

ICP-OES

Varian
Liberty Series II
ICP-OES



VARIAN

Liberty Series II— fast, economical performance

Purgeable optics for
superior performance
below 190 nm

Direct serial coupling
provides 75% transfer
efficiency of RF power
to the plasma

Choice of radially or
axially viewed plasma
configurations

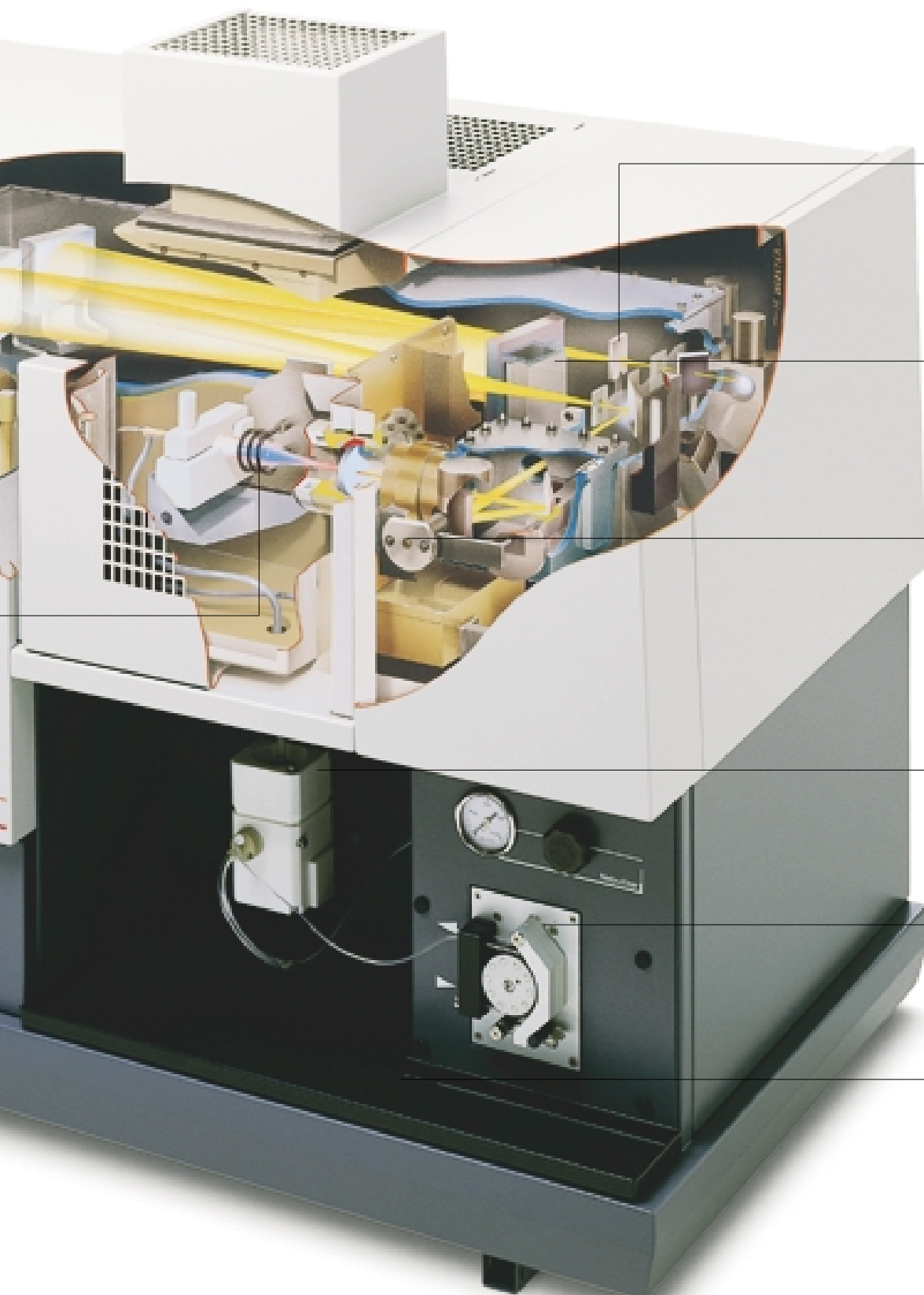
Liberty ICP optical emission spectrometer systems have been chosen by hundreds of analysts around the world for their superior optical resolution, high level of automation and unmatched performance with difficult samples. With over 40 years experience in atomic spectroscopy, Varian is a recognized leader and innovator in AAS, ICP-OES and ICP-MS. Today, Liberty Series II is the world's Number One selling sequential ICP.

It features:

- Varian's award-winning worksheet software—making operator training easy

- Our famous free-running, 40 MHz, RF generator that delivers unsurpassed performance on difficult samples such as fusions, sludge digests and organic solvents
- Advanced optical design with a huge holographic grating, used in up to four orders for maximum resolution of spectral interferences and high light throughput for improved detection limits
- Greater uptime, reduced maintenance requirements and improved reliability





Unique low mass refractor plate for Measurements At Peak (MAP™)

Rapid slewing holographic grating—measure 15 elements in just 5 minutes

Computer controlled plasma viewing position gives optimum results

Choice of spray-chambers. The inert Sturman-Masters™ spraychamber is shown

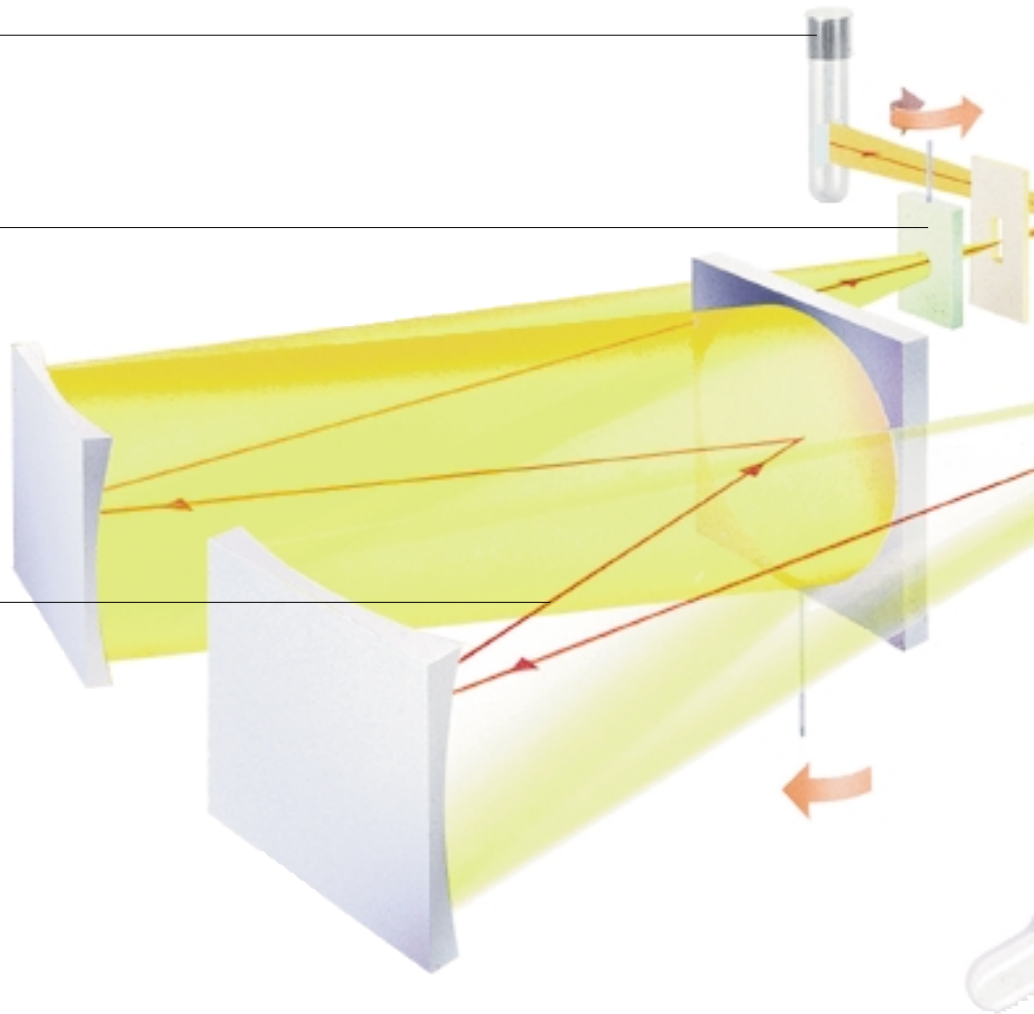
'Fast Pump™' mode improves productivity

External sample introduction system provides ease of access

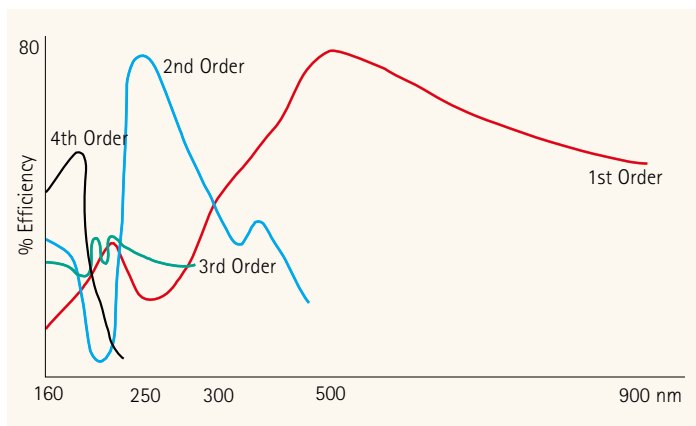
Software selected dual detectors for optimum sensitivity over the entire wavelength range

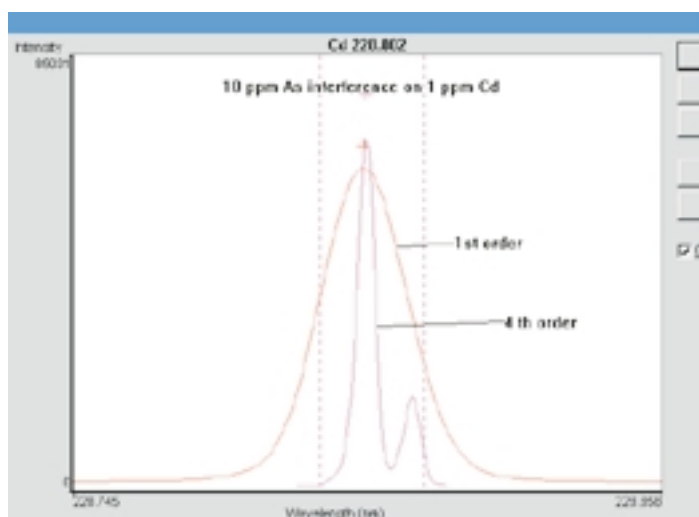
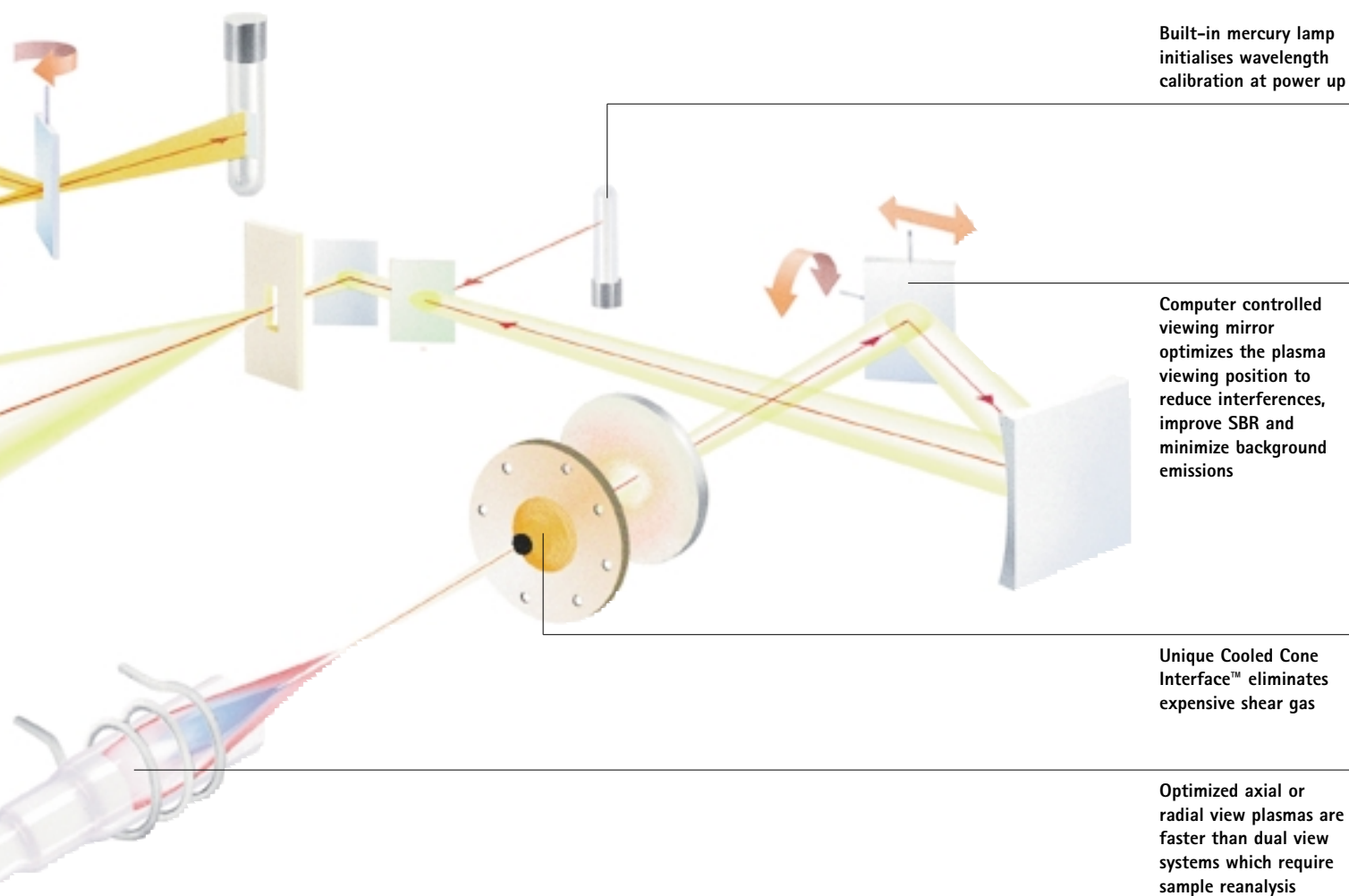
Refractor Plate Measurement At Peak (MAP) provides immediate drift correction and background correction while locating the peak maximum

Huge, fully illuminated holographic grating that generates minimal stray light and provides a typical resolution of 0.006 nm in the low-UV wavelength range. This minimizes interferences in this analytically important region



Liberty's advanced optical design ensures maximum light throughput in up to four orders for superior resolution and sensitivity. This minimizes spectral interferences and produces accurate results





Liberty's 0.006 nm resolution in 4th order eliminates the potential interference of arsenic on cadmium at 228.8 nm. A comparison with 0.018 nm resolution, typical of other ICP systems, shows the benefits of Liberty's high resolution.

Varian's Liberty ICP-OES has always demonstrated stable and accurate analytical results on samples that were not even possible by ICP-OES before. The Liberty Series II continues this tradition of excellence with further innovation in RF design:

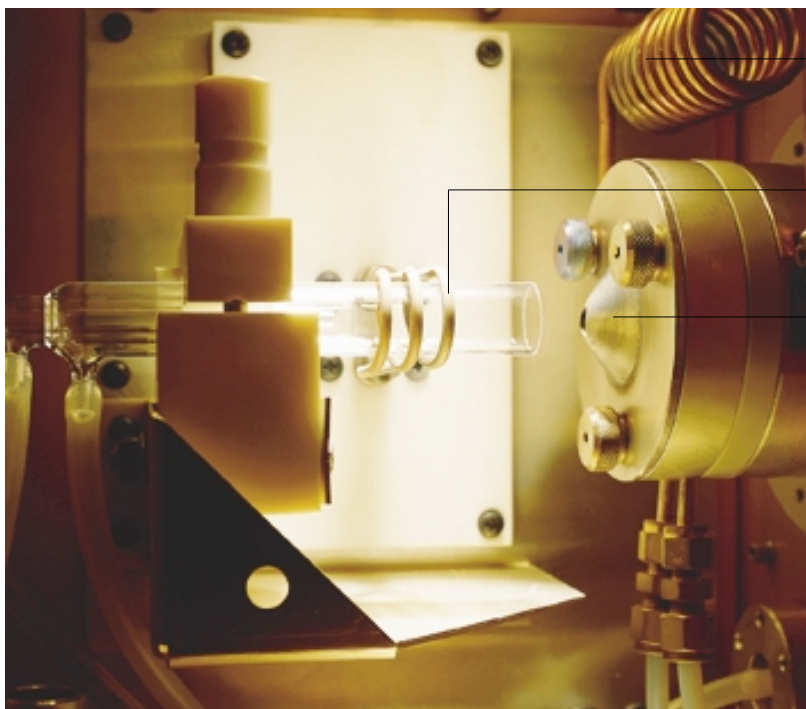
- Superior plasma performance, allowing you to analyze samples containing high levels of organics and dissolved salts
- Over 75% power efficiency is achieved by eliminating inefficient secondary matching networks
- Higher uptime and better reliability, as there are no moving parts
- The only air-cooled 40 MHz free-running RF generator with solid state power supply

A better free-running RF generator

Some RF systems are limited by poor power control and low coupling efficiency, resulting in a less stable plasma. With difficult matrices, such as gasoline and methanol, the plasma can even be extinguished. The Liberty Series II has a free-running RF generator with power control system directly coupled to the induction coil to rapidly adjust to changes in the plasma impedance for improved stability. With Direct Serial Coupling (DISC), Varian have improved the transfer efficiency of RF energy into the plasma by eliminating inefficient secondary matching networks. The result is a RF system that produces a stable plasma and is tolerant to organic solvents and other difficult to analyze samples.

The benefits of Air Cooling

The Liberty Series II RF power source is air cooled, eliminating the need for unreliable and difficult-to-service water cooling.



Anti-arcing
resonance coil

Axial plasma
optimized coil

Cooled cone
interface

No Moving Parts Design

The Liberty Series II design eliminates the need for variable tuning capacitors in the matching network—eliminating all moving parts which results in high up-time, reliability and lower cost of ownership. Varian's Liberty Series II ICP-OES robust axially viewed plasma delivers improvements in detection limits and linear dynamic range.

Vertical or Horizontal Plasma?

Liberty offers either optimized axially viewed or radially viewed plasma systems. The horizontal, axially viewed plasma is ideal for environmental applications that require excellent sensitivity and wide dynamic range. Varian's axially viewed plasma is suitable for the routine analysis of samples with dissolved solids contents up to 5%. This outstanding performance is achieved via the Cooled Cone Interface (CCI) design. The CCI uses a water cooled cone to deflect the cooler plasma tail outwards, away from the optical path.

This reduces interferences caused by self-absorption in the cool plasma tail, maintaining a wide linear dynamic range and eliminating the need for a shear gas. The Liberty Series II ICP-OES, with axially viewed plasma, is able to meet all US EPA Contract Required Detection Limits (CRDL) for waters and waste waters and is capable of handling up to 5% dissolved salts.

If long term analysis of the most difficult sample types is required, the Liberty radial 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. Vertically orientated, radially viewed plasma systems have become 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 salt performance of the Liberty radial.

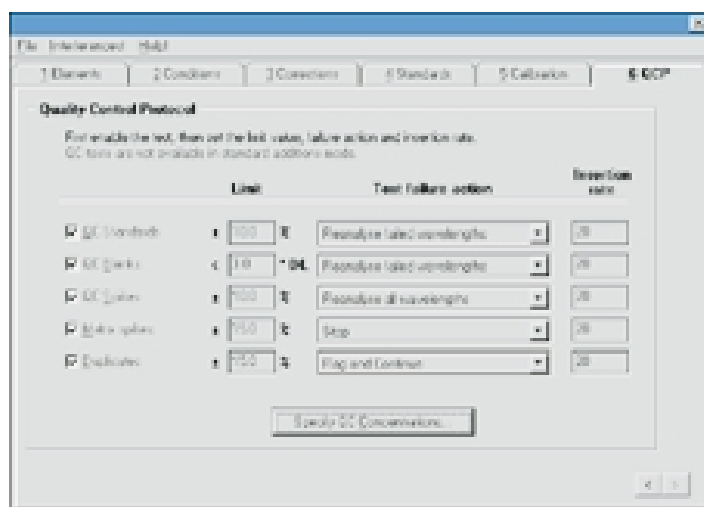
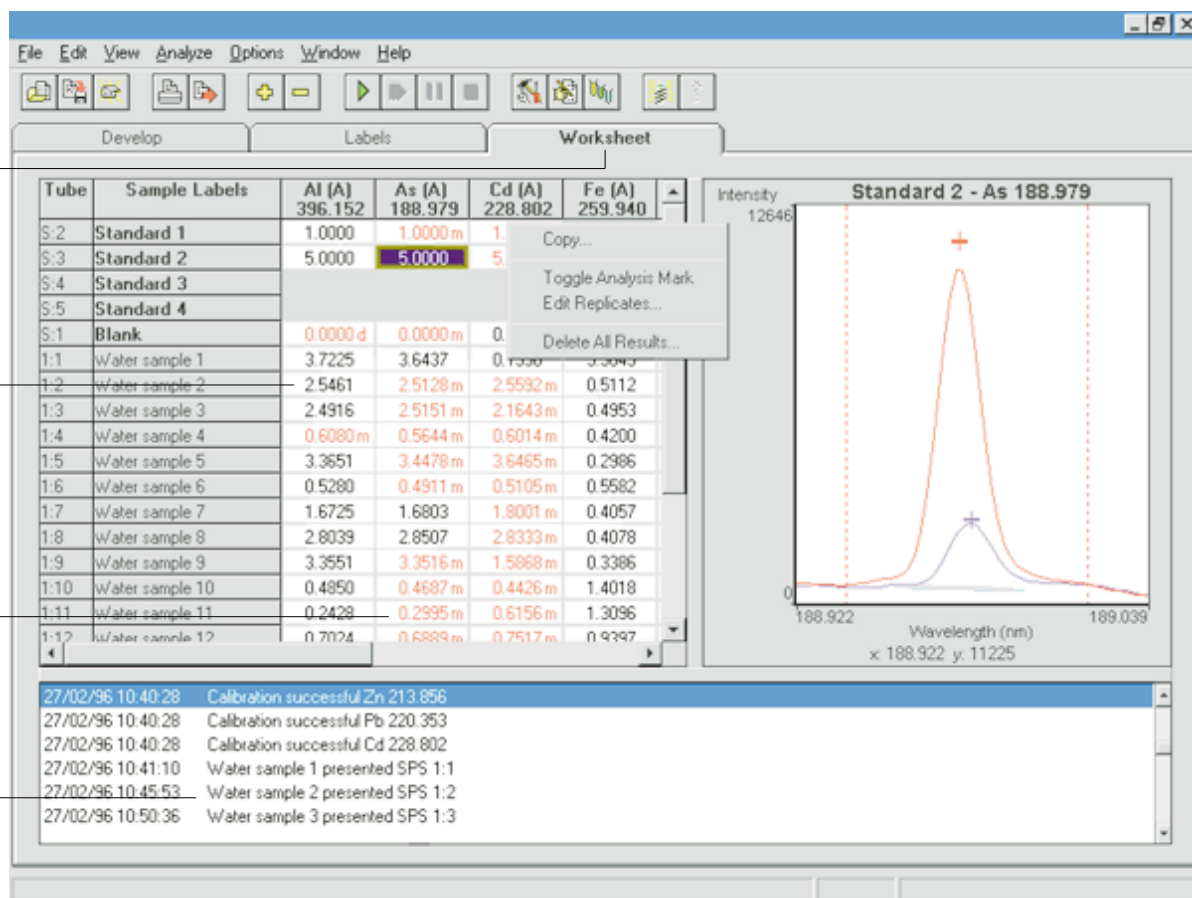
ICP Expert™—the benefit of experience

The heart of the ICP Expert software is the worksheet which uses the "spreadsheet" concept used in many business applications

Results are displayed in the worksheet. By selecting a cell the wavelength scan and replicate results can be viewed for any element in any sample

Color-coding indicates interferences, out-of-range, diluted, below detection limits and uncalibrated results

The operation log provides information on instrument status and analysis progress



Just generating results is no longer enough. The answers your laboratory generates are not only expected to be accurate, but must also be validated and timely. To assist in complying with your internal quality control procedures or external regulatory requirements, ICP Expert features an extensive range of quality control procedures with support for the following in the standard software:

- Quality control standards
- Duplicate analysis
- QC blank solution
- Matrix spike addition
- QC spikes

Varian offers a complete range of accessories for the Liberty Series II ICP-OES family of spectrometers.

Autosampler and Auto-Diluter

The SPS-5 Sample Preparation System and Liberty Series II ICP-OES can be combined to deliver real productivity gains. Unattended analysis is possible with powerful software, a stable, high throughput spectrometer and a sample preparation system capable of automatically performing on-line dilutions of over-range samples.

Large capacity

With the inclusion of the optional rear rack extension, the SPS-5 can accommodate up to 5 separate racks with a total capacity of up to 500 solutions. Five different rack types are available for the SPS-5, and any rack type may be placed in any of the five different rack positions on the sample platform. All SPS-5 racks contain a magnetic sensor in the base to provide the unique Magnetic Rack Recognition feature. This prevents incorrect rack usage in a selected method. Each rack is constructed from chemically resistant polypropylene.

Auto-Diluter

Varian's Auto-Diluter is a powerful companion to the SPS-5 Sample Preparation System. The Auto-Diluter extends the capabilities of the Liberty ICP-OES, allowing samples to be analyzed within the calibration range, quickly and accurately.

The automatic on-line dilution of over-range samples provides:

- Productivity gains, by eliminating post-run re-analysis of overrange samples
- Re-analysis of overrange samples, within existing QC protocols
- Improved dilution accuracy, with the high precision syringe diluter
- Freedom from operator errors and the contamination often associated with a manual dilution

The Auto-Diluter is made from inert materials and is compatible with a wide range of sample types, including solutions containing high dissolved solids and HF acid.

RoboPrep—Your new staff member

With Varian's RoboPrep software, the SPS-5 and Auto-Diluter can be used off-line for the preparation of multi-element standards, standard additions, matrix spikes and addition of internal standards. RoboPrep automates sample preparation—freeing your laboratory staff for other more productive tasks.

Vapor Generation Accessory

The VGA-77P provides up to a 50 fold improvement in the detection limit performance of hydride forming elements As, Se, Sb, Bi, Ge and Sn as well as Hg on either radially or axially viewed plasma systems.

Ultrasonic Nebulizer

The Ultrasonic Nebulizer (USN) is ideal for the trace level determinations required in a wide range of environmental applications. The USN typically provides at least a 5 fold improvement in detection limits when compared to conventional pneumatic nebulization on either radially or axially viewed plasma systems.

Volatile Organics Kit

The volatile organics kit, consisting of a cooled spraychamber, auxillary gas module and a demountable torch, allows analysis of highly volatile organic solvents such as gasoline and ether. A small flow of oxygen is added into the plasma auxiliary gas to minimize band structures and eliminate carbon build-up on the injector tube.

Sample Introduction Accessories

Varian offer a wide range of nebulizers, torches, spray chambers and consumables to maintain and customize the Liberty Series II to suit your particular application. Visit the Varian, Inc. website at www.varianinc.com for more details.



TeleDiagnostics™ Service and Support

To maximize instrument productivity and uptime, Varian provides a worldwide network of factory-trained service personnel who are able to offer a range of services. Varian's TeleDiagnostics connects your instrument, via a modem, to an authorised support centre, enabling the remote examination of result, method and instrument log files. TeleDiagnostics minimizes on-site service calls and enables better diagnosis when a fault does occur.

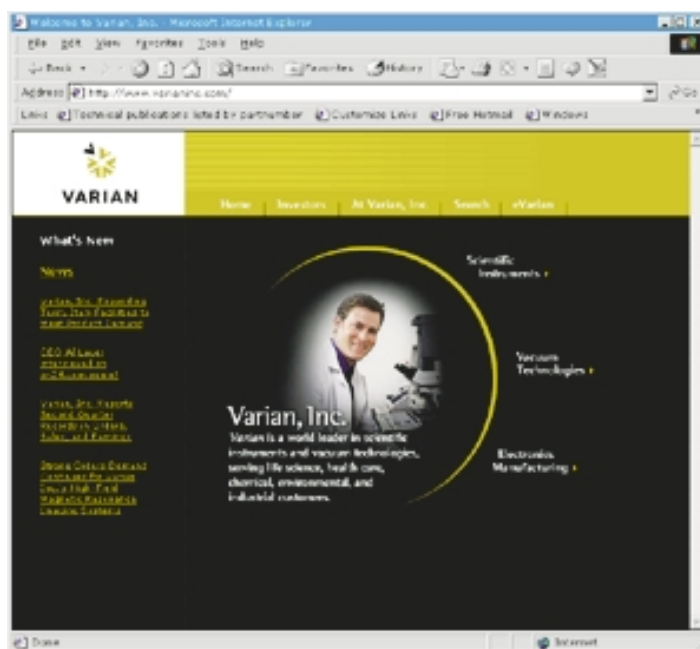
World Wide Web

Varian's Home Page

<http://www.varianinc.com> is another part of our on-going commitment to customer support. You can access applications notes, newsletters, updates about latest product developments or email us if you have a question. Use our on-line Parts and Supplies catalog to identify any consumables you need.

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 light and electricity. Each product is designed to protect operators from potential hazards. Varian supplies instructions which describe the correct procedures for the operation and maintenance of each product.

Liberty Inductively Coupled Plasma, Optical Emission Spectrometers are designed to be used to determine trace elements.



The Liberty Series II instruments are certified to comply with the requirements of the EMC and LV directives of the European Union





Varian 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.



Varian Analytical Instruments, serving worldwide markets in:

- Agriculture
- Basic Chemical
- Biotechnology
- Clinical
- Electronics
- Environmental
- Photonics
- Toxicology
- Pharmaceutical
- Food and Beverage
- Metals and Mining
- Petroleum and Petrochemical

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