

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "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 (SAI Global File Number (010105)).



2.0 PRODUCT DESCRIPTION

Product Code: **Water QC Reference Material**

Catalog Number: QCP-TMS

Lot Number: J2-TMS01070

Matrix: 5% (v/v) HNO₃

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Analyte	Certified Value* (µg/L)	Analytical Method	NIST Traceability	Acceptance Limits** (µg/L)	
				High	Low
Aluminum	384 ± 2	ICP	SRM 3101a	475	299
Antimony	192 ± 2	ICP	SRM 3102a	234	143
Arsenic	147 ± 1	ICP	SRM 3103a	181	113
Barium	294 ± 1	ICP	SRM 3104a	338	250
Beryllium	48.0 ± 0.3	ICP	SRM 3105a	55	41
Boron	864 ± 6	ICP	SRM 3107	994	735
Cadmium	78.4 ± 0.5	ICP	SRM 3108	90.2	66.7
Chromium	98.0 ± 0.6	ICP	SRM 3112a	112.7	83.3
Cobalt	96.0 ± 0.5	ICP	SRM 3113	110.4	81.6
Copper	96.0 ± 0.6	ICP	SRM 3114	110.4	81.6
Iron	392 ± 2	ICP	SRM 3126a	451	333
Lead	196 ± 1	ICP	SRM 3128	225	167
Manganese	192 ± 1	ICP	SRM 3132	221	163
Molybdenum	147 ± 1	ICP	SRM 3134	170	122
Nickel	192 ± 1	ICP	SRM 3136	226	161
Selenium	196 ± 1	ICP	SRM 3149	225	167
Silver	98.0 ± 0.7	ICP	SRM 3151	112.7	83.3
Strontium	72.0 ± 0.5	ICP	SRM 3153a	82.8	61.2
Thallium	147 ± 1	ICP	SRM 3158	179	111
Vanadium	192 ± 1	ICP	SRM 3165	221	163
Zinc	294 ± 1	ICP	SRM 3168a	338	250

*Certified Value based on diluted solution (1:100). See Sec. 7.2

**Calculated using NELAC PT for Accreditation: Fields of Proficiency Testing with PTRLs (Non-Potable Water) October 3, 2011 & July 1, 2013

CERTIFIED DENSITY OF SOLUTION (measured at 20 ± 1°C): 1.027 g/mL

The Calculated Value is a value calculated from the weight of a starting material. See Section 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Characterization of CRM/RM by Two Methods

Certified Value, $X_{\text{CRM/RM}}$, where two methods of characterization are used is the weighted mean of the two results:

$$X_{\text{CRM/RM}} = [(w_a)(X_a) + (w_b)(X_b)]$$

X_a = mean of Assay Method A with standard uncertainty $u_{\text{char a}}$

X_b = mean of Assay Method B with standard uncertainty $u_{\text{char b}}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$$w_a = (1/u_{\text{char a}})^2 / ((1/u_{\text{char a}})^2 + (1/u_{\text{char b}})^2)$$

$$w_b = (1/u_{\text{char b}})^2 / ((1/u_{\text{char a}})^2 + (1/u_{\text{char b}})^2)$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char a\&b}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{sts}}^2)^{1/2}$$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{\text{char a\&b}} = [(w_a)^2 (u_{\text{char a}})^2 + (w_b)^2 (u_{\text{char b}})^2]^{1/2}$ where $u_{\text{char a}}$ and $u_{\text{char b}}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{sts} = short term stability standard uncertainty (transportation)

Characterization of CRM/RM by One Method

Certified Value, $X_{\text{CRM/RM}}$, where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = \text{mean of Assay Method A with standard uncertainty } u_{\text{char a}}$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char a}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{sts}}^2)^{1/2}$$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{\text{char a}} = \text{square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume}$

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{sts} = short term stability standard uncertainty (transportation)

No correction has been applied for transpiration that will occur after the CRM/RM bottle has been removed from the sealed aluminized bag. See Section 7.0 (Instructions for the Correct Use of this Reference Material) for more information.

4.0 TRACEABILITY TO NIST

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 ($\mu\text{g/mL}$) - N/A

6.0 INTENDED USE

-For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

-This product can be stored at room temperature before opening and dilution. EPA method 200.7 recommends that the prepared solution (See Sec. 7.2) be analyzed within 6 months.

-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. 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. Do not pipette from the container. Do not return removed aliquots to container.

-For more information, visit www.inorganicventures.com/TCT.

7.2 Preparation Instructions

Carefully open container and transfer solution to a clean, dry glass or plastic container for pipetting. Pipette 10mL of the solution into a 1L volumetric flask and dilute to just below the mark with 18 megohm water. Adjust the pH to <2 with HNO₃. Dilute to the mark with 18 megohm water and mix well.

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 10CFR50 Appendix B – Nuclear Regulatory Commission

-Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 – Nuclear Regulatory Commission

-Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

-SAI Global File Number 010105

10.4 ISO/IEC Guide 17025 “General Requirements for the Competence of Testing and Calibration Laboratories”

-Chemical Testing – Accredited / A2LA Certificate Number 883.01

10.5 ISO/IEC Guide 34 “General Requirements for the Competence of Testing and Calibration Laboratories”

-Reference Material Producer – Accredited / A2LA Certificate Number 883.02

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 5, 2015

-The certification is valid within the measurement uncertainty specified, provided the CRM/RM is stored and handled in accordance with instructions given in Section 7.1. This certification is nullified if instructions in Section 7.1 are not followed or if the CRM/RM is damaged, contaminated or otherwise modified.

11.2 Period of Validity

-Sealed TCT Bag Open Date: _____

-This CRM/RM should not be used longer than one year from the date of opening the sealed TCT bag or after the date given in Section 11.3, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instruction given in Section 7.1.

11.3 Lot Expiration Date

June 5, 2018

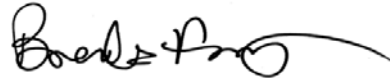
-The date after which this CRM/RM should not be used (See Section 11.2)

-The lot expiration date reflects the period of time the stability of a CRM/RM can be supported by long-term stability studies conducted on properly stored and handled CRM/RMs.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Brenda Francis
Product Documentation Lead Technician



Certificate Approved By:

Brian Alexander
PhD., Technical Process Director



Certifying Officer:

Paul Gaines
PhD., Senior Technical Director

