



Chemistry Instrumentation & Solutions College & University

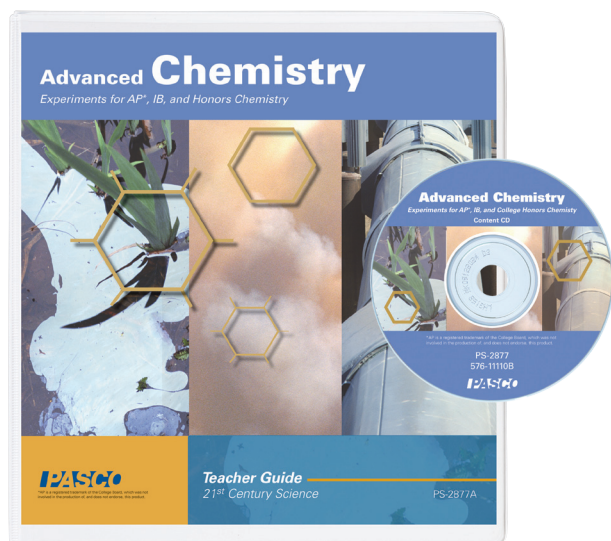


*Investigate Ideal Gas Law
see page 4*

Advanced Chemistry Teacher Guide

Advanced Chemistry Teacher Guide

PS-2877A \$129



Includes CD and printed manual. Manual contains detailed teacher version complete with guided inquiry lab activities, background materials, tips, suggested answers and much more. CD contains an editable MS Word version of student handouts and PDF of full teacher edition.

Also Available:

Teacher Guide CD only PS-2887

(Contains all materials from the Teacher Guide in electronic format only)

Student Lab Activity Blackline Master PS-2897

(A printed version of the same student handouts which are included electronically with both the Teacher Guide and Teacher Guide CD only)

WE CAN HELP

We offer support, training and customer service by email or phone and through self-directed online tutorials, live webcam feeds, in-person training at your site and PASCO Summer Institutes.

Visit PASCO.com for details

Topics Covered:

States of Matter and Molecular Interactions

Quantities and Reactions

Solutions

Chemical Thermodynamics

Light and Matter

Kinetics and Equilibrium

Atomic and Nuclear Structure



* AP is a registered trademark of the College Board, which was not involved in the production of, and does not endorse, this product.

ORDERING GUIDE

Equip your lab for student investigations in Advanced Chemistry.

1. GET STARTED WITH THE TEACHER GUIDE.

This valuable teacher resource includes 36 standards-based lab activities for Advanced Chemistry, including all 22 recommended AP® Chemistry labs.

Order one per teacher.

2. SELECT THE SENSORS

With the Advanced Chemistry Standard Sensor Bundle, you will have all the sensors required to perform 35 of the 36 lab activities. You can also build your own from our offering of over 70 sensors (visit www.pasco.com).

Order one bundle per lab station (we recommend 3-4 students per lab station).

3. SELECT YOUR DATA COLLECTION AND ANALYSIS TOOL

Choose the SPARK Science Learning System

The SPARK Science Learning System (page 6) can be used in the classroom or out in the field and is a fully integrated science solution. Use standalone or connect to your computers.

Order one per lab station.

Or power your computers with SPARKvue software

Just connect your sensors to computers with our SPARKlink interface. Great for interactive whiteboards and LCD projectors as well. (See page 6 for more on SPARKvue and SPARKlink.)

Order one SPARKlink per lab station.

Order just one site license of SPARKvue per campus—install on every computer!

4. ADD A SPECTROMETER FOR THE ABSORPTION SPECTRA LAB

To perform the Absorption Spectra lab, a spectrometer is required. We recommend the Amadeus Spectrometer, designed for student use without sacrificing quality measurement. See page 3 for more information.

Order one Amadeus Spectrometer system per lab station, or purchase one for your lab and rotate.

*AP is a registered trademark of the College Board, which was not involved in the production of, and does not endorse, this product.

Advanced Chemistry Standard Sensor Bundle

Get the sensors needed to conduct the 36 Chemistry lab activities included with the Advanced Chemistry Teacher Guide — for use with your SPARK Science Learning System or with SPARKlink and SPARKvue on your own computers.

36 Lab Activities

States of matter and molecular interactions

Determine the Molar Mass of a Volatile Liquid
Exploring Gas Laws
Identifying an Unknown Metal
Molar Volume of a Gas
Molecular Interaction in Ethanol and Acetone
Separation by Liquid Chromatography

Quantities and reactions

Conductometric Titration
Determination of Electrochemical Series
Determining the Empirical Formula of a Compound
Determine the Percentage of Water in a Hydrate
Electroplating
Gravimetric Determination of a Precipitate
Mole Relationships in a Chemical Reaction
Organic Synthesis I—Preparation
Organic Synthesis II—Analysis
Analysis of Anions
Separation and Analysis of Cations
Analysis of a Coordination Compound
Synthesis of a Coordination Compound
The Breathalyzer™ Test for Alcohol

Solutions

Acid–Base Titration
Molecular Weight by Freezing Point Depression
Oxidation–Reduction Titration
Standardizing a Solution of Sodium Hydroxide
Using Different Indicators for pH Determination

Chemical thermodynamics

Enthalpy of a Chemical Reaction

Light and Matter

Absorption Spectra (Requires spectrometer system)
Colorimetric Analysis

Kinetics and equilibrium

Determining K_a by Half- Titration of a Weak Acid
Determination of the K_a Values of Two Isomeric Multi-Protic Acids
Determination of a Solubility Product
Determine the Equilibrium Constant for a Chemical Reaction
Determination of the Rate of the Decomposition of Hydrogen Peroxide
Order of Reaction
Properties of Buffer Solutions

Atomic and nuclear structure

Determining the Half-Life of an Isotope

Advanced Chemistry Standard Sensor Bundle

PS-2928

Includes:

PS-2170 Chemistry Sensor
PS-2116A Conductivity Sensor
PS-2121 Colorimeter
PS-2117 High Accuracy Drop Counter
PS-2115 Voltage/Current Sensor
CI-6716 Oxidation Reduction Potential Probe
PS-2166 Alpha Beta Gamma Radiation Sensor
(includes Digital Adapter PS-2159)

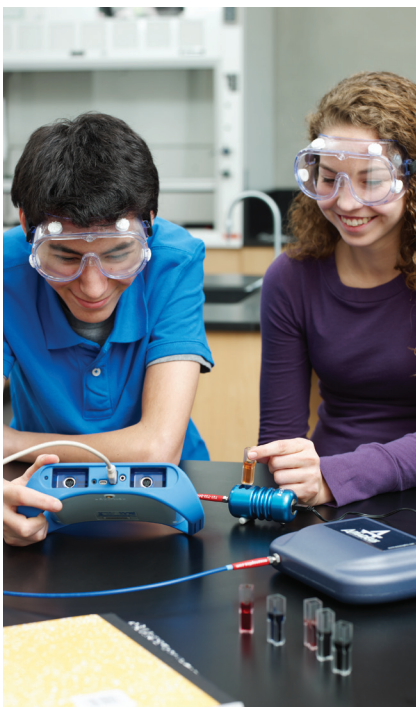


Real Spectrometry at a reasonable price

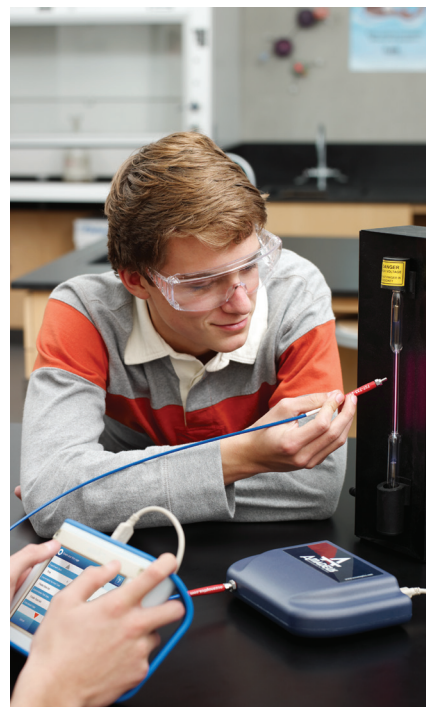
Measure absorbance, emission and fluorescence with this affordable spectrometer designed for high school use. The Amadeus has quality features and accurate data collection. Unlike many other inexpensive spectrometers, the Amadeus Spectrometer System uses a Tungsten bulb for its light source rather than a set of LEDs. It is built by Ocean Optics, an industry leader in Spectroscopy systems and includes their powerful Quantum software. Include the Spectral Tube Power Supply and Mount and any number of available spectral tubes for a complete solution to exploring emission spectra in your lab.

THE TEACHING ADVANTAGE

- Perfect for the "Absorption Spectra" activity from the Advanced Chemistry manual
- Spectral Range: 350 to 850 nm
- Resolution: 3 nm (FWHM) with a total of 300 datapoints



Students collect full absorption spectra to determine the concentration of the solution.



Quick quantitative identification of emission peaks from elemental and molecular species.

Amadeus Spectrometer System

SE-7183

Includes Amadeus spectrometer, Tungsten light source with power supply, 1.8 meter fiber optic probe, USB cable, 10 cuvettes, CD with display and analysis program for Windows. SPARK and SPARKvue will support Amadeus Spectrometer in June 2010.



Spectral Tube Power Supply and Mount

SE-9460

Spectral Tubes not included – select from list below.



Spectral Tubes available:

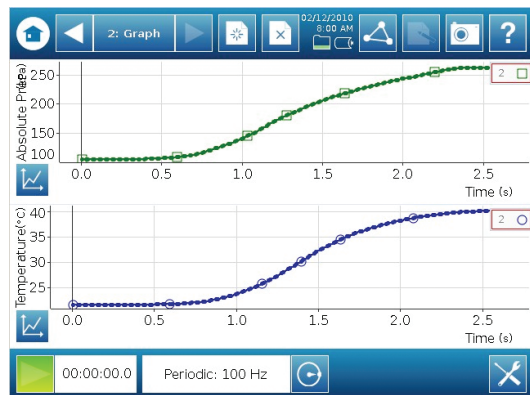
Argon SE-9463
Carbon Dioxide SE-9464
Helium SE-9462
Hydrogen SE-9461
Krypton SE-9465
Mercury SE-9466
Neon SE-9467
Water Vapor SE-9468

Investigate the Ideal Gas Law simply and effectively

Newly redesigned for 2010 the Ideal Gas Law Apparatus has a stable design which ensures repeatable results and long term reliability. By connecting a Pressure Sensor and a Temperature Sensor to this large syringe, students will be able to quantitatively investigate relationships between pressure, temperature and volume of a gas.

FEATURES:

- Low thermal mass thermistor
- Quick connect port for a pressure sensor
- Mechanical stop on the plunger to prevent damage



Students observe that both pressure and temperature increase as the volume inside the Ideal Gas Law Apparatus is decreased.



Students observe that both pressure and temperature increase as the volume inside the Ideal Gas Law Apparatus is decreased over time.

Ideal Gas Law Apparatus

TD-8596A

Includes Ideal Gas Law syringe, built-in fast response thermistor, and quick connect pressure port.



Recreate a classic experiment and determine absolute zero experimentally

The Absolute Zero Sphere has a constant volume – perfect for determining absolute zero temperature. Connect a Pressure Sensor and Temperature Sensor and immerse the sphere in water baths of several different temperatures. See pressure and temperature changes in real-time. Once the data is collected, students can use a linear fit to extrapolate the value of absolute zero.

Absolute Zero Sphere

TD-8595

Includes built-in Fast Response Thermistor Probe and quick connect pressure port.



Also Requires:

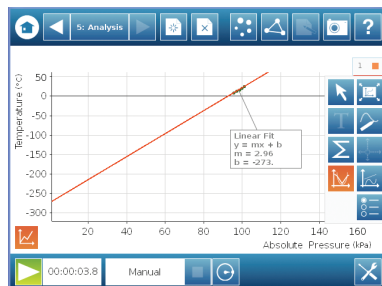
Chemistry Sensor PS-2170

or

Pressure/Temperature Sensor PS-2146

THE TEACHING ADVANTAGE:

- Experimentally determine the temperature of absolute zero
- Investigate the relationship between pressure and temperature (Gay-Lussac's Law)
- Discover the Ideal Gas Law



A linear fit can be applied to the pressure versus temperature data collected to extrapolate absolute zero.



Immerse the sphere in water baths of several different temperatures to see pressure and temperature changes in real-time.

USB Link

PS-2100A



Single sensor port connection to your computer.

PowerLink

PS-2001



Three sensor port connection to your computer.

PASPORT AirLink 2

PS-2010



Single sensor port for wireless connection to your Bluetooth-enabled computer.

Xplorer®

PS-2000



Single sensor port datalogger. Connect to computer or collect data in the field. Two-line display.

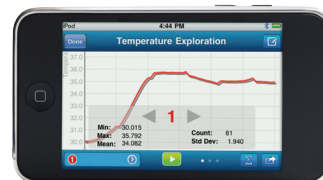
Xplorer GLX®

PS-2002

Includes 2 Fast Response Temperature Probes and 1 Voltage Probe.



Four sensor port graphing datalogger. Connect to your computer or use stand-alone.



And now use the PASPORT AirLink 2 to connect PASPORT Sensors to your iPhone or iPod Touch via Bluetooth. For more, see www.pasco.com

DataStudio® Software

Site License CI-6871G

**SYSTEM REQUIREMENTS**

Windows: Windows 2000 or higher, Pentium or equivalent processor, 50 MB hard drive space, 16 MB RAM

Macintosh: MAC OS X 10.4 or higher (Universal Binary), 50 MB hard drive space, 16 MB RAM

MULTI LANGUAGE SUPPORT (Windows version)

Arabic, Chinese (simplified), Chinese (traditional), Danish, English, French Canadian, German, Italian, Japanese, Norwegian, Portuguese (Brazilian), Russian, Spanish, Swedish, Turkish.

Also Available:

Single User License CI-6870G

All interfaces and dataloggers are compatible with both SPARKvue and DataStudio, and with all PASPORT Sensors.



SPARK Science Learning System™

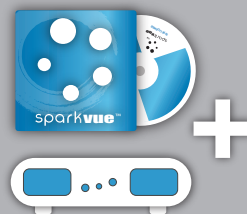
PS-2008

Includes temperature and voltage sensors, native SPARKvue software and over 60 free SPARKlab activities.



Completely portable hand-held device with 2 sensor ports – a fully integrated SPARKscience solution, featuring a rugged ergonomic design, native SPARKvue software and embedded SPARKlab collection.

Which do I choose?



Have computers for your science classroom or lab? Power them with a SPARKvue Site License, and outfit each computer with a SPARKlink.

or



Don't have computers or want more portability? The SPARK Science Learning System is not only portable, but is a fully integrated SPARKscience solution – it's all on board!

SPARKvue™

Site License PS-2400

Generous Site License includes rights to install SPARKvue on all computers on your campus.



SYSTEM REQUIREMENTS

Windows XP or higher; Mac OS X v10.5 or greater 300 MHz processor, 128MB RAM, 100 MB available disk space.

LANGUAGES:

Danish, Dutch, English, French, German, Italian, Kazakh, Norwegian, Portuguese, Russian, Spanish, Swedish, and Turkish.

For most current list, see pasco.com/sparkvue

SPARKlink™

PS-2009

Includes temperature and voltage sensors plus power adapter.



Two sensor ports for connecting sensors to your computer. Ideal for schools with sufficient computers available for science.

Acid-base titrations done quickly and accurately



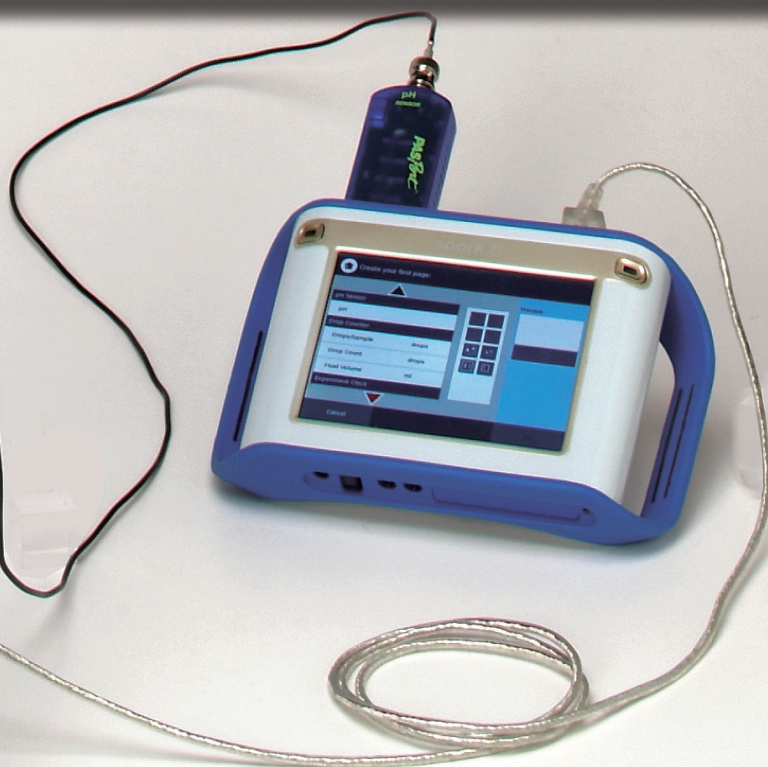
Chemistry Sensor
(temperature, pH, voltage and pressure)
PS-2170



High Accuracy Drop Counter
PS-2117



Magnetic Stirrer
SE-7700



PASCO® Chemistry

10101 Foothills Blvd. • Roseville, CA 95747-7100
www.pasco.com

B-0084
3/2010