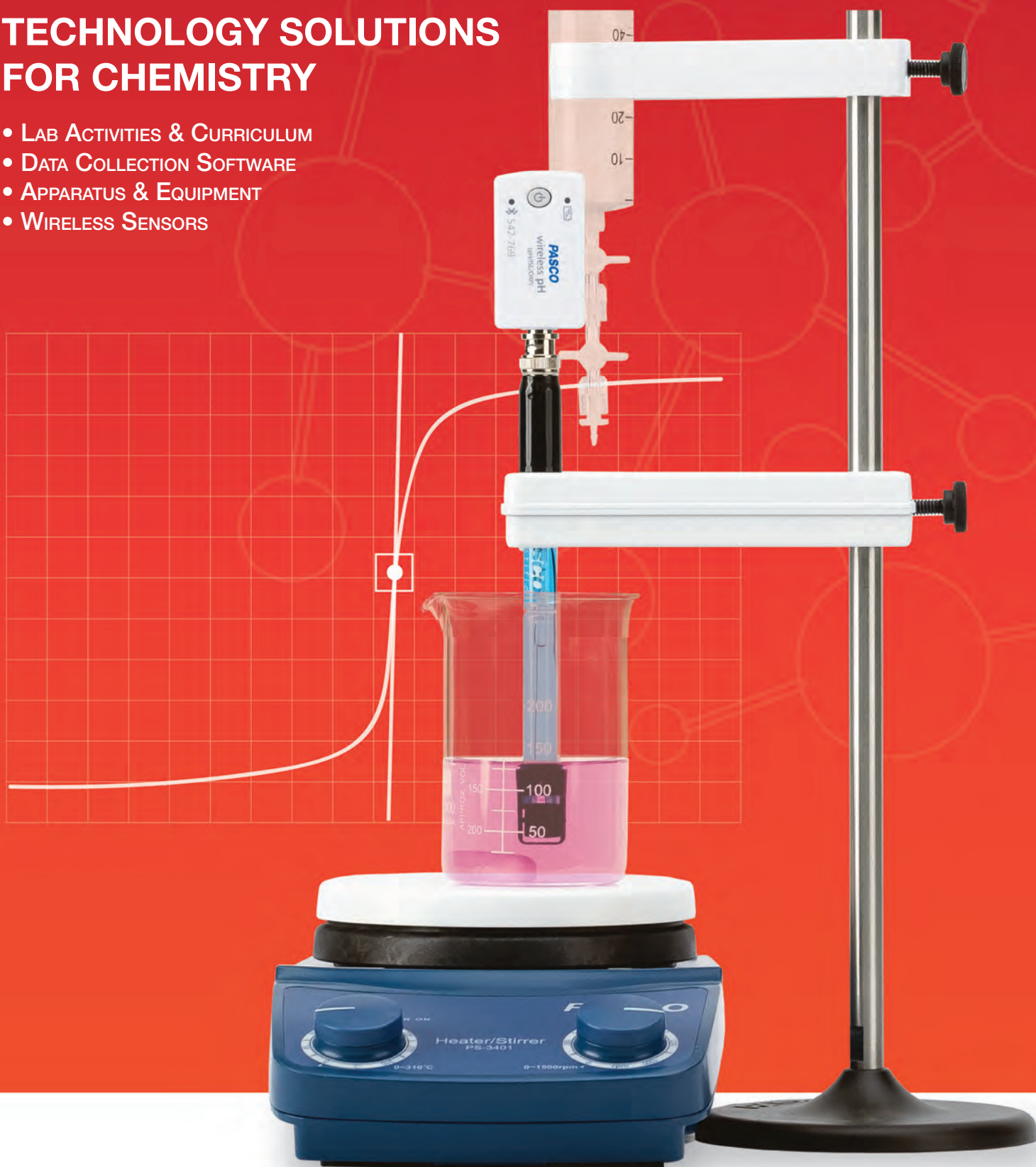


CHEMISTRY

TECHNOLOGY SOLUTIONS FOR CHEMISTRY

- LAB ACTIVITIES & CURRICULUM
- DATA COLLECTION SOFTWARE
- APPARATUS & EQUIPMENT
- WIRELESS SENSORS



SINCE 1964 **PASCO**[®]

60 YEARS OF

INNOVATION

PASCO is Celebrating 60 Years of Innovation in Science Education

60 years ago, PASCO scientific introduced its first product, the Millikan Oil Drop Experiment, that had its origins as a high school science project. Amazingly, schools ordered this apparatus from a company they had never heard of – displaying a great amount of trust in a new company.

And for the past 60 years, high schools and colleges have continued to place their trust in the apparatus we design, manufacture, sell and support. For that trust over the years, we simply say, **“Thank You!”** With your continued support and suggestions, we will strive to maintain that trust into the future.

What have we been doing for the past 60 years? I invite you to peruse our catalog and see the hundreds of products that bear the name PASCO.



PASCO capstone™



SPARKvue™



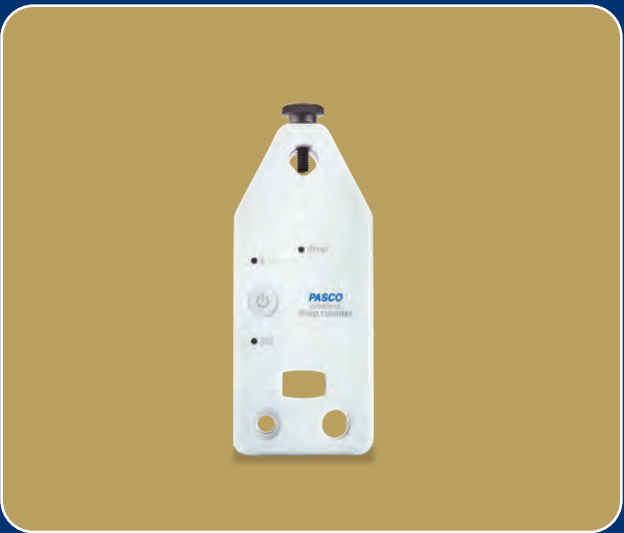
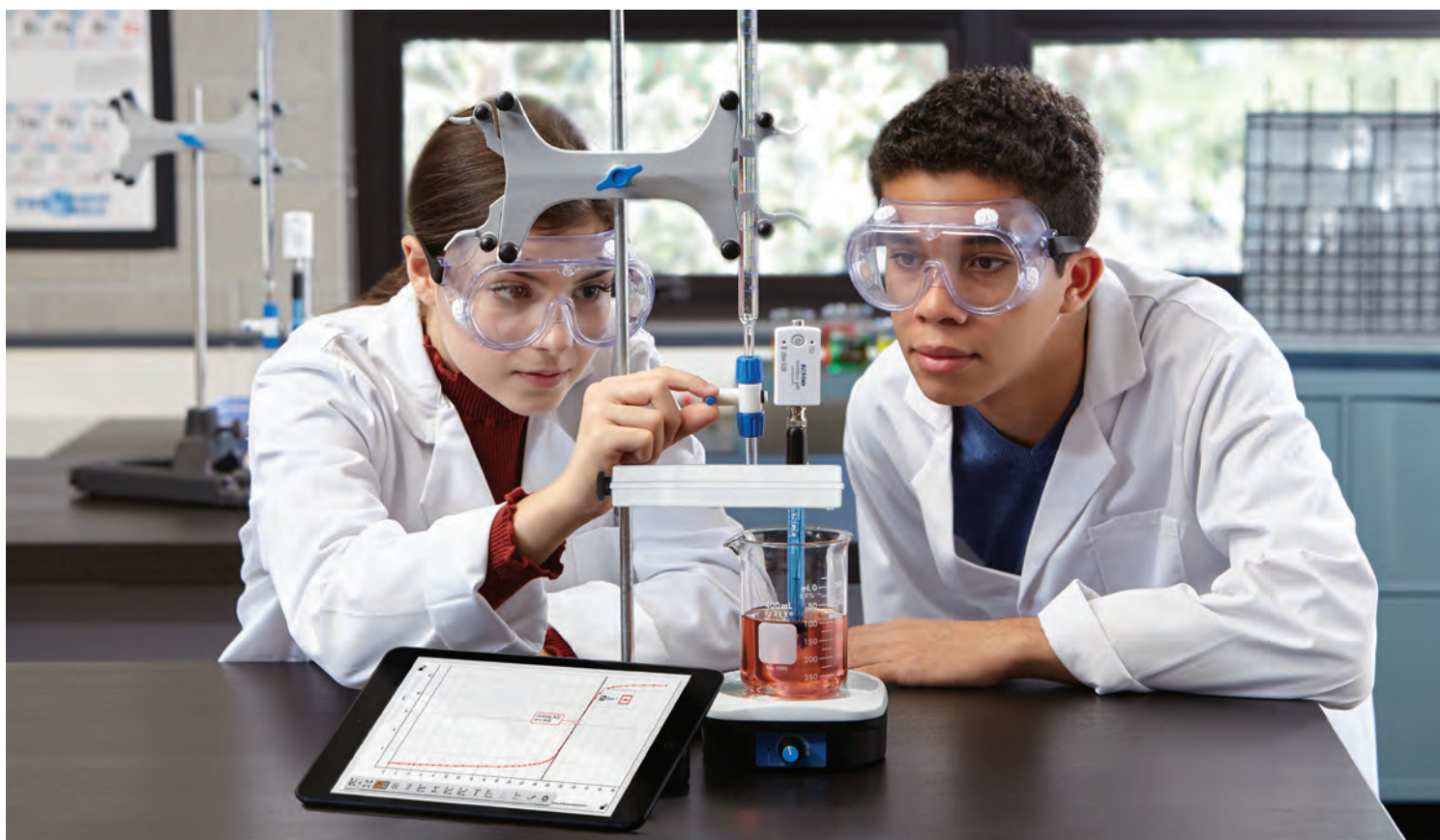


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Getting Started - Chemistry Lab Station



Chemistry Educational solutions for General, AP®, IB®, and Honors Chemistry courses

Award-Winning Solutions for Your Chemistry Lab

At PASCO, we provide chemistry educators with the most complete and reliable solutions on the market. With live, interactive data, graphical displays, and convenient tools for data analysis, our durable sensors and award-winning software empower chemistry educators to spend less time prepping, so that students can spend more time experimenting.

Plus, every PASCO solution comes with full teacher support. From free experiments and webinars to how-to videos and guides, our ongoing teacher support provides everything teachers need to support student success both inside and outside the classroom.



World Class Support and Professional Development - Committed to Your Success!

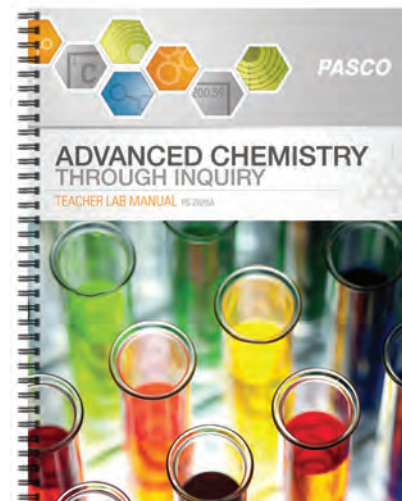
We want you to have all the support, guidance, and training you need. Just let us know how we can help.

Chemistry Lab Stations

Together, the Chemistry Starter and Extension Lab Stations offer a lab-ready solution for exploring essential topics in chemistry. Complete with Wireless Sensors, lab manual, and a custom storage case, these convenient stations let students perform a wide variety of investigations. Explore concepts such as pH, acid-base titrations, and limiting reactants. Pair the Chemistry Starter and Extension Lab Stations with PASCO's Essential Chemistry Student Lab Manual (EC-6330), to perform an additional forty lab investigations – plus dozens of free activities from the PASCO Experiment Library.



Lab Stations Support Advanced Chemistry



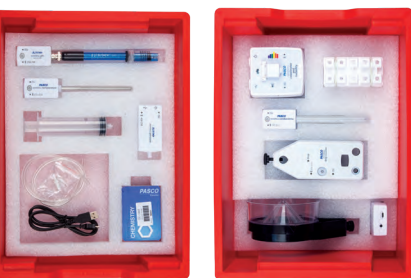
Advanced Chemistry Through Inquiry Teacher Lab Manual (EC-6330)

Add this teacher lab manual to support sixteen student investigations of advanced chemistry concepts.

Chemistry Station Lab Titles

The Chemistry Starter Lab Station supports 7 of the 10 included labs. Add the Extension Lab Station* to perform all 10 labs – plus more than 50 investigations from PASCO's Essential Chemistry Lab Manual.

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Physical or Chemical Change 2. Specific Heat 3. Chemical Reactions 4. Determining Limiting Reactions 5. Types of Bonding* | <ol style="list-style-type: none"> 6. Evaporative Cooling 7. Solution Concentration* 8. What is pH 9. Investigation of Acid-Base Titration 10. Lemon Battery* |
|--|--|



The Chemistry Starter & Extension Lab Stations include these Wireless Sensors and materials:

- | | |
|--|---|
| Starter <ul style="list-style-type: none"> • Temperature • Pressure • pH • Molecular Models • Periodic Table • Periodic Trend Cards • Spectrum Cards • Storage Case | Extension <ul style="list-style-type: none"> • Drop Counter • Colorimeter & Turbidity • Conductivity • Voltage • Condenser • Electrode Support |
|--|---|



Oxidation Reduction Potential Probe (PS-3515)

Use the ORP Probe with the Wireless pH Sensor to monitor redox titrations.



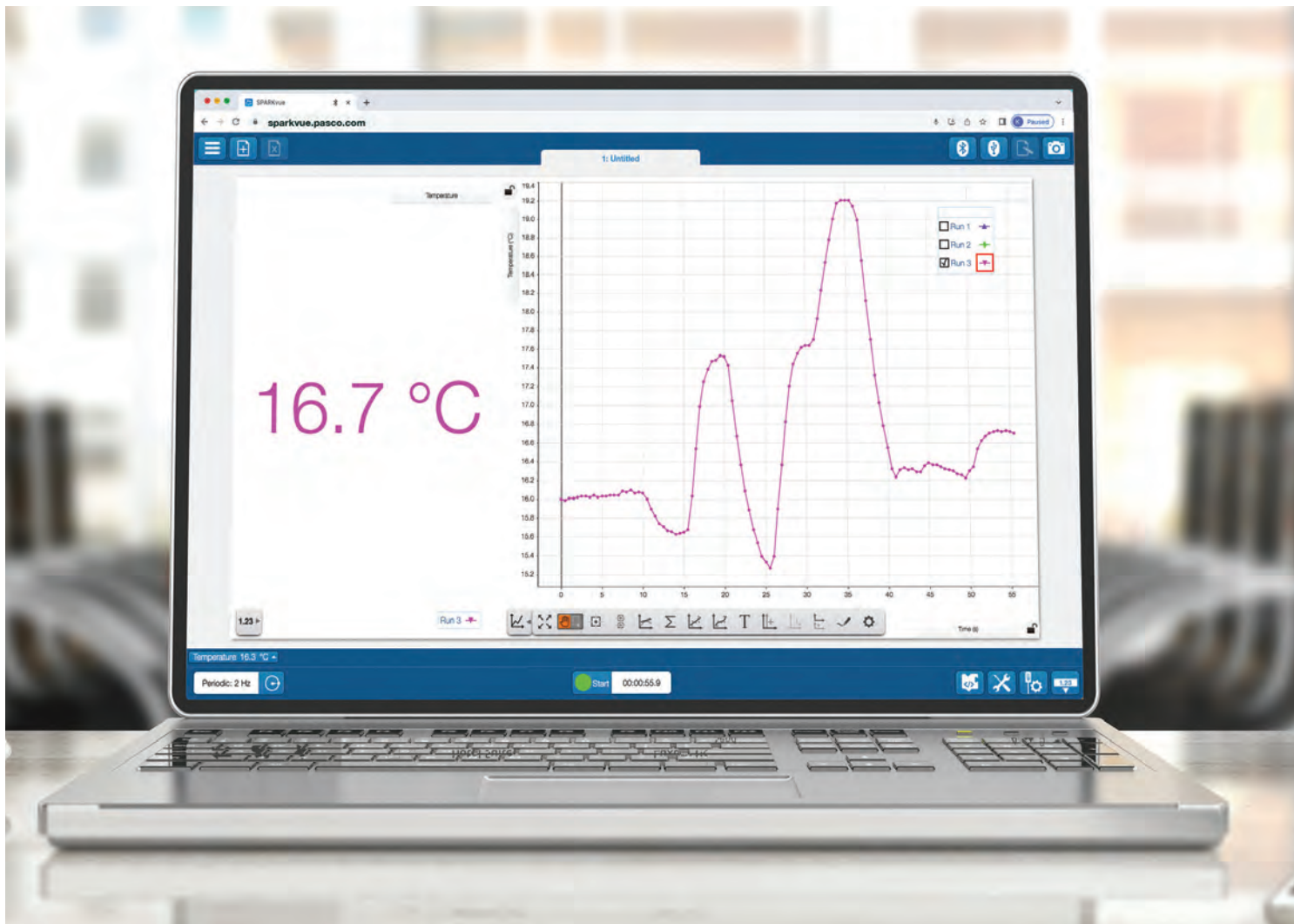
Wireless Spectrometer (PS-2600A)

Introduce students to spectrometry, Beer's law, and kinetics with our award-winning Wireless Spectrometer.

Chemistry Starter Lab StationEC-6362
 Chemistry Extension Lab Station.....EC-6363
 Essential Chemistry Teacher Lab Manual.....EC-6330

Advanced Chemistry Through Inquiry.....PS-2828A
 Wireless Spectrometer (VIS).....PS-2600A
 Oxidation Reduction Potential Probe.....PS-3515

Data Collection Software

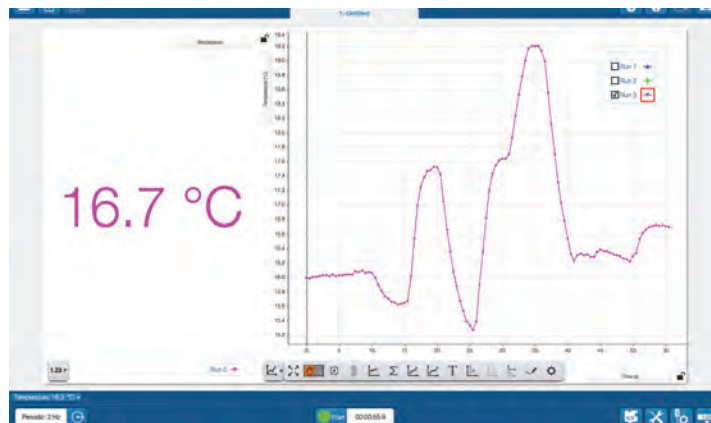


 **SPARKvue** This FREE award-winning data collection and analysis software works on any platform!

 Windows •  Mac OS •  iOS •  chrome •  KANAKA

SPARKvue's intuitive design has made it an award-winning tool for collecting and analyzing experimental data. The user-friendly platform optimizes data collection and provides tools for in-depth analysis within a compact, yet powerful workspace.

SPARKvue features Blockly coding, allowing students to use block-based code for sense and control of PASCO devices, including any of our sensors.

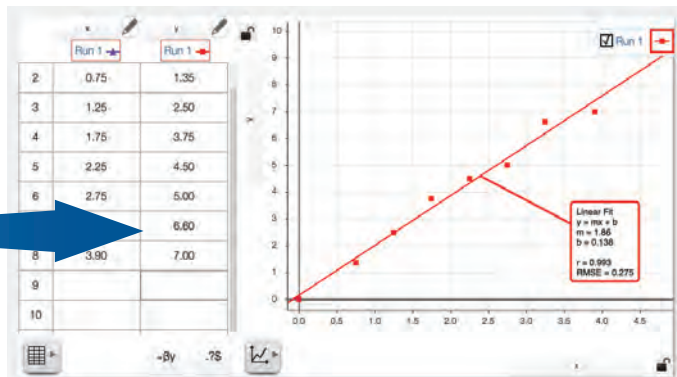
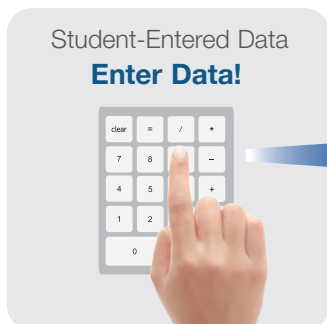


Student Data Collection...**MADE EASY!**

Student-Entered Data & Graphing **MADE EASY!**

Choose manual data collection to record live values with the click of a button.

Make a mistake? No problem! Simply select a data point to replace it.

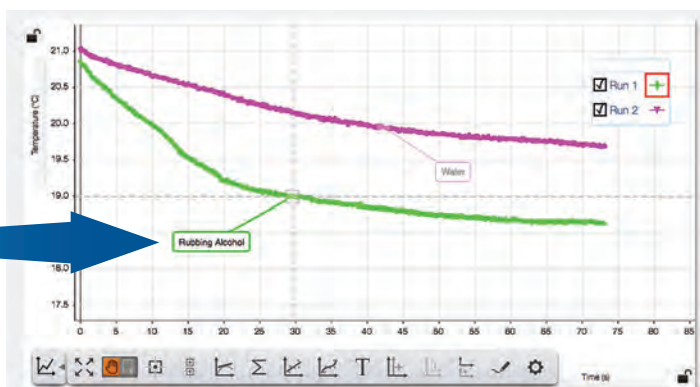


Graph & Analyze Student-Entered Data

Collecting & Graphing Sensor Data **MADE EASY!**

Automate sensor data collection to monitor measurements in real-time.

Save time with pre-made experiment files or easily build your own displays. You and your students will be up and running in minutes.



Rapid, Real-Time Data Collection & Analysis



Digits Display



Bar Graph Display



Meter Display



GIS Map Display

Free award winning data collection and analysis software now runs in your browser!

We're excited to announce SPARKvue is now available **FREE** of charge on all your devices as a browser-based application. This new version of our software as a Progressive Web Application (PWA) means you have free access to all the features of SPARKvue from Google Chrome and Microsoft Edge browsers. That's right: No download fees, subscription fees, or update fees, even for Windows® and Mac®. Plus, the app is always updated to the latest version automatically, so you never have to worry about it.

Go to sparkvue.pasco.com to access the PWA. SPARKvue is also available as a **FREE** app for Chromebook™, iPad®, Android™ tablets, and Apple® and Android™ smartphones.



Looking for additional options? See pasco.com/sparkvue for more details.

Chemistry Sensor Technology & Lab Equipment

Bring chemistry concepts to life with world class solutions from PASCO. Our high-quality sensors, software, and labs empower students to think like real-life scientists, as they form hypotheses, collect data, and perform analyses to make sense of the world around them. Plus, they're compatible with most devices, enabling students to collect and display experimental data using a computer, laptop, Chromebook, tablet, or Bluetooth-enabled smartphone.

- Stream live sensor data to virtually any device.
- Contextualize measurements with a variety of graphical displays.
- Perform long-term studies by logging data to a sensor's onboard memory.
- Easily integrate new sensors or software with free webinar trainings, how-to videos, and technical support.
- Explore dozens of ready-made experiments for general, Honors, AP®, and IB® chemistry courses, all available for free from the PASCO Experiment Library.



Deepen student understandings of core concepts, while developing key 21st-century skills with live, interactive data that streams to virtually any device.



Our growing line now includes over 30 Wireless Sensors!



Wireless pH Sensor

The Wireless pH Sensor is a must-have for any chemistry course. Equally capable in the lab or field, this sensor eliminates the hassle of cables to reduce spills and improve safety. It can transmit data in real time, or save measurements to its onboard memory, when continuous monitoring is required.

Features:

- Compatible with Ion-Selective Electrodes (ISE) and the Oxidation Reduction Probe (ORP)
- Bluetooth® connectivity and a long-lasting coin cell battery
- Saves pH data directly to the onboard memory for long-term experiments



Wireless pH Sensor PS-3204

Oxidation Reduction Potential Probe

Use this probe to monitor solutions during oxidation-reduction titrations, perform water quality studies, and study the effects of water chlorination. This probe is not a standalone sensor. It connects to and requires a wireless pH Sensor amplifier.

Required Accessories:

- Wireless pH Sensor PS-3204
- Electrode Support PS-3505



Oxidation Reduction Potential Probe PS-3515

Wireless Pressure Sensor

The Wireless Pressure Sensor allows students to easily collect accurate gas pressure data for a wide range of applications. It can also be used as a potometer.

Applications:

- Study Boyle's Law and Charles's Law
- Calculate the molar volume of a gas
- Explore reaction rates
- Study catalyzed reactions using hydrogen peroxide and catalase



Wireless Pressure Sensor PS-3203

Wireless Voltage Sensor

The Wireless Voltage Sensor is ideal for exploring topics in electrochemistry, such as voltaic cells.

Features:

- Long-lasting rechargeable battery
- Logging mode with onboard memory
- Variable sampling rate
- Range ± 15 V
- Accuracy $\pm 1\%$



Wireless Voltage Sensor PS-3211

Wireless Current Sensor

The Wireless Current Sensor accurately measures a wide range of electrical currents, making it ideal for student investigations of electrochemistry and electroplating.

Applications:

- Electrochemistry
- Ohm's Law
- Current flow in electrolysis solutions



Wireless Current Sensor PS-3212

Wireless Drop Counter

The Wireless Drop Counter features a wide drop window that improves control and accuracy during titrations. Pair it with the Wireless pH Sensor to generate live titration curves (pH vs. Volume).

Features:

- Accurately records titrant volume in mL or drops
- IR filter prevents room lighting from affecting results
- Sensor unit can suspend up to three other probes in solution



Wireless Drop Counter PS-3214

Wireless Sensors and Equipment

Wireless Conductivity Sensor

The Wireless Conductivity Sensor measures the electrical conductivity of an aqueous solution. It is ideal for investigating the properties of solutions, including total dissolved solids (TDS) for water quality inquiry.

Features:

- Measure conductivity and total dissolved solids
- Automatic temperature compensation
- Battery life >1 year
- Remote logging with built-in memory
- Dust-proof, sand-proof, and water-resistant (1 meter for 30 minutes)



Wireless Conductivity Sensor PS-3210A

Absolute Zero Sphere

The Absolute Zero Sphere is an effective tool for determining absolute zero temperature. Students connect Pressure and Temperature Sensors before immersing the sphere in water baths of varying temperatures.

Applications:

- Experimentally determine absolute zero
- Gay-Lussac's Law
- Ideal Gas Law
- Measure temperature and pressure changes in real time



Absolute Zero Sphere..... TD-8595

Wireless Colorimeter & Turbidity Sensor

The Wireless Colorimeter & Turbidity Sensor simultaneously measures the absorbance and transmittance of six different wavelengths. The sensor can be used to study Beer's Law (absorbance vs. concentration), enzyme activity, photosynthesis, and the rates of chemical reactions (absorbance vs. time). After a simple calibration, students can quickly begin viewing live measurements as they materialize across the visible spectrum at 650 nm (red), 600 nm (orange), 570 nm (yellow), 550 nm (green), 500 nm (blue), and 450 nm (violet).

Features:

- Measures six different wavelengths simultaneously
- Stabilized light source for consistent readings
- PASCO software displays the absorbance & transmittance at each wavelength in the appropriate color



Wireless Colorimeter & Turbidity Sensor.....PS-3215

Ideal Gas Law Apparatus

The Ideal Gas Law Apparatus is an all-in-one solution to studying gas laws. Simply connect Pressure and Temperature Sensors to the syringe to investigate the relationship between pressure, temperature, and volume.

Applications:

- Ideal Gas Law
- Gay-Lussac's Law
- Boyle's Law
- Charles's Law



Ideal Gas Law Apparatus TD-8596A

Wireless Polarimeter

PASCO's Wireless Polarimeter passes plane polarized light through a vertical sample, which contains a chiral compound, followed by an analyzer and detector. The optical rotation is determined by finding the angle between the starting position and the location where the optimum light level transmits through the cross polarizer. Students can use the rotation data to calculate the concentration of a chiral sample, while the specific rotation (amount turned per g/ml dissolved) is an intrinsic property that can be used to differentiate molecules or identify racemic mixtures.

Specifications:

Connectivity: Bluetooth and USB

LED Light Source: 589 nm

Optical Rotation Accuracy: $\pm 0.09^\circ$

Cell Length: 101.3mm ± 0.8 mm



Wireless PolarimeterPS-3237

Wireless Spectrometer (Vis)

The award-winning PASCO Wireless Spectrometer is specifically designed for modern teaching labs. It connects to student devices via USB or Bluetooth Low Energy and includes free Spectrometry software with built-in tools for spectral analysis. Scan times are fast, enabling students to collect a full spectrum of data in less than a second. Built-in plots are provided for common applications, including Absorbance vs. Wavelength, Intensity vs. Wavelength, Absorbance vs. Concentration (Beer's law), and Absorbance vs. Time (kinetics).

Applications:

- Absorbance Spectra
- Beer's Law
- Kinetics
- Fluorescence (405 & 500 nm)
- Emission Spectra of Light



Wireless Spectrometer (Vis)PS-2600A





Applications:

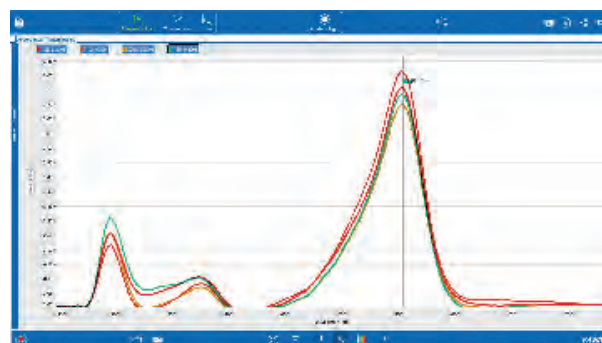
- Determination of solution concentrations
- Measurement of reaction rates or rate of decay
- Colorimetric assays (e.g., BCA, Bradford, Lowry)
- Purity testing of synthesized compounds
- Determination of the equilibrium constant
- Determination of molar absorption coefficients
- Quality testing (e.g., fermentation mediums, food adulteration, QA levels)

UV-Vis Spectrometer

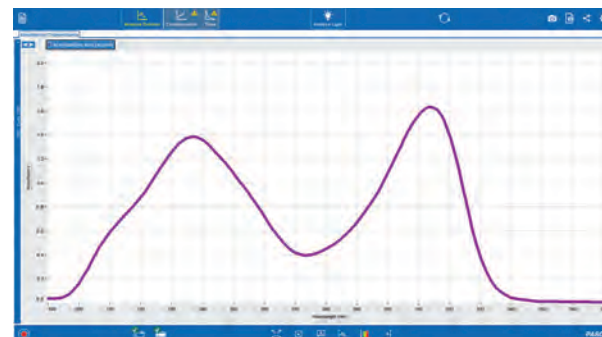
The SE-3607 is an easy-to-use, wide range UV-Vis spectrometer that delivers fast, accurate and reliable performance for routine analyses in chemistry and biochemistry teaching labs. With USB connectivity and cross-platform Spectrometry Software, the PASCO UV-Vis Spectrometer improves collaboration between lab members, enabling data collected on a computer or laptop to be analyzed on tablets, iPads, and Chromebooks. Additional accessories, such as the UV-Vis Fiber Optic Kit, can be used to extend the spectrometer's capabilities for the analysis of emission spectra, light sources, and the classification of lasers.

Highlights:

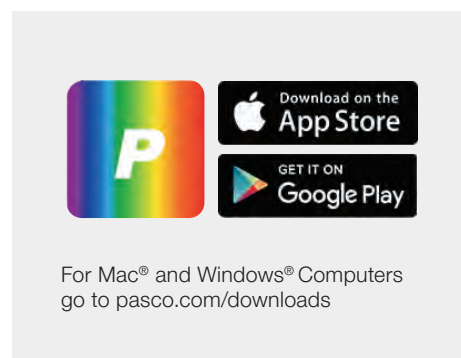
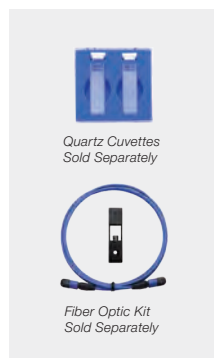
- Spectral Scans from 180 to 1050 nm
- Award-winning Spectrometry software
- Free, multi-platform Spectrometry app
- One-click light and dark calibrations
- Fast warm-up time (<10 minutes)
- Adjustable scan averaging, signal integration time and smoothing
- Graphs Absorbance vs. Wavelength (full spectrum scans)
- Graphs Absorbance vs. Concentration (Beer's Law)
- Graphs Intensity vs. Wavelength (emission spectra)
- Graphs Absorbance vs. Time (kinetics)



Absorbance of solutions containing various amounts of NaOH.



Absorbance spectra of Aspirin.



UV-Vis Spectrometer.....SE-3607
 UV-Vis Fiber Optic Kit.....SE-7182

UV Quartz Cuvettes (Qty. 2)SE-3611
 Disposable UV Semi-Micro Volume Cuvettes (Qty. 10)..... SE-3610

Instrument Comparison

Which solution is right for you?

Our compact analytical instruments are specially designed with teaching labs in mind. Use the chart below to compare their features and determine which solution is right for you and your students.



COLORIMETER & TURBIDITY
PS-3215



PASCO SPECTROMETER
PS-2600A



PASCO UV-Vis SPECTROMETER
SE-3607

Feature	Colorimeter & Turbidity	PASCO Spectrometer	UV-Vis Spectrometer
Light Source	White LED	RGB LED-Boosted Tungsten	Deuterium (UV) Tungsten (Vis)
Optical Resolution	±25 nm	2 nm	1 nm
Wavelength Range	450, 500, 550, 570, 600, 650 nm	390 – 950 nm	180 – 1050 nm
Wavelength Accuracy	NA	≤6 nm	1 nm
Photometric Range (for best accuracy)	0.05 – 1.5	0.1 – 1.8	0.1-1.0
Photometric Accuracy	±5%	±5%	±5%
Full Spectrum Scans	No	Yes	Yes
Scan Time	N/A	1 ms – 25 s	1 ms – 25 s
Connects via USB	Yes	Yes	Yes
Connects via Bluetooth	Yes	Yes	No
Rechargeable battery (for cordless operation only)	Yes	Yes	No
Fluorescent Excitation	No	405, 500 nm	No
Works with SPARKvue & Capstone Software	Yes	No	No
Works with PASCO Spectrometry Software	No	Yes	Yes
Data Storage/Onboard Memory	Yes	No	No
Good for Field Use	Yes	Yes	N/A
Turbidimeter	Yes	No	No

Comprehensive Chemistry Solution – Essential Chemistry



PASCO's Essential Chemistry curriculum is the only curriculum solution that includes a Student Textbook, Student e-Book, Teacher e-Resources, Student Lab Manual, Teacher Lab e-Resources, and Equipment Kits, all at a very affordable price. This 3-D STEM program includes a full year of instruction for both General and

Honors Chemistry classes. Use our complete solution or integrate Essential Chemistry into your existing curriculum. Essential Chemistry is multiplatform and works on iOS, Android™, Chrome™, Windows®, and Mac®. What's more, it includes 24/7 online access, as well as correlations to NGSS and your state standards.

Student Textbook & Lab Manual

- 24 chapters cover a full year of instruction for General and Honors Chemistry
- One main idea per page
- Quality illustrations
- Section and Chapter Reviews
- 73 complete investigations
- 4 Design Projects

Student e-Book

- Browser-based version of the textbook
- Same layout with convenient 24/7 online access
- Embedded videos and animations bring content to life
- Interactive equations and simulations enrich key concepts
- Formative and summative assessment questions

Teacher e-Resources for Lab Manual

- Editable documents
- SPARKvue Software
- PowerPoint presentations
- Answer keys
- Video lab assistance

Teacher e-Resources for Textbook

- Infinite Test Bank
- Teacher User Guide
- Teacher e-Book (1-year or multi-year license)
- Alignment details for NGSS and state standards

PASCO Academy Chemistry Resources

- Available through your PASCO Educator account
- 25 engaging video labs with detailed instruction and data collection
- 25 datasets for student analysis and discussion
- 25 editable lab handouts with teacher answer keys
- Digital access to more than 70 labs for General and Honors Chemistry

Equipment

- Standard Equipment Kit supports 47 labs
- Extend your investigations with additional sensors and apparatus

Essential Chemistry correlates with NGSS and is constructed around the three dimensions:

- Science and Engineering Practices
- Crosscutting Concepts
- Disciplinary Core Ideas



Textbook + e-Book + Equipment

Essential Chemistry Student Textbook

EC-6350

This rigorous yet accessible textbook includes core Chemistry topics that cover a complete year of instruction. The lessons follow the 5E model and include tools for ELL students, as well as tools for students with different learning styles. And the curriculum aligns to your standards for both regular and advanced coursework. The accessible textbook includes one main idea per page, quality illustrations, 73 complete investigations, four Engineering Design Projects, and Section and Chapter Reviews. The 24 chapters cover these topics:

- The Science of Chemistry
- Measurement and Analysis
- Classifying Matter
- Temperature and Heat
- Chemical Compounds
- Moles
- Chemical Reactions
- Stoichiometry
- Atomic Structure
- Bonding and Valence
- Energy and Change
- Gases
- Solutions
- Reaction Rates
- Equilibrium
- Acids and Bases
- Oxidation and Reduction
- Electrochemistry
- Nuclear Chemistry
- Organic Chemistry
- Molecular Biology
- Biochemistry
- The Earth
- The Universe

Essential Chemistry Student e-Book

EC-6350-EB5 (5-yr. lic) or EC-6350-EB1 (1-yr. lic)

The e-Book is an electronic version of the full textbook plus interactive elements. Throughout the electronic text, content and theory are supported with optional audio reading, as well as interactive elements such as interactive equations, videos, animations, and simulations. Students may also expand content using the 'more' button to go deeper into concepts.

Essential Chemistry Student Lab Manual

EC-6352

The *Essential Chemistry Student Lab Manual* is a student-consumable print book. In the manual there are 73 labs that cover a full year of instruction. Best of all, the labs are completely integrated with PASCO equipment and software.

Essential Chemistry Lab Station Equipment Kits

EC-6362 & EC-6363

These equipment kits will outfit a single chemistry lab station of 2-5 students. When used in conjunction with the *Essential Chemistry* program, including the e-Book and lab manual, they create a complete solution for teaching high school chemistry. The equipment kits can also be used to supplement your existing textbook, serving as the lab components of your curriculum. This use is supported by the more than 70 standards-based *Essential Chemistry* labs that are available for free download in the PASCO Experiment Library.



Essential Chemistry Lab Station Equipment

42 labs are designed to use this equipment set.

- | | |
|--------------------------------------|---------|
| Includes 1 of each of the following: | |
| • Wireless Temperature Sensor | PS-3201 |
| • Wireless pH Sensor | PS-3204 |
| • Wireless Conductivity Sensor | PS-3210 |
| • Wireless Pressure Sensor | PS-3203 |
| • Wireless Voltage Sensor | PS-3211 |
| • Wireless Colorimeter and Turbidity | PS-3215 |
| • Molecular Model Kit | PS-3400 |
| • Electrode Support | PS-3505 |
| • Periodic Trend Cards | EC-3405 |
| • Periodic Table | EC-3404 |
| • Spectrum Cards | EC-3403 |
| • Condenser | PS-3402 |
| • Wireless Drop Counter | PS-3214 |
| • Gratnells® Storage Trays (2) | |

*The equipment list (above) includes everything in the *Chemistry Starter and Extension Lab Stations* (EC-6362 + EC-6363).

Essential Chemistry 1st Edition: Student Textbook..... EC-6350A
Essential Chemistry 1st Ed.: Student e-Book (1 year license) EC-6350-EB1
Essential Chemistry Student Lab Manual EC-6352

Essential Chemistry Teacher Lab Manual EC-6330
Essential Chemistry Lab Investigations - Teacher Resources . EC-6353-DIG
Essential Chemistry Standard Equipment Kit EC-6361



Melting Point Apparatus

NEW

PS-3239

Melt point range is an important factor for determining the identity and purity of compounds, which is primary focus of many college chemistry labs. The built-in magnifying eyepiece allows students to observe the melting process individually, or a USB camera can be mounted to record the process to view in real time on a screen for larger groups.

The variable ramp rates allow you to quickly raise the sample temperature near melting (to preserve lab time) before slowing the rate down again, and the hold temp command ensures all substances reach a uniform temperature. Check the current temperature easily with the built-in temperature sensor, and use the cooling fan between measurements to restore the heating block to room temperature fast.

Melting Point Apparatus Eyepiece Camera

SE-6215

Short focal length digital eyepiece camera to capture the melting process. Image stacks will be time coded to compare to temperature data from the Melting Point Apparatus. Images can be scheduled to be captured every 5 seconds during the heating curve for more accurate determination of substances melting points.

Melting Point ApparatusPS-3239

Melting Point Apparatus Eyepiece CameraSE-6215