

# Agilent 5800 ICP-OES

Reclaim your wasted time



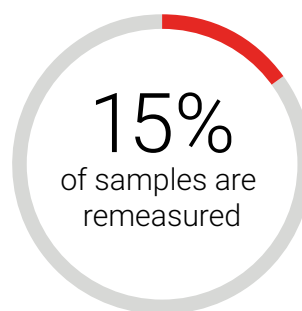
# The Smart Way to Stop Wasting Time and Get the Right Answers

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 alert<sup>1</sup>, stating that an estimated 25 to 50% of arsenic results are false-positive in environmental data reported using ICP-AES. Three subsequent case studies<sup>2</sup> 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

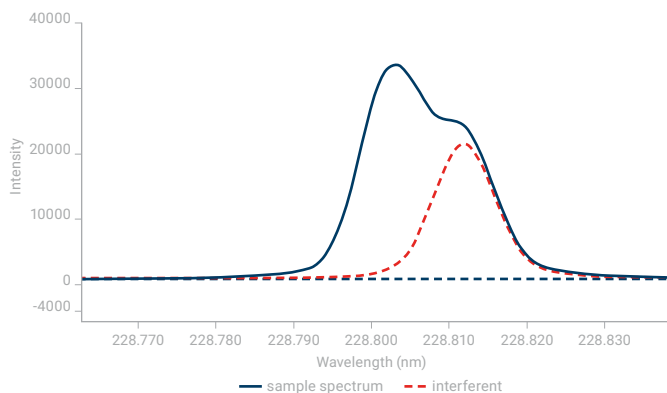
IntelliQuant captures data from the entire wavelength range as each sample is measured, then uses this broader view to calculate the approximate concentration of up to 70 elements in a sample. By collecting more than just the data at the wavelengths nominated, IntelliQuant sees spectral interferences 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.

Run	Sample Label	Ca	Co	Cr	Fe	Si	Sr	Zn
22	ORCSA-45a-2	1.1946	1.1883	19.6747	14.8828	3549.8498	57.8998	0.1167
23	SRM 2791-2	0.2291	0.1247	3.7999	11.3295	629.6713	93.9259	0.2827
24	SRM 2791-2	0.2323	0.1270	3.8199	11.8284	639.5738	97.9176	0.2894
25	SRM 2792-1	5.9177	4.4999	2.2081	55.5204	5985.2510	71.4071	1.2249
26	SRM 2792-2	1.8422	1.8283	2.1963	21.4172	5474.8269	87.6586	1.5094
21	ORCSA-45a-1	1.4262	1.2215	20.2521	15.3607	3395.9574	61.6904	0.9347
22	ORCSA-45a-2	1.4942	1.1999	20.8833	16.1894	3419.9162	69.4210	0.9188
23	SRM 2791-1	0.2293	0.1244	3.8020	11.4742	634.8713	95.9179	0.2911
24	SRM 2791-2	0.2416	0.1306	3.8746	12.2483	660.3115	100.6466	0.4072
25	SRM 2792-1	1.9941	1.4752	2.2826	49.8037	6422.7162	71.1889	1.0191
26	SRM 2792-2	1.4689	1.4462	2.2234	51.5604	5436.4548	66.9090	1.1341
21	ORCSA-45a-1	1.4973	1.2446	20.8513	16.3819	3447.8621	62.1334	0.9383
22	ORCSA-45a-2	1.4998	1.2027	20.1368	15.2630	3419.2306	69.4497	0.9168
23	SRM 2791-1	0.2204	0.1267	3.8933	11.9111	601.2126	98.6493	0.2909

Run	Sample Label	Ca	Co	Cr	Fe	Si	Sr	Zn
22	ORCSA-45a-2							
24	SRM 2791-2							
25	SRM 2792-1							6342.2216
26	SRM 2792-2							
21	ORCSA-45a-1							
22	ORCSA-45a-2							
23	SRM 2791-1							
24	SRM 2791-2							
25	SRM 2792-1							6422.7162
26	SRM 2792-2							
21	ORCSA-45a-1							
22	ORCSA-45a-2							
23	SRM 2791-1							

# Smart Instrument Health Tracking

Preemptive alerts to reduce downtime and maintenance costs

## Avoid downtime and wasted time with the right amount of maintenance

Insufficient maintenance of an ICP-OES 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.

The screenshot displays the 'User Maintenance Counters' section of the software. It features a sidebar on the left with navigation options: Status, Configuration, Calibration, Tests, Dashboard, Maintenance (highlighted), Ignition, Plasma, Optics, Pump, Camera, Water Cooling, Plasma Torch Door, Torch Loader, Preoptics, Gas Module, RF, Electronics, Switching Valve, Argon, and IsoMist. The main area shows a grid of maintenance tasks with progress bars and 'Reset' buttons. Below this is an 'Instrument Counters' table and a 'Maintenance Log' table.

**User Maintenance Counters**

Receive Popup Alerts Restore/Set Default Counters

Maintenance Task	Progress / Status	Reset
Inspect pre-optics window	Plasma on hours: 32/40 (Red bar)	Reset
Replace pump tubing	Plasma on hours: 32/40 (Red bar)	Reset
Clean spray chamber	Solutions measured: 1276/2000 (Yellow bar)	Reset
Clean nebulizer	Solutions measured: 138/1000 (Green bar)	Reset
Inspect torch	Solutions measured: 138/1000 (Green bar)	Reset
Perform wavelength calibration	Days elapsed: 4/30 (Green bar)	Reset
Clean AVS	AVS switches: 173/5000 (Green bar)	Reset

**Instrument Counters**

Power on hours	2075
Plasma on hours	365
AVS switches	183
Solutions measured	6408

**Maintenance Log**

Timestamp	Operator	Maintenance Performed	Comment
2/9/2022 9:49:15 AM	John Smith	Changed Sample Peristaltic Pump Tubing, I	
1/18/2022 1:15:24 PM	John Smith	Checked Calibration Standards, Checked In	
1/11/2022 2:13:10 PM	John Smith	Cleaned Torch Box, Cleaned Torch, Cleaned Torch blocked	
11/3/2021 9:40:27 AM	John Smith	Cleaned Axial Preoptic Window, Cleaned R	



## 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".

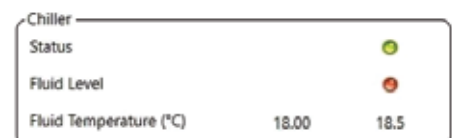


## Avoid unnecessary failures

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.



# The Vision to Anticipate. The Strength to Endure.

Meet the Agilent 5800 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:

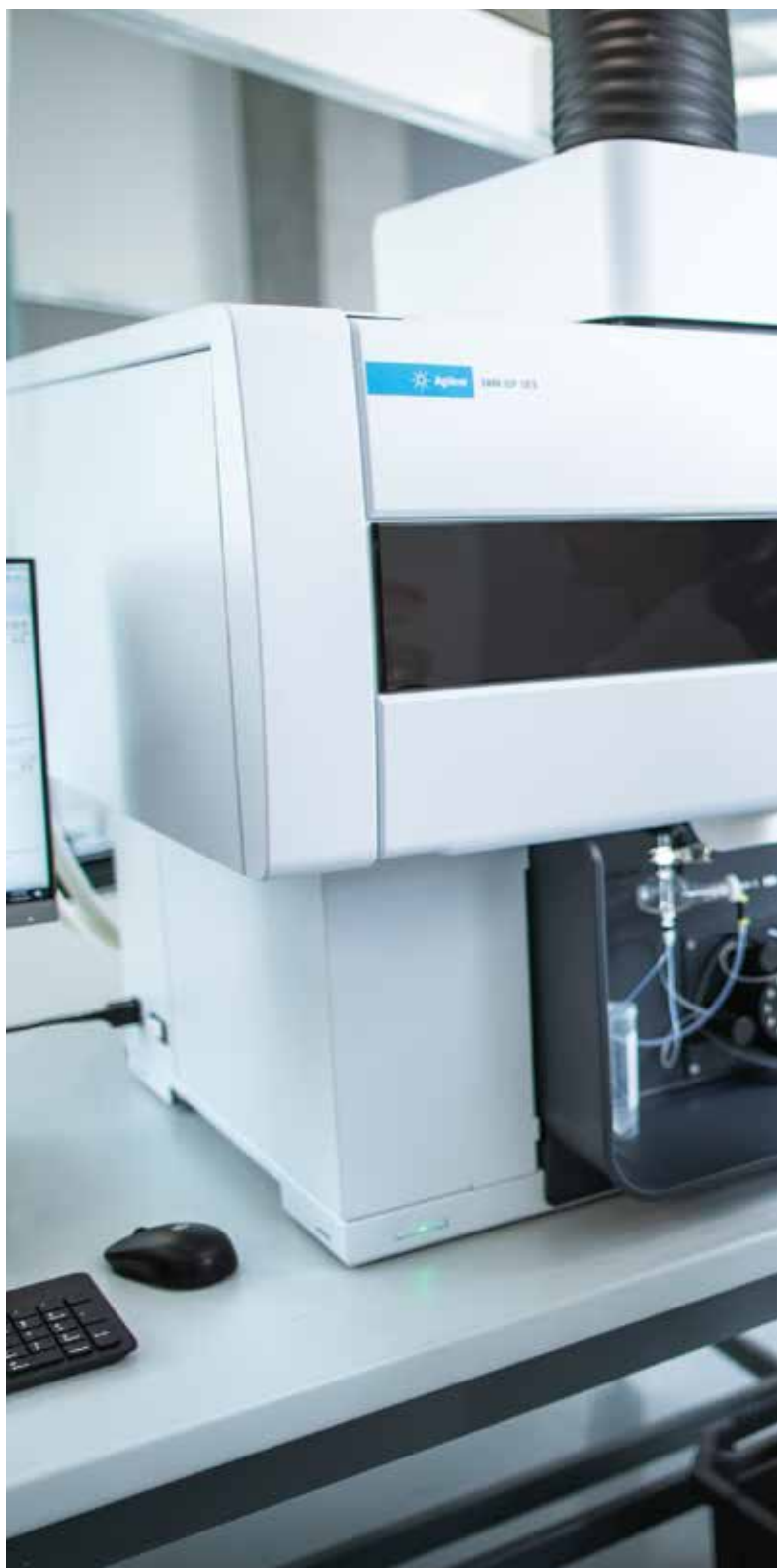
- **Fitted background correction (FBC)** automatically provides accurate background correction.
- **Fast Automated Curve-fitting Technique (FACT)** or **Inter Element Correction (IEC)** technique for spectral interference correction.
- **IntelliQuant** allows rapid identification of all elements in a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

## 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.

## 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.







**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 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.

**Resilient vertical torch**

The vertically oriented torch 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.

**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.

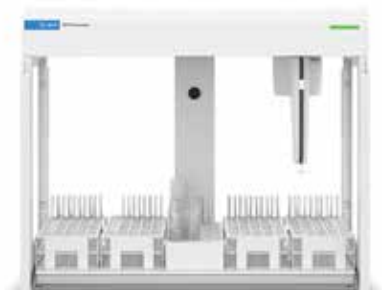
# Accessories

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.



## SPS 4 Autosampler

This flexible-configuration automatic sampler holds up to 360 samples. It is robust, easy to use, and ideal for unattended elemental analysis.



## Application-specific sample introduction options

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

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

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



## 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.



## IsoMist

The IsoMist is a temperature-controlled spray chamber. It can be adjusted between -10 and +60 °C. Lowering the temperature of the spray chamber improves the long-term stability of volatile organic solvent analysis.

# Need More? Meet the Agilent 5900 ICP-OES



*Future-proof your business and avoid the risk of outgrowing your ICP-OES with the fastest, most advanced instrument ever.*

## Designed for lab productivity

If your lab has a high sample load, you need the fastest 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 fitted 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.

## Delivering lowest cost of ownership

One of the benefits of high-speed analysis is lower gas use. The 5900 uses half the argon per sample, compared to other ICP-OES instruments. Combine that low gas use with the option of using cheaper, lower purity argon gas (99.99%) and the savings really start to add up.

The built-in self-health checks and proactive maintenance alerts of the 5900 allow you to keep the instrument running, without having to call a service engineer.

Replacing components only when needed, rather than on a time-based schedule, saves on the cost of consumables.

## 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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