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<p>Procurement Folder: 1905432</p> <p>Procurement Type: Central Purchase Order</p> <p>Vendor ID: <input type="text" value="000000226955"/> </p> <p>Legal Name: AGILENT TECHNOLOGIES INC</p> <p>Alias/DBA:</p> <p>Total Bid: \$66,383.39</p> <p>Response Date: <input type="text" value="03/09/2026"/> </p> <p>Response Time: <input type="text" value="14:17"/></p> <p>Responded By User ID: <input type="text" value="AGILENT"/> </p> <p>First Name: <input type="text" value="Georgeann"/></p> <p>Last Name: <input type="text" value="Foster"/></p> <p>Email: <input type="text" value="iscabids@agilent.com"/></p> <p>Phone: <input type="text" value="800-227-9770"/></p>	<p>SO Doc Code: CRFQ</p> <p>SO Dept: 1400</p> <p>SO Doc ID: AGR2600000032</p> <p>Published Date: 3/2/26</p> <p>Close Date: 3/10/26</p> <p>Close Time: 13:30</p> <p>Status: Closed</p> <p>Solicitation Description: <input type="text" value="Inductively Coupled Plasma-Optical Emission Spectrometer"/></p> <p>Total of Header Attachments: 9</p> <p>Total of All Attachments: 9</p>
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Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

**State of West Virginia
 Solicitation Response**

Proc Folder: 1905432
Solicitation Description: Inductively Coupled Plasma-Optical Emission Spectrometer
Proc Type: Central Purchase Order

Solicitation Closes	Solicitation Response	Version
2026-03-10 13:30	SR 1400 ESR03092600000005789	1

VENDOR
 000000226955
 AGILENT TECHNOLOGIES INC

Solicitation Number: CRFQ 1400 AGR2600000032
Total Bid: 66383.38999999999941792339086 **Response Date:** 2026-03-09 **Response Time:** 14:17:17
Comments:

FOR INFORMATION CONTACT THE BUYER

Larry D McDonnell
 304-558-2063
 larry.d.mcdonnell@wv.gov

Vendor Signature X **FEIN#** **DATE**

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Inductively Coupled Plasma-Optical Emission Spectrometer	1.00000	EA	66383.390000	66383.39

Comm Code	Manufacturer	Specification	Model #
41115411			

Commodity Line Comments: Agilent Technologies, Inc. (Agilent) is pleased to respond to this request. Agilent is in agreement with customer's terms and conditions.
Please refer to the attachments for details.

Extended Description:
Please see specifications section 3.1.1 in the attached documentation for further details.

Agilent Technologies, Inc.
 2850 Centerville Rd
 Wilmington DE 19808
 U.S.A.

Prepared For:
 Matthew Sites
 Chemist III
 State of West Virginia
 Dept of Agriculture
 1900 Kanawha Blvd E
 CHARLESTON WV 25305-0170

Quotation

Quote No: 7031178	Quote Expiration Date: 06/04/26
Incoterms: Delivered duty paid	Payment Terms: Net 30 Days
Estimated Delivery (weeks): 8	
Your Agilent Representative: Michael Michalski michael@browningAS.com	
To Place an Order: Phone:1-800-227-9770 option 1 Fax:1-302-633-8953 email:Lscainstrumentsales@agilent.com website:www.agilent.com/store	

Item	Product ID and Description	Qty/UOM	Unit List Price	Discount Amount	Ext Net Price	Surcharge Amt	Total with Surcharge
1	G8018AA Agilent 5800 VDV ICP-OES. PC controlled Vertical Dual View Inductively Coupled Plasma - Optical Emission Spectrometer. With the following configuration: Ship-to Country - USA 100 - Add ICP Expert PRO Feature pack Installation (44K) Introduction (44L) 1 Year SW Update/Phone Assist (44W) The following Special Discount has been applied: 62.0 %	1 EA	123,504.00	76,572.48	46,931.52	1,104.66	48,036.18
2	G8490A SPS 4 is a compact 4 rack autosampler, ideal for high throughput labs requiring the ultimate in performance without compromising bench space. With the following configuration: Ship-to Country - USA 002 - SPS 4 Integrated Cover kit 007 - SPS 4 Pumped Drain kit Installation (44K) Introduction (44L) The following Special Discount has been applied: 60.0 %	1 EA	15,579.00	9,347.40	6,231.60	144.65	6,376.25
3	G8496A Agilent smart, non-CFC recirculating chiller with temperature control and software integration. With the following configuration: Ship-to Country - USA The following Special Discount has been applied: 60.0 %	1 EA	9,009.00	5,405.40	3,603.60	90.09	3,693.69

4	6610030100	1 EA	649.00	324.50	324.50	8.11	332.61
	Bottle ICP-OES Wavecal soln 500mL 5 ppm						
	The following Special Discount has been applied: 50.0 %						
5	5190-7001	1 EA	141.00	70.50	70.50	1.76	72.26
	Calibration blank solution 5 percent HNO3 for						
	The following Special Discount has been applied: 50.0 %						
6	1610132400	1 EA	17.90	8.95	8.95	0.22	9.17
	Fitting y barb 1/16, 1/pk						
	The following Special Discount has been applied: 50.0 %						
7	3710068300	1 EA	92.55	46.28	46.27	1.16	47.43
	Peri pump tubes PVC orange/green flared						
	The following Special Discount has been applied: 50.0 %						
8	G8010-60293	1 EA	1,287.00	643.50	643.50	16.09	659.59
	OneNeb Series 2, inert ICP nebulizer 1/p						
	The following Special Discount has been applied: 50.0 %						
9	H2149A	1 EA	10,525.00	5,262.50	5,262.50	0.00	5,262.50
	Method and Application Consulting On-site consulting for a maximum of 4 participants. Certificates and manuals not included.						
	With the following configuration:						
	Ship-to Country - USA						
	002 - 2 Day On-Site (Consecutive, Incl Travel)						
	The following Special Discount has been applied: 50.0 %						

Total List:	160,804.45 USD
Total Discount:	97,681.51 USD
Total Net:	63,122.94 USD
Shipping & Handling:	1,893.71 USD
Surcharge:	1,366.74 USD
Total Net with Shipping and Surcharge:	66,383.39 USD
Estimated Taxes:	0.00 USD
Total Quote:	66,383.39 USD

Agilent Financial Solutions

Leasing estimate is based on a total cost of **66,383.39 USD**.

	24 Months (USD)	36 Months (USD)	48 Months (USD)	60 Months (USD)
Fair Market Value Lease(FMV Lease)	2,479	1,735	1,399	1,179
Finance Lease(\$1.00 Purchase Option)	3,013	2,091	1,632	1,357

Financing for business customers may be available from Agilent's independent finance partner(s), (hereinafter "Lender"). The above financing examples are provided for illustrative purposes only and do not constitute a legally binding offer from Agilent.

Please note: Financing offers, payment amounts, and structures are subject to credit approval and acceptance of contract terms directly with the Lender. Terms and interest rates are subject to change based on the customer's credit review. Financing payments are calculated based on the "Total Net Cost with Shipping and Handling" (excludes applicable taxes) as identified on this Quotation.

Fair Market Value Purchase Option (FMV Lease):

An agreement with the Lender allowing a customer to use the asset(s) for an agreed term in return for regular payments. Title is retained by the Lender. End of term options may include extend the contract, purchase for fair market value, or return the financed equipment.

\$1 Purchase Option (Finance Lease):

An agreement with the Lender allowing a customer to use the asset(s) for an agreed term in return for regular payments resulting in equipment ownership once all monthly payments have been made.

Contact your local Agilent Sales Representative or the Agilent Financial Solutions Specialist (financing@agilent.com) if you wish to proceed with a finance arrangement. We will then arrange for a quotation from the Lender, which you would enter into directly with the Lender, and will be subject to their terms and conditions (and credit reviews).

Visit us online at www.agilent.com/en/technology/agilent-financial-solutions to find out why more and more Labs are choosing Agilent Financial Solutions and learn more about our attractive payment options and how we can help you acquire the latest innovations, while minimizing the upfront costs.

Product and Warranty:

Each Product receives a global warranty which includes the standard warranty for the country of purchase. Please review the terms of the global warranty and Agilent's "Rights Due to Defects (Warranty)" terms and conditions on our [website](#).

The warranty period for standard instruments is twelve (12) months from the date of acceptance. Consumables are warranted for ninety (90) days from the date of acceptance. Customer may receive a different warranty when the product is purchased as a part of a system. Selected Automation consumables are warranted for one hundred and eighty (180) days, selected Vacuum Products are warranted for twenty-four (24) months. Please check with your Agilent Sales Representative for details.

Terms and Conditions:

The sale of Agilent Products and Services referenced in this quotation is subject to the then current version of [Agilent's Terms of Sale](#), and any Supplemental Terms or Occasional Reseller Terms of Sale or other applicable terms referenced herein. The sale of Microplates Products shall be subject to Microplates Terms of Sale and any Supplemental Terms or other applicable terms referenced herein. The sale of Microplates Tooling Products shall be subject to Microplates Tooling Terms of Sale and any Supplemental Terms or other applicable terms referenced herein. All of the above "Terms" as applicable. A copy of the Terms is either attached or has been previously provided to you. Please contact us if you have not received a copy or require an additional copy. If you have a separate agreement in effect with Agilent covering the sale of Products and Services referenced in this quotation, the terms of that agreement will take precedence for those Products and Services. Agilent expressly objects to any different or additional terms in your purchase/sales order documentation, unless agreed to in writing by Agilent. Products and Services availability dates are estimated at the time of the quotation. Actual delivery dates or delivery windows will be specified at the time Agilent acknowledges and accepts your purchase order. The above conditions shall apply to the fullest extent permitted by the law. You may have other statutory or legal rights available. Commodities, technology or software exported from the United States of America ("U.S.") or from other exporting countries will be subject to the U.S. Export Administration Regulations and all exporting countries' export laws and regulations. Diversion contrary to U.S. law and the applicable export laws and regulations is prohibited.

For Education & Method Consulting Services, please find terms & conditions here: [Exhibit 22Y](#), Password: rudRUbr7

Additional Information:

Agilent Payment Method: ACH Credit card accepted only at the time of order placement. Agilent will charge 3% of the invoiced amount, when term invoices are paid with a credit card.

3.1.1 Inductively Coupled Plasma – Optical Emission Spectrometer (ICP-OES)

3.1.1.1 Quantity of one ICP-OES must be new, simultaneous, solid state detector instrument with spectral wavelength coverage from 167 – 780 nm. The instrument must have a dynamic range that can detect sample concentrations up to or greater than 200 ppm.

3.1.1.1.1 The Agilent 5800 is a new ICP-OES. The Vista Chip III is a solid state, simultaneous, CCD detector with full wavelength coverage from 167 – 786 nm. Anti-Blooming and Adaptive Integration technologies help provide the detector with a wide linear range. Selection of alternate wavelengths and use of MultiCal functionality extend the working range even further.

3.1.1.1.2 Supporting Document Number(s): 1, 2

3.1.1.2 ICP-OES must include a software operating system and a new computer which must have the capability of running the instrument software including a keyboard and mouse. The ICP-OES operating software must have the ability to transfer data to a LabWorks LIMS.

3.1.1.2.1 The PC and peripherals such as mouse, keyboard, and monitor are included as part of the proposal. The ICP Expert software controls the primary instrument and accessories such as the SPS4 autosampler. Data from the ICP Expert software can be exported to either an Excel or a .CSV file for transfer into a LIMS.

3.1.1.2.2 Supporting Document Number(s): 1, 3

3.1.1.3 ICP-OES must include an autosampler with a minimum 120-position rack.

3.1.1.3.1 The SPS4 supports four interchangeable sample racks and standards rack. Common sample rack configurations include 21-positions for 50 mL vials and 60-positions for 15 mL vials.

3.1.1.3.2 Supporting Document Number(s): 1, 4

3.1.1.4 ICP-OES must include a minimum one-year warranty on all parts and service. This product will need to be registered and provide registration to WVDA. This includes maintenance services also.

3.1.1.4.1 Product and Warranty: Each Product receives a global warranty which includes the standard warranty for the country of purchase. Please review the terms of the global warranty and Agilent’s “Rights Due to Defects (Warranty)” terms and conditions on our website.

The warranty period for standard instruments is twelve (12) months from the date of acceptance. Consumables are warranted for ninety (90) days from the date of acceptance.

3.1.1.4.2 Supporting Document: Warranty in the supplied quotation

3.1.1.5 ICP-OES must be set up and installed on site all systems are benchtop and require a 220V that is already in place.

3.1.1.5.1 The Agilent 5800 is a benchtop model. Both the instrument and chiller require 220V outlets for NEMA 6-15 plugs.

3.1.1.5.2 Supporting Document Number(s): 1, 5

3.1.1.6 Vendor must include a one-day training session that lasts between two and eight hours with a minimum of one person and a maximum of three people.

3.1.1.6.1 In addition to familiarization during instrument installation, the proposal includes a two-day onsite training session for up to four people.

Document #	Document Title	Reference #	Year
1	Data Sheet: Agilent 5800 and 5900 ICP-OES Specifications	5994-1616EN	2026
2	Technical Overview: Innovative Freeform Optical Design Improves ICP-OES Speed and Analytical Performance	5994-5891EN	2023
3	Technical Overview: Agilent ICP Expert Software	5994-1517EN	2023
4	Flyer: Agilent SPS 4 and SPS 6 Autosamplers	5991-5730EN	2025
5	Site Preparation Checklist: Agilent 5800 and 5900 ICP-OES	G8020-90901	2024
6	Brochure: Agilent 5800 ICP-OES Reclaim your wasted time	5994-1276EN	2025

Agilent 5800 and 5900 ICP-OES

Specifications



Reclaim your wasted time

The Agilent 5800 and 5900 ICP-OES instruments are designed for busy labs wanting to reclaim wasted time. The 5800 and 5900 are embedded with an ecosystem of sensors—powerful processors with smart algorithms and diagnostics designed to automate troubleshooting, preempt maintenance, and identify problems that could impact results. This functionality provides the user with insight into their samples and instrument health to reduce remeasurement and downtime, giving more confidence in results.

The 5800 and 5900 ICP-OES are true simultaneous systems and can use axial and/or radial plasma viewing modes in a single method. All configurations also feature the unique third-generation VistaChip III detection system, which delivers fast simultaneous measurement over the 167 to 785 nm wavelength range. They also include a vertical torch and Freeform optical design which enhances sensitivity and resolution.

The 5800 ICP-OES spectrometer is available in two configurations: Vertical dual view (VDV), which offers deep insights from the use of smart tools, and radial view (RV), ideal for labs needing a fast, high-performance radial ICP-OES.

The 5900 synchronous vertical dual view (SVDV) ICP-OES uses ingenious optics to measure both the axial and radial views of the plasma, at the same time. A seven-port advanced valve system (AVS), which reduces sample introduction and rinse times, is also included as standard. The combination of the optical design and the switching valve allows the measurement of samples in half the time of other ICP-OES instruments.

If lab throughput demands increase, the 5800 VDV can be upgraded onsite to the SVDV configuration.

Table 1. The 5800 and 5900 ICP-OES configurations and available viewing modes.

Instrument model	Radial Mode	Axial Mode	VDV Mode	SVDV Mode
5900 SVDV ICP-OES	✓	✓	✓	✓
5800 VDV ICP-OES	✓	✓	✓	
5800 RV ICP-OES	✓			

Instrument hardware

<p>Sample introduction</p> <p>Options for sample introduction are shown in the last section.</p>	<p>Both the 5800 and 5900 ICP-OES instruments have been designed to ensure easy operation and maintenance, and reproducible results. For example, a torch loader mechanism automatically aligns the torch and connects gases for fast start-up and reproducible performance.</p> <p>All 5800 and 5900 configurations come standard with:</p> <ul style="list-style-type: none"> - Mass flow-control on each of the nebulizer, plasma gas, auxiliary and make-up gas channels - One-piece quartz tube (polymer base) Easy-fit torch - Glass concentric nebulizer - Glass cyclonic double-pass spray chamber with 'ball and socket' connection to the bottom of the torch injector for easy setup and maintenance - Fully computer-controlled peristaltic pump with variable speed from 0–80 rpm, and five channels for sample, drain, internal standard, and the optional MSIS vapor generation system - Sample and waste pump tubing
<p>Gas controls</p>	<p>All plasma-related gas flows are computer-controlled, using high precision mass flow controllers:</p> <ul style="list-style-type: none"> - Plasma gas 8 to 20 L/min in 0.1 L/min increments, default setting 12 L/min - Auxiliary gas 0 to 2.0 L/min in 0.01 L/min increments, default setting 1.0 L/min - Nebulizer gas 0 to 1.5 L/min in 0.01 L/min increments, default setting 0.7 L/min - Make up gas 0 to 2.0 L/min in 0.01 L/min increments (used for optional accessories) - Option gas (argon/oxygen blend), added as percent of auxiliary gas at 0 to 2.0 L/min via software (used for some organic solvent applications) <p>User-interchangeable gas control modules for supply of argon, nitrogen, and argon/oxygen blend are available on the 5800 and 5900 instruments</p> <p>The 5800 is supplied as standard with a single port module supplying argon only:</p> <ul style="list-style-type: none"> - The single port module supplies the argon plasma gases, and argon purge gas for the optics, cone, and snout - User-interchangeable two and three port gas control modules are available as upgrade options <p>The 5900 is supplied as standard with user-interchangeable two- and three-port gas control modules:</p> <ul style="list-style-type: none"> - The two-port module is used to supply argon and an option gas. One port supplies argon for the plasma gases and the argon purge gas for the optics, cone, and snout. The second port is used to supply an argon/oxygen blend as the option gas - The three-port module is used to supply argon, nitrogen, and an option gas. One port supplies argon for the plasma gases and the argon purge gas for the optics, cone, and snout. The second port allows the supply of nitrogen for the optics purge. The third, an argon/oxygen blend as the option gas <p>The Agilent 5800 and 5900 systems are compatible with 99.99% purity argon</p>
<p>RF generator</p>	<p>All 5800 and 5900 configurations feature a vertical torch allowing you to measure the most challenging samples—from high matrix to volatile organic solvents. The vertical torch and 27 MHz solid state, water-cooled RF generator delivers reliable measurements on tough samples with less cleaning, less downtime, and fewer replacement torches. The free running design of the RF generator rapidly reacts to changes in plasma load. This rapid response provides stable and consistent power supply into the plasma when switching between samples of high or varying matrix.</p> <p>The 27 MHz solid state, water-cooled RF generator delivers:</p> <ul style="list-style-type: none"> - Power output of 750-1500 W in 10 W increments - Coupling efficiency of more than 75% - Power output stability typically better than 0.1% when tested in a lab with stable environmental conditions

<p>Optical system</p>	<p>The optical bench features a mass flow-controlled polychromator purge (argon or nitrogen). When combined with the Freeform optical design, faster warmup times and approximately half the purge times of other ICP-OES systems are achieved.</p> <p>The optical system features:</p> <ul style="list-style-type: none"> - Echelle optics including a CaF₂ prism cross disperser and echelle grating of 113.3 lines/mm creating an echellogram of 70 orders projected onto a single CCD detector - Freeform mirror technology which enables a 253 mm focal length polychromator providing excellent sensitivity and resolution - No moving optical parts and a 35 °C thermostatted optical bench to ensure the lowest detection limits and maximum signal stability - A cooled cone interface (CCI) that prevents the cooler plasma tail from being viewed by the optics when viewing axially. This results in less interferences, which increases the linear dynamic range - Computer-optimized echelle optical design uses a single entrance slit, and a Freeform collimating mirror to allow >98% of the available wavelengths to be collected onto a single CCD detector - Easy access to pre-optics windows for user serviceability/maintenance - Adjustable Radial Viewing Height between 0 - 20 mm. - The 5900 also includes, as standard, the dichroic spectral combiner (DSC). The DSC allows you to analyze with simultaneous axial and radial views of the plasma in a single measurement of the sample (SVDV mode). This approach provides the fastest analysis with lowest argon consumption. The viewing modes available on the Agilent 5800 and 5900 are summarized in Table 1
<p>CCD detector</p>	<p>The Agilent 5800 and 5900 are true simultaneous ICP-OES systems that feature the VistaChip III CCD detector. This detector is a high speed, >98% wavelength coverage detector with antiblooming protection on every pixel. It is a zero gas consumption design and enables fast warmup, high throughput, high sensitivity, and the largest dynamic range. Adaptive integration technology (AIT) on the CCD allows both intense and trace signals to be measured simultaneously at the optimum signal-to-noise ratio. AIT automatically allocates a pixel read time to each of the selected wavelengths. More intense peaks are allocated multiple shorter integration times and less intense peaks are allocated fewer longer integration times to optimize precision. These simultaneous measurements occur within the user selected read time for the analysis. Image-Mapping Technology (I-MAP) matches the image from the echelle optics exactly to the CCD. This design provides wavelength coverage from 167 to 785 nm on a single detector, from a single entrance slit.</p> <p>The CCD is:</p> <ul style="list-style-type: none"> - Mounted on a triple-stage Peltier device and cooled to -40 °C for low dark current and photometric noise - Hermetically sealed, providing excellent sensitivity in the UV range and eliminating delays due to zero purge requirements for the detector - Designed for fast CCD readout with a 1 MHz clocking speed, with an approximate, full wavelength range, read out of 0.8 seconds - Able to achieve 8 Orders of Linear Dynamic Range
<p>Software—standard inclusions</p>	<p>The ICP Expert software has a familiar worksheet interface and has been developed to allow easy method development. Application-specific software applets are also provided which allow a preset method to automatically load so you can start analysis immediately. Designed for use without requiring extensive training, the software also includes a method Import wizard which allows you to quickly import and optimize your existing methods.</p> <p>Other software features include:</p> <p>IntelliQuant</p> <ul style="list-style-type: none"> - Captures data from the entire wavelength range, identifies spectral interferences and provides wavelength recommendations - Performs rapid qualitative screening and semi quantitates all elements in each sample - Allows 'heat map' results display to provide rapid and intuitive visualization of results, at a glance, for all elements in each sample <p>Sample management</p> <ul style="list-style-type: none"> - Weight/volume/dilution correction factors with user-definable concentration units conversion for samples and calibration/QC solutions - Fully editable sample label list with optional customer and batch label fields <p>Calibration options</p> <ul style="list-style-type: none"> - MultiCal helps to extend linear dynamic range and automatically validates results - Calibration routines for multi-element external calibration and the method of standard addition - Calibration reslopes eliminate the need for full recalibration - Choice of background correction techniques from traditional manually adjusted off-peak background correction to the unique automatic fitted background correction (FBC) - Numeric definition of off-peak marker positions available - Fast automated curve-fitting technique (FACT) for online spectral deconvolution of complex spectra. - Inter element correction (IEC) technique included <p>Data Management</p> <ul style="list-style-type: none"> - Summary row automatically selects the best results for each wavelength from all available measurements of a sample and compile them into one row. - All remeasurements data, such as reactive dilutions, is retained and organized by sample and can be collapsed to show only a one line summary. <p>Neb Alert and plasma monitoring</p> <ul style="list-style-type: none"> - Neb Alert continuously monitors the nebulizer pressure, alerting the user when a suspected blockage or leakage occurs - Plasma ignition reminder dialog to increase probability of ignition success

<p>Software—standard inclusions, continued</p>	<p>Early maintenance feedback Early maintenance feedback uses instrument sensors and counters to track instrument health and provide guidance for when maintenance is needed</p> <ul style="list-style-type: none"> - Over 100 sensors can be monitored - Custom counters and alerts can be created <p>QC options</p> <ul style="list-style-type: none"> - User-customizable quality control protocols (QCP) designed to meet US EPA and other international compliance standards - Column-based QC - %Relative standard error (%RSE) as a calibration validation parameter - Expanded QC to enable user definable QC for all samples - Segregated analysis page display of QC tests including accuracy, repeatability, ruggedness and detectability. Can be used for USP and ICH elemental analysis in pharmaceutical products regulations - Calibrations can be programmed at a user-specified rate either inline with sample tubes or from centralized calibration tubes (rate-driven) <p>Analytical monitoring</p> <ul style="list-style-type: none"> - Estimated detection limits calculated based on the calibration - Outlier conditional formatting flags unexpected results adding color-based flags to results based on a set of configurable rules - Internal standard ratio chart to monitor internal standard during analysis <p>Reporting and help</p> <ul style="list-style-type: none"> - Simple, flexible reporting with the Agilent OpenLab intelligent reporting enables users to configure reports to include only the data required - Wide variety of reporting and exporting options with user-definable settings - Comprehensive and interactive online help and learning center with contextual search functionality, with step-by-step instructions, tips and videos for maintenance and hardware setup <p>System and accessory control</p> <ul style="list-style-type: none"> - Computer controlled plasma gas flows, vertical plasma viewing position, plasma ignition, RF power, safety interlocks and utilities monitoring - Fully integrated Advanced Valve System 4 (AVS 4) with 4 ports - Integrated control of the IsoMist temperature-controlled spray chamber - Full control of Agilent SPS 4 and SPS 6 autosamplers - SPS 4 Autosampler rack and tube positions can be edited for true random-access sampling - SPS 4 Autosampler custom rack editor to support nonstandard racks <p>General</p> <ul style="list-style-type: none"> - Windows 11, 64-bit compatible - Software interface available in English, Japanese, Simplified Chinese, French, German, Italian, Spanish, Portuguese and Polish
<p>Optional Pro software pack:</p>	<p>The optional Pro software pack offers the additional features to enhance productivity and performance including:</p> <ul style="list-style-type: none"> - Support for 3rd party autosamplers including: <ul style="list-style-type: none"> - Teledyne CETAC: <ul style="list-style-type: none"> - Oils 7400, 7600 - ASX-520, -560, -1400 and -1600 - EXR-8 - Elemental Scientific: <ul style="list-style-type: none"> - DX Autosampler series, SC-2, -4, -8, -14 - prepFAST autodilution with the SC-2, -4, -8 - Brooks/Aimlab: <ul style="list-style-type: none"> - AIM1250 and AIM3600 - Rate-generated QCP - IntelliQuant Screening—a dedicated semi-quantitative worksheet type with super-fast readout capability for sample screening and creates easy visualization of results, in pie charts, bar charts and a results grid heatmap - Integrated control of the Advanced Valve System switching valve accessory (AVS 6 or 7), available with 6 or 7 ports. 7th port for inline internal standard - Integrated control of the Advanced Dilution System 2 (ADS 2) - Standard bracketing capability to support high-precision quantification applications - Oxygen addition for use when analyzing organic matrices - Automatically monitor sample washout using Intelligent Rinse to reduce carry over, improve sample throughput and reduce consumables costs - User definable replicates for all different solution types including blank, standards, samples and QC - Trend analysis of argon back pressure to nebulizer and argon emission per sample - Live export of data to Microsoft Excel (Excel not provided)
<p>Other optional software</p>	<p>Software is available to assist in achieving compliance to the US FDA 21 CFR Part 11 requirements for audit trails, electronic signatures, and access privileges</p>

Performance

Typical warmup time

Warmup time from standby mode of <20 minutes from plasma ignition.

Stray light

Stray light elimination via baffles and optical design to less than 1 ppm effective As signal at 193.696 nm from 10,000 ppm Ca.

Signal stability

Typically stable to less than 1% RSD over 8 hours without internal standardization or any form of drift correction.

Typical resolution

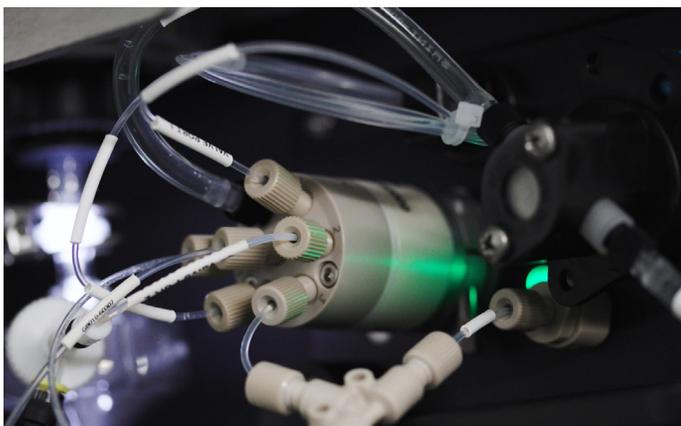
Table 2. The typical resolution achieved by the Agilent 5800 and 5900 for a selection of elements and wavelengths.

Element	Wavelength (nm)	Resolution (pm)
As	188.980	< 6.5
Mo	202.032	< 7
Zn	213.857	< 7.5
Pb	220.353	< 7.5
Cr	267.716	< 9.5
Cu	327.395	< 13
Ba	614.171	< 32

Accessories and peripherals

Agilent offers a full range of optional configurable accessories and peripherals for the 5800 and 5900, including:

Advanced Valve System (AVS)



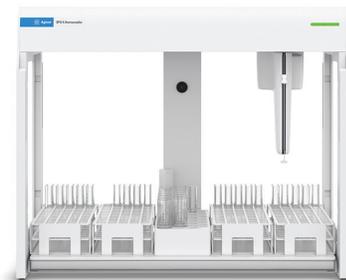
The fully integrated AVS simplifies setup and use while delivering ultra-high sample throughput without compromise to analytical performance and is available in 4 port, 6 port, and 7 port options. [More information is available on agilent.com](#)

Advanced Dilution System (ADS 2)



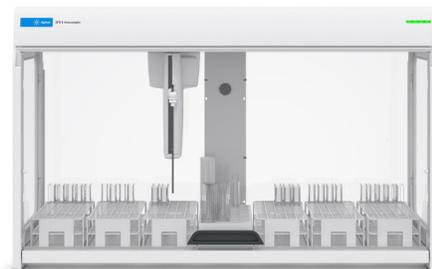
Designed and manufactured by Agilent, the ADS 2 automates standard preparation and pre-run sample dilutions. It also automates post-run sample dilutions for over-range samples using real-time reactive dilutions during the analysis. Automating dilutions removes common sources of human error, contamination, and wasted time. [More information is available on agilent.com](#)

SPS 4 Autosampler



High capacity (360 sample), fast and compact autosampler designed to meet the needs of everyday high-throughput laboratories. [More information is available on agilent.com](#)

SPS 6 Autosampler



The SPS 6 is a six sample rack autosampler with 50% more capacity than the SPS 4, offering up to 540 samples for laboratories using ICP-OES or ICP-MS. It is ideal for laboratories looking for higher-capacity, longer unattended runs and using the Advanced Dilution System (ADS 2) autodilutor. [More information is available on agilent.com](#)

Multimode Sample Introduction System (MSIS)

The MSIS provides simultaneous measurement of hydride and non-hydride elements including As, Se, and Hg to sub ppb levels. This eliminates sample introduction changeover allowing routine and hydride elements to be determined simultaneously using the same setup. [More information is available on agilent.com.](#)

Application-specific sample introduction options

A range of optimized torches and sample introduction kits is available for:

- aqueous samples
- organic solvents
- high salt/matrix samples
- samples containing hydrofluoric acid (HF)

You can minimize costs with demountable torches, designed for easy maintenance, fast changeover, and economical operation.

Installation requirements

System installation

For details of ICP-OES installation requirements refer to the Agilent 5800 and 5900 ICP-OES site preparation guide.

Dimensions

Table 3. The Agilent 5800 and 5900 ICP-OES instrument dimensions.

Width	Depth	Height	Weight
625 mm	740 mm	887 mm	90 kg
24.6 in	28.6 in	34.9 in	198 lb

Exhaust requirements

The 5800 and 5900 ICP-OES instruments incorporate corrosion-resistant materials, and an on-board fan maintains internal positive pressure to keep acid vapors out. User serviceable high efficiency dust/particulate filter included on air supply inlet.

Exhaust flow minimum requirements are 2.5 m³/min (88 ft³/min).

Air supply inlet options:

External inlet duct adapter to enable connection of ducting to the air supply inlet of the instrument, to duct clean dust/acid-vapor free air into the instrument from outside the lab.

Access and serviceability

All connections for power, gas, water and communications are accessed from the side rather than the rear of the instrument. Instrument sensors and counter constantly monitor instrument status, allowing rapid identification of components for guidance when maintenance is needed.

Power requirement

2.9 kVA, single phase mains input voltage of between 200-240 VAC (50-60 Hz), drawing a maximum of 15 A.

Instrument qualification services

Instrument qualification services (IQ/OQ) provide initial and ongoing verification that your system meets regulatory requirements.

Instrument communication

Communication with the instrument uses Ethernet via an IEEE 802.3, Ethernet LAN cable.

You can minimize costs with demountable torches, designed for easy maintenance, fast changeover, and economical operation.

Customer support policy

Warranty

Twelve (12) months, though this may vary according to location.

Agilent service guarantee

If your Agilent instrument requires service while covered by an Agilent service agreement, we guarantee repair or we will replace your instrument for free. No other manufacturer or service provider offers this level of commitment to keeping your lab running at maximum productivity.

Agilent value promise

We guarantee you at least 10 years of instrument use from your date of purchase, or we will credit you with the residual value of the system toward an equivalent model.

Further details

For further information please consult your Agilent office or supplier, or our website at www.agilent.com

www.agilent.com/lifesciences/icpoes

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Innovative Freeform Optical Design Improves ICP-OES Speed and Analytical Performance

Agilent 5800 ICP-OES and Agilent 5900 ICP-OES



Introduction

The innovative optical design of the Agilent 5800 and 5900 ICP-OES has transformed each instrument's analytical performance, size, warm-up and purge times. These improvements are due to the customized design and novel location of freeform optics into the polychromator of the fully simultaneous ICP-OES instruments. The US patented freeform optic-design has led to direct improvements in both detection limits and resolution of the 5800 and 5900, even when using 99.99% purity bottled argon as a purge gas. The optical layout is compact, so the instrument is quick to purge, reducing the wait time before samples can be measured.

What are the advantages of freeform optics?

Reduction in size of instrument footprint

The freeform optical surface is the key to unlocking previously unattainable optical size reduction, as well as improving performance. The polychromator optical system has reduced in volume by 50% compared to previous designs, enabling the footprint of the 5800 and 5900 to be reduced significantly. As one of the smallest ICP-OES available, the 5800 and 5900 ICP-OES save valuable bench space in the laboratory.

Enhanced analytical performance

The freeform optic, synchronous dual view pre-optics (5900), and Vista Chip III detector of the 5800 and 5900 enable both true simultaneous measurements and full wavelength coverage from 167 to 785 nm. This unique design is key to the unmatched multi-elemental analysis speed and performance of the 5800 and 5900 ICP-OES. The new hardware configuration has led to improvements in detection limits by 40% on average, as well as improved optical resolution. Also, significant improvements have been made to reduce instrument warm-up time and purge time, due to the reduced internal volume and thermal mass of the optics.

Polychromator design

Polychromators have the distinct advantage of measuring all wavelengths at the same time. A polychromator therefore differs from a monochromator that can typically measure only one analyte wavelength of interest per measurement, requiring multiple sequential measurements to capture all analyte wavelengths of interest. Most modern simultaneous ICP-OES instruments use an echelle polychromator to separate and focus analyte emissions from the plasma onto a detector for elemental analysis. The optical emissions generated in the plasma are directed through the pre-optics to an entrance slit (or sometimes, directed through multiple entrance slits, sequentially). The entrance slit defines the physical size of the emission from the plasma entering the polychromator. The emission is channeled by mirrors, dispersed by a prism and diffraction grating, and finally onto the surface of the detector. This process produces a two-dimensional (2D) emission image, where pixel positioning on the detector corresponds to a specific emission wavelength that is characteristic of an element present in the analyte solution.

Freeform optical component

Uniquely, the echelle polychromator used in the 5800 and 5900 ICP-OES produces a single echelle image of the entire spectrum. The image is focused onto a single detector using a freeform collimating mirror, grating, prism, and focus mirror ensuring sharp focusing and high light intensity.

There is no need for multiple detectors or multiple entrance slit optics to achieve high resolution and fully simultaneous wavelength coverage, which ensures superior analytical speed. Instruments that use multiple detectors or multiple entrance slit optics often require separate sequential measurements to be taken to cover the whole spectrum, increasing analysis times and reducing sample throughput.

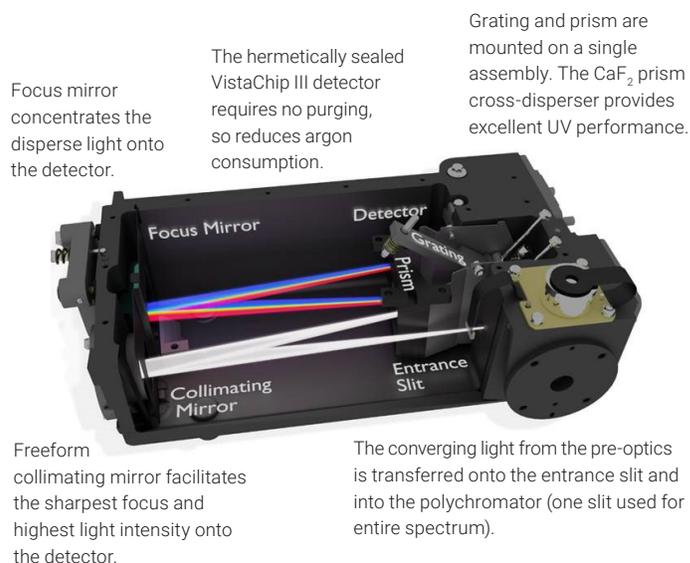


Figure 1. Computer aided design schematic of the echelle polychromator with freeform collimating mirror used in the Agilent 5800 and 5900 ICP-OES. The system has no moving parts and is temperature-controlled to provide excellent long-term stability.

Improving resolution and peak shape

The optical resolution of an ICP-OES is characterized by the physical attributes of the optical system and is defined as the full-width at half maximum (FWHM). The use of high diffraction orders that are characteristic of the Agilent echelle optical design is coupled with a freeform collimating mirror. This combination of components leads to improved resolution and sensitivity in the 5800 and 5900 ICP-OES.

The use of a freeform collimating mirror in the Agilent polychromator design provides better resolution compared to designs that use parabolic and/or toroidal optical components. The freeform collimating mirror improves light-focus by reducing the spread of the light in both directions (tighter in width and height). Reduced spread is especially useful for wavelengths that are focused away from the center of the detector. Table 1 shows typical resolution performance of the 5800 and 5900 ICP-OES for representative emission lines.

Table 1. Typical resolution performance of the Agilent 5800 and 5900 ICP-OES (based on FWHM).

Element and Wavelength (nm)	Typical Resolution of 5800 and 5900 (pm)
As 188.980	< 6.5
Mo 202.032	< 7
Zn 213.857	< 7.5
Pb 220.353	< 7.5
Cr 267.716	< 9.5
Cu 327.395	< 13
Ba 614.171	< 32

The tighter focus of light achieved by replacing the standard shaped mirrors with freeform optics also improves peak shape. The excellent optical resolution of the 5800 and 5900 ICP-OES is demonstrated by the doublet peak of thallium (Tl) 190.794 and Tl 190.807 nm shown in Figure 2. Both peaks are symmetrically shaped and easily resolved.

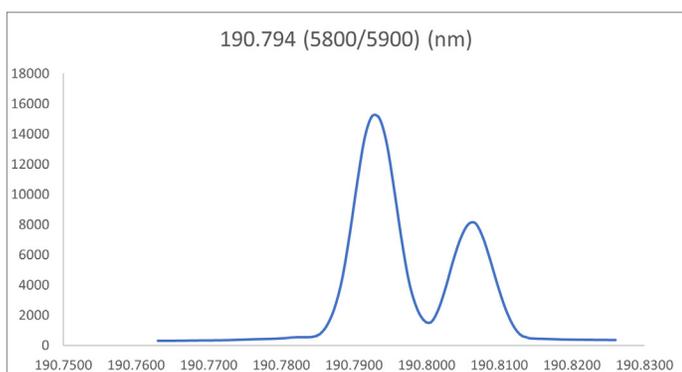


Figure 2. Clear resolution of the Tl 190.794 and 190.807 nm doublet peak using an Agilent 5800 or 5900 ICP-OES.

What are freeform optics?

Traditional ICP-OES optical system designs use simple spherical, toroidal, or parabolic mirrored surface shapes to collect and focus the light emitted from the plasma. Since these surfaces are fundamental in functional form, they are simple to design and manufacture. But these surfaces have some limitations in collecting and transmitting the emitted plasma light and transforming it into separate analytical element wavelength emissions across the wavelength range

simultaneously.

In these traditional systems, typically only one wavelength will traverse the optical system to be correctly focused onto the 2D detector array or arrays. All other wavelengths will have slightly compromised optical paths resulting in various degrees of defocus, known as optical aberrations. Aberrations lead to lower signal-to-noise (poorer detection limits) and wider peaks (poor resolution). Optical designs in ICP-OES typically use a number of components in an attempt to minimize the performance degradation. However, optical systems built with simple symmetrical components do not have the flexibility to correct for multiple types of aberrations simultaneously across the whole spectrum.

The innovative, highly customized asymmetric and aspheric surface of the Agilent freeform collimating mirror corrects for all types of optical aberrations across the entire wavelength range, including both the visible and ultraviolet wavelengths, simultaneously. The high degree freeform surface corrects spherical aberrations, coma, and astigmatism, which typically occur on wavelengths as they deviate from the center of the detector. Agilent engineers have pioneered both the design of the freeform collimating mirror surface and precise manufacturing by replication (Figure 3) for use inside the 5800 and 5900 polychromator.

How do freeform optics reduce focal length but increase resolution and detection limits?

Traditional ICP-OES systems require a long focal length of 400 mm or more to effectively separate wavelengths and achieve adequate resolution. The unique freeform collimating mirror in the 5800 and 5900 ICP-OES optics makes it possible to reduce the optical focal length to just 253 mm, while improving resolution and sensitivity across the detector. The surface of the freeform mirror is not a symmetric parabolic surface. It is a novel shape, designed to improve the focus of light onto the detector, as shown in Figure 3. The flexibility of the freeform surface allows for any optical distortions to be greatly reduced by a mirrored optical surface profile. The surface profile is customized to match the ideal mirror shape needed by any wavelength that is defocused from its correct optical axis.

The freeform mirror provides sharper focus and higher light intensity at the detector than standard spherical shaped mirrors. The higher light intensity leads to a higher signal-to-noise ratio on the detector pixels, improving detection limits by 40% on average compared to traditional optical systems.

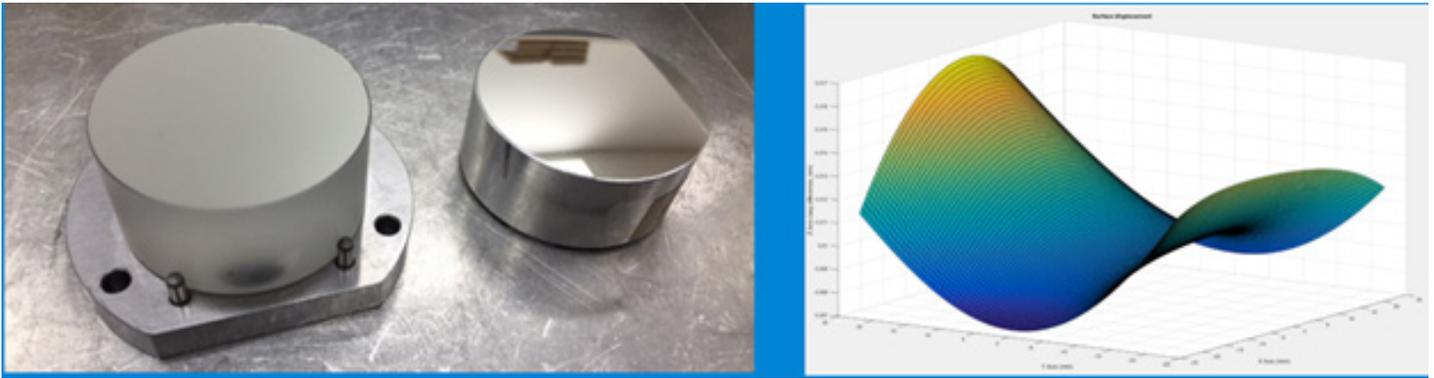


Figure 3. Left: Mirrors used for the replication process. Right: Deviation of the freeform surface from a perfect spherical surface. The freeform surface has a unique shape that has been optimized to provide a sharper focus and higher light intensity on the detector, producing higher sensitivity. The freeform “saddle” surface shape deviation is in the order of microns.

Vista Chip III detector

The Vista Chip III detector (Figure 4) was designed to work with the new freeform polychromator hardware and advanced IntelliQuant software within Agilent ICP Expert (1–3). The detector is a charge-coupled device (CCD). To continuously cover a wavelength range from 167 to 785 nm, the CCD is made up of approximately 70,000 light sensitive pixels spread across 70 diagonal linear arrays (DLAs). The layout of the pixels on the detector has been designed to match the unique echelle pattern produced by the 5800 and 5900 polychromator. It uses image-mapping technology (I-MAP) to exactly match the echelle image, allowing it to fit onto a small, perfectly shaped, 2D detector.

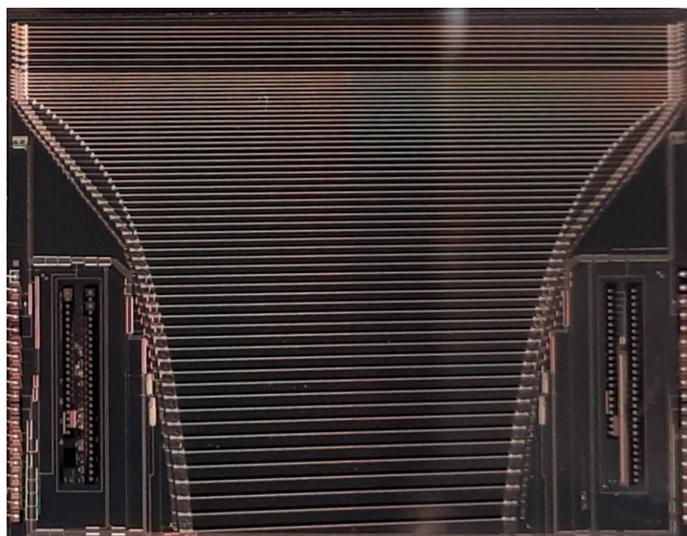


Figure 4. Vista Chip III detector with I-MAP and Adaptive Integration Technology for higher speed, full-wavelength coverage from 167 to 785 nm.

The position and length of each DLA on the detector is aligned to match the free spectral range of each diffraction order produced by the echelle optics (Figure 5). The detector is Peltier cooled to $-40\text{ }^{\circ}\text{C}$ to minimize dark current and readout noise.

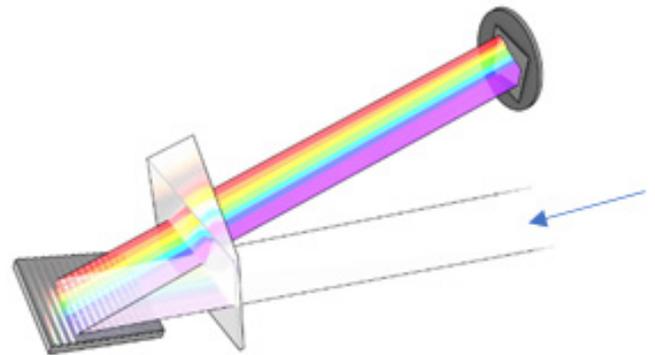


Figure 5. Schematic of how the light from the collimating mirror passes through the prism onto the grating, and back through the prism towards the focus mirror (not shown). The focus mirror then concentrates the dispersed light onto the detector surface. The grating separates light containing all wavelengths into a spectrum of separate wavelengths, spreading them into overlapping DLA orders. The prism then separates the wavelength ranges into a second dimension, so that the entire wavelength range can fit onto a small, square, 2D detector.

Fast signal readout

With a 1 MHz pixel processing speed and pixel location efficiency, the Vista Chip III CCD sets the benchmark for ICP-OES detector speed. Duplex circuitry enables pixels to be read out from both sides of the detector, ensuring a readout speed significantly faster than competitive systems. With the 5800 and 5900 ICP-OES, the entire spectrum from 167 to 785 nm can be measured in less than half a second. Figure 6a shows a close-up of five DLAs on the Vista Chip III CCD. Figure 6b shows the micro-electronic circuitry used to control the photosensitive pixels.

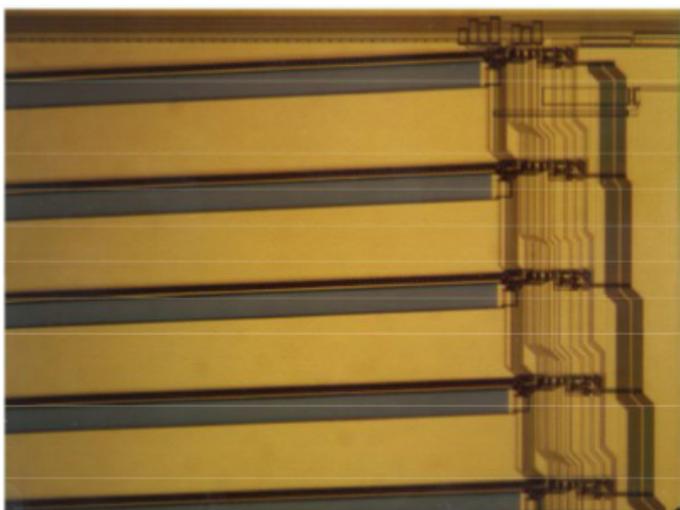


Figure 6a. Individual DLAs on one side of the Vista Chip CCD with associated readout circuitry.

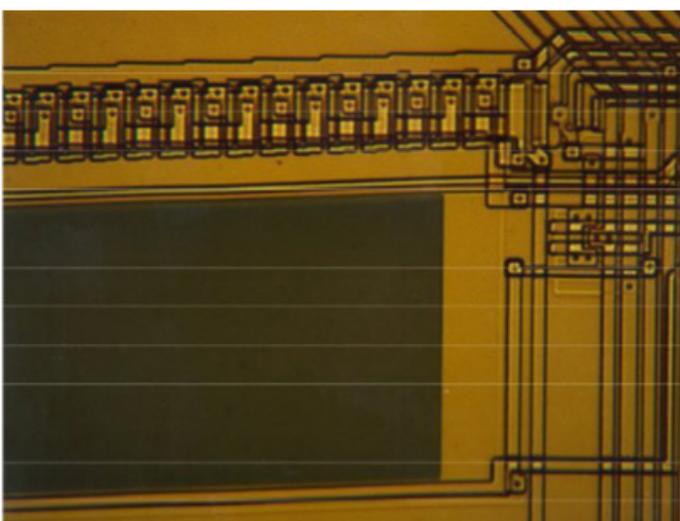


Figure 6b. A single DLA at higher magnification. The dark region is the photosensitive area. The antiblooming drain can be seen running continuously along the bottom of the photosensitive area and the readout control circuitry for each pixel along the top.

Adaptive Integration Technology

Adaptive Integration Technology (AIT) is an intelligent algorithm that prevents overrange signals by automatically adjusting the integration time for each emission line depending on the incoming signal intensity (Figure 7). Some competitor systems group wavelengths that need similar integration times together. Each group of wavelengths is then measured one after the other (sequentially), which leads to longer analysis times. AIT automatically sets the optimum integration time for each wavelength, allowing all element concentrations to be determined with a single, truly simultaneous measurement, regardless of the analyte concentration or the sensitivity of the chosen emission line. By increasing the efficiency of signal processing, AIT optimizes the sample analysis times of the 5800 and 5900 ICP-OES.

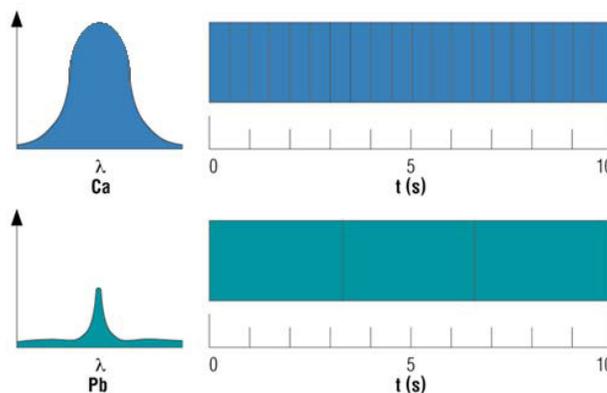


Figure 7. Using a 10 s replicate read time, AIT averages many short readings for high-intensity signals and fewer, longer readings for low intensity signals, simultaneously providing the optimum signal-to-noise ratio.

Antiblooming on every pixel

Emissions are collected on light sensitive pixels (A) across the CCD detector surface, where they are converted to an electronic signal, transferred and held at register B before being read-out at register C (Figure 8). 'Blooming' is an undesirable property of a solid-state detector. It occurs when intense illumination of one part of the detector can interfere with the measurement of nearby pixels. Unlike segmented CCD detectors, the Vista Chip III CCD features antiblooming protection on every pixel. If pixels are saturated by a very intense signal, the excess signal overflows into the antiblooming gutter, rather than neighboring pixels. Antiblooming protection ensures that trace elements can be accurately measured in the presence of high concentrations of other elements.

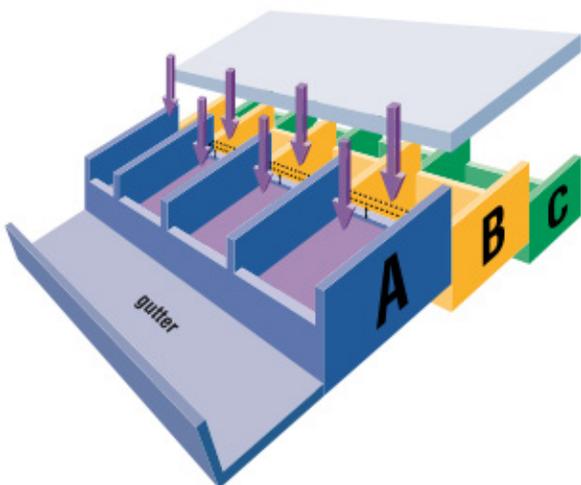


Figure 8. Schematic of a single DLA on the Vista Chip III CCD illustrating the potential barriers between pixels and the antiblooming gutter.

Conclusion

The Agilent 5800 and 5900 ICP-OES use the most innovatively designed freeform optics in the polychromator and a specially designed Vista Chip III detector that have lowered detection limits and improved optical resolution. Advantages of the asymmetric and aspheric surface of the Agilent freeform collimating mirror include:

- Correction for all types of optical aberrations across the entire wavelength range, including both the visible and ultraviolet wavelengths, simultaneously.
- Correction for spherical aberrations, coma, and astigmatism, which typically occur on wavelengths as they deviate from the center of the detector.
- Sharp focusing and high light intensity at the detector leading to an excellent signal-to-noise ratio and an improvement in detection limits by 40% on average compared to traditional optical systems.

The advanced polychromator design has also led to a reduction in the optics volume by 50%, meaning less time spent purging and a significant reduction in the footprint of both instruments. The synchronous dual view pre-optics (of the 5900) and Vista Chip III CCD detector enable true simultaneous measurements and full wavelength coverage from 167 to 785 nm within less than half a second.

The overall hardware design of the 5800 and 5900 is key to their unmatched multi-elemental analysis speed and performance, including fast, insightful full screening analysis of samples using IntelliQuant software.

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3. Agilent IntelliQuant Screening: Smarter and quicker semiquantitative ICP-OES analysis, Agilent publication, [5994-1518EN](#)

www.agilent.com/chem/icp-oes

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Agilent ICP Expert Software

Powerful software with smart tools for ICP-OES



Introduction

The Agilent 5800 ICP-OES and Agilent 5900 ICP-OES are controlled by the Agilent ICP Expert software. ICP Expert uses a familiar worksheet interface and offers simplified method development and sample analysis. It includes the IntelliQuant function that allows the analyst to gather concentration data on up to 70 elements in a sample. ICP Expert also includes quality control (QC) functionality, smart maintenance features, and a suite of predeveloped templates for common analytical methods. Both instruments integrate with a range of automation accessories, which are fully controlled by the software. These accessories include the Agilent SPS 4 and SPS 6 autosamplers, Advanced Valve System (AVS) 6- or 7-port switching valve, and Advanced Dilution System 2 (ADS 2) autodilutor.

Easy-to-use software

ICP Expert software includes smart features that reduce the learning-curve for new users, while allowing experienced analysts to easily run complex methods. The layout of the software reflects the most common workflows of actual applications. To set up and perform an analysis, the analyst simply follows the sequence of pages in the displayed order. The current page is always highlighted to provide full visibility of progress in the workflow (Figure 1).

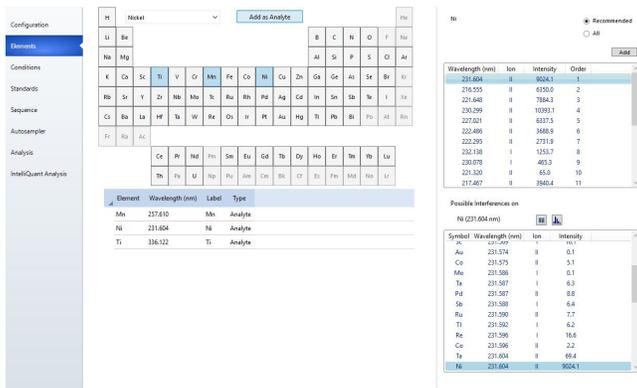


Figure 1. Agilent ICP Expert software provides a clear, logical workflow to guide users through method setup and analysis.

The software includes a suite of predeveloped templates covering a range of common analytical methods and sample types, such as food, environmental, and water sample analysis. These templates are an excellent starting point for any user looking to perform an unfamiliar analysis. The templates can significantly reduce the time taken to fully develop a new method.

Applet mode

ICP Expert software uses application-specific software applets that allow users of all skill levels to confidently run ICP-OES analyses.

Someone with administrator privileges can choose which application methods are available to each user. A user can then walk up and select from the ICP applets available to them (Figure 2, step 1). The applet automatically loads the method (Figure 2, step 2). The user can then enter sample information and start analysis by igniting the plasma and clicking the Run button (Figure 2, step 3).

This step-by-step approach ensures that all users can achieve accurate and reproducible results with minimal training. Applets can easily be imported and exchanged with other users by using the built-in Applet Management tool.

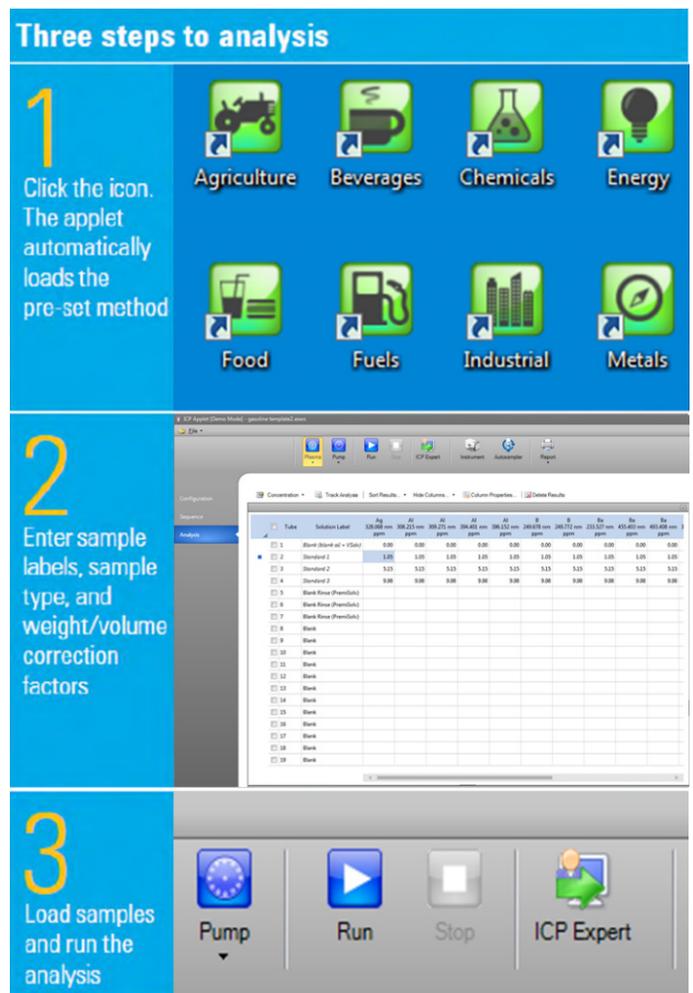


Figure 2. Agilent ICP Expert software includes several applets for common applications. In three steps the analyst can start an analysis.

Simplified method development

The ICP Expert software contains several smart tools to simplify method development. These tools allow analysts to spend less time setting up methods and more time running samples.^{1,2}

The AVS Parameter Calculator is a useful tool that provides recommended timings on method parameters, including timings and flow rates, based on analyst-defined tubing type and length (Figure 3).

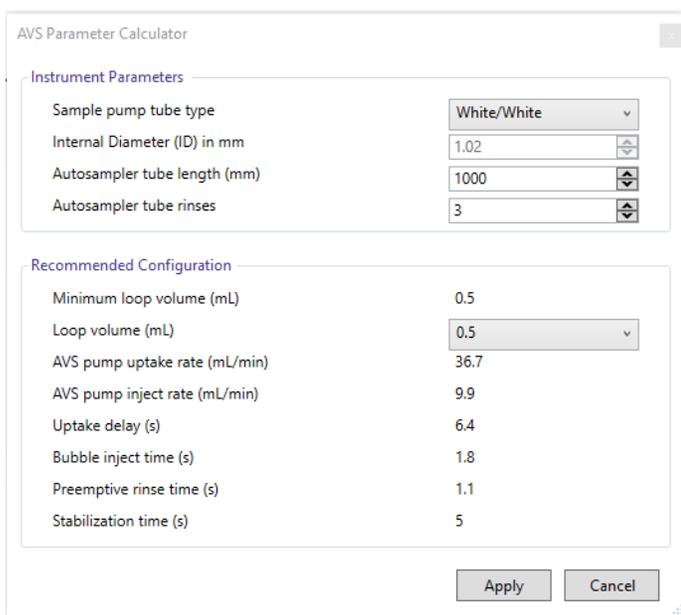


Figure 3. AVS Parameter Calculator in Agilent ICP Expert.

The Timing Monitor function in the software allows users to optimize their timings and measurement conditions with a clear signal readout for the whole sample-to-sample process. IntelliQuant Screening (available in the Pro-pack software module) allows users to run a quick, semiquantitative screening of samples. IntelliQuant Screening collects data from the entire spectral range from 167 to 785 nm in as little as 15 seconds per sample, as shown in Figure 4.

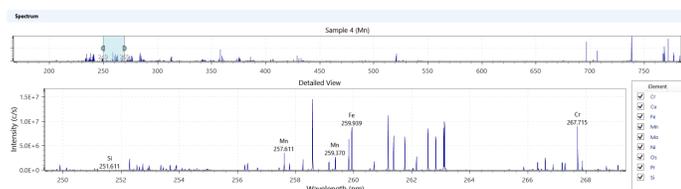


Figure 4. A full wavelength scan can be collected in as little as 15 seconds.

Using this data, IntelliQuant Screening displays the relative concentrations of up to 70 elements in a sample on a periodic table display (refer to Figure 5). Any potential interferences are identified and presented to the user in a simple and clear way. The optimal analysis wavelengths are determined, based on potential interferences and other factors. All this information is provided automatically, requiring no prior knowledge of the contents of the samples being measured or expertise in spectroscopy.

With the insights provided by IntelliQuant Screening, it is easy for the operator to create a customized quantitative method for sample analysis through importing the recommended wavelengths into a new worksheet.

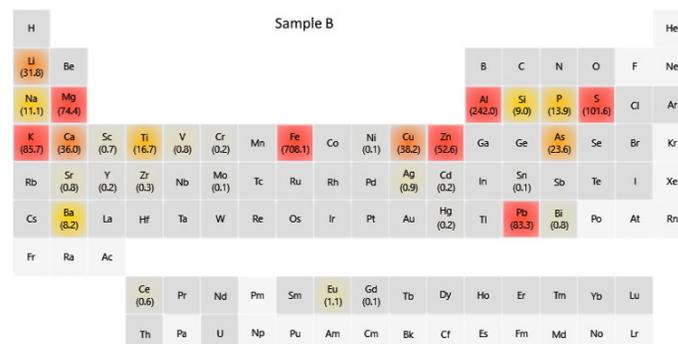


Figure 5. IntelliQuant generates a heat map to visually present the relative concentrations of elements in a sample. The information provides useful analytical insight into the sample, helping with method development.

Data management

ICP Expert has built in tools to streamline your data analysis workflow. Summary Row automatically selects the best results for each wavelength from all available measurements of a sample and compiles them into one row (Figure 6). All remeasurement data, such as reactive dilutions by an autodilutor, are retained and organized by sample, and can be collapsed to show a one-line summary.

	Rack/Tube	Solution Label	Timestamp	As 188.980 nm ppm	Ba 455.403 nm ppm	Cd 214.439 nm ppm	Co 238.892 nm ppm	Cr 267.716 nm ppm
<input type="checkbox"/>	S1:1	Blank	22/11/2023 1:21:28 PM	0.00	0.00	0.00	0.00	0.00
<input type="checkbox"/>	S1:2	Standard 1	22/11/2023 1:22:08 PM	5.00	5.00	5.00	5.00	5.00
<input type="checkbox"/>	S1:2	Sample 1	22/11/2023 1:33:51 PM	5.01	5.01	5.01	5.00	5.00
<input checked="" type="checkbox"/>	S1:2	Summary	22/11/2023 1:33:51 PM	5.01	5.01	5.01	5.00	5.00
<input type="checkbox"/>	S1:2	Original	22/11/2023 1:22:49 PM	5.01	5.01	5.01	5.00	5.00
<input type="checkbox"/>	S1:2	Dilution - 10	22/11/2023 1:33:51 PM	5.42	5.65	5.59	5.43	5.51
<input type="checkbox"/>	S1:2	Sample 2	22/11/2023 1:35:23 PM	4.98	4.99	4.99	4.98	4.99
<input checked="" type="checkbox"/>	S1:2	Summary	22/11/2023 1:35:23 PM	4.98	4.99	4.99	4.98	4.99
<input type="checkbox"/>	S1:2	Original	22/11/2023 1:23:29 PM	4.98	4.99	4.99	4.98	4.99
<input type="checkbox"/>	S1:2	Dilution - 10	22/11/2023 1:35:23 PM	4.95	5.22	5.16	5.03	5.09

Figure 6. Summary Row showing a one-line summary of the best or optimum results, and expanded view showing all measurements for each sample vial.

Standard bracketing

The Pro-pack for ICP Expert includes an integrated standard bracketing capability to support high-precision quantification of high-purity metals, alloys, and other demanding materials. The software automatically pairs each sample with two closely matched standards and determines the result by direct interpolation. This approach compensates for short-term signal variation and matrix effects, improving accuracy and supporting compliance with ISO-based methods.

Built-in summarization and reporting tools streamline data review and help ensure traceable results across long sequences. Standard bracketing is suitable for applications such as precious-metal analysis, plating solutions, catalysts, semiconductor materials, and battery components, where tight composition control is essential. The capability is fully integrated into the ICP Expert workflow.

Outlier Conditional Formatting

The Outlier Conditional Formatting (OCF) feature allows users of ICP Expert to identify potentially problematic results. OCF uses one or more color-based configurable rules to check the results on the analysis screen (Figure 7). For example, results will be flagged if they

- Are above the defined concentration range
- Have a high %RSD
- Are below the method detection limit (MDL)
- Fail internal standard tests

If there are multiple wavelengths for an element in the worksheet, OCF can highlight inconsistencies in the results between wavelengths. Obtaining different results for the same element might indicate a potential interference or calibration issue on one or more of the wavelengths. Flagged results will also be avoided by the Summary Row.

	Rack:Tube	Solution Label	Outlier Summary	Sb 206.834 nm ppm	Sb 217.582 nm ppm	Sb 231.146 nm ppm
<input type="checkbox"/>	1.1	Blank		0.00	0.00	0.00
<input type="checkbox"/>	1.2	Cr				
<input type="checkbox"/>	1.3	Sb		50.00	50.00	50.00
<input checked="" type="checkbox"/>	1.8	Cr	F	0.12	0.05	0.05
<input type="checkbox"/>	1.9	Sb		4.91	4.92	4.88
<input type="checkbox"/>	1.10	Sb+Cr	F	5.65	5.14	5.11
<input type="checkbox"/>	1.11	Test3				
<input type="checkbox"/>	1.12	Test4				

Outliers for [Sb+Cr]:
Element Concentration % RSD > Pass Value: Sb

Figure 7. Outlier Conditional Formatting provides a simple way for users to identify potentially problematic results. Results that fail to meet specified rules will be flagged with a letter corresponding to the failure mode and a colored flag for quick identification (a green 'F' in this image).

Early Maintenance Feedback

Both the 5800 and 5900 instruments have over 100 sensors that monitor their performance. The ICP Expert software includes an Early Maintenance Feedback (EMF) function that utilizes these sensors and other counters to alert the operator when maintenance is required.

Traffic light color-coding of the counters show which maintenance activities should be done immediately and which can wait (Figure 8). The counters are useful for most general applications, but users can set the counter limits to suit their specific requirements.

The maintenance log built into EMF digitally records the maintenance history of the ICP-OES. When troubleshooting a problem, it is easy to determine if the instrument has been sufficiently maintained.

EMF reduces downtime and repair costs by scheduling routine maintenance of components based on actual use, rather than at set time intervals.

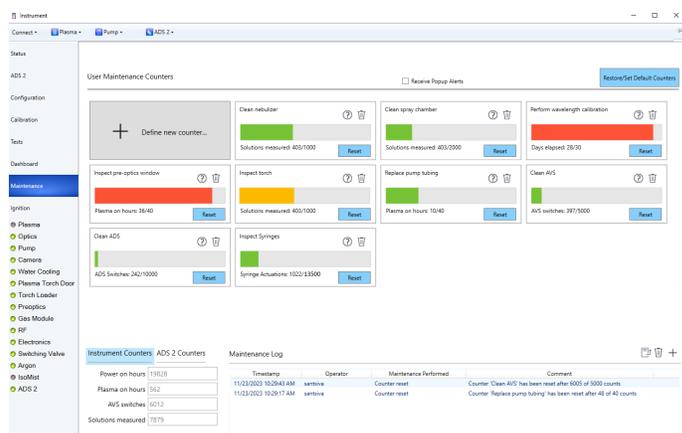


Figure 8. Early Maintenance Feedback functionality with integrated maintenance log helps to keep your instrument properly maintained, reducing unplanned downtime and ensuring that you continue to produce consistent, high-quality results.

Intelligent Rinse

The Intelligent Rinse software function is available in the optional Pro-pack software module for ICP Expert. Intelligent Rinse monitors the intensities of nominated element wavelengths during the rinse period. The function automatically ends the rinse when these intensities reach a threshold. The threshold is based on which rinse setting has been selected: Thorough, Moderate, or Quick. The rinse period varies, depending on the time taken to wash out each individual sample to the threshold. Intelligent Rinse improves sample throughput while preserving the accuracy of the results.

Neb Alert

Neb Alert is a smart feature of the ICP Expert software that monitors nebulizer back-pressure during an analysis. Neb Alert warns the user if a potential blockage or leakage is detected—a common problem when analyzing samples with a high total dissolved solids (TDS) content or samples that still include particles (Figure 9). The alert allows the analyst to stop the analysis and correct the issue rather than continue and collect potentially incorrect data.

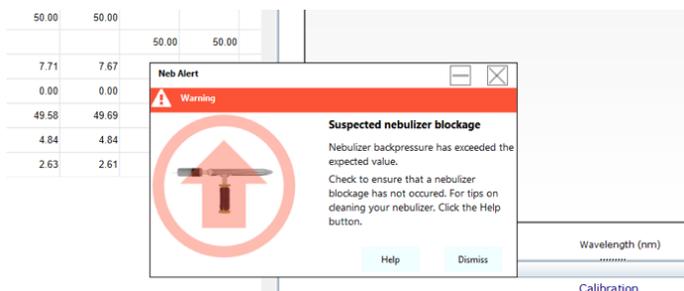


Figure 9. Neb Alert provides an instant notification to the user if a suspected nebulizer blockage or leakage is detected.

Accessory control

The Agilent SPS 4 and SPS 6 autosamplers are fully controlled through the ICP Expert software. The user can select the sample rack type, rinse pump speed, and control the sample probe from within the software.

Operation of the IsoMist programmable temperature-controlled spray chamber is also fully integrated into the ICP Expert software.

Control of the Agilent Advanced Valve System (AVS) 6- or 7-port switching valve and the Agilent Advanced Dilution System 2 (ADS 2) is fully integrated and controlled through the ICP Expert software via the optional Pro-pack software module. (The 4-port version of the AVS is supported by the base software.) Full-integration of the AVS and ADS 2 ensures optimal timing, unlike third-party switching valve accessories that use complicated, standalone control software. ICP Expert incorporates the AVS parameter calculator that facilitates the setup and method development of the AVS 6/7. It also includes the AVS/ADS Timing Monitor feature to optimize timings and parameters.

The Agilent recirculating chiller enables analysts to monitor and set water-cooling parameters directly from the instrument PC (Figure 10).



Figure 10. Agilent recirculating chiller.

Seamless control of the ADS 2 autodilutor

The ADS 2 is integrated natively into ICP Expert for a seamless autodilution experience.

The ADS 2 automates manual tasks and is optimized to maximize throughput with the following functions:

- Multipoint calibration from a single stock standard; no need to manually make up standards, saving time and avoiding mistakes.
- Autocalibration Assistant (Figure 11) can recommend calibration standards across a defined concentration range using the integrated lists of common stock standards. It automatically calculates the dilution factors required to accurately create each standard at the required concentration.

Autocalibration Definition						
Element	Minimum Concentration	Maximum Concentration	Calibration Points	Calibration Weighting		
<input checked="" type="checkbox"/> As	10.00	100.00	3	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Ca	200.00	1000.00	3	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Cd	10.00	100.00	3	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Mg	200.00	1000.00	3	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Mn	10.00	100.00	3	<input checked="" type="checkbox"/>		

Generated Calibration Standards										
Import	From Stock	Dilution Factor	As	Ca	Cd	Mg	Mn	Na	P	
<input checked="" type="checkbox"/>	Calibration mix 2	500.00	0.20	1.00	0.20					
<input checked="" type="checkbox"/>	Calibration mix 2	20.00	5.00	5.00	5.00					
<input checked="" type="checkbox"/>	Calibration mix 2	10.00	10.00	10.00	10.00					
<input checked="" type="checkbox"/>	Calibration mix majors	500.00	1.00	1.00	1.00					
<input checked="" type="checkbox"/>	Calibration mix majors 499	100.20	100.20	100.20	100.20					
<input checked="" type="checkbox"/>	Calibration mix majors 230	200.00	200.00	200.00	200.00					

Figure 11. The Autocalibration Assistance can prepare standards from a nominated stock solution.

- Automatic Reactive dilution; in the event of an unexpected result, such as a sample measurement outside of the calibration range, or when Internal Standard ratios are outside the defined customizable thresholds. The Summary Row feature then automatically picks the optimal result for each element out of the available measurements.
- Dilution Lists allows the customization of which elements and wavelengths can trigger reactive dilutions on a per-sample basis, ensuring you only perform a dilution when you need to.
- Prescriptive dilution; during method setup, a defined (prescriptive) dilution factor can be entered by analysts and the ADS 2 will automatically perform the defined dilution, removing a manual step from the workflow, improving accuracy, reducing contamination, and minimizing usage of single-use plastic labware.
- Real-time flow path diagrams to assist users in understanding and troubleshooting their ADS 2, coupled with detailed help content.

ESI PrepFast and SampleSense compatibility

The 5800 and 5900 ICP-OES can also be coupled with the ESI prepFAST autodilution system and SampleSense switching valve. Note the ESI SC software needs to be running in the background for integration with ICP Expert.

AVS/ADS Timing Monitor

Analysts can troubleshoot their AVS and ADS 2 systems using the Timing Monitor (Figure 12). Various issues with the sample introduction system can be spotted via the Timing Monitor graph. This monitor, in combination with the extensive Help and Learning Center content, not only assists with diagnosing an issue but also with understanding the next steps once the issue has been found.

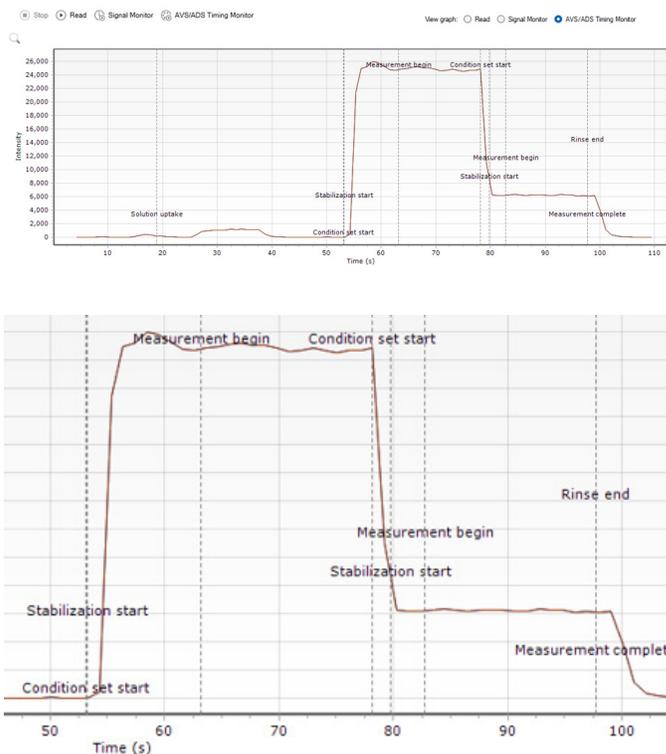


Figure 12. AVS/ADS Timing monitor full (top) and zoomed (bottom), showing the analyte signal during each step of the method.

Comprehensive Help and Learning Center

ICP Expert contains a comprehensive and interactive Help and Learning Center (Figure 13). This resource includes an extensive set of instructional videos on performing common hardware and software-related tasks coupled with detailed content on the ICP-OES, AVS 6/7, and ADS 2 to further understand certain functionalities and assist with troubleshooting. The videos improve the confidence and knowledge of less experienced operators by helping them to set up and maintain their instruments in the best way. Functions such as Neb Alert are integrated with the Help and Learning Center. This means the appropriate information and videos will be displayed when a sensor detects a problem.

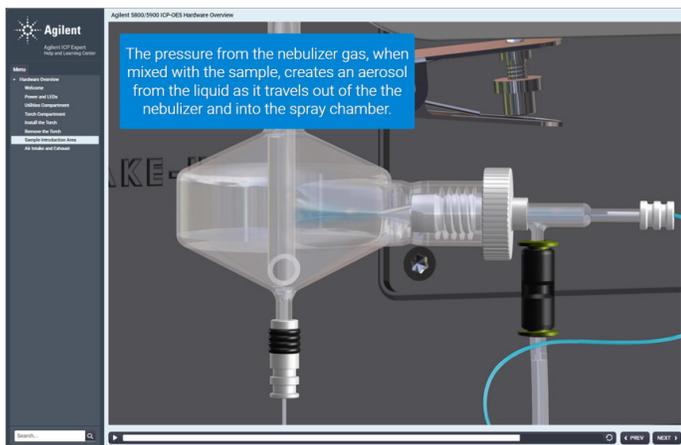


Figure 13. The Agilent ICP Expert Help and Learning Center provides extensive video instructions on how to perform common instrument setup and maintenance tasks.

Correction options to suit any situation

The ICP Expert software provides several options to correct background or spectral interferences:

- Fitted background correction (FBC) uses an advanced algorithm to model the background signal under the analyte peak.³ FBC is applied simultaneously upon measurement of the analyte peak, providing fast, easy, and accurate background correction. Requiring no method development, FBC provides accurate and automatic correction of both simple and complex background structures.
- Off-peak correction is a traditional ICP-OES correction technique that allows the analyst to manually select correction points—from left, right, or both sides of the analytical peak.
- Fast Automated Curve-fitting Technique (FACT) correction. The proprietary Agilent FACT technique applies spectral modeling to accurately analyze complex analytical spectra.⁴ FACT is a powerful alternative to Inter-Element Correction (IEC) and can also be used for accurate background correction. It is useful when highly complex background structures are observed, and other background correction techniques like FBC or off-peak correction are unsuitable.

FACT provides real-time spectral correction using a spectral modeling technique to mathematically deconvolute (separate) the analyte signal from the raw spectrum.

Models are built by measuring the expected components separately. The method typically includes measuring a blank solution, a pure analyte solution, and pure interferent

solutions. Figure 14 shows a FACT model applied to the Cd emission line at 228.802 nm, which suffers an interference from As. FACT mathematically separates the two peaks allowing accurate measurement of the analyte signal. For overlapping interferences that cannot be resolved using FBC or FACT, IEC is available.

Background correction for each analyte can be applied after analysis via the spectrum display.

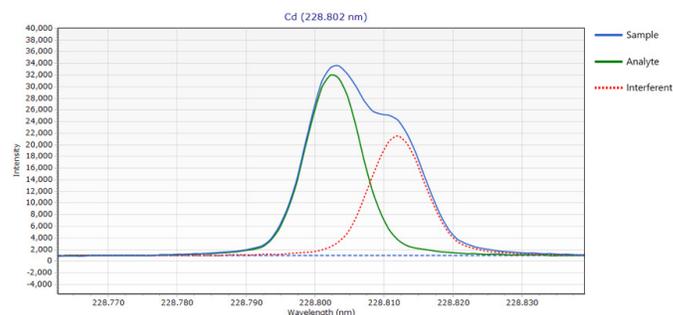


Figure 14. Example of a FACT model being applied to Cd 228.802 nm, with interference from As. A solution containing ~ 1000 µg/L Cd in 20 mg/L As was analyzed on an Agilent 5900 ICP-OES.

Extended dynamic range

Utilizing the extensive wavelength range of the Vista Chip III CCD detector, the MultiCal function of the ICP Expert software can create multiple calibration ranges for sample analysis. This capability increases the linear dynamic range.

Many elements can be measured using more than one wavelength. The different wavelengths often have different sensitivities, so using a combination of wavelengths for the same element extends the dynamic range of the determination. Selecting the most sensitive line will give the best detection limits and accurate measurement of low-level analytes. Less sensitive lines allow the measurement of higher concentration analytes in the same measurement.

The MultiCal function requires only a few standards to define the calibration range for each wavelength. Figure 15 shows two calibration graphs for Zn. The first calibration used a sensitive line for Zn, with a concentration range of 0 to 5 ppm. A less sensitive line extended the calibration range to 55 ppm.

Based on the measured concentrations for each wavelength, MultiCal reports an appropriate result based on the defined calibration ranges for those wavelengths. This extends the dynamic range of the analysis from parts per billion to percentage levels. Concentration ranges can be overlapped, providing a simple way to verify sample results.

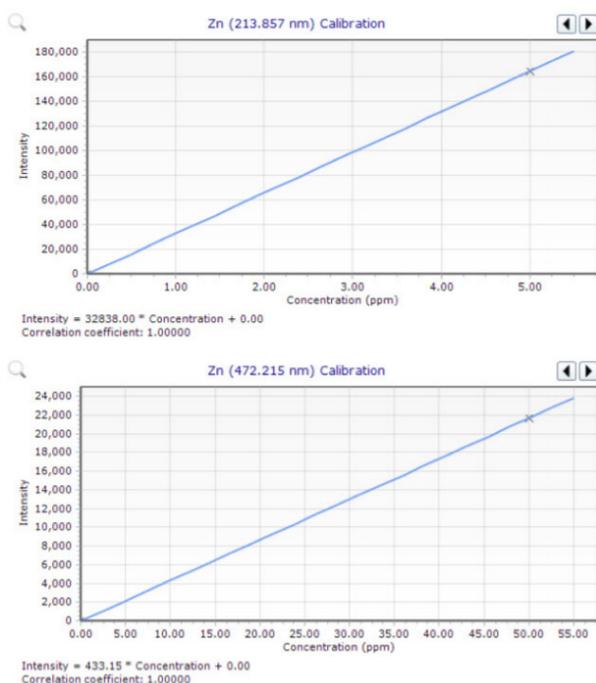


Figure 15. In this example, MultiCal uses the 213.857 nm Zn emission line to measure concentrations in the range 0 to 5 ppm, and the 472.215 nm line for higher concentrations, up to 55 ppm.

Reporting options

The ICP Expert software includes the Agilent OpenLab Intelligent Reporting platform. This platform enables the analyst to configure reports to include only the data required, and to customize the report layout, including adding a company logo. Once set up, the report layout and design can be saved as a template for future use, see Figure 16.

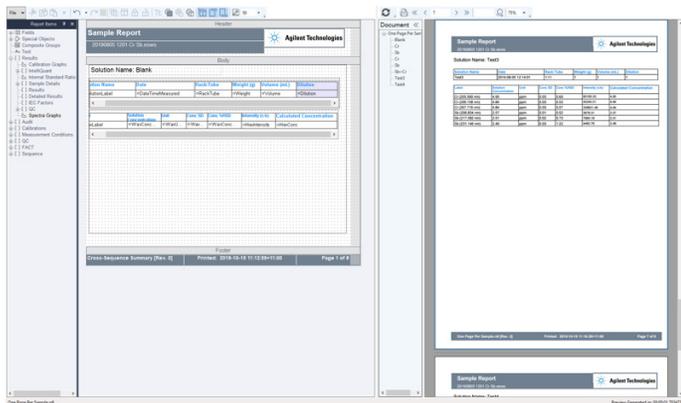


Figure 16. The Agilent OpenLab Intelligent Reporting platform can create customized reports.

Expanded QC support for USP <232>/<233> and ICH Q3D methods

The ICP Expert software supports compliance with the USP and ICH requirements for measuring elemental impurities in pharmaceutical products and their components. Software features include:

- J-value spike calculator
- Flagging of pass/fail acceptance criteria limits for validation tests and product or component composition analysis
- Compatibility with the Agilent 21 CFR 11 extension pack
- Facilitating the set-up, running, and validation of a method, compliant with USP<232>/<233> and ICH Q3D
- Method templates to accelerate method development

Data transfer and export

Results are easily transferred to a Laboratory Information Management System (LIMS) or other application using the data exporting options offered in the ICP Expert software.

Data can be exported in CSV format for direct transfer to a spreadsheet or other program for data manipulation, trend analysis, or process monitoring. The ICP Expert software allows multitasking: acquired data can be reviewed, processed, and reported while the ICP-OES collects data for the current batch of samples.

Base- and Pro-pack versions of ICP Expert software

The ICP Expert software is available in two versions: base- and Pro-pack. The base-pack ICP Expert software is used for easy ICP-OES instrument setup and routine operation. The Pro-pack software offers other features to enhance instrument productivity and performance including:

- Rate driven QC: automatically run QC solutions after a defined number of samples
- IntelliQuant Screening including Snapshot mode for quick sample insight
- Integrated control of the Advanced Valve System switching valve accessory (AVS 6 or 7)
- Integrated control of the Advanced Dilution System 2 (ADS 2)
- Standard bracketing capability to support high-precision quantification applications
- Oxygen addition and nitrogen purge
- Intelligent Rinse

- Ability to customize replicate counts for different solution types
- Trend monitoring of argon back-pressure to the nebulizer, and argon emission per solution
- Support for third-party autosamplers such as Teledyne CETAC Oils 7400, 7600, ASX-520, 560, 1400, 1600, and EXR-8; ESI SC -2, 4, 8, 14, and Micro; and Brooks AIM 1250 and 3600
- Control of the ESI prepFAST autodilution system and SampleSense switching valve
- Export to Microsoft Excel (Excel not provided)

Remote control with the Automation Software Pack

The Agilent ICP Expert Automation Software Pack is an optional programming toolkit (SDK). It enables third-party client software control of the ICP-OES instrument—sending commands and receiving real-time data and instrument status updates via a network connection. This is true remote control and offers the ultimate in flexibility.

ICP Expert software for 21 CFR Part 11 compliance

An optional Agilent 21 CFR 11 extension pack is available to assist with the requirements of the US FDA 21 CFR Part 11 (and equivalent regulations in other countries). The pack supports assigning user access privileges, creating audit trails, electronic records, and electronic signatures. Autodilutor configurations and actions are also captured using these features. The extension pack is compatible with the Pro-pack version of ICP Expert.

Easy troubleshooting

As shown in Figure 17, the Instrument Status page provides an immediate overview of the status of the system. Continual, automatic background monitoring allows you to quickly check the instrument status or troubleshoot should a problem arise.

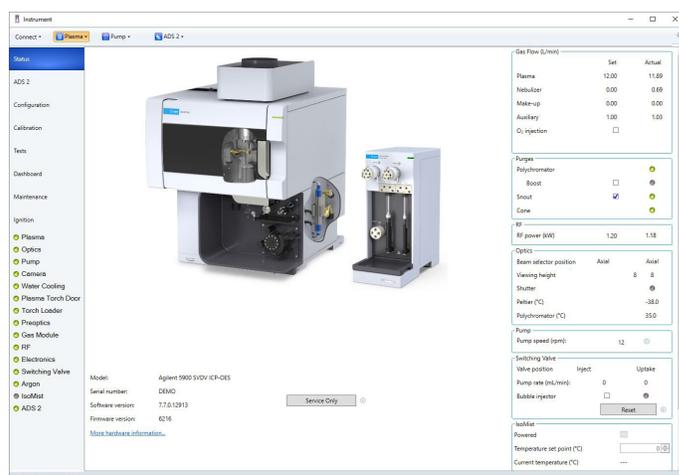


Figure 17. View the interactive Instrument Status page to check the current status of the instrument and identify causes of problems.

The interactive diagram of the instrument gives an overview of the instrument status, including the AVS 6/7 or ADS 2 if fitted, and suggests the possible cause of any errors. For more detailed guidance, the instrument dashboard provides live information on various parameters, making it easy to find and correct problems. The status is automatically updated when any system changes occur.

Checking instrument performance

For periodic performance testing of the instrument, a suite of tests is available to automatically verify instrument performance. Inadequate setup of utilities and/or the instrument, especially of water, gas, exhaust, and sample introduction systems, is often the cause of performance problems or instrument failure. The tests check the basic functionality of the instrument to confirm that the system is working to specification, which can be an important troubleshooting tool. Tests to confirm installation and function of the AVS 6/7 and ADS 2 are also available.

At the completion of the test cycle, a report in PDF format can be exported to any location on the local network.

References

1. Agilent IntelliQuant Software: For greater sample insight and simplified method development, Agilent publication, [5994-1516EN](#)
2. Agilent IntelliQuant Screening: Smarter and quicker semiquantitative ICP-OES analysis, Agilent publication, [5994-1518EN](#)
3. Fitted Background Correction (FBC) – fast, accurate and fully-automated background correction, Agilent publication, [5991-4836EN](#)
4. Real-time Spectral Correction of Complex Samples using FACT Spectral Deconvolution Software, Agilent publication, [5991-4837EN](#)

www.agilent.com/chem/icp-oes

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Agilent SPS 4 and SPS 6 Autosamplers

Innovative. Robust. Productive

Introduction

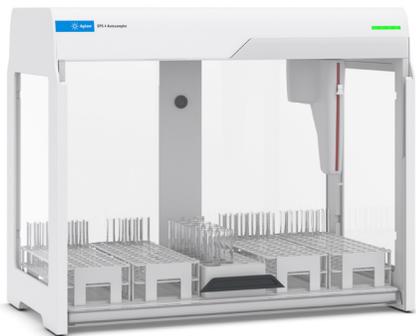
The Agilent SPS 4 and SPS 6 are high-performance autosamplers for Agilent atomic spectroscopy applications. Designed to meet the needs of both everyday high-throughput and higher-capacity laboratories requiring fast, reliable autosamplers that are also compact, quiet, easy to use, and affordable.

The SPS 4 is a four sample rack autosampler suitable for everyday high-throughput laboratories using AAS, MP-AES, ICP-OES or ICP-MS for up to 360 samples.

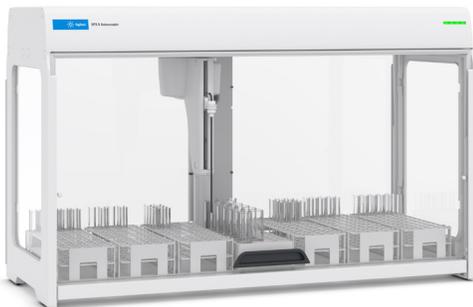
The SPS 6 is a six sample rack autosampler with 50% more capacity than the SPS 4, offering up to 540 samples for laboratories using ICP-OES or ICP-MS. It is ideal for laboratories looking for higher-capacity, longer unattended runs and using the Advanced Dilution System (ADS 2) autodilutor.

Built around an innovative dual-pillar gantry design that supports the mechanical components between two rigid pillars, the SPS autosamplers provide improved accuracy and precision, high speed, ease of access, and corrosion resistance.

With the integrated environmental enclosure (optional), the SPS autosamplers offer maximum sample integrity while protecting your laboratory environment from hazardous sample vapors, all without compromising a millimeter of valuable bench space. In addition, access to the power switch, peristaltic pump, and all electrical and communications ports are outside the environmental enclosure for easy access and protection from corrosion from samples contained inside.



SPS 4 autosampler for everyday high-throughput laboratories



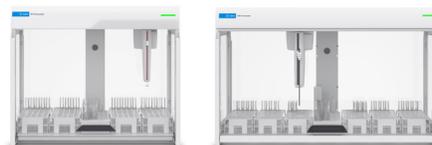
SPS 6 autosampler for higher-capacity and longer unattended runs

Uniquely Agilent in design and compatibility

- Modern industrial design combines well thought out robustness and performance characteristics with a sleek, eye-catching profile that coordinates with Agilent atomic spectroscopy instruments.
- Heavy-duty, powder-coated aluminum frame for light weight, maximum rigidity and corrosion resistance.
- User programmable high-speed probe arm assembly and optimized movement for fastest sample-to-sample speed.
- USB plug-and-play connectivity allows fast and easy setup.
- Integrated spill tray contains accidental spills, protecting the laboratory bench and simplifying cleanup.
- Standards rack and rinse port are centrally located for the fastest access and maximum throughput.
- All electronic and mechanical components are located in top gantry, away from liquid spills, for long life and easy maintenance. Purge port with the option to purge the gantry with inert gas for enhanced corrosion protection.
- The SPS 4 is compatible with Agilent's full range of atomic spectroscopy instruments including AAS, MP-AES, ICP-OES and ICP-MS. The SPS 6 is compatible with ICP-OES and ICP-MS only.



The SPS 4 is compatible with Agilent's comprehensive atomic spectroscopy portfolio.



The SPS 6 is compatible with Agilent ICP-OES and ICP-MS only.



Integrated environmental enclosure option protects your samples and your laboratory environment

- Maintain maximum sample integrity by protecting samples from the lab environment.
- Protect operators and laboratory instrumentation from corrosive sample vapors.
- Fully integrated environmental enclosure takes up no extra valuable bench space. This allows the SPS 4 to be at least 25% smaller than other four sample rack autosamplers in its class.
- When the environmental enclosure is fitted, sample visibility remains unrestricted, as well as sample access from the front when the door is in the raised position.
- Vertically sliding front access door can be fixed open for easy access to samples.
- Electrical and plumbing connections remain outside the environmental enclosure for easy access with the cover in place.
- Environmental Enclosure Kit includes a 50 mm (2 in) extraction air duct fitting that can be fitted to either side of the autosampler as needed. The kit also includes 5 meters of flexible PVC exhaust ducting.



SPS 4 autosampler shown with optional integrated environmental enclosure. Front cover shown in fixed open position for easy access to samples.

Dual-wash reservoir option eliminates potential carryover

- Optional dual-port wash reservoir for ultra-trace applications or applications requiring two different rinse chemistries.

Three-channel peristaltic pump for ultimate flow-through rinse flexibility

- Simultaneously pump two different rinse solutions (in conjunction with the optional dual wash reservoir).
- Third channel still allows for a pumped drain when a gravity drain is not an option.

Multiple probe size options for a diverse range of applications

- A range of carbon fiber–reinforced fluoropolymer probes suit all applications from microvolume sampling to high-speed discrete sampling.
- Integrated nebulizer/probe assembly option for ultra-clean applications.
- Variable probe speed in 3 axes for the ultimate performance with all sample types.
- Intelligent probe acceleration and deceleration permits high speed while minimizing spattering.
- Programmable probe depth for sedimentary or separated layer samples.



There are multiple probe sizes available for both the SPS 4 and SPS 6 to suit a diverse range of applications.

Specifications

Dimensions		SPS 4 Autosampler	SPS 6 Autosampler
	Width	600 mm (23.6 in)	820 mm (32.8 in)
	Depth	320 mm (12.6 in)	320 mm (12.6 in)
	Depth including peristaltic pump	363 mm (14.3 in)	363 mm (14.3 in)
	Height	510 mm (20.1 in)	510 mm (20.1 in)
	Weight	15 kg (33.1 lbs)	18 kg (39.7 lbs)
Sample Capacity		4 x Belart 'No-Wire' racks with outside dimensions 246 x 104 x 64 mm (9.7 x 4.1 x 2.5 in): 360 x 13 mm tubes (4 x 90 position racks) 240 x 16 mm tubes (4 x 60 position racks) 160 x 20 mm tubes (4 x 40 position racks) 96 x 25 mm tubes (4 x 24 position racks) 84 x 30 mm tubes (4 x 21 position racks)	6 x Belart 'No-Wire' racks with outside dimensions 246 x 104 x 64 mm (9.7 x 4.1 x 2.5 in): 540 x 13 mm tubes (6 x 90 position racks) 360 x 16 mm tubes (6 x 60 position racks) 240 x 20 mm tubes (6 x 40 position racks) 144 x 25 mm tubes (6 x 24 position racks) 126 x 30 mm tubes (6 x 21 position racks)
Microtiter Capacity	ICP-OES* and ICP-MS only	8 racks of 96 well-plates	
Standards Racks		5 x position ~63 mm diameter bottles (i.e 250 ml, 62 mm diameter x 135 mm high) (default for ICP-MS) 34 x position rack (12 x 30 mm tube + 22 x ~16-17 mm tubes) (Default for ICP-OES, MP-AES and AAS)	5 position ~63 mm diameter bottles (i.e. 250 ml, 62 mm diameter x 135 mm high) (default for ICP-MS) 34 x position rack (12 x 30 mm tube + 22 x ~16-17 mm tubes) (default for ICP-OES)
Maximum Tube Height		150 mm	
Probe Options	Carbon Fibre reinforced fluoropolymer probes	0.25 mm i.d. (required for microsampling) 0.5 mm i.d. (default for ICP-MS) 0.8 mm i.d (default for ICP-OES, MP-AES and AAS) 1.0 mm i.d. (required for AVS and ADS 2) 1.2 mm i.d	0.25 mm i.d. (required for microsampling) 0.5 mm i.d. (default for ICP-MS) 0.8 mm i.d (default for ICP-OES) 1.0 mm i.d. (required for AVS and ADS 2) 1.2 mm i.d.
Rinse Port Flow Rate	Programmable, up to 50mL/min depending on pump tube diameter		
Communication	USB 2.0 (full speed) virtual com port with plug-and-play capability.		
AUX Interface	RS485 for future upgradability to external device control.		
Power requirements	100–240 VAC, 47–63 Hz, 1.5 A		
Built-in diagnostics	The SPS autosamplers include a row of four LEDs on the front panel that indicate the operational or error status of the autosampler.		
Purge Port for electronics			Standard
Autosampler Trolley			Optional
Cover Kit			Optional
Dual Port Rinse			Optional
Pumped Drain			Optional
Rinse and Waste Bottle Kit			Optional
Organics Rinse Tubing Kit			Optional

* Requires ICP Expert 7.7.3 or above for microtiter

Supported instruments

	SPS 4	SPS 6
AA	240FS, 280FS, 55B (computer controlled) Requires SpectrAA software version 5.3 or above	-
MP-AES	4100, 4200, 4210 Requires MP Expert software version 1.5.1 or above for 4100 and 4200 and version 1.6 or above for 4210	-
ICP-OES	5100, 5110, 5800, 5900 Requires ICP Expert software version 7.1 or above Well plate compatibility requires ICP Expert software version 7.7.3 or above	5100, 5110, 5800, 5900 Requires ICP Expert software version 7.7.3 or above
ICP-MS	7700, 7800, 7850, 7900, 8800, 8900 Requires ICP-MS MassHunter software version 4.2 or above	7800, 7850, 7900, 8800, 8900 Requires ICP-MS MassHunter software version 5.4.1 or above



Promising 10 Years of Value

From the date you purchase an Agilent autosampler, Agilent guarantees at least 10 years' use or residual-value credit towards a replacement model upgrade. Our Value Promise maximizes your return-on-investment by ensuring that your purchase is safe.

Genuine Agilent supplies for flexible sample handling and maximum productivity

Agilent supplies for the SPS 4 and SPS 6 autosamplers are designed to give flexibility in sample handling and maintain the high performance of your system. With a wide range of sample racks and vessels supporting small or large sample volumes, probe options and interface supplies, we can help keep your lab running at maximum productivity.

Learn more:

www.agilent.com/chem/AtomicSupplies

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Agilent 5800 and 5900 ICP-OES

Site Preparation Checklist

Thank you for purchasing an Agilent *instrument*. To get you started and to assure a successful and timely installation, please refer to this specification or set of requirements.

Correct site preparation is the key first step in ensuring that your instruments and software systems operate reliably over an extended lifetime. This document is an information guide and checklist prepared for you that outlines the supplies, consumables, space, and utility requirements for your equipment.

Introduction

Customer Responsibilities

Ensure that your site meets the following specifications before the installation date. For details, see specific sections within this checklist, including:

- The necessary laboratory or bench space is available.
- The environmental conditions for the site as well as laboratory gases, plumbing and extraction.
- The power requirements related to the product (e.g. number and location of electrical outlets).
- The required operating supplies necessary for the product and installation.
- If Agilent is delivering Installation and Familiarization services, users of the instrument should be present throughout these services. Otherwise, they will miss important operational, maintenance, and safety information.
- Please consult the Special Requirements section for other product-specific information.
- For more details, please consult the 5800 and 5900 ICP-OES Site Preparation Guide
- Agilent Technologies service providers will not install your Agilent ICP-OES system until an adequate exhaust system is present and functioning. See Environmental Conditions section.

Customer Information

- 1 If you have questions or problems in providing anything described as a Customer Responsibility, please contact your local Agilent or partner support service organization for assistance before the scheduled installation. In addition, Agilent and/or its partners reserve the right to reschedule the installation dependent upon the readiness of your site.
- 2 Should your site not be ready for whatever reasons, please contact Agilent as soon as possible to re-arrange any services that have been purchased.
- 3 Other optional services such as extra training, compliance services and consultation for user-specific applications may also be provided at the time of installation. Please discuss with your Agilent Sales representative before the installation is scheduled.

Important Customer Web Links

- Videos about specific preparation requirements for your instrument can be found by searching the *Agilent YouTube* channel at <https://www.youtube.com/user/agilent>
- To access *Agilent University*, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful *Agilent Resource Center* web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>
- Need technical support, FAQs, supplies? – visit our *Support Home page* at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections:
Join the *Agilent Community* at <https://community.agilent.com/welcome>

Site Preparation

Dimensions and Weight

Identify the laboratory bench space before your instrument arrives based on the following table.

Pay special attention to the total height and total weight requirements for all system components you have ordered and avoid bench space with overhanging shelves.

Special notes

- 1 The Agilent ICP-OES, its data system and accessories will be delivered to your site in large and small shipping containers. Note the size of the largest shipping container below.
- 2 The containers will be delivered in a large truck. You must furnish a forklift, or other suitable lifting device, and make arrangements to unload the truck and transport the containers to your site. All doorways, hallways, floors and elevators must be able to accommodate the largest, heaviest container. Do not open any of the shipping containers unless a representative of Agilent Technologies is present.

Table 1 Dimensions and Weight

Instrument Description	Weight		Height		Depth		Width	
	Kg	lbs.	cm	in	cm	in	cm	in
Agilent ICP-OES Instrument	90	198.4	88.7	34.9	74.0	29.5	62.5	24.6
ICP-OES Shipping Container	113.5	250.2	117.2	46.2	88.9	35	83.6	32.9
Agilent Recirculating Chiller	82	181	57.5	22.6	70.2	27.6	36.8	14.5
SPS 4 Autosampler	15	33.1	51.0	20.1	36.3	14.3	60.0	23.6
SPS 4 trolley	8.4	18.5	96	37.8	80	31.5	49.0	19.3
Personal computer (typical)	10	22	52	20.5	77	30	50	20
Printer (typical)	10	22	20	8	65	26	50	20
Advance Dilution System 2	7.9	17.4	37.9	15	31.3	12.3	15.8	6.2

Environmental Conditions

Operating your instrument within the recommended temperature ranges ensures optimum instrument performance and lifetime.

Special notes

- 1 Instrument performance can be affected by external sources of heat and cold, (e.g., direct sunlight, heating/cooling from air conditioning outlets, drafts), and/or vibrations.

- 2 Exhaust flow must be continuous as long as the plasma is ON.
- 3 Flexible ducting must be used for easy removal during instrument maintenance.
- 4 User safety requires that the exhaust gases from the plasma be vented externally to the building and not re-circulated by the environmental control system. Health hazards include chemical toxicity of solvents and samples.
- 5 The customer is responsible for supplying the ductwork between the instrument and the lab extraction system.
- 6 The Advanced Dilution System is rated to 2000m elevation.

Table 2 Temperature and Humidity Specifications

Parameter	Specification
Temperature	15-30°C (59-86°F) < 2 °C/h change throughout the entire working day
Humidity	20-80 %
Elevation	Up to 3,000 meters (10,000 Ft)
Atmosphere	Non-Condensing; Non-Corrosive

Table 3 Heat Dissipation

Instrument Description	Heat Dissipated (Maximum)		Heat Adsorbed (Maximum)	
	W	BTU	W	BTU
Agilent ICP-OES Instrument	870	2,970		
PC/Monitor (typical)	430	1,570		
Agilent Recirculating Chiller	3,200	10,920	1,400	4,780

Table 4 Exhaust Venting Requirements

Product	Port Diameter		Exhaust flow	
	mm	in	m3/min	ft3/min
Agilent ICP-OES Instrument	150	5.9	> 2.5	> 90
			< 6	< 200
SPS 4 Cover Kit	50	1.97	> 0.35	> 12.4

Power Consumption

Special notes

- 1 If a computer system is supplied with your instrument, be sure to account for those electrical outlets.
- 2 Installation requires an isolated, noise free ground.
- 3 A power cable will be supplied based on your region. Please ensure the appropriate wall receptacle is provided.
- 4 Do not use extension cords with Agilent Technologies equipment. They cannot provide enough power to the system and can be a safety hazard. If the desired location of equipment does not permit its standard power cord to reach an electrical outlet, your electrician should install additional outlets. Otherwise, you should relocate the equipment closer to existing electrical outlets.

Table 5 Power Cords and Receptacle

Power Cord Description	Wall Receptacle	Length Meters (ft)
Power cord UK, Sing, Malay, HK, C19, 13A	BS1363	2.5 (8.2)
Power Cord, Australia, C19, 16 amp	AS 3112	2.5 (8.2)
Power Cord, Europe/Korea, C19, 16 amp	CEE7/V11	2.5 (8.2)
Power Cord, 250V US/Canada 15A	NEMA 6-15R	2.5 (8.2)
Power Cord, Japan, C19, 20 amp	NEMA L6-20P	2.5 (8.2)
Power Cord, Swiss/DK, C19, 16 amp	Swiss/Denmark 1302	2.5 (8.2)
Power Cord, India/S.Africa, C19, 15 Amp	BS 546	2.5 (8.2)
Power Cord, Israel, C19, 16 Amp	Israeli SI32	2.5 (8.2)
Power Cord, Argentina, C19, 20 amp	IRAM 2073	2.5 (8.2)
Power Cord, China, C19, 15 amp, Fast	GB 1002	4.5 (14.7)
Power Cord, Taiwan/S America, C19, 20A	NEMA 5-20P	2.5 (8.2)
Power Cord, Thai 220V, 15 A, 1.8M, C19	NEMA 5-15	1.8 (5.9)
Power Cord, Brazil, C19 250V 16A	NBR 14136	2.5 (8.2)

Table 6 Power Requirements

Instrument Description	Line Voltage and Frequency V, Hz	Maximum Power Consumption VA	Maximum Current Consumption Amps
Agilent ICP-OES Instrument	200-240 V 50/60Hz Single phase	2900	15
Recirculating Chiller	208-230 V 60 Hz 240 V 50 Hz	2900	12.2
Advance Dilution System 2	100-240 V, +/-10% 50-60 Hz	50	

Cooling Water Requirements

Special notes

- 1 The preferred cooling system is the Agilent Recirculating Chiller, filled with Agilent Cool Clear (p/n 5799-0037).
- 2 If you are not using the preferred system, and another type of water re-circulator is used, the reservoir should be filled with distilled water having a conductance in the range of 50-150 μ S.
- 3 Distilled water will keep the system clean. Do not use tap water as it will contaminate the system and do not use deionized water as it will corrode the system.

Table 7 Cooling Water Requirements

Cooling water Parameter	Specification
Heat to be adsorbed	1,400W for dual view instruments 900W for radial view only instruments
Flow Rate	2.0 L/min (0.3 us gallons/min) minimum
Temperature	15- 28°C, 20°C recommended at water inlet of ICP-OES
Temperature Stability	$\pm 1.0^\circ\text{C}$
Pressure	Inlet pressure 230-400kPa (33-58psi)
Connections	Hoses 5 m (16.4 feet) long, ID=12 mm (7/16 inch) 2 x Male NPT 1/2 inch fittings
Conductivity	50-150 μ S at the chiller reservoir

Gas Requirements

Special notes

- The gas regulators should be within 3 meters (9.8 feet) of the ICP-OES.

Table 8 Gas Requirements

Compressed gas	Purity	Typical Working Pressure
Argon	≥99.99%	500-600kPa (73-88psi) Recommended 550kPa (80 psi)
Nitrogen, Optional Polychromator Purge Gas	≥99.99%	500-600kPa (73-88psi) Recommended 550kPa (80 psi)
Option Gas (If required for application)	Oxygen 20% Argon 80% ≥99.99%	500-600kPa (73-88psi) Recommended 550kPa (80 psi)

Required Operating Supplies by Customer for Installation

Special notes

- Download the Essential Chromatography and Spectroscopy Supplies Catalogs for a complete overview about available supplies for your new and existing Agilent Instruments
<https://www.agilent.com/en-us/products/lab-supplies>

Table 9 Required Operating Supplies

Item Description (including Dimensions etc.)	Vendor's Part Number (if applicable)	Recommended Quantity
DI Water	Not Available	500 mL
Blank Solution Pure ASTM Type 1A water with 5% HNO3	5190-7001	500 mL
5 ppm Wavelength Calibration Solution	6610030100	500 mL
Waste Liquid Container	5042-4769	4L minimum

Agilent 5800 ICP-OES

Reclaim your wasted time



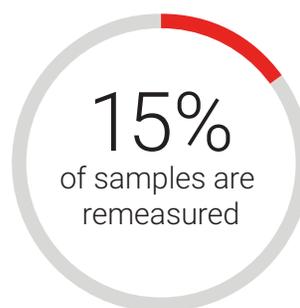
The Smart Way to Stop Wasting Time and Get the Right Answers

There are many reasons why ICP-OES samples need to be remeasured: QC failures, instrument problems, incomplete sample digestion, simple sample mix-ups, and more.

There are also many reasons why you might be worried about the accuracy of the results you are reporting.

The Agilent 5800 has an ecosystem of embedded sensors—powerful processors with smart algorithms and diagnostics designed to automate troubleshooting, preempt maintenance, and identify problems that could impact results. Always working behind the scenes, the 5800 thinks like an expert, and can make recommendations and solve problems before they happen. This smart functionality reduces the number of samples you have to remeasure and gives you more confidence in your results.

Top lab time wasters



Remeasuring samples

A recent poll* found that, on average, labs are remeasuring 15% of their ICP-OES samples. Interestingly, over 15% of labs don't consider their sample remeasurement rate at all, so have no idea of the time they are wasting or how much it's costing them.



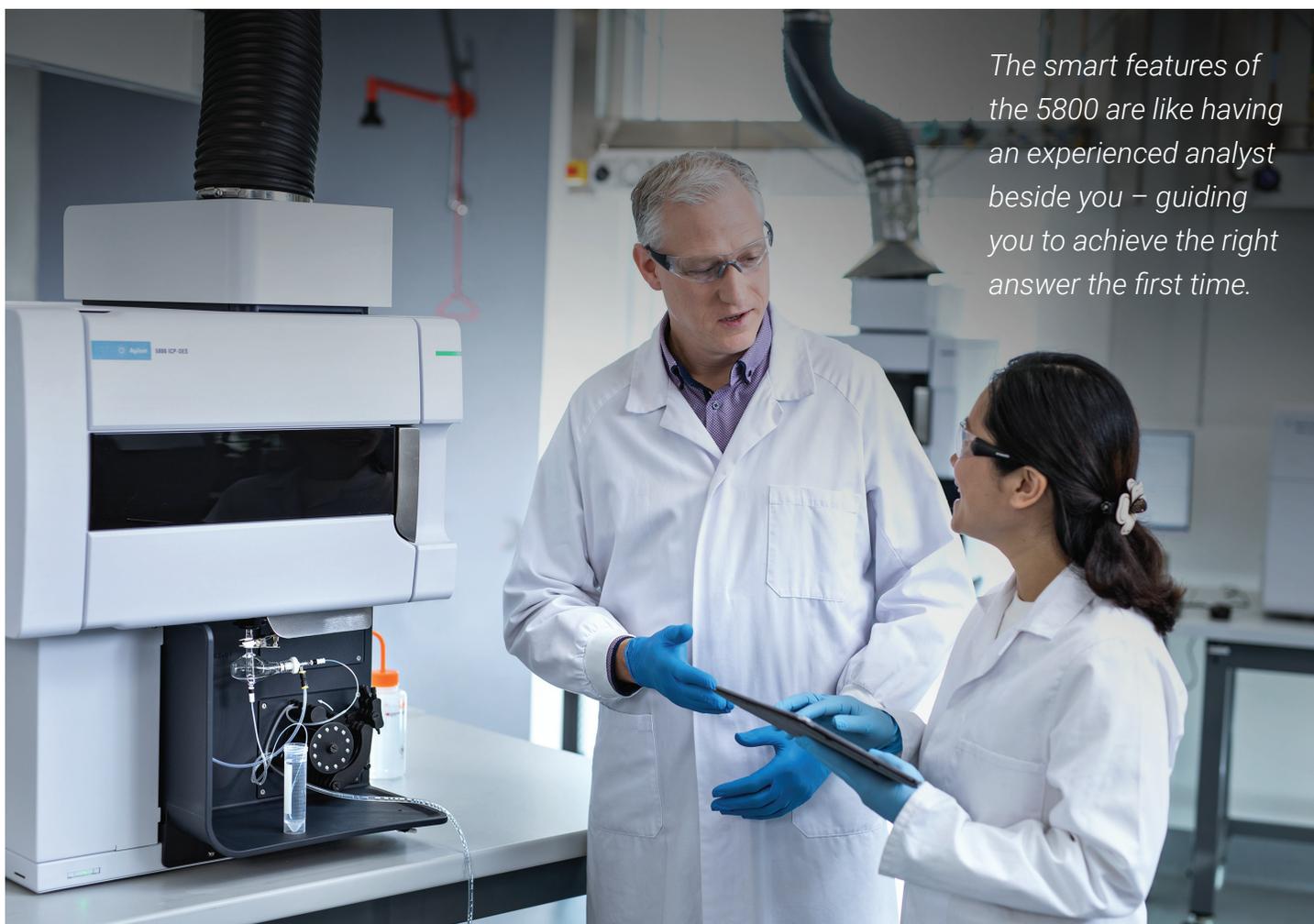
Instrument maintenance and downtime

Up to 30%† of service calls are unnecessary. The instrument operator could have solved the problem if only they knew what was going wrong and how to fix it.

* Results from an online poll of over 200 laboratories, conducted in 2019

† Agilent service data, from November 2017 to October 2018

The Agilent 5800 ICP-OES



The smart features of the 5800 are like having an experienced analyst beside you – guiding you to achieve the right answer the first time.

Just because QCs pass, it doesn't mean the results are correct

The U.S. Environmental Protection Agency Office of Technical Standards issued an alert¹, stating that an estimated 25 to 50% of arsenic results are false-positive in environmental data reported using ICP-AES. Three subsequent case studies² demonstrated arsenic bias. This was despite US EPA method quality control results being acceptable. It was demonstrated that batch QC samples do not always accurately assess the effects of the environmental sample matrix on the accuracy and precision of the results for samples contained within the batch.

1. United States Environmental Protection Agency (US EPA). (2001a). OTS Alert #2, Use of the ICP analytical method (CLP SOW ILM04.1, SW-846 6010, MCAWW 200.7) for drinking water samples may result in false positive detections of arsenic, lead, and/or thallium above their respective MCLs. Office of Technical Standards. Washington, DC.

2. Susan D. Chapnick, Leonard C. Pitts, Nancy C. Rothman. Arsenic and Thallium Data in Environmental Samples: Fact or Fiction? REMEDIATION Autumn 2010, Wiley Periodicals, Inc.

Learn More About Your Samples

Get insight into what's in your sample and how to best measure it

IntelliQuant puts the power of an experienced analyst inside your instrument—and only Agilent has it

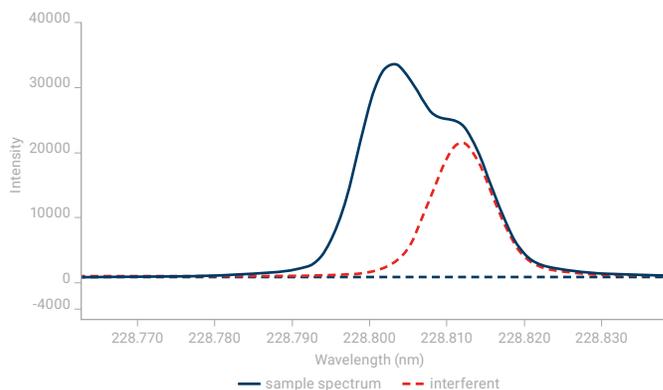
IntelliQuant captures data from the entire wavelength range as each sample is measured, then uses this broader view to calculate the approximate concentration of up to 70 elements in a sample. By collecting more than just the data at the wavelengths nominated, IntelliQuant sees spectral interferences and provides you with recommendations to ensure you get the right answers every time.

Running unknown or atypical samples? Put IntelliQuant to work, and ease your method development, troubleshooting, and sample screening challenges.

It's like having QC on every sample

If your results are too high, it could be due to a spectral interference from another element. Results that are too low could be due to chemistry problems. IntelliQuant uses data analytics to automatically identify spectral overlaps that can lead to false-positive results, and recommends the emission wavelength that will give the most accurate result.

The example on the right shows the measurement of cadmium at 228.802 nm. The measured emission (blue line) has been erroneously increased by the presence of an emission from arsenic (red line). IntelliQuant will flag this wavelength as being problematic using a star ranking feature (shown below) to make it easy for the user to select the right wavelength to report on.



Wavelength (nm)	Star Ranking
214.439	*****
226.502	***
228.802	* ?
361.051	*
326.105	**
508.582	*

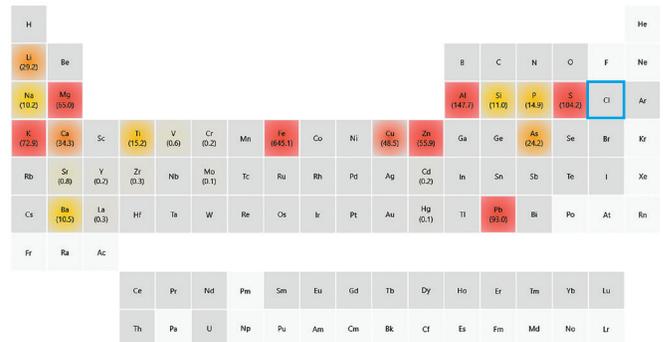
Analyte: Cd(228.802)
Confidence: moderate
Interference: As(228.812)
Confidence: strong

IntelliQuant Star ranking output for Cd. A five-star ranking with green check mark indicates Cd 214 wavelength to be the best. The red question mark indicates there is an issue on Cd 228, and the pop-up tip indicates the Cd 228 result has only moderate confidence as it has a strong arsenic interference.



Spot sample preparation mistakes

Did someone forget to put HCl in during the digestion process? By running your eye over the IntelliQuant results, shown as a heat map on the right, you can quickly identify whether Cl is present and know that the digestion was done correctly. The same approach can be used for most acids used for sample digestion.



Elements shaded red are in high concentration, orange are in mid-range concentration, and those in yellow are in low concentration. Unshaded elements are not at detectable levels in the sample. In this case, Cl is missing, indicating that HCl was not used during sample preparation.

Flagging outlying results

An outlier alert highlights results that exceed a nominated range or don't pass a test. The outlier alert system can monitor a range of parameters, from %RSD through to failed QC tests, and can be configured to your requirements.

Results can be filtered to show only the samples that have failed. Filtering makes it easy to see which results need to be reviewed.

The image below shows the flagging of outlier results on the sample results screen. On the right is shown a filter applied to display only the outliers that are in need of review.

	Rack Tube	Solution Label	Outlier Summary	Co 8.615 nm ppm	Cr 230.786 nm ppm	Cr 267.716 nm ppm	Cu 327.395 nm ppm	Fe 273.358 nm ppm	K 766.491 nm ppm	La 408.671 nm ppm	Li 670.783 nm ppm	Mn 279.80 ppm
<input type="checkbox"/>	2.2	ORESA 45e 2		1.3645	1.1683	19.5747	14.8628	3340.6496	57.8595	0.0167	0.1325	7
<input type="checkbox"/>	2.3	SRM 2781 1		0.2291	0.1247	3.7595	11.3385	520.5713	93.9258	0.3927	0.1407	107
<input type="checkbox"/>	2.4	SRM 2781 2		0.2323	0.1270	3.8096	11.8384	531.5788	97.1176	0.3894	0.1445	109
<input type="checkbox"/>	2.5	SRM 2782 1	A	1.5177	1.4996	2.3091	53.5224	5852.2210 o	71.4071	1.2246	0.1355	55
<input type="checkbox"/>	2.6	SRM 2782 2		1.4482	1.4303	2.1963	51.4172	5474.6380	67.6546	1.1696	0.1378	52
<input type="checkbox"/>	2.1	ORESA 45e 1		1.4282	1.2215	20.2531	15.9087	3385.5674	61.0864	0.0047	0.1407	4
<input type="checkbox"/>	2.2	ORESA 45e 2		1.4042	1.1999	20.0833	15.1864	3409.9162	59.4210	0.0166	0.1320	7
<input type="checkbox"/>	2.3	SRM 2781 1		0.2293	0.1244	3.8020	11.4742	534.8713	96.1179	0.3911	0.1418	110
<input type="checkbox"/>	2.4	SRM 2781 2		0.2405	0.1306	3.9745	12.0563	550.3115	100.0555	0.4072	0.1418	112
<input type="checkbox"/>	2.5	SRM 2782 1	A	1.5041	1.4722	2.2825	53.6837	5822.7552 o	71.1665	1.2091	0.1284	55
<input type="checkbox"/>	2.6	SRM 2782 2		1.4600	1.4463	2.2234	51.6004	5436.4548	66.9066	1.1841	0.1276	51
<input type="checkbox"/>	2.1	ORESA 45e 1		1.4573	1.2448	20.6513	16.0510	3447.9631	62.1334	0.0053	0.1377	4
<input type="checkbox"/>	2.2	ORESA 45e 2		1.4048	1.2037	20.1358	15.2630	3419.2366	59.4457	0.0166	0.1269	7
<input type="checkbox"/>	2.3	SRM 2781 1		0.2334	0.1267	3.8933	11.6111	551.2126	98.6493	0.3990	0.1374	113

	Rack Tube	Solution Label	Outlier Summary	Co 8.615 nm ppm	Cr 230.786 nm ppm	Cr 267.716 nm ppm	Cu 327.395 nm ppm	Fe 273.358 nm ppm	K 766.491 nm ppm	La 408.671 nm ppm	Li 670.783 nm ppm	Mn 279.80 ppm
<input type="checkbox"/>	2.2	ORESA 45e 2										
<input type="checkbox"/>	2.3	SRM 2781 1										
<input type="checkbox"/>	2.4	SRM 2781 2										
<input type="checkbox"/>	2.5	SRM 2782 1	A					5852.2210 o				
<input type="checkbox"/>	2.6	SRM 2782 2										
<input type="checkbox"/>	2.1	ORESA 45e 1										
<input type="checkbox"/>	2.2	ORESA 45e 2										
<input type="checkbox"/>	2.3	SRM 2781 1										
<input type="checkbox"/>	2.4	SRM 2781 2										
<input type="checkbox"/>	2.5	SRM 2782 1	A					5822.7552 o				
<input type="checkbox"/>	2.6	SRM 2782 2										
<input type="checkbox"/>	2.1	ORESA 45e 1										
<input type="checkbox"/>	2.2	ORESA 45e 2										
<input type="checkbox"/>	2.3	SRM 2781 1										

Flag	Flag Rule	Pass Value	Enable
A	Result Concentration Overrange	N/A	<input checked="" type="checkbox"/>
B	Result Concentration % RSD > Pass Value	10.00	<input type="checkbox"/>
C	Result Concentration < MDL	N/A	<input type="checkbox"/>
D	Internal standard % recovery variation > Pass Value	15.00	<input type="checkbox"/>
E	QC Equation Test Fail	N/A	<input type="checkbox"/>

Only apply when result > 10.0 * MDL

Smart Instrument Health Tracking

Pre-emptive alerts to reduce downtime and maintenance costs

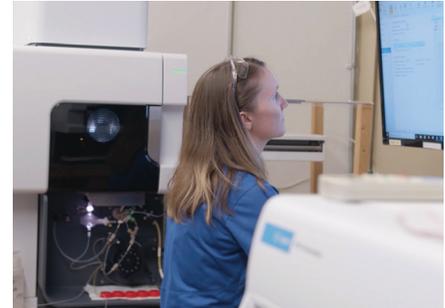
Avoid downtime and wasted time with the right amount of maintenance

Insufficient maintenance of an ICP-OES and accessories can lead to costly unplanned downtime, or analysis failures that cause time-wasting sample remeasurement. Maintenance that is too frequent also wastes time and can increase the cost of consumables.

Just like modern cars, the 5800 includes sensors and counters that guide the user when maintenance is needed, so you can schedule maintenance at a convenient time that doesn't disrupt your working day – and most importantly, maximize instrument uptime.

Traffic light color-coding of the counters visually shows which maintenance activities should be done immediately, and which can wait.

The maintenance log digitally records the maintenance history of the ICP-OES. When troubleshooting a problem it is easy to determine if the instrument has been sufficiently maintained.



AgSource Laboratories uses three generations of Agilent ICP-OES instruments to analyze soils, plants, and manures to support farming activities in Wisconsin, USA.

[Learn more in this case study.](#)

The screenshot displays the 'User Maintenance Counters' section of the software. It features a grid of maintenance tasks, each with a progress bar and a 'Reset' button. The tasks include: Clean nebulizer (403/1000), Clean spray chamber (403/2000), Perform wavelength calibration (28/30 days elapsed), Inspect pre-optics window (36/40 hours), Inspect torch (403/1000), Replace pump tubing (10/40 hours), Clean ADS (242/10000), and Inspect Syringes (1022/13500). A 'Maintenance Log' table at the bottom right shows recent events:

Timestamp	Operator	Maintenance Performed	Comment
11/23/2023 10:29:43 AM	santsiva	Counter reset	Counter 'Clean AVS' has been reset after 6005 of 5000 counts
11/23/2023 10:29:17 AM	santsiva	Counter reset	Counter 'Replace pump tubing' has been reset after 48 of 40 counts

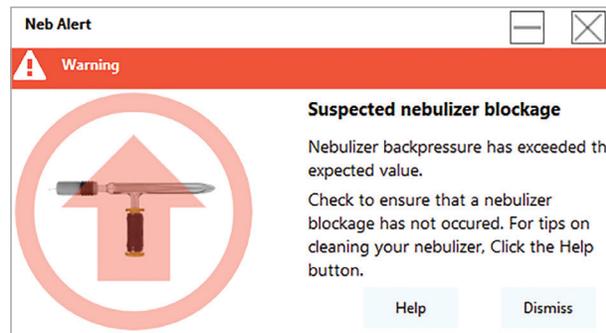
Below the log, there is an 'Instrument Counters' section for 'ADS 2 Counters' with the following values:

- Power on hours: 19828
- Plasma on hours: 562
- AVS switches: 6012
- Solutions measured: 7879



Prevent common reasons for ICP-OES service calls

A blocked nebulizer causes wasted time and the expense of troubleshooting. And it's completely preventable. The 5800 continuously monitors the nebulizer, alerting you when the nebulizer needs cleaning or is leaking.



Plasma ignition health

On-screen tips provide reminders to prevent common causes of plasma ignition failure.

In the case of the occasional plasma ignition failure, onboard smart tools provide clear advice on how to resolve. For example, "The gas flows are incorrect. Reset the plasma ignition values in the ignition table (instrument screen) by clicking the Default button and retry plasma ignition".



Avoid unnecessary failures

When left undetected, water-cooling faults can lead to unexpected downtime.

The Agilent recirculating chiller is an optional accessory that enables the analyst to monitor and set water-cooling parameters directly from the instrument PC. On-screen notifications allow labs to respond immediately to faults and avoid more serious breakdowns.

Save valuable time and inconvenience by switching the chiller on/off without having to leave the lab. Power costs are reduced by automatically turning it off at the end of an analysis.



Hardware Built for Performance and Longevity



The Agilent 5800 is available in two configurations:

- Vertical Dual View (VDV) – offers high throughput, and is upgradable on-site to the Synchronous Vertical Dual View (SVDV) configuration if your lab throughput demands increase.
- Radial View (RV) – ideal for labs needing a fast, high-performance radial ICP-OES.

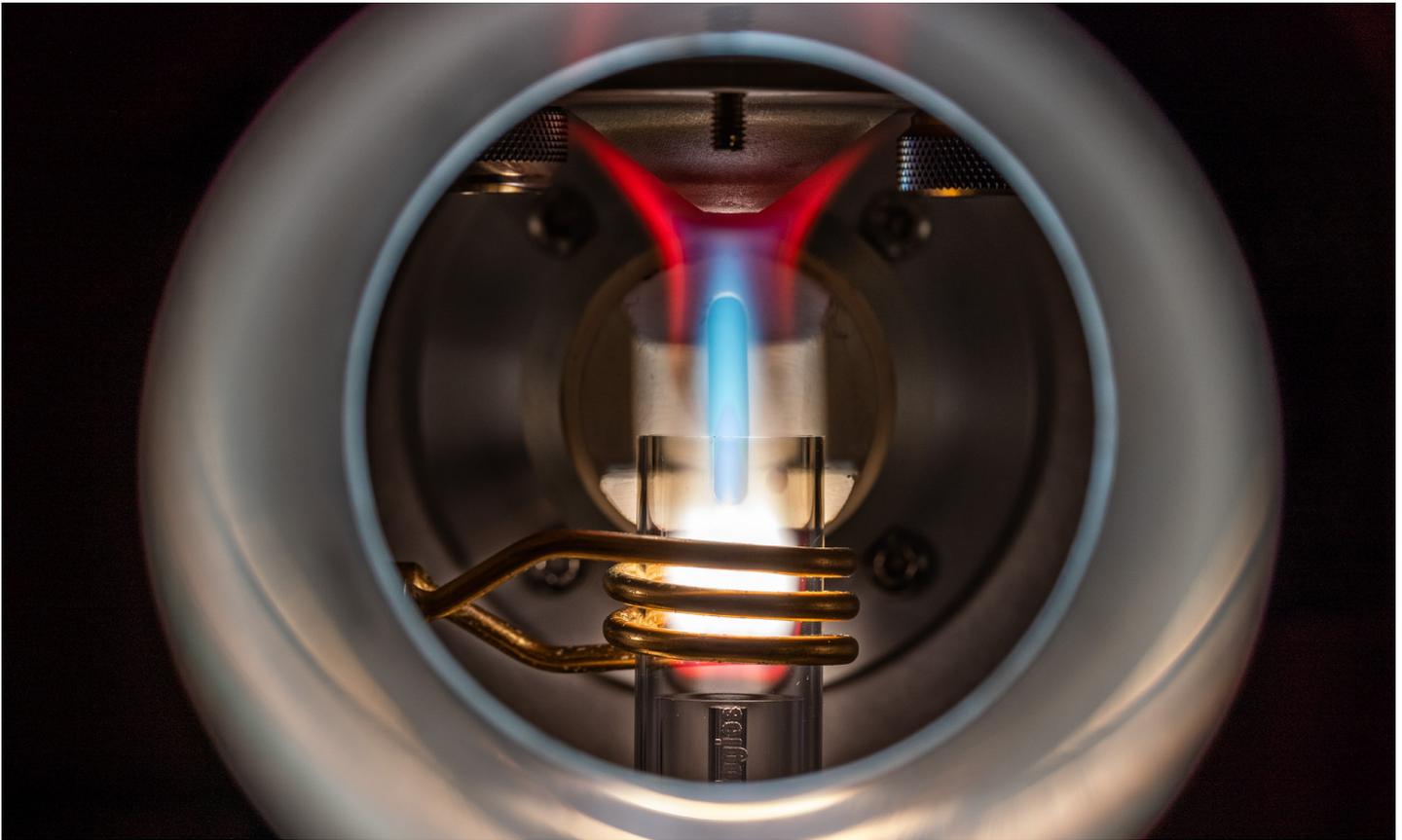
High speed, intelligent detector

A unique detection system delivers fast, simultaneous measurement over the full wavelength range, irrespective of concentration or signal strength. Detector advancements take smart software features to the next level – guiding you to achieve the right answer the first time.

Smart algorithms

Take the guesswork out of method development and automate troubleshooting with built-in smart algorithms:

- **Fitted background correction (FBC)** automatically provides accurate background correction.
- **Fast Automated Curve-fitting Technique (FACT)** or **Inter Element Correction (IEC)** technique for spectral interference correction.
- **IntelliQuant** allows rapid identification of all elements in a sample and their relative concentration. Ideal for method development, troubleshooting and sample screening.



Resilient vertical torch

The vertically oriented torch (pictured above) means less cleaning, less downtime and fewer replacement torches. A torch loader mechanism automatically aligns the torch and connects gases for fast startup and reproducible performance.

Built-in performance tests

How do you know an ICP-OES is operating as it should? The performance tests built into the 5800 quickly confirm that everything is OK, before you start measuring samples.

High performance with lower argon cost

Innovative Freeform optics deliver low detection limits and high resolution, even when using 99.99% purity bottled argon. The optical layout is compact, so is quick to purge, reducing the wait time before samples can be measured.

Self-diagnosis and health tracking

Self-diagnosing electronics monitor instrument status, allowing rapid identification of component health issues. Sensors and counters alert the analyst when maintenance is required.

Corrosion resistant, dust resistant

The 5800 is made from corrosion-resistant material and uses internal positive pressures and optimized airflows to keep out acid vapors. An easy-to-remove air filter protects your instrument in dusty environments and an air flow monitor alerts you when the filter needs replacing.

Small footprint

As one of the smallest ICP-OES available, the 5800 saves valuable bench space. Connections for power, gas, cooling, water, and communications are easily accessed—from the side rather than the rear.

The Integrated, All-Agilent Automation System



Multiple levels of automation

By adding various accessories to the 5800 instrument, you can achieve increasing levels of automation for your ICP-OES analyses.

Add the SPS 4 or SPS 6 autosampler—to automate sample preparation, enabling unattended analysis

Add an AVS switching valve—to double sample throughput

Add the ADS 2 autodilutor—to automate standard preparation and pre-run sample dilution. It also eliminates post-run sample dilutions by doing reactive dilutions to overrange samples during the run.

With all three accessories, you have an all-Agilent automation system that is designed and manufactured to be completely integrated.

Our all-Agilent workflow automation systems:

- Are fully-integrated. There's no 3rd party.
- Are optimized for Agilent ICP-OES's.
- Are designed to work as one system, with all settings included in the method and advanced features that can only be achieved when software and hardware are designed as one.
- Offer a simpler purchasing process and faster product support from a single point of contact.
- Require less staff training with only one software platform to learn.
- Contain no surprises. The system is tested to Agilent's strict QC requirements.

Accessories

Options to further enhance your workflow



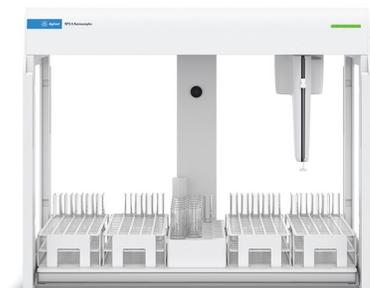
Advanced Valve System (AVS)

Four-, six-, or seven-port switching valve systems can improve productivity and lower the cost of ownership. To simplify operation, the valves are conveniently located and are fully integrated with the instrument hardware and software.



Advanced Dilution System (ADS 2)

The ADS 2 automates standard preparation and pre-run sample dilutions. It also automates post-run sample dilutions for over-range samples using real-time reactive dilutions during the analysis.



SPS 4 and SPS 6 Autosamplers

High-performance autosamplers designed for both everyday high-throughput and higher-capacity laboratories. The SPS 4 holds up to 360 samples, while the SPS 6 holds up to 540 samples, for longer unattended runs. Robust, easy to use, and ideal for automated elemental analysis.



Multimode Sample Introduction System (MSIS)

MSIS provides simultaneous measurement of hydride and non-hydride elements including As, Se, and Hg to sub-ppb levels. Simultaneous measurement eliminates changeover and allows routine and hydride elements to be determined simultaneously using the same setup.



Application-specific sample introduction options

Optimized torches and sample introduction kits are available for:

- Organic solvents
- High salt or high matrix samples
- Samples containing hydrofluoric acid

Minimize costs with demountable torches, designed for fast changeover, and economical operation.

Agilent CrossLab: Real insight, real outcomes

CrossLab goes beyond instrumentation to bring you services, consumables, and lab-wide resource management. So your lab can improve efficiency, optimize operations, increase instrument uptime, develop user skill, and more.



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Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

State of West Virginia
 Centralized Request for Quote
 Laboratory

Proc Folder: 1905432		Reason for Modification:	
Doc Description: Inductively Coupled Plasma-Optical Emission Spectrometer		Addendum No. 01	
Proc Type: Central Purchase Order			
Date Issued	Solicitation Closes	Solicitation No	Version
2026-03-02	2026-03-10 13:30	CRFQ 1400 AGR2600000032	2

BID RECEIVING LOCATION

BID CLERK
 DEPARTMENT OF ADMINISTRATION
 PURCHASING DIVISION
 2019 WASHINGTON ST E
 CHARLESTON WV 25305
 US

VENDOR

Vendor Customer Code:
Vendor Name : Agilent Technologies, Inc.
Address : 2850
Street : Centerville Road
City : Wilmington
State : DE **Country :** USA **Zip :** 19808
Principal Contact :
Vendor Contact Phone: 800-227-9770 **Extension:**

FOR INFORMATION CONTACT THE BUYER

Larry D McDonnell
 304-558-2063
 larry.d.mcdonnell@wv.gov

Please refer to the attached documents for details.

Vendor Signature X  **FEIN#** 77-0518772 **DATE** 03/09/2026

All offers subject to all terms and conditions contained in this solicitation

ADDITIONAL INFORMATION

Addendum No. 01
 To attach answers to vendor questions.

Bid opening date and time still remains 03/10/2026 at 1:30PM EST/EDT.

No other changes

INVOICE TO		SHIP TO	
AGRICULTURE DEPARTMENT OF ADMINISTRATIVE SERVICES 1900 KANAWHA BLVD E CHARLESTON WV US		AGRICULTURE DEPARTMENT OF REGULATORY PROTECTION DIVISION 313 GUS R DOUGLAS LN, BLDG 11 CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	Inductively Coupled Plasma-Optical Emission Spectrometer	1.00000	EA	66,383.39	66,383.39

Comm Code	Manufacturer	Specification	Model #
41115411	Agilent Technologies, Inc.		Agilent 5800

Extended Description:

Please see specifications section 3.1.1 in the attached documentation for further details.

SCHEDULE OF EVENTS

<u>Line</u>	<u>Event</u>	<u>Event Date</u>
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	Document Phase	Document Description	Page
AGR2600000032	Final	Inductively Coupled Plasma-Optical Emission Spectrometer	3

ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions