

Certified Reference Material

Reference material certificate

Arsenic(V) Standard for ICP

TraceCERT®
Traceable Certified Reference Materials

Product no.: 76686
Lot no.: BCCN6073
Description of CRM: Arsenic pentoxide (high-purity quality) in high-purity water (18.2 MΩ·cm, 0.22 µm filtered).
Expiry date: JUL 2029 (unopened bottle in aluminized bag)
Storage: Store at 5°C-25°C
Density at 20°C: 999.5 kg m⁻³ ± 0.5 kg m⁻³ (k = 2)

Constituent	Certified values at 20°C and expanded uncertainties, $U = k \cdot u$ ($k = 2$) ^{[1][2]}									
Arsenic(V)	996	mg kg ⁻¹	±	3	mg kg ⁻¹	995	mg L ⁻¹	±	3	mg L ⁻¹

Metrological traceability: Directly traceable to NIST SRM 3103a. ^[3]
Measurement method: The certified value is established by inductively coupled plasma optical emission spectrometry ICP-OES in accordance with ISO/IEC 17025. ^[4]
Intended use: Specific determination of As (V)-ion concentration with ICP-spectrometry (after separation), ion chromatography, spectrophotometry or any other analytical technique.
Instructions for handling and correct use: The bottle's temperature must be 20°C. Shake well before every use. If storage of a partially used bottle is necessary (at the user's risk), the cap should be tightly sealed and the bottle should be stored at reduced temperature (e.g. refrigerator) to minimize transpiration rate.
Health and safety information: Please refer to the Safety Data Sheet for detailed information about the nature of any hazard and appropriate precautions to be taken.
Packaging: 100 mL HDPE bottle sealed with an aluminized bag
Accreditation: Sigma-Aldrich Production GmbH is accredited by the Swiss Accreditation Service SAS as reference material producer under no. SRMS 0001 in accordance with international standard ISO 17034 ^[5]
Certificate issue date: 18 SEP 2025



ISO 17034
SRMS 0001

Dr. P. Zell – Approving Officer
(Quality Assurance)



Certification process details:

The certified value of the content (mg/kg) is determined using high-performance inductively coupled plasma optical emission spectrometry (HP-ICP-OES). To obtain performance comparable to isotope dilution and classical methods (titration and gravimetric analysis) the HP-ICP-OES measurement is performed using an internal standard and a drift correction procedure. ^[6]

The mean value is based on 20 measurements (two samples and 10 measurements per sample). All measurements are traced gravimetrically to an internationally accepted reference material e.g. from NIST (USA) or BAM (Germany).

The certified arsenic (V) mass fraction is calculated from total arsenic minus measured arsenic (III). When the arsenic (III) mass fraction is below detection limit only an additional uncertainty contribution is added.

The two arsenic species were separated by suitable chromatography method and then measured with ICPMS. Heightening experiments were conducted to verify the recovery rate and the reliability of the method.

Homogeneity assessment:

Due to the production process, a homogeneous solution derives. Nevertheless a small homogeneity contribution is included into the calculation of content uncertainty of this CRM.

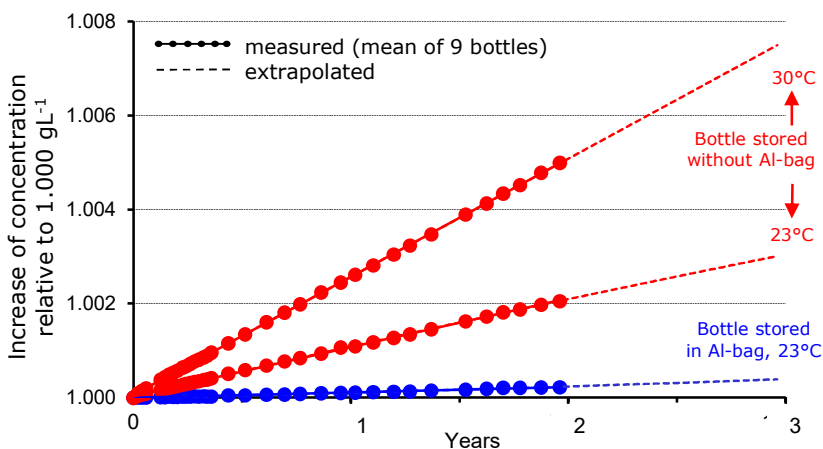
Stability assessment:

The storage behavior of standard solutions is of greatest importance with regard to the certified value. Therefore the two most important effects were investigated by in-depth studies in a cooperation with EMPA, St. Gallen:

1. The leachate from HDPE (high-density polyethylene) bottles was analyzed by HR-ICP-MS after leaching the bottles with 2% nitric acid. Maximum contamination levels were found in the ng L^{-1} level for 12 elements.

2. To avoid significant loss of mass through transpiration the bottle is delivered in aluminum coated bags. After the bottle has been removed from the bag, transpiration will occur at an accelerated rate (see figure). We highly recommend not opening the bag until the solution is needed. Once the bottle is opened the solution should be stored at reduced temperature (4°C) to reduce transpiration.

Transpiration through 100 mL HD-PE bottles



Density Measurement:

The density measurement is carried out in accordance with ISO/IEC 17025^[4] and ISO 15212-1^[7] using the digital density meter DMA 4500M from Anton Paar with an oscillating U-tube installed. The measurement uncertainty is calculated according to Eurachem/CITAC Guide and reported as combined expanded uncertainty at the 95% confidence level, using a coverage factor of $k = 2$.

References:

- [1] ISO Guide 35:2017, "Reference materials - Guidance for characterization and assessment of homogeneity and stability"
- [2] Eurachem/CITAC Guide, 3rd Ed. (2012), "Quantifying uncertainty in analytical measurement"
- [3] Eurachem/CITAC Guide, 2nd Ed. (2019), "Metrological Traceability in chemical measurement"
- [4] The accredited testing laboratory STS 0490 performs the measurements and weighing steps for the certification of this CRM under ISO/IEC 17025:2017, "General requirements for the competence of testing and calibration laboratories"
- [5] ISO 17034:2016, "General requirements for the competence of reference material producers"
- [6] Marc L. Salit et al., Anal. Chem. 2001, 73, 4821-4829, "Single-Element Solution Comparisons with a High-Performance Inductively Coupled Plasma Optical Emission Spectrometric Method"
- [7] DIN EN ISO 15212-1:1998, Oscillation-type density meters - Part 1: Laboratory instruments

Certificate of analysis revision history:

Certificate version	Certificate issue date	Reason for version
01	18 SEP 2025	Initial version

The most recent version of the Certificate is available online (www.sigmaaldrich.com).

Disclaimer:

The purchaser must determine the suitability of this product for its particular use. Sigma-Aldrich Production GmbH makes no warranty of any kind, express or implied, other than its products meet all quality control standards set by Sigma-Aldrich Production GmbH. We do not guarantee that the product can be used for a special application.

The vibrant M, Supelco, TraceCERT and Sigma-Aldrich are trademarks of Merck KGaA, Darmstadt, Germany or its affiliates. All other trademarks are the property of their respective owners. Detailed information on trademarks is available via publicly accessible resources. © 2018 Merck KGaA, Darmstadt, Germany and/or its affiliates. All Rights Reserved.

The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada.

