

# CERTIFICATE OF ANALYSIS

## CERTIFIED REFERENCE MATERIAL FOR ICP-MS

Solution of Thallium(Tl) concentration 10 mg/l Matrix: 2% HNO<sub>3</sub>

Lot N: 969834  
Barcode: 84637666

Ref N: 12987433

Certification Date: 19.01.2024

Component	Certified Value and uncertainty [mg/l]	Metrological traceability
Tl	10.035 ± 0.056 <sup>(a)</sup>	NIST SRM No 3158 Lot 151215

### Notes:

(a) WQP 5.15.1.1 The certified value was obtained using ICP/OES or ICP/MS calibration

Density\* 1.006 g/cm<sup>3</sup> at 20°C

Starting Material, Purity*	Batch
TlNO <sub>3</sub> 99.99%	82115203

\* These values are not certified

Storage Conditions: Store under normal laboratory conditions, at temperatures between 15°C to 25°C

Shelf-life: 19.02.2027

Date of opening: .....

(Recommended period of use should not exceed 12 month(s) from date of opening )

### Concept of Certification and traceability statement:

This certified reference material (CRM) is produced using a high purity starting material, acid from sub-boiling and 18 MOhm deionised water and filtered through a 0.2 micron filter.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA 4/02

Property of the result of a measurement whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties (ISO VIM)

The metrological traceability is using certified reference material traceable to SI of NIST (SRM) or BAM (CRM). All contributions in relation to the certification of standard solutions are considered when evaluating the uncertainty.

The measurement results are traceable to SI. All analytical balances used for the preparation of the solution are calibrated yearly under an in-house procedure with analytical weights, traceable to DKD, and are checked daily.

Class A laboratory glassware is used.

The results from temperature measurement are traceable to SI. The thermometers used for solution's calibration are calibrated from an ISO 17025 accredited laboratory. The ambient conditions are controlled with a hygrometer calibrated from an ISO 17025 accredited laboratory.

### Intended use: For Laboratory Use Only

Calibration of ICP/MS, ICP/OES

Preparation of "working reference samples"

This statement is not intended to restrict the use for other purposes.

Validation of analytical methods

Detection limit and linearity studies

### Instructions for the correct use of this reference material:

This certified reference material can be used directly or can be diluted in an appropriate high purity matrix. Only a clean class A glassware should be used. Do not pipet from container. Obtained concentration (in mg/l) after dilution is a result from the multiplication of certified value of CRM concentration and the CRM's volume used for dilution and divided into the flask's volume used for dilution.

### Stability and storage:

This CRM is with a guaranteed stability until ±0.5% of the certified concentration within its shelf life. Stability is guaranteed, provided that the solution is kept in its original packaging, tightly closed stored, as written in the section: Storage Conditions. If storage of a partially used bottle is necessary, the cap should be tightly sealed and the bottle should be stored in refrigerator to minimize transpiration rate. The laboratory performs stability tests according to MQP 5.14.1 therefore solutions with one and the same bar-code number might have different expiration dates.

### Hazardous situation:

The normal laboratory safety precautions should be observed when working with this CRM. Further details for the handling of this CRM are available as safety data sheet.

**Level of homogeneity:**

The material was tested for homogeneity by analyzing randomly selected samples according to an in-house procedure. The level of homogeneity proved satisfactory for a sample volume of 20 ml. The uncertainty incorporates the sample standard deviation combined with the uncertainty calculated from homogeneity and stability studies.

To ensure sufficient homogeneity of the sample prior to use thoroughly mix by inversion.

**Names of certifying officers:**

Laboratory:  Tihomir Stoyanov

Manager:  Krassimira Taralova

*This document QF 5.17.1/1 version 1 is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31, ISO Guide 35, and Eurachem / CITAC Guides*

*This certificate relates solely to the lot number given above.*

*All processes (including generating of this certificate) are completely controlled by the specialized Computer-Aided-Manufacturing (CAM) software.*

*This Certified Reference Material was produced under a quality management system that is:*

*- Registered to ISO 9001 Quality Management System (Lloyd's Register Quality Assurance Ltd Cert No 0039638)*

*- Accredited according to ISO/IEC 17025*

*- Accredited according to ISO 17034*

**Trace impurities in the actual solution reported in ppm:**

(all values below are nominal and not certified)

Ag	<0.0038
Al	<0.0018
As	<0.016
Au	<0.016
B	<0.0078
Ba	<0.0005
Be	<0.0001
Bi	<0.016
Ca	<0.004
Cd	<0.0012
Ce	<0.0085
Co	<0.0028
Cr	<0.0014
Cs	<0.05

Cu	<0.0009
Dy	<0.0054
Er	<0.0035
Eu	<0.0039
Fe	<0.0025
Ga	<0.020
Gd	<0.0028
Ge	<0.020
Hf	<0.0032
Hg	<0.024
Ho	<0.0053
In	<0.098
Ir	<0.0061
K	<0.0095

La	<0.0024
Li	<0.0001
Lu	<0.0062
Mg	<0.0006
Mn	<0.001
Mo	<0.0024
Na	<0.007
Nb	<0.0066
Nd	<0.0058
Ni	<0.0061
P	<0.048
Pb	<0.021
Pd	<0.033
Pr	<0.0046

Pt	<0.0097
Rb	<0.063
Re	<0.0081
Rh	<0.0038
Ru	<0.0089
S	<0.071
Sb	<0.020
Sc	<0.0016
Se	<0.023
Si	<0.037
Sm	<0.0058
Sn	<0.050
Sr	<0.00006
Ta	<0.004

Tb	<0.022
Te	<0.031
Th	<0.014
Ti	<0.0012
Tl	*
Tm	<0.0023
U	<0.45
V	<0.0018
W	<0.017
Y	<0.0007
Yb	<0.0003
Zn	<0.0032
Zr	<0.0007