HUMAN HEALTH

ENVIRONMENTAL HEALTH

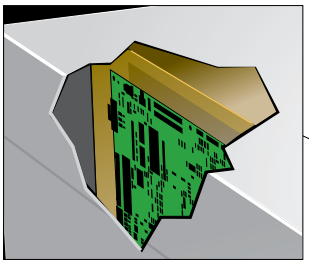
BRINGING PERFORMANCE AND PRODUCTIVITY INTO FOCUS

Optima 7x00 Series

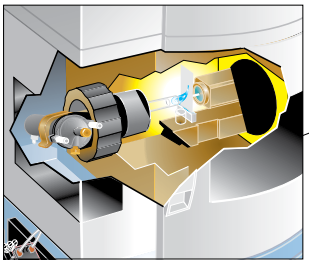
ICP-OES Systems

PerkinElmer®
For the Better

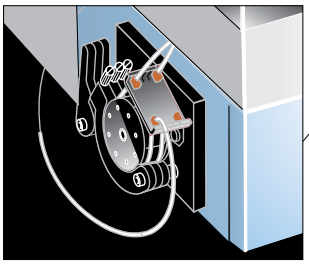
A WORLD OF OPPORTUNITY



Compact solid-state RF generator



Quick-change adjustable torch mount



Built-in three-channel peristaltic pump

THE OPTIMA 7X00 SERIES

Better by design

The latest evolution of the world's most popular line of ICP instruments, the Optima™ 7x00 Series delivers exactly the right level of analytical capacity, precision, flexibility and speed, no matter what your requirements.

Developed with a variety of expanded capabilities in response to customer needs and real-world applications, the Optima 7x00 Series (which includes the Optima 7000 DV, 7100 DV, 7200 DV, 7300 DV and 7300 V) enables laboratories to lower their cost per analysis and to run more samples per hour. Each instrument has also been precision engineered to minimize day-to-day maintenance and virtually eliminate QC failures.

The result is a full family of reliable, robust, feature-rich solutions that gives every customer – from the simplest quality assurance lab to the most complex research lab – the tools they need to optimize work-flow and enhance productivity.

Patented solid-state detectors, third-generation, solid-state RF power supply and a purged optical system provide superior performance and enhanced reliability, reducing operating costs and ensuring that your instrument is available when needed. Automatic dual viewing of the plasma (available on four of the five platforms) offers uncompromising performance – axial viewing provides the lowest detection limits while radial viewing permits extended working ranges. Plus, Optima's unique high-resolution mode improves accuracy and speeds method development. The instrument's sophisticated electronics even enable real-time graphics display, enhancing instrument optimization by allowing parameter changes while viewing data.

EXCELLENCE RUNS IN THE FAMILY

Optima 7000 DV

The Optima 7000 DV brings advanced technology to laboratories requiring flexibility and excellent analytical performance for varied and moderate sample loads. The CCD array detector allows you to collect a complete analyte spectrum at speeds that far exceed competitive systems. Automatic dual viewing ensures the lowest detection limits and the widest working ranges. The Optima 7000 DV is the ideal solution for research and quality assurance laboratories that have a wide variety of samples and lower frequency of analysis.

The custom-designed solid-state CCD array detector, solid-state RF power supply and purged optical system provide both superior measurement stability and enhanced reliability, reducing operating costs and, more importantly, ensuring that your instrument is available when needed. Computer-controlled gas flows and mass-flow control of the nebulizer gas ensure day-to-day reproducibility.

Optima 7100 DV and Optima 7200 DV

The Optima 7100 DV and 7200 DV offer automatic dual viewing for the lowest detection limits and widest working ranges. Capable of analyzing large sample loads quickly, the Optima 7100 DV ICP-OES is the ideal solution for quality control laboratories that do not require sensitive alkaline metals. The Optima 7200 DV offers improved sensitivity for alkaline measurements at slightly slower sample throughput.

Optima 7300 V

The Optima 7300 V offers the ideal solution for laboratories requiring excellent performance and productivity but that don't require the degree of sensitivity and flexibility offered by a dual-view optical system. The Optima 7300 V also delivers all the functionality and reliability of the Optima family to users (such as used oils or specialty metals laboratories) who may require – or simply prefer – a vertical torch configuration.

Optima 7300 DV

The Optima 7300 DV represents the ultimate ICP-OES instrument in terms of optimizing both performance and productivity. Capable of determining more than 73 elements in seconds, the Optima 7300 DV can run more samples per hour at a lower cost per analysis than any other system. Sample throughput is maximized in all areas of the instrument, from the sample introduction system to the unique, automated sample integration modes.

With its dual viewing of the plasma and two solid-state detectors (one for UV, one for Vis), the Optima 7300 DV offers superior detection limits and true simultaneous measurements, ideal for laboratories with moderate to heavy loads of difficult samples.

QUICK GLANCE

- Complete family of solutions to meet a variety of performance, productivity and budgetary needs
- Dual-view optical system ensures the widest working range in a single method
- Vertical torch model delivers economical option for specialized applications
- Versatile wavelength selection for analysis flexibility
- Superior optics and excellent RF stability make it easy to meet U.S. EPA and DIN regulations
- Enhanced sample throughput and performance with simultaneous background correction

Features and benefits of the Optima 7x00 Series

Unique optical systems	Deliver superior light throughput and measures all wavelengths of interest for enhanced productivity
Automatic dual viewing of the plasma	Axial viewing allows ultratrace measurements because it provides a longer emission path for increased sensitivity Radial viewing permits percentage concentration measurements Both are possible; automatically in single method (Dual viewing available on all models except the Optima 7300 V)
Efficient, solid-state RF power supply	Ensures robust plasma and eliminates the need for costly power tubes High efficiency reduces energy consumption Only single-phase 20 amp, 220V required
High-performance detectors	Provide exceptional detection limits, reduce interferences and improve accuracy Designs are custom and application-specific for ICP analysis
Flexible performance characteristics	System can adapt to the requirements of a specific application – short analysis times for elements that have high concentrations and longer analysis times for elements where detection limits are critical Determined automatically
Adjustable, quick-change torch cassette	Requires no tools and simplifies torch assembly Robust, field-tested sample introduction cassette. Adjustable while ICP is running Optimizes performance for difficult samples Accommodates a vast array of sample introduction accessories that make sample analysis simple, regardless of the sample matrix. Accessories include: • Nebulizers; concentric, MiraMist, HF resistant, cross flow and many others • Spray chambers; cyclonic and Scott, glass and HF resistant • Sample injection systems (Quick-change torch cassette available on all models, except Optima 7300 V)
Autosamplers	Application driven autosamplers available, including the compact S10, and selected models from CETAC and ESI
Limited component movement and Dynamic Wavelength Stabilization™	Eliminate peak profiling and searching, and ensure exceptional wavelength accuracy, reproducible performance, exceptional long-term stability, superior analytical accuracy and reliability. Simultaneous measurement of spectrum assures excellent precision
Environmentally stable, easily accessible sample compartment and optical system	Provides exceptional stability, eliminating the drift commonly experienced with other systems
SmartRinse™ software feature	Customizes rinse times based on element concentrations in each sample
Compact benchtop design	Conserves valuable laboratory space. Can fit on your benchtop based on your specifications
Unique, compressed-air shear gas system	Removes the cool tail plume of the plasma to eliminate interferences caused by the cooler regions in the plasma gas. Provides a maintenance-free, reliable system compared to alternative methods that use expensive argon gas and cones prone to clogging
WinLab32 Software	Provides all the tools you need to analyze your samples, report and archive data and ensure regulatory compliance WinLab32™ adapts to your needs; no restrictive set procedures

See next page for more details

SOFTWARE TOOLS FOR OPTIMUM PERFORMACE AND SIMPLICITY

All aspects of the Optima 7x00 Series are computer-controlled using WinLab32™ software, including gas flows, RF power, viewing position and purge rates. In fact, all analytical data and spectra can be stored, recalled and examined with complete confidence. This enables you to reprocess stored spectra, saving precious time re-running samples and making it simpler than ever to archive records.

WinLab32 combines practical functionality with advanced capabilities, ensuring the software will grow as your needs change. Dual internal processors support continuous graphics display, a useful tool for instrument optimization and method development. Integrated FIAS control and external triggering extend application of the system to sophisticated techniques, including flow injection, speciation and laser ablation sampling.

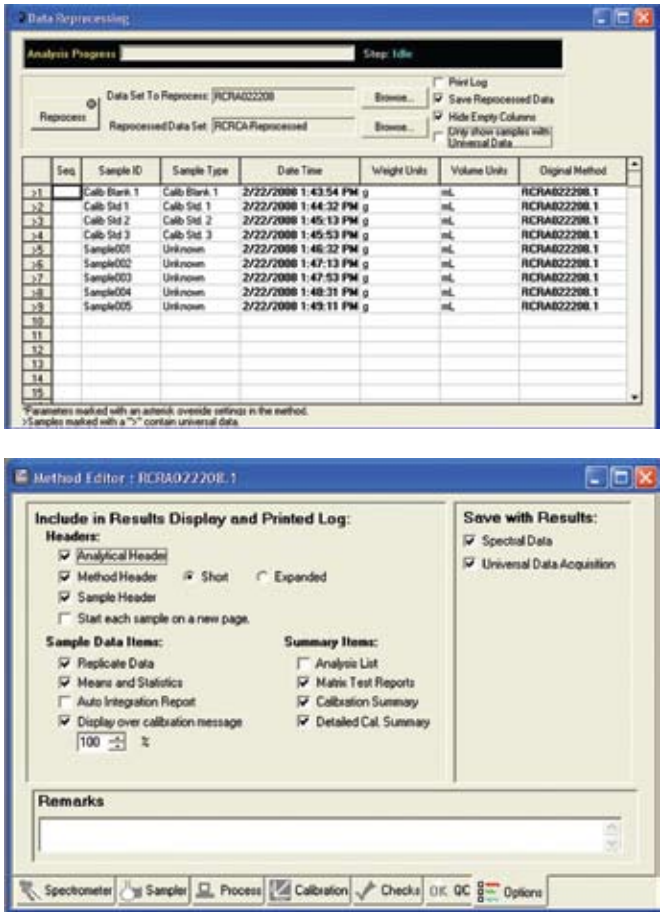


Figure 1. When running in Universal Data Acquisition (UDA) mode, Optima will record all of the emission spectra for every sample regardless of the elements being determined. This UDA capability allows users to retroactively use data that was not in the original method to determine additional elements or measure at alternative wavelengths.

Developed in response to customer needs

This flexible and easy-to-use Windows®-based software now offers an even greater degree of functionality and simplicity than ever before thanks to a range of customer-driven enhancements:

New methods of addition

Users can now perform standard additions calculations by simply selecting the equation they wish to use. Both method-of-additions calibration as well as the classic standard additions calibrations are possible.

"Universal Data Acquisition" mode

Enables users to – optionally, on demand – collect all the spectral data for every sample regardless of the elements being determined. This then allows analysts to retroactively determine the concentrations of elements not in the original method or at alternate wavelengths, saving precious time and resources.

Programmable "Over Calibration" message

Users can set an "over calibration limit" and specify whether or not "over calibration" messages are displayed when samples are run.

"Reprint Original Data" function

Allows users to create a verbatim copy of their original printout – ideal for regulatory environments (or other audit situations) when data needs to be presented exactly the same.

Flexibility during autosampler runs

By simply clicking on the "Append Method" button, users can dynamically add to autosampler run lists even after an analysis has started.

Detailed version of calibration summary

Provides specifics about a calibration – including "expected concentrations" vs. "measured concentrations" – enabling users to ensure the accuracy of their calibration and the quality/validity of their results.

Customizable "Set Limits" for individual elements

A new "Sample Limits" tab allows users to quickly and easily set up sample limit checks. When a sample result falls above or below a specified range, a message is displayed in the "Results" window. Users can specify whether or not they want the range included in the message.

Detection limit diagnostic

One button diagnostic causes measurements of blanks and calculations of detection limits – number of replicates and standard deviation multipliers are fully user programmable.

Continuous graphics

Continuous graphics offer a look at how the instrument is operating by acquiring and displaying data in real-time. The operating parameters of the instrument and RF generator can be modified as data are acquired, allowing method optimization to be further enhanced. For example, RF power and nebulizer flow can be changed while their impact is monitored. Peristaltic pump speed can be set to improve noise and signal intensity, maximizing system performance.

Confidence in your analysis

Built-in diagnostics check each component to verify proper instrument operation and run a method self-check to make sure everything's correct to ensure method validity. WinLab32 takes advantage of the many security features of the Windows® operating system, including user-defined, password-controlled access to software functionality.

Regulatory compliance

Whether regulations are internal, industry or government-imposed, WinLab32 gives you the tools you need to adhere to even the most stringent of them. An Enhanced Security™ (ES) version of WinLab32 is also available that provides a full audit trail and security capabilities to enable compliance with 21 CFR Part 11.

Built-in compliance features in both versions, including multiple user-defined quality control (QC) standards, check samples, internal standard checks and a selection of calibration procedures, ensure adherence to appropriate guidelines.

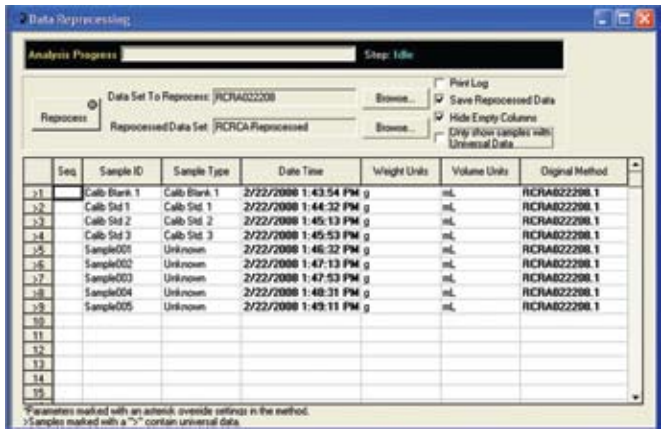


Figure 2. Optima 7x00 instruments are capable of acquiring and displaying data in a continuous real-time graphics format to help optimize performance. The graph shows the signal increasing as the RF power is increased.

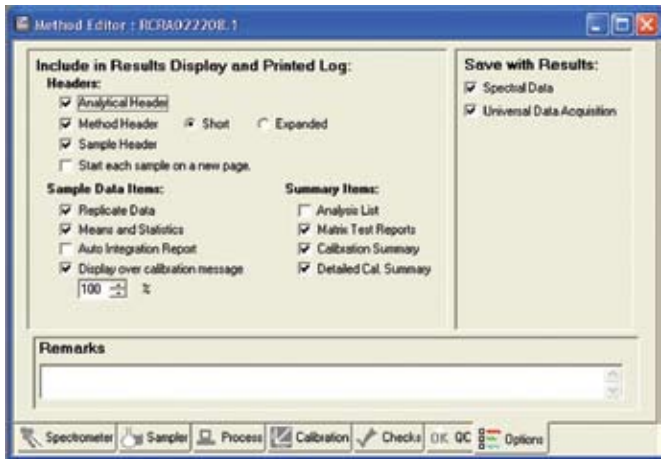
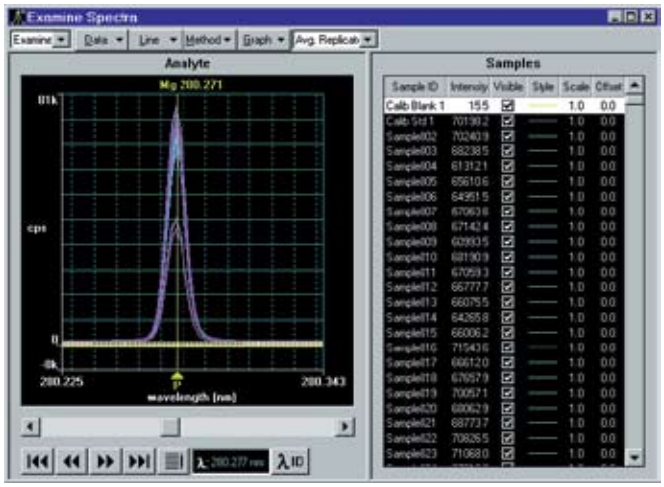


Figure 3. A typical WinLab32 workspace: you determine what is displayed; pick the features you want; move and size them to create a display you are comfortable with; save the workspace for automatic setup the next time you run the method; or use one of the many standard layouts to start your analyses immediately.



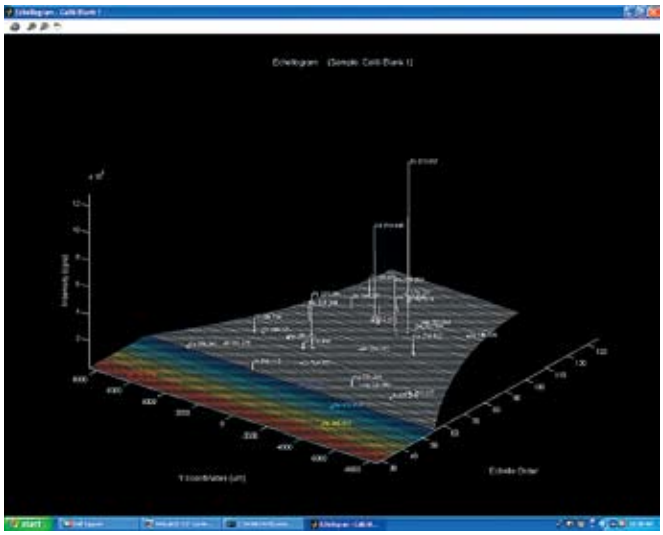


Figure 4. Examine Spectra mode allows you to display peaks and associated analytical data at any time. The echellogram view (below) shows your analytes as the detector sees them, a useful tool for method development.

Reporting made easy

The WinLab32 Report function uses Wizards to guide you through the process step-by-step, or you can use one of the built-in reporting functions, including the industry-standard cross-tab report. With WinLab32's multi-tasking capabilities, you can generate reports while the instrument processes the next group of samples. WinLab32 stores all raw analytical data, including spectra, so you can reprocess previously stored data with new parameters, eliminating the time-consuming process of repeating analyses.

Seamless data transfer

WinLab32 automatically reformats your results for transfer to different programs or computers. Simply select the data and samples you want to move and specify the file format. WinLab32 can automatically generate a file configured for exporting directly into most spreadsheet, database and word-processing programs. Save the file to disk or send it to any connected device.

Context-sensitive help is a click away

WinLab32 is loaded with features to make it easy to learn and use. Dialog boxes suggest correct entries or entry ranges. Wizards guide you through procedures. Tool Tips, available in many languages, provide useful information to simplify your tasks. Many functions, such as selection of integration times, are fully automated – providing you with optimum results with minimal or no operator effort required. And, if you have a question, just press the F1 key for context-sensitive help.

Attention to detail

Optima 7x00 Series instruments can be programmed to start up and shut down at preset times through WinLab32. This not only improves productivity – since you won't spend time waiting for the system to warm up – but also reduces operating costs. Each model also offers a selection of options typically only found on the highest-priced ICP-OES systems, including simultaneous background correction and Multi-component Spectral Fitting (MSF) that significantly enhance analytical performance and minimize potential interferences. Many of the features also boost productivity such as Inter-Element Correction (IEC) that automatically stores data for easy access at any time without requiring you to run the method again.

QC charting

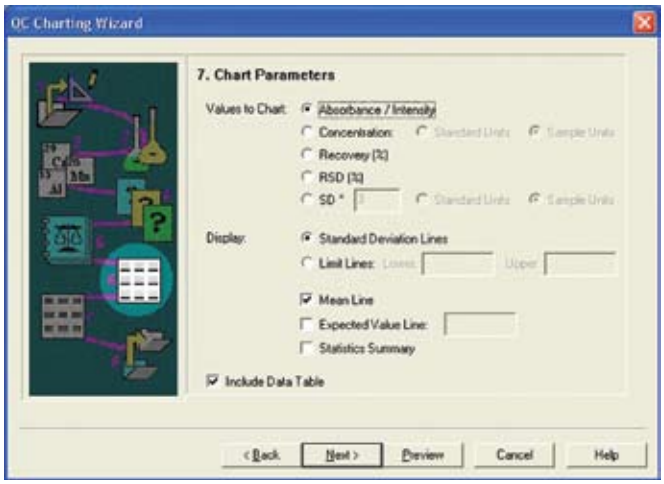
Designed to meet the rigorous needs of today's analytical laboratories, the WinLab32 for ICP-OES software is equipped with an integrated Quality Control (QC) Charting option to provide customers with a convenient and comprehensive solution to increase flexibility and productivity. PerkinElmer's QC Charting feature allows laboratories to quickly and easily prepare quality control charts from results, as well as store customized templates for future use, without purchasing additional third-party software. In addition, the feature provides laboratories with the ability to plot results from QC samples, standards, blanks or other samples, include limit ranges, means or expected values, and export results as ASCII data for use with other applications.

Reprocessing data

If you store your results while analyzing samples, WinLab32 offers a very elegant approach to allow you to return to the raw data and make changes to the way the data are processed and then "reprocess the data." This useful tool saves you time since you can optimize a measurement after the sample is run and not have to re-run the sample. There are a variety of changes possible – background correction points can be added or adjusted, peak position can be optimized, data entry errors can be corrected, calibration curve type can be changed – and then the entire dataset (or only the samples you chose) can be reprocessed and reported. Importantly, WinLab32 never changes the raw data and reprocessed data are clearly identified so you can tell what was done.

Interference correction

In atomic spectroscopy, overlapping emission lines, even when you use high optical performance optics as those used in the Optima 7x00, can cause issues and you have to be prepared to correct for these. WinLab32 offers solutions to correct for inter-element effects. One way is the classic "Inter-Element Correction (IEC)" which requires that you measure the amount of interference as a mathematical correction factor and then apply this to the measured value. Since the Optima 7x00 is so stable, you are able to store these factors and reuse them without measuring them every time the method is run. The second option is to run a multi-component spectral fitting (MSF) routine. This patented approach uses the "image" of the interfering element and the matrix background to contract a mathematical matrix model which is used at run time to extract the analytical signal – free of interference – from the measured spectra. MSF is especially successful when the interferences are complex.



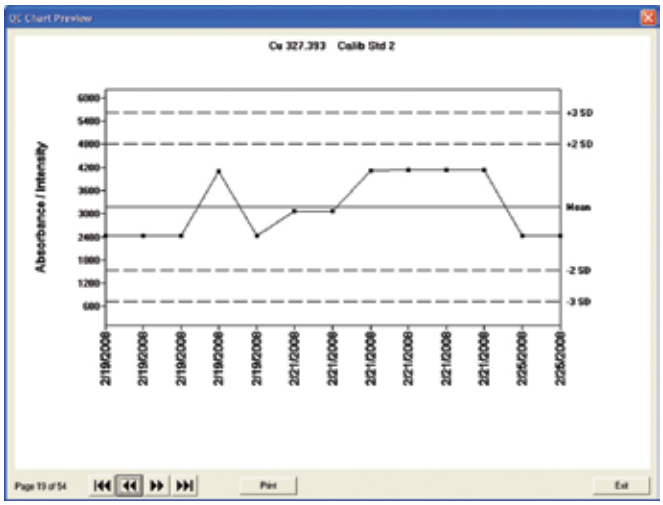


Figure 5. Users can select from existing chart designs or customize the displayed data by defining specific parameters.

OPTIMA CONSUMABLES AND SUPPLIES

PerkinElmer offers a wide selection of consumables and supplies designed and tested to enhance the performance, productivity and reliability of every Optima 7x00 Series instrument. Precision-engineered to the most exacting standards, these products come with the peace-of-mind of a comprehensive guarantee and many offer the flexibility to be used with systems from other manufacturers.

For more information on any of our available torches, nebulizers, spray chambers, injectors or standards, please contact your sales representative or visit **www.perkinelmer.com/supplies.**

ICP Autosamplers

- Flexible rack configurations
- Fast, accurate random access
- Corrosion-resistant sampling components
- Flow-through rinse station to minimize sample-to-sample contamination
- Broad selection of productivity-enhancing systems available, including: S10 autosamplers and a variety of CETACand ESI autosamplers

Multiwave 3000

Microwave sample digestion system

- Built-in cooling system to reduce total cycle time, improving productivity
- Ideal for drying, evaporation, acid digestion and solvent extraction

FIAS

Fully automated flow-injection system

- Simplifies and speeds up analyses requiring complex sample preparation such as mercury and other hydride-forming elements

ICP Consumables

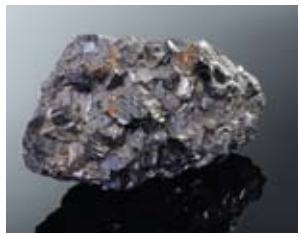
- Torches
- Nebulizers
- Standards

High-Throughput Sample-Introduction System

- Minimizes sample uptake and washout time
- Throughput increased up to 2-3 fold
- Eliminates sample contact with peristaltic pump tubing

For more information on any of the products shown here, or for a complete listing of all Optima accessories available, please **visit www.perkinelmer.com/optima.**

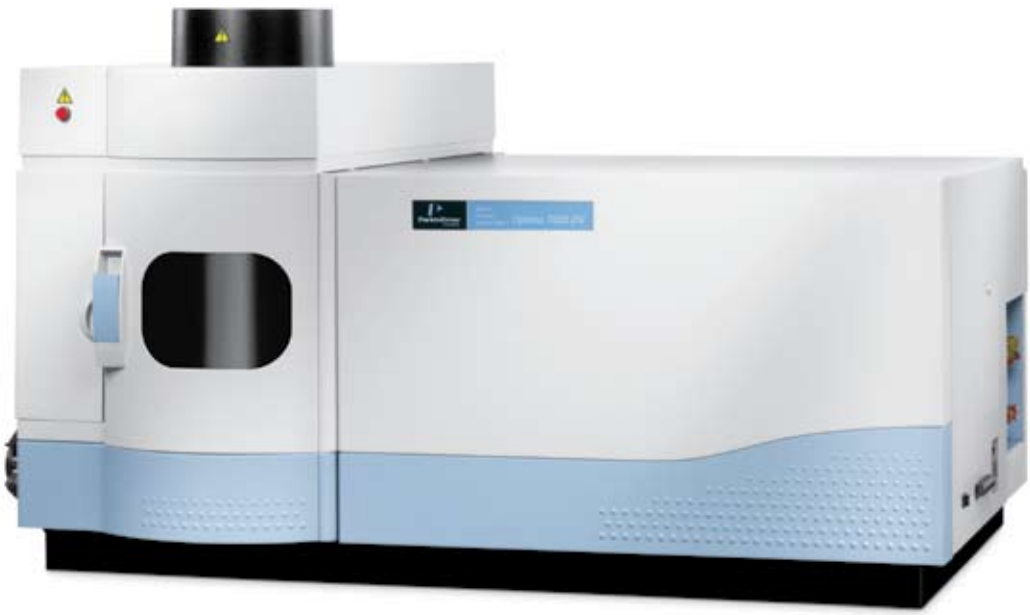
POTENTIAL PRODUCT SELECTION BY MARKET AND APPLICATION

With its wavelength flexibility and range of performance and productivity offerings, the Optima 7x00 Series is the ideal solution for applications ranging from drinking water to precious metals analysis, and everything in between. See below for an overview of sample markets and the reasons behind the selection of specific instruments for certain applications.

A WORLD OF OPPORTUNITY

Market	Application	Platform	Reason
Environmental	Water Analysis	Optima 7000 DV	Application typically has a low sample throughput but requires the excellent detection limits offered by a dual-view system.
Sustainable Energy	Biofuels	Optima 7100 DV	Analysis requires excellent detection limits for a range of elements without the need to test for sodium or potassium at the most sensitive levels.
Agriculture	Product Testing	Optima 7200 DV	For moderate volume labs seeking a high performance, cost-effective solution with sensitivity for alkali testing.
Hydrocarbon Processing	Used Oils Analysis	Optima 7300 V	System can read samples every 30 seconds providing a fast, stable solution; offers a low cost per analysis.
Food & Beverage	Country Of Origin	Optima 7300 DV	Application requires speciation capabilities only available with the integrated Flow Injection Atomic Spectroscopy (FIAS) on the Optima 7300 DV.



PERKINELMER: A HISTORY OF INNOVATION IN ICP-OES

LATE 1970's

PKI begins experimentation coupling an ICP to an AA platform

Introduction of ICP5000 – 3 elements per minute – first successful sequential ICP

ICP5500 improves throughput to 20 elements per minute

ICP6000 – introduces system with enhanced color graphics – combined ICP and graphite furnace

ICP6500 – Offers PKI RF generator

Plasma II introduced – application specific integrated design for ICP measurements

Plasma 40 introduced, small footprint low cost

Optima 3000 introduced – first solid-state detector-based instrument; totally application specific solid-state, simultaneous system – competitive landscape changes permanently

Axial version of Optima released – enhanced sensitivity

Patented dual view version introduced – best of axial and radial world

Optima 3300 released – redesigned detectors reflecting customer needs

PRESENT DAY

Optima 2000 and 4x00 released – high performance solid-state RF generator, bench top designs

Optima 2100 and 5x00 released – customer application requirements implemented with enhanced generator robustness

Optima 7x00 Series released – offers many features driven by application requests

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