ICP-OES

Varian Vista-PRO CCD Simultaneous ICP-OES

VARIAN

Varian's patented VistaChip™ CCD ensures Vista-PRO™ is the world's fastest ICP-OES, measuring 73 elements in just 35 seconds. When combined with a high efficiency RF generator and powerful, easy to use software the Vista-PRO is quite simply the world's best ICP-OES.

Cutting-edge technology for today, and tomorrow

The custom designed VistaChip CCD detector provides unparalleled advances in performance. Combined with a compact, thermally stabilized echelle polychromator, the Varian Vista-PRO gives complete flexibility in wavelength selection to avoid spectral interferences, and increase linear dynamic range.

A built-in wavelength library features 32,000 lines but you can choose any line you like ensuring that you meet your needs now, and in the future.

Measure any sample type

Varian's highly efficient free-running 40 MHz RF generator with Direct Serial Coupling (DISC™), produces a robust plasma that gives you the confidence to analyze any sample type—from brines and fusions to the most volatile organic solvents. The reliable RF generator has no moving parts and is proven in over 1000 instruments worldwide. With fast analysis and short warm-up times, Vista-PRO delivers reliability, low operating costs and greater uptime.

You are the Expert

Vista-PRO's ICP Expert™ software takes the guesswork out of analysis. Manual optimization is eliminated with AutoMax™, providing fast, automated, method optimization. New worksheet features allow you to mathematically combine results for total composition analysis, purity calculations and extend linear dynamic range. Add in SmartRinse™ for faster sample washout, FACT™ on-line spectral deconvolution and Stability Reference Standardization for geochemical and high salt applications, and you are the ICP Expert.

Vista-PRO improves productivity and precision by providing true simultaneous measurement of all elements from parts per billion to percent levels.

Save time and argon costs with simple 'one step' analysis from one plasma view. Unlike dual-view systems, with Vista-PRO, you don't have to measure the sample twice.

From tubings and nebulizers to spectrometers, applications and technical support, Varian offers a complete elemental solution for your laboratory.

Varian's patented VistaChip CCD detector features unique image mapping (I-MAP™) technology. I-MAP ensures complete coverage of the echelle spectrum by arranging 70,000 pixels in uninterrupted arrays that exactly match the two-dimensional optical image. This provides full wavelength coverage from 167-785 nm.

The VistaChip CCD also features anti-blooming protection on every pixel, ensuring trace analytes can be accurately measured in the presence of high concentrations of other elements.

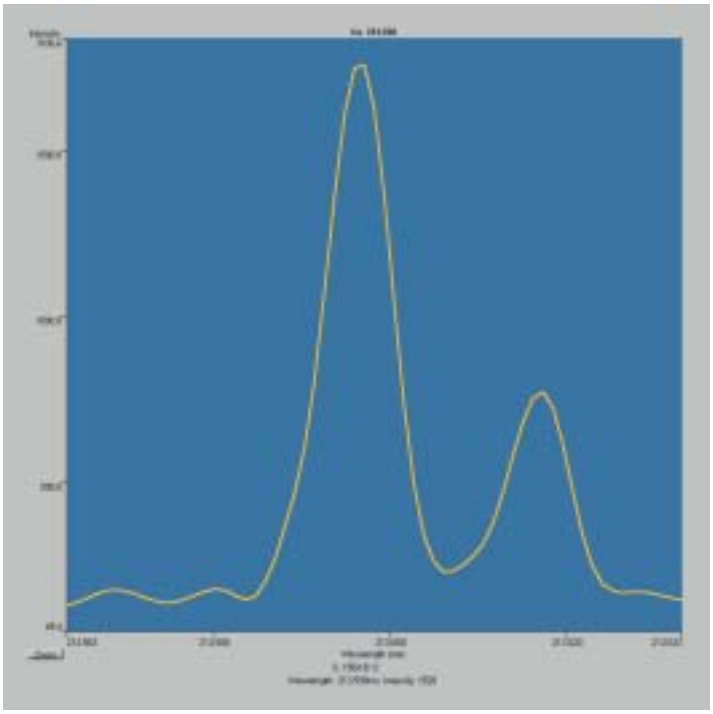
The unparalleled detection limits and linear dynamic range of the Vista-PRO allow one step analysis from a single plasma view.

Only Vista-PRO offers superior dynamic range and detection limits using:

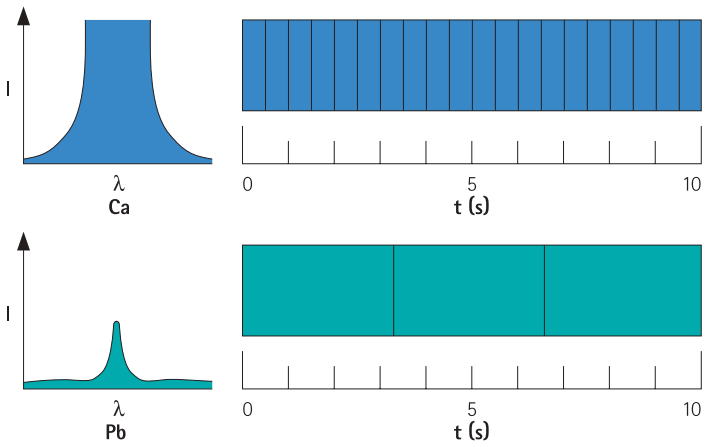
• Adaptive Integration Technology™ (AIT), an intelligent algorithm that prevents overrange signals by adjusting the measurement time simultaneously for each wavelength to achieve the optimum signal-to-noise ratio.

• Triple stage Peltier cooling that provides the ultimate in low noise performance.

• True simultaneous measurement of background signals and internal standards. The VistaChip CCD improves analytical precision by eliminating plasma flicker noise, further lowering detection limits.



Principles of Adaptive Integration

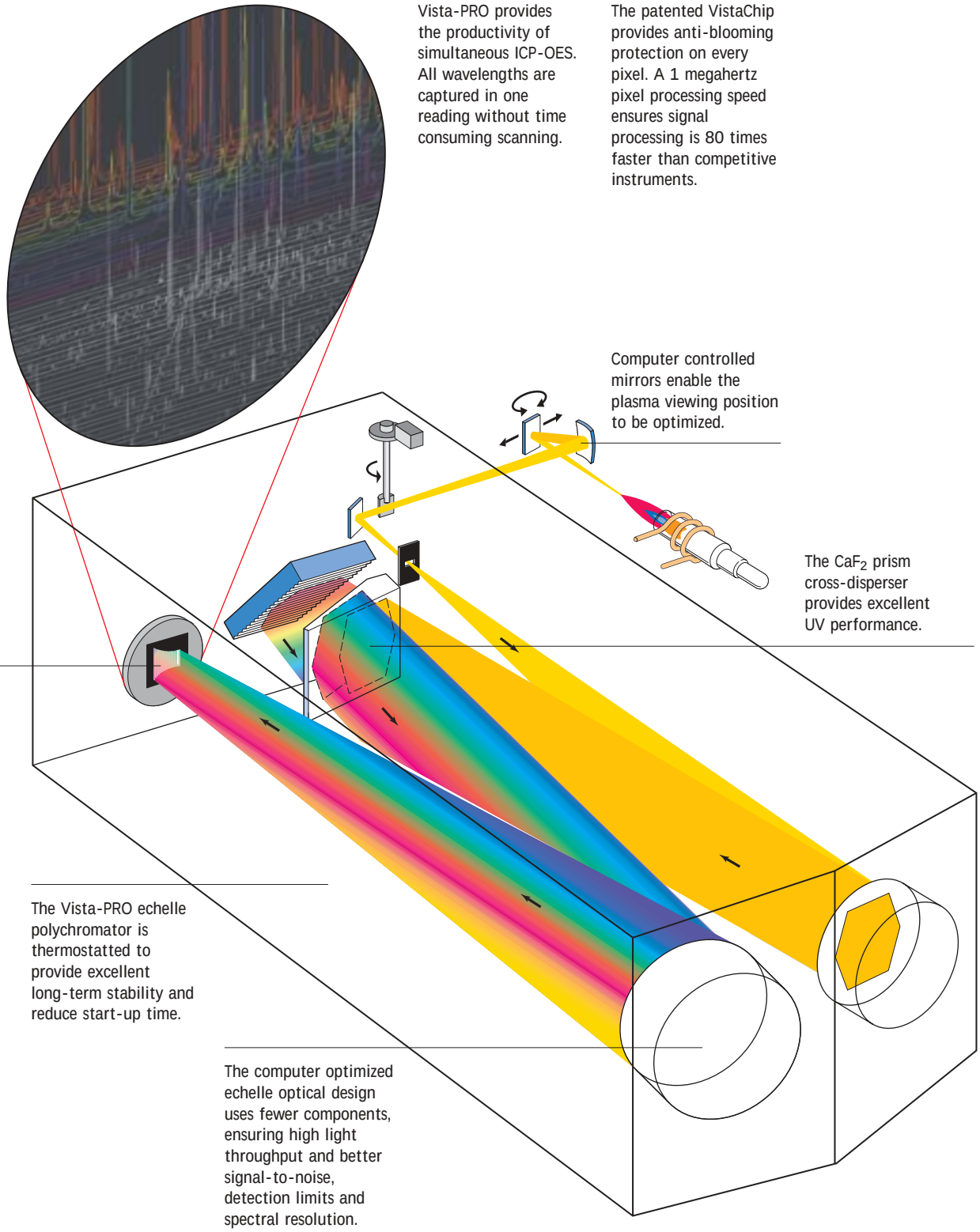


The high resolution provided by the optical system does not compromise sensitivity as the separation of P 213.618 nm from Cu 213.598 nm shows. (Top)

For a replicate time of 10 seconds, AIT will average lots of short readings for a high intensity line and fewer, longer readings for low intensity lines, providing the optimum signal-to-noise ratio in both cases, simultaneously. (Bottom)

Vista-PRO provides the productivity of simultaneous ICP-OES. All wavelengths are captured in one reading without time consuming scanning.

The patented VistaChip provides anti-blooming protection on every pixel. A 1 megahertz pixel processing speed ensures signal processing is 80 times faster than competitive instruments.



Computer controlled mirrors enable the plasma viewing position to be optimized.

The CaF_2 prism cross-disperser provides excellent UV performance.

The fast operational speed of the VistaChip reduces running expenses, by saving on maintenance and argon costs, as well as providing more accurate sample analyses each day.

The Vista-PRO echelle polychromator is thermostatted to provide excellent long-term stability and reduce start-up time.

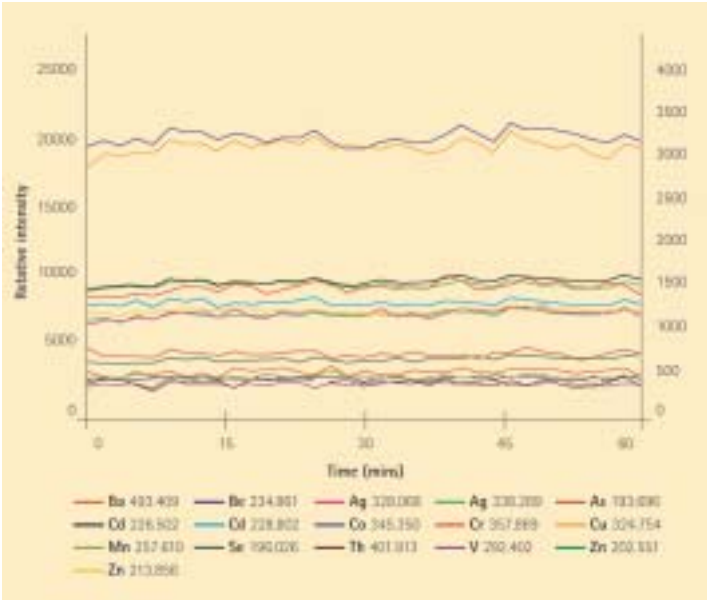
The computer optimized echelle optical design uses fewer components, ensuring high light throughput and better signal-to-noise, detection limits and spectral resolution.

Varian's ICP systems have always provided stable and accurate analytical results, even for the most challenging samples. Utilizing our established high performance RF generator, Vista-PRO continues this tradition of excellence, offering:

- Superior plasma performance from over 75% RF coupling efficiency. Directly analyze organic solvents and samples containing high levels of dissolved salts.
- Excellent long-term stability through the elimination of inefficient secondary matching networks, and reduced waste heat.
- Higher uptime, better reliability and lower service costs, as there are no moving parts.
- The flexibility to easily analyze your full range of sample types. Varian's compact 40 MHz free running design responds quickly to any changes in plasma sample loading.
- Maximized reliability and serviceability, as water-cooling is eliminated.

Difficult samples made easy

No matter what the sample, the Vista-PRO provides excellent long-term stability. To achieve this, Varian created the Direct Serial Coupling (DISC) system that improves the transfer efficiency of RF energy into the plasma by eliminating inefficient secondary matching networks. As a result, the Vista-PRO RF system produces a robust and stable plasma suitable for the direct analysis of samples ranging from organic solvents to industrial wastes and concentrated brines. Unlike crystal locked designs, Vista-PRO's free running RF generator responds instantly to changes in the plasma impedance for superior stability.



The direct aspiration of methanol for an extended period is a test of RF and sample introduction stability. This continuous measurement of a range of elements for over an hour demonstrates the excellent robustness and stability of the Vista-PRO.

Linear dynamic range from parts per billion to percent levels

The revolutionary VistaChip CCD detector provides full wavelength coverage from 167-785 nm. Our unique MultiCal™ feature then automatically assigns each result to the appropriate wavelength for that result. MultiCal extends the linear range of ICP-OES analysis from parts per billion to percentage levels. Unlike dual view systems, Vista-PRO provides this linear dynamic range without having to analyze the sample twice. Vista-PRO provides one-step analysis from a single plasma view.

Automatic results confirmation

One of the greatest challenges in the laboratory is to prove that you have accurate results for unknown samples. Vista-PRO's MultiCal can help by providing automatic on-line results confirmation throughout the analysis. Use MultiCal to simply monitor your results at two or more wavelengths for each element and you have automatic results validation. MultiCal also offers an extra level of data quality control, giving you confidence in the accuracy of your results and confirmation of freedom from interferences. If you are not using MultiCal confirmation today, how can you be sure of the accuracy of your data?

Vertical or horizontal plasma?

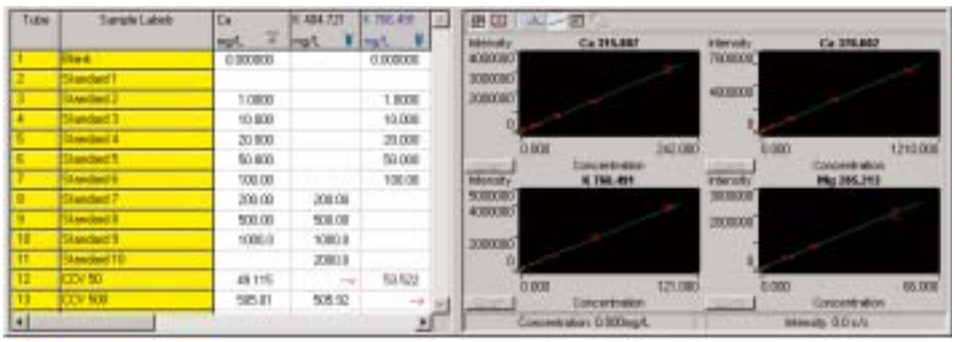
Vista-PRO offers either optimized axially viewed or radially viewed plasma systems. The horizontal, axially viewed plasma is ideal for environmental and research applications that require excellent sensitivity, while MultiCal provides the dynamic range needed from one plasma view. Varian's axially viewed plasma is suitable for the routine analysis of samples with dissolved solids content up to 5% (or up to 25% with Varian's High Solids* torch).

If long term analysis of the most difficult samples is required, the Vista-PRO radially viewed plasma offers the benefits of robust operation with minimal maintenance. The radially viewed plasma is vertically oriented, providing immediate venting of exhaust vapors for reduced injector tube blockage and longer torch life. Vertically oriented, radially viewed plasma systems are the accepted standard in many industries including chemicals manufacture, salt production, wear metals analysis, petrochemical production and precious metals refining. Dual view plasma systems, which feature horizontal torches, cannot match the rugged, high dissolved salts performance of the Vista-PRO radial system.

* patent pending

3 sigma detection limits of Vista-PRO radial and axial radial instruments using 30 s integration time

Element	Wavelength (nm)	3σ Detection Limits (µg/L) Vista-PRO Radial	Vista-PRO Axial
Ag	328.068	1	0.3
Al	167.016	0.9	0.2
As	188.979	5	1.5
Au	267.595	5	1.0
B	249.773	0.6	0.1
Ba	455.403	0.15	0.03
Be	234.861	0.05	0.01
Bi	223.061	6	2
Ca	396.847	0.06	0.01
Cd	214.438	0.6	0.05
Ce	418.660	2	2
Co	238.892	1	0.2
Cr	267.716	0.9	0.15
Cu	327.396	1	0.3
Fe	259.940	0.8	0.1
K	766.490	4	0.3
Li	670.784	1	0.06
Mg	279.553	0.04	0.01
Mn	257.610	0.08	0.03
Mo	202.030	2	0.5
Na	589.592	2	0.15
Ni	231.604	1.4	0.3
P	177.432	5	2
Pb	220.353	5	0.8
S	181.971	10	5
Sb	231.147	5	2
Se	196.026	6	2
Si	251.611	2.2	1.4
Sr	407.771	0.05	0.01
Ti	334.941	0.2	0.1
Tl	190.790	6	2
V	292.402	0.7	0.2
W	207.911	3.5	2
Zn	213.856	0.8	0.2
Zr	343.823	0.9	0.3



The advantages of MultiCal: shown is Ca calibrated using both the 315.887 and 370.602 nm lines with an axial Vista-PRO. The wavelengths are calibrated to 100 mg/L and 1000 mg/L respectively, providing extended linear dynamic range and detection limits from one plasma view.

The accuracy of the results is verified by the Continuing Calibration Verification (CCV) results. The first column combines the results from the two wavelengths to provide the mean final result.

ICP Expert software for the Vista-PRO is the most capable ICP software ever developed. Use its multi-tasking capabilities to reprocess results from yesterday's analyses, whilst collecting results for today's samples. ICP-Expert software is compatible with Microsoft Windows® 98, Windows NT4 and Windows 2000, ensuring it is suitable for any laboratory computing environment.

The intuitive interface of ICP Expert is logically organized for easy navigation and use. With ICP Expert you can become an expert user quickly, with wizards that guide you through common operations and a video help system that shows you how to do everything from setting up a method to changing an accessory.

ICP Expert is compatible with Varian's complete range of ICP spectrometers and features unmatched software capabilities, including:

• Powerful reporting features that enable you to export to spreadsheets for trend analysis and process monitoring, and to HTML formats for web access compatibility.

• Full retrospective editing that allows you to mask replicates or standards, correct standard concentrations, try alternative calibration algorithms and adjust your choice of background correction.

• The capability to mathematically combine results for different elements or wavelengths, and to provide automatic calibration range verification. This facility is ideal for manufacturers of metals, chemicals and pharmaceuticals seeking total composition analysis, purity calculations or elemental ratios.

• Complete units' conversion facilities and element reporting in molecular forms such as KCl or NaCl.

• Stability Reference Standardization (SRS), which provides periodic referencing to a standard reference material for the ultimate in analytical accuracy. SRS is ideal for geochemical and high salt content samples and when internal standard elements cannot be used.

• Extensive Quality Control Protocols (QCP) that can be easily modified to suit your laboratory's QC system.

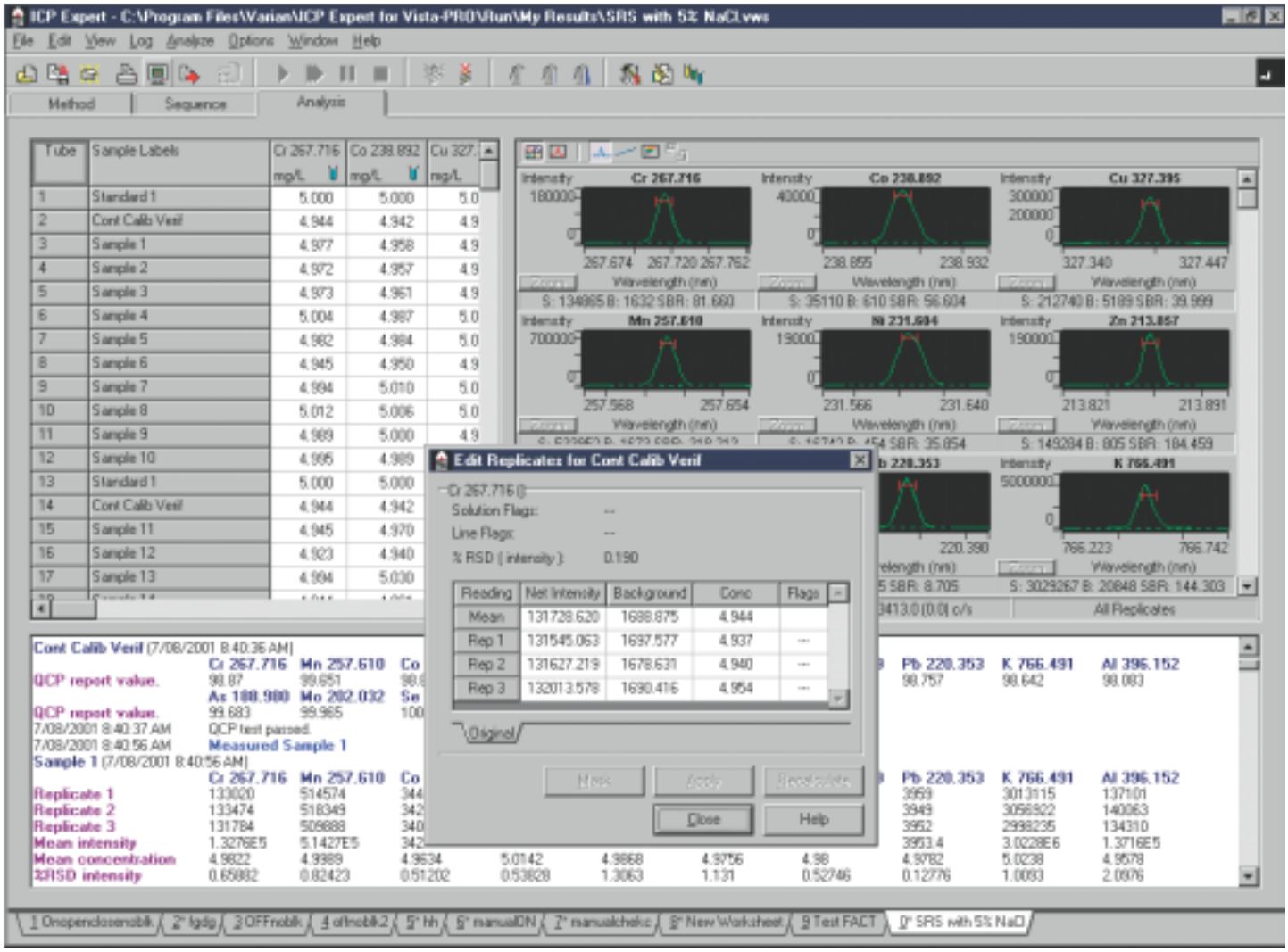
• A unique time resolved signal mode that enables you to couple the Vista-PRO to an HPLC for fast speciation and separation applications.

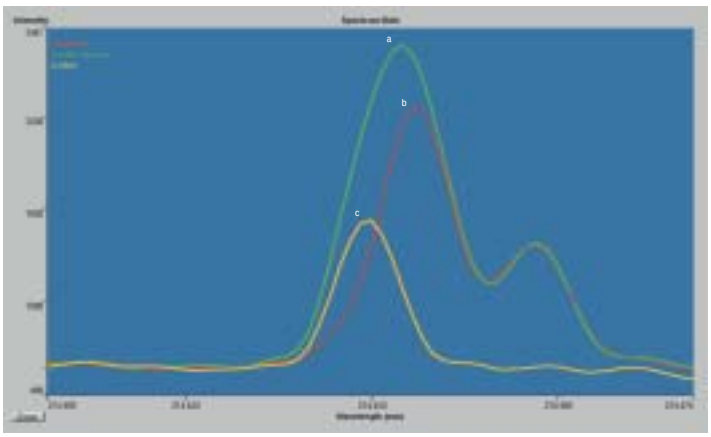
• Compliance to the US FDA's 21 CFR Part 11 requirements for audit trails, electronic signatures and access privileges (optional software).

PlasmaNet

Need help? Join PlasmaNet™, Varian's online ICP user email forum.

The ICP Expert online help includes video instructions on hardware setup and routine maintenance procedures.

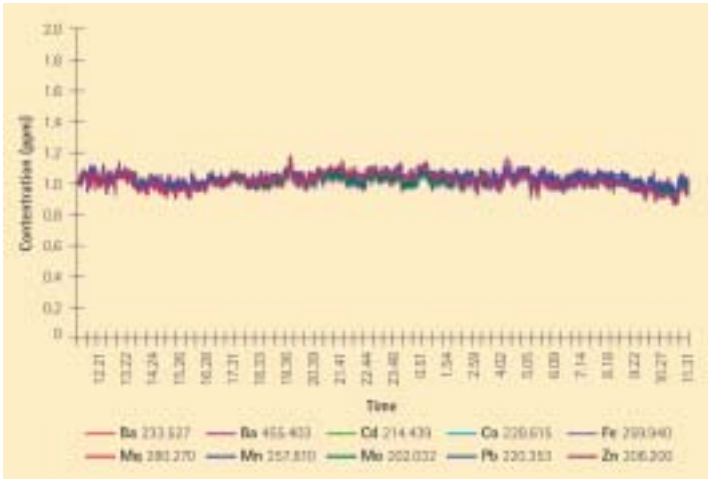




Varian's patented Fast Automated Curve-fitting Technique provides real time spectral deconvolution with no time penalty. FACT improves analytical accuracy by solving spectral interference problems in difficult samples. Best of all, if you suspect a spectral interference in your analysis, you can apply FACT after the analysis has finished.

As shown here FACT easily handles the resolution of the difficult Fe interference on Cd at 214.438 nm. Shown are:
a. the unresolved spectrum from a soil sample
b. the FACT model of the interference (500 mg/L Fe)
c. the FACT deconvolution of the Cd analyte

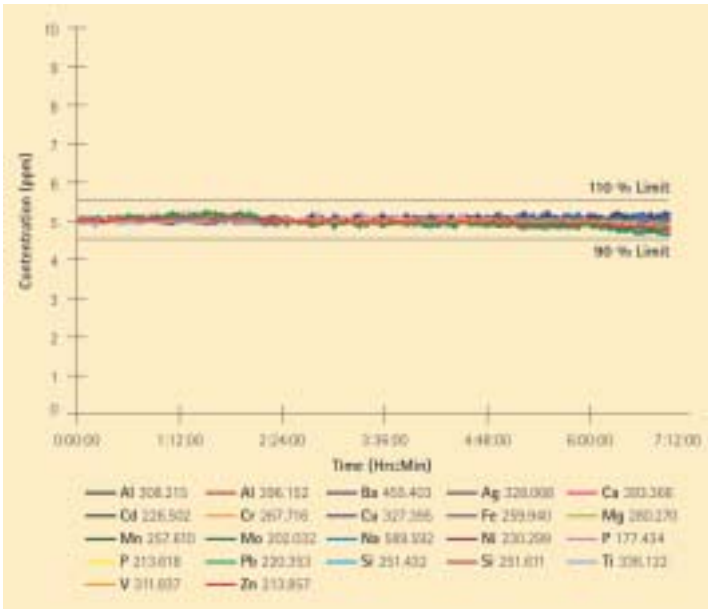
Element	Wavelength (nm)	Measured (µg/L)	Certified (µg/L)
Analysis of NIST SRM 1643c Water			
Ag	328.068	2.3	2.2 ±0.3
As	188.979	83.5	82.1 ±1.2
Ba	233.527	46.6	49.6 ±3.1
Be	265.045	23.1	23.1 ±2.2
Cd	226.502	12.1	12.2 ±1.0
Co	228.616	21.5	23.5 ±0.8
Mn	257.610	35.7	35.1 ±2.2
Mo	202.030	100.0	104.3 ±1.0
Ni	231.604	58.0	60.6 ±7.3
Pb	220.353	32.7	35.3 ±0.9
V	292.402	28.1	31.4 ±2.8



With Varian's unique high solids torch, the axial Vista-PRO shows excellent stability for the direct aspiration of 25% sodium chloride over 24 hours. (Top)

The Vista-PRO axial instrument offers one-step analysis from one plasma view. Soil digest analyses are easily and accurately performed. Varian's MultiCal gives accurate recoveries from parts per billion to sub-percentage levels, such as the excellent recovery for 650 mg/L of Al shown. (Right)

Element	Wavelength (nm)	Measured (mg/L)	Certified (mg/L)
Analysis of Soil Digest			
As	188.979	6.0	6.3
Ba	233.527	6.6	7.0
Cd	214.438	0.2	0.2
Co	228.616	0.07	0.1
Cu	324.754	3.1	3.0
Zn	206.200	68.8	70.0
Fe	260.709	348.0	350.0
Al	257.510	649.0	650.0
K	766.490	221.0	210.0



The stability of elements in kerosene directly aspirated for 8 hours with no internal standardization is shown. (Bottom)

Today, busy laboratories are expected to be both centres of analytical excellence and profitability. Providing excellent long-term stability and plasma robustness, Varian's Vista-PRO is perfect for achieving these goals. The long-term stability offered by the Vista-PRO results in greater productivity and profits for your laboratory due to less downtime and maintenance costs. The superior stability of the Vista-PRO reduces the need for recalibration, thereby reducing running costs and maximizing the throughput of samples per hour.

With Vista-PRO you can confidently analyze any sample, from the highest dissolved solids to the most volatile organic solvents, simply and accurately.

Sample introduction systems for every analytical challenge

Every analysis presents its own unique challenges. Varian's comprehensive range of sample introduction components allows you to tailor your ICP to achieve the best, most accurate results as quickly as possible.

Varian's sample introduction systems are easy to mix and match for your specific application. For high dissolved solids applications choose our high solids torch with Twister™ spraychamber and Seaspray™ nebulizer. For volatile organic solvents you can rapidly change to our fully or semi-demountable torches with our water-cooled glass spraychamber for optimum performance.

The benefits of Varian's sample introduction systems include:

- A wide choice for ultimate flexibility
- Easy, fast set-up and changeover
- Dedicated systems for unique applications
- Fast delivery

Safety

It is Varian's policy to manufacture safe products and to meet all legal requirements governing the design, manufacture and sale of safe products. As with all similar products, some or all of the following hazards may be present: high temperatures, high pressure gases, explosive gases, magnetic and radio frequency radiation, UV and visible light and electricity. Each product is designed to protect operators from potential hazards. Varian supplies instructions that describe the correct procedures for the operation and maintenance of each product.

The Vista-PRO series Inductively Coupled Plasma Optical Emission Spectrometer is designed to be used to determine the levels of trace and major elements.

CE

Vista-PRO is certified to comply with the requirements of the EMC and LV directives of the European Union.

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Biotechnology
Clinical
Electronics
Environmental
Photonics
Toxicology
Pharmaceutical
Food and Beverage
Metals and Mining
Petroleum and Petrochemical

Varian, Inc. is committed to a process of continuous improvement which demands that we understand and then meet or exceed the needs and expectations of our customers—both inside and outside the company—in everything we do.

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