microLAB 2017

EQUIPMENT
PACKAGES AND PRICING

COMPUTER-BASED
DATA ACQUISITION
TOOLS AND SOFTWARE FOR **CHEMISTRY**

1.888.586.3274 • www.microlabinfo.com

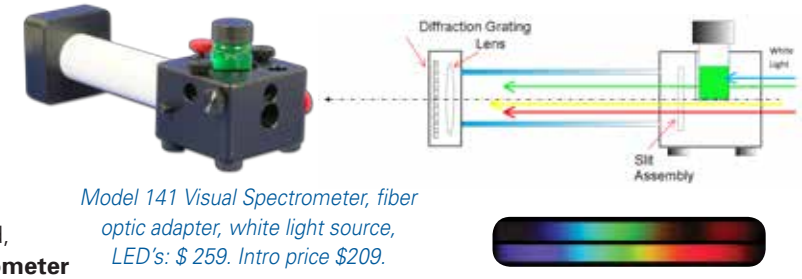
MicroLab Equipment Packages

MicroLab instruments may be purchased in five different packages with increasing sensor capability. Additional sensors can be added later. When purchased as part of a "package" (listed here or you can design your own – please call) the cost is discounted. Sensor packages are listed by chemical measurement and price.

There are no hidden costs. With addition of a computer, MicroLab packages are completely operational on delivery. A site license for MicroLab's high quality software is included with every instrument. You may load the software on lab computers and college networks. Students may download free personal copies of the software from the MicroLab web site to make graphs and reports at home. Periodic upgrades are available free from the MicroLab web site. MicroLab software runs on PC's running XP, Windows 7, Windows 8, Windows 10, and on Mac's with Windows emulators.

Atoms First: Light, Energy, and Atomic Models

Faculty using an "Atoms First" general chemistry organization experience a vacant spot early in the general chemistry lab. They are discussing atomic spectra, electron structure, and bonding. Traditional lab topics of reactions and wet chemistry don't fit. *MicroLab's "Atoms First" experiments provide hands-on experience with light and color, Planck's Law, atomic spectra, and atomic models.*

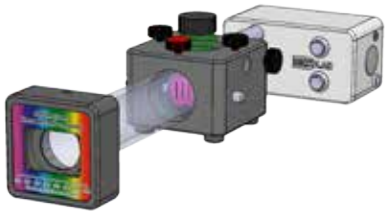


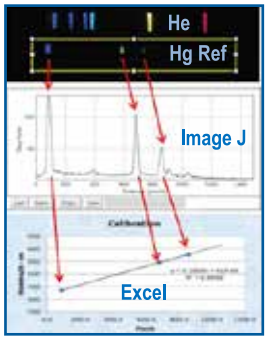
Model 141 Visual Spectrometer, fiber optic adapter, white light source, LED's: $ 259. Intro price $209.

MicroLab's patented **Model 141 Visual Spectrometer** is rugged, affordable, and easy to use. Couple it with our **Model 243 Spectrometer Web Camera and Spectrometer Mount** or a **cell phone or point-and-shoot camera**, the included fiber optic reference spectrum adapter, and free Image J pixel analysis software from the National Institutes of Health, and you have a powerful calibrated emission spectrometer with 1 nm resolution. Students can observe and measure both atomic emission and molecular absorption spectra.

Concepts You Can Develop With Your Students:

- Emission spectra of hot gases and solids – line and band spectra.
- Color and wavelength of light.
- Reference spectra, graphs, and spectrometer calibration.
- Atomic spectral "fingerprints" and identification of unknown elements.
- Molecular absorption spectra and the formation of color.
- Beer's Law and wavelength selection.
- Light source temperature and the Boltzman spectral distribution.
- Spectrometer design: Slit width, light throughput, and resolution. Three selectable slit widths permit students to see the competing effects of changing slit width on resolution (smaller is better) and on light throughput (larger is better). Students may easily photograph line spectra and determine Full Width Half Maximum (FWHM) resolution for the spectrometer.





The **141 Visual Spectrometer Package** includes an adjustable color temperature white light source for observation of absorption spectra of colored solutions. Also included are six adjustable power LED light sources at 400, 472, 525, 590, 640 and 880 nm for band emission spectra experiments, to visually demonstrate wavelength selection in absorption spectrophotometry Beer's Law experiments, and fluorescence and turbidity measurements.

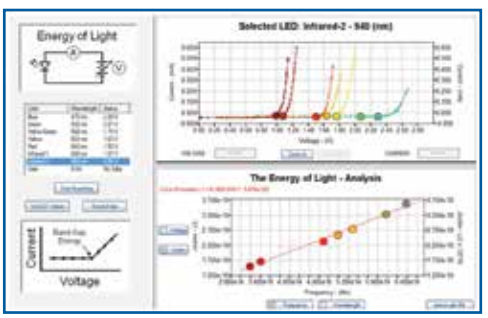
What's in the box: The Visual Spectrometer, Fiber optic adapter, adjustable white light source and power pack, LED kit, CD with Image J software and sample spectra. The 141 Visual Spectrometer is a Universal Sensor. It does not require a MicroLab for use.

Web Camera and Spectrometer Mount

Model 243 Web Camera and Spectrometer Mount. $ 119.

The Energy of Light / Planck's Constant *$129*

Our new interactive **Model 214 Energy of Light** module uses measurement of LED bandgap energy to demonstrate the energy and color of light, and to determine Planck's constant ± 5%.



MicroLab FS-528 Equipment Packages

Spectrophotometry		Intro FS-528-I	Advanced 528-A	Titrations FS-528-T	Conductance FS-528-C	Comprehensive FS-528-C2
Absorbance/Transmission Beer's Law, Kinetics Fluorescence, Turbidity, Backscatter Beer's Law path length experiments Controlled temperature kinetics	Integrated ***FASTspec 380***-880 nm scanning spectrophotometer	●	●	●	●	●
	Model 183 Vial Pack	●	●	●	●	●
	Model 186 multi-path length Adapter/Vial pack					●
	Model 257 20 Watt Heater		●	●	●	●
Thermochemistry / Gas Laws						
Freezing/boiling points Supercooling Heat of reaction Absolute zero Boyles Law Vapor pressure	Model 103 Thermistor	●	●	●	●	●
	Integrated 0-2 atm pressure sensor	●	●	●	●	●
	Model 2011 Gas Pressure Syringe	●	●	●	●	●
	Model 116 Gas Pressure Apparatus					●
	Model 109 Stainless Steel Thermocouple					●
Acid-Base Chemistry / Titrations						
Titrations Visual and spectrophotometric indicator end-points.	Model 106 Sample Illumination Module	●	●	●	●	●
	Integrated rotating magnetic field stirring	●	●	●	●	●
pH, buffers, Ka, Indicators, titration curves, spectrophotometric titrations	Model 121 pH electrode		●	●	●	●
	Model 107 pH electrode holder		●	●	●	●
	Micropipette, 100 µL		●	●	●	●
Drop-counting titrations Titration Curves 1st & 2nd derivative plots	Model 226 IR Drop Counter, non-corroding clamp			●	●	●
	Model 154 Constant Volume Drop Dispenser, non-corroding clamp			●	●	●
Reflected light indicator titrations	Model 112 Light sensor					●
Electrochemistry						
Electroplating, Avogadro's number Atomic Mass	Integrated 0-5 volt, 750 mA regulated power supply	●	●	●	●	●
Half-Cells Electrochemical Series, Nernst Equation	Model 133 Voltage Lead	●	●	●	●	●
	Model 151 Metal Kit		●	●	●	●
	Model 152 Half-cell module		●	●	●	●
Ionization Conductance Titrations	Model 160 Conductance Electrode				●	●
Redox Titrations	Model 125 Redox Probe					●
Scientific Package Total		**$ 789**	**$ 974**	**$ 1125**	**$ 1215**	**$1490**

Atoms First / Visual Spectrometer	
Visual Spectrometer, Fiber Optic reference Spectrum Adapter, Adjustable Color Temperature White Light Source	**$ 299**

Atoms First Planck's Constant / Camera package			
Planck's Constant / Energy of Light	Model 214 Energy of Light Module	**$ 129**	Atoms First course organization emphasizes spectra, atomic structure, and atomic models early in the course. This content is not well supported by traditional "wet labs". MicroLab "Atoms First" experiments provide hands-on experience with light and color, Planck's Law, atomic spectra, and atomic models.
Web camera package with camera mount for visual spectrometer. Calibrated atomic spectra measurements and atomic models.	Model 243 Web camera and mount	**$ 119**	

The MicroLab Advantage

With three U.S. patents recently granted, MicroLab's technology and software are at the cutting edge. MicroLab's instruments are used in intro, general, analytical, physical, organic, and biochemistry laboratory courses, in undergraduate and graduate research, and in industrial and research laboratories.

Faculty can easily integrate MicroLab into existing laboratory curricula. They will save lab time, reduce sample size, cost, and prep time, and improve safety. Students will gain high resolution measurements and instant visualization of data. One MicroLab FS-528 can replace multiple single-purpose instruments.

Sensors

		Sensor Price
103	Thermistor temperature sensor / insulated stainless steel shaft	$ 32
109	Stainless steel "K" thermocouple with cord and plug	$ 44
112	Light sensor	$ 34
116	Gas Pressure Apparatus	$ 19
121	General purpose pH probe, BNC	$ 79
125	Redox probe, BNC	$ 97
127	Dissolved oxygen probe, BNC	$ 195
133	Voltage lead, banana plug for MicroLab 524/528	$ 13
135	Gas Chromatography Cable	$ 35
141B	Visual Spectrometer with Fiber Optic Cable & Software, white light source	$ 299
144	Demonstration Camera Mount	$ 35
151	Seven-element Metal WIre Kit (Ag, Cu, Ni, Fe, Pb, Zn, Al)	$ 17
152	Multi-EChem Half Cell Module	$ 47
154	Precision Constant Volume drop dispenser plus Model 156 clamp	$ 85
160	Conductance probe, mini-phone plug	$ 95
170	Cyclic Voltammetry Module	$ 295
175	Ion-Specific Electrodes, BNC	Call
180	Vial pack for FS522/524 spectrophotometer, 3 sizes x 4 vials each.	$ 14
186	Adapter/Vial kit for FS-528	$ 35
211C	Diode Array Spectrophotometer	$ 1299
211FOC	Fiber optic adapter	$ 120
214	Energy of Light module	$ 129
214D	Demo power pack/DVM lead for Model 214.	$ 28
226	IR Reflective Drop Counter ($112) with Model 158 clamp ($16)	$ 128
232	Model 232 Electrochemistry Electroplating Module	$ 28
233	Digital Voltmeter	$ 30
243	Web camera and spectrometer mount to fit Model 141 Visual Spectrometer	$ 119
245	Atoms First Planck's Constant/Camera Package	$239
254	Automated Constant Volume Drop Dispenser with 156 clamp and 255 control module	$ 294
257	Immersion heater, 20 watts	$ 25
290	Sensor adapter module	$ 49
292	Electrochemistry Module: Coulometry/Voltammetry/Isolated Sensors	$ 225
910	MicroLab 40+ Experiment CD in Word and WordPerfect formats with site license to modify and publish at user's college or university	$ 50
920	Introductory manual, **Measurement: The Basic Science**, 70 pages, color	$ 12
802	MCL MicroLab Compact Laboratory cabinet	$ 199
2260	Drop dispenser	$ 12

Getting Started in Electrochemistry

Here is a quick, affordable way to get your students started with electrochemistry. The MicroLab electroplating power supply and half-cell modules are unique, rugged, require small amounts of chemicals, and will last a long time. They have been designed for inexpensive entry into this field. To explore electrochemical series and Nernst equation experiments, your students must be able to measure voltage. This can be done with a MicroLab FS-522/524/528, another brand of lab interface that measures voltage, or a simple digital voltmeter that you might have on hand, purchase locally, or purchase from MicroLab.

The table below shows equipment packages for these several alternatives. The metal kit contains two each 5 cm lengths of wire representing seven elements: Cu, Ni, Fe, Pb, Zn, Al, and Ag (one wire) Sandpaper is provided to clean the metal samples before each measurement. Sample experiments are available on our web site.

Model 232 Electrochemistry Module

Model 151 Seven-element Metal Wire kit

Model 233 DVM

Model	Component	Electrochem Kit 235	Electrochem Kit 236	Electrochem Kit 237
151	Seven element metal kit **($17)** Two each metal samples + sandpaper	The Electrochemical Series, Nernst Equation Models 151, 152 $62	Add Electroplating Module 232 $85	Add Digital Voltmeter Model 233 $117
152	Half-cell Module **($47)** 			
232	Electroplating Module + clip leads + two copper foil anodes ($25) .			
+-233	Digital voltmeter + test leads and battery **($30).**			

MicroLab's Compact Laboratory: Solving Bench Space and Security Problems

Adequate bench space and computer security are problems in many labs. MicroLab's Compact Laboratory – the **MCL** - can help.

MCL integrates MicroLab's FS-528 ***FASTspec***$^{+plus\text{™}}$ lab interface, sensor storage, and a portable computer in a compact, rugged, and easily secured package.

MCL's 14.5" x 17" footprint on a lab bench is just slightly larger than an open laboratory manual. The computer keyboard is safely located five inches above the lab bench. Non-skid rubber feet hold the cabinet securely in place. Inside storage secures the computer power pack and cables. Only AC power, mouse, and network cables leave the cabinet, and networking can be provided wirelessly. The cabinet can store vertically to save space.

The MCL cabinet can be purchased separately, or for convenience as a package containing a MicroLab FS-528 lab interface, a Dell computer with mouse, sensors, software, and the compact desk cabinet with sensor storage and security cable. There are no hidden costs and only one item to order. Warranty and support are provided by both MicroLab and Dell.

MicroLab Compact Laboratory

Model 802 MCL MicroLab Compact Laboratory Cabinet	**$199**
Model 802 MCL Cabinet plus Dell Latitude 14 5000 Series network-certified laptop computer, USB mouse, security cable and lock	**$989**