



**Innovative Solutions in Chemistry, S.L. (ISC Science)**

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# CERTIFIED REFERENCE MATERIAL

## Preliminary report

The information provided pertains only to the material  
reference and the batch number specified

This information is only valid for the issue date: 16/02/2024. It may change due to manufacturer reasons.

### Material name:

**111Cd-enriched Standard Solution**

**Certified Reference Material code:** 111Cd100025

**Enriched isotope:** 111Cd

**Matrix:** 2% HNO<sub>3</sub>

**Batch number:** 20170110

### Value calculation:

Isotopic abundance values are reported as percentage [amount fraction (\*100), %] and concentration values as micrograms of element per gram of solution (µg/g). According to ISO 17034 and ISO/IEC 17025, the certified concentration value was determined gravimetrically from a standard characterized by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) using a reference method in a single laboratory [Isotope Dilution Mass Spectrometry (IDMS)] and certified isotopic abundances were determined by measuring the isotope-amount ratios for all isotopes by ICP-MS using the enriched isotope stated above as reference. The expanded uncertainty for each certified value was calculated as  $U = 2 \cdot u$ , where  $k = 2$  is the coverage factor for a 95% confidence interval and  $u$  is the combined standard uncertainty calculated according to ISO Guide 35. The value of  $u$  is intended to represent the combined effect of uncertainty components associated with the gravimetric preparation, the IDMS determination, homogeneity and stability for concentration values and the ICP-MS determination for abundance values. -

Stability of this material is based upon rigorous long-term (storage conditions) and short-term (transport conditions) testing of the solution for the certified values according to ISO 17034 and ISO Guide 35. This testing includes, but is not limited to, the effect of temperature. -

### Certified abundance values of the element:

NOTICE: Abundances below 0.1% are reported as <0.1% and have no uncertainty stated.

Isotope	Abundance (%)	Uncertainty (%)
106Cd	<0.1	
108Cd	<0.1	
110Cd	0.35	0.01
111Cd	96.09	0.06
112Cd	2.02	0.05
113Cd	0.50	0.02
114Cd	0.90	0.03
116Cd	0.12	0.01

This is a preliminary certificate of analysis. It is not a valid certificate.



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### Estimated concentration value of the element:

NOTICE: These values are an estimation. The certified value and the uncertainty depend on the unit.

Concentration ( $\mu\text{g/g}$ )	Uncertainty ( $\mu\text{g/g}$ )
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100

4.6

### Metrological traceability statement:

Certified abundance values were assigned by using a reference method in a single laboratory and are traceable to the unit of the measurement scale (mol).

Certified concentration value is traceable to the property value assigned to NIST 3108. The traceability of this value is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties:

#### A. Analytical balance

The balance is calibrated yearly by ISO 17025 accredited services, and is verified daily by an in-house method using standards weights.

#### B. Standards

The standard used during the gravimetric preparation is traceable to a CRM that was verified against the NIST stated above. The CRM was provided by an ISO 17034 accredited Reference Material Producer and used for the characterisation of the standard.

### Intended use:

This material is designed for quantitative analysis by Isotope Dilution ICP-MS. According to ISO Guide 33, it can be used to validation of methods, determine the element concentration in other materials and precision and/or bias control.

### Expiration of certification:

The expiration date is guaranteed to be valid for 12 months from the certificate issue date provided.

Certificate issue date (dd/mm/yyyy): (xx/xx/xxxx)

Expiration date: (xx/xx/xxxx)

### Preparation information:

The standard solution is prepared using high purity materials and assayed by analytical methods for conformity prior to use. The standard solution was prepared gravimetrically using balances calibrated with SI-traceable weights. All balances are yearly calibrated by ISO 17025 accredited entities and are verified prior to each use using an internal-calibrated weight. Sub-boiling distilled high-purity acid has been used to place the material in solution and to stabilize the standard.

### Packing and storage conditions:

To maintain the integrity of this material, the solution should be kept tightly closed and stored under normal laboratory conditions in its original packaging.



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### Intructions for use and safety conditions

Refer to Safety Data Sheet.

**Content verified by:**

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*(General Quality Manager)*

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