

300 Technology Drive  
Christiansburg, VA 24073 USA  
inorganicventures.com

P: 800-669-6799/540-585-3030  
F: 540-585-3012  
info@inorganicventures.com

## 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Releasing Agent  
Catalog Number: LACB1  
Lot Number: V2-LA742034  
Matrix: 3% (v/v) HCl  
Value / Analyte(s): 10 000 µg/mL ea:  
Lanthanum  
Starting Material: Lanthanum Oxide  
Starting Material Lot#: 2483  
Starting Material Purity: 99.9990%

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Nominal Value:** 10 000 µg/mL La

**Certified Density:** 1.017 g/mL (measured at 20 ± 4°C)

Not to be used as a calibration standard, for analytical reagent use only.

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. In rare cases where no NIST SRM/ RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

Solutions tested for trace metallic impurities by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3  $\mu\text{m}$ .

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3  $\mu\text{m}$ .

|   |    |   |          |   |    |   |          |   |    |   |          |   |    |   |          |   |    |   |          |
|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|
| M | Ag | < | 0.001600 | M | Eu | < | 0.000800 | O | Na |   | 0.031000 | M | Se | < | 0.004000 | O | Zn |   | 0.015000 |
| M | Al |   | 0.030000 | O | Fe |   | 0.008200 | M | Nb | < | 0.000400 | O | Si |   | 0.070000 | M | Zr | < | 0.000800 |
| M | As | < | 0.003600 | M | Ga | < | 0.000800 | M | Nd | < | 0.005600 | M | Sm | < | 0.002400 |   |    |   |          |
| M | Au | < | 0.006000 | M | Gd | < | 0.004000 | M | Ni | < | 0.004400 | M | Sn | < | 0.004800 |   |    |   |          |
| O | B  | < | 0.006000 | M | Ge | < | 0.002400 | M | Os | < | 0.002400 | M | Sr | < | 0.004000 |   |    |   |          |
| O | Ba |   | 0.018000 | M | Hf | < | 0.001600 | i | P  | < |          | M | Ta | < | 0.000400 |   |    |   |          |
| M | Be | < | 0.000800 | M | Hg | < | 0.002400 | M | Pb |   | 0.005800 | M | Tb | < | 0.000400 |   |    |   |          |
| M | Bi | < | 0.001600 | M | Ho |   | 0.000560 | M | Pd | < | 0.000800 | M | Te | < | 0.008400 |   |    |   |          |
| O | Ca |   | 0.025000 | M | In | < | 0.000400 | M | Pr |   | 0.000900 | M | Th | < | 0.000400 |   |    |   |          |
| M | Cd | < | 0.000400 | M | Ir | < | 0.002400 | M | Pt | < | 0.001600 | O | Ti | < | 0.000890 |   |    |   |          |
| M | Ce | < | 0.005600 | M | K  |   | 0.034000 | M | Rb | < | 0.000400 | M | Tl | < | 0.000400 |   |    |   |          |
| M | Co | < | 0.000400 | s | La | < |          | M | Re | < | 0.000400 | M | Tm | < | 0.000800 |   |    |   |          |
| O | Cr | < | 0.003400 | O | Li | < | 0.000120 | M | Rh | < | 0.000400 | M | U  | < | 0.000400 |   |    |   |          |
| M | Cs | < | 0.001600 | M | Lu | < | 0.000400 | M | Ru | < | 0.000400 | O | V  |   | 0.001400 |   |    |   |          |
| M | Cu |   | 0.005100 | O | Mg |   | 0.001600 | i | S  | < |          | M | W  | < | 0.004000 |   |    |   |          |
| M | Dy | < | 0.004000 | M | Mn |   | 0.000560 | M | Sb | < | 0.001600 | O | Y  |   | 0.002100 |   |    |   |          |
| M | Er | < | 0.002400 | M | Mo | < | 0.002400 | M | Sc | < | 0.000800 | O | Yb |   | 0.001300 |   |    |   |          |

M - Checked by ICP-MS      O - Checked by ICP-OES      i - Spectral Interference  
n - Not Checked For      s - Solution Standard Element

## 6.0 INTENDED USE

- For analytical reagent use only.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20°  $\pm$  4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Atomic Weight; Valence; Coordination Number; Chemical Form in Solution** - 138.91 +3 6 to 8, 9,10 for some compounds  $\text{La}(\text{OH})_y(\text{H}_2\text{O})_{x+3-y}$

**Chemical Compatibility** -Soluble in HCl, and  $\text{HNO}_3$ . Avoid HF,  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$  and neutral to basic media. Stable with most metals and inorganic anions forming an insoluble carbonate, oxide, oxalate, and fluoride and sparingly soluble sulfates (La - Eu exhibit low sulfate solubility). Avoid mixing with elements / solutions containing moderate amounts of fluoride.

**Stability** - 2-100 ppb levels stable for months in 1%  $\text{HNO}_3$  / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5 %  $\text{HNO}_3$  / LDPE container.

**La Containing Samples (Preparation and Solution)** -Metal (Soluble in acids); Oxide (Dissolved by heating in  $\text{H}_2\text{O}$  /  $\text{HNO}_3$ ); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (Dry ash and dissolve in 1:1  $\text{H}_2\text{O}$  / HCl or  $\text{HNO}_3$ ).

**Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):**

| Technique/Line     | Estimated D.L.                | Order | Interferences (underlined indicates severe) |
|--------------------|-------------------------------|-------|---|
| ICP-MS 139 amu     | 1 ppt                         | n/a   | <u>123Sb16O</u> ,<br><u>123Te16O</u>        |
| ICP-OES 333.749 nm | 0.01 / 0.001 $\mu\text{g/mL}$ | 1     |   |
| ICP-OES 408.672 nm | 0.01 / 0.001 $\mu\text{g/mL}$ | 1     | Th  |
| ICP-OES 412.323 nm | 0.01 / 0.001 $\mu\text{g/mL}$ | 1     | Ce, Th                                      |

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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## 11.0 ISSUE DATE, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Issue Date

March 22, 2024

- The information is valid provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This property value is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- **March 22, 2029**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used after the date given in Sec. 11.2. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS


### Certificate Prepared By:

Uyen Truong  
Custom Processing Supervisor



### Certificate Approved By:

Thomas Kozikowski  
Stock VSM Manager



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director

