NEW PRODUCTS

VERNIER SOFTWARE & TECHNOLOGY

Watch your mailbox in March for our 2012 catalog!

Projectile Launcher

ORDER CODE **VPL, $289** vernier.com/vpl

Use the Vernier Projectile Launcher to investigate important concepts in two-dimensional kinematics. Launch steel balls at angles between 0 and 70 degrees and up to a distance of 2.5 m. A unique pneumatic launching system provides excellent repeatability and allows you to set the launch velocity. Built-in photogates simplify the measurement of launch velocity, allowing for precise quantitative analysis. Includes launcher, six steel balls, hand pump, goggles, and accessories.

Polarizer/Analyzer Set

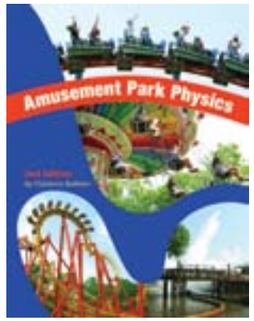
ORDER CODE **PAK-OEK, $68** vernier.com/pak-oek

The Polarizer/Analyzer Set allows students to study light polarization, doing experiments such as Malus's law. The set consists of three adjustable linear polarizers, one of which includes attachment points for the Vernier Rotary Motion Sensor. A complete experiment requires the Vernier Dynamics System Track, a Vernier Light Sensor, and the Light Sensor Holder and Light Source from the Optics Expansion Kit (all are sold separately). Optionally, a Vernier Rotary Motion Sensor allows sensor-based angle measurement.

Mirror Set for the Optics Expansion Kit

ORDER CODE **M-OEK, $59** vernier.com/m-oek

The Mirror Set for the Optics Expansion Kit extends the kit to allow students to easily study image formation by concave and convex mirrors. A half screen allows light to pass through on one half and to be focused on the other half. Includes concave mirror, convex mirror, and half screen.



Amusement Park Physics by Clarence Bakken

ORDER CODE **AMPK, $35** vernier.com/ampk

This book is an excellent resource for teachers who want their students to connect their experiences at an amusement park to the physics concepts studied in class. The book explains how the instruments used to collect data, including electronic sensors, work on a conceptual level. The book provides an extensive discussion of the analysis of the data, including graphs. A key portion of the book discusses taking your class to the amusement park, and includes sample lab sheets and problem sets.

A LabVIEW engineering project to introduce PID control

LabVIEW™ for Education

vernier.com/labview

National Instruments' LabVIEW for Education is the latest educational version of LabVIEW, used in the classroom to teach engineering concepts through hands-on STEM and robotics projects. This is industry-standard LabVIEW (used throughout the engineering disciplines) refined for classroom use, with modules for educational hardware, including the following Vernier products:

- SensorDAQ
- LabQuest
- LabQuest Mini
- Go!Link, Go!Temp, Go!Motion
- NXT Sensor Adapter

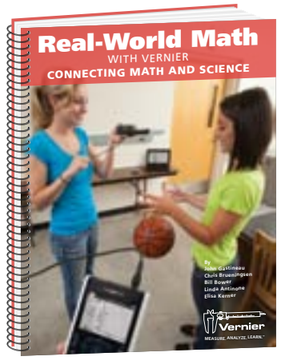
License available to U.S. high schools only.

LICENSE	ORDER CODE	PRICE
Single User	LV4E-1	$129
10 User	LV4E-10	$799
Site License	LV4E-SITE	$1,499

TI-Nspire CX Handhelds

ORDER CODE **TI-NSCX, $135** ORDER CODE **TI-NSCXCAS, $138** vernier.com/ti

TI-Nspire CX handhelds are the latest in learning technology from TI. The screen is a full color, backlit display that is easy to read, even in low-light situations. The CAS includes Computer Algebra System capabilities, which enables students to explore and manipulate mathematical expressions in symbolic form.

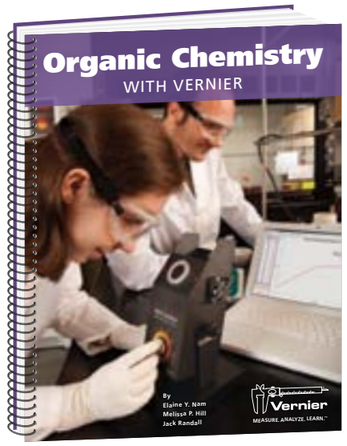


Real-World Math with Vernier

ORDER CODE **RWV, $48** vernier.com/rwv

This revised lab book contains 32 activities that explore real-world applications of math concepts from algebra through calculus. Activities cover topics such as linear, quadratic, and periodic functions, statistics, systems of equations, and much more. The printed activities in this book support data collection using TI-Nspire technology. Instructions for other TI calculators and the Vernier Logger *Pro* software can be found on the CD that is included with the book.

CHEMISTRY



Organic Chemistry with Vernier

ORDER CODE **CHEM-O, $48** vernier.com/chem-o

This lab book makes it easy for organic chemistry instructors to integrate Vernier data-collection technology into the organic chemistry lab curriculum. The experiments involve characterization of reactions and compounds using the Vernier Melt Station, Mini Gas Chromatograph, SpectroVis Plus spectrophotometer, and the new Polarimeter. Experiments cover a broad range of topics and techniques, including compound identification, synthesis, chromatography, spectroscopy, and optical rotation.

Download evaluation PDFs for student experiments at vernier.com/chem-o

EXPERIMENTS

USING A POLARIMETER
- Understanding Polarimetry
- Identification of Organic Unknowns Using Polarimetry
- Observing the Reaction Kinetics of Sucrose with Polarimetry
- Isolation and Epoxidation of a Natural Product: Limonene
- Analysis of Natural Products

USING A MELT STATION
- Determining Melting Temperature
- Recrystallization of Benzoic Acid and Aspirin
- Identifying an Unknown Analgesic by Melting Temperature and Thin-Layer Chromatography
- Separation of Organic Compounds by Acid-Base Extraction Techniques
- The Synthesis and Analysis of Aspirin
- Synthesis of Dibenzalacetone by Aldol Condensation
- The Diels-Alder Reaction of Anthracene with Maleic Anhydride
- Friedel-Crafts Acylation of Ferrocene

USING A SPECTROVIS PLUS
- Extraction of Spinach Pigments and Analysis by Electronic Absorption Spectroscopy
- The Synthesis and Analysis of Aspirin
- Grignard Formation of Crystal Violet
- Synthesis of Fluorescein
- Synthesis of Methyl Orange and Its Application to Textiles

USING A WIDE-RANGE TEMPERATURE PROBE
- Determination of a Boiling Point: Simple and Fractional Distillation
- Fractional Distillation of Esters
- The Synthesis and Analysis of Aspirin
- Isolation and Epoxidation of a Natural Product: Limonene
- Synthesis of Dibenzalacetone by Aldol Condensation
- The Diels-Alder Reaction of Anthracene with Maleic Anhydride
- Friedel-Crafts Acylation of Ferrocene
- Synthesis of Fluorescein

USING A MINI GAS CHROMATOGRAPH
- Fractional Distillation of Esters
- Investigating Gas Chromatography
- Understanding Intermolecular Forces Using a Gas Chromatograph: Enthalpy of Vaporization
- Investigating Thermodynamic Relationships of Substituted Hydrocarbons
- Synthesizing Ethyl Acetate by Fisher Esterification
- Using a Gas Chromatograph: Identifying an Unknown Compound
- S_N1: Synthesis of t-butyl chloride
- S_N2: Synthesis of 1-bromobutane

Identification of organic unknowns using polarimetry from Organic Chemistry with Vernier

Chemical Polarimeter

ORDER CODE **CHEM-POL, $499** vernier.com/chem-pol

The Chemical Polarimeter is a device used for measuring the rotation of plane-polarized light caused by an optically active substance. The Polarimeter uses a 589 nm LED, a fixed polarizer, and a rotating polarizer to detect the compound's optical rotation. Used with Vernier technology, students no longer have to determine the optical maximum with their eye, but have a graph that shows a clear change in the light's polarization.

- Determine sugar-solution purity by optical rotation.
- Characterize the purity of organic and inorganic syntheses yielding chiral products.
- Determine the enantiometric purity of optically active compounds.
- Resolve racemic mixtures.
- Study the kinetics of acid-catalyzed and enzyme-catalyzed hydrolysis.
- Explore the optical activity of amino acids.

Chemical Polarimeter Sample Cells

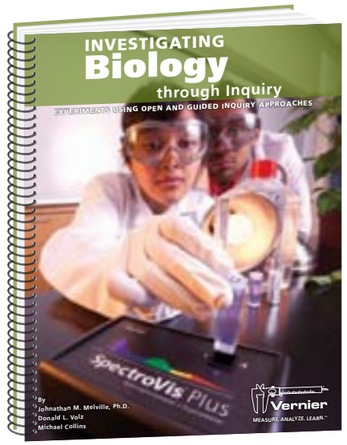
ORDER CODE **CELLS-POL, $66** vernier.com/cells-pol

Package of four replacement sample cells. They are 150 mm tall flat-bottom test tubes with an easy-pour spout designed specifically for the Polarimeter, with height markings in cm.

Constant Current System

ORDER CODE **CCS-BTA, $49** vernier.com/ccs-bta

The Constant Current System is a combination current sensor and power supply. It eliminates the need for a separate power supply when performing electroplating and electrolysis experiments in chemistry. It is capable of delivering up to 0.6 A at 5 V DC. Use the Constant Current System to explore Faraday's law and determine Avogadro's Number.



Investigating Biology through Inquiry

ORDER CODE **BIO-I, $48** vernier.com/bio-i

Our *Investigating Biology through Inquiry* lab book will help you integrate inquiry into your existing curriculum, whether you teach high school, AP*, IB†, or college level biology. Each investigation includes a preliminary activity, teacher information, researchable questions, and sample data. If you are new to inquiry-based instruction, the extensive teacher sections will help you and your students design and conduct their own inquiry-based biology experiments. The book comes with a CD that includes word-processing files of the student sections, so that any investigation may be easily edited to your specifications. This book is designed to meet the new requirements for inquiry in AP biology.

Available March 2012

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EXPERIMENTS

USING A SPECTROVIS PLUS
- Plant Pigments
- Chemistry of Membranes
- Evolution of Cellobiase in Fungi
- Analysis of Enzymes using Tyrosinase
- Introduction to Biofuels: Enzyme Action
- Investigating Protein: The Bradford Assay
- Photosynthesis by Choloroplasts

USING A HEART RATE SENSOR
- Heart Rate

USING A PH SENSOR
- Investigating Buffers
- Water Monitoring

USING A WHITE DIGITAL BIOIMAGING SYSTEM
- Introduction to Molecular Evolution

USING A TEMPERATURE PROBE
- Sugar Metabolism with Yeast
- Fermentation with Yeast
- Water Monitoring

USING A CO_2 GAS SENSOR
- Cellular Respiration
- Sugar Metabolism with Yeast
- Evolution of Yeast: Artificial Selection

USING AN O_2 GAS SENSOR
Testing Catalase Activity (O_2)

USING A CONDUCTIVITY PROBE
- Diffusion
- Water Monitoring

USING A DISSOLVED OXYGEN PROBE
- Investigating Dissolved Oxygen
- Investigating Primary Productivity

USING A GAS PRESSURE SENSOR
- Transpiration of Plants
- Testing Catalase Activity (Gas Pressure)
- Investigating Osmosis
- Fermentation with Yeast

Praise for Enzyme Analysis with Tyrosinase from *Investigating Biology through Inquiry*:

> “After a literature search, many wanted to investigate the action of tyrosinase from other sources and compare it to the potatoes, so they did extractions from apples, pears, bananas and even sweet potatoes. It proved to be a great inquiry lab.” Barb Burkhardt, University of Indianapolis

Transpiration of Plants from Investigating Biology through Inquiry

Primary Productivity Kit

ORDER CODE **PPK, $44** vernier.com/ppk

This kit is an accessory for one of our most popular biology labs, Primary Productivity. The kit consists of a box of seven plastic bottles, seven rubber stoppers, and a set of screens for varying light intensity. This is a great accessory that can be used for experiments in our new *Investigating Biology through Inquiry* lab book.

Water Quality Bottles

ORDER CODE **WQ-BOT, $28**
vernier.com/wq-bot

Box of eight plastic bottles with stoppers for general water quality use. They can also be used as replacements for the bottles and stoppers in the Primary Productivity Kit.

Turbidity Bottles

ORDER CODE **TRB-BOT, $27**
vernier.com/trb-bot

Box of six glass bottles with lids for use with the Turbidity Sensor. These bottles are the same as the one shipped with the Turbidity Sensor.

O_2 Gas Sensor to Spirometer Adapter

ORDER CODE **O2-SPR, $8**
vernier.com/o2-spr

This adapter connects an Oxygen Gas Sensor to a Spirometer for measuring the oxygen gas concentration and flow rate of exhaled air.

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New Products for 2012 Inside!

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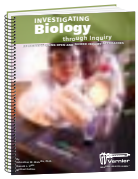

INVESTIGATING BIOLOGY THROUGH INQUIRY BOOK
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HANDS-ON WORKSHOPS IN SPRING 2012

Four Hours of *free* Hands-On Professional Development

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21	Oklahoma City, OK
23	Dallas, TX
25	Houston, TX
27	San Antonio, TX
27	Tampa, FL
28	Orlando, FL

MARCH

1	Ft. Lauderdale, FL
12	Birmingham, AL
14	Marietta, GA
15	Chattanooga, TN
15	Norfolk, VA
17	Richmond, VA
19	Arlington, VA
20	Nashville, TN
20	Baltimore, MD
22	Wilmington, DE

APRIL

16	Memphis, TN
18	Jackson, MS
19	Baton Rouge, LA
24	Princeton, NJ
25	Newark, NJ
26	White Plains, NY
28	Bridgeport, CT
30	Hartford, CT
30	San Jose, CA
30	Tri-Cities, TN

MAY

1	Oakland, CA
1	Winston-Salem, NC
3	Sacramento, CA
3	Columbia, SC