UV-visible spectroscopy solutions

for chemical analysis

Agilent 8453 UV-visible spectrophotometer

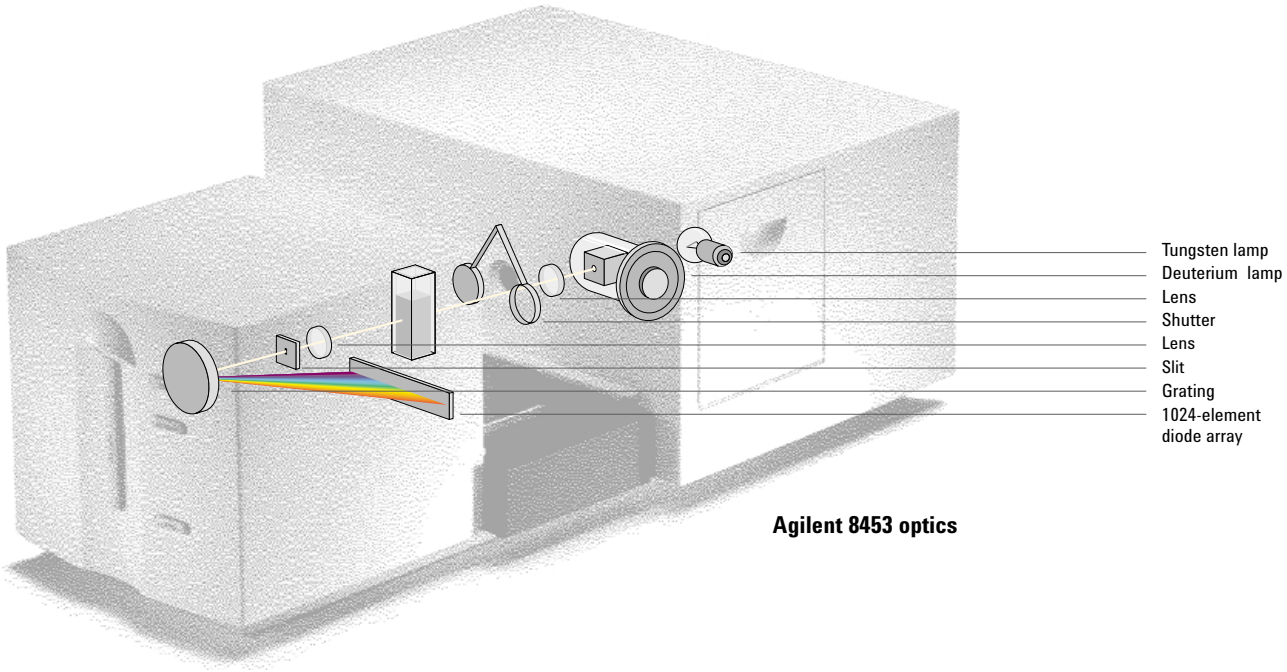
Our measure is your success.

products | applications | software | services

Agilent Technologies

Agilent's UV-visible systems

UV-visible spectroscopy solutions that satisfy the diverse needs of analysts in routine QA/QC, research, and method development laboratories.



Agilent 8453 optics

The Agilent 8453 UV-visible spectrophotometer offers the latest in diode-array technology:

- Small footprint to save bench space
- Prealigned deuterium and tungsten lamp light sources for trouble-free maintenance
- Built-in buttons to measure sample, standard, and blank for convenient measurements even when wearing gloves
- Thermally stable ceramic spectrograph for a wide operating temperature range
- Communication through GPIB or LAN for dedicated or networked PC control
- Firmware upgrade from PC for easy participation in future developments
- Built-in GPIO interface for control of accessories
- Compliance with all requirements of the European Pharmacopoeia (EP) and United States Pharmacopeia (USP)

The diode-array advantages

Backed by over two decades of experience in the development and manufacture of diode-array spectrophotometers, the Agilent 8453 gives you clear advantages.

- Fast spectral scanning for complete spectral information useful for:
  - proof of identity and pureness of the sample
  - additional information for "out of specification test result" investigation in a regulated environment
  - re-evaluation with different method
  - multi-wavelength applications such as user-defined equations
  - multicomponent analysis of mixtures
- Open sample area for convenient sample handling
- High throughput optics guarantees excellent signal-to-noise for high sensitivity
- Virtually absolute wavelength resettability allows selection of optimum wavelength and use of electronic standards
- Exceptional ruggedness and reliability

Optical performance

The Agilent 8453 offers the advantages of a diode array plus significant improvements in optical performance:

- 190 – 1100 nm wavelength range
- 1 nm slit width
- < 0.03 % stray light

Good Laboratory Practice

The Agilent 8453 supports compliance with GLP regulations:

- Serial and firmware revision number held in firmware
- Own clock for time and date stamps of the spectra
- Extensive self-test procedures that check the electronics and key optical characteristics to ensure consistent performance between validation
- Built-in electronic logbooks, which contain the results of self-tests, notes in instrument maintenance, events and errors

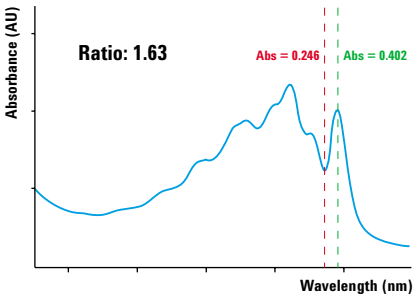
Sipper operation is easy with built-in measurement buttons

Side door for easy lamp change

Open sample area means large accessories are easy to use – here the Peltier cell holder

Specifications – Agilent 8453 UV-Visible spectrophotometer

Optical performance		
Wavelength range	190–1100 nm	
Slit width	1 nm	
EP resolution test	> 1.6	toluene in hexane, ratio abs. at 269 nm/266 nm
Stray light	< 0.03 %	at 340 nm ($NaNO_2$, ASTM)
	< 0.05 %	at 220 nm (NaI, ASTM)
	< 1 %	at 198 nm (KCl, EP)
Wavelength accuracy	< ± 0.5 nm	0.5-second scan (NIST 2034)
	< ± 0.2 nm	at 486.0 and 656.1 nm
Wavelength reproducibility	< ± 0.02 nm	ten consecutive scans (NIST 2034)
Photometric accuracy	< ± 0.005 A	at 440.0, 465.0, 546.1, 590.0, and 635.0 nm, 1 A (NIST 930e)
	< ± 0.01 A	at 235, 257, 313, 350, 430 nm, (potassium dichromate, EP method)
Photometric noise	< 0.0002 A	sixty 0.5 second scans at 0 A, 500 nm, rms
Photometric stability	< 0.001 A/h	at 0 A, 340 nm, after 1-hour warm up, measured over 1 hour, every 5 seconds, constant ambient temp.
Baseline flatness	< 0.001 A	0.5-second blank, 0.5-second scan, rms
Typical scan time	1.5 second	full range
Shortest scan time	0.1 second	full range
Time until next scan	0.1 second	full range, 0.1-second scan, up to 150 consecutive scans
Physical dimensions		
Height x width x depth	185 x 344 x 560 mm (7.3 x 13.5 x 22.0 inches)	
Weight	16.5 kg (36.3 lb)	
Power requirements		
Line voltage	90–264 V AC	
Line frequency	47–63 Hz	
Power consumption	70 VA typical	
Environmental conditions		
Operating temperature	0–50 °C (32–122 °F)	
Non-operating temperature	-40–70 °C (-4–158 °F)	
Humidity	< 95 %, at 25–40 °C (77–104 °F)	

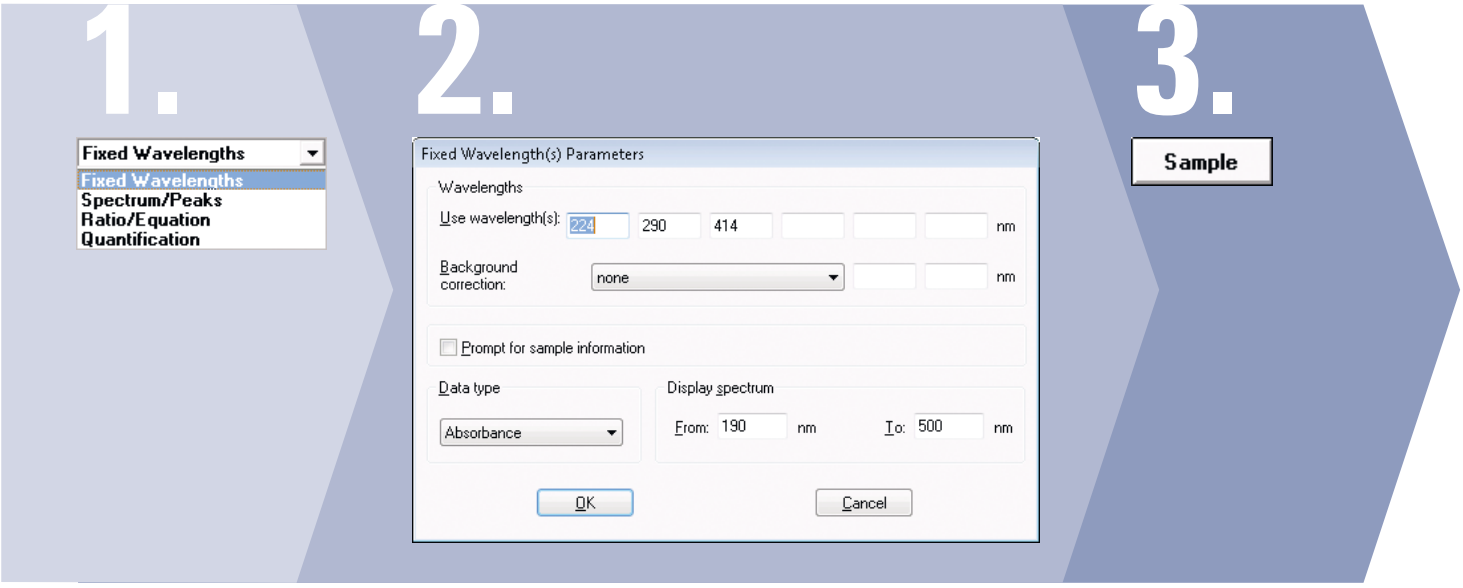


Spectrum of a 0.02 % v/v solution of toluene in hexane

Solutions for general purpose tasks

Easy to learn and easy to use for increased productivity

Select the task you want **Enter the parameters** **Do the measurement**



Easy to use

The Agilent 8453 UV-visible spectroscopy system may well be the easiest UV-visible system you will ever use.

Three steps are all you need to get results:

1. Select the task you want
2. Enter the parameters and
3. Do the mesurement

Graphical user interface

Usability tests performed with actual users in their own labs initiated a completely new approach to user interface design. The Agilent 8453 UV-visible spectroscopy system uses symbolic graphics to:

- make the system intuitive, easy to learn, and easy to use,
- provide confirmation of current status at a glance,
- provide visual confirmation of actions, and
- provide fast access to frequently performed activities.

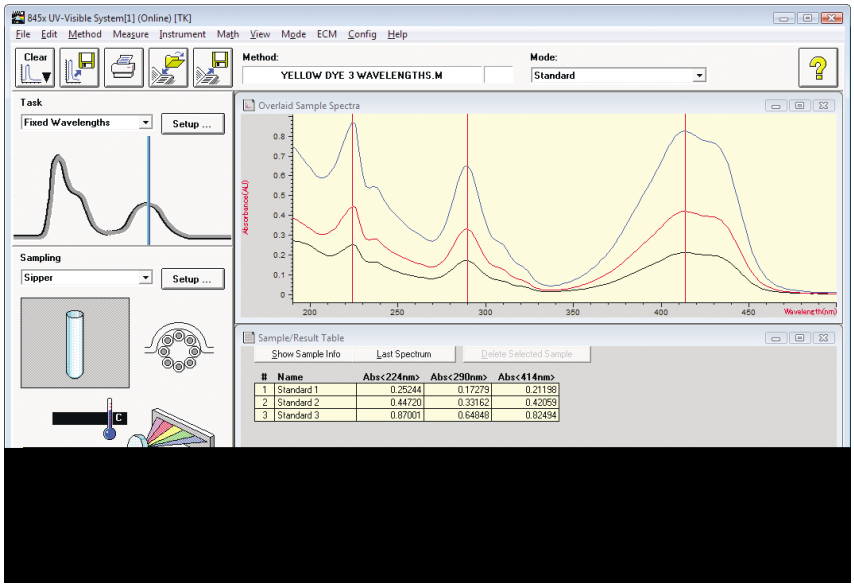
Automation

A single dialog box makes setup for automated analyses easy and quick. You can use automation to guide an operator through a series of manual measurements, or combine it with sampling accessories to provide semi- or fully automated analysis. The automation function controls

- the Agilent sipper system
- the Agilent XY autosampler
- the Agilent multicell transport

The optional control samples allow you to run an automatic system suitability test before quantitative analyses.

Your results are displayed automatically



You may print a report

Compatibility

The Agilent UV-visible ChemStation uses the Microsoft® Windows environment so you can run other programs, such as word processors and spreadsheets, at the same time, and transfer data using copy-and-paste.

Clear and simple reports

Generating reports could not be easier. Simply click the printer icon in the toolbar and a standard report is printed. When possible this standard report is printed on a single sheet of paper. The report format depends upon the task in use but all reports include essential GLP information such as method and data file name, date, time, operator, overlay of sample spectra and result table.

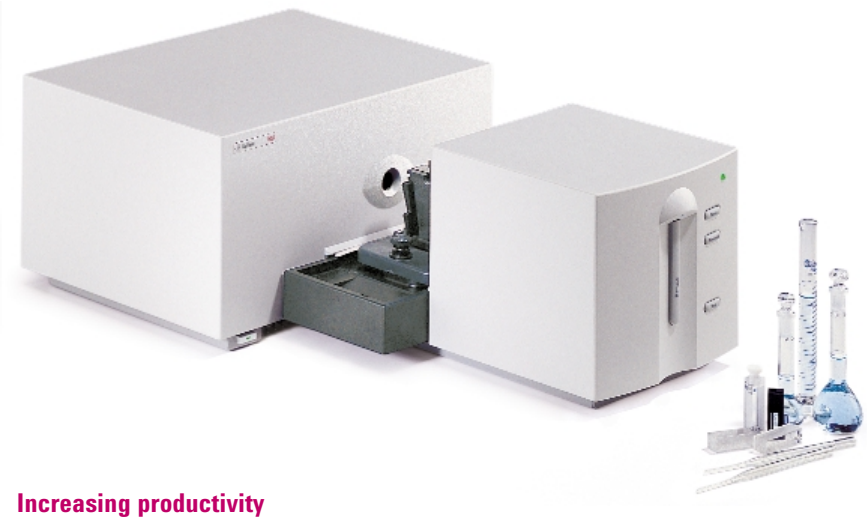
Productivity

The Agilent 8453 system is a highly productive UV-visible spectroscopy system. Its combination of ease of learning, ease of use, fast spectral acquisition, fast data evaluation, report generation, and automation lets you get results fast – even if you only use the system occasionally.

Add diagnostic tools such as performance verification, system documentation, and the extreme reliability of the system and you will spend the minimum time with administration or maintenance and repair.

Solutions for chemical analysis

At a glance



Selection of software modules

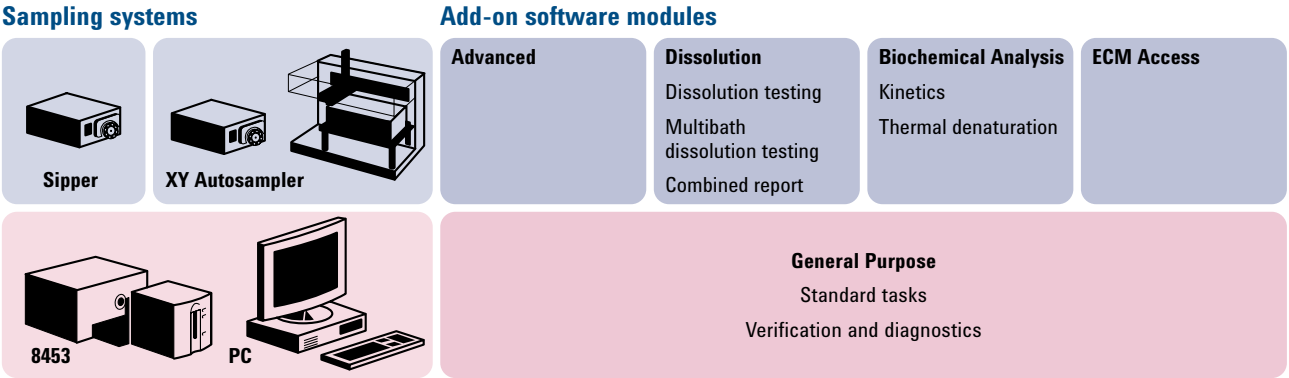
Adapt the 8453 spectroscopy system to your needs by adding different software modules to the general-purpose software. One or more modules can be added to at the same time to support different applications.

- General-purpose software, including verification and diagnostics, for standard applications
- Advanced software for more capabilities in data evaluation, method development and automation
- Biochemical analysis software, including kinetics and thermal denaturation
- Dissolution testing software for single and multibath dissolution testing
- OpenLAB enterprise content manager for handling and sharing methods and data across the web
- Security pack software to support compliance with 21 CFR Part 11

Increasing productivity

The UV-visible ChemStation software allows control of different sampling systems to increase throughput. A common feature of the general purpose, advanced and dissolution software is that the predefined methods work with different sampling systems – without changing parameters.

Therefore, a method developed for manual sampling can easily be used with a sipper or autosampler, depending on the actual demand.



8453 spectroscopy system with general purpose UV-visible ChemStation software

Accessories

Cell holders

Agilent Technologies offers a range of single cell holders, providing you with the ability to analyze a wide variety of samples. Unless otherwise stated the holders accept cells with path lengths up to 10 mm.

Standard cell holder: Ensures quick and precise cell positioning for each measurement. Supplied standard with all Agilent spectrophotometers.

Thermostattable cell holder: When connected to a circulating-water bath, ensures constant sample temperature for temperature-sensitive analyses. An optional accessory provides water-driven stirring with magnetic stirring bar for 10-mm cells.

Long-path length cell holder: Holds rectangular and cylindrical cells with path lengths up to 100 mm.

Multicell transport

The multicell transport provides a significant increase in productivity when you need to do simple, repetitive measurements on a small number of samples, or when you want to follow changes in several samples (for example, enzyme kinetic studies). The multicell transport features:

- Full control through software
- Eight cell positions (for example, one blank and seven samples)
- Random access to all positions
- Water-thermostattable using external water bath, 5–90 °C temperature range and ±0.3 degrees temperature difference between any two cells at 37 °C
- Less than 1 second to move between adjacent cells
- ± 0.1 mm position repeatability
- Optional water-driven magnetic stirring module

Sipper system

For repetitive measurement of liquid samples a sipper system improves productivity and eliminates errors caused by manual cell handling. The Agilent sipper system comprises a peristaltic pump and a quartz flow cell:

- Full control through software
- Variable pump, delay, and return time
- Flow cell with 10 mm path length, 3 mm diameter, and 80 µL volume
- Constant-speed peristaltic pump with Tygon pump tubing
- Minimum sample volume of approximately 1 mL
- Typical sampling time of 20 seconds

Peltier thermostatted cell holder

Use the Peltier controller and cell holder when you require precise or variable temperature control:

- Built-in magnetic stirrer
- Heat exchanger for sample pre-heating when using sipper system
- Fully controlled through software and GPIB interface
- External sensor for precise sample temperature (optional)
- Typical range of 10–100 °C (-10 to +80 degrees relative to ambient) without need for water cooling
- Accuracy of ± 0.2 degrees at 20–40 °C, ± 0.3 degrees at 0–20 °C and 40–60 °C, ± 0.5 degrees at 60–100 °C
- Reproducibility of ± 0.1 degrees at 0–60 °C, ± 0.2 degrees at > 60 °C
- Stiring speed of 40–1000 rpm

Cell holders

Multicell transport

Peltier thermostatted cell holder

Autosampler

Combine an XY autosampler with a sipper system and you can measure large numbers of samples fully automatically in unattended mode. The XY autosampler features:

- Full control through software
- Capacity of up to 240 samples
- Wash station for optional rinsing between samples
- 10–13-mm diameter sample tubes with maximum height of 100 mm
- Typical transit time (adjacent samples) of approximately 6 seconds (including raising and lowering probe)
- Typical time per sample of 25 seconds (including sipper operation time)
- Minimum sample volume of 2 mL.

Cells

Agilent Technologies offers a range of quartz cells for standard and flow-through operation including:

- Regular rectangular cells with path lengths of 1, 2, and 10 mm
- Cylindrical cell with 100-mm path length
- Stoppered cells to protect your sample from air and ideal for use with the external sensor of the Peltier temperature controller
- Flow cells of different designs with screw fittings and path lengths of 0.1, 0.2, 0.5 1, 2, 5 and 10 mm
- Semi-micro and micro cells with path lengths of 2 and 10 mm for minimum sample volumes of 15 and 60 µL respectively

Third-party accessories

A wide range of accessories, designed for or compatible with Agilent spectrophotometers are available:

- **Custom Sensors & Technology** fiber optics coupler, fibers and sampling devices
- **DBS** Peltier devices for single cell and multicell transport
- **Gilson** autosamplers that are controlled directly from the Agilent UV-visible ChemStation software
- **Labsphere** diffuse reflectance accessories
- **Applied Photophysics** stopped-flow accessory for fast kinetics
- **Hi-Tech** stopped-flow accessory for fast kinetics
- **Distek** dissolution baths

Agilent support

Agilent has support centers in 85 countries supplying a wide range of support products that can be tailored to your needs.

For example, the Agilent network of Analytical Response Centers provides direct access to support professionals who help you resolve operational difficulties, and offer assistance and advice on running Agilent chemical analysis software. They also help you to solve analytical problems, to keep your equipment up to date, and to maintain GLP standards.

All of us at Agilent are here to help you meet your chemical analysis goals, not just now but also long into the future.

Ask your Agilent representative for more details or see the Agilent Columns and Supplies Catalog.
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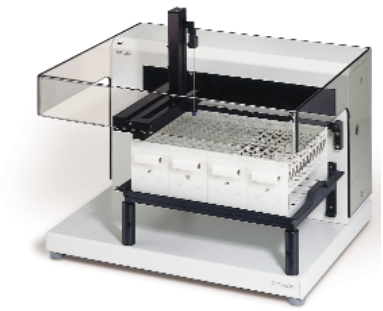
Sipper system



Autosampler

Cells

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