

Certificate of analysis

Product No.: 13871
Osmium Plasma Standard

Certified Concentration of Os: $1000 \pm 5 \mu\text{g/mL}$ ($961 \pm 5 \mu\text{g/g}$)

Lot No.: 704420B

Matrix: 20% HCl

Expiry Date: June 30, 2016

Intended Use: This solution is intended for use as a certified reference material or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), x-ray fluorescence spectroscopy (XRF), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured and certified under an ISO 9001, ISO/IEC 17025, and ISO Guide 34 quality management system. This CRM was prepared to a nominal concentration of 1000 $\mu\text{g/mL}$ by gravimetric methods using 99.99% pure ammonium hexachlorosmate $[(\text{NH}_4)_2\text{OsCl}_6]$ dissolved in high purity hydrochloric acid (HCl) and diluted with filtered (0.22 μm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration was determined based upon gravimetric procedures. Secondary verification of the certified concentration was performed using ICP-OES. The uncertainty associated with the certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of $k=2$.

Uncertified Values: ICP-MS was used to determine trace metal concentrations for this product (nd = not determined).

Trace Concentrations ($\mu\text{g/L}$)

Ag	<2	Ce	<0.2	Gd	<0.2	Lu	<0.2	Pb	<10	Se	<2	Tl	<10
Al	10	Co	<1	Ge	0.5	Mg	10	Pd	1.6	Si	<100	Tm	<0.2
As	<2	Cs	<0.5	Hf	<0.2	Mn	<1	Pr	<0.2	Sm	<0.2	U	<20
Au	<2	Cr	2	Hg	<2	Mo	<0.5	Pt	0.9	Sn	45	V	<5
B	40.04	Cu	3	Ho	<0.2	Na	<25	Rb	<0.5	Sr	<1	W	<0.5
Ba	<1	Dy	<0.2	In	nd	Nb	<1	Re	<0.2	Ta	<0.5	Y	<0.5
Be	<0.5	Er	<0.2	Ir	40	Nd	<0.2	Rh	<0.5	Tb	<0.5	Yb	<0.2
Bi	<5	Eu	<0.2	K	<25	Ni	12	Ru	0.6	Te	<1	Zn	<2
Ca	190	Fe	<20	La	<0.5	Os	Major	Sb	<0.5	Th	<0.5	Zr	<0.5
Cd	<0.5	Ga	<0.5	Li	<2	P	<100	Sc	<5	Ti	<2		

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) use a minimum sub-sample size of 500 μL , (4) make dilutions using calibrated balances or certified volumetric class A flasks and pipettes, (5) dilute with the same matrix as the original CRM, and (6) never pour used product back into the original container. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or expose to direct sunlight. Minimize exposure to moisture or high humidity.

Period of Validity: Alfa Aesar guarantees the accuracy of this Specpure® solution until the expiry date shown above, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

1/30/2015

Certification Date

Hazard Information: Refer to the Material Safety Data Sheet (MSDS).

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Further Information: Please contact Alfa Aesar for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is:

- Registered to ISO 9001 – Quality Management Systems – Requirements (TUV USA Cert. No. 12-1280)
- Accredited to ISO Guide 34 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
 - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35
- Accredited ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)