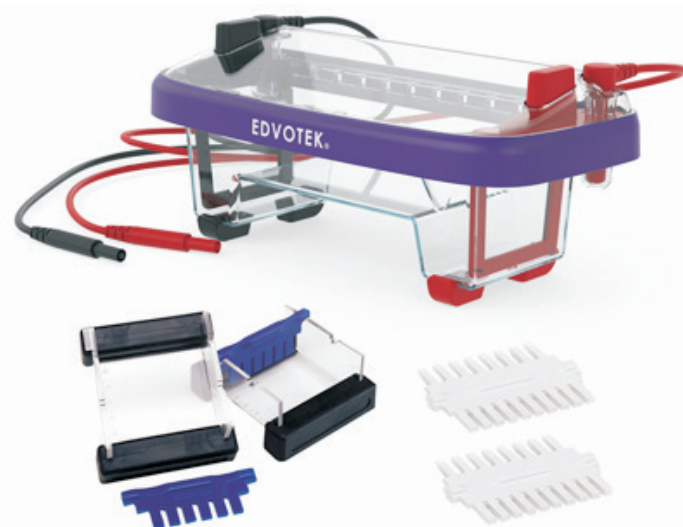


EDVOTEK MV10
S90257ND \$292.00



Edvotek™ M12 and M12 Dual Electrophoresis Apparatus

Host two lab groups on one apparatus.



Choose either two 7 × 7cm gel trays (dual model) or one 7 × 14cm gel tray (single model).

- New, sleek design
- Contoured lid enhances visualization
- Vented base
- Color coded push tabs
- Pour spout for disposing of used buffer
- Replaceable electrode modules
- Results in 30-40 minutes
- Patent pending

INCLUDES: S90242ND

- Two 7 × 7cm trays
- Two 6-tooth combs
- Two 8/10-tooth combs
- Four rubber end caps

S11502

- One 7 × 14cm tray
- Two 6-tooth combs
- One 8/10-tooth comb
- Two rubber end caps

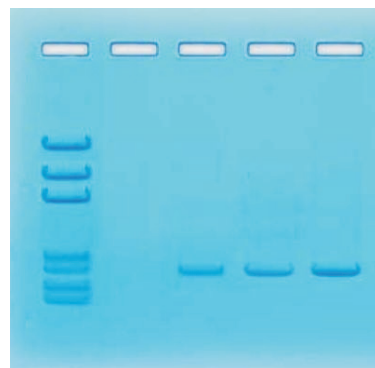


Cat. No.	Model	Sample Size	Includes	Price
S11502	M12 single	Up to 12	One 7 × 14cm trays, two 6-teeth combs, one 8/10-teeth comb, two Rubber end caps	266.00/Each
S90242ND	M12 dual	Up to 20	Two 7 × 14cm trays, two 6-teeth combs, two 8/10-teeth comb, four Rubber end caps	281.00/Each

Edvotek™ Amplification of DNA by PCR

Students will make billions of copies of a small amount of DNA.

- Mix template DNA and primers with PCR beads
- PCR beads contain all of the other components required to carry out a PCR reaction
- Students will see the increasing amounts of DNA for themselves, taking samples every few cycles and analyzing them on a DNA gel
- For 10 lab groups
- PCR 3 hours or overnight, Electrophoresis 45 min.



Cat. No.	Description	Price
S11330	DNA amplification by PCR	199.00/Each



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Visit www.fisheredu.com/nursingcte for a full list of products to support your nursing, med tech and other CTE Programs.

Stop Peeing in the Pool (Scientists Can Tell)

By Celeste Beley

You may have heard that many swimming pools now have a chemical that will change colors if you urinate in the pool. It's a myth, but that doesn't mean that scientists can't tell — it may just take a little more time, and a lot more science.

Another myth is that chlorine and other chemicals added to pools will kill any bacteria from urine. While chlorine does kill germs, urine from healthy people is actually sterile. However, the urine reacts with chlorine to create many new chemicals, some of which are irritants.

Scientists at the University of Alberta specifically looked at one chlorine byproduct called trichloramine to see if they could tell how much urine was really in pool water. Most people think that the "swimming pool smell" is from

chlorine, but the smell is actually from trichloramine. The stronger the smell, the more irritants are present.

Since urine is sterile, scientists needed a marker to signal its presence. They chose acesulfame potassium (also called Ace-K), an artificial sweetener used in food and beverages. Ace-K does not break down in pool water or at normal temperatures and is not digested in the human body, which made it a good choice.

The researchers estimated the average amount of Ace-K in a typical urine excretion by collecting and mixing 20 samples. They found that each milliliter of urine contained approximately 2.36 micrograms of Ace-K. Then they collected water samples from a city water supply and from two separate swimming pools in Canada — one that held

approximately 110,000 gallons of water and the other with about 220,000 gallons.

Samples from the city water supply contained between 12 and 20 nanograms of Ace-K. If there was no urine in the swimming pools, their Ace-K levels would have been similar. Instead, they found over 156 nanograms of Ace-K per liter in the smaller pool and 210 nanograms per liter in the larger pool — the equivalent of eight and 20 gallons of urine per pool, respectively.

The same researchers tested an additional 21 public pools, eight hot tubs and one private pool and found that those locations also contained urine, so the results are typical.

In spite of these rather unpleasant findings, researchers hope that the results will trigger prevention, not

cleanup. The results may help to determine when or if the pool water needs to be changed or diluted, but it also tells us what you already know: Don't pee in the pool!

[DISCUSSION QUESTIONS]

Research the other types of markers that researchers could use. Would any other markers work for this type of research? Why or why not?

If you knew how much urine was in a swimming pool, would you change your mind about swimming there? How much urine would keep you out of the pool? Discuss other health issues that could arise from exposure to chlorine byproducts.

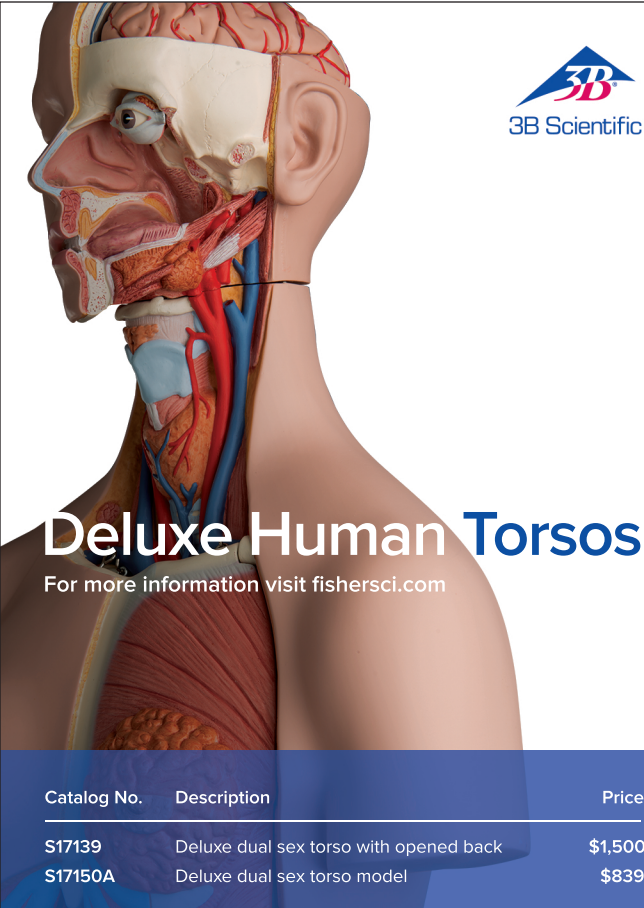
[VOCABULARY]

- CONCENTRATION
- STERILE
- MARKER

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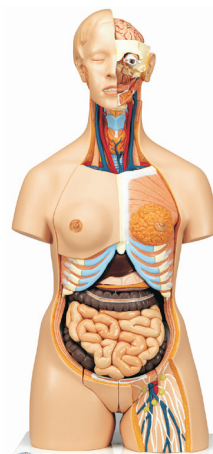
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- Each median section is dissectible into frontal with parietal lobes, temporal with occipital lobes, half of cerebellum and half of brain stem

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Rearranging the Dino Family Tree

By Mike Howie

After 130 years of study, you might think that most of the key facts about dinosaurs, including their family tree, would have been sorted out by now. That's certainly what paleontologists have thought since 1887, when British paleontologist Harry Seeley divided dinosaurs into two groups based on hip structure: the lizard-hipped saurischians included *Tyrannosaurus* and *Brontosaurus* while *Triceratops* and *Stegosaurus* were categorized as bird-hipped ornithischians.

Seeley's dinosaur family tree has been widely accepted ever since — but now another British paleontologist suggests that Seeley got it wrong.

Matthew Baron, a graduate student at the University of Cambridge who works in London's Natural History Museum, studied 74 species of dinosaurs and species closely related to dinosaurs and

compared 457 different physical characteristics. He found that a subgroup of dinosaurs called theropods, formerly classified as saurischians, are, in fact, more closely related to the ornithischians.

New Identities

Baron's revised dinosaur family tree combines subgroups Therapoda and Ornithischia into a new clade, or parent group, called Ornithoscelida, while the Saurischia clade includes the subgroups Sauropodomorpha and Herrerasaurida. In basic terms, as Ed Yong explains in an article for *The Atlantic*, "this is like someone telling you that neither cats nor dogs are what you thought they were, and some of the animals you call 'cats' are actually dogs." While most of what researchers currently understand about dinosaurs is unaffected by this new information, the changes to basic facts about

the dinosaur family tree will deeply affect the field of paleontology.

Most obviously, Baron's tree fundamentally changes how paleontologists thought different species of dinosaurs were related. For example, scientists always believed that *Tyrannosaurus* was more closely related to *Brontosaurus* than *Triceratops*, but it now appears that the opposite is true. The tree also suggests that dinosaurs first came on the scene between four and 16 million years earlier than previously estimated, and that they originated in the northern half of the world instead of the southern half.

Baron's research is an exciting change for paleontologists, and modifications to taxonomy are not as uncommon as they might seem. As recently as 2014, 28 scientific papers were published that changed the way we look

at major groups of birds that are alive today. And in its day, Seeley's classification replaced the 1869 dinosaur subgrouping proposed by Thomas Henry Huxley. While more research is required to confirm Baron's findings, he's confident in his results. "We tested and tested and then some," he said, "and it's a robust result."

[DISCUSSION QUESTIONS]

How do you think this will affect what we know about dinosaurs? What will change, and what will stay the same?

Do you think this will change what we know about modern creatures? If so, how?

[VOCABULARY]

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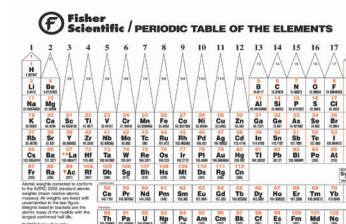


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INCLUDES:

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REQUIRES:

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114-Piece Organic Chemistry Set II

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Cat. No.	Type	Price
Model Sets		
S96538	54 Pieces Molecular Model Set	31.50/Each
S96540	65 Pieces set - Inorganic/Organic	48.50/Each
S96539	114 Pieces Molecular Model Set	43.75/Each
S96541	Student Basic Organic Chemistry Molecular Model Set	103.00/Each
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S14019	Ball with 2 holes	3.75/Each
S14020	Ball with 3 holes	3.75/Each
S14021	Ball with 4 holes	4.10/Each
S14024	Ball with 1 hole	3.10/Each
S14025	Ball with 1 hole	3.10/Each
S14026	Ball with 4 holes	3.45/Each
S14027	Ball with 4 holes	4.10/Each
S14028	Ball with 2 Holes at 18°	3.10/Each
S14029	Ball with 2 holes at 90°	3.10/Each
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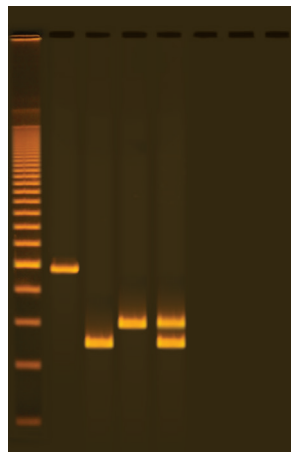
For 10 lab groups.

INCLUDES:

Instructions; control DNAs and primers; DNA ladder; *E. coli* control strain; InstaStain™ Ethidium Bromide; proteinase K; PCR beads; gel loading dye; agarose; electrophoresis buffer and FlashBlue™ stain

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Thermal cycler; waterbath, electrophoresis tank; power supply; micropipets to measure between 5 and 50µL; tips and microcentrifuge



Cat. No.	Description	Price
S95132	Water Quality Testing III	247.00/Each

Edvotek™ Water Quality Testing I: Chromogenic Analysis of Water Bacteria Contaminants

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REQUIRES:

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- Test duration: complete in 30 minutes and grow overnight

ORDERING INFORMATION:

For 10 lab groups.

INCLUDES:

Instructions, biologicals and Gram's Stains, ReadyPour™ Agar, fluorescent reagents, Petri dishes, inoculating loops, sterile swabs and microtubes

Cat. No.	Description	Price
S68636	Water Quality Testing I	119.00/Each

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Description	Catalog#	Price
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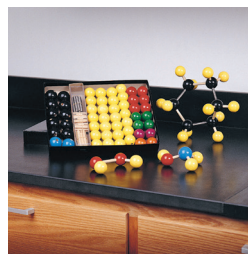
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Grades 4+.

Cat. No.	Description	Price
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- 25 strips per bottle
- 6-Pack/Case

Cat. No.	Description	Price
S28429	Low Range Phosphate Test Strips	20.00/Each

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ORDERING INFORMATION:

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INCLUDES:

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- Flashcards feature: a full-color photograph of a common macroinvertebrate in its natural environment on front and a list of dichotomous characteristics, a measuring scale and detailed drawing on the back



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S67780	Insect Life Cycle and Habitat Flashcards	60.75/Each

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Cat. No.	pH Range	Price
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S04675	5.5 to 8	17.25/Each
S04676	6.5 to 13	17.25/Each

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S05084	ST10	0.0 to 14.0pH	0.1pH	Yes	54.00/Each
S05085	ST20	0.00 to 14.00pH	0.01pH	No	97.00/Each
ORP Pen Meters					
S05086	ST10R	-1000 to 1000mV	1mV	No	118.00/Each
S05087	ST20R	-1000 to 1000mV	1mV	Yes	154.00/Each
Conductivity Pen Meters					
S05088	ST10C-A	0.0 to 199.9µS/cm	0.1µS/cm	No	72.00/Each
S05089	ST10C-B	0 to 1999µS/cm	1µS/cm	No	72.00/Each
S05090	ST10C-C	0.00 to 19.99mS/cm	10µS/cm	No	72.00/Each
S05091	ST20C-A	0.0 to 199.9µS/cm	0.1µS/cm	Yes	102.00/Each
S05092	ST20C-B	0 to 1999µS/cm	1µS/cm	Yes	102.00/Each
S05093	ST20C-C	0.00 to 19.99mS/cm	10µS/cm	Yes	102.00/Each
Salinity Pen Meters					
S05094	ST10S	0.0 to 10ppt	+/- 2.5% FS	Yes	58.00/Each
S05095	ST20S	0.0 to 80.0ppt	+/- 1.5% FS	No	102.00/Each
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S05096	ST10T-A	0.0 to 100.0mg/L	0.1mg/L	No	81.00/Each
S05097	ST10T-B	0 to 1000mg/L	1mg/L	No	81.00/Each
S05098	ST20T-A	0.0 to 100.0mg/L	0.1mg/L	Yes	85.00/Each
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- NIST: 1.678, 4.010, 6.865, 9.184, 12.460
- DIN: 1.090, 3.060, 4.650, 6.790, 9.230, 12.750
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Language Selection

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Memory

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Datalogging

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Cal Due Alarm

- User selectable from 8 hours, 16 hours and 1 to 31 days

High/Low Alarms

- User selectable, visual and audible, parameter based



INCLUDES: AB150 Kit: Includes meter, TRIS compatible pH/ATC electrode, electrode arm, RS-232 and USB cables, 100/240V power supply, and manual
AB150 Meter only: Includes meter, electrode arm, RS-232 and USB cables, 100/240V power supply, and manual

WARRANTY:

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Select models available with Certificate of NIST Traceability

Cat. No.	Model	Price
S04964	AB150 pH Meter only	939.00/Each
S04962	AB150 pH Meter Kit	1054.00/Each
S04960	pH combination electrode	239.00/Each
S04961	pH/ATC electrode	230.00/Each

Fisher Scientific™ accumet™ Portable AP110 pH Meters

For accurate measurements anytime, anywhere.

- Large LCD with backlighting and plain-language text
- Rugged waterproof IP67 housing
- 200 data point internal memory



pH Mode

- Range: -2.00 to +20.00
- Resolution: 0.1/0.01
- Accuracy: ±0.01
- Calibration: Up to five or six points from threesets: (USA: 2.00, 4.00, 7.00, 10.00, 12.00; NIST: 1.68, 4.01, 6.86, 9.18, 12.45; EURO: 1.00, 3.00, 6.00, 8.00, 10.00, 13.00)

INCLUDES:

Meter Kit: Includes meter, pH/ATC electrode, refill solution, hard carrying case, sample bottles, pH calibration packets, 9V battery, and manual

Meter Only: Includes meter, 9V battery, and manual

WARRANTY:

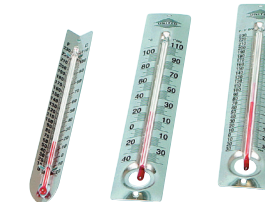
Three year meter warranty, one year electrode warranty

Cat. No.	Type	Price
S04974	AP110 pH Meter Kit	811.00/Each
S04971	AP110 pH Meter	680.00/Each

Metal-Back Thermometers

Alcohol-filled glass thermometers.

- Mounted on aluminum backs



Cat. No.	Temperature Range (Metric)	Price
S41570	-30° to +110°C	3.65/Each
S65302	-40° to +110°C	3.65/Each
S65303	0° to 230°C	3.65/Each

Fisher Scientific™ Dial Barometer

Wall mountable with dual scales.

- Provides a measure of barometric pressure in both millimeters of mercury and hectoPascals (hPa)
- L x dia.: 1.5 x 4.18 in. (3.81 x 10.6cm)
- Weight: 4 oz. (113g)



Cat. No.	Description	Price
S90195	Dial Barometer	32.00/Each

LAB-AIDS™ Blinking LED Conductivity Indicator

Hands-on testing for electrical properties of liquids and solids.

- Measures relative electrical conductivity; LED displays the amount
- Strong or good conductors: LED blinks continuously
- Weak conductors: LED displays a continuous dull red glow
- Poor conductors or nonconductors: LED does not glow or blink



INCLUDES:

Chemplate™ and instructions for use

REQUIRES:

9V battery

WARRANTY:

One-year limited

Cat. No.	Description	Price
S45012	LED Conductivity Indicator	32.50/Each

Physics

K'NEX Education™ Renewable Energy Set

An outstanding series of STEM investigations for secondary school students.

- Students generate electricity to operate models as they experiment with renewable energy systems
- Students will compare and contrast the power and efficiency that can be realized from wind, solar and water powered machines
- Three groups of students will work simultaneously on projects of real-world significance as they learn about issues and concepts that will impact our future
- Builds three models at a time
- For grades 5 to 9



Key Concepts Include:

- Renewable Energy
- Solar, Wind and Hydro Power
- Energy Storage
- Green Energy/Clean Energy
- Electrical Energy Generation
- Hydroelectric Energy Generation

INCLUDES:

- 550 K'NEX™ pieces
- Color-coded building instructions
- One 1.38V, 500mA solar panel
- Three motors and power cords
- One capacitor for energy storage
- Comprehensive teacher's guide with inquiry-based lesson plans and background information

Cat. No.	Description	Price
S02168	Renewable Energy Building Set	108.00/Each

EISCO Specific Gravity Metal Cylinder Set

Set of four different metal cylinders.

- Made of aluminium, zinc, copper, and steel
- L x dia.: 38 x 10mm
- Supplied in plastic box

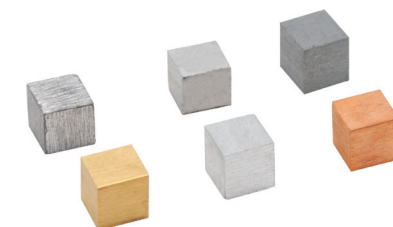


Cat. No.	Description	Price
S12803	Specific gravity metal cylinder set	13.50/Each

EISCO Specific Gravity Cubes

Investigate a range of specific gravities.

- 0.79 in. (20mm) cubes with hooks
- Set includes brass, iron, aluminum and zinc cubes



Cat. No.	Description	Price
S99390	Specific Gravity Cubes	19.75/Each

Fisher Scientific™ Digital Auto-Range Multimeter

This multimeter checks a whole range of functions. Fisher Scientific Digital Auto-Range Multimeter measures electric current, voltage and resistance, typically over several ranges of value.

Checks batteries, cables, printed circuit boards and more.

- Displays answer by selecting proper range
- 0.4 in. (1cm), four-digit LCD shows resistance or voltage unit
- Audible beep checks continuity



ORDERING INFORMATION:

Dimensions: 2.9 x 4.3 x 0.4 in. (5 x 11 x 1cm); weight: 3.0 oz. (85g).

INCLUDES:

Batteries, protective case, Traceable™ Certificate, pair of needle probes, pair of alligator probes and instructions

Cat. No.	Description	Price
S442081	Digital Auto-Range Multimeter	64.00/Each

The Role of Learning Centers in Science Education

By Dr. Lynn Gatto, Warner School of Education, University of Rochester

Learning centers are areas in classrooms or labs that offer activities meant to engage, enhance and differentiate learning by reinforcing concepts and offering problem-solving tasks to help develop critical thinking, independence and cooperation. They can be used for any subject and are particularly well suited to science classrooms.

Why Use Learning Centers?

Research shows that when learning centers are aligned with individual ability levels, student motivation increases along with attention. Learning centers can also provide students with the opportunity to use multiple intelligences.

What Do Learning Centers Look Like?

Learning centers typically focus on specific skills or strategies and

review activities or inquiry, but they may also include enrichment activities that extend the curriculum. For example, a rock study learning center for lower grades could offer rock samples, reference guides, review games and more. For higher grades, an osmosis learning center might include visual guides, multimedia tutorials, a lab activity, and a vocabulary review. Learning centers can be elaborate, but simple ones may be just as effective.

The design of a learning center should be based on the following questions:

- What are my instructional purposes?
- What concepts, skills or themes do I want to support?
- How will centers fit into my space and schedule?
- What student interactions will I expect?

- What activities will provide for the use of multiple intelligences?
- How is accountability for the activities managed?

When Are Learning Centers Used?

Learning centers are often used during small group instruction to provide a meaningful and engaging way for students to work independently. They can also serve as anchor activities for students who finish quizzes or activities early, or as end-of-the-day activities.

Learning centers can be embedded into almost any instructional framework to include scripted syllabuses, a workshop approach, inquiry-based blocked instruction, constructivist approaches or the 5E model (Engage, Explore, Explain, Elaborate and Evaluate).

How Are Learning Centers Managed for Effectiveness?

Successful learning centers require planning that incorporates many decisions, including:

- How will the schedule accommodate the centers?
- How many students can use each center at the same time?
- How will students understand the expectations for each center?
- How will students who need assistance be accommodated?
- What methods will students use to record their answers or results?

A scaffolded approach to introducing learning centers is central to their success. When a new center is introduced, expectations should be clearly presented. Teachers should model these expectations and review them over the first few days, examine what is going well and identify areas for improvement.

K'NEX EDUCATION®

★★★★★

"Terrific Physics Examples! [T]his kit will allow you to have fun with physics/engineering"

— Teacher Review

TEACH PHYSICS with a Working Roller Coaster!

- K'NEX Education sets are proudly created in the USA, from domestic and global component parts
- Roller Coaster Physics allows students to investigate scientific principles in action while building models that move like real-world machines
- Teacher's Guide aligned to national STEM standards included

Description	Cat. No.	Price
Roller Coaster Physics	S90157	\$310.00

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Add some power to STEM labs

Building and Designing Batteries STEM Kit

United's series of STEM-based curriculum kits accent the scientific method and independent inquiry using hands-on learning materials and exciting interactive digital content. This kit contains eight investigative activities that teach students how to construct batteries, assemble electrical circuits, use a multimeter to measure voltage and amplitude, calculate electrical resistance and electrode potentials, and evaluate battery performance.

Description	Cat. No.	Price
Building and Designing Batteries STEM Kit	S13123	\$247.00

Visit fisheredu.com to order this and other United Scientific Supplies hands-on STEM items.

Manufactured by:

UNITED SCIENTIFIC SUPPLIES, INC.

Compact Multimeter

- DC/AC voltage and DC current
- Resistance measurement
- Transistor and diode test function
- Full overload protection
- Operates on one 9V transistor battery
- Dimensions: 5L x 2.88W x 1 in.H (12.7 x 7.3 x 2.5cm)
- Includes test leads and battery



Cat. No.	Description	Price
S47778	Compact Multimeter	15.50/Each

GSC Hand Held DC Generator

A great addition to any classroom experiment using up to 12 volts of DC current.

Simple and useful generator for experiments requiring up to 12 volts DC current. Housed in a tough plastic case with binding posts for electrical connections. Includes 2 alligator connector cords and replacement bulb.

- Hand held and portable
- Posts for electrical connections



Cat. No.	Description	Price
S13682	Hand Held DC Generator	10.50/Each

World's Simplest Motor

Ultrasimple DC motor, designed by science teacher Bruce Yeany.

- Consists of a coil of wire suspended above a small magnet
- Current flows through the coil to generate a magnetic field and repel the magnet's field
- Wire enamel at coil ends is sanded on one side and acts like a commutator as the coil spins
- Requires one D battery (S43923H)



Cat. No.	Description	Price
S83082	Simple DC motor	6.93/Each

EISCO Tuning Forks

Demonstrate eight different frequencies with one set.

- Forks vibrate with these frequencies: 256, 288, 320, 341.3, 384, 426.6, 480 and 512Hz
- Mallets made with one hard and one soft end
- Cushioned for safe storage



ORDERING INFORMATION:
Come in sturdy wooden case.

Cat. No.	Description	Price
S96194	Tuning Forks, Set of 8	42.00/Each

Wood Strips

Economical with workability and finishing qualities

- Can be stained or painted to represented any wood type

Cat. No.	Material	Dimensions (L x W x H)	Price
S12886	BALSA	0.09 x 3 x 36in.	38.82/Pack
S12887	BALSA	0.125 x 3 x 36in.	41.87/Pack
S12888	Basswood	0.19 x 0.37 x 24in.	16.24/Pack

Glider Catapult Kit

Helps prepare for high-flying competitions

- Includes contest-legal catapult kit constructed of basswood with rubber strip launch elastic

Cat. No.	Description	Price
S12889	Tech glider catapult kit	20.30/Each

Basic Inclined Plane

Designed specially for students.

For small-scale demonstrations.

- Measures vertical displacement, angular displacement and distance with built-in scales
- Heavy-gauge steel construction



ORDERING INFORMATION:
Length: 12.6 in. (32cm).

INCLUDES: Instructions and accessories

Cat. No.	Description	Price
S96183	Basic inclined plane	57.75/Each

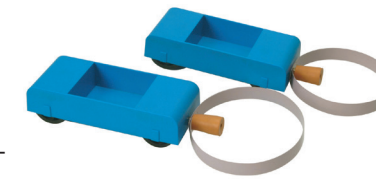
YOUR STEM PROGRAM:
MAKE IT AMAZING!
www.fisheredu.com/STEM: Your source for products, professional development, resources and everything STEM.

EISCO Hall's Car Pair

Essential items for dynamics experiments.

Use in conjunction with inclined plane, pulley and weights to study relationship between work and energy.

- Low-friction wheels
- Oil-free sleeve bearings — never needs adjustment
- Durable plastic molded body has deep well for weights and low profile



Cat. No.	Description	Price
S96317	Hall's Cars, Pair	18.25/Pair

EISCO Single and Tandem Pulleys

Single pulley plus double and triple tandem pulleys in durable nickel/steel frames.

- Plastic pulleys mounted on brass bearings and set in nickel/steel frames with hooks at the top and the bottom
- Single pulley measures 2 in. (5cm) Double tandem pulley block, measuring 5.75 in. (14.6cm), holds two plastic pulleys with successive diameters of 1.52 and 2 in. (3.8 and 5cm)
- Triple tandem pulley block, measuring 7.18 in. (18cm), holds three plastic pulleys with successive diameters of 1, 1.52 and 2 in. (2.5, 3.8 and 5cm)



Cat. No.	Description	Price
S96181	Single	9.45/Each
S98035	Double Tandem	12.25/Each
S98036	Triple Tandem	10.25/Each

EISCO Boxed Set of Prisms

Variety of shapes for different demonstrations.

- Set of six prisms
- Clear acrylic, all sides polished

ORDERING INFORMATION:
Set includes one rectangular, one semi-circle and one equilateral prism, plus one double convex and two double concave lenses.



Cat. No.	Description	Price
S96195	Boxed Set of Prisms	45.00/Each

EISCO Quantitative Spectroscope

A quantitative spectroscope for measuring wavelength and color of light.

- Diffraction grating with series of parallel slits 500 lines/mm separates white light into its spectrum
- Measures wavelengths from ~400 to 700nm
- Accuracy of ±5nm for precise measurement
- Versatile for measuring spectras emitted from gas tubes, flame tests and basic astronomy applications



Cat. No.	Description	Price
S07816	Quantitative Spectroscope	5.30/Each

Earth and Space

Celestron™ MicroDirect/1080p HDMI Handheld Digital Microscope

Streams in clear 1080p HD video via HDMI cable. PRO HD Digital Handheld Microscope connects directly to monitor, no computer needed.



- 3.5MP high speed CMOS 7.62mm (0.3 in.) sensor and 5 element IR cut glass lens configuration
- Larger individual pixel size is bigger 2um x 2um vs. 1.75um x 1.75um
- 30fps video recording capable
- Great for classrooms, lecture halls and labs
- Micro SD card slot for saving 3MP still images
- Includes adjustable stand
- Shutter on main body
- Windows compatible as option

Cat. No.	Description	Price
S35672	MicroDirect/1080p HDMI Handheld Digital Microscope	199.00/Each

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SCIENCE HAPPENS
Keep informed and check out the latest edition at www.fisheredu.com/headlinediscoveries.

Celestron™ NexStar Evolution Telescope

Control your telescope wirelessly via your smartphone and tablet.

- Compact, portable 6-, 8-, and 9.25 inch Schmidt-Cassegrain optical tube with StarBright XLT optical coatings and Faster compatibility
- Computerized GoTo mount with high-performance worm gears and motors for improved tracking accuracy, along with reduced gear backlash
- Rechargeable lithium-iron battery with enough power for 10 hours of continuous observing
- Improved industrial design with manual clutches and integrated carry handles, plus the added convenience of two accessory trays and a USB charge port for your smart device
- 4 auxiliary ports: 2 on top of the fork and 2 on the bottom
- A classic NexStar+ hand control is included, but is not necessary when using NexStar Evolution with the mobile app
- Includes a StarPointer finderscope, two 1.25 in. Plossl eyepieces, a 1.25 in. star diagonal, and an AC adapter



Cat. No.	Optical Tube	Aperture	Focal Length	Magnification	Focal Ratio	Price
S28076	6 in.	150mm	Eyeiece 1: 40mm; Eyeiece 2: 13mm	Eyeiece 1: 38x; Eyeiece 2: 115x	10	1200.00/Each
S28077	8 in.	203.2mm	Eyeiece 1: 40mm; Eyeiece 2: 13mm	Eyeiece 1: 51x; Eyeiece 2: 156x	10	1600.00/Each
S28078	9.25 in.	235mm	Eyeiece 1: 40mm; Eyeiece 2: 13mm	Eyeiece 1: 59x; Eyeiece 2: 180x	10	2100.00/Each

What to Expect When You're Expecting Asteroids

By Christina Phillis

You have a greater chance of winning the Powerball lottery than you have of being killed by an asteroid, according to Tulane University researchers. Nevertheless, scientists at the University of Southampton wanted to find out what would happen if a giant asteroid did hit Earth. Using a computer model to simulate 1.2 million asteroid impacts, they found that, regardless of asteroid size, wind and shock waves would be the most common cause of death, accounting for six out of every 10 fatalities.

A Recipe for Disaster

To create a computer model that could predict mortality rates for asteroid strikes, researchers started with maps of human populations. They then added data on the probable amount of energy a falling asteroid would release at a given location. Using existing casualty data from studies of extreme weather and nuclear blasts,

they estimated death rates at varying distances from the point of impact for asteroids between 50 and 1,300 feet in diameter. When they combined all of this data and added it to their computer model, the 1.2 million simulations fit into approximately 50,000 different scenarios for location, speed and strike angle.

Death á la Asteroid

Although the deadliest scenario would cause 117 million deaths, there is a silver lining to the findings — the majority of asteroid strikes would not cause any fatalities. No deaths were caused by sixty percent of asteroids smaller than 200 feet across. Asteroids smaller than 180 feet across would explode in Earth's atmosphere before making it to the surface, generating intense heat and creating high-speed winds in their wake.

Before this study was conducted, scientists were already evaluating different solutions for dealing with a potential asteroid strike, like hitting the asteroid with a high-speed spacecraft or destroying part of its surface with a nearby nuclear blast. Researchers hope that knowing what to expect when an asteroid strikes may one day help world leaders to decide how to react to such an unpredictable event.

[DISCUSSION QUESTIONS]

If there was an asteroid strike, how could a world leader use the information in this study to formulate a plan for dealing with it?

What other information would you need to know in order to make the best decision possible in this situation?

[VOCABULARY]

ASTEROID SIMULATION SHOCK WAVES

The Next Generation of Portable Balances

Portable balance operation has never been easier, faster, or more intuitive than the newly redesigned OHAUS Scout! The all-new Scout STX offers quick and efficient navigation via an intuitive color touchscreen display, while offering superior overload protection and multiple connectivity options for data logging and storage.

Model	Capacity (g)	Readability (g)	Cat. No.	Price
STX123	120	0.001	S14505	\$734
STX223	220	0.001	S14506	\$822
STX422	420	0.01	S14507	\$539
STX421	420	0.1	S14512	\$304
STX622	620	0.01	S14509	\$735
STX621	620	0.1	S14513	\$450
STX1202	1200	0.01	S14510	\$840
STX2202	2200	0.01	S14511	\$1134
STX2201	2200	0.1	S14514	\$474
STX6201	6200	0.1	S14515	\$762
STX8200	8200	1	S14516	\$394

Visit fisheredu.com/ohaus to learn more.

OHAUS™ Gold Series Pocket Scales

Perfect for weighing jewelry, coins and small parts and external calibration.

- Large backlit display
- External calibration
- Full-capacity tare range
- Automatic shutoff
- Stability indicator
- Low battery indicator
- Rugged plastic flip-top case
- Weighing platform: 2.50D x 2.63 in.W (6.4 x 6.7cm)
- Dimensions: 2.75L x 3.875W x 0.875 in.H (7.0 x 9.8 x 2.2cm)
- Net weight: 2.7 oz.

- One year warranty
- AS/NZS4251.1 Emission, AS/NZS4252.1 Immunity.
- CE certified

Cat. No.	Capacity	Model	Readability	Price
S93805	1.1 lb., 500g	YA501	0.1g	64.75/Each
S93806	0.66 lb., 300g	YA302	0.05g	90.00/Each
S93807	0.22 lb., 100g	YA102	0.01g	104.00/Each

OHAUS™ Scout™ SKX Portable Balances

- Superior overload protection and practical stackable design for convenient storage
- Improved functionality with bright backlit LCD and 4 button operation
- Multiple connectivity options available for data logging and communication
- Geared for classroom use with education specific software applications



Cat. No.	Model	Capacity (Metric)	Readability	Price
S14529[†]	SKX123	120g	0.001g	576.00/Each
S14530[†]	SKX222	220g	0.01g	416.00/Each
S14531[†]	SKX422	420g	0.01g	593.00/Each
S14532[†]	SKX622	620g	0.01g	696.00/Each
S14533[†]	SKX1202	1200g	0.01g	798.00/Each
S14534[†]	SKX2202	2200g	0.01g	695.00/Each
S14535[†]	SKX421	420g	0.1g	241.00/Each
S14536[†]	SKX621	620g	0.1g	337.00/Each
S14537	SKX2201	2200g	0.1g	430.00/Each
S14538[†]	SKX6201	6200g	0.1g	723.00/Each
S14539[†]	SKX8200	8200g	1g	353.00/Each

[†]With draft shield

[†]Without draft shield

OHAUS™ Compact Scales

Ideal for field and lab activities.

- Measure in grams or pounds/ounces from 200 to 5000g
- Large weighing surface with full-capacity tare
- Removable stainless-steel pan
- Easy-to-read LCD display
- Weighing units: g, lb.,oz. (S63462 does not have lb.,oz.)
- Zero range: to capacity by subtraction
- Stabilization time: three seconds
- Readabilities from 0.1 to 1g
- Calibration: digital calibration from keypad
- One-year warranty
- Auto shutoff: five minutes with no activity (battery operation only)
- Net weight: 1.0 lb. (0.47kg)



Cat. No.	Capacity	Model	Readability	Repeatability	Price
S63462	0.44 lb., 200g	CS-200	0.1g	±0.1g	127.00/Each
S402421	4.4 lb., 2000g	CS2000	1g	±1g	99.00/Each
S63464	11.02 lb., 5000g	CS-5000	2g	±1g	167.00/Each

OHAUS™ Triple Beam Balances

Accurate, rugged and dependable. OHAUS Triple Beam Balances have stainless-steel weighing pans and bearing covers which prevent rust and corrosion.

- Precision-cast poises and deep notches in beams for accurate values every time
- Precision-ground knife edges and self-aligning agate bearings for maximum sensitivity and reproducibility
- Accurate with quick response time
- Magnetic damping minimizes oscillation
- Heavy zinc base won't tip easily like cast aluminum

SPECIFICATIONS:

- Capacity: 610g (2610g with attachment weights)
- Readability: 0.1g
- Front Beam: 10 × 0.1g
- Middle Beam: 500 × 100g
- Rear Beam: 100 × 10g
- Vernier Dial (Dial-O-Gram™ Model only): 10 × 0.1g

- Pan size: 6 in. dia. (21.2cm)
- Dimensions: 18L × 12W × 9 in.H (45.7 × 30.5 × 22.3cm)

Dial-O-Gram model includes advanced features

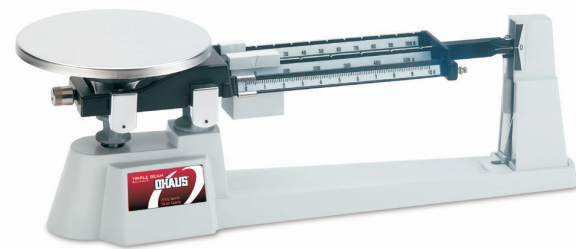
- Direct-reading vernier dial for faster weighing results
- Tare beam allows containers up to 225g to be balanced out

Poly Scoop and Counterweight

- Ideal for retaining all of the object being weighed
- Counterweight returns balance to zero when nothing but the scoop is on the platform

WARRANTY:

Five years



Cat. No.	Type	Calibration	Readability	Price
S40020	Triple beam mechanical balance	10 x 0.1g (front beam), 500 x 100g (middle beam), 100 x 10g (rear beam)	0.1g	110.00/Each
S40014	Triple beam mechanical balance	10 x 0.1g (front beam), 500 x 100g (middle beam), 100 x 10g (rear beam)	0.1g	253.00/Each
S40021	Triple beam mechanical balance	10 x 0.1g (front beam), 500 x 100g (middle beam), 100 x 10g (rear beam)	0.1g	245.00/Each
S400311	Triple beam Dial-O-Gram™ balance	500 x 100g (middle beam), 100 x 10g (rear beam), 10 x 0.1g (dial)	0.01g	329.00/Each
S400471	Triple beam Dial-O-Gram™ balance	500 x 100g (middle beam), 100 x 10g (rear beam), 10 x 0.1g (dial)	0.01g	379.00/Each
S40071	Dust cover	----	----	32.50/Each

OHAUS™ Triple Beam Mechanical Balance

Accuracy and convenience of a toploading balance.



- Rugged construction
- Integrated security bracket (cable sold separately)
- Three notched and tiered beams provide ease in reading
- Positive poise positioning ensures repeatable results
- Spring-loaded zero-adjust compensator
- Magnetic damping minimizes oscillation and speeds weighing
- Stainless-steel platform for easy cleaning
- Capacity: 21.5 oz. (610g); with accessory mass set (sold separately), 2610g
- Readability: 0.1g
- Front beam calibration: 10 × 0.1g
- Middle beam calibration: 500 × 100g
- Rear beam calibration: 100 × 10g
- Platform: 6 in. dia. (15.2cm)

ORDERING INFORMATION:

Optional accessories include metric attachment mass set (two 1000g and one 500g), security cable

WARRANTY:

Three years

Cat. No.	Description	Price
S93975	Triple Beam Mechanical Balance	125.00/Each

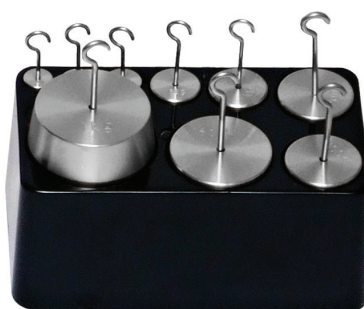
Troemner Hooked Stainless-Steel Weight Sets and Individual Weights

Weights can be hooked together at top and bottom.

The design of the hook weight allows the bottom hook to be recessed in the bottom so the hook weights can be set on a flat surface.

- Adjusted to tolerances specified by ANSI™/ASTM™ Class 7

Weight sets are supplied in an open plastic storage case



Cat. No.	Product Type	Weight (Metric)	Price
Sets			
S40300A	Metric hook weight Set	10g to 1kg	142.00/Each
S40210A	Newton hook weight set	10N, 5N, 1N, 0.5N, 0.1N, 2N, 0.2N	151.00/Each
Individual			
S40302A	Metric hook weight	10g	16.25/Each
S40303A	Metric hook weight	20g	10.00/Each
S40304A	Metric hook weight	50g	17.00/Each
S40305A	Metric hook weight	100g	18.25/Each
S40306A	Metric hook weight	200g	14.50/Each
S40307A	Metric hook weight	500g	33.75/Each
S40308A	Metric hook weight	1kg	64.00/Each

Fisher Scientific™ Hotplates and Stirring Hotplates

Experience precise stirring control with exceptional safety and temperature performance for your routine protocols.

Available with analog or digital (more precise) controls.



Description	Cat. No.	Price
Digital Hotplate, 4 x 4 in.	S43492	\$298.00
Digital Hotplate, 7 x 7 in.	S43496	\$305.00
Digital Stirring Hotplate, 4 x 4 in.	S43495	\$358.00
Digital Stirring Hotplate, 7 x 7 in.	S14365	\$458.54
Analog Hotplate, 4 x 4 in.	S50462CH	\$385.00
Analog Hotplate, 7 x 7 in.	S504631H	\$416.00
Analog Stirring Hotplate, 4 x 4 in.	S50466CSH	\$537.00
Analog Stirring Hotplate, 7 x 7 in.	S50467CNSH	\$537.00

Visit fishersci.com to learn more.

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Fisher Scientific™ Isotemp™ Hotplates

For routine protocols.

Advanced technology

- Strong magnetic coupling
- Temperature adjustable in 1 degree increments
- HOT TOP warning system designed to protect from accidental burns with prominent display when heating surface is above 50°C (122°F)
- Automatic over-temperature protection

Flexible, robust design

- Top plate choices in ceramic or aluminum
- Raised display design protects electronics from spills
- Optional temperature probe and splash guard protection shield
- Variable sizes for different sample volumes

INCLUDES:

- Stirring hotplates (S28663, S28665) include stir bar.

Cat. No.	Description	Price
S28662	Hotplate, 7.25 x 7.25 in.	311.00/Each
S28663	Stirring Hotplate, 7.25 x 7.25 in.	483.00/Each
S28664	Hotplate, 10.25 x 10.25 in.	520.00/Each
S28665	Stirring Hotplate, 10.25 x 10.25 in.	593.00/Each

Fisher Scientific™ Hotplates, Stirrers and Hotplate/Stirrers

Heat from 150° to 590°C (302° to 1094°F); reach maximum temperature in minutes.

Hotplate/Stirrers

- Reflective white ceramic top plate resists alkalis and acids and cleans easily; drip edge guards against spills
- Durable die-cast aluminum base
- Built-in ring stand holder
- Three-wire grounded cord
- HOT TOP indicator light alerts when top plate is too hot to touch For 120V 60Hz
- Variable analog speed control from 100 to 1200rpm — stir up to 0.52 gal. (2L) water
- Instant-on at 100rpm ensures smooth, safe, low-speed operation
- Come with support rod mount and PTFE-coated stir bar



Ceramic-Top Magnetic Stirrers

- Variable speed control from 100 to 1400rpm
- Instant-on feature ensures uniform low-speed stirring at 100rpm
- Quiet-running, direct-drive motor
- Reflective, porcelain-coated stainless-steel top surface with drip edge protects internal components from spillage
- Durable die-cast aluminum housing for durability and long life
- Supplied with three-wire grounded cord and plug and PTFE-coated stir bar
- For 120V 60Hz

COMPLIANCE:

CSA approved

Cat. No.	Dimensions (L x W x H)	Surface Area (English)	Price
Hotplates			
S50462CH	8.25 x 5.25 x 4.38 in. (21 x 13 x 11.1cm)	4 x 4 in.	385.00/Each
S504631H	11.5 x 8.5 x 4.5 in. (29.2 x 21.2 x 11cm)	7 x 7 in.	416.00/Each
Hotplates/Stirrers			
S50466CSH	8.25 x 5.25 x 4.38 in. (20.9 x 13 x 11.12cm)	4 x 4 in.	537.00/Each
S50467CNSH	11.5 x 8.5 x 4.5 in. (29.21 x 21.59 x 11.43cm)	7 x 7 in.	537.00/Each
Stirrers			
S504503AS	8.5 x 5.25 x 4.38 in. (21.6 x 13.3 x 11.1cm)	4 x 4 in.	316.00/Each
S504501AS	11.5 x 8.5 x 4.5 in. (29.2 x 21.6 x 11.4cm)	7 x 7 in.	366.00/Each



Thermo Scientific™ Cimarec+™ Hotplates and Stirring Hotplates Series

Get precise stirring control, exceptional safety and temperature performance for your routine protocols.

Our new Thermo Scientific™ Cimarec+ hotplate series offers precise stirring control, exceptional safety and temperature performance for your routine protocols. The Cimarec+ Series are available in three sizes, providing flexibility from microscale chemistries to production operations.

Advanced technology

- Stir-Trac features innovative engineering for slow-speed stirring, consistent speed control, and strong magnetic coupling
- Temperature adjustable in 1 degree increments
- Hot Top warning system protects from accidental burns with prominent display when heating surface is above 50°C (122°F)

Flexible, robust design

- Top plate choices in ceramic or aluminum
- Easy-to-read LED display for heating and stirring except for 4x4 has heating display only
- Raised display design protects electronics from spills
- Optional temperature probe and splash guard protection shield
- Variable sizes for different sample volumes



Cat. No.	Description	Size	Price
S28874	Ceramic Hotplate	4.25 in.	259.00/Each
S28875	Ceramic Stirring Hotplate	4.25 in.	398.00/Each
S28876	Aluminum Hotplate	7.25 in.	364.00/Each
S28877	Aluminum Stirring Hotplate	7.25 in.	467.00/Each
S28432	Ceramic Hotplate	7.25	281.00/Each
S28433	Ceramic Stirring Hotplate	7.25	491.00/Each
S28878	Ceramic Hotplate	10.25 in.	422.00/Each

Corning™ Hotplates with Digital Displays

Digital displays provide easy-to-read LED temperature.

Digital temperature display is adjustable in 5° increments and indicates when set temperature has been achieved. Microprocessor-controlled feedback technology maintains consistent repeatable temperature.

- Bright LED icons for POWER and HOT TOP light up when top plate is over 60°C (140°F)
- Separate temperature sensor provides power cutoff if unit overheats
- Small footprint and a low profile conserve lab space
- Fit comfortably inside hoods or storage cabinets
- Glass-ceramic Pyroceram™ top cleans easily and resists scratches, corrosion and chemicals
- Two-piece casing deflects spills away from internal components
- Built-in support-rod mount for temperature probe
- Heating range: 5° to 550°C (41° to 1022°F)
- Electrical requirements: 120V 60Hz



WARRANTY:
Two years

CERTIFICATIONS:
UL listed

Cat. No.	Description	Size	Price
5 x 7 in. Ceramic Top Plate			
S90870A	Hotplate	5 x 7 in.	327.00/Each
S90870B	Stirrer	5 x 7 in.	393.00/Each
S90870C	Hotplate/Stirrer	5 x 7 in.	572.00/Each
10 x 10 in. Ceramic Top Plate			
S90870D	Hotplate	10 x 10 in.	545.00/Each
S90870E	Stirrer	10 x 10 in.	621.00/Each
S90870F	Hotplate/Stirrer	10 x 10 in.	740.00/Each

Corning™ Scholar™ Hotplates and Stirrers

Rugged construction guarantees years of use in the classroom.

- Low 4 in. (10.2cm) profile
- Compact top plate, 5 x 5 in. (12.7 x 12.7cm)

Hotplate FEATURES:

- White enameled-steel top plate
- Heats from 25° to 360°C (77° to 672°F)
- Dual heat shields dissipate heat transfer and keep the case cool to the touch

WARRANTY:
One year

COMPLIANCE:
UL/CUL approved

Stirrer FEATURES:

- Plastic top plate
- Stirs from 100 to 1600rpm
- Alternating current motor provides vigorous stirring and longer instrument life



Cat. No.	Amperage	Price
S50441	2.1A	188.00/Each.
S63062	0.24A	228.00/Each.

fisherbrand Octagon Magnetic Stir Bars

Octagonal magnetic stirring bars with integral pivot ring are the most commonly used shape



- Alnico magnets encapsulated in FDA Grade, USP Class VI Teflon™ PTFE low friction coating
- Durable and inert
- Interrupted profile provides greater surface area and added turbulence when compared to the smooth surface of cylindrical bars
- Pivot ring aids in reducing friction and chattering (F37110-1218 does not have a pivot ring)
- Autoclavable
- Manufactured in a registered ISO 9001:2008 facility, as verified by SGS certification

Cat. No.	Length (English)	Length (Metric)	Price
S68072	0.5 in.	12.7mm	4.90/Each
S68073	0.63 in.	1.6mm	4.85/Each
S68069	1 in.	25.4mm	5.25/Each
S68070	1.5 in.	38mm	5.80/Each
S68071	2 in.	50.8mm	10.25/Each

Don't Let Your Stirbars Disappear Down the Drain

Spinbar™ Magnetic Stirring Bar Sink Strainers

- Four strong magnets attract and hold stir bars
- Legs prevent strainer from being dislodged by flowing liquid
- Slits allow fluids to drain rapidly
- Flexible and chemical-resistant



Video: Watch it work!

Catalog Number	Color	Each
S04610	Blue	\$39.00
S04611	Green	\$39.00



Visit fisheredu.com to learn more.

Magnetic Spinbar Retrievers

Reach down drains for lost bars.

- 0.38 in. (9.5mm) dia. polyethylene pick-up rod
- With powerful Alnico magnet sealed in one end
- Handy hang-up grip on other end



Cat. No.	Length (English)	Length (Metric)	Price
S5039812	12 in.	30.48cm	16.00/Each
S5039818	18 in.	45.7cm	24.00/Each

KIMAX™ Beaker Sets

Commonly used sizes of borosilicate glass beakers.



- Starter pack beaker set from 14000 Low Form Griffin series
- Double capacity scale beakers
- Made of durable KIMAX borosilicate glass
- Enamel graduations and marking spot

Cat. No.	Capacity (Metric)	Price
S30731	1 each of: 50, 100, 250, 600, 1000mL	37.75/Case
S30731A	1 each of: 250, 400, 600, 1000mL	60.25/Case

Beaker Set

Ideal for laboratory use.



- Glass
- One each of 50, 125, 250, 600 and 1000mL

Cat. No.	Description	Price
S04405	5 pc Beaker Set	35.50/Pack

PYREX™ Beaker Set

Five popular sizes in one set.



- Convenient set provides the sizes you need without purchasing multiple packs
- Set contains one each of 50, 100, 250, 600 and 1000mL

Cat. No.	Description	Price
S63266	PYREX Beaker Set	40.00/Case

Bel-Art™ SP Scienceware™ Round Bubble Racks

For use in beakers or ice buckets.

- Hold 1.5mL tubes
- Discs are 1/4 in. thick (0.6cm)
- Circular hole pattern with either single or double ring depending on size
- Legs, 3/4 in. long (1.9cm)
- 8-place rack has 66mm diameter and 20-place rack has 95mm diameter



Cat. No.	Autoclavable	Price
S66814	Yes	18.00/Each

Dynalon™ Polypropylene Student Beaker Set

- Griffin-style design
- Permanent graduation scales
- Nest for easy storage

ORDERING INFORMATION:
Packaged in a polyethylene bag

INCLUDES:
One each of 50mL, 100mL, 250mL, 500mL, and 1000mL beakers



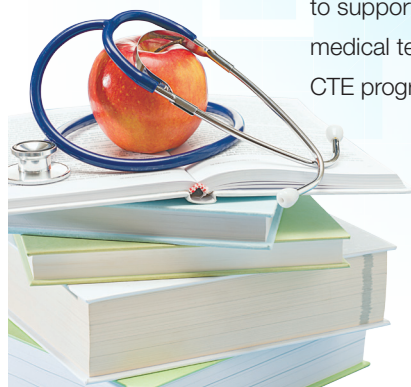
Cat. No.	Price
S30693	23.25/Pack

FISHER SCIENCE EDUCATION NURSING AND CTE EDUCATION PROGRAMS

Career and Technical Education (CTE) gives students a head start on a future career in a STEM field.

Fisher Science Education provides the tools educators need to get them ready.

Visit fisheredu.com/nursingcte for a full list of products available to support your nursing, medical technology and other CTE programs.



PYREX™ VISTA™ Griffin Beakers

Provide balance between thermal shock resistance and mechanical strength.

- Extra-large marking spot
- 250 through 1000mL beakers have a double-graduated metric scale to indicate approximate content (10mL size is not graduated)

COMPLIANCE:
Designed to ASTM™ E-960.



Cat. No.	Capacity (Metric)	Price
S76100A	10mL	44.75/Pack
S76100B	20mL	38.50/Pack
S76100C	30mL	38.50/Pack
S76100D	50mL	40.50/Pack
S76100E	100mL	42.75/Pack
S76100F	150mL	40.50/Pack
S76100G	250mL	39.00/Pack
S76100H	400mL	46.50/Pack
S76100J	600mL	29.25/Pack
S76100K	1000mL	54.50/Pack

Climate Change Is Heating up Our Lakes

By Ralph Birch

For nearly a decade, a meteorological station at the Stannard Rock Lighthouse on Michigan's Keweenaw Peninsula has been measuring evaporation rates at Lake Superior. While weather patterns can shift significantly from one year to the next, Lake Superior is showing signs indicative of long-term climate change.

Water temperatures and evaporation rates in Lake Superior are on the rise, which results in lower water levels during some seasons. This has a negative effect in a number of areas, including hydropower plants, navigation and fishing.

Typical discussions of this topic might focus on glacial melt or flooding, but the data being collected at Stannard Rock has shed light on the importance of lakes in the study of climate change. The physical, chemical and biological

changes that take place in lakes year after year have brought them to the forefront of climate change research.

On a global scale, the numbers indicate that lake temperatures are on the rise, but the ecological consequences from around the world differ from those in the U.S. Lake Tanganyika in eastern Africa is warming at a slow rate, but its fish populations are dwindling quickly and leaving people without a vital food source.

Getting Warmer (and Colder)

Lakes and ponds make up approximately four percent of the Earth's surface not already covered by glaciers. While this may seem like a small percentage, the world's more than 100 million lakes are responsible for cycling carbon between the surface of the water

and the atmosphere, giving off heat-trapping gases like carbon dioxide and methane and storing carbon amongst layers of muck in the lake bottom.

A 2015 study found that the average warming rate of the 235 lakes where scientists collected data was 0.34°C per decade between 1985 and 2009. Some lakes warmed at a much more rapid rate, while others bucked the warming trend and actually cooled over the same period of time. The lakes with similar warming rates were scattered across the globe at different latitudes and elevations and the changes in temperature varied greatly based on size and depth. Scientists couldn't even pinpoint a clear warming trend among lakes in the same geographic location.

"Even though lakes are experiencing the same weather, they are responding in different ways," says

Stephanie Hampton, an aquatic biologist at Washington State University.

While lakes are undoubtedly an important piece of the climate change puzzle, researchers are collecting more data in hopes of reaching more definitive conclusions.

[DISCUSSION QUESTIONS]

Aside from lakes and oceans, what are some other bodies of water that would be useful for the study of climate change?

Can you think of more water-based activities that would be affected by rising temperatures and increased evaporation rates?

[VOCABULARY]

- EVAPORATION
- HYDROPOWER
- LATITUDE



Economical Carboys

Compare pricing and save on heavy-duty carboys!

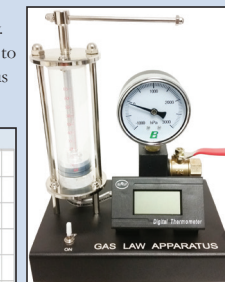
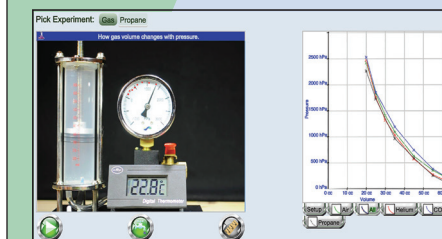
Easy on your budget!

- Easy to fill or empty
- Wide offset neck opening, easy-grip handle
- Removable leakproof spigot with tubing adapter
- Molded graduations
- Tolerates a variety of lab chemicals
- Autoclavable polypropylene

Description	Cat. No.	Price
Bottle, 5L	S01989C	\$44.25
Bottle, 10L	S01989D	\$73.25
Bottle, 20L	S01989E	\$92.00
Carboy with Spigot, 5L	S01989	\$71.00
Carboy with Spigot, 10L	S01989A	\$99.00
Carboy with Spigot, 20L	S01989B	\$119.00

Get the most out of STEM education with Hybrid Labs!

- Hybrid Labs combine guided, virtual labs with hands-on experimentation.
- Hands-on labs provide important tactile feedback that really helps students develop a deep understanding of concepts that can seem abstract at first.
- Virtual labs use real-world video and precise measurements to observe concepts at just the right speed for your students to absorb new information.
- Virtual labs come with pre-tests to assess initial knowledge and post-tests to assure subject mastery.
- Each hybrid lab comes with access for 15 students to three different experiments and a physical apparatus corresponding to one of the labs.



SKU	Description	Price
S13575	Gas Law Apparatus & Virtual Labs	\$243.00
S09586	Gas Law Apparatus	\$98.00



Check out our tutorial on YouTube by following the link below!

<http://vurl.com/2v24j>

PYREX™ VISTA™ Educational-Grade Cylinders

Calibrated "To Contain."

- Two-piece construction
- Single metric scale
- Detachable plastic base absorbs impact and reduces breakage
- Durable blue-enamel graduations
- Plastic bumper guards supplied on 25 through 100mL sizes; 10mL size has funnel top
- Tolerance $\pm 5\%$ of total capacity at any volume



Cat. No.	Capacity (Metric)	Subdivision	Height (English)	Height (Metric)	Price
S95186	10mL	0.1mL	6.2 in.	160mm	105.00/Case
S95186A	25mL	0.2mL	7.4 in.	188mm	97.00/Case
S95186B	50mL	1mL	8.5 in.	218mm	110.00/Case
S95186C	100mL	1mL	9.7 in.	248mm	121.00/Case

EISCO Polypropylene Cylinders

Base provides good stability.

- Made of polypropylene
- Single piece, autoclavable, graduated
- Good contact clarity



Cat. No.	Capacity (Metric)	Quantity	Price
S95171A	10mL	24/Pack	28.75/Pack
S95172A	25mL	12/Pack	20.50/Pack
S95173A	50mL	12/Pack	26.75/Pack
S95174A	100mL	12/Pack	30.75/Pack
S95175A	250mL	6/Pack	26.00/Pack
S95176A	500mL	4/Pack	21.75/Pack
S95177A	1000mL	3/Pack	29.25/Pack
S95178A	2000mL	2/Pack	33.00/Pack
S95179A	10 to 2000mL	8/Set	33.75/Pack

Plastic Graduated Cylinder Set

A convenient classroom set of seven graduated polypropylene cylinders in sizes 10, 25, 50, 100, 250, 500 and 1000mL.

- Shipping weight: 1.75 lb. (0.7kg)
- Dimensions: 15.5 x 10 x 4 in. (39.37 x 25.4 x 10.16cm)



Cat. No.	Description	Price
S01973	Plastic Graduated Cylinders Set	31.25/Pack

Long-Stem Funnel

For use with tall flasks or containers.

- Made from heavy-duty polypropylene
- Smooth walls
- 60° cone angle and long stem
- External ribs prevent airlock
- Steam autoclavable at 121°C (250°F)
- Stem length: 3.06 in. (78mm)
- Top I.D.: 2.7 in. (70mm)



ORDERING INFORMATION:
Sold in packs of six.

Cat. No.	Description	Price
S345101	Long-Stem Funnels, Pack of 6	28.00/Pack

ValueWare™ Narrow-Mouth Erlenmeyer Flasks

Economical and versatile; ideal for general laboratory usage.

- Kimax™ KG-33 glass Reinforced tops tooled with a rounded finish — contain more glass for maximum mechanical strength
- Thick-walled body has long tapered outside contour to minimize chipping when struck or rubbed together
- Durable white ceramic enamel scales indicate approximate volumes at various levels — useful for measuring and mixing solutions where a high degree of accuracy is not necessary



COMPLIANCE:

Glass meets Type 1, Class A, ASTM™ E-438 standards. Designed to ASTM Specification E1404, Type I, Class 1 specification requirements.

Cat. No.	Capacity (Metric)	Price
S00140	25mL	50.75/Pack
S00141	50mL	63.25/Pack
S00143	125mL	62.50/Pack
S00144	250mL	60.25/Pack
S00145	500mL	40.00/Pack
S00146	1000mL	61.75/Pack
S00147	2000mL	99.00/Pack

EISCO Beaker Brushes

With 15.75 in. (40cm) wooden handle.



- Choice of bristle or nylon
- Dimensions: 2.6 x 1.8 x 5.9 in. (65 x 45 x 150mm)

Cat. No.	Bristle Material	Price
S95942	Nylon	15.25/Each
S95943	Bristle	13.75/Each

EISCO Acrylic Buret

Transparent acrylic body and leakproof PTFE plunger stopcock.

- Acrylic body is unaffected by dilute minerals, acids and bases except hydrofluoric acid and ammonium hydroxide
- Capacity: 50mL
- Subdivisions: 0.10mL
- Tolerance: ± 0.10 mL



Cat. No.	Description	Price
S95180A	EISCO Acrylic Buret	18.75/Each

EISCO Borosilicate Burette, Straight Bore, PTFE Stopcock, 50mL, Class A, Blue Graduation

Borosilicate burettes are straight bore with interchangeable PTFE key stopcocks.

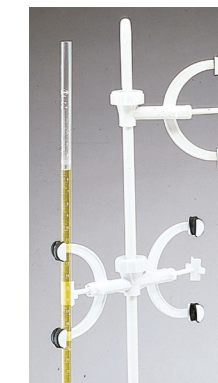


Cat. No.	Description	Price
S27992	50mL Capacity Burette	30.75/Each

Polypropylene Buret Clamps

Noncorrosive clamp provides a steady grip without obscuring graduations.

- Burets are easily inserted
- Concealed steel spring and rubber pads prevent slipping
- Center clamp tightens to a standard support rod
- Autoclavable



INCLUDES:

12.5 and 9.5mm bushings

Cat. No.	Product Type	Price
S49141	Single Buret Clamp	18.00/Each
S49142	Double Buret Clamp	27.00/Each

EISCO Double Buret Clamp

Suited to hold two burettes up to 100mL.

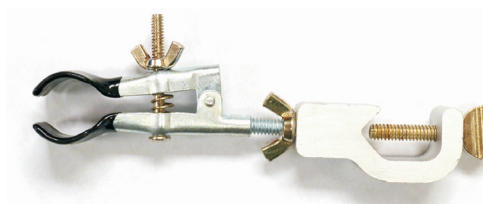
- Metal construction for high strength
- With jaws and rubber projected tips



Cat. No.	Description	Price
S07858	Double buret clamp	13.75/Each

EISCO Round Jaw Burette Clamp

For holding any burette during titration experiments.



- Round clamps with PVC dipped steel jaws which open from 15 to 45mm
- Attaches to rods up to 13mm in diameter
- Clamp angle and overall length from 13 to 15cm adjusted by threaded rod and wing nut

Cat. No.	Description	Price
S07860	Round jaw burette clamp	5.80/Each

fisherbrand Polymethylpentene Graduated Clear Cylinders

Easy-to-read transparent cylinders with large molded-in graduations.

- Withstand autoclaving temperatures of up to 175°C
- All-plastic construction eliminates liquid meniscus for easier and more accurate readings
- Octagonal bases improve stability



Cat. No.	Capacity (Metric)	Price
S32810A	10mL	20.00/Each
S32811A	25mL	24.00/Each
S32812A	50mL	24.00/Each
S32813A	100mL	29.00/Each
S32814A	250mL	36.50/Each
S32815A	500mL	47.25/Each
S32816A	1000mL	65.50/Each



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MAKING SCIENCE MATTER

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Industrial Grade Clamps

Features:

- Zinc die cast construction made from Zamac 3 Alloy + Aluminum Alloy
- Connecting rods stainless steel
- Complete non ferrous construction
- High grade non toxic powdered coating

Benefit

- Won't rust and will last for years
- Can be used in tough scientific environments
- High strength, supports heavy loads



S02630

EISCO Bunsen Burners with Flame Stabilizer and Gas Adjustment

Allows both air to fuel ratio adjustments and throttle control via gas adjustment needle valve.

- Flexible and premium option for standard Bunsen burner
- Flame stabilizer comes standard
- Carry hot burner with ease and safety using finger handle
- Expanded base prevents easy tipping, even with hoses connected
- Spaced feet so burner fits comfortably under stands
- 16.5cm (6in) tall



Cat. No.	Product Type	Price
S12809	Natural gas bunsen burner	25.75/Each
S12810	Liquid Propane bunsen burner	25.75/Each

Butane Micro Burner



This small butane burner uses clean burning butane and features a trigger ignition, eliminating the need for wicks, matches or a central gas line.

- Stable, tip-resistant design and easy-grip handle make the burner safe and portable
- Flame height is fully adjustable
- Maximum temperature of approximately 1300°C (2372°F)
- Two-hour fuel capacity
- Compatible with standard butane cartridges

Cat. No.	Description	Price
S65148	Butane Micro Burner	66.25/Each
S64968	Butane Fuel Refill; 3.38 oz. Can	7.00/Each

EISCO Basic Bunsen Burners

Prevents easy tipping, even with hoses connected.

- Spaced feet so burner fits comfortably under stands
- Carry hot burner with ease and safety using finger handle
- Without flame stabilizer or throttle control, but have air flow adjustment sleeve
- 15.2cm (6 in.) tall



Cat. No.	Product Type	Price
S12805	Natural gas bunsen burner	18.25/Each
S12806	Liquid Propane bunsen burner	18.50/Each

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A HEAD START ON STEM CAREERS

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Unraveling an Incan Language Tied Up in Knots

By Moira Bell

If you've ever been tongue tied, you know how difficult it is to find the right words. Now imagine trying to communicate through a variety of twists and knots. That may be one of the ways that the Incas communicated, according to Sabine Hyland, St. Andrews University, Scotland. Hyland arrived at that theory after examining two macramé textiles, or *kipu* (also spelled *quipu* and pronounced *kee-poo*) that were recently discovered in San Juan de Collata, Peru.

The word *kipu* comes from the Quechua language word for knot and is defined in a Harvard University database as a textile artifact composed of cords and cotton. Each *kipu* has a primary cord with 10 or 12 levels of additional

cords, called subsidiaries, attached to multiple pendant cords.

Researchers believe the Incas created *kipu* during their rebellion against the Spanish conquerors to ensure Incan secrecy and affirm their native culture. These recently discovered *kipu*, preserved by the village elders of San Juan de Collata, are believed to be sacred text about warfare.

Deciphering an Ancient Language

Before this discovery, scholars thought of *kipu* as memory aids or record-keeping devices, but Spanish witnesses long believed they contained historical narratives, biographies and epistles. In the

kipu from San Juan de Collata, Hyland was able to find 95 symbols, as well as family names, buried in the various twists and knots of animal hairs, cotton fibers and colors.

The *kipu* examined by Hyland were stored in a sacred wooden box with more than 100 manuscripts, and had been a well-guarded secret among village elders. San Juan de Collata is the only village in the Andes where colonial manuscripts and *kipu* are known to have been stored together.

Today, *kipu* are mostly kept as a historic legacy by Andean villagers. There are about 600 of these textiles found in museums and collections around the world. Some may be fakes as they deviate

from what is considered to be the standard. Now, those artifacts may need to be reexamined in light of her findings, said Hyland. No matter how the story unfolds, it seems that this ancient empire is not finished talking to us yet.

[DISCUSSION QUESTIONS]

Why is it important to examine the languages of ancient civilizations?

What can we learn about our own language using these artifacts?

[VOCABULARY]

MACRAMÉ

EPISTLES

ANTHROPOLOGIST

INCAS

Fisher Scientific™ Traceable™ Kangaroo™ Thermometer

Kangaroo “pouch” stores probe cable.

- Automatically captures and recalls minimum and maximum temperature readings over any time period
- High/low alarm is programmable in 1° increments
- Alarm sounds every minute until temperature returns to nonalarm conditions
- Hold button freezes display to record reading
- 0.75 in. digits (19mm) are readable from 20 ft. (9.6m)
- Range: -58° to +572°F/-50° to +300°C
- Accuracy: ±1°C between -30° to +250°C (-22° to 482°F) (otherwise ±2°C)
- Resolution: 0.1° between -19.9° and +199.9° (otherwise 1°)
- Dimensions: 2.5 x 4.75 x 0.5 in. (63 x 119 x 13mm)
- Probe dimensions: 0.14 dia. x 7.5 in. (4 x 188mm)

INCLUDES:

42 in. (105cm) probe cable stored in reel-compartment pouch, Built-in stand with bench footprint of 4.5 sq. in. (11.4cm), Silver-oxide battery with one year continuous use life

CERTIFICATIONS:

Traceable™ to NIST™ per ISO 17025 calibration lab; certificate included.

Cat. No.	Description	Price
S94109	Kangaroo Thermometer	36.00/Each



fisherbrand

Wireless Refrigerator/Freezer Digital Datalogger Thermometers

Revolutionizing temperature recording and monitoring

- Receive mobile/email/text notifications
- Alerts: temperature alarm, connectivity interruption, low battery
- Cloud-based data interface — no local software required; web, Android, Apple iOS data visibility

Probe	Cat. No.	Price
2 Bottles (patented)	S24970	\$250.00
1 Bottle/1 Bullet™	S24971	\$248.00
2 Bullets™	S24972	\$242.00
2 Stainless-steel	S24973	\$267.00

fisher scientific
part of Thermo Fisher Scientific

Fisher Science Education™ Laboratory Grade Spirit Thermometers

Economical solution for classroom laboratories.

- Choose from total or partial immersion
- Length: 30.5cm (12 in.)
- Permanently fused markings
- PFA coating (where available) helps prevent liquid and glass contamination if thermometer is broken
- Thermometers should be stored at a 15° angle minimum

ORDERING INFORMATION:

Individually packaged.



Cat. No.	Temperature Range (English)	Temperature Range (Metric)	Price
Laboratory Grade Spirit, Total Immersion			
S02003A	-4° to +230°F	-20° to +110°C	11.00/Each
S02003C	-4° to +302°F	-20° to +150°C	3.95/Each
S02003D	14° to 392°F	-10° to +200°C	15.75/Each
S02003F	-4° to +230°F	-20° to +110°C	3.70/Each
S02003H	0° to +300°F	-20° to +150°C	15.00/Each
Laboratory Grade Spirit, Partial Immersion			
S02003B	-4° to +302°F	-20° to +150°C	3.95/Each
S02003M	-4° to +230°F	-20° to +110°C	4.05/Each
S02003E	Not Applicable	-10° to +200°C	17.00/Each
S02003G	-4° to +230°F	-20° to +110°C	3.80/Each
S02003K	-4° to +302°F	-20° to +150°C	15.00/Each
Laboratory Grade, Red Spirit, Partial Immersion			
S01963B	-4° to +302°F	-20° to +150°C	4.05/Each
S01963M	-4° to +230°F	-20° to +110°C	4.05/Each
S01963T	14° to 230°F	-10° to +110°C	4.00/Each
Laboratory Grade Spirit, PFA Coated, Partial Immersion			
S01963P	-4° to +302°F	-20° to +150°C	11.00/Each
S01963R	-4° to 230°F	-20° to +110°C	11.00/Each
S01963D	14° to 392°F	-10° to +200°C	15.75/Each
Laboratory Grade Spirit, PFA Coated, Total Immersion			
S01963A	-4° to +230°F	-20° to +110°C	4.05/Each
S01963C	-4° to +230°F	-20° to +150°C	3.95/Each
S01963E	14° to 392°F	-10° to +200°C	15.75/Each
S01963G	14° to 230°F	-10° to +110°C	3.80/Each
S01963H	-4° to +302°F	-20° to +150°C	3.70/Each
S01963K	-4° to +302°F	-20° to +150°C	5.00/Each

MyChron™ Individual Student Timers

Enrich classroom activities in science, reading, mathematics, assessment, physical education and more.

- Handy size for student use
- Easy-to-use, three-key operation
- Easy-to-read display shows hours, minutes, seconds and hundredths of seconds
- Automatic shutoff when not in use



INCLUDES:

Lanyard, built-in stand, belt-clip, magnet, clear storage box

Cat. No.	Quantity	Price
S65329	6/Pack	43.00/Each
S65330	12/Pack	80.00/Each

General Purpose Liquid-in-Glass Partial Immersion Thermometer, Economical Grade

Red organic liquid with white back glass

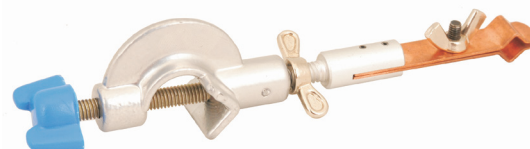


- Non-mercury, organic liquid fill
- Partial immersion of 76mm
- Range: -20/+110°C
- Division: 1°C
- Accuracy: +/-1.5°C, 2°C above 100°C
- Length: 30cm (11.81 in.)

Applications: Chemical laboratories, Universities, Scientific institutions, Food and beverage processing, Petrochemical laboratories, Pharmaceutical industry, Medical industry, manufacturers, Dairies, Breweries, Distilleries

Cat. No.	Description	Price
S05008	Liquid-in-Glass Partial Immersion Thermometer	5.50/Each

EISCO Thermometer Clamp with Boss Head



Cat. No.	Description	Price
S14088	Thermometer Clamp	4.50/Each

Fisher Scientific™ Traceable™ LCD Timer with Nano Counter

Displays countdown alarm time/stopwatch (count-up) time and time of day. Fisher Scientific™ Traceable™ LCD Timer with Nano Counter includes memory feature for repetitive use, large, easy-to-read digits, clip, stand and magnet on back.

- Two timing channels, each with 23 hours, 59 minutes, 59 seconds capacity
- Clock works on AM/PM or 24-hour format
- 60-second loud alarm
- Memory feature for repetitive use
- Large, easy-to-read digits
- Clip, stand and magnet on back



ORDERING INFORMATION:

Dimensions: 2.5L x 2W x 0.88 in. H (6.4 x 5.1 x 2.2cm).

INCLUDES:

Two Year battery, clip, stand, magnet on back

Cat. No.	Description	Price
S90203	LCD Timer w/Nano Counter	15.00/Each

Fisher Scientific™ 100-min. Count Down/Up Timer

Single-channel timer with a timing capacity of 99 minutes and 59 seconds

- Features extra-large keys, extra-large digits, and alarm
- Three-key operation makes this timer incredibly easy to learn and use
- Timer counts down from 99 minutes, 59 seconds in second increments
- 19mm digits are readable from 6m
- Alarm sounds for 30 seconds and then silences automatically
- Supplied with magnet, flip-open stand, clip, and battery



Cat. No.	Description	Price
S01614	100-min. Count Down/Up	15.00/Each

Stainless Steel Laboratory Crucibles

Withstands temperatures from -180°C to +800°C.

- Unibody construction from Type 304 stainless steel
- Includes cover
- Available in 15, 20, 25, 30, 50 and 100mL capacities



Cat. No.	Capacity	Diameter (Metric)	Height (Metric)	Price
S13085	15mL (0.5 oz.)	32mm	34mm	9.80/Each
S13086	20mL (0.6 oz.)	33mm	34mm	8.50/Each
S13087	25mL (0.8 oz.)	36mm	34mm	11.00/Each
S13088	30mL (1.01 oz.)	39mm	38mm	11.50/Each
S13089	50mL (1.6 oz.)	46mm	48mm	14.50/Each
S13090	100mL (3.3 oz.)	57mm	55mm	17.50/Each

Dynalon™ Sterile Disposable Inoculating Loops

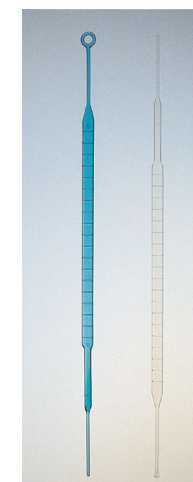
No more twisted wires.

These sterile, plastic and affordable inoculating loops eliminate the problem of twisted, tangled loops and wires.

- Blue loops are 10 in.L and have a plastic needle on one end
- For single use only

ORDERING INFORMATION:

Sold in packs of 20.

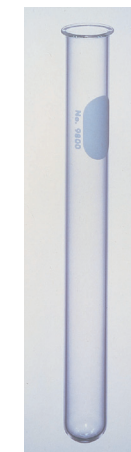


Cat. No.	Description	Price
S17356A	0.5mm	5.55/Pack

PYREX™ Test Tubes

Beaded rim for durability.

- Made from special tubing to provide optimum wall thickness
- Beaded rims are fire-polished
- All tubes have enamel marking spots except the 0.98 in. (25mm) size



Cat. No.	Capacity (Metric)	Diameter (Metric) Outer	Length (Metric)	Price
S63285	3mL	10mm	75mm	33.75/Pack
S63286	5mL	12mm	75mm	33.75/Pack
S63287	9mL	13mm	100mm	46.25/Pack
S63288	14mL	15mm	125mm	59.75/Pack
S63289	20mL	16mm	150mm	63.00/Pack
S63290	27mL	18mm	150mm	76.00/Pack
S63291	34mL	20mm	150mm	84.66/Pack
S63292	55mL	25mm	150mm	137.00/Pack

EISCO In-Line Test Tube Rack

Keeps your test tubes handy and secure.

- Six openings for 1 in. (25mm) test tubes
- Top plate supported by two columns
- Autoclavable
- Blue polypropylene

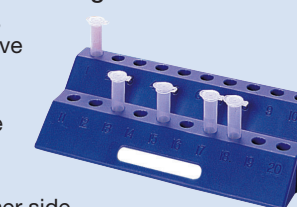


Cat. No.	Description	Price
S95921	In-Line Test Tube Rack	10.75/Each

fisherbrand 20-Well Tube Rack

Interlock racks for customized storage.

- User-friendly design makes it easy to identify and remove microtubes
- Constructed of durable, autoclavable polypropylene
- Interlock multiple racks to increase tube storage
- Racks lock together on either side
- Easily remove tubes using the "hold-it" finger slot on the front of the rack
- Large molded coordinates for easy tube identification
- Bi-level rack enables easy tube label identification



Cat. No.	Description	Price
S43127	213 x 90 x 50mm; Blue	16.00/Each

fisherbrand Locking-Lid Microcentrifuge Tubes with Polypropylene Snap-Cap™

Convenient, pierceable locking lids snap into place with one-handed operation.



- Polypropylene tubes with flat tops
- Ideal for sample-handling applications, including centrifugation, boiling and freezing of specimens, incubation and storage
- With graduation marks for volume estimation

NOTE: Centrifuges that develop excessive heat may damage these tubes.

Cat. No.	Capacity (Metric)	Color	Max. Force	Price
S06500	0.6mL	Blue	30000xG	90.75/Pack
S06501	0.6mL	Green	30000xG	90.75/Pack
S06498	0.6mL	Natural	30000xG	90.75/Pack
S06503	0.6mL	Orange	30000xG	90.75/Pack
S06499	0.6mL	Red	30000xG	90.75/Pack
S06504	0.6mL	Violet	30000xG	90.75/Pack
S06502	0.6mL	Yellow	30000xG	90.75/Pack
S06506	1.5mL	Blue	26000xG	47.25/Pack
S06507	1.5mL	Green	26000xG	47.25/Pack
S06511	1.5mL	Orange	26000xG	47.25/Pack
S06510	1.5mL	Red	26000xG	47.25/Pack
S06512	1.5mL	Violet	26000xG	47.25/Pack
S06513	1.5mL	Assorted	26000xG	47.25/Pack
S06516	2mL	Blue	25000xG	58.50/Pack
S06517	2mL	Green	25000xG	58.50/Pack
S06514	2mL	Natural	25000xG	58.50/Pack
S06519	2mL	Orange	25000xG	58.50/Pack
S06515	2mL	Red	25000xG	58.50/Pack
S06520	2mL	Violet	25000xG	58.50/Pack
S06518	2mL	Yellow	25000xG	58.50/Pack

Thermo Scientific™ Life Science Analyzer: BioMate™ 3S Spectrophotometer, Six-position cell holder

With stray light and noise specifications comparable to instruments two or three times the price, the new, compact Thermo Scientific™ BioMate™ 3S saves you valuable bench space. The BioMate 3S offers pre-programmed assay methods for nucleic acid and protein concentration as well as cell culture measurements.

The BioMate 3S is a highly configurable instrument, adaptable to the needs of the lab. A variety of accessories adds convenience and provides Peltier temperature control, automation, and fiber optic sampling.



Cat. No.	Description	Price
3-728-3	BioMate 3S Spectrophotometer (only)	5570.00/Each
3-728-4	BioMate 3S Spectrophotometer with Printer	6100.00/Each

Student-friendly Spectrophotometer

The Thermo Scientific™ SPECTRONIC™ 200 Visible Spectrophotometer brings new possibilities to student education:

- Trusted live display supports current experiments
- Full spectrum scan mode finds peaks in seconds
- Removable sample compartment for easy clean-up
- Measure in square or test tube cuvettes

Request a free trial unit for your classroom at thermofisher.com/spec200free



Cat. No.	Price
S06240	\$1,490

thermo scientific

Thermo Scientific™ GENESYS™ 10S UV-Vis Spectrophotometer

Thermo Scientific™ GENESYS™ 10S UV-Vis spectrophotometer utilizes a high-intensity xenon lamp and dual-beam optical geometry to deliver unsurpassed data quality. Firing pulses of light only when the instrument is taking a measurement, the xenon lamp provides strong illumination from the UV to the near-IR region of the spectrum. Whether your application is research or routine analysis, educational or industrial, you can count on the GENESYS 10S for accurate and reliable results. The GENESYS 10S spectrophotometer series offer an excellent value providing high-performance, reliability, ease-of-use and a low cost of ownership.



Cat. No.	Description	Price
S37281	10S UV-Vis Spectrophotometer (only)	4750.00/Each
S37282	10S UV-Vis Spectrophotometer with Printer	5110.00/Each

Thermo Scientific™ Disposable Transfer Pipets

Chemically inert, polyethylene pipets.

- Unbreakable, one-piece plastic pipets
- One squeeze draws 1.5 to 3.5mL (depending on style used)
- Deliver repeatable drop sizes
- Can be sealed and used to store small amounts
- Length: 5.9 in. (15cm)
- Pack of 500



Cat. No.	Capacity (Metric)	Type	Price
S304671	5mL	Standard	16.50/Pack
S304672	4.25mL	Thin Stem	24.00/Pack
S304673	7mL	Jumbo Bulb	22.00/Pack
S304674	2mL	Graduated	41.75/Pack

fisherbrand Disposable Soda Lime Glass Pipets

Ideal for transferring samples to sample cups and for drop counting.

- Carton top folds back — tilts carton into convenient dispensing position
- Tip openings range from 0.80 to 1.20mm
- Top and tip free of sharp edges
- Can be cotton plugged (plugs not included)
- Aspirator Plug

Cat. No.	Length (English)	Length (Metric)	Price
S67050	5.75 in.	14.6cm	20.00/Pack
S67051	9 in.	15.24cm	26.00/Pack

Fast Release Pipette Pump™ III Pipet

Easy to use for a longer period of time.

Ergonomic design enhances comfort, utility and dispensing precision while helping to reduce the risk of injury from repetitive and awkward pipetting motions.



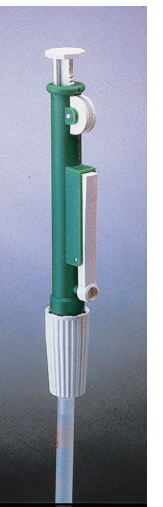
- Lightweight, one-handed operation minimizes strain on the hand and wrist
- Fast release trigger dispenses the entire pipette contents
- Optimally located thumb wheel easily rotates for precision aspirating or dispensing, down to a volume of one drop at a time — all while using a relaxed grip
- Compact design adds only 15.2cm (6 in.) to the pipette length allowing use in fume hoods and controlled environment glove boxes
- Self-stabilizing collar inside the silicone chuck holds either glass or plastic pipettes
- Resistant to acids, alkalis and most solvents; can be disassembled for cleaning
- Overall length: 17.1cm (6.75 in.)

Cat. No.	Color	For Use With (Equipment)	Price
S90142A	Blue	2mL	28.00/Each
S90142B	Green	10mL	28.00/Each
S90142C	Red	25mL	38.00/Each

Bel-Art™ SP Scienceware™ Fast-Release Pipette Pump™ Pipetters

Pipetting device with rapid release

- Provides easy, precise pipetting
- Rotating the knurled thumbwheel draws up or dispenses liquid
- Rapid-release lever provides zip-quick emptying
- Easy to take apart for cleaning
- Sizes are color coded



Cat. No.	Color	For Use With (Equipment)	Price
S32282F	Green	10mL	37.00/Each

BIOTECHNOLOGY:
ITS FULL OF LIFE

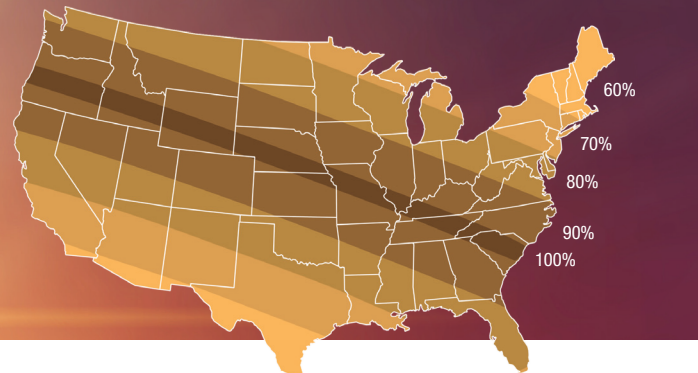
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YOUR STEM PROGRAM:
MAKE IT AMAZING!

www.fisheredu.com/STEM: Your source for products, professional development, resources and everything STEM.

Total Solar Eclipse

By Robert Marshall, Fisher Science Education



Historic In Our Lifetime

If you follow celestial events, you have probably already marked August 21, 2017 on your calendar. That's the day a total solar eclipse will cast a 70-mile-wide shadow across a number of areas in the United States.

The eclipse will first be visible near the coast of Oregon at about 10:15 a.m. PT before the visibility range moves to the southeast through Salem, Idaho Falls, Kansas City, St. Louis and Nashville before finishing its route near Charleston, South Carolina around 2:45 p.m. ET.

Anyone in the direct path of the Moon's shadow will experience a

once-in-a-lifetime total eclipse of the Sun, and people throughout the continental United States as well as parts of Canada and Mexico will be able to see a partial eclipse.

What's Going to Happen?

As the Sun, Moon and Earth come into alignment, a lunar shadow will be cast onto the Earth's surface. When the Moon first comes between the Earth and the Sun, the solar disk will appear as if someone took a bite out of it. As the transit continues, the sky will become darker and darker, and anyone watching from the top of a hill may be able to see the totality shadow as it approaches.

For approximately two minutes when the Moon is directly in front of the Sun, it will appear to be night – the air and ground will cool and nocturnal animals may awaken. After a few minutes, the Moon will move past the Sun and the sunlight will return.

Words of Caution

While the eclipse will be a beautiful event to watch, it's important to never look directly at the sun without special protective eyewear. Your Fisher Science Education Sales Representative can help you find the right eyewear to safely watch the eclipse. Also check online to see when the event will

begin in your time zone, and hope for good weather that doesn't block your view!

[DISCUSSION QUESTIONS]

Why is it important not to look directly at the sun during an eclipse?

When and where are the next visible solar or lunar eclipses happening near you?

[VOCABULARY]

- TOTALITY
- ECLIPSE
- LUNAR



Labconco™ Protector™ ClassMate™ Laboratory Hoods

Designed to meet the needs of instructional laboratories.

- Taller viewing window with clear back and sides for 360° visibility
- Angled sash and panel for reduced glare
- Durable tempered safety glass sash, sides, back and removable baffle
- Low profile, ADA-compliant spill trough
- Other models available with or without service fixtures, electrical receptacles, and airflow monitor
- Required (but not included): work surface, hood base, remote blower, ductwork, and service fixture inlet tubing



Visit fisheredu.com for more information.

Description	Cat. No.	Price
ClassMate Hood, 4 ft., with four fixtures, two electrical receptacles	S15388	\$9,510.00
ClassMate Hood, 5 ft., with four fixtures, two electrical receptacles	S15390	\$10,645.00
ClassMate Hood, 6 ft., with four fixtures, two electrical receptacles	S15392	\$11,245.00



Labconco™ Neutrodine™ Molecular Filter

For use with Protector™ Echo™ and Airo™ filtered fume hood.



- Molecular carbon filter unit for multi-purpose use of acids, bases, solvents
- Tested and found efficient on over 500 chemicals
- Comprehensive molecular filter that allows the simultaneous handling of solvents, acids, bases, ammonia and formaldehyde
- May last two years or more before requiring replacement
- Allows Protector Filtered Fume Hoods to act as fully-featured, containment-enhancing fume hoods without any ducting

WARRANTY:

One year

Cat. No.	Description	Price
S28323	Neutrodine Molecular Filter	1040.00/Each

Flip Safety Pipetting Ball

Easy to use and clean.

This patented ball fits pipets up to 50mL.

- Press on the bulb to evacuate
- Press on the up arrow to intake solution
- Drain by pressing on the down arrow
- Top valve can be removed and reinserted for easy cleaning of the inside



Cat. No.	Description	Price
S32247	Flip safety pipetting ball	12.50/Each

Dispensing Bottles

Low-density polyethylene bottles.

- Supplied with a sealer cap that snaps on easily after using and seals tightly
- Spout openings are standard 0.030 in. (0.08cm)
- Opening can be enlarged by cutting back with scissors



Cat. No.	Capacity	Price
S31700	0.5 oz., 15mL	14.50/Pack
S31701	1 oz., 30mL	17.00/Pack
S31702	2 oz., 60mL	17.75/Pack
S31703	4 oz., 125mL	22.50/Pack
S31704	6 oz., 180mL	26.75/Pack
S31706	16 oz., 500mL	15.50/Pack

fisherbrand Labeled Wash Bottles

Polyethylene bottles with polypropylene closures to ensure leakproof dispensing.



- Easy-to-read printed bottles
- Wide mouth 53mm (2 in.) bottle for easy refilling
- Translucent LDPE
- Polypropylene closure with leakproof design

INCLUDES:

Safety labeled wash bottles include Department of Transportation (DOT) and National Fire Protection Association (NFPA) codes and symbols, Chemical Abstract Service (CAS), protective equipment symbols and target organ information.

COMPLIANCE:

Comply with OSHA requirements outlined in the Hazard Communication Standard 29 CFR 1910.1200

Cat. No.	Capacity	For Use With (Application)	Price
S317322	16 oz., 500mL	Deionized Water	7.32/Each

fisherbrand Qualitative-Grade Filter Paper Circles

Limited wet strength.

Coarse Porosity

- Flowrate: Fast, 175mL/min.
- Surface: Smooth, open texture
- Particle Retention: >20µm
- Applications: Suitable for coarse and gelatinous precipitates



Medium Porosity

- Flowrate: Medium, 60mL/min.
- Surface: Smooth
- Particle Retention: 5 to 10µm
- Applications: General lab uses

Fine Porosity

- Flowrate: Slow, 5mL/min.
- Surface: Smooth, dense texture
- Particle Retention: 1 to 3µm
- Applications: Excellent retention; suitable for finest particles or precipitates

Cat. No.	Diameter (Metric)	Grade	Porosity	Price
S47573B	7cm	P8	Coarse	9.36/Pack
S47573C	9cm	P8	Coarse	5.70/Pack
S47573D	12.5cm	P8	Coarse	8.16/Pack
S47573E	11cm	P8	Coarse	6.78/Pack
S47573F	15cm	P8	Coarse	9.69/Pack
S47574B	9cm	P5	Medium	5.54/Pack
S47571C	11cm	P5	Medium	5.43/Pack
S47574D	12.5cm	P5	Medium	12.25/Pack
S47574E	15cm	P5	Medium	9.00/Pack
S47575E	12.5cm	P2	Fine	14.00/Pack

fisherbrand Polystyrene Weighing Dishes

Ideal for weighing, dispensing or storing applications.

- Contaminant-free, antistatic and biologically inert
- Resist dilute acids, aqueous solutions, alcohols and bases
- Flat bottoms resist tipping
- Made from 12mil thick polystyrene for better strength, stability and handling ease



Cat. No.	Length (English)	Length (Metric)	Width (English)	Width (Metric)	Price
S67090A	3.5 in.	812mm	3.5 in.	812mm	58.00/Each
S67091A	5.5 in.	139mm	5.5 in.	139mm	88.00/Each

Thermo Scientific™ Nalgene™ Aspirator Vacuum Pump

Efficient and easy to use.

- Pumping capacity: 11.5L/min.
- Water consumption rate: 6.5L/min.
- Easily attaches to faucet
- Ultimate vacuum: 28.5 in. (72.39cm) of Hg



Cat. No.	Description	Price
S41381	Aspirator Vacuum Pump	28.75/Each

Seamless Cellulose Dialysis Tubing

Retains materials with 12,000 and higher molecular weight.



- Especially useful in analytical chemistry, biology, and pharmaceutical fields
- Highly permeable to water and low molecular weight compounds
- Contains glycerin, water and 1% sulfur
- Must be stored in airtight container or rehumidified before use
- Pore diameter: 4.8nm

Cat. No.	Diameter (Metric)	Length (English)	Length (Metric)	Price
S25645D	6.4mm	10 ft.	3m	29.00/Each
S25645	15.9mm	10 ft.	3m	12.25/Each
S25645A	20.4mm	10 ft.	3m	12.75/Each
S25645B	28.6mm	10 ft.	3m	14.50/Each
S25645C	47.7mm	10 ft.	3m	35.25/Each
S25645E	6.4mm	100 ft.	30m	290.00/Each
S25645F	15.9mm	100 ft.	30m	93.00/Each
S25645G	20.4mm	100 ft.	30m	99.00/Each
S25645H	28.6mm	100 ft.	30m	95.00/Each

Hand-Held Series Magnifiers

For home, school or office

- Crystal-clear acrylic lens offers a sharp, distortion-free view
- Bifocal lens allows the finest details to be seen with ease



Cat. No.	Diameter (English) Lens	Magnification	Weight (English)	Price
S95500	3.5 in.	2, 4.5x	3.5 oz.	11.00/Each

Plastic Forceps

Medium serrated tips allow a good grip on tissue.

- Economical polypropylene forceps
- Autoclavable
- Length: 5 in. (12.7cm)



Cat. No.	Description	Price
S17315F	Plastic Forceps	3.75/Each

EISCO Scalpel Blades

Quality blades, individually packed in aluminum foil.

- Blades 10 and 11 are suitable for use with handle No. 3 (S95937)
- Blades 20 through 23 are suitable for handle No. 4 (S95938)



ORDERING INFORMATION:
Sold as pack of 10.

Cat. No.	Size	Price
S95937A	10	5.10/Pack
S95937B	11	5.10/Pack
S95938A	20	5.10/Pack
S95938B	21	5.10/Pack
S95938C	22	5.10/Pack
S95938D	23	5.10/Pack

Dynalon™ Lab Supply Container

Molded, seamless polypropylene.

- Autoclavable
- Lightweight
- Tapered for nesting
- 12.2 x 7.8 x 5.2 in. (31 x 20 x 13.3cm)



Cat. No.	Description	Price
S47884	Lab Supply Container	20.25/Each

Kimwipes™ Delicate Task Wipers

Clean and polish delicate surfaces without scratching or leaving residue.

- Low-linting wipers absorb 18% more water and are 24% faster than the leading private label task wiper
- Ideal for surfaces, parts, instruments and lens cleaning in laboratories and research environments
- Will not scratch delicate surfaces when used wet



Cat. No.	Length (Metric)	Width (Metric)	Price
S47299	21.33cm	11.17cm	8.84/Pack
S47299A	42.16cm	37.33cm	15.50/Pack

Labconco™ Protector™ Airo™ Filtered Fume Hoods

Compact design that avoids potential challenges of existing lab conditions while still providing space, utility and options of a traditional hood.

- Uses Erlab™ ft.s GFH Filtration Technology and Neutrodine® Filters to work safely with a broader range of chemicals than ductless enclosures.
- Requires no ducting
- Fits in spaces with ceiling heights as low as 8 ft.
- 2 depths - 37.7 in. or 31.7 in. for shallow spaces
- By-pass airflow design.
- Eco-Foil™ Air Foil with aerodynamic Clean-Sweep™ airflow openings.
- Cord-Keeper™ Slots on left and right side of air foil.
- Removable front and side panels, and front and interior service access panels for access to plumbing and electrical wiring.
- Pre-wired vapor-proof fluorescent lighting providing up to 63 foot candles: 1 light per 3 ft. model and 2 lights per 4 ft. model.
- Factory-prepared for up to two electrical duplex receptacles and six service fixtures.
- Factory-installed control panel with digital display, fan button and light button.
- Roughing prefilter, 1 each per 3 ft. model and 2 each per 4 ft. model.
- Built-in exhaust fans: 1 each per 3 ft. model and 2 each per 4 ft. model, to maintain 60 fpm face velocity at 16 in. sash opening height.
- Sound pressure of <60 dB(A) with sash at operating height and <48 dB(A) with sash closed.
- Sensor package for primary filter breakthrough of solvent and acid fumes, laboratory air quality, sash position, and temperature.
- Audible/visual alarms for breakthrough detection, temperature ≥40° C (104° F), fan failure and high sash position opening. At ≥60° C (140° F), all fans stop.
- Three radio frequency identification (RFID) cards included: 9580901 User Card, 9580900 Administrator Card, and 9580902 Maintenance Card.
- Power cord with plug. Or, may be hard wired to top-mounted boxes.

ORDERING INFORMATION:

The Lifetime Payback Questionnaire (LPQ) form is REQUIRED for all Protector Airo Filtered Fume Hood orders. It must be completed in full, submitted, reviewed,



and approved before an order can be processed. Lead times do not start until the LPQ is approved.

INCLUDES:

Hood, power cord and plug

REQUIRES:

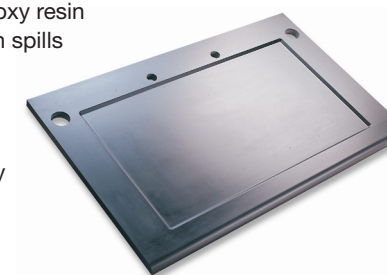
Work surface, base cabinet or stand, and Neutrodine Filters

Cat. No.	Width (English)	Depth (English)	Receptacle Type	Price
S28440	3 ft.	31.7 in.	2 Service Fixtures/0 Duplex Receptacles	17435.00/Each
S28441	3 ft.	31.7 in.	2 Service Fixtures/1 Duplex Receptacles	17540.00/Each
S28442	3 ft.	31.7 in.	0 Service/1 Duplex Receptacles	16705.00/Each
S28443	3 ft.	37.7 in.	2 Service/0 Duplex Receptacles	17955.00/Each
S28444	3 ft.	37.7 in.	2 Service/1 Duplex Receptacles	18060.00/Each
S28445	3 ft.	37.7 in.	0 Service/1 Duplex Receptacles	17225.00/Each
S28446	4 ft.	37.7 in.	2 Service/0 Duplex Receptacles	20030.00/Each
S28447	4 ft.	37.7 in.	2 Service/1 Duplex Receptacles	20135.00/Each
S28448	4 ft.	37.7 in.	0 Service/1 Duplex Receptacles	19300.00/Each

Labconco™ SpillStopper™ Work Surface

Designed for protecting your Labconco Protector™ Echo Filtered, Airo Filtered or XL Fume Hood from accidental spills.

- Molded from special formulation of corrosion-resistant epoxy resin
- Dished surface to contain spills
- Pre-drilled holes for venting and plumbing pass-through
- Front edge has large radius to aerodynamically direct airflow into hood
- Chemical resistant
- Cupsink sold separately



Cat. No.	Product Type	For Use With (Equipment)	Width (Metric) Cabinet	Price
S28436	Cutout: None	3 ft. Protector Echo Filtered, Airo Filtered or XL Fume Hood	91.4cm	820.00/Each
S28274	Cupsink	3 ft. Protector Echo Filtered, Airo Filtered or XL Fume Hood	91.4cm	1110.00/Each
S28283	Cupsink	4 ft. Protector Echo Filtered, Airo Filtered or XL Fume Hood	121.9cm	1385.00/Each

Labconco™ Flat Solid Epoxy Work Surfaces

For use with Basic™ and Fiberglass 30 Laboratory Hoods.



- Install atop Labconco Protector storage cabinets and adjustable height base stands
- Solid epoxy work surface
- Chemical-resistant
- Flat surface
- No cupsink cutout

Cat. No.	Width (Metric)	For Use With (Equipment)	Price
S28132	122cm	Basic 47 Hoods and Fume Adsorbers	1405.00/Each
S28133	182.8cm	Basic 70 Hoods	1940.00/Each

Labconco™ Basic™ Laboratory Hoods

Basic Laboratory Hoods are designed specifically for laboratories, classrooms and light duty applications where safe ventilation is required. Basic Hoods have smaller overall height and depth than traditional hoods so they fit in areas with low ceilings or narrow aisles.

- By-pass airflow design
- Curved air foil that lifts off for cleaning
- Glacier white powder-coated, 16 gauge steel exterior and interior
- Vapor-proof incandescent lights
- Two-piece adjustable baffle
- Thick tempered safety glass 4.7mm (0.187 in.)
- Vertical-rising sash with epoxy-coated aluminum sash handle
- Removable front panel for access to electrical wiring
- Factory-prepared right side fixture panel for up to three service fixtures, one duplex electrical receptacle and one airflow monitor (fixtures, receptacle and monitor not included)
- Factory-prepared right interior wall for one cupsink and turret (cupsink and turret not included)
- Powder-coated steel 26.1cm (10.3 in.) OD exhaust connection



Cat. No.	Description	Electrical Requirements	Dimensions (L x W x H)	Pressure	Price
S28126	Basic 47	100 - 115V, 50/60Hz, 1A, Domestic	63.5 x 119.4 x 121.9cm (25 x 47 x 48 in.)	With sash full open, exhausts 720 CFM at 0.25 in. H ₂ O maximum external static pressure (CFM/Static pressure at 100 fpm)	4260.00/Each
S51259MF	Basic 47	115V, 60Hz, 6.8A, Domestic	63.5 x 119.4 x 134.6cm (25 x 47 x 53 in.)	With sash full open, exhausts 720 CFM at 0.25 in. H ₂ O maximum external static pressure (CFM/Static pressure at 100 fpm)	5495.00/Each
S28127	Basic 70	100 - 115V, 50/60Hz, 1A, Domestic	63.5 x 177.8 x 121.9cm (25 x 70 x 48 in.)	With sash full open, exhausts 1120 CFM at 0.57 in. H ₂ O static pressure (CFM/Static pressure at 100 fpm)	5350.00/Each
S28128	Basic 70	115V, 60Hz, 12.9A, Domestic	63.5 x 177.8 x 121.9cm (25 x 70 x 48 in.)	With sash full open, exhausts 1120 CFM at 0.57 in. H ₂ O maximum external static pressure (CFM/Static pressure at 100 fpm)	7230.00/Each
S28129	Basic 70, Unassembled	100 - 115V, 50/60Hz, 1A, Domestic	63.5 x 177.8 x 121.9cm (25 x 70 x 48 in.)	With sash full open, exhausts 1120 CFM at 0.57 in. H ₂ O maximum external static pressure (CFM/Static pressure at 100 fpm)	5350.00/Each

Furniture

Diversified Woodcrafts™ Oak Table with Plain Aprons

Made of smoothly machined oak, providing long-lasting usability and easy care.

Solid red oak tables with plain aprons and a chemical-resistant finish. Fitted with 2.25 in. (5.7cm) square oak legs.

- Three tops available: plastic laminate, ChemGuard™ and 1 in. (2.54cm) epoxy resin
- Legs installed with 0.31 in. (0.79cm) hanger bolts and attached to apron with supplied nuts and washers
- Legs equipped with nonskid adjustable glides for precise leveling
- Legs fashioned with rubber leg boots
- Apron fitted with heavy-duty 13-gauge steel corner braces

ORDERING INFORMATION:

FASTRAK item — ships within five days



Cat. No.	Dimensions (L x W x H)	Case Material	Material	Finish	Price
S94734MF	54 x 24 x 30 in. (137.16 x 60.96 x 76.2cm)	Plastic	Oak	Epoxy Resin	541.00/Each
S94735MF	48 x 24 x 30 in. (121.92 x 60.96 x 76.2cm)	ChemGuard™	Oak	Epoxy Resin	590.00/Each
S94736MF	54 x 24 x 30 in. (137.16 x 60.96 x 76.2cm)	ChemGuard™	Oak	Epoxy Resin	598.00/Each
S94737MF	60 x 24 x 30 in. (152.4 x 60.96 x 76.2cm)	ChemGuard™	Oak	Epoxy Resin	622.00/Each
S94738MF	54 x 24 x 30 in. (137.16 x 60.96 x 76.2cm)	ChemGuard™	Oak	Epoxy Resin	866.00/Each
S94739MF	60 x 24 x 30 in. (152.4 x 60.96 x 76.2cm)	ChemGuard™	Oak	Epoxy Resin	941.00/Each



Get Organized!
TOTE TRAY STORAGE

- Plastic Laminate Top
- Solid Oak and Veneer Construction
- Chemical Resistant, Earth-Friendly UV Finish
- 500 lb. Mobile Capacity
- 4" Locking Swivel Casters
- Locking Doors
- Includes 21 Plastic Tote Trays
- Dimensions: 48"W x 24"D x 41-1/2"H

Product S02364MF Price \$1,775.00

DIVERSIFIED WOODCRAFTS

Diversified Woodcrafts™ Oak Wood Trapezoid Tables

Made of solid oak or maple aprons with chemical resistant, non-emitting UV finish.

- Flexible, uniquely shaped science table
- Solid legs with rubber boots
- Steel frame to support apron
- Choice of tops: Plastic laminate 1.25 in (3.17 cm) or ChemGuard
- Height: 30 in. (76.2 cm)



Cat. No.	Material	Size (Metric)	Price
S14216	Solid oak with Plastic laminate	76.2 x 152.4 x 76.2cm	1366.00/Each
S14217	Solid oak with Chemguard	76.2 x 152.4 x 76.2cm	803.00/Each
S14218	Solid oak with Plastic laminate	61 x 152.4 x 76.2cm	702.00/Each
S14219	Solid oak with Chemguard	61 x 152.4 x 76.2cm	765.00/Each



Diversified Woodcrafts™ Stainless-Steel Tables

Diversified Stainless-Steel Table features a top with integrally welded C channels to prevent sagging.

- Stainless-steel top with two sound deadened integrally welded 12.7cm (5 in.) channels to reinforce and maintain level working surface (prevents sags)
- Material: T-430 18-gauge stainless-steel
- Galvanized legs (4.1cm dia.) with adjustable high impact corrosion resistant feet
- Adjustable under-shelf with two pins per corner provides strength and stability
- Dimensions: 76D x 89 cm H (30 x 35 in.)

CERTIFICATIONS: NSF

Cat. No.	Width (Metric)	Price
S14188	91.4cm	454.00/Each
S14189	122cm	271.00/Each
S14190	152.4cm	585.00/Each
S14191	182.8cm	643.00/Each



Diversified Woodcrafts™ Tote Tray Case

Store various materials or student projects with these large totes in a mobile storage cabinet

- Constructed of oak veneers and solid oak with a chemical resistant, earth friendly UV finish
- Rolls easily on 4 in. locking swivel casters
- Two lockable doors swing 270 degrees and conceal 21 tote trays
- Plastic laminate top can double as a work surface
- Mobile capacity: 500 lb.
- Store various materials or student projects with these large totes in a mobile storage cabinet

ORDERING INFORMATION: Tote trays: 19" x 14.25W x 3.5 in.H (48.2 x 36 x 8.9cm); Overall: 24D x 48W x 41.5 in.H (61 x 122 x 105.4cm); Weight: 231 lb. (105kg)

Cat. No.	Includes	Price
S02364MF	Mobile tote tray storage cabinet	1775.00/Each
S01939MF	Tan fiberglass tray	31.25/Each



fisherbrand Metal Stools

Tough, sturdy stools with durable powder coat finish.

- Constructed of 11-gauge steel
- 13 in. diameter (33cm) steel seat
- Formed flange and no sharp edges



Cat. No.	Height (English)	Price
S68908A	18 in.	63.75/Each
S68908B	24 in.	67.75/Each
S68908C	30 in.	77.00/Each

Fisher Science Education™ Pneumatic Vinyl Chair with Casters, Medium Bench Height

Armless ergonomic chair with chrome-hooded casters for added mobility.

- Chrome hooded, rolling, non-marring casters are suitable for both hard and carpeted floors
- Contoured waterfall seat cushion and an adjustable back rest with lumbar support for increased comfort during extended sitting durations
- Constructed of highly durable molded polyurethane foam cushioning covered with easily cleaned antibacterial/antimicrobial vinyl
- Seat height controlled by fingertip pneumatic lift
- 5-leg nylon reinforce fiberglass base



Cat. No.	Color	Footrest Size (English)	Price
S36234	Black	20 in.	290.00/Each
S36098	Navy	20 in.	290.00/Each
S36097	Burgundy	20 in.	290.00/Each
S36047	Blue	20 in.	290.00/Each
S36632	Gray	20 in.	290.00/Each

Fisher Science Education™ Pneumatic Polyurethane Chair, High-Bench Height

Adjust to fit most body types and workstations.

- Provide proper seat high range for high work surfaces.
- Polyurethane material is self-skinning, chemical- and puncture-resistant. It is easily cleaned and soil resistant making it ideal for almost any environment
- Choose from chrome hooded rolling, non-marring casters (suitable for both hard and carpeted floors) or black, non-marring bell glides (suitable for both hard and carpeted floors) on a polished cast aluminum base
- Optional seat tilt provides 8° forward and 3° backward locking tilt for ergonomic posture support
- 5-leg nylon reinforced fiberglass

Cat. No.	Wheel Type	With Tilt	Price
S36748	Chrome hooded, rolling, non-marring casters	No	286.00/Each
S36248	Black, non-marring bell glides	No	271.00/Each
S36121	Black, non-marring bell glides	Yes	303.00/Each
S38584	Black, non-marring bell glides	Yes	315.00/Each



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A HEAD START ON STEM CAREERS

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fisherbrand Chairs



- ✓ Quick Ship
- ✓ Durable
- ✓ BIFMA Certified
- ✓ 15-Year Warranty

Great minds sit alike

Safety

Fisher Scientific™ PVC Apron of the Elements

Displays current periodic table with properties of 114 elements.



- Reusable
- Blue
- Made of PVC (polyvinyl chloride)
- Cotton ties at the waist and neck

Cat. No.	Size	Price
S32134A	Small	9.95/Each
S32135A	Medium	9.95/Each



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AquaPhoenix Transparent PVC Aprons

Reusable transparent PVC apron with cotton ties at the waist and neck.



Cat. No.	Measures	Price
S475651A	36 x 27 in. (91.4 x 68.6cm)	8.90/Each
S475652A	42 x 27 in. (106.7 x 68.6cm)	12.50/Each

Lab Coats

Well fitted and comfortable.

- Made of easy-care white cotton blend fabric (65% polyester, 35% cotton)
- Knee-length
- One upper left breast pocket and two roomy lower pockets
- With side slit openings and adjustable belt
- White



Cat. No.	Size	Price
S04775	X-Small	34.75/Each
S04776	Small	34.75/Each
S04777	Medium	34.75/Each
S04778	Large	34.75/Each
S04779	X-Large	35.25/Each
S04780	2X-Large	43.50/Each
S04781	3X-Large	54.75/Each

Tyvek™ Lab Coats

Disposable, yet strong enough to withstand several wearings.

- Lightweight and tear-resistant Tyvek fabric
- Knee-length with two pockets, a five-snap front and full sleeves
- Inherent barrier protection against dry particulate hazards
- Chemically and biologically inert
- Provide limited splash protection
- White

⚠️ ALERTS:
Garments made of Tyvek should not be used around heat, flames, sparks or in potentially flammable or explosive environments.



Cat. No.	Size	Height	Length Sleeve	Size Chest	Price
S475561	Small	5 to 5'7" ft	30.5 in.	32.25 to 35.75 in.	8.00/Each
S475562	Medium	5'3" to 5'7" ft	32 in.	35.25 to 38.75 in.	8.00/Each
S475563	Large	5'5" to 5'9" ft	33 in.	38.25 to 41.75 in.	8.00/Each
S475564	X-Large	5'8" to 6'2" ft	34.5 in.	41.75 to 45.25 in.	8.00/Each

Rubberized Chemical Resistant Aprons

Flexible and lightweight.

- Made of chemically resistant rubberized material
- Reinforced at points of strain
- Ties at waist and neck
- Latex-free
- Color: black

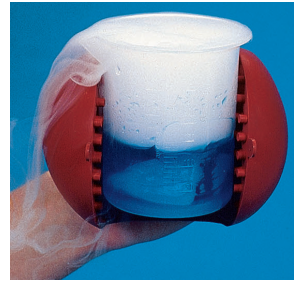


Cat. No.	Height (English)	Width (English)	Price
S475611A	36 in.	27 in.	13.00/Each
S475611E	42 in.	36 in.	10.25/Each

Hot-Hand™ Protector

Mitt protects hands when handling extremely hot or cold objects, including dry ice.

- Use for handling hot and cold objects from -70° to +500°F (-57° to +260°C)
- Soft and compliant silicone rubber naturally conforms to hand and object
- Gripping surfaces studded with small concave nubs for positive grip and additional protection against temperature extremes
- Easier and faster to use than gloves or tongs for many applications
- Tab with hole for hanging hand protector near work station
- One size fits all hands, left or right



Cat. No.	Description	Price
S47371D	Hot Hand Protector	28.00/Each

fisherbrand 200 Series Spectacles

Economical, lightweight protection.

- One-piece lens provides a full and unobstructed field of vision
- Absorb >99.9% of harmful UV light
- Molded-in sideshields and browguards
- Adjustable spatula temples



COMPLIANCE:
Meet ANSI™ Z87.1-2003 standards.

CERTIFICATIONS:
CSA-approved.

Cat. No.	Frame Color	Price/Pack
S01821	Blue	44.00/Pack
S01822	Black	44.00/Pack

fisherbrand Impact and Chemical Splash Goggles

Coated lens to minimize scratching and fogging.

- Built for comfortable protection with a soft, flexible PVC body that conforms to facial contours
- Large frames fit over most prescription eyewear
- Coated, clear polycarbonate lens resists impact, scratching and fogging
- Headstrap easily adjusts for a custom fit



Impact Goggles

- Protect eyes from dust, mist and other airborne particles; perforations on goggle top and sides provide direct ventilation

Chemical-Splash Goggles

- Resist a wide range of chemicals and feature indirect ventilation to direct airflow over the lens

COMPLIANCE:
Meet ANSI™ Z87.1-2003 and CSA standards

Cat. No.	Description	Price
S01823	Impact goggles	10.00/Each
S01817	Chemical-Splash Goggles	10.00/Each

North Trauma First Aid Kit

Designed to meet emergency medical needs.

- Contains essential items to treat minor injuries and to support medical personnel
- Packed in large trauma duffel bag for easy access, transport and storage



Cat. No.	Description	Price
S94724	North Trauma First Aid Kit	360.80/Each

fisherbrand Ultraspec™ 2000 and 2001 Eyewear

Adjustable side temple for a customized fit.

- Frameless lens features Ultradura™ hardcoat, scratch-resistant coating
- S43187 has a larger lens to fit over most glasses and Duoflex™ comfort cushions at ends of the temples



COMPLIANCE:
Meets ANSI™ Z87.1-1989 standards for impact protection.

Cat. No.	Description	Price
S43186	Ultraspec 2000	12.00/Each
S43187	Ultraspec 2001	13.00/Each

Astrospec 3000™ Eyewear

Quality, comfort and styling make these a popular choice.

- Adjustable temple length and lens inclination system
- Duoflex™ comfort cushions relieve pressure behind the ear
- Optically correct lens has Uvextreme™ AF anti-fog and anti-scratch coating



COMPLIANCE:
Meet ANSI™ Z87.1-2003 standards.

Cat. No.	Frame Color	Lens Coating	Price
S476252	Black	Ultra-dura Anti-scratch; Anti-fog	12.38/Each

Contoured Chemical Goggles

Superior design offers improved optics, comfort, affordability and convenience.

- Curved lens provides distortion-free optics with a full 160° field of vision
- Comfortable soft vinyl frame fits over most glasses
- Integrated side vents are designed for optimal air passage
- Quick-draw strap can be adjusted in seconds



COMPLIANCE:
SEI certified to ANSI™ Z87.1-2003 High Impact and CSA Z94.3-2007.

Cat. No.	Lens Coating	Price
S47628	Uncoated	12.00/Each

fisherbrand Powder-Free Nitrile Exam Gloves

Powder-Free Nitrile Exam Gloves are the perfect solution for individuals sensitive to natural rubber latex and donning powder.

- Contains no allergy causing natural rubber proteins
- Extraordinary strength and puncture resistance while maintaining tactile sensitivity
- Blue



Cat. No.	Description	Price
S79585XS	X-Small	29.00/Pack
S79585S	Small	29.00/Pack
S79585M	Medium	29.00/Pack
S79585L	Large	29.00/Pack
S79585XL	X-Large	29.00/Pack
S79585XXL	2X-Large	29.00/Pack

Microflex™ XCEED™ Ergonomic Nitrile Exam Gloves

Utilize breakthrough polymer technology and manufacturing process to offer a soft and comfortable nitrile glove. Microflex™ XCEED™ Ergonomic Nitrile Exam Gloves rival the fit of latex while providing up to 60% more strength.

- Lightweight and comfortable with less than 3 mil palm thickness
- Reduce hand fatigue and help workers be more productive while exerting less muscle effort
- Contains no natural rubber latex or powder to help protect wearers from skin allergies, irritation, and dryness
- Beaded cuff
- Textured fingers
- Blue



COMPLIANCE:
MDD 93/42/EEC; PPED 89/686/EEC Category III; Complex Design; EN 455 1, 2, and 3; EN374-3; EN374-2 Level 3 AQL.65; ASTM D6319; EN420; Reach Compliant; TGA; US QSR/FDA 510(K)

Cat. No.	Size	Price
S28981	X-Small	45.00/Pack
S28982	Small	45.00/Pack
S28983	Medium	45.00/Pack
S28984	Large	45.00/Pack
S28985	X-Large	45.00/Pack

Microflex™ Supreno™ SE Heavy-Duty Nitrile Exam Gloves

Emphasize strength and protection for work in environments that demand consistent grip and reliability. Microflex™ Supreno™ SE Heavy-Duty Nitrile Exam Gloves offer advanced barrier protection against contaminants due to lower acceptable pinhole rates.

- Offer advanced barrier protection against contaminants due to lower acceptable pinhole rates; 0.65 Acceptance Quality Limit for pinholes
- Non-stick properties create a resistance to tape or adhesives to increase speed and efficiency
- Textured fingers ensure strong, efficient grip and maximize protection
- Polymer coating for easy donning and doffing
- Constructed without natural rubber latex or powder to help protect from allergies, skin irritation, and dryness



Cat. No.	Size	Price
S28992	Small	25.00/Pack
S28993	Medium	25.00/Pack
S28994	X-Large	25.00/Pack
S28996	X-Small	25.00/Pack

Microflex™ MidKnight™ Black Nitrile Exam Gloves

Hide stains and provide a contrasting backdrop for identifying lighter colored material with a distinct black color.

- Fully textured design and non-foaming formula enable wearers to have a firm wet grip when handling objects
- Contain no natural rubber latex and are powder-free to help protect wearers from Type I skin allergies, skin irritation, and dryness
- Recommended for use in environments that demand firm grip and reliability, and where precise contact requires enhanced tactile sensitivity
- Ambidextrous, single use only
- Beaded cuff, standard examination length



COMPLIANCE:

MDD 93/42/EEC; PPE 89/686/EEC Category III; Complex Design; EN 455 1, 2, AND 3; EN374-3; EN374-2 LEVEL 2 AQL 1.5; ASTM D6319; EN420; Reach Compliant; TGA; US QSR/FDA 510(K)

Cat. No.	Size	Price
S28986	X-Small	20.00/Pack
S28987	Small	20.00/Pack
S28988	Medium	20.00/Pack
S28989	Large	20.00/Pack
S28990	X-Large	20.00/Pack
S28991	XX-Large	20.00/Pack

Galvanized-Steel Oily Waste Safety Cans

Prevent spontaneous combustion in safety cans by choosing cans with raised, ventilated bottoms to promote air circulation. Justrite™ Galvanized-Steel Oily Waste Safety Cans are used in the safe disposal of oily waste, solvent cloths and wiping rags.

- Lid opens to no more than 60 degrees and stays closed when not in use, isolating contents from fire sources and limiting oxygen to virtually eliminate the risk of spontaneous combustion
- Durable steel construction with a powder-coat finish provides chemical resistance
- Raised, ventilated bottom promotes air circulation, prevents spontaneous combustion
- Rugged, lead-free galvanized-steel body with reinforced ribs
- Trilingual safety label
- Self-closing opens easily with foot treadle
- Approved by FM, UL, TUV



Cat. No.	Capacity	Product Type	Closure Type	Price
S28755	2 gal., 7.6L	Countertop Oily Waste Can	Hand-operated cover	84.00/Each
S28756	6 gal., 23L	Ventilated Bottom Oily Waste Safety Can	Hand-operated cover	89.00/Each
S28757	6 gal., 23L	Ventilated Bottom Oily Waste Safety Can	Foot-operated cover	95.00/Each
S28758	21 gal., 80L	Ventilated Bottom Oily Waste Safety Can	Hand-operated cover	151.00/Each
S28759	21 gal., 80L	Ventilated Bottom Oily Waste Safety Can	Foot-operated cover	151.00/Each

Sure-Grip™ EX™ Safety Cabinets With Handles, For Flammables

Nonslip gripper allows fingertip opening.

- Sure-Grip EX flush-mounted door handle with two keys for security
- Handle can be padlocked (padlock not included), no interference with traffic
- Exclusive self-latching feature ensures safe closing of cabinet doors without manually engaging door handle
- Double-wall construction provides 1.5 in. (3.8cm) of insulating air space to help prevent spread of flames
- High-visibility Haz-Alert™ reflective warning labels offer added safety during power outages or fires
- Dual vents with flame arresters at top and opposite bottom allow hazardous vapors to be piped away
- Easy-closing, self-latching doors facilitate fire protection of the cabinet
- Self-latch engages critical three-point latching system for protection under fire conditions
- Two-door models hinged left and right with self-closing mechanism ensures proper closing sequence

- Fusible links hold self-closing doors wide open, flush with front of cabinet for easy access and resupply; automatically release and slam doors shut at 165°F (74°C)
- Concealed self-close mechanism provides optimum storage space and obstruction-free access to contents
- SpillSlope™ safety shelves direct incidental spills to the back and bottom of leakproof sump
- Adjustable leveling feet ensure solid positioning and alignment for tight door closure
- Exterior side panel has built-in grounding connector for easy grounding
- Finished inside and out with durable lead-free powder paint
- Meet OSHA and NFPA requirements
- Color: Yellow

WARRANTY:
10 years



COMPLIANCE:
Meet NFPA Code 30 and OSHA regulations; models with self-close doors also comply with the International Fire Code and NFPA1, FIRE CODE™.

CERTIFICATIONS:
FM-approved

Cat. No.	Capacity (English)	No. of Shelves	Door Style	Price
S15226MF	12 gal.	1	Self-closing	947.00/Each
S04760MF	30 gal.	1	Manual Close	995.00/Each
S04761MF	45 gal.	2	Manual Close	1184.00/Each
S04763MF	45 gal.	2	Self Close	1748.00/Each
S15223MF	60 gal.	2	Manual	1727.00/Each
S15224MF	60 gal.	2	Self-closing	2066.00/Each



Cloaking Devices and the Hunt for Faster Computing

By Rita Waimer

For many, the idea of a cloaking device belongs entirely to science fiction or a distant, distant future. But University of Utah professor Rajesh Menon's microscopic work tells a different story.

In November 2016, Menon, doctoral student Bing Shen and senior optical engineer Randy Polson published a paper in Nature Communications detailing how they developed a cloaking device that hides microscopic photonic integrated devices from one another inside photonic computer chips.

The Power of Light

Photonic computer chips use light photons instead of electrons to transfer and process data. They're faster than silicon chips, yet they

could consume 10 to 100 times less energy. Photonic chips are already being used in high-end military equipment, and their reduced power consumption could be hugely beneficial to data centers, which are expected to account for 4 percent of all electricity usage in the U.S. by 2020.

The struggle with photonic chips is that the devices within them must be spaced apart for the chip to work properly. If they're too close together, leaking light will spread from one device to another and cause interference. The spacing requirement is fine for simple chips, but forces more powerful chips to become larger, limiting where they can be used. Menon's cloak aims to eliminate this spacing requirement, allowing photonic devices to be packed more densely together

and making photonic chips more capable than ever before.

Invisibility for the Future

Menon and his team placed nanopatterned silicon-based barriers between the devices, preventing them from "seeing" one another. Any light that leaks out of one device is redirected back to it, fooling the device into thinking there's nothing on the other side of the barrier. Other researchers have demonstrated similar cloaks before, but Menon's cloak occupies a much smaller footprint. Moreover, it's applicable to various integrated photonic components.

It's an exciting development for silicon photonics, which are gaining more and more interest from influential companies like

Facebook and Google. The chips are already being tapped for use in emerging technologies like self-driving cars, and as they mature they'll become more affordable and inevitably be used in consumer devices. Particularly, they'll bring longer battery life to smartphones, smartwatches and other small devices that have limited space for batteries — something users have been wanting for years.

DISCUSSION QUESTIONS

How do you think photonic chips could be used in daily life?
What other technology could make electronic devices more power efficient?

VOCABULARY

PHOTON

SILICON



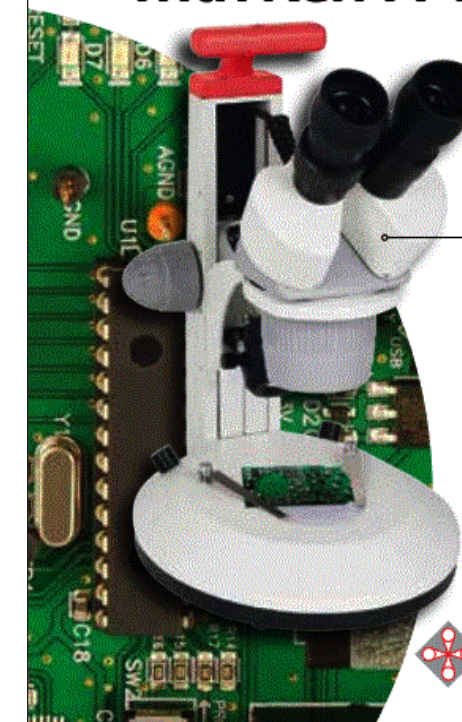
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