

ICP-MS Elemental Impurity Analysis of Pharmaceuticals Following USP and ICH Protocols

Routine oral drug analysis using the Agilent 9500 Triple Quadrupole ICP-MS in Advanced Helium Mode



Author

Yoshiaki Shiraishi,
Agilent Technologies, Inc

Introduction

All pharmaceutical products must be evaluated to demonstrate that they are safe for patients and effective for their intended therapeutic use. As part of this evaluation, potentially toxic elemental impurities must be monitored. The relevant requirements and procedures are specified by organizations such as the United States Pharmacopeia (USP) and the International Council for Harmonisation of Technical Requirements (ICH). ICH Q3D(R2) establishes Permitted Daily Exposure (PDE) values for 24 elements and includes the elements specified in USP General Chapter <232>.^{1,2} USP General Chapter <233> describes the analytical procedures and validation requirements for determining elemental impurities.³ In this study, the 24 elements listed in ICH Q3D(R2) were analyzed using an ICP-MS method based on USP <233> to meet the requirements of both ICH and USP.

Agilent ICP-MS systems, including single quadrupole (SQ) and triple quadrupole (QQQ) instruments, have been extensively tested and used in pharmaceutical laboratories for many years.⁴ The instruments deliver reliable, high-quality data, supported by trusted service teams, qualification services, and compliance solutions. To extend the benefits of ICP-QQQ technology to a wider range of laboratories, Agilent has developed the 9500 ICP-QQQ, an entry-level triple quadrupole ICP-MS.⁵ Unlike traditional ICP-QQQ systems, which are often used for advanced applications, the 9500 is designed for routine sample analysis. It combines excellent interference removal, dependable performance, and straightforward operation, enabling laboratories to benefit from ICP-MS/MS capability in high-volume daily workflows while still supporting more complex research projects.

Agilent 9500 Triple Quadrupole ICP-MS

The 9500 ICP-QQQ is equipped with the Dual-Cell System (DCS), a new collision/reaction cell (CRC) that incorporates two independently controlled ion guides. The DCS enables effective removal of many spectral interferences through a new standard cell-gas mode, Advanced Helium Mode (AHM), which uses Kinetic Energy Discrimination (KED) and Collision-Induced Dissociation (CID) mechanisms.⁶ This enhanced helium (He) mode provides efficient removal of polyatomic interferences while maintaining sufficient high sensitivity in the low-mass range, making it suitable for the analysis of most analytes in the majority of sample types.

AHM replaces the need for conventional multitune operation using no gas, He, and high energy (HE)He modes. By eliminating gas switching between these modes, AHM simplifies operation and improves sample throughput.

In pharmaceutical samples, AHM is particularly advantageous for the analysis of elements such as lithium (Li), which typically has low sensitivity in conventional He mode, as well as vanadium (V), chromium (Cr), arsenic (As), and selenium (Se), which are susceptible to polyatomic interferences.

While AHM effectively resolves many polyatomic ion interferences, such as oxide ions (MO^+) and argon-based ions (ArM^+), it is less effective at suppressing doubly charged ion interferences (M^{++}). However, a reactive cell gas mode known as Air cell mode has been developed for the 9500 that reduces M^{++} interferences through ion-molecule reactions with oxygen (O_2).⁷ In Air cell mode, ambient air is purified through an air filter before being introduced into the cell. Using MS/MS settings to control which analyte ions enter the DCS and interact with O_2 , the 9500 ICP-QQQ ensures effective interference removal of M^{++} , as well as challenging polyatomic species that AHM cannot fully suppress.

This note describes the analysis of 24 elements in an over-the-counter (OTC) oral drug product using the 9500 ICP-QQQ in AHM. The method was evaluated for both limit and quantitative procedures against the performance criteria specified in the ICH guidance and USP Chapters.

Experimental

Elemental impurity limits: the J value

The maximum permitted levels of elemental impurities in finished pharmaceutical products are specified as Permitted Daily Exposure (PDE) values. The specific PDE assigned to each element depends on the type of pharmaceutical product and its route of administration, since different routes correspond to different allowable daily exposures.

Because samples typically require digestion and dilution before ICP-MS analysis, the PDE values must be converted to concentration limits in the final sample solution. This concentration is referred to as the target concentration, or J value, and is calculated using Equation 1. Note that the J values used in this study were calculated according to ICH Q3D Option 1, which assumes a maximum daily intake of 10 g for oral drug products with a maximum daily dose of 10 g or less. Therefore, the same analytical method and calibration solutions can be used for the analysis of other oral drugs unless the maximum daily dose exceeds 10 g.

$$J = \frac{\text{PDE } (\mu\text{g/day})}{\text{Total Dilution Factor} \times \text{Max Daily Dose (10 g/day)}}$$

The PDE and calculated J values for the 24 elements for the oral drug sample are listed in Table 1.

Sample preparation and analytical procedures

Sample preparation and all analytical procedures were performed in accordance with USP <233>. The OTC oral drug sample was digested using a MARS 6 microwave digestion system (CEM). A 0.36 g portion of the sample was accurately weighed, and the acids summarized in Table 2 were added. Hydrochloric acid (HCl) was included to stabilize mercury (Hg) and to provide an appropriate acidic medium for the reduction and stabilization of osmium (Os). However, the addition of HCl introduces chloride into the sample matrix, which can generate chloride-based polyatomic ions and cause spectral interferences on several target elements, particularly V and As. The effective interference removal capability of AHM reduced these polyatomic interferences, enabling reliable determination of the affected elements in the presence of HCl, as shown in Table 7.

For the spike recovery experiments, the samples were fortified at 0.3, 0.8, 1.0, and 1.5 J using the J values listed in Table 1. Six replicate samples were prepared for the non-spiked sample and for each of the four spike levels to meet the precision requirements of USP <233>. All samples were digested using the temperature program shown in Table 3.

Table 1. PDEs and J values for 24 elements in the oral drug product (500x dilution and 10 g/day max dose).

ICH/USP Class	Element	Oral PDE (µg/day)	J Value (µg/L, ppb)
Class 1	As	15	3
	Cd	5	1
	Hg	30	6
	Pb	5	1
Class 2A	Co	50	10
	V	100	20
	Ni	200	40
Class 2B	Tl	8	1.6
	Au	300	60
	Pd	100	20
	Ir	100	20
	Os	100	20
	Rh	100	20
	Ru	100	20
	Se	130	30
	Ag	150	30
	Pt	100	20
Class 3	Li	550	110
	Sb	1,200	240
	Ba	1,400	280
	Mo	3,000	600
	Cu	3,000	600
	Sn	6,000	1,200
	Cr	11,000	2,200

Table 2. Sample amount and acid volume used for digestion.

Sample	0.36 g
Ultrapure Water	5 mL
HNO ₃	4 mL
HCl	1 mL

Table 3. Microwave digestion program.

Stage	Temp (°C)	Time (min)	Step
1	180	20	Ramp
2	180	15	Hold
3	–	–	Cool

After digestion, the samples were allowed to cool sufficiently. Then, 0.1 g of ascorbic acid was added to prevent the loss of Os through conversion of Os (VIII) to Os (IV). The digested solutions were diluted to 50 mL with ultrapure water and then further diluted to achieve a final dilution factor of 500.

Calibration standards

Calibration standards were prepared in the same acid matrix as the sample solutions, consisting of 2% HNO₃ and 0.5% HCl, at concentrations equivalent to 0.5, 0.8, 1.0, and 1.5 J. The standards were prepared using the Agilent USP 232 Oral Kit_v2. The kit includes four bottles, each containing a different group of elements. The concentration of each element is based on the oral PDE value, allowing the calibration standards to be prepared by dilution alone.

The online internal standard (ISTD) solution was prepared by diluting USP Internal Standard 1 solution, also included in the Agilent USP 232 Oral Kit_v2, by a factor of 10. The ISTD solution comprised Sc (1 µg/mL), Ge (0.5 µg/mL), In (0.5 µg/mL), Te (2.5 µg/mL), Lu (0.5 µg/mL), and Bi (0.5 µg/mL).

Instrumentation

An Agilent 9500 Triple Quadrupole ICP-MS equipped with a Dual-Cell System (DCS) was used for the analysis. The instrument was configured with a MicroMist glass concentric nebulizer, a quartz spray chamber, a quartz torch with a 5 mm inner-diameter injector, and nickel sampler and skimmer cones. An Agilent SPS 4 autosampler was used for sample introduction. The optimized operating conditions are summarized in Table 4.

The instrument was controlled using Agilent OpenLab ICP-MS software. The software includes preset methods for USP/ICH applications, allowing operators to configure the analytical conditions in just a few steps. The target elements and their corresponding PDE values are predefined in the batch template. The template for oral drugs was used in this study.

Table 4. Agilent 9500 ICP-MS operating conditions.

Parameters	Settings
Plasma Mode	General purpose
RF Power (W)	1550
Spray Chamber Temperature (°C)	2
Sampling Depth (mm)	12
Nebulizer Gas Flow (L/min)	1.14
Lens Tune	Autotune
Cell Mode	AHM
He Gas Flow (mL/min)	14
KED (V)	10

Results and discussion

Sensitivity and analysis time

AHM provides improved sensitivity, particularly for low-mass elements, compared to conventional He mode. In conventional He mode, an integration time of 6 s is typically required to obtain sufficient signal for low-mass elements, whereas AHM typically requires only 0.3 s. In this study, the 20-fold reduction in integration time shortened the overall analysis time while maintaining sufficient analytical performance. The improved low-mass sensitivity of AHM therefore contributed to increased sample throughput.

The improved sensitivity provided by AHM also allowed shorter integration times to be used for the other target elements. As a result, the total integration time for all 24 elements was reduced by approximately 50% compared with a conventional multitune method. The shorter integration times, together with the elimination of gas switching, further improved productivity without sacrificing analytical performance.

Specificity

USP <233> requires the analytical procedure to unequivocally assess each target element in the presence of components that may be expected in the sample, including other target elements and matrix components. In this study, the sample solutions contained carbon, chloride, and ascorbic acid as matrix components. These components can cause polyatomic interferences affecting elements such as V and As, as well as matrix-induced signal enhancement.

The background equivalent concentrations (BECs) were low relative to the corresponding J values that are listed in Table 1. AHM provided sufficiently low detection limits (DLs) and BECs for all elements (Table 5). Low BECs were obtained for ^{51}V , ^{52}Cr , ^{75}As , and ^{78}Se , despite the potential interferences from $^{35}\text{Cl}^{16}\text{O}^+$, $^{36}\text{Ar}^{16}\text{O}^+$, $^{40}\text{Ar}^{35}\text{Cl}^+$, and $^{40}\text{Ar}^{38}\text{Ar}^+$, respectively.

These results clearly demonstrate the excellent polyatomic interference removal capability of AHM. A relatively high concentration of HCl was used during sample digestion to stabilize Hg and other elements. Although the increased chloride concentration can generate chloride-based polyatomic ions, AHM effectively reduced the effects of these interferences. Consequently, stable and reproducible spike recoveries were obtained even in the chloride-rich sample matrix, as shown in the Detectability section of this note.

Table 5. DLs and BECs for 24 elements (ppb) plus secondary isotopes for some elements.

m/z	Element	DL	BEC
7	Li	0.008	0.055
51	V	0.004	0.015
52	Cr	0.005	0.037
53	Cr	0.014	0.078
59	Co	0.001	0.001
60	Ni	0.007	0.021
62	Ni	0.015	0.022
63	Cu	0.003	0.009
65	Cu	0.003	0.009
75	As	0.003	0.002
78	Se	0.009	0.010
80	Se	0.049	0.401
95	Mo	0.001	0.0008
97	Mo	0.001	0.0005
101	Ru	0.0001	0.00002
103	Rh	0.0002	0.0003
105	Pd	0.0002	0.0001
107	Ag	0.0004	0.0009
109	Ag	0.0005	0.001
111	Cd	0.0001	0.00002
114	Cd	0.00002	0.00001
118	Sn	0.011	0.071
121	Sb	0.0006	0.0004
135	Ba	0.005	0.004
137	Ba	0.004	0.005
188	Os	0.001	0.001
189	Os	0.001	0.001
191	Ir	0.021	0.413
193	Ir	0.001	0.002
194	Pt	0.0006	0.0002
195	Pt	0.0001	0.00001
197	Au	0.001	0.001
200	Hg	0.002	0.004
201	Hg	0.002	0.004
202	Hg	0.002	0.004
205	Tl	0.0004	0.0003
*	Pb	0.0002	0.0003

*Lead (Pb) was automatically reported by the Agilent OpenLab ICP-MS software as the sum of the ^{206}Pb , ^{207}Pb , and ^{208}Pb signals.

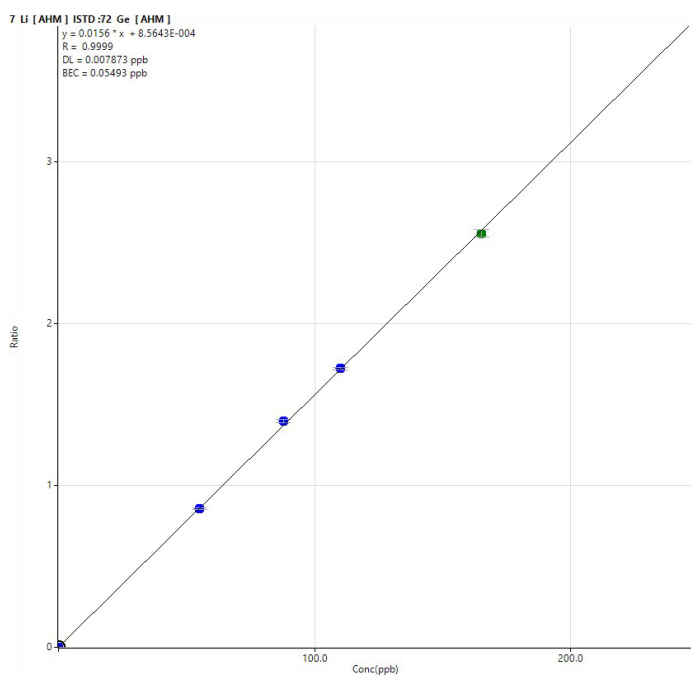
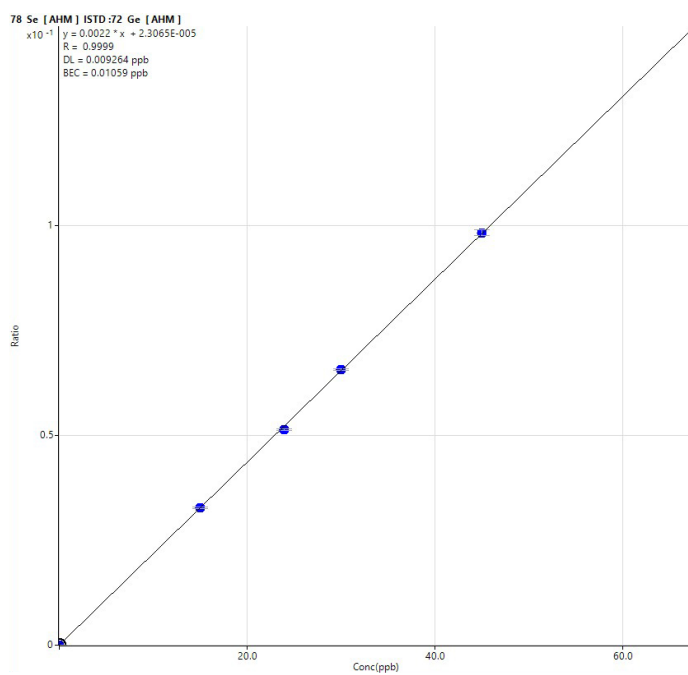
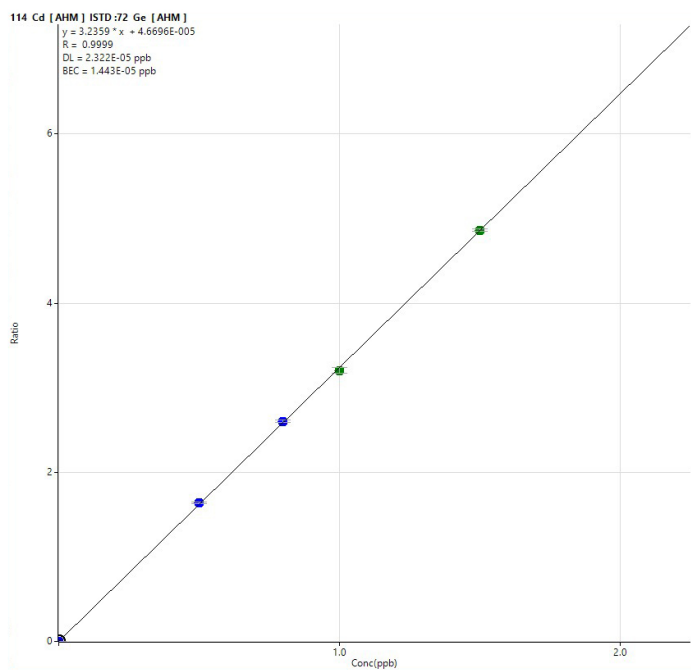
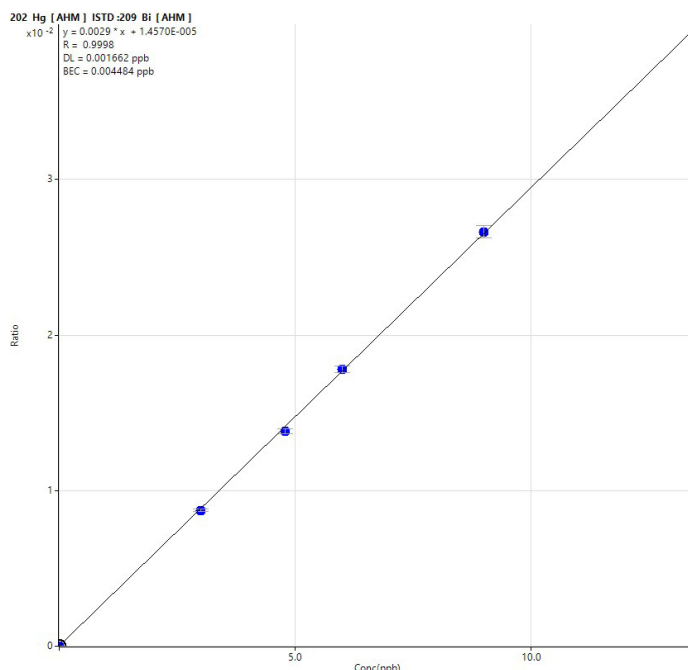


Figure 1. Representative calibration curves of four elemental impurities (Li, Se, Cd, and Hg) required by in ICH Q3D (R2) demonstrating the high sensitivity and linearity of the Agilent 9500 ICP-QQQ in AHM.

Representative calibration curves for a low mass element, Li, a highly interfered element, Se, and two class 1 elements, Cd and Hg, are shown in Figure 1. The calibration data with correlation coefficients above 0.999 confirm linearity, while DLs and BECs indicate high sensitivity and effective control of spectral interferences.

Doubly charged ion interferences

Depending on the sample matrix, some spectral interferences, such as those caused by doubly charged rare earth element ions (REE²⁺), may not be sufficiently removed using AHM. Example sample types that contain relatively high concentrations of some REEs include gadolinium-based contrast agents and lanthanum carbonate drug products. For the analysis of these samples, Air cell mode can be used to avoid the REE⁺⁺ interferences such as ¹⁵⁰Nd⁺⁺ and ¹⁵⁰Sm⁺⁺ on ⁷⁵As; ¹⁵⁶Gd⁺⁺ and ¹⁵⁶Dy⁺⁺ on ⁷⁸Se; and ¹⁶⁰Dy⁺⁺ on ⁸⁰Se using an MS/MS mass-shift approach. The combination of AHM and Air cell mode provides a flexible analytical strategy for addressing a wide range of spectral interferences in different sample matrices using the 9500 ICP-QQQ.

To assess the effectiveness of the 9500 ICP-QQQ in Air cell mode, As and Se were measured in the presence of a 10-ppb mixed REE solution containing Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sm, Sc, Tb, Tm, Yb, and Y. As shown in Table 6, the results were sufficiently low relative to the BECs and J values. The data demonstrates that mass-shift measurement using Air cell mode is an effective option for avoiding specific spectral interferences that cannot be sufficiently resolved using AHM alone.

Table 6. BECs for As and Se and measured values in a 10 ppb REE-spiked solution using the Agilent 9500 ICP-QQQ in AHM and Air cell mode (ppb).

Mode	m/z	Element	BEC	J Value	10 ppb REE
AHM	75	As	0.002	3	0.381
Air	75->91	As->AsO	0.003		0.001
AHM	78	Se	0.010	30	2.559
Air	78->94	Se->SeO	0.012		0.002
AHM	80	Se	0.401		1.467
Air	80->96	Se->SeO	0.019		0.001

Detectability

Samples spiked at 0.8 and 1.0 J were used to demonstrate detectability. USP <233> requires the signal intensity or measured value obtained from each sample solution spiked at 1.0 J to be equivalent to or greater than that obtained from the corresponding standard solution. In addition, the signal intensity or measured value for each sample solution spiked at 0.8 J must be lower than that obtained from the corresponding sample solution spiked at 1.0 J.

As shown in Table 7, all 24 elements met the USP <233> acceptance criteria. Recoveries for samples spiked at 1.0 J ranged from 92 to 106%, while samples spiked at 0.8 J produced lower signal intensities than the corresponding samples spiked at 1.0 J.

Repeatability

To meet the acceptance criteria for the instrumental precision procedure specified in USP <233>, the relative standard deviation (RSD) of the results obtained from six independent samples spiked at each level must be less than 20%. As shown in Table 7, the RSDs obtained at 1.0 J for all elements were well below this threshold. The RSDs for the primary isotopes were less than 3%, demonstrating excellent precision.

Intermediate precision

USP <233> requires six samples to be analyzed under different conditions, such as on different days, by different analysts, or using different instruments, resulting in a total of 12 results. The acceptance criterion is an RSD of less than 25% for the 12 results. In this study, six independently prepared samples at each spike level were analyzed on two different days. The RSDs calculated from the 12 results obtained at 1.0 J are shown in Table 7. All elements met the USP <233> acceptance criteria, demonstrating excellent intermediate precision.

Table 7. Detectability and repeatability results.

<i>m/z</i>	Element	J Value (ppb)	1.0 J Standard (ppb)	1.0 J Mean (ppb)	1.0 J Recovery (%)	0.8 J Mean (ppb)	0.8 J Recovery (%)	RSD% (1.0 J, n=6)	RSD% (1.0 J, n=12)
7	Li	110	109	101	92	81.3	92	1.3	1.4
51	V	20	20.3	19.4	97	16.2	101	0.9	1.3
52	Cr	2200	2223	2120	96	1756	100	1.3	1.6
53	Cr	2200	2202	2139	97	1756	100	1.2	1.3
59	Co	10	10.3	9.52	95	7.80	97	1.0	1.5
60	Ni	40	41.1	38.0	95	31.2	98	1.0	1.2
62	Ni	40	40.1	37.4	94	31.0	97	1.1	1.5
63	Cu	600	600	565	94	466	97	1.1	1.6
65	Cu	600	598	568	95	463	97	1.1	1.7
75	As	3	3.02	3.18	106	2.52	105	1.0	3.6
78	Se	30	30.8	29.5	98	24.1	100	1.2	2.6
80	Se	30	30.3	29.6	99	24.4	102	1.1	1.9
95	Mo	600	598	609	101	476	99	1.1	2.9
97	Mo	600	596	614	102	482	101	1.5	2.6
101	Ru	20	19.7	20.0	100	15.7	98	1.0	2.8
103	Rh	20	19.7	20.0	100	15.7	98	0.9	2.9
105	Pd	20	20.2	20.2	101	15.6	98	1.2	2.7
107	Ag	30	29.2	29.9	100	23.4	97	1.3	2.8
109	Ag	30	29.6	30.1	100	23.6	98	1.1	2.4
111	Cd	1	1.00	1.03	103	0.80	100	0.8	3.6
114	Cd	1	1.03	1.06	106	0.81	101	1.3	3.1
118	Sn	1200	1187	1243	104	932	97	1.6	1.9
121	Sb	240	240	227	95	189	98	1.8	2.5
135	Ba	280	282	268	96	223	99	1.4	2.2
137	Ba	280	281	271	97	224	100	1.0	2.5
188	Os	20	20.0	19.9	99	15.5	97	2.0	1.8
189	Os	20	20.0	20.0	100	15.7	98	2.3	1.8
191	Ir	20	20.9	19.3	97	15.2	95	2.2	2.0
193	Ir	20	20.0	19.0	95	15.7	98	1.1	2.0
194	Pt	20	20.0	18.6	93	15.0	94	1.8	2.3
195	Pt	20	20.0	18.7	94	15.1	94	1.6	1.9
197	Au	60	59.6	56.7	95	46.0	96	1.7	2.5
200	Hg	6	6.03	5.74	96	4.68	97	1.9	1.8
201	Hg	6	6.02	5.75	96	4.66	97	1.8	1.6
202	Hg	6	6.03	5.75	96	4.65	97	1.8	2.4
205	Tl	1.6	1.60	1.56	97	1.27	99	2.0	2.0
*	Pb	1	1.00	0.97	97	0.79	99	1.8	1.6

*Lead (Pb) was automatically reported by the Agilent OpenLab ICP-MS software as the sum of the ²⁰⁶Pb, ²⁰⁷Pb, and ²⁰⁸Pb signals.

Quantitative procedures

Accuracy

Accuracy was evaluated by analyzing samples spiked at 0.3, 0.8, 1.0, and 1.5 J. Six independently prepared samples were analyzed at each spike level. The selected spike levels covered concentrations below, near, and above the target concentration, allowing evaluation of the quantitative procedure's accuracy across the relevant analytical range.

USP <233> requires the recovery for each target element at each spike level to be within 70 to 150%. As shown in Figure 2, all 24 elements comfortably met the USP <233> acceptance criteria at all evaluated spike levels. Notably, acceptable recoveries were obtained for all target elements at 0.3 J, which corresponds to 30% of the J value and represents the control threshold used in this study. These results demonstrate that the method can accurately quantify and reliably monitor the target elements even at the control threshold, well below the target concentration.

Overall, the acceptable recoveries obtained for 0.3 to 1.5 J demonstrate the method's accuracy across the evaluated concentration range. The results also indicate that sample preparation, calibration, and analytical procedures were appropriate and that potential matrix effects did not significantly affect the quantitative results.

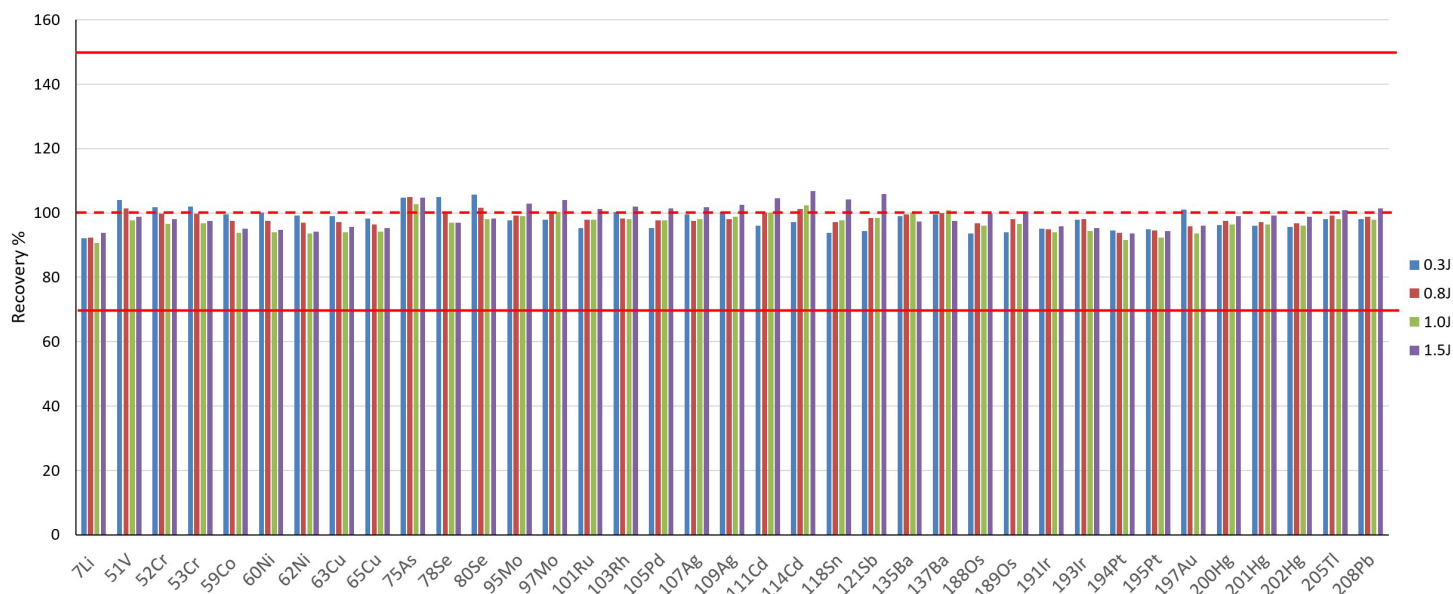


Figure 2. Percent recoveries of spiked samples at four concentration levels, ranging from 0.3 to 1.5 J, measured using the Agilent 9500 ICP-QQQ in AHM. The two solid red lines show the acceptable upper and lower recovery limits as specified in USP <233>.

Conclusion

A rapid method for the simultaneous determination of the 24 elemental impurities specified in ICH Q3D (R2) was successfully developed using the Agilent 9500 Triple Quadrupole ICP-MS. Operating the 9500's Dual-Cell System (DCS) in Advanced Helium Mode (AHM) effectively suppressed polyatomic interferences while maintaining sufficient sensitivity across the entire mass range. This performance enabled quantification of all target elements in an oral drug product using a single gas mode. Eliminating conventional multitune operation and gas switching also enabled a faster and more streamlined ICP-MS workflow.

The method was evaluated in accordance with the requirements of USP <233>, including detectability, precision, intermediate precision, specificity, and accuracy. All 24 elements met the applicable acceptance criteria. The RSDs for the primary isotopes were less than 3% in the precision study, and results obtained on different days met the intermediate precision criterion. Acceptable recoveries were obtained at all evaluated spike levels from 0.3 to 1.5 J.

AHM provided low detection limits and background equivalent concentrations for all 24 elements, including V, Cr, As, and Se, which are susceptible to polyatomic interferences arising from the sample matrix. These results demonstrate effective interference removal capability and quantitative performance of the method. The use of a preset USP/ICH method in the Agilent OpenLab ICP-MS software further simplified method setup and routine operation.

In addition, Air cell mode provides a complementary mass-shift approach for specific sample matrices affected by spectral interferences that cannot be sufficiently resolved using AHM alone. Examples include doubly charged rare earth element ion interferences on As and Se.

Overall, the 9500 ICP-QQQ method using AHM met the requirements of both ICH and USP for the determination of elemental impurities in the OTC drug sample. The ability to accurately determine the target elements at 0.3 J confirms that the method is suitable for monitoring elemental impurities at concentrations as low as 30% of the J value.

The single-mode analytical approach simplifies operation, reduces analysis time, and improves sample throughput, making it suitable for routine pharmaceutical analysis.

References

1. International Council for Harmonization (ICH). ICH Q3D (R2): Guideline for Elemental Impurities. Step 4, April 2022
2. United States Pharmacopeia General Chapter <232> Elemental Impurities—Limits. USP–NF. United States Pharmacopeial Convention, Rockville, MD, USA
3. United States Pharmacopeia Elemental Impurities — Procedures, General Chapter <233>, USP–NF. United States Pharmacopeial Convention, Rockville, MD, USA
4. USP/and ICH Q3D Elemental Impurities Analysis: The Agilent ICP-MS Solution, Agilent publication, [5991-8149EN](#)
5. The Agilent 9500 ICP-MS Interactive Brochure, Agilent publication, [5994-9105EN](#)
6. Dual-Cell System (DCS) and Advanced Helium Mode (AHM), Agilent publication, [5994-8985EN](#)
7. Air Cell Mode of the Agilent 9500 ICP-QQQ with Dual-Cell System, Agilent publication, [5994-8987EN](#)

Products used in this application

Agilent products

Product Type	Description	Part Number
Sample Introduction	Quartz sample introduction system for 9500 ICP-MS	M5150-67107
	MicroMist nebulizer for 9500 ICP-MS	M5150-67024
Interface	ICP-MS sampler cone for 9500 ICP-MS, Ni tip with Cu base	M5150-67000
	Nickel skimmer cone for 9500 ICP-MS with u-lens	M5150-67005
	Extraction-Omega lens assembly, u-lens, stainless steel base	M5150-67022
Tubing Kits	Easy-fit peristaltic-pump tubing, PVC, white/white, 1.02 mm id, for sample	5005-0020
	Easy-fit peristaltic-pump tubing, PVC, blue/orange, 0.25 mm id, for internal standard	5005-0021
	Easy-fit peristaltic-pump tubing, beige thermoplastic, yellow/blue, 1.52 mm id, for drain	5005-0022
Standards	ICH Q3D & USP 232 Orals Kit_v2	5191-4553

www.agilent.com/chem/9500icpqqq

DE-017957

This information is subject to change without notice.