

BUILDING RELATIONSHIPS WITH CREATIVE SOLUTIONS...

A Platform of Support

Personalized service sets JY apart.

When you purchase an ICP spectrometer from JY you get more than just the instrument. You get the commitment to dedicated comprehensive support. The goal is to enhance your ownership experience — from the placement of your purchase order to the installation of your instrument and beyond. Our staff of highly trained customer service, application and field service engineers stand ready to provide assistance when you need it, where you need it.

- Training programs designed to educate both novice and advanced level users
- User group meetings to inform and obtain your feedback
- Supplies, accessories and upgrades for the future growth of your instrument
- Financing with flexible terms to suit your Company's specific needs
- Unlimited toll-free support*
- Remote diagnostics for service and applications support via modem
- Comprehensive partnership agreements for service maintenance
- Made-to-measure instruments customized for radiological and mobile environments

We know you need the right answers the first time.

JY offers locations around the world to provide a platform for your support. As our user you will receive the fastest response time and a receptive, considerate person to take your call. We are in the business of not only building instruments, but more importantly, building relationships through creative solutions. Call us today.



*In countries where available

Specifications subject to change without notice.

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The excellence of the ULTIMA

180 years of JY optical experience

The expertise of JY Horiba manufacturing



A Platform for the Future™

ULTIMA 2 ICP OPTICAL
EMISSION SPECTROMETER

ULTIMA 2

A Platform for the Future

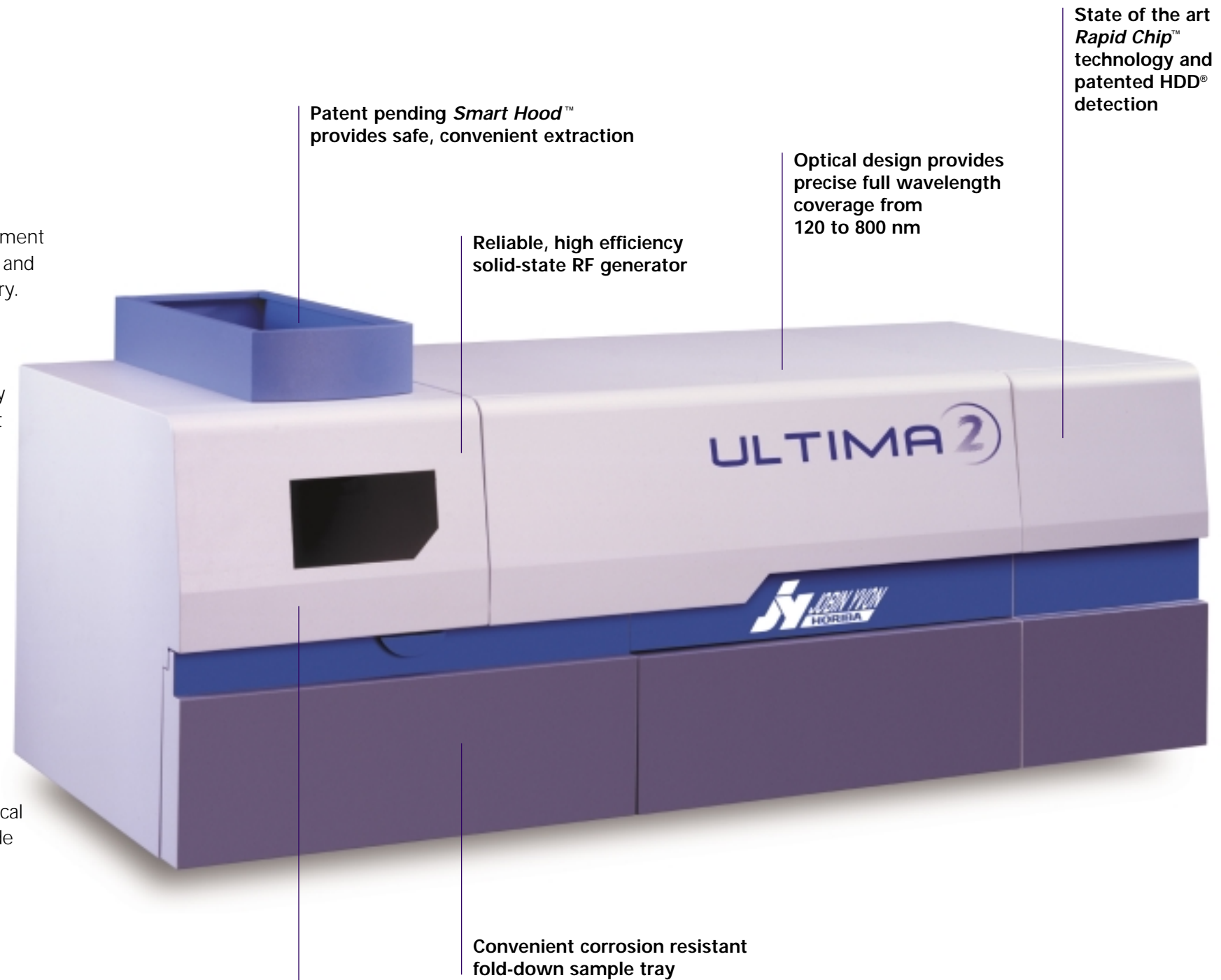
Providing productivity and performance in a platform for the future.

You need fast, accurate results in your laboratory and you want an instrument that will grow with you and your business. The ULTIMA 2 is productivity and performance defined in an innovative design for every analytical laboratory.

When you consider the purchase of a new ICP, you ask yourself the basic questions about speed, accuracy, reliability, support, etc. But think below the surface of these questions. Many instruments claim the ability to provide accurate results in a relatively quick timeframe today. So what is the difference? The difference is in the design. The ULTIMA 2 with its innovative design provides a tool that increases lab productivity not only with fast analysis times, but with less complicated methods, shorter warm up time and better performance. The power in the performance of the ULTIMA 2 is in its simplicity. No moving parts in the sample introduction area, a superb RF generator, few reflective surfaces in the optics and the lowest detection limits in the industry, combined with the best spectral resolution, highest light throughput and a patented detection system for full spectrum acquisition from 120 to 800 nm.

The ULTIMA 2 continues the success established by the ULTIMA, providing the highest performance of any ICP OES available today. JY was recognized with an industry award upon the introduction of the first commercial ICP in 1977. This innovation was continued in 1980 with another industry award recognizing the first combination ICP. Today, JY optical experience and Horiba expertise in manufacturing quality combine to provide the ULTIMA 2 — a complete solution — the foundation for the success of your laboratory.

From 180 years of JY optical experience — the excellence of the ULTIMA and the expertise of JY Horiba manufacturing.



ULTIMATE FACT SHEET

- Quick and reliable results
- Easy to use and understand
- Performance to handle difficult analyses without complex method development
- Powerful software
- Comprehensive support and growth opportunity for the future through instrument upgrades and accessories

Provides a Platform for Productivity & Ease of Use



The ULTIMA 2 offers the advantage of viewing the entire Normal Analytical Zone at once due to the use of a gigantic 110 x 110 mm grating (shown at actual size in the background) and efficient transfer optics corresponding to the size of the NAZ. Viewing this entire region at one time allows excellent results for all elements with only one set of viewing conditions and eliminates the need for optimization routines, thus increasing lab productivity.

Complete flexibility for the analysis of any type of matrix is achieved through the use of a single view radial plasma that provides excellent sensitivity. Compared with systems using axial or dual views (radial and axial), the JY single view radial plasma offers the lowest detection limits available in an ICP OES today. The exclusive use of a radial plasma to achieve ultra trace detection limits is possible due to the extremely high luminosity and exceptional resolution of the instrument. Other designs that use many reflective surfaces and offer poor spectral resolution resort to the use of an axial view to increase sensitivity, but even this increase is a compromise. These instruments are subject to the strong matrix effects seen close to the coil when viewed axially. To compensate for these interferences they must provide correction by way of complex software routines, standard additions or internal standards. In addition, these designs typically require the combination of a radial and axial view, or dual view, to approach the flexibility obtained by the single view radial plasma of the ULTIMA 2.

The unique sheath gas feature, originally patented by JY, allows continuous analysis of samples with high salt or dissolved solid levels up to 30% without clogging the injector tube. The sheath gas produces robust plasma conditions in samples with high dissolved solids while also providing improved detection limits for the alkali elements. Combined with a large, 3 mm injector tube, the sheath gas provides more sample to travel to the plasma for excitation. The laminar flow of the argon sheath gas pockets the sample to eliminate contact with the walls of the injector tube thus minimizing the chance of injector clogging.

Typical detection limits in ppb at 3 sigma

Element	Detection Limit
Al	0.2
As	1.2
B	0.3
Ba	0.04
Be	0.05
Br	100
Ca	0.03
Cl	200
Co	0.20
Cr	0.20
Cu	0.20
Fe	0.20
K	1.5
Mn	0.05
Mo	0.2
Na	0.60
Ni	0.3
P	1.5
Pb	1.5
Sb	1.5
Se	1.5
Ti	0.2
Tl	1.0
V	0.2
Zn	0.2

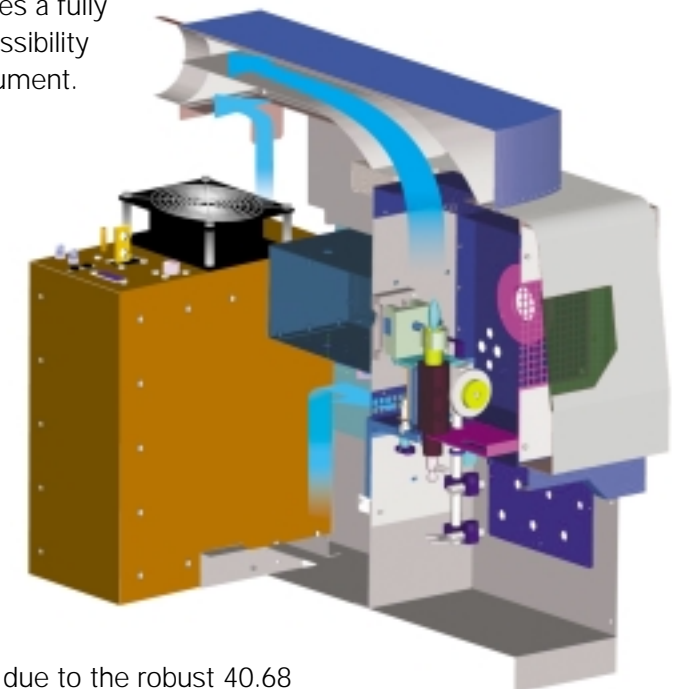
Method development and analysis simplified, as well as increased productivity with one radial view, one set of conditions and no optimization routines.

The sample introduction area of the ULTIMA 2 has been designed with a focus on productivity. An improved cassette design combines a fully demountable quick-release torch system with increased accessibility to allow rapid, easy access to this important area of the instrument.

A fold down sample tray with a convenient, removable corrosion resistant insert provides a space for samples to be placed while awaiting analysis. This area also allows samples to be maintained in an orderly and uncontaminated fashion while being prepared for automated analysis using an autosampler.

Smart Hood (patent pending) offers an exclusive design for trouble-free exhaust of the instrument. This unique design eliminates the need for complicated bifurcation for both the plasma and RF exhaust. The instrument is protected with a safety interlock to eliminate costly downtime should the exhaust be interrupted.

Lab productivity is enhanced with a very short warm up time due to the robust 40.68 MHz solid state RF generator. In less than 15 minutes from start up, your instrument is ready to produce accurate, stable results. Operating costs and analysis times are reduced compared to instruments with warm up times of 35 minutes or more. JY was among the first to implement the use of a robust solid state RF generator.



ULTIMATE FACT SHEET

- *Smart Hood* provides trouble free exhaust with safety interlock protection
- Quick-release torch is fully demountable and needs no alignment
- Unique sheath gas allows continuous analysis of 30% solids
- Single view radial plasma provides lowest detection limits available today
- Operating costs reduced due to
 - lower plasma gas flows
 - extended torch glassware lifetime and short warm up time
- Unattended analysis of up to 500 samples with JY AS-421 programmable random access autosampler. Features a variety of sample and standard racks.
- Sample introduction kits for a variety of applications including organic samples, high dissolved solids and HF acid as well as ultrasonic and micro-concentric nebulizers
- Patented Concomitant Metals Analyzer (CMA) hydride generation system provides simultaneous analysis of hydride and non-hydride elements without sample pre-treatment. Detection limits of 20 to 50 times improvement are seen for hydride elements
- For more information on the full range of accessories, visit our web site at www.jyhoriba.com.

Speed and Sensitivity in Detection

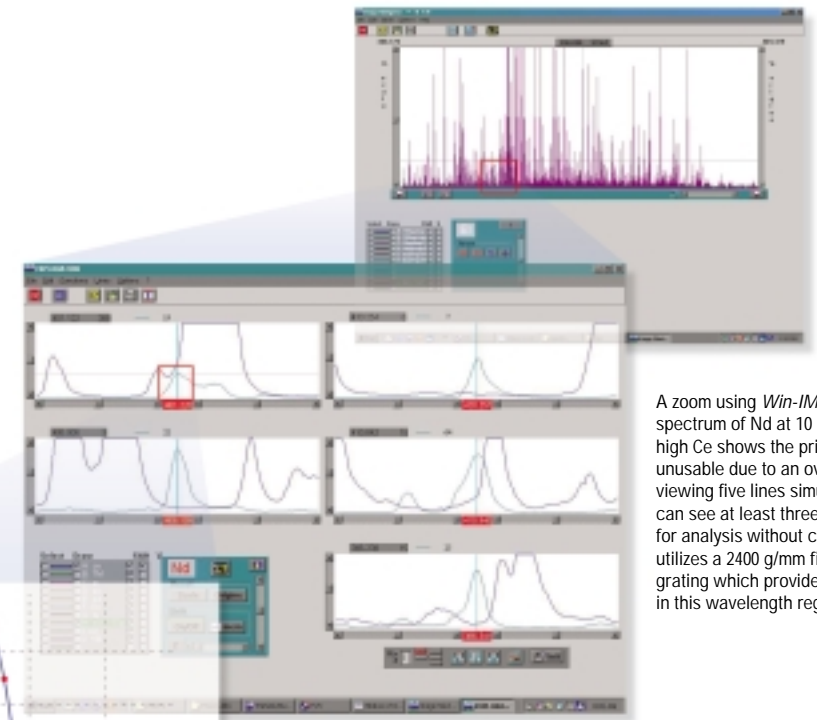
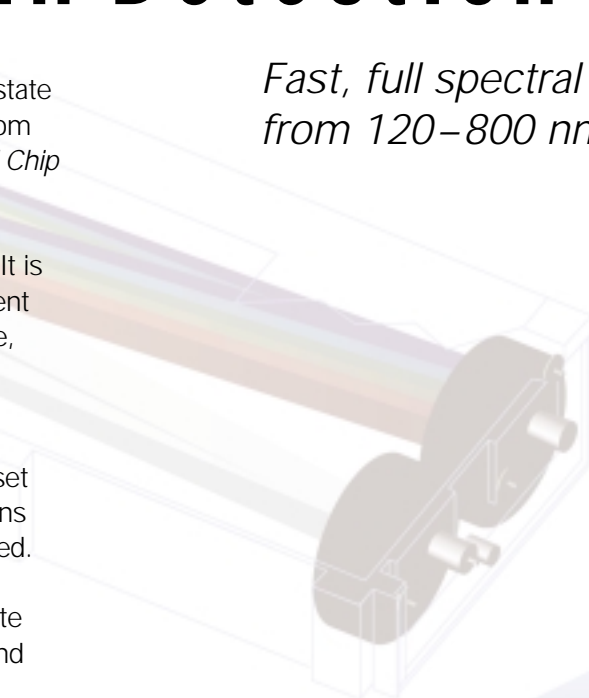
Today some ICP manufacturers declare full spectral coverage with high speed using a solid state detector. However, only the ULTIMA 2 can provide such coverage with every wavelength from 120 to 800 nm in less than 2 minutes using patented High Dynamic Detection (HDD), *Rapid Chip* electronics and the powerful *Win-IMAGE* software.

Patented HDD detection is a unique design from JY based on a photomultiplier tube (PMT). It is not, however, a classical PMT detector. HDD tailors instrument sensitivity to the measurement of the signal present with automatic hysteresis-free gain adjustment on the millisecond scale, allowing a dynamic range of 10 orders of magnitude. Productivity is enhanced by the measurement of all elements at the concentrations present, both trace and major, in one analysis, typically without the need for dilution due to the increased linear dynamic range offered. Solid state detection devices, on the other hand, acquire a snapshot in time at one set of measurement conditions using a fixed integration time and gain. This fixed set of conditions is not necessarily optimized for the sensitivity required for individual elements being measured. Such optimization requires the flexibility of gain adjustment during an acquisition. This is not possible with the solid state detectors used in ICP OES today. Consequently, these solid state detectors use longer integration times for trace analysis, which can reduce dynamic range and more often than not require multiple analyses for optimized trace and major element measurement in the same sample.

While some say only the quantum efficiency (QE) of the detector is important, because of our optical expertise, at JY we know that detector QE is only part of the story. The detector cannot be evaluated individually, as all components of the spectrometer combine to provide the final result. The original, gigantic grating used in the ULTIMA 2 combines with only two reflective surfaces to provide the utmost in luminosity and the highest resolving power. These conditions provide analyses using a practical working resolution of 5 pm at or below 320 nm. In addition, the abundance of signal allows the use of short integration times while maintaining excellent reproducibility, even at ppb levels in difficult matrices.

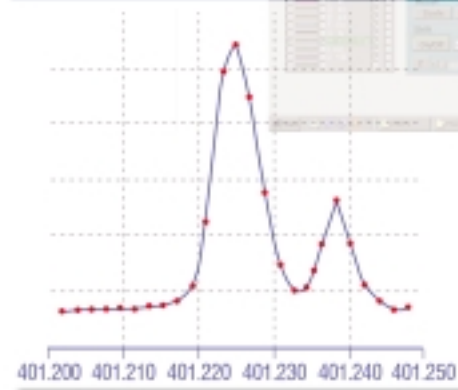
The advantages of the JY optical design with HDD detection and *Rapid Chip* electronics are clear – fast, full spectrum analysis, unparalleled spectral resolution and tailored instrument sensitivity. The ULTIMA 2 is a platform for performance offering speed and sensitivity without compromise.

Fast, full spectral coverage...the flexibility of every emission line from 120–800 nm.



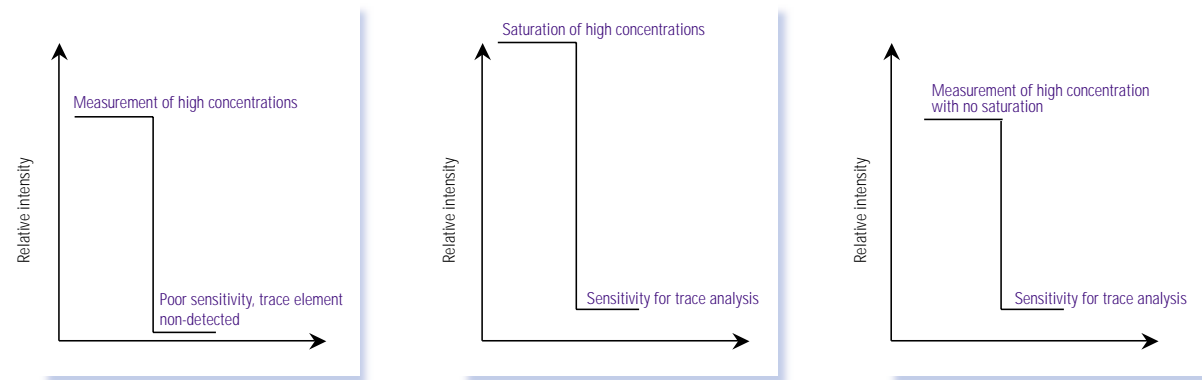
A solution of 10 ppm of mixed rare earth elements Ce, Er, Eu, Gd, Ho, Lu, Nd, Tm & Yb shows the ability to respond to the sensitivity of the line being measured.

A zoom using *Win-IMAGE* into the full spectrum of Nd at 10 ppm in the presence of high Ce shows the primary line at 401.225 nm unusable due to an overlap of the Ce line. By viewing five lines simultaneously, the user can see at least three other lines available for analysis without correction. The ULTIMA 2 utilizes a 2400 g/mm first and second order grating which provides a resolution of 10 pm in this wavelength region.



An optional back-to-back 4320/2400 gr/mm first order grating allows the improvement of resolution to 6 pm up to 450 nm eliminating the interference on the primary line.

Principle of High Dynamic Detection (HDD®)



Classical PMT: To see the signals of a major element at high concentrations, gain is lower and trace concentration are non-detectable.

Classical PMT: To see the signal of a trace concentration, gain is raised and high concentrations saturate.

HDD: Tailored sensitivity to the signal present, allowing the detection of trace and high concentrations in the same acquisition without saturation or loss of sensitivity.

NASA EXCELLENCE AWARD

"In recognition of your holographic diffraction gratings for the 'Cosmic Origin Spectrograph' instrument that will enable a new generation of scientific exploration for the Hubble Space Telescope, the astronomers of the world and every person who looks to the sky in wonder."

Over 180 years of JY optical experience provides the platform for NASA projects. This same quality is at the heart of every ULTIMA 2.

ULTIMATE FACT SHEET

- Continuous wavelength coverage from 160 to 800 nm, standard
- Optional extension to 120 nm for Far UV analysis of the halogen elements or the use of alternative wavelengths
- New optical tank designed to ensure stability with exclusive materials and precise construction
- Purge with nitrogen or argon for analysis below 190 nm
- Unmatched spectral resolution of 5 pm at less than 320 nm minimizes interferences
- Optional gratings to further improve resolution for line-rich matrices such as geological or precious metals
- Real time internal standard option available for precision improvement; Sequential internal standard as standard feature.
- Fast, accurate analysis with *Rapid Chip* electronics and powerful software
- Patented detection provides analysis of sub-ppb to percent level in one analysis
- Dynamic range of up to 10 orders of magnitude on a single calibration curve

FAST, SENSITIVE, AND STABLE...

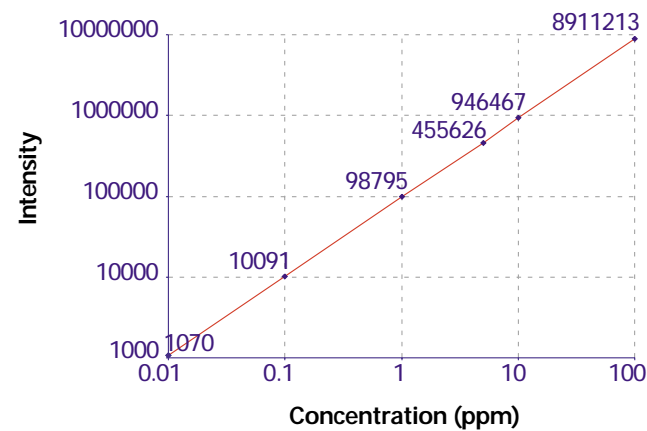
Productivity & Performance Defined

Comparison of detection limits in high salt and oil matrices to the typical detection limits provided in water show little difference. This is due to the robustness of the JY single view radial plasma. Robustness is the capability of the plasma to accept various changes in the load without any significant variation of the analyte signal and can be measured by the ionic-atomic line intensity ratio of Mg. This figure of merit is an important feature that contributes greatly to the quality and accuracy of the analytical results. The robustness of the ULTIMA 2 is a result of the excellent sample introduction system featuring a 3 mm injector tube and unique sheath gas feature with a vigorous, well-built RF generation system.

Detection limits for 10% Oil in Kerosene in ppb at 3 sigma		
Element	Wavelength	Detection Limit
Cr	205.552	0.5
Ni	221.647	0.7
Fe	238.204	0.4
Si	251.611	2.0
V	292.402	0.6
Cu	324.754	0.4
Na	588.995	7.0

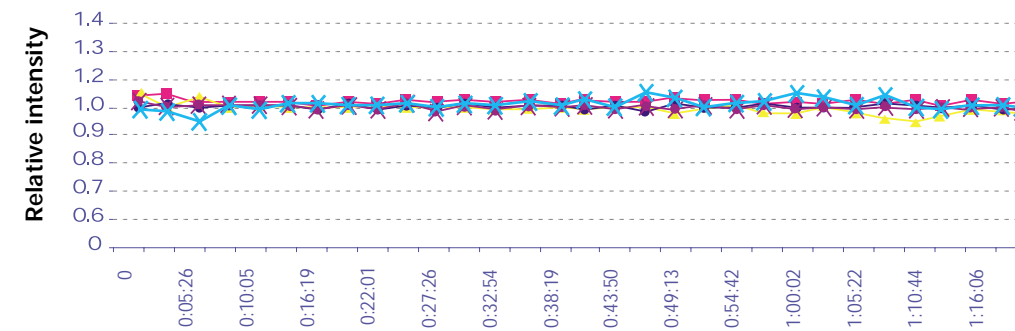
Detection limits in 10% NaCl in ppb at 3 sigma		
Element	Wavelength	Detection Limit
As	189.042	5.0
Sb	206.833	5.0
Zn	213.856	0.2
Pb	220.353	5.0
Fe	259.940	0.3
Cr	267.716	0.5
Ti	334.941	0.3

Detection limits in the Far UV in ppb at 3 sigma		
Element	Wavelength	Detection Limit
Cl	134.664	200
Br	154.064	100
As	159.360	12
Ge	164.919	4
Al	167.020	0.5
Pb	168.180	4
I	178.218	1
P	178.229	3

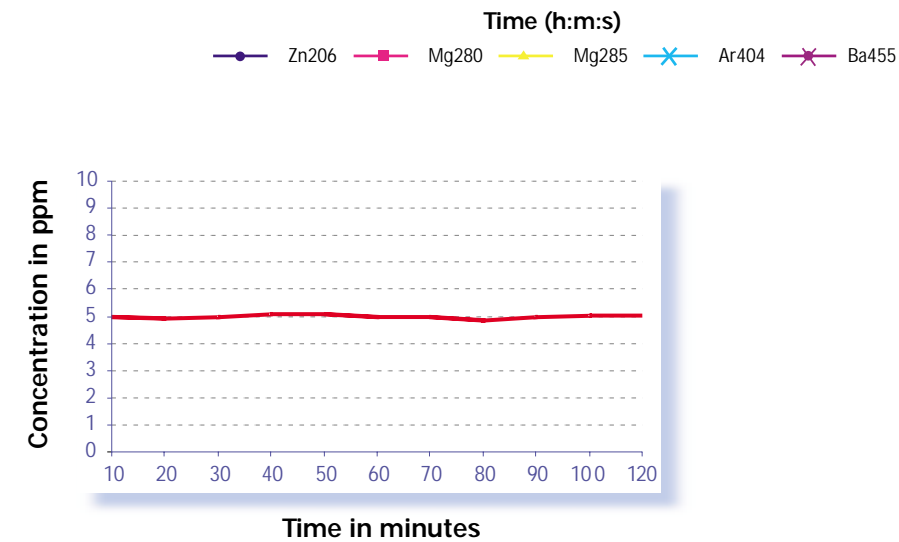


Patented HDD detection offers an increased range of linear signal without saturation or loss of sensitivity. Linear dynamic range shown here for Ti 334.941 nm from 10 ppb to 100 ppb with a detection limit of 0.1 ppb. The correlation coefficient is 0.999965.

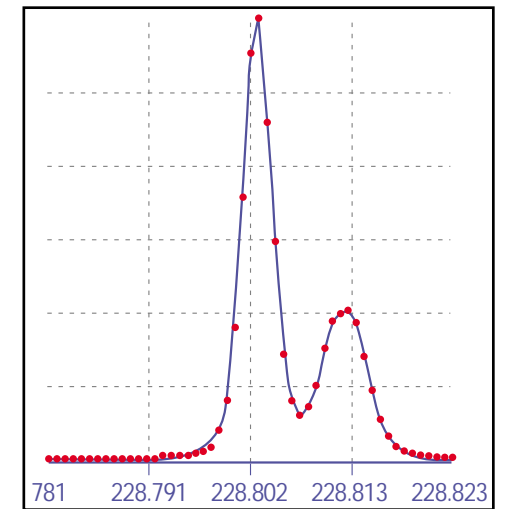
When your instrument is stable over long periods of time in the real world, then you have confidence. When you can rely on your instrument you know you have made the right choice.



Warm up time is less than 15 minutes due to the powerful, robust 40.68 MHz solid state RF generator. After warm up, stability is better than 1% over more than one hour.



Continuous aspiration of 30% NaCl for 2 hours shows stability of better than 1%. The robust RF generator, wide 3 mm injector tube and the unique sheath gas combine to provide excellent stability in high TDS matrices.



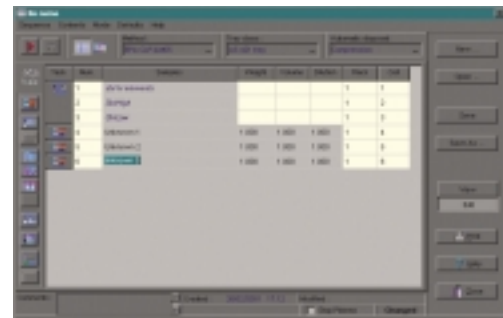
Cd at 228.802 nm is easily resolved from As at 228.812 nm line. A spectral resolution of 4 pm is seen in this example. HDD® detection does not impose the restrictions of pixel resolution on the spectrometer that is seen with solid state detectors.

ULTIMATE FACT SHEET

- Typical stability of better than 2% over 4 hours
- Excellent stability in high dissolved solid matrices due to 3 mm injector tube, unique sheath gas feature and radial plasma
- Analysis of halogen elements Chlorine and Bromine *WITHOUT* compromise on sensitivity of other elements
- Ultra trace detection limits in difficult matrices such as oils and high salts using radial view
- Compliant analysis of the 22 elements of the US EPA CLP in less than 6 minutes

Powerful Software Multiplies Productivity

Analyst software provides the tools you need to take full advantage of state-of-the-art hardware. Productivity is maximized through fast, straightforward automated tasks and sequences. The software is powerful yet flexible providing tools for first time users, such as the *Analyst Wizard*, as well as the potential for in-depth analysis required for research and development.



Multi-method sequences automate the analysis. Automatic tasks such as QC, recalibration, standard additions and blank subtraction can be inserted into the sequence with the click of a button.



The status of the sequence during analysis is clear. Spectral acquisitions are shown in real time.



Autosampler locations can be defined using drag-and-drop. Several standard racks exist and custom racks and tube sizes can easily be created using the flexible *Analyst* software.

User sign in

- Provides a data audit trail for user and instrument operation
- Multi-level security provides user access levels for view and edit

Loading samples and analysis

- Sample and sequence naming via LIMS import, manual or auto-naming
- Multi-method sequencing for automatic change of method, calibration, QC and analysis.

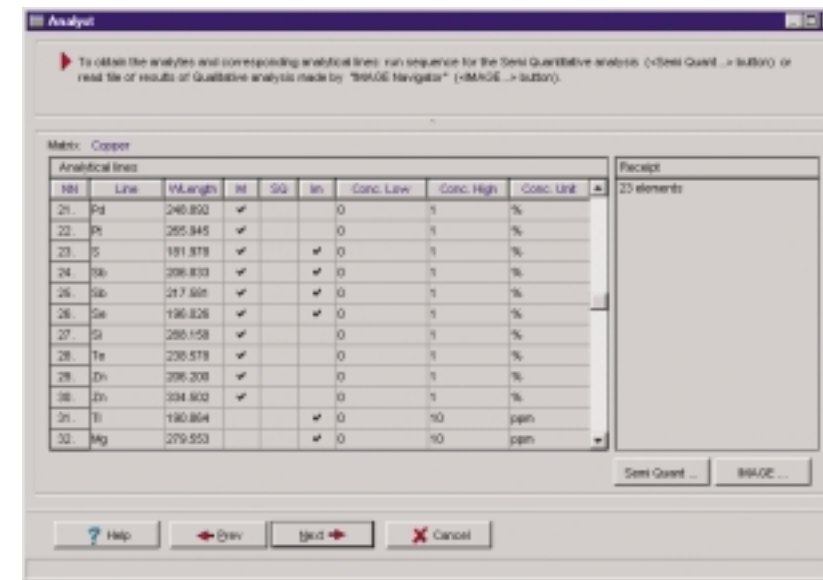
Results and reporting

- Network ready
- Export to defined location or to LIMS
- Automatic storage of all results with raw data
- Variety of standard or custom reporting formats
- Compliant with international regulated protocols such as FDA 21 CFR 11

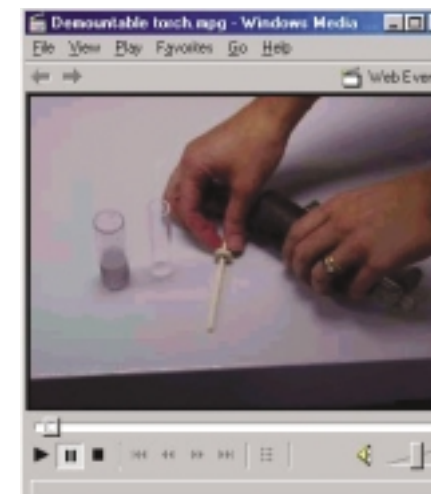
Semi-quantitative and retrospective analysis with *Win-IMAGE*

- Automatic semi-quantitative analysis for all elements
- No need for calibration
- Fingerprint your sample using more than 125,000 emission lines
- Store sample *IMAGE* for retrospective analysis in the future
- View up to five wavelengths at a time per element

The *Analyst Wizard* with *Win-IMAGE* does everything for you except load the samples. It tells you what and how much is there, and even suggests standards and wavelengths to use.



The *Analyst Wizard* supplies well known matrices to begin the method development. Once selected it suggests elements and wavelengths. When the sample *IMAGE* has been integrated by *Analyst Wizard*, the elements present and the concentrations are displayed beside the elements of the method. At this time the user can choose what to analyze.



JY multimedia support offers help with basic maintenance such as demounting the torch

Automatic method development — *Analyst Wizard* with *Win-IMAGE*

- Semi-quantitative analysis automatically identifies all elements present in the sample
- Choose all or specific elements present to analyze
- Suggestion of wavelengths based on sample composition
- Standard concentrations recommended based on concentrations
- Calibration and analysis with user defined export and reporting formats

Diagnostics

- Network ready software allows the instrument to be diagnosed from anywhere in your facility or from a remote location
- Online lab book to record daily actions performed such as cleaning, changing pump tubing, gas tanks, etc.
- Automatic recording of the trigger of all safety interlocks
- Real time output of instrument signal for troubleshooting
- Remote diagnostics for applications and service of all software and hardware components