



# Agilent ICP-MS Journal

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# 7800

## Special Issue



The Measure of Confidence



**Agilent Technologies**

## New! Solution-ready Agilent 7800 ICP-MS

Ed McCurdy, Tomo Yamada and Steve Wilbur, Agilent Technologies



Figure 1. New Agilent 7800 ICP-MS simplifies analytical workflow

The Agilent 7800 ICP-MS system was designed to meet the needs of industry and contract laboratories that want to simplify method development and ease of operation.

While no two laboratories are the same in terms of sample types, analytical requirements, or workload, many facilities follow regulated or standard methods, and many others use well-defined application workflows to manage the analysis of their samples. These "routine" testing labs are demanding in their choice of instrumentation, with robustness, ease-of-use, and productivity as important as performance and reliability. The new Agilent 7800 ICP-MS (Figure 1) meets these laboratories' demands by providing proven high-performance capabilities, together with method optimization tools and pre-defined batch templates to streamline setup and routine operation.

### Streamline your lab operations with solution-ready ICP-MS

The Agilent 7800 ICP-MS has been optimized for ease of method development and ease-of-use, especially in routine and high throughput laboratories. The new instrument offers fast setup, simple method development, and reliable routine operation, with auto-optimization tools, Pre-set Methods, and standard operating procedures (SOPs) for common applications. SOPs include drinking water, waste analysis, and USP<232>/ICH Q3D for pharmaceutical products (Figure 2).

### Confidence with proven pedigree

Building on the success of the Agilent 7700x ICP-MS, the new 7800 ICP-MS is configured to provide robust operation and reliable results, with hardware optimized to simplify your analysis. The Agilent 7800 ICP-MS helps you to:

- Analyze samples containing up to 3% total dissolved solids (TDS), a factor of 10 higher than most other ICP-MS systems, without needing matrix-matched calibration, due to the robustness and matrix tolerance of high matrix introduction (HMI) technology.
- Remove matrix-based polyatomic interferences, using a single, consistent helium (He) cell mode.
- Measure major and trace elements in one run, and minimize reruns due to over-range results, with 10 orders dynamic range detector.

## Simplified Method Development with MassHunter Software and Pre-set Methods

Agilent ICP-MS MassHunter is integral to the simplified operation of the Agilent 7800 ICP-MS. The software provides fast system setup, robust auto-optimization tools and extensive system status monitoring, to ensure consistent high performance.

Familiarization tools, such as the user tutorial disk, ensure that the 7800 ICP-MS is operational fast, and new users are quickly up to speed with system operation and data analysis.

### Pre-set Methods

Pre-set Methods, included with ICP-MS MassHunter, are a key part of the operational simplification provided

by the Agilent 7800. Pre-set Methods predefine the analysis parameters for many common applications, including analytes list, preferred isotopes, integration times, cell mode, internal standard assignment, and more. Hardware settings (such as HMI dilution factor) and autotune conditions are also pre-set, based on the target sample types for that Method. Many common methods can simply be loaded and run, with parameters predefined in the Pre-set Method. Even when a specific new method is needed, the Method Wizard simplifies the setup process based on a few questions about your samples.

### Drinking Water Application

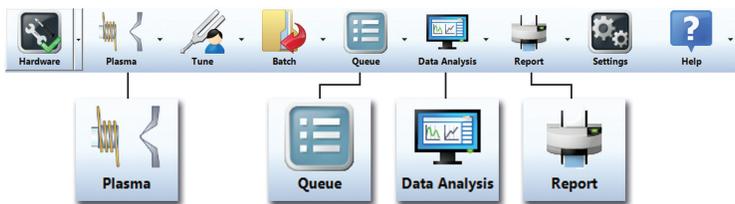
ICP-MS is widely used for trace element analysis of drinking water, but many laboratories have not yet switched to ICP-MS because of concerns about ease of use, complex method development, or limited throughput. Other laboratories use ICP-MS, but not to its full potential, due to limitations in dynamic range or control of interferences.

Drinking water is a relatively simple matrix, but there are some challenges in measuring all the required analytes accurately:

- TDS levels can be high, due to minerals in the source water.
- Many elements suffer from polyatomic interferences.
- Major elements (Na, Ca) can be present at 100s mg/L (ppm), over-range on some ICP-MS instruments.
- Chloride (HCl) must be added to samples to retain Hg, creating further Cl based interferences can be problematic.
- Poorly ionized analytes such as Be, As, Se, Cd, and Hg have relatively low sensitivity.



Figure 2. SOPs guide new users in system setup and routine operation for accurate sample analysis.



**Figure 3.** ICP-MS MassHunter software uses an intuitive layout with graphical toolbar Gadgets, making it easy to learn and use.

The optimized hardware of the 7800 ICP-MS addresses these issues. The robust plasma improves ionization, while HMI technology extends matrix tolerance up to 3% TDS. The wide dynamic range detector measures all major and trace analytes in a single run. Helium (He) cell mode (where permitted) reduces interferences, including Cl-based polyatomic ions from the addition of HCl. This ensures accuracy and eliminates the need for correction equations.

### Waste Analysis Application

Waste analysis, from treated wastewater to contaminated soil, presents many challenges for routine analysis by ICP-MS. Sample matrices are often high and complex, with many major elements at 100s or 1000s of mg/L, and percent levels of other matrix components such as chloride, sulphate, and carbon. This leads to signal suppression and the formation of many polyatomic interferences in the ICP-MS spectrum, a problem compounded by matrix levels that vary from sample to sample, meaning the interferences are unpredictable. Contract labs must analyze many regulated and non-regulated samples with fast turnaround times. Consequently, routine waste analysis requires a robust method that produces reliably accurate results for many elements, in variable matrices, without requiring extensive method development for each sample type.

Two key issues must be solved to simplify routine waste analysis and ensure accurate results with variable, high-matrix samples:

- Suppression (signal loss) caused by high and variable sample matrices must be avoided or corrected.
- Spectral interferences caused by polyatomic ions formed from the matrix elements must be reduced.

HMI technology on the 7800 ICP-MS reduces the sample matrix load on the plasma, and so much higher matrix levels can be analyzed routinely (up to 3% TDS). This means that

additional sample dilution is avoided, and unknown samples are measured with confidence, simplifying laboratory workflow.

The octopole based collision/reaction cell works so effectively in He mode, that most matrix based polyatomic interferences are eliminated with one set of cell conditions. This provides method simplicity, and delivers reliable and accurate quantitation of all elements at the regulated levels, without the added complexity of reactive cell gas methods.

### Pharma Application

Metals analysis in pharmaceutical products and ingredients is changing. Existing colorimetric tests are being replaced with new instrumental methods to measure potentially toxic Elemental Impurities in drug products and ingredients. The new ICP-MS and ICP-OES methods require only a small amount of sample, provide quantitative results for individual impurities, and give accurate recoveries for all the elements included in the new ICH-Q3D Step 4 and USP<232> methods.

Some sample types measured in pharma labs can pose problems for ICP-MS. Samples can contain high levels of matrix, or be solubilized in organic solvents, which can overload the plasma. Furthermore, the analyte lists for ICH-Q3D and USP<232> include several critical toxic elements that can be difficult to measure at low levels. Some are poorly ionized (As, Cd, and Hg), meaning that they have relatively low sensitivity, and some suffer from polyatomic interferences (e.g.,  $\text{ArCl}^+$  on  $\text{As}^+$  at mass 75).

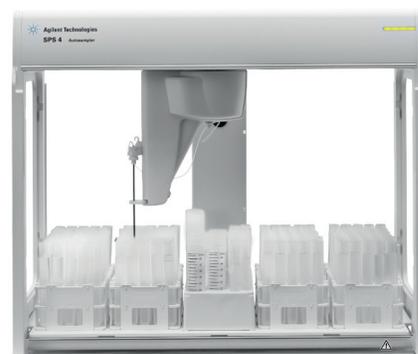
The 7800 ICP-MS uses optimized hardware to address these issues. The robust plasma, with HMI technology, tolerates high dissolved solids (up to 3%), and the solid state RF generator easily handles organic solvents. Standard He mode reduces all common polyatomic interferences,

ensuring accuracy and removing the need for correction equations.

### Increase productivity with ISIS 3 and new SPS 4 Autosampler

For high-throughput laboratories, the third generation of Agilent's Integrated Sample Introduction System (ISIS 3), recently released with the Agilent 7900 ICP-MS, can be added as an option to the Agilent 7800 ICP-MS. With its high speed uptake pump and close-coupled 7-port switching valve, ISIS 3 maximizes sample throughput and productivity by enabling fast discrete sampling.

The Agilent SPS 4 Autosampler (Figure 4) is a next-generation high-performance autosampler designed to meet the needs of high throughput laboratories requiring a fast, reliable, high-capacity autosampler. The SPS 4 is suitable for ultra-trace analysis by ICP-MS while at the same time providing the ruggedness and robustness demanded by FAAS, MP-AES, and ICP-OES users.



**Figure 4.** New Agilent SPS 4 Autosampler for atomic spectroscopy applications.

The new autosampler provides improved accuracy and precision, high speed, ease of access, and corrosion resistance, all with a footprint (including covers) that is nearly 40% smaller than other autosamplers with comparable sample capacity. With the optional integrated enclosure, the Agilent SPS 4 offers maximum sample integrity while protecting your laboratory environment from hazardous sample vapors. Flexible sample and standard rack configuration enables a wide range of sample capacities to be accommodated. For example, four-rack capacity supports up to 360 10 mL sample vials or 768 microtiter wells.

**For more information, go to:**  
[www.agilent.com/chem/7800icpms](http://www.agilent.com/chem/7800icpms)

# Sub-ppb Detection Limits for Hydride Gas Contaminants using GC-ICP-QQQ

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## Introduction

Hydride gases, such as phosphine and arsine, are important contaminants in process chemicals used in both the petrochemical and semiconductor industries. The presence of phosphine, arsine, hydrogen sulfide, and carbonyl sulfide in polymer grade ethylene or propylene can have a deleterious effect on catalysts used in the production of polypropylene plastics.

In the semiconductor industry, phosphine is used as a precursor for the deposition of group III-V compound semiconductors, and as a dopant in the manufacturing of semiconductor devices, such as diodes and transistors. The presence of unwanted hydride gas impurities can have a profound effect on the performance of the final device.

## Experimental

### Instrumentation

An Agilent 7890 GC was coupled to an Agilent 8800 ICP-QQQ using the Agilent GC-ICP-MS interface. The GC operating parameters given in Table 1 were also used for a parallel GC-ICP-MS study using an Agilent 7900 ICP-MS.

Table 1. GC operating conditions

Column	100 meter x 0.53 mm x 5.0 $\mu$ m DB-1
Flow	Pressure control isobaric @ 20 psig
Column exit pressure	4 psig
Temperature	Isothermal ambient
Sample size	400 $\mu$ L (Valco 6 port valve)

The 8800 ICP-QQQ was operated in MS/MS mass-shift mode using oxygen as the collision/reaction cell (CRC) gas for the measurement of Ge, As, P, and S. Hydrogen cell gas mode was used for the on-mass measurement of the primary isotope of Si at  $m/z$  28. Tuning conditions were almost identical for the two modes, the only

differences being in the Kinetic Energy Discrimination (KED) voltage and the cell gas flow, as shown in Table 2.

Table 2. ICP-QQQ operating parameters

	O <sub>2</sub> mode	H <sub>2</sub> mode
RF power	1350 W	
Sample depth	8.4 mm	
Argon carrier (makeup) gas flow	0.85 L/min	
Extract 1	-150 V	
Extract 2	-190 V	
Omega bias	-120 V	
Omega lens	2.2 V	
Cell entrance	-50 V	
Cell exit	-60 V	
KED	-4 V	0 V
Cell gas flow	0.35 mL/min	5.0 mL/min

## Results and Discussion

### Low level phosphine analysis

The purpose of this experiment was to establish a detection limit for phosphine (PH<sub>3</sub>) using GC-ICP-QQQ under ideal conditions. Q1 was set to  $m/z$  31 (the precursor ion <sup>31</sup>P<sup>+</sup>) and Q2 was set to  $m/z$  47 to measure the product ion <sup>31</sup>P<sup>16</sup>O<sup>+</sup>. Since the eluting peaks are relatively narrow, with duration of no more than ~12 seconds, a maximum of 1 second was set for the total scan time. For the single element analysis of phosphine (measured as PO<sup>+</sup>), an integration time of 1.0 second was used. A multi-point calibration curve was generated for PH<sub>3</sub> at concentrations of 8.2, 18.8 and 50.8 ppb (Figure 1). This covers the representative concentration range required for the measurement of this contaminant.

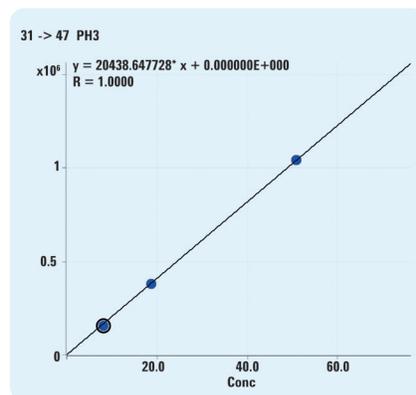


Figure 1. Phosphine calibration curve with an R value of 1.000 over the concentration range.

A low-level phosphine standard (~0.42 ppb) was also prepared, to allow the detection limit (DL) to be calculated. Two different methods for DL calculation were used:

1. Two times the signal-to-noise (S/N) of the phosphine peak in the low-level standard based on "Peak to Peak" noise method.
2. The standard deviation of the concentrations measured in seven replicate analyses of the low-level standard.

In the chromatogram shown in Figure 2, a S/N ratio of 96.9 was determined for the phosphine peak. Using the equation  $DL = 2 \times ((\text{concentration of standard}) / (S/N))$ , a detection limit approximation of 8.67 ppt was calculated based on  $2 \times ((0.42 \text{ ppb}) / (96.9))$ . Using the standard deviation method, where multiple replicates of the low level standard were analyzed, the detection limit was 19 ppt.

### Analysis of additional hydride gases

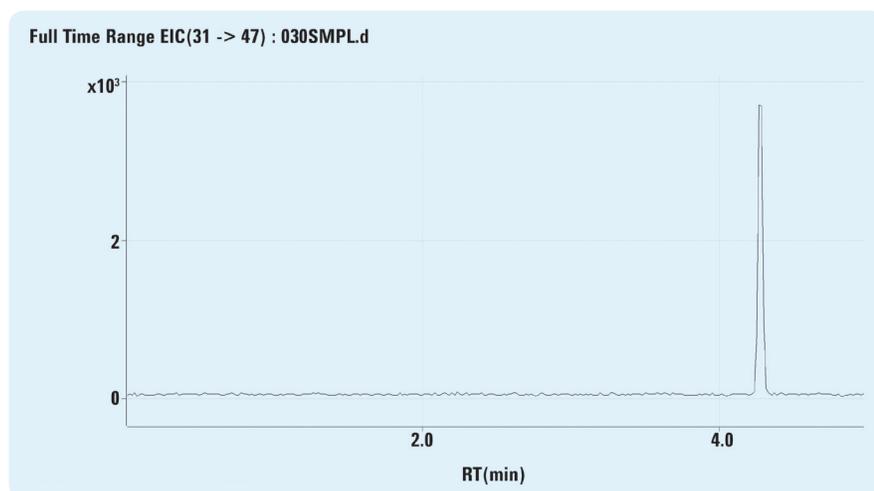
The GC-ICP-QQQ method was applied to the multielement analysis of germane, arsine and phosphine within a single analysis. Ge and As were measured as their O<sub>2</sub> reaction product ions, GeO<sup>+</sup> and AsO<sup>+</sup>, as was the case with P (PO<sup>+</sup>).

Hydrogen sulfide (H<sub>2</sub>S) and carbonyl sulfide (COS) were also analyzed using O<sub>2</sub> mass-shift mode, based on the ICP-QQQ measurement of sulfur as the <sup>32</sup>S<sup>16</sup>O<sup>+</sup> reaction product ion at  $m/z$  48.

For the analysis of silane, Si was measured directly (on-mass) at its major isotope <sup>28</sup>Si, using H<sub>2</sub> cell gas. The primary polyatomic interferences on <sup>28</sup>Si<sup>+</sup> are <sup>12</sup>C<sup>16</sup>O<sup>+</sup> and <sup>14</sup>N<sub>2</sub><sup>+</sup>, due to the presence of CO<sub>2</sub>, N<sub>2</sub>, and O<sub>2</sub> in the argon supply and from air entrainment into the plasma. H<sub>2</sub> was selected as the reaction gas as both the CO<sup>+</sup> and N<sub>2</sub><sup>+</sup> interferences react readily with H<sub>2</sub> cell gas. Si<sup>+</sup> remains unreactive and so can be measured, free from interferences, at its original mass.

### Comparison of GC-ICP-QQQ and GC-ICP-MS detection limits

For comparison purposes, H<sub>2</sub>S, COS, PH<sub>3</sub>, GeH<sub>4</sub>, AsH<sub>3</sub>, and SiH<sub>4</sub> were analyzed by GC-ICP-QQQ with the 8800 ICP-QQQ, and GC-ICP-MS, using the same GC method with an



**Figure 2.** Chromatogram of 0.42 ppb PH<sub>3</sub> standard. S/N: 96.9

Agilent 7900 conventional quadrupole ICP-MS. A summary of the detection limits (DLs) for both techniques is given in Table 3.

For analytes where the background noise is very low (Ge-74, As-75), single digit ppt level detection limits are easily achieved using either GC-ICP-MS or GC-ICP-QQQ. However, for analytes that are prone to higher backgrounds

(P-31 and S-32), significantly lower detection limits can be achieved by using MS/MS with O<sub>2</sub> cell gas and measuring the oxygen addition reaction product ions PO<sup>+</sup> and SO<sup>+</sup> in mass-shift mode. In addition, MS/MS mode with H<sub>2</sub> cell gas provides effective removal of background interferences at mass 28, allowing on-mass measurement of Si at its primary isotope.

**Table 3.** Detection limit comparison between GC-ICP-QQQ and GC-ICP-MS.

Gas	8800 ICP-QQQ		7900 ICP-MS	
		DL, ppb		DL, ppb
<b>H<sub>2</sub>S</b>	<b>32 -&gt; 48 (O<sub>2</sub>)</b>		<b>32 (No gas)</b>	
	MDL 7 reps	0.21	MDL 7 reps	0.62
	MDL 2 x S/N	0.11	MDL 2 x S/N	0.22
<b>COS</b>	<b>32-&gt;48 (O<sub>2</sub>)</b>		<b>32 (No gas)</b>	
	MDL 7 reps	0.12	MDL 7 reps	0.51
	MDL 2 x S/N	0.11	MDL 2 x S/N	0.21
<b>PH<sub>3</sub></b>	<b>31-&gt;47 (O<sub>2</sub>)</b>		<b>31 (No gas)</b>	
	MDL 7 reps	0.019	MDL 7 reps	0.139
	MDL 2 x S/N	0.009	MDL 2 x S/N	0.077
<b>GeH<sub>4</sub></b>	<b>74-&gt;90 (O<sub>2</sub>)</b>		<b>74 (No gas)</b>	
	MDL 7 reps	NA	MDL 7 reps	0.013
	MDL 2 x S/N	0.0038	MDL 2 x S/N	0.0013
<b>AsH<sub>3</sub></b>	<b>75-&gt;91 (O<sub>2</sub>)</b>		<b>75 (No gas)</b>	
	MDL 7 reps	NA	MDL 7 reps	0.016
	MDL 2 x S/N	0.0013	MDL 2 x S/N	0.006
<b>SiH<sub>4</sub></b>	<b>28-&gt;28 (H<sub>2</sub>)</b>		<b>28 (H<sub>2</sub>)</b>	
	MDL 7 reps	0.14	MDL 7 reps	1.09
	MDL 2 x S/N	0.196	MDL 2 x S/N	1.18

\*NA = not available

## Conclusions

The significantly lower background and higher sensitivity of the Agilent 8800 ICP-QQQ resulted in a GC-ICP-QQQ method that shows a clear advantage for the determination of a range of contaminants in high purity gases at the low detection levels demanded by the industry.

Compared to GC-ICP-MS with conventional quadrupole ICP-MS, GC-ICP-QQQ DLs for silane, phosphine, hydrogen sulfide, and carbonyl sulfide were lower by a factor of 5 to 10 with silane detection limits in the ~200 ppt range and phosphine detection limits in the ~15 ppt range.

## More Information

To read more, download the Agilent Application Note, Sub-ppb detection limits for hydride gas contaminants using GC-ICP-QQQ, 5991-5849EN.

Find out more about CONSCI at [www.consci.com](http://www.consci.com)

# Agilent MAPs: Innovative New Services Benefit Customers in EMEA

Jean-Pierre Lener

EMEA Spectroscopy MAPS Specialist

## Introduction

Agilent's Europe, Middle East, Africa, and India (EMEA) field sales organization is taking a new approach to working with customers. A series of Market and Application Programs – or MAPs – have been specially designed to provide complete working solutions to meet users' analytical business needs.

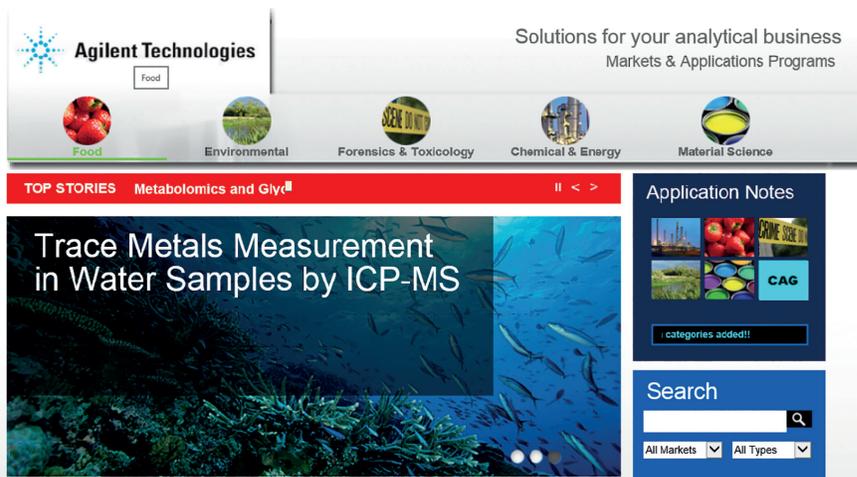
## The Challenge: Evolving Business Trends

By working closely with customers over a number of years, Agilent has noticed a number of changes in the business models of a large number of its client-companies. One significant trend has been the move away from building up in-house expertise – once regarded as a key competitive advantage in many sectors. Today's focus is firmly on maximizing productivity, while reducing costs, but with minimal internal technical expert involvement.

## The Solution: MAPs Instrumentation and Beyond

Agilent is aware that many customers need a total solution to address their specific analytical requirements rather than just a new instrument and a general training course. And, as previously mentioned, many labs no longer have the time, resources or expertise to develop their own methodology. With this in mind, Agilent started to develop the MAPS program in 2010 – building up a team of experts to work closely with customers to offer total analytical solutions.

To ensure a full-breadth of application and market knowledge, Agilent has its own specialists plus a network of 23 Partner Laboratories, from both public and private sectors that showcase new hardware capabilities and develop applications. In addition, Agilent has established a large number of channel partners. Typically, channel partners handle the project needs of clients from



concept to installation through application consultancy and support until end of warranty. Under MAPs, there is now a much more defined working relationship between all parties.

MAPs Manager, Armando Miliazza, heads a management team which is responsible for each of the applied markets covered by MAPS: food, environmental, forensics and toxicology, chemical and energy, pharmaceutical, clinical, and materials. In addition, there is a network of local 'MAPs champions', who manage the program and assemble the team for each customer. Working together, a tailored Scope of Work is developed for each MAP customer so that all expectations can be discussed, noted, monitored and met.

## What are MAPs?

MAPs provide a 'solution' to a customer's analytical or measurement requirements. Once the right instrumentation has been selected, the MAP Scope of Work is used to coordinate all aspects of the agreement, from delivery of the product and installation to application-specific training and method development – all depending on the level of support required.

## Different MAPs levels

As not all customer needs are the same, Agilent offers five MAPs packages. For example, level 1 is based on available application notes and/or analysis done during a demonstration, with application consultancy delivered after installation/familiarization, whereas level 5 includes a fully developed and validated Standard Operation Procedure (SOP) that is supported by Agilent.

## ICP-MS for Drinking Water: Example of MAPs Approach

Level 1 MAPs would define the instrumentation required for the application, include the application note that describes workflow in detail, plus consultancy, as defined in the Scope of Work.

A level 5 package would include a complete and dedicated SOP that adheres to the latest legislation and includes sample preparation procedure developed and validated by a partner lab and fully supported by Agilent. In fact, all you would need to be up and running soon after installation.

## More Information

Learn more by visiting the MAPS website at:

[www.solutions-to-win.com/](http://www.solutions-to-win.com/)

You will find a wide range of market-specific information, including announcements of any new or updated regulations, application notes, events, conferences, plus details about Agilent's partner labs and Value Added Resellers (VAR). There are links to a wide range of product, application or technique videos and on-demand e-seminars.



Example of MAPs e-Newsletter

For regular updates, you can subscribe to the MAPS newsletter – a monthly e-publication that details the latest information on markets, products and applications.

# Software Tips and Tricks Migrating to ICP-MS MassHunter 4.2 – Why You Should Consider Making the Move

**Steve Wilbur**

Agilent ICP-MS Software Product Manager

## Expand the Capabilities of Your ICP-MS with MassHunter 4.2

Agilent ICP-MS MassHunter 4.2 includes many enhancements intended to simplify the user experience (workflow and user interface) making it easier to learn, easier to remember and more intuitive. More importantly, it includes several significant new functions which vastly expand the capabilities of existing Agilent 7700, 7900 or 8800 instruments for specific applications, as well as supporting the new Agilent 7800 ICP-MS.

- Optional Single Nanoparticle Analysis Module (G5714A) automates the entire process of nanoparticle analysis, both by single particle mode and by field flow fractionation mode.<sup>i</sup> More details will be included in Agilent's ICP-MS MassHunter 4.2 brochure that will be available soon.

- Extended maximum Time Resolved Analysis (TRA) acquisition time from <2.8 hours max to more than 24 hours max. This feature enables laser imaging users to acquire data continuously into a single data file for simplified input into 3<sup>rd</sup> party imaging software.
- Full support for USP <232>/<233> QA/QC requirements<sup>ii</sup> including spike recoveries, as well as calculation and reporting of precision and ruggedness according to USP<233>. An updated preset method makes setup and validation quicker and easier than ever.
- Enhanced support for hyphenated ICP-MS systems (GC-ICP-MS, LC-ICP-MS etc.) with improved integration of Agilent LC and GC control, and more powerful, simpler-to-use integrated data analysis for chromatographic data.
- Support for the new Agilent SPS 4 autosampler.

## Updating to MassHunter 4.2

MassHunter 4.2 does not require any computer hardware or operating system changes or updates to run on systems configured for MassHunter 4.1.

License codes are upward compatible, so the upgrade is free of charge for customers with valid license codes for MassHunter 4.1 core software and any purchased options.

Existing SMA (software maintenance agreement) subscribers will be

automatically notified by email of the availability of the free MassHunter 4.2 upgrade.

Customers of earlier versions of ICP-MS MassHunter who don't have a current SMA can take advantage of new, inexpensive upgrade products for core software and purchased options. Contact your Agilent sales rep for more information.

<sup>i</sup> Field flow Fractionation (FFF) requires the use of a 3rd party FFF unit for sample introduction. FFF software is not controlled by or integrated into ICP-MS MassHunter software.

<sup>ii</sup> Typically, companies involved in pharmaceutical product manufacturing or quality control may also use a secure electronic records storage solution, such as Agilent's SDA, OpenLAB Data Store, or OpenLab ECM (Enterprise Content Manager).

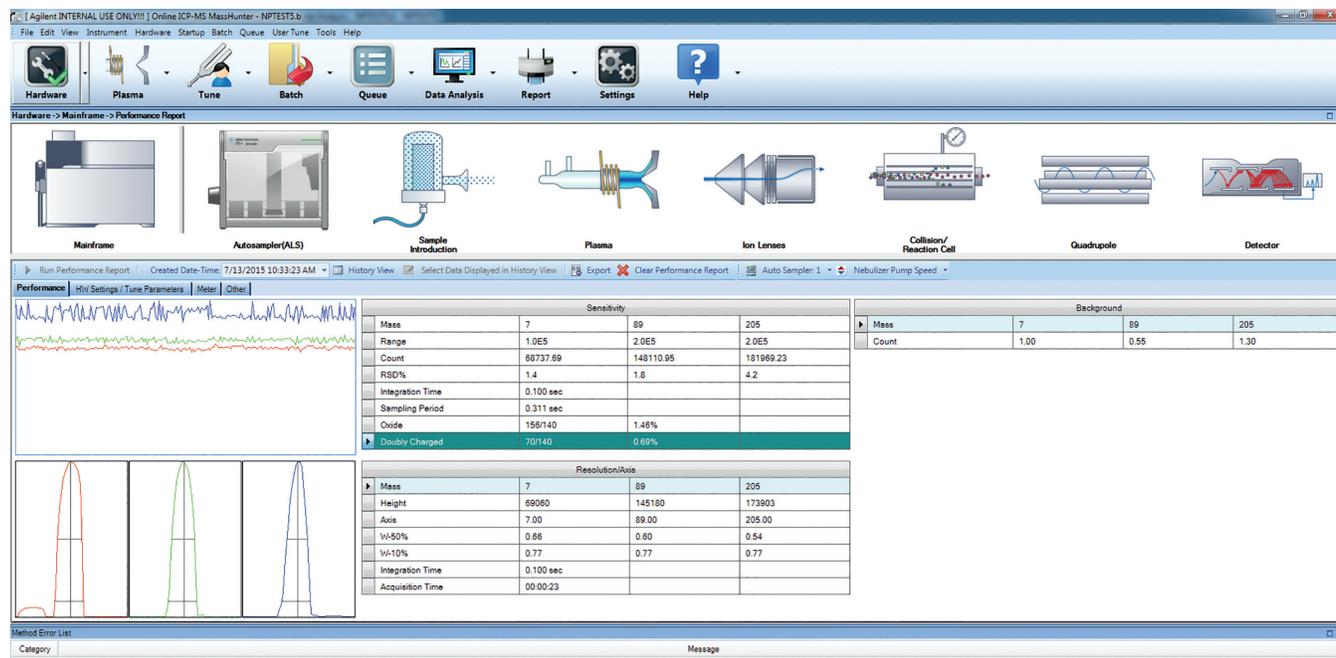
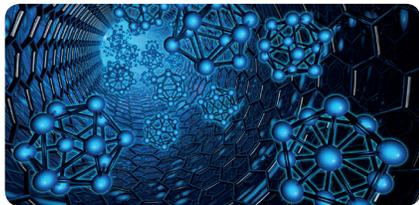


Figure 1. ICP-MS MassHunter 4.2 instrument control pane displaying real time tuning signal

# On-demand Webinar on the Fundamentals of Nanoparticle Analysis by ICP-MS



As nanoparticles become more a part of our daily lives, understanding their behavior in our bodies and our environment is critical. Numerous techniques are available for determining various characteristics of nano-scale materials. However only ICP-MS is capable of simultaneously determining nanoparticle size and size distribution, elemental composition, concentration (particles/volume and mass/volume) along with dissolved metal concentration in a single sample in one quick analysis.

This on-demand webinar discusses the principles and limitations of nanoparticle analysis by ICP-MS, both in single particle mode and in bulk analysis mode using asymmetric field flow fractionation (AF4) and capillary electrophoresis (CE) coupled to ICP-MS and Triple Quadrupole-ICP-MS (ICP-QQQ).

Content includes:

- Definition of “nanoparticle” in the context of risk assessment.
- Differences between hyphenated ICP-MS techniques and single-particle ICP-MS techniques for nanoparticle analysis.
- Understanding the critical ICP-MS performance factors for optimum single nanoparticle analysis.

Results from analysis of reference materials and real-world samples are also presented.

If you missed the live broadcast of this webinar, presented by Steve Wilbur, you can catch up now by viewing the on-demand version. Duration: 1.00h.

Click on the “Webcasts” tab at [www.spectroscopyonline.com](http://www.spectroscopyonline.com)

This information is subject to change without notice.

## New Agilent 7800 ICP-MS Literature

You can find out more about the new Agilent 7800 ICP-MS online at [www.agilent.com/chem/7800icpms](http://www.agilent.com/chem/7800icpms), including access to new literature items:

- **Brochure:** Solution-ready Agilent 7800 ICP-MS, 5991-5874EN
- **Solution flyer:** Fast-track your metals analysis with the Agilent 7800 ICP-MS, 5991-5926EN
- **Solution flyer:** Fast-track your environmental waste analysis with the Agilent 7800 ICP-MS, 5991-5877EN
- **Solution flyer:** Fast-track your drinking water analysis with the Agilent 7800 ICP-MS, 5991-5875EN
- **Solution flyer:** Fast-track your pharmaceutical analysis with the Agilent 7800 ICP-MS, 5991-5880EN
- **Application note:** The Agilent 7700x/7800 ICP-MS Advantage for Drinking Water Analysis, 5990-4315EN
- **Application note:** Simple, Reliable Analysis of High Matrix Samples According to US EPA Method 6020A using the Agilent 7700x/7800 ICP-MS, 5990-5514EN
- **Application note:** Using Qualifier Ions to Improve ICP-MS Data Quality for Waste Water Analysis, 5990-5890EN
- **Application note:** Analysis of flue gas desulfurization wastewaters by Agilent 7700x/7800 ICP-MS, 5990-8114EN
- **Application note:** Validating the Agilent 7700x/7800 ICP-MS for the determination of elemental impurities in pharmaceutical ingredients according to draft USP general chapters <232>/<233>, 5990-9365EN
- **Application note:** Enhancing the productivity of food sample analysis with the Agilent 7700x/7800 ICP-MS, 5991-0107EN
- **Tech flyer:** Agilent 7800 ICP-MS: Successful low level mercury analysis, 5990-7173EN
- **Tech flyer:** Agilent 7800 ICP-MS: Enhanced helium mode cell performance for improved interference removal in ICP-MS, 5990-7573EN
- **Tech flyer:** Agilent 7800 ICP-MS: ORS4 and helium mode for more effective interference removal in complex samples, 5990-7574EN
- **Tech flyer:** Agilent 7800 ICP-MS: Plasma robustness in ICP-MS benefits of a low CeO/Ce ratio, 5990-8060EN

## Conferences. Meetings. Seminars.

- **Geoanalysis Leoben 2015**, Aug 8-14, Styria, Austria, <http://geoanalysis.info/>
- **Goldschmidt 2015**, Aug 16-21, Prague, CZ, <http://goldschmidt.info/2015/>
- **JASIS: Sept 2-4**, Makuhari, Chiba, Japan, <http://www.jasis.jp/en/>
- **ICEEN 2015**, Sept 6-10, Vienna, Austria, <https://nanoenvironment2015.univie.ac.at/>
- **17th Agilent ICP-MS User Meeting**, Sept 16-17, Bitburg, Germany
- **SciX – Sept 27-Oct 2**, Providence, RI, USA, [www.scixconference.org/](http://www.scixconference.org/)
- **ISTERH 2015**, Oct 18-23, Dubrovnik, Croatia, <http://isterh2015.com/>
- **2016 Winter Conference on Plasma Spectrochemistry**, Jan 11-16, 2016, Tucson, Arizona, USA, <http://icpinformation.org>

## Agilent ICP-MS Publications

To view and download the latest ICP-MS literature, go to [www.agilent.com/chem/icpms](http://www.agilent.com/chem/icpms)

- **Application note:** Rapid determination of five arsenic species in polished rice using HPLC-ICP-MS, 5991-5933EN
- **Application note:** Accurate and sensitive analysis of arsenic and selenium in foods using the Agilent 8800 ICP-MS to remove REE doubly charged interferences, 5991-5860EN
- **Application note:** Determination of chromium, selenium, and molybdenum in nutritional products by ICP-MS, 5991-5865EN
- **Application note:** Sub-ppb detection limits for hydride gas contaminants using GC-ICP-QQQ, 5991-5849EN

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