

# DATA REPORTING QUALIFIERS- INORGANIC

For reporting results, the following "Results Qualifiers" are used:

J	Indicates the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
U	Indicates the analyte was analyzed for, but not detected.
ND	Indicates the analyte was analyzed for, but not detected
E	Indicates the reported value is estimated because of the presence of interference
M	Indicates Duplicate injection precision not met.
N	Indicates the spiked sample recovery is not within control limits.
S	Indicates the reported value was determined by the Method of Standard Addition (MSA).
*	Indicates that the duplicate analysis is not within control limits.
+	Indicates the correlation coefficient for the MSA is less than 0.995.
D	Indicates the reported value is from a secondary analysis with a dilution factor. The original analysis exceeded the calibration range.
M OR	Method qualifiers  "P" for ICP instrument  "PM" for ICP when Microwave Digestion is used  "CV" for Manual Cold Vapor AA  "AV" for automated Cold Vapor AA  "CA" for MIDI-Distillation Spectrophotometric  "AS" for Semi – Automated Spectrophotometric  "C" for Manual Spectrophotometric  "T" for Titrimetric  "NR" for analyte not required to be analyzed  Indicates the analyte's concentration exceeds the calibrated range of the instrument for that specific analysis.
Q	Indicates the LCS did not meet the control limits requirements
Н	Sample Analysis Out Of Hold Time



# LAB CHRONICLE

OrderID: Q3281

Client: Tully Environmental, Inc

Contact: Dean Devoe

**OrderDate:** 10/3/2025 12:41:00 PM

Project: Transfer Station-SPDES Location: D41,VOA Ref. #3 Water

LabID	ClientID	Matrix	Test	Method	Sample Date	Prep Date	Anal Date	Received
Q3281-01	001-WILLETS-PT-BLV D(OCT)	Water			10/02/25			10/03/25
	D(OCI)		Metals Group 10	200.7		10/06/25	10/07/25	
Q3281-02	002-35TH-AVE(OCT)	Water			10/02/25			10/03/25
			Metals Group 10	200.7		10/06/25	10/07/25	



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# Hit Summary Sheet SW-846

**SDG No.:** Q3281 **Order ID:** Q3281

Client: Tully Environmental, Inc Project ID: Transfer Station-SPDES

Sample ID	Client ID	Matrix	Parameter	Concentration	C	MDL	RDL	Units
Client ID:	001-WILLETS-PT-BLVD(OCT)							
Q3281-01	001-WILLETS-PT-BLVD(OCT)	Water	Copper	10.2		1.89	10.0	ug/L
Q3281-01	001-WILLETS-PT-BLVD(OCT)	Water	Iron	1380		18.0	50.0	ug/L
Q3281-01	001-WILLETS-PT-BLVD(OCT)	Water	Lead	2.10	J	1.21	6.00	ug/L
Client ID:	002-35TH-AVE(OCT)							
Q3281-02	002-35TH-AVE(OCT)	Water	Copper	3.39	J	1.89	10.0	ug/L
Q3281-02	002-35TH-AVE(OCT)	Water	Iron	1570		18.0	50.0	ug/L
Q3281-02	002-35TH-AVE(OCT)	Water	Lead	2.31	J	1.21	6.00	ug/L



# SAMPLE DATA



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# **Report of Analysis**

Client: Tully Environmental, Inc Date Collected: 10/02/25 Project: Transfer Station-SPDES Date Received: 10/03/25 Client Sample ID: 001-WILLETS-PT-BLVD(OCT) SDG No.: Q3281 Lab Sample ID: Q3281-01 Matrix: Water % Solid: Level (low/med): low 0

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7440-50-8	Copper	10.2		1	1.89	10.0	ug/L	10/06/25 09:20	10/07/25 15:26	EPA 200.7	
7439-89-6	Iron	1380		1	18.0	50.0	ug/L	10/06/25 09:20	10/07/25 15:26	EPA 200.7	
7439-92-1	Lead	2.10	J	1	1.21	6.00	ug/L	10/06/25 09:20	10/07/25 15:26	EPA 200.7	

Color Before: Colorless Clarity Before: Clear Texture:

Color After: Colorless Clarity After: Clear Artifacts:

Comments: Metals Group 10

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

\* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence

of interference.

OR = Over Range

N =Spiked sample recovery not within control limits



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# **Report of Analysis**

Client: Tully Environmental, Inc Date Collected: 10/02/25 Project: Transfer Station-SPDES Date Received: 10/03/25 Client Sample ID: 002-35TH-AVE(OCT) SDG No.: Q3281 Lab Sample ID: Q3281-02 Matrix: Water % Solid: Level (low/med): low 0

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7440-50-8	Copper	3.39	J	1	1.89	10.0	ug/L	10/06/25 09:20	10/07/25 15:30	EPA 200.7	
7439-89-6	Iron	1570		1	18.0	50.0	ug/L	10/06/25 09:20	10/07/25 15:30	EPA 200.7	
7439-92-1	Lead	2.31	J	1	1.21	6.00	ug/L	10/06/25 09:20	10/07/25 15:30	EPA 200.7	

Color Before: Colorless Clarity Before: Clear Texture:

Color After: Colorless Clarity After: Clear Artifacts:

Comments: Metals Group 10

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

\* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence

of interference.

OR = Over Range

N =Spiked sample recovery not within control limits



# METAL CALIBRATION DATA



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# Metals

# - 2a -

# INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Tully	Environmental,	Inc	<u></u>	SDG No.:	Q3281	
Contract:	TULL01		<u>_</u>	Lab Code:	ACE	
Initial Calibrati	on Source:	EPA	<u> </u>			
Continuing Cali	bration Source:	Inorganic Ventures				

		Result ug/L	True Value	%	Acceptance			Analysis	Analysis	Run
Sample ID	Analyte			Recovery	Window (%R)		M	Date	Time	Number
ICV01	Copper	1020	1000	102	95 - 105	P		10/07/2025	10:54	LB137447
	Iron	4130	4000	103	95 - 105	P		10/07/2025	10:54	LB137447
	Lead	3890	4000	97	95 - 105	P		10/07/2025	10:54	LB137447



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# Metals

# - 2a - INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:	Tully Environmental, Inc	SDG No.:	Q3281
Contract:	TULL01	Lab Code:	ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Analyte	ug/L	True Value	% Recovery	Acceptance Window (%R)		M	Analysis Date	Analysis Time	Run Number
Copper	21.9	20.0	110	80 - 120	P		10/07/2025	12:01	LB137447
Iron	119	100	119	80 - 120	P		10/07/2025	12:01	LB137447 LB137447
	Copper	Analyte  Copper 21.9 Iron 119	Copper         21.9         20.0           Iron         119         100	Analyte         Recovery           Copper         21.9         20.0         110           Iron         119         100         119	Analyte         Recovery         Window (%R)           Copper         21.9         20.0         110         80 - 120           Iron         119         100         119         80 - 120	Analyte         Recovery         Window (%R)           Copper         21.9         20.0         110         80 - 120         P           Iron         119         100         119         80 - 120         P	Analyte         Recovery         Window (%R)         M           Copper         21.9         20.0         110         80 - 120         P           Iron         119         100         119         80 - 120         P	Analyte         Recovery         Window (%R)         M         Date           Copper         21.9         20.0         110         80 - 120         P         10/07/2025           Iron         119         100         119         80 - 120         P         10/07/2025	Analyte         Recovery         Window (%R)         M         Date         Time           Copper         21.9         20.0         110         80 - 120         P         10/07/2025         12:01           Iron         119         100         119         80 - 120         P         10/07/2025         12:01





# Metals

# - 2a - INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:	<b>Tully Environmental, Inc</b>	SDG No.:	Q3281
Contract:	TULL01	Lab Code:	ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	М	Analysis Date	Analysis Time	Run Number
CCV01	Common	1270	1250	101	90 - 110	P	10/07/2025	12:50	LB137447
CCV01	Copper Iron	5200	5000	101	90 - 110 90 - 110	P	10/07/2025	12:50	LB137447 LB137447
	Lead	4980	5000	104	90 - 110 90 - 110	P	10/07/2025	12:50	LB137447 LB137447
CCV02		1260	1250	100	90 - 110 90 - 110	r P	10/07/2025	14:19	LB137447 LB137447
CC V02	Copper Iron	5340	5000	101	90 - 110 90 - 110	P	10/07/2025	14:19	LB137447 LB137447
	Lead	4960	5000	99	90 - 110 90 - 110	P	10/07/2025	14:19	LB137447 LB137447
CCVO2									
CCV03	Copper	1240	1250	99	90 - 110	P	10/07/2025	15:08	LB137447
	Iron	5120	5000	102	90 - 110	P	10/07/2025	15:08	LB137447
	Lead	4840	5000	97	90 - 110	P	10/07/2025	15:08	LB137447
CCV04	Copper	1260	1250	101	90 - 110	P	10/07/2025	16:00	LB137447
	Iron	5080	5000	102	90 - 110	P	10/07/2025	16:00	LB137447
	Lead	4950	5000	99	90 - 110	P	10/07/2025	16:00	LB137447
CCV05	Copper	1250	1250	100	90 - 110	P	10/07/2025	16:50	LB137447
	Iron	5320	5000	106	90 - 110	P	10/07/2025	16:50	LB137447
	Lead	4890	5000	98	90 - 110	P	10/07/2025	16:50	LB137447
CCV06	Copper	1250	1250	100	90 - 110	P	10/07/2025	17:49	LB137447
	Iron	4840	5000	97	90 - 110	P	10/07/2025	17:49	LB137447
	Lead	4880	5000	98	90 - 110	P	10/07/2025	17:49	LB137447
CCV07	Copper	1260	1250	101	90 - 110	P	10/07/2025	18:44	LB137447
	Iron	4950	5000	99	90 - 110	P	10/07/2025	18:44	LB137447
	Lead	4920	5000	98	90 - 110	P	10/07/2025	18:44	LB137447
CCV08	Copper	1210	1250	96	90 - 110	P	10/07/2025	19:20	LB137447
	Iron	4810	5000	96	90 - 110	P	10/07/2025	19:20	LB137447
	Lead	4720	5000	94	90 - 110	P	10/07/2025	19:20	LB137447



Tully Environmental, Inc

22.2

123

12.1

TULL01

**Client:** 

CRI01

Copper

Iron

Lead

**Contract:** 

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SDG No.:

Lab Code:

65 - 135

65 - 135

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P

P

Q3281

ACE

10/07/2025

10/07/2025

10/07/2025

LB137447

LB137447

LB137447

12:10

12:10

12:10

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20.0

100

12.0

# Metals

# - 2b -CRDL STANDARD FOR AA & ICP

Initial Calibra Continuing Ca	ntion Source: alibration Source	:		<u> </u>					
Sample ID	Analyte	Result ug/L	True Value ug/L	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number

111

123

101



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# Metals

# - 3a - INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Tully Environmental, Inc SDG No.: Q3281

Contract: TULL01 Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
ICB01	Copper Iron Lead	4.60 23.4 2.30	+/-10 +/-50 +/-6	U U U		P P P	10/07/2025 10/07/2025 10/07/2025	12:06 12:06 12:06	LB137447 LB137447 LB137447



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# Metals - 3a -

# INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Tully Environmental, Inc SDG No.: Q3281

Contract: TULL01 Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
CCB01	Copper	4.60	+/-10	U	20.0	P	10/07/2025	12:58	LB137447
	Iron	23.4	+/-50	U	100	P	10/07/2025	12:58	LB137447
	Lead	2.30	+/-6	U	12.0	P	10/07/2025	12:58	LB137447
CCB02	Copper	4.60	+/-10	U	20.0	P	10/07/2025	14:24	LB137447
	Iron	28.4	+/-50	J	100	P	10/07/2025	14:24	LB137447
	Lead	2.30	+/-6	U	12.0	P	10/07/2025	14:24	LB137447
CCB03	Copper	4.60	+/-10	U	20.0	P	10/07/2025	15:12	LB137447
	Iron	23.4	+/-50	U	100	P	10/07/2025	15:12	LB137447
	Lead	2.30	+/-6	U	12.0	P	10/07/2025	15:12	LB137447
CCB04	Copper	4.60	+/-10	U	20.0	P	10/07/2025	16:04	LB137447
	Iron	23.4	+/-50	U	100	P	10/07/2025	16:04	LB137447
	Lead	2.30	+/-6	U	12.0	P	10/07/2025	16:04	LB137447
CCB05	Copper	4.60	+/-10	U	20.0	P	10/07/2025	17:01	LB137447
	Iron	23.4	+/-50	U	100	P	10/07/2025	17:01	LB137447
	Lead	2.30	+/-6	U	12.0	P	10/07/2025	17:01	LB137447
CCB06	Copper	4.60	+/-10	U	20.0	P	10/07/2025	17:59	LB137447
	Iron	23.4	+/-50	U	100	P	10/07/2025	17:59	LB137447
	Lead	2.30	+/-6	U	12.0	P	10/07/2025	17:59	LB137447
CCB07	Copper	4.60	+/-10	U	20.0	P	10/07/2025	18:48	LB137447
	Iron	23.4	+/-50	U	100	P	10/07/2025	18:48	LB137447
	Lead	2.30	+/-6	U	12.0	P	10/07/2025	18:48	LB137447
CCB08	Copper	4.60	+/-10	U	20.0	P	10/07/2025	19:24	LB137447
	Iron	23.4	+/-50	U	100	P	10/07/2025	19:24	LB137447
	Lead	2.30	+/-6	U	12.0	P	10/07/2025	19:24	LB137447





# - 3b -PREPARATION BLANK SUMMARY

Metals

Client: Tully Environmental, Inc SDG No.: Q3281

**Instrument:** P4

		Result	Acceptance Conc CRQL		Analysis A	Analysis Analysis			
Sample ID	Analyte	(ug/L)	Limit	Qual	ug/L	M	Date	Time	Run
PB169982BL		WATER		Batch Number:	PB169982		Prep Date:	10/06/2025	
	Copper	1.89	<5	U	10.0	P	10/07/2025	15:43	LB137447
	Iron	18.0	<25	U	50.0	P	10/07/2025	15:43	LB137447
	Lead	1.21	<3	U	6.00	P	10/07/2025	15:43	LB137447





Metals - 4 -INTERFERENCE CHECK SAMPLE

Client: Tully Environmental, Inc SDG No.: Q3281

Contract: TULL01 Lab Code: ACE

ICS Source: EPA Instrument ID: P4

Sample ID	Analyte	Result ug/L	True Value ug/L	% Recovery	Low Limit (ug/L)	High Limit (ug/L)	Analysis Date	Analysis Time	Run Number
ICSA01	Copper	13.8	2.0	690	-18	22	10/07/2025	12:14	LB137447
ICSAUI	Iron	94400	101000	94	85600	116500	10/07/2025	12:14	LB137447
	Lead	-1.11			-12	12	10/07/2025	12:14	LB137447
ICSAB01	Copper	489	511	96	434	588	10/07/2025	12:37	LB137447
	Iron	97100	99300	98	84400	114500	10/07/2025	12:37	LB137447
	Lead	50.4	49.0	103	37	61	10/07/2025	12:37	LB137447
ICSA	Copper	18.9	2.0	945	-18	22	10/07/2025	12:41	LB137447
	Iron	99800	101000	99	85600	116500	10/07/2025	12:41	LB137447
	Lead	-1.50			-12	12	10/07/2025	12:41	LB137447
ICSAB	Copper	521	511	102	434	588	10/07/2025	12:45	LB137447
	Iron	93400	99300	94	84400	114500	10/07/2025	12:45	LB137447
	Lead	17.4	49.0	36	37	61	10/07/2025	12:45	LB137447



# METAL QC DATA



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# metals - 5a -MATRIX SPIKE SUMMARY

client: Tully Environmental, Inc level: low sdg no.: Q3281

contract: TULL01 lab code: ACE

matrix: Water sample id: Q3283-02 client id: 002-35TH-AVE(SEP)MS

Percent Solids	Percent Solids for Sample:		Spiked ID:		Q3283-02MS		Percent Solids for Spike Sample:			NA
Analyte	Units	Acceptance Limit %R	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Copper	ug/L	75 - 125	152		2.83	J	150	100		P
Iron	ug/L	75 - 125	2390		859		1500	102		P
Lead	ug/L	75 - 125	468		1.88	J	500	93		P



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# metals - 5a -MATRIX SPIKE DUPLICATE SUMMARY

client: Tully Environmental, Inc level: low sdg no.: Q3281

contract: TULL01 lab code: ACE

matrix: Water sample id: Q3283-02 client id: 002-35TH-AVE(SEP)MSD

Percent Solids	Percent Solids for Sample:		Spiked ID:		Q3283-02	MSD	Percent Solids for Spike San		mple:	NA
		Acceptance	MSD		Sample		Spike	%		
Analyte	Units	Limit %R	Result	C	Result	C	Added	Recovery	Qual	M
Copper	ug/L	75 - 125	154		2.83	J	150	101		P
Iron	ug/L	75 - 125	2450		859		1500	106		P
Lead	ug/L	75 - 125	471		1.88	J	500	94		P



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# Metals - 5b -

Client:	Tully Environm	ental, Inc				SDG No	Q3281			
Contract:	TULL01					Lab Co	de: ACE		_	
Matrix:			Level:	LOW		Client I	D:			
Sample ID:	:		Spiked ID:							
Analyte	Units	Acceptance Limit %R	C	Sample Result	C	Spike Added	% Recovery	Qual	M	



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#### Metals

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#### **DUPLICATE SAMPLE SUMMARY**

Client: Tully Environmental, Inc Level: LOW SDG No.: Q3281

Contract: TULL01 Lab Code: ACE

Matrix: Water Sample ID: Q3283-02 Client ID: 002-35TH-AVE(SEP)DUP

Percent Solids for Sample: NA Duplicate ID Q3283-02DUP Percent Solids for Spike Sample: NA

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M
Copper	ug/L	20	2.83	J	2.60	J	8		P
Iron	ug/L	20	859		942		9		P
Lead	ug/L	20	1.88	J	1.79	J	5		P



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#### Metals

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#### **DUPLICATE SAMPLE SUMMARY**

Client: Tully Environmental, Inc Level: LOW SDG No.: Q3281

Contract: TULL01 Lab Code: ACE

Matrix: Water Sample ID: Q3283-02MS Client ID: 002-35TH-AVE(SEP)MSD

Percent Solids for Sample: NA Duplicate ID Q3283-02MSD Percent Solids for Spike Sample: NA

		Acceptance	Sample		Duplicate				
Analyte	Units	Limit	Result	C	Result	C	RPD	Qual	M
Copper	ug/L	20	152		154		1		P
Iron	ug/L	20	2390		2450		2		P
Lead	ug/L	20	468		471		1		P



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#### Metals

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# LABORATORY CONTROL SAMPLE SUMMARY

Client: Tully Environmental, Inc SDG No.: Q3281

Contract: TULL01 Lab Code: ACE

Analyte	Units	True Value	Result C	% Recovery	Acceptance Limits	M
PB169982BS						
Copper	ug/L	150	156	104	85 - 115	P
Iron	ug/L	1500	1610	107	85 - 115	P
Lead	ug/L	500	478	96	85 - 115	P



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# Metals

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# ICP SERIAL DILUTIONS

SAMPLE NO.

Lab Name:	Alliance			Contract:	TULL01	_
Lab Code:	ACE		<b>Lb No.:</b> lb137447	Lab Sample ID: Q3283-02L	SDG No.:	Q3281
Matrix (soil/water):		Water		Level (low/med):	LOW	<u></u>
			<b>Concentration Units:</b>	ug/L		

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Differ- ence	Q	M
Copper	2.83	J		50.0 U	100.0		P
Iron	859			822	4		P
Lead	1.88	J		30.0 U	100.0		P



# METAL PREPARATION & INSTRUMENT DATA



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# Metals - 11 -ICP INTERELEMENT CORRECTION FACTORS

Tully Environmental, Inc	SDG No.:	Q3281
TULL01	Lab Code:	ACE
ID:	Date:	
	TULL01	TULL01 Lab Code:

Interelement Correction Factors (apparent ppb analyte/ppm interferent )

	Wave-	ICP Interelement Correction Factors For:				
Analyte	Length (nm)	Al	Ca	Fe	Mg	Ag
Copper	224.700	0.0000000	0.0000000	0.0007850	0.0000000	0.0000000
Iron	240.488	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.353	-0.0000920	0.0000000	0.0000380	0.0000000	0.0000000



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# Metals - 11 -ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q3281
Contract:	TULL01	Lab Code:	ACE
Instrument	ID:	Date:	
Intovolomon	t Convection Factors (annaugust unb analyte)	um interferent)	

Interelement Correction Factors (apparent ppb analyte/ppm interferent )

	Wave-	ICP Interelement Correction Factors For:				
Analyte	Length (nm)	As	Ba	Be	Cd	Co
Copper	224.700	0.0000000	0.0000000	0.0000000	0.0000000	0.0009530
Iron	240.488	0.0000000	0.0000000	0.0000000	0.0000000	-0.0039600
Lead	220.353	0.0000000	0.0003170	0.0000000	0.0000000	0.0000000



Iron

Lead

284 Sheffield Street, Mountainside, New Jersey 07092, Phone : 908 789

8900, Fax: 908 789 8922

# Metals - 11 -

0.0000000

0.0000000

# ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q3281
Contract:	TULL01	Lab Code:	ACE
Instrument	iD:	Date:	
Interelemen	t Carrection Factors (annaront nnh analyte/	anm interferent	

240.488

220.353

	Wave-	ICP Inte	erelement Correcti	ion Factors For:		
Analyte	Length (nm)	Cr	Cu	K	Mn	Mo
Copper	224.700	0.0000000	0.0000000	0.0000000	0.0006510	0.0020500

0.0000000

0.0000000

0.0000730

0.0000000

0.0000000

0.0001400

-0.0015250

-0.0008600



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# Metals - 11 -ICP INTERELEMENT CORRECTION FACTORS

Tully Environmental, Inc	SDG No.:	Q3281
TULL01	Lab Code:	ACE
ID:	Date:	
	TULL01	TULL01 Lab Code:

Interelement Correction Factors (apparent ppb analyte/ppm interferent )

	Wave-	ICP Interelement Correction Factors For:				
Analyte	Length (nm)	Na	Ni	Pb	Sb	Se
Copper	224.700	0.0000000	-0.0047000	0.0036100	0.0000000	0.0000000
Iron	240.488	0.0000000	-0.0017000	0.0000000	0.0000000	0.0000000
Lead	220.353	0.0000000	0.0006580	0.0000000	0.0000000	0.0001290



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# Metals - 11 -

# ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q3281
Contract:	TULL01	Lab Code:	ACE
Instrument	ID:	Date:	
Interelement	t Correction Factors (apparent ppb analyte/p	pm interferent )	

	Wave-	ICP I	r:			
Analyte	Length (nm)	Sn	Ti	Tl	V	Zn
Copper	224.700	0.0000000	0.0003840	0.0000000	0.0000000	0.0000000
Iron	240.488	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.353	0.0000000	-0.0003610	0.0000000	0.0000000	0.0000000



# METAL PREPARATION & ANALYICAL SUMMARY



 $284 \; Sheffield \; Street, \; Mountainside, \; New \; Jersey \; 07092, \; Phone: \; 908 \; 789 \; 8900, \\$ 

Fax: 908 789 8922

# Metals - 13 -SAMPLE PREPARATION SUMMARY

Client:	Tully Environmental, Inc	SDG No.:	Q3281	
Contract:	TULL01	Lab Code:	ACE	Method:

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(mL)	Final Sample Volume (mL)	Percent Solids
Batch Number	: PB169982						
PB169982BL	PB169982BL	MB	WATER	10/06/2025	50.0	25.0	
PB169982BS	PB169982BS	LCS	WATER	10/06/2025	50.0	25.0	
Q3281-01	001-WILLETS-PT-BLVD(OCT)	SAM	WATER	10/06/2025	50.0	25.0	
Q3281-02	002-35TH-AVE(OCT)	SAM	WATER	10/06/2025	50.0	25.0	
Q3283-02DUP	002-35TH-AVE(SEP)DUP	DUP	WATER	10/06/2025	50.0	25.0	
Q3283-02MS	002-35TH-AVE(SEP)MS	MS	WATER	10/06/2025	50.0	25.0	
Q3283-02MSD	002-35TH-AVE(SEP)MSD	MSD	WATER	10/06/2025	50.0	25.0	



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# metals - 14 -ANALYSIS RUN LOG

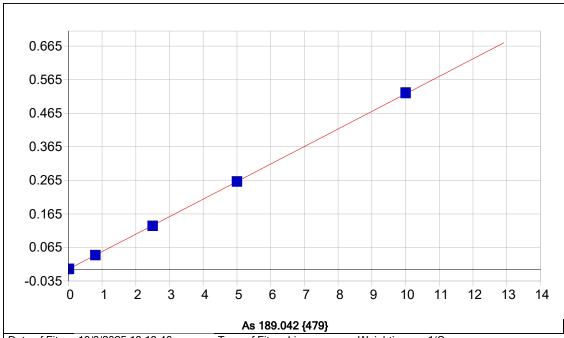
Client:	Tully Environmental	, Inc		Contract:	TULI	L01	
Lab code:	ACE			Sdg no.:	Q3281		
Instrument	id number:		Method:	 Run numbe	er:	LB137447	
	_				_		

**Start date:** 10/07/2025 **End date:** 10/07/2025

Lab sample id.         Client Sample Id         d/f         Time         Parameter list           S0         S0         1         1029         Cu,Fe,Pb           S1         S1         1         1034         Cu,Fe,Pb           S2         S2         1         1038         Cu,Fe,Pb           S3         S3         1         1042         Cu,Fe,Pb           S4         S4         1         1046         Cu,Fe,Pb	
S1         S1         1         1034         Cu,Fe,Pb           S2         S2         1         1038         Cu,Fe,Pb           S3         S3         1         1042         Cu,Fe,Pb	
S2         S2         1         1038         Cu,Fe,Pb           S3         S3         1         1042         Cu,Fe,Pb	
S3 S3 1 1042 Cu,Fe,Pb	
S4 S4 1 1046 Cu Fe Pb	
S5 S5 1 1050 Cu,Fe,Pb	
ICV01   ICV01   1   1054   Cu,Fe,Pb	
LLICV01   LLICV01   1   1201   Cu,Fe,Pb	
ICB01	
CRI01   CRI01   1   1210   Cu,Fe,Pb	
ICSA01	
ICSAB01	
ICSA ICSA 20 1241 Cu,Fe,Pb	
ICSAB ICSAB 20 1245 Cu,Fe,Pb	
CCV01   1   1250   Cu,Fe,Pb	
CCB01	
Q3283-02DUP	
Q3283-02L 002-35TH-AVE(SEP)L 5 1333 Cu,Fe,Pb	
Q3283-02MS	
Q3283-02MSD	
CCV02   CCV02   1   1419   Cu,Fe,Pb	
CCB02	
CCV03   CCV03   1   1508   Cu,Fe,Pb	
CCB03	
Q3281-01 001-WILLETS-PT-BLVD(OCT) 1 1526 Cu,Fe,Pb	
Q3281-02 002-35TH-AVE(OCT) 1 1530 Cu,Fe,Pb	
PB169982BL PB169982BL 1 1543 Cu,Fe,Pb	
PB169982BS	
CCV04	
CCB04	
CCV05	
CCB05	
CCV06	
CCB06	
CCV07	
CCB07	
CCV08	
CCB08	



# METAL RAW DATA



Date of Fit: 10/3/2025 13:13:46 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000072 Re-Slope: 1.000000 A1 (Gain): 0.052272 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

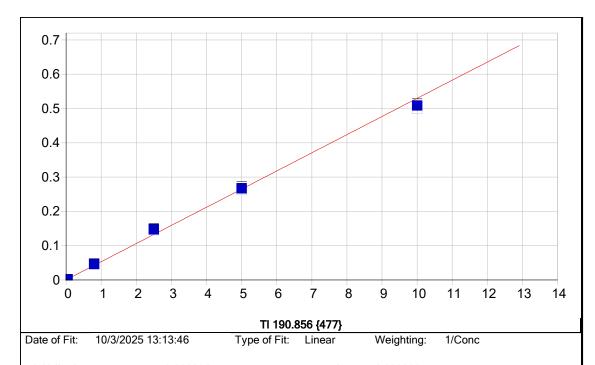
Correlation: 0.999983 Status: OK.

 Std Error of Est:
 0.000007

 Predicted MDL:
 0.002187

 Predicted MQL:
 0.007289

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00007	.000	1
S1	.02000	.02167	.002	8.33	.00120	.000	1
S3	2.5000	2.4716	028	-1.14	.12913	.000	1
S4	5.0000	4.9941	006	118	.26086	.001	1
S5	10.000	10.037	.037	.373	.52420	.003	1
S2	.80000	.79531	005	586	.04160	.000	1



A0 (Offset): 0.000301 Re-Slope: 1.000000 A1 (Gain): 0.052924 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

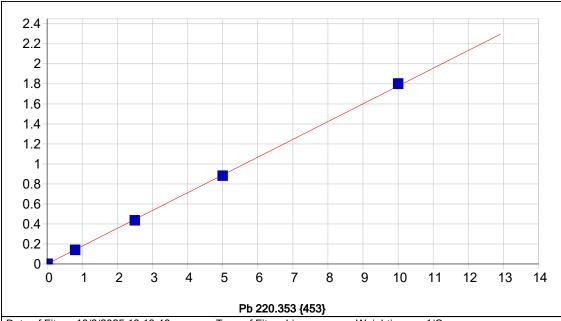
Correlation: 0.998479 Status: OK.

 Std Error of Est:
 0.000095

 Predicted MDL:
 0.003182

 Predicted MQL:
 0.010605

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00001	000	.000	.00030	.000	1
S1	.04000	.04529	.005	13.2	.00256	.000	1
S3	2.5000	2.7840	.284	11.4	.14523	.003	1
S4	5.0000	5.0418	.042	.836	.26231	.005	1
S5	10.000	9.6057	394	-3.94	.49903	.005	1
S2	.80000	.86350	.063	7.94	.04523	.002	1



Date of Fit: 10/3/2025 13:13:46 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000334 Re-Slope: 1.000000 A1 (Gain): 0.177798 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

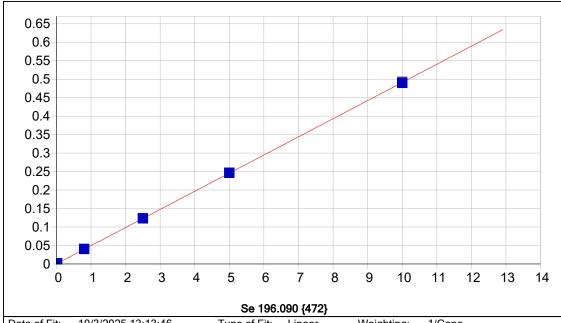
Correlation: 0.999908 Status: OK.

 Std Error of Est:
 0.000044

 Predicted MDL:
 0.001542

 Predicted MQL:
 0.005140

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00033	.000	1
S1	.01200	.01132	001	-5.65	.00230	.000	1
S3	2.5000	2.4425	057	-2.30	.43412	.000	1
S4	5.0000	4.9569	043	862	.88068	.001	1
S5	10.000	10.116	.116	1.16	1.7970	.005	1
S2	.80000	.78497	015	-1.88	.13974	.000	1



A0 (Offset): 0.000397 Re-Slope: 1.000000 A1 (Gain): 0.049090 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

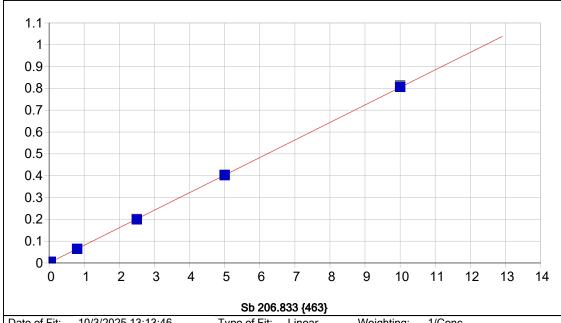
Correlation: 0.999967 Status: OK.

 Std Error of Est:
 0.000009

 Predicted MDL:
 0.003057

 Predicted MQL:
 0.010191

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00040	.000	1
S1	.02000	.02447	.004	22.3	.00160	.000	1
S3	2.5000	2.5068	.007	.274	.12342	.000	1
S4	5.0000	5.0087	.009	.175	.24621	.000	1
S5	10.000	9.9713	029	287	.48975	.003	1
S2	.80000	.80863	.009	1.08	.04008	.000	1



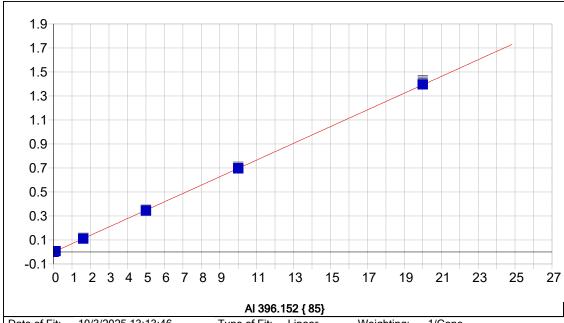
A0 (Offset): 0.000662 Re-Slope: 1.000000 Y-int: 0.000000 0.080384 A1 (Gain):

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999989 OK. Status:

Std Error of Est: 0.000014 Predicted MDL: 0.002238 Predicted MQL: 0.007460

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00066	.000	1
S1	.05000	.05174	.002	3.47	.00483	.000	1
S3	2.5000	2.4770	023	919	.20032	.000	1
S4	5.0000	4.9927	007	145	.40309	.001	1
S5	10.000	10.031	.031	.312	.80919	.003	1
S2	.80000	.79737	003	329	.06493	.000	1



A0 (Offset): -0.000534 Re-Slope: 1.000000 A1 (Gain): 0.069670 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

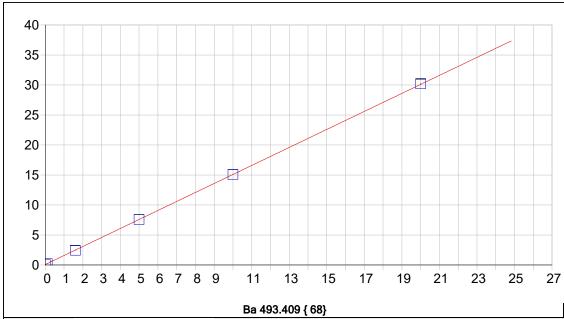
Correlation: 0.999981 Status: OK.

 Std Error of Est:
 0.000032

 Predicted MDL:
 0.014199

 Predicted MQL:
 0.047329

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00001	000	.000	00053	.000	1
S1	.10000	.10827	.008	8.27	.00755	.000	1
S3	5.0000	4.9456	054	-1.09	.35078	.001	1
S4	10.000	9.9915	008	085	.70909	.002	1
S5	20.000	20.051	.051	.256	1.4235	.007	1
S2	1.6000	1.6030	.003	.187	.11331	.002	1



A0 (Offset): 0.075290 Re-Slope: 1.000000 A1 (Gain): 1.500833 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

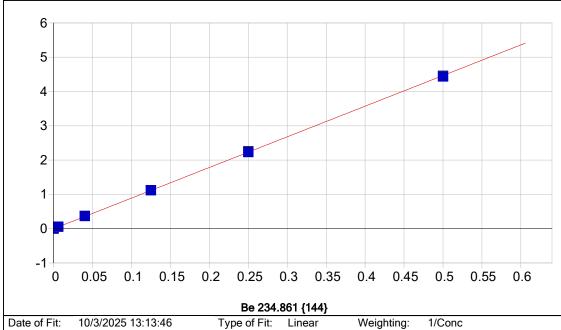
Correlation: 0.999987 Status: OK.

 Std Error of Est:
 0.000575

 Predicted MDL:
 0.001708

 Predicted MQL:
 0.005692

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.07529	.001	1
S1	.10000	.10034	.000	.342	.22589	.003	1
S3	5.0000	4.9807	019	385	7.5506	.016	1
S4	10.000	9.9839	016	161	15.059	.017	1
S5	20.000	20.067	.067	.336	30.193	.050	1
S2	1.6000	1.5677	032	-2.02	2.4281	.005	1



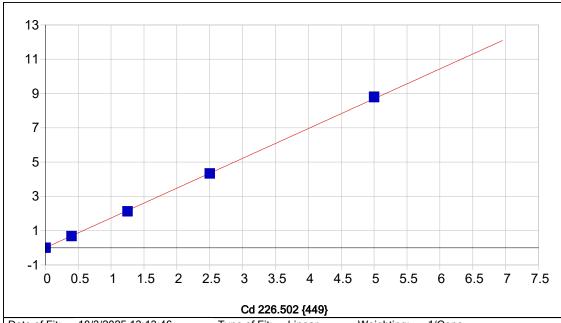
A0 (Offset): -0.002662 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 8.938020

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999954 OK. Status:

Std Error of Est: 0.000246 Predicted MDL: 0.000075 Predicted MQL: 0.000251

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	00267	.000	1
S1	.00600	.00643	.000	7.13	.05439	.001	1
S3	.12500	.12549	.000	.393	1.1140	.001	1
S4	.25000	.25045	.000	.180	2.2259	.018	1
S5	.50000	.49741	003	518	4.4232	.013	1
S2	.04000	.04122	.001	3.06	.36419	.002	1



A0 (Offset): -0.000518 Re-Slope: 1.000000 A1 (Gain): 1.739467 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

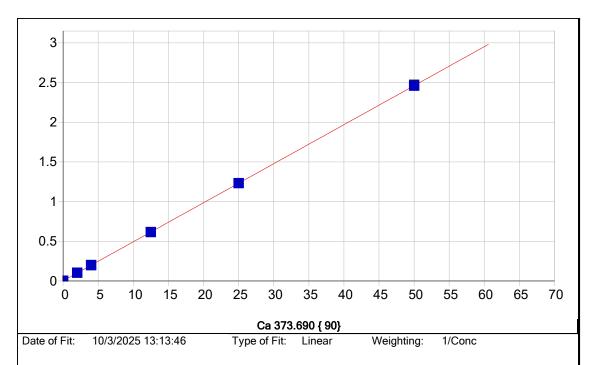
Correlation: 0.999920 Status: OK.

 Std Error of Est:
 0.000199

 Predicted MDL:
 0.000123

 Predicted MQL:
 0.000410

ļ	Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
	S0	.00000	.00000	.000	.000	00052	.000	1
	S1	.00600	.00616	.000	2.64	.01023	.000	1
	S3	1.2500	1.2213	029	-2.30	2.1253	.003	1
	S4	2.5000	2.4907	009	372	4.3349	.008	1
	S5	5.0000	5.0486	.049	.972	8.7871	.029	1
	S2	.40000	.38925	011	-2.69	.67703	.002	1



A0 (Offset): 0.001787 Re-Slope: 1.000000 A1 (Gain): 0.049187 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

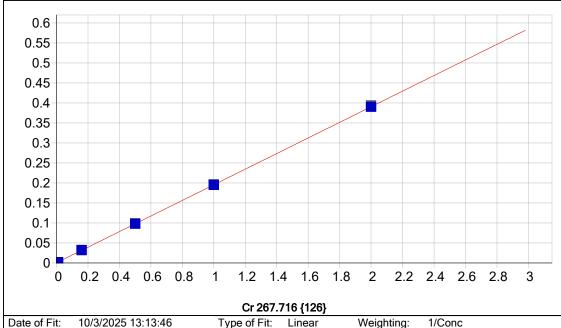
Correlation: 0.999993 Status: OK.

 Std Error of Est:
 0.000097

 Predicted MDL:
 0.015854

 Predicted MQL:
 0.052848

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00004	000	.000	.00179	.001	1
S2	4.0000	3.9925	007	186	.19817	.001	1
S3	12.500	12.455	045	362	.61439	.001	1
S4	25.000	25.010	.010	.039	1.2319	.001	1
S5	50.000	49.996	004	009	2.4609	.009	1
S1	2.0000	2.0474	.047	2.37	.10249	.001	1



Weighting:

A0 (Offset): 0.000320 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.195086

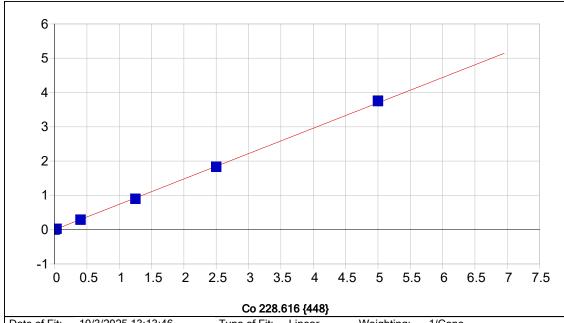
A2 (Curvature): 0.000000

n (Exponent): 1.000000

Correlation: OK. 0.999997 Status:

Std Error of Est: 0.000004 Predicted MDL: 0.000412 Predicted MQL: 0.001372

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00032	.000	1
S1	.01000	.00977	000	-2.27	.00223	.000	1
S3	.50000	.50002	.000	.003	.09794	.001	1
S4	1.0000	.99969	000	031	.19550	.001	1
S5	2.0000	1.9989	001	056	.39059	.002	1
S2	.16000	.16163	.002	1.02	.03188	.000	1



A0 (Offset): 0.000065 Re-Slope: 1.000000 A1 (Gain): 0.739619 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

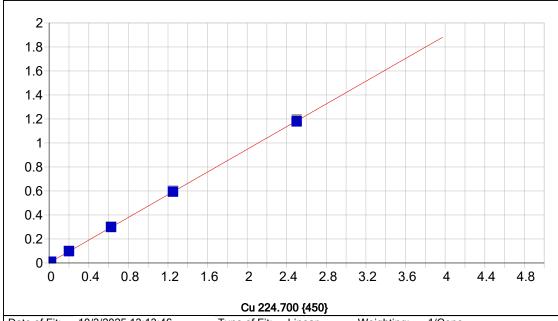
Correlation: 0.999883 Status: OK.

 Std Error of Est:
 0.000230

 Predicted MDL:
 0.000265

 Predicted MQL:
 0.000884

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00007	.000	1
S1	.03000	.03046	.000	1.54	.02250	.000	1
S3	1.2500	1.2170	033	-2.64	.90176	.001	1
S4	2.5000	2.4765	023	938	1.8349	.002	1
S5	5.0000	5.0651	.065	1.30	3.7526	.014	1
S2	.40000	.39082	009	-2.29	.28963	.001	1



A0 (Offset): 0.001150 Re-Slope: 1.000000 A1 (Gain): 0.472979 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

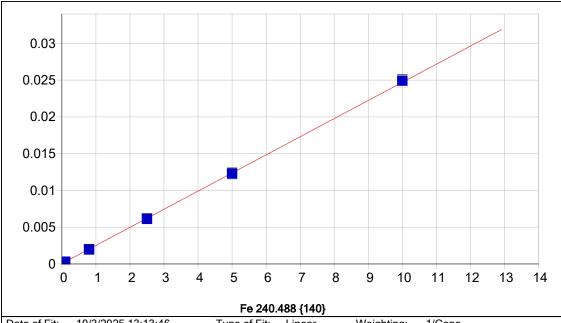
Correlation: 0.999976 Status: OK.

 Std Error of Est:
 0.000039

 Predicted MDL:
 0.000542

 Predicted MQL:
 0.001808

Std. Nar	me Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00115	.000	1
S1	.02000	.02110	.001	5.52	.01124	.000	1
S3	.62500	.62786	.003	.457	.30058	.001	1
S4	1.2500	1.2523	.002	.187	.59840	.001	1
S5	2.5000	2.4893	011	428	1.1884	.004	1
S2	.20000	.20440	.004	2.20	.09862	.000	1



A0 (Offset): 0.000045 Re-Slope: 1.000000 A1 (Gain): 0.002466 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

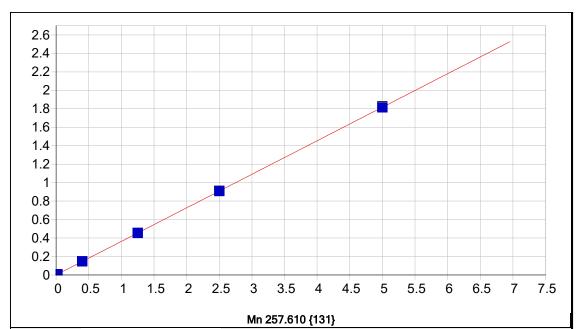
Correlation: 0.999936 Status: OK.

 Std Error of Est:
 0.000001

 Predicted MDL:
 0.009368

 Predicted MQL:
 0.031225

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00004	.000	1
S1	.10000	.10480	.005	4.80	.00030	.000	1
S3	2.5000	2.4741	026	-1.04	.00609	.000	1
S4	5.0000	4.9563	044	874	.01216	.000	1
S5	10.000	10.088	.088	.879	.02471	.000	1
S2	.80000	.77693	023	-2.88	.00194	.000	1



A0 (Offset): 0.000392 Re-Slope: 1.000000 A1 (Gain): 0.363250 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

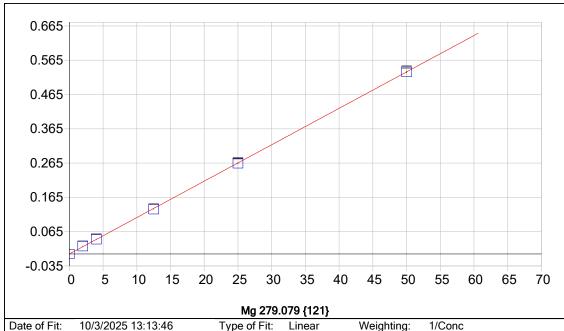
Correlation: 0.999992 Status: OK.

 Std Error of Est:
 0.000024

 Predicted MDL:
 0.000795

 Predicted MQL:
 0.002650

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00039	.000	1
S1	.02000	.02124	.001	6.21	.00811	.000	1
S3	1.2500	1.2510	.001	.083	.45492	.000	1
S4	2.5000	2.4979	002	084	.90794	.002	1
S5	5.0000	4.9950	005	099	1.8152	.009	1
S2	.40000	.40476	.005	1.19	.14745	.000	1



Weighting:

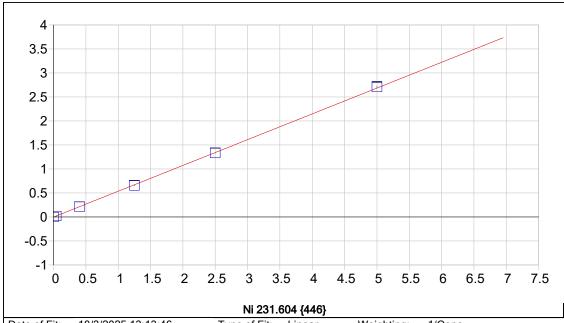
A0 (Offset): -0.000164 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.010621

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999903 OK. Status:

Std Error of Est: 0.000078 Predicted MDL: 0.035570 Predicted MQL: 0.118566

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00017	000	.000	00017	.000	1
S2	4.0000	4.0771	.077	1.93	.04314	.001	1
S3	12.500	12.337	163	-1.31	.13086	.001	1
S4	25.000	24.925	075	302	.26456	.002	1
S5	50.000	49.993	007	014	.53080	.003	1
S1	2.0000	2.1687	.169	8.44	.02287	.000	1



A0 (Offset): -0.000619 Re-Slope: 1.000000 A1 (Gain): 0.537098 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

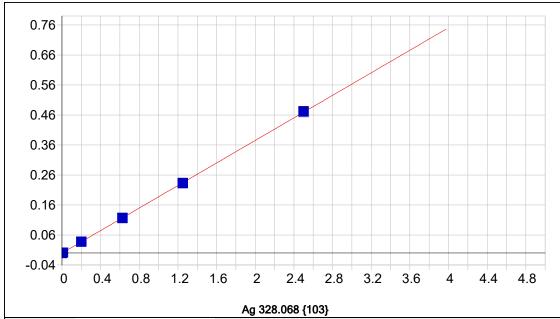
Correlation: 0.999932 Status: OK.

 Std Error of Est:
 0.000147

 Predicted MDL:
 0.000409

 Predicted MQL:
 0.001362

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00062	.000	1
S1	.04000	.04103	.001	2.58	.02142	.000	1
S3	1.2500	1.2239	026	-2.09	.65675	.001	1
S4	2.5000	2.4811	019	756	1.3320	.001	1
S5	5.0000	5.0486	.049	.973	2.7110	.010	1
S2	.40000	.39531	005	-1.17	.21170	.001	1



A0 (Offset): -0.000610 Re-Slope: 1.000000 A1 (Gain): 0.187883 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

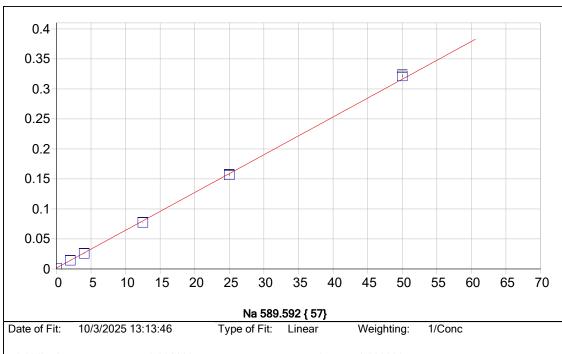
Correlation: 0.999983 Status: OK.

 Std Error of Est:
 0.000009

 Predicted MDL:
 0.000663

 Predicted MQL:
 0.002208

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	00061	.000	1
S1	.01000	.01061	.001	6.07	.00137	.000	1
S3	.62500	.62199	003	481	.11568	.000	1
S4	1.2500	1.2416	008	674	.23152	.000	1
S5	2.5000	2.5090	.009	.361	.46852	.001	1
S2	.20000	.20180	.002	.899	.03712	.000	1



A0 (Offset): 0.001608 Re-Slope: 1.000000 A1 (Gain): 0.006289 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

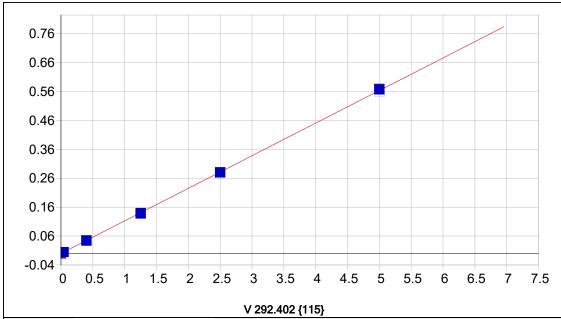
Correlation: 0.999794 Status: OK.

 Std Error of Est:
 0.000067

 Predicted MDL:
 0.025012

 Predicted MQL:
 0.083374

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00010	.000	.000	.00161	.000	1
S2	4.0000	3.8566	143	-3.58	.02586	.000	1
S3	12.500	12.083	417	-3.34	.07760	.000	1
S4	25.000	24.674	326	-1.30	.15678	.001	1
S5	50.000	50.860	.860	1.72	.32147	.002	1
S1	2.0000	2.0261	.026	1.31	.01435	.000	1



A0 (Offset): -0.000338 Re-Slope: 1.000000 A1 (Gain): 0.112805 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

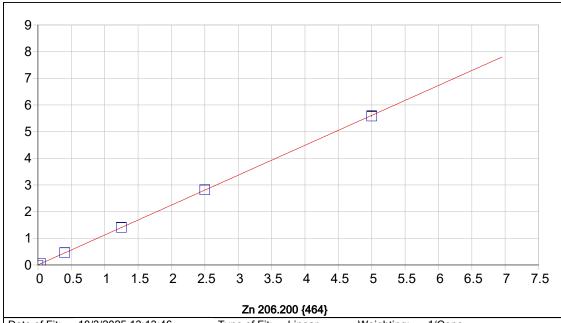
Correlation: 0.999938 Status: OK.

 Std Error of Est:
 0.000029

 Predicted MDL:
 0.003896

 Predicted MQL:
 0.012987

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	00034	.000	1
S1	.04000	.04415	.004	10.4	.00447	.000	1
S3	1.2500	1.2310	019	-1.52	.13647	.001	1
S4	2.5000	2.4857	014	572	.27595	.000	1
S5	5.0000	5.0345	.035	.690	.55936	.002	1
S2	.40000	.39474	005	-1.32	.04353	.000	1



A0 (Offset): 0.001513 Re-Slope: 1.000000 A1 (Gain): 1.121463 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

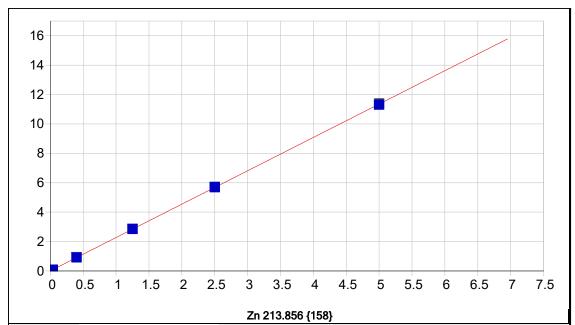
Correlation: 0.999972 Status: OK.

 Std Error of Est:
 0.000196

 Predicted MDL:
 0.000147

 Predicted MQL:
 0.000489

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00151	.000	1
S1	.04000	.04267	.003	6.68	.04937	.000	1
S3	1.2500	1.2521	.002	.171	1.4057	.002	1
S4	2.5000	2.5102	.010	.407	2.8166	.004	1
S5	5.0000	4.9766	023	467	5.5826	.013	1
S2	.40000	.40839	.008	2.10	.45951	.001	1



A0 (Offset): 0.004073 Re-Slope: 1.000000 A1 (Gain): 2.269730 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

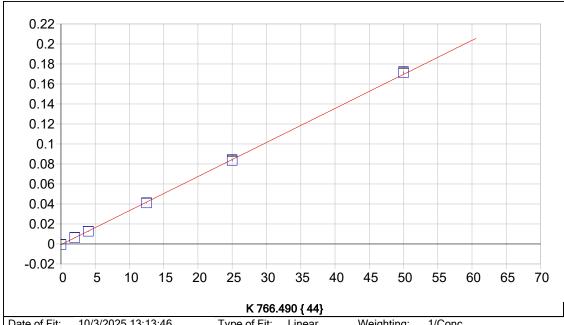
Correlation: 0.999979 Status: OK.

 Std Error of Est:
 0.000345

 Predicted MDL:
 0.000266

 Predicted MQL:
 0.000885

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00407	.000	1
S1	.04000	.04249	.002	6.21	.10114	.001	1
S3	1.2500	1.2522	.002	.176	2.8660	.008	1
S4	2.5000	2.5052	.005	.207	5.7296	.001	1
S5	5.0000	4.9823	018	354	11.391	.012	1
S2	.40000	.40786	.008	1.96	.93611	.004	1



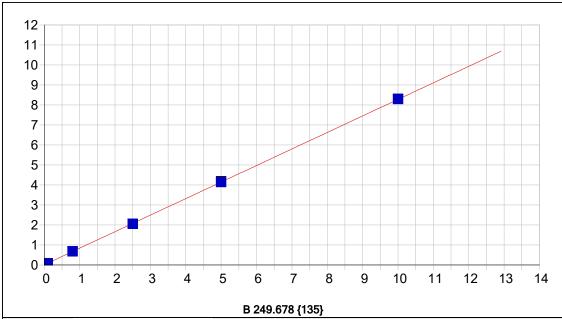
A0 (Offset): -0.000695 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.003405

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999896 OK. Status:

Std Error of Est: 0.000026 Predicted MDL: 0.055693 Predicted MQL: 0.185642

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00001	.000	.000	00070	.000	1
S2	4.0000	3.8997	100	-2.51	.01258	.000	1
S3	12.500	12.248	252	-2.02	.04101	.000	1
S4	25.000	24.730	270	-1.08	.08351	.001	1
S5	50.000	50.546	.546	1.09	.17141	.001	1
S1	2.0000	2.0768	.077	3.84	.00638	.000	1



A0 (Offset): 0.010836 Re-Slope: 1.000000 A1 (Gain): 0.826701 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

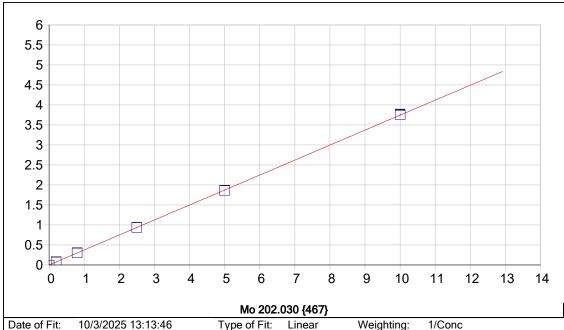
Correlation: 0.999989 Status: OK.

 Std Error of Est:
 0.000201

 Predicted MDL:
 0.000857

 Predicted MQL:
 0.002858

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.01084	.000	1
S1	.10000	.10073	.001	.734	.09362	.001	1
S3	2.5000	2.4730	027	-1.08	2.0478	.003	1
S4	5.0000	5.0017	.002	.035	4.1309	.036	1
S5	10.000	10.017	.017	.172	8.2622	.016	1
S2	.80000	.80733	.007	.917	.67587	.006	1



10/3/2025 13:13:46 Type of Fit: Linear Weighting:

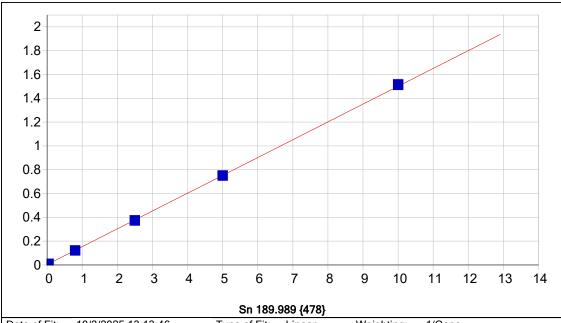
A0 (Offset): 0.000494 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.374448

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999994 OK. Status:

Std Error of Est: 0.000097 Predicted MDL: 0.000425 Predicted MQL: 0.001416

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00049	.000	1
S1	.20000	.20198	.002	.989	.07612	.000	1
S3	2.5000	2.4931	007	278	.93401	.002	1
S4	5.0000	4.9764	024	472	1.8639	.003	1
S5	10.000	10.027	.027	.266	3.7549	.017	1
S2	.80000	.80193	.002	.241	.30077	.001	1



A0 (Offset): 0.003744 Re-Slope: 1.000000 A1 (Gain): 0.149757 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

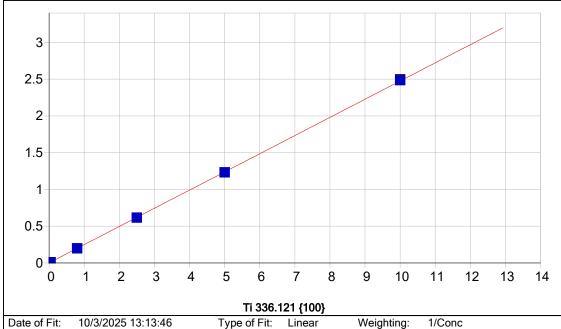
Correlation: 0.999942 Status: OK.

 Std Error of Est:
 0.000053

 Predicted MDL:
 0.000672

 Predicted MQL:
 0.002241

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00001	.000	.000	.00374	.000	1
S1	.04000	.03539	005	-11.5	.00904	.000	1
S3	2.5000	2.4652	035	-1.39	.37254	.001	1
S4	5.0000	4.9820	018	361	.74906	.001	1
S5	10.000	10.076	.076	.763	1.5112	.006	1
S2	.80000	.78121	019	-2.35	.12061	.001	1



A0 (Offset): 0.001728 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.247296

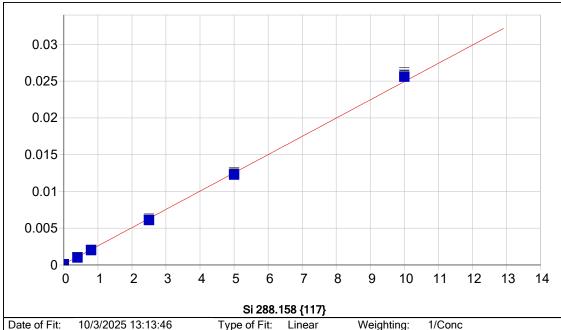
A2 (Curvature): 0.000000

n (Exponent): 1.000000

Correlation: 0.999987 OK. Status:

Std Error of Est: 0.000042 Predicted MDL: 0.002292 Predicted MQL: 0.007639

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00173	.000	1
S1	.04000	.03956	000	-1.10	.01150	.000	1
S3	2.5000	2.4818	018	729	.61524	.002	1
S4	5.0000	4.9793	021	414	1.2326	.001	1
S5	10.000	10.046	.046	.455	2.4850	.010	1
S2	.80000	.79385	006	769	.19797	.001	1



10/3/2025 13:13:46 Type of Fit: Linear Weighting: 1/Conc

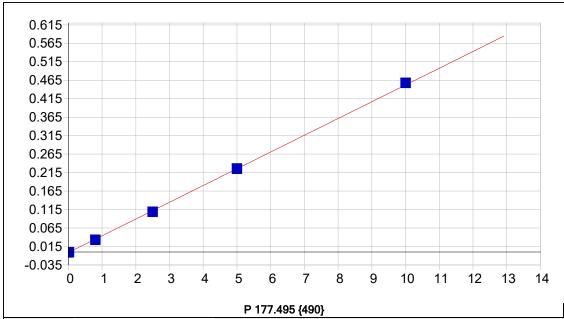
A0 (Offset): 0.000109 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.002483

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999541 OK. Status:

Std Error of Est: 0.000008 Predicted MDL: 0.016906 Predicted MQL: 0.056354

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00007	.000	.000	.00011	.000	1
S1	.40000	.35951	040	-10.1	.00100	.000	1
S3	2.5000	2.4101	090	-3.60	.00619	.000	1
S4	5.0000	4.9033	097	-1.93	.01247	.000	1
S5	10.000	10.262	.262	2.62	.02597	.000	1
S2	.80000	.76433	036	-4.46	.00204	.000	1



A0 (Offset): -0.001444 Re-Slope: 1.000000 A1 (Gain): 0.045375 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

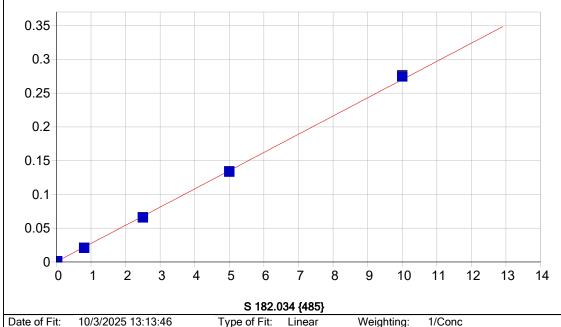
Correlation: 0.999858 Status: OK.

 Std Error of Est:
 0.000018

 Predicted MDL:
 0.001799

 Predicted MQL:
 0.005995

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00144	.000	1
S1	.02000	.02115	.001	5.76	00048	.000	1
S3	2.5000	2.4330	067	-2.68	.10893	.000	1
S4	5.0000	4.9893	011	215	.22491	.001	1
S5	10.000	10.116	.116	1.16	.45750	.001	1
S2	.80000	.76046	040	-4.94	.03306	.000	1



Weighting:

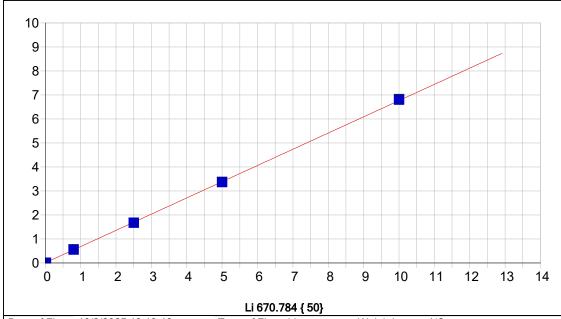
A0 (Offset): 0.000396 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.026956

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999767 OK. Status:

Std Error of Est: 0.000014 Predicted MDL: 0.003272 Predicted MQL: 0.010908

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00040	.000	1
S1	.02000	.01919	001	-4.06	.00089	.000	1
S3	2.5000	2.4245	075	-3.02	.06558	.000	1
S4	5.0000	4.9371	063	-1.26	.13313	.001	1
S5	10.000	10.181	.181	1.81	.27413	.001	1
S2	.80000	.75858	041	-5.18	.02079	.000	1



A0 (Offset): 0.006366 Re-Slope: 1.000000 A1 (Gain): 0.675904 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

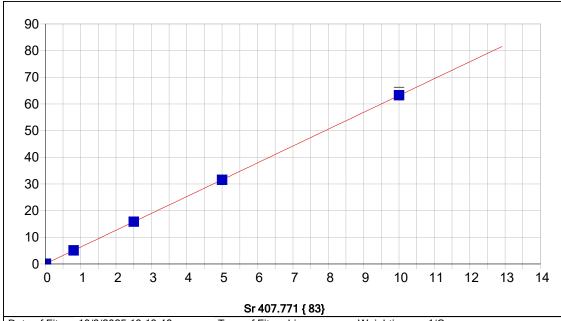
Correlation: 0.999969 Status: OK.

 Std Error of Est:
 0.000126

 Predicted MDL:
 0.002641

 Predicted MQL:
 0.008805

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00637	.001	1
S5	10.000	10.051	.051	.507	6.8051	.023	1
S4	5.0000	4.9696	030	607	3.3681	.004	1
S3	2.5000	2.4657	034	-1.37	1.6743	.002	1
S1	.02000	.02047	.000	2.36	.02044	.002	1
S2	.80000	.81351	.014	1.69	.55666	.002	1



A0 (Offset): 0.002127 Re-Slope: 1.000000 A1 (Gain): 6.316125 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

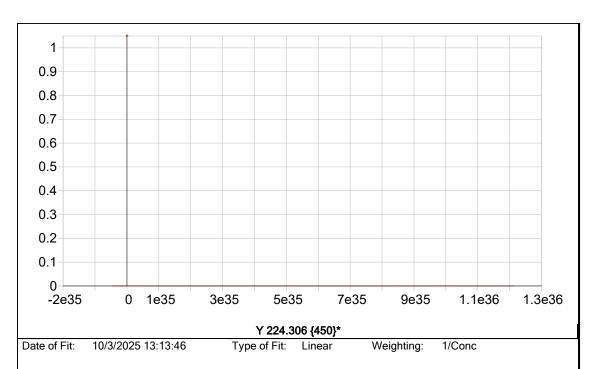
Correlation: 0.999995 Status: OK.

 Std Error of Est:
 0.000459

 Predicted MDL:
 0.000151

 Predicted MQL:
 0.000502

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00212	.000	1
S1	.02000	.02145	.001	7.27	.13824	.001	1
S3	2.5000	2.5052	.005	.209	15.841	.019	1
S4	5.0000	4.9879	012	242	31.537	.059	1
S5	10.000	10.010	.010	.095	63.284	1.13	1
S2	.80000	.79587	004	517	5.0338	.003	1



A0 (Offset): 0.000000 Re-Slope: 1.000000 A1 (Gain): 0.000000 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

Correlation: 0.000000 Status: Warning Zero Gain

Std Error of Est: 0.000000

Predicted MDL: n/a

Predicted MQL: n/a

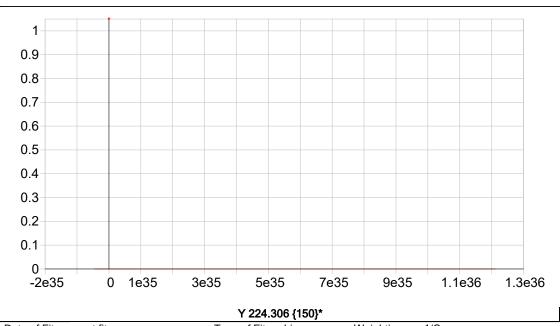
Std. Name	. Name Stated F Conc. C		Difference	% Diff.	(S)IR	Std Dev	Emphasis
1							
0.9							
0.8							
0.7							
0.6							
0.5							
0.4							
0.3							
0.2							
0.1							
0 -2e35	5 0	1e35 3	3e35 5e3	35 76	e35 9e3	35 1.1e36	1.3e36

Y 360.073 { 94}\*

Date of Fit: <not fit> Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000000 Re-Slope: 1.000000 A1 (Gain): 0.000000 Y-int: 0.000000

A2 (Curvatu	-	0.00000							
n (Exponent Correlation:	,	1.00000 0.00000			Status:		Warning	Zero Gain	
Std Error of		0.00000			Otatus.		vvairing	Zero Gairi	
Predicted M		n/a							
Predicted M		n/a							
Std. Name	Stated Conc.	Found Conc.	Diffe	erence	% Diff.		(S)IR	Std Dev	Emphasis
1									
0.9									
8.0									
0.7									
0.6									
0.5									
0.4									
0.3									
0.2									
0.1									
0 -2e35	5 0	1e35	3e35	5e3	85 7	e35	9e35	1.1e36	1.3e36
2000	,	1000	0000			000	0000	1.1000	1.0000
Date of Fit:	<not fit=""></not>		Tyn	Y 371.0 e of Fit:	030 { 91}* Linear		Weighting:	1/Conc	
			.,,,	0 01 1 16.				1700110	
A0 (Offset):		0.00000				-	1.000000		
A1 (Gain):	,	0.00000			Y	-int:	0.000000		
A2 (Curvatu		0.00000							
n (Exponent	•	1.00000			Ctatus		Morning	Zara Cair	
Correlation: Std Error of		0.00000			Status:		Warning	Zero Gain	
Predicted M		n/a	JU						
Predicted M		n/a							
Std. Name	Stated Conc.	Found Conc.	Diffe	erence	% Diff.		(S)IR	Std Dev	Emphasis



Date of Fit: <not fit> Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000000 Re-Slope: 1.000000 A1 (Gain): 0.000000 Y-int: 0.000000

Found

A2 (Curvature): 0.000000

n (Exponent): 1.000000

Correlation: 0.000000 Status: Warning Zero Gain

Difference

Std Error of Est: 0.000000

Predicted MDL: n/a

Predicted MQL: n/a

Std. Name Stated

Co	onc. Conc.						
1							
0.9							
8.0							
0.7							
0.6							
0.5							
0.4							
0.3							
0.2							
0.1							
0 -2e35	0 1e35	3e35	5e35	7e35	9e35	1.1e36	1.3e3
			In 230.606 {4	446}*			

% Diff.

(S)IR

Std Dev

**Emphasis** 

Date of Fit: <not fit> Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000000 Re-Slope: 1.000000 A1 (Gain): 0.000000 Y-int: 0.000000

Reviewed By:jaswal On:10/8/2025 11:43:16 PM Inst Id :P4 LB :LB137447

A2 (Curvature): 0.000000 n (Exponent): 1.000000 Zero Gain Correlation: 0.000000Status: Warning Std Error of Est: 0.000000 Predicted MDL: n/a Predicted MQL: n/a Std. Name Stated Found Difference % Diff. (S)IR Std Dev **Emphasis** Conc. Conc.

## **Water Metals Preparation Sheet**



SOP ID:

M200.7-Trace Elements-22

SDG No:

N/A

Start Digest Date:

10/06/2025

Time: 09:20
Time: 12:25

Temp: 96 °C

Matrix:

WATER

**End Digest Date:** 

10/06/2025

Temp: 96 °C

Pippete ID:

ICP A

Digestion tube ID:

M5595

\_\_\_\_

Balance ID:

N/A

**Block thermometer ID:** 

MET-DIG. #1

Filter paper ID:

N/A

Dig Technician Signature:

SM9

pH Strip ID:

M6069

#3

Supervisor Signature:
Temp: 1.

**1.** 96°C

2. N/A

Hood ID: Block ID:

1. HOT BLOCK #1

2. N/A

Standared Name	MLS USED	STD REF. # FROM LOG	
LFS-1	0.25	M6180	
LFS-2	0.25	M6181	
N/A	N/A	N/A	
N/A	N/A	N/A	
N/A	N/A	N/A	

Chemical Used	ML/SAMPLE USED	Lot Number
Conc. HNO3	3.00	M6158
1:1 HCL	5.00	MP87148
N/A	N/A	N/A

## **Extraction Conformance/Non-Conformance Comments:**

HOT BLOCK#1 CELL#50 96C

Date / Time	Prepped Sample Relinquished By/Location	Received By/Location
10/06/25 13:25	Slagmet dis	motar & Cat
	Preparation Group	Analysis Group



Lab Sample ID	Client Sample ID	рН	Initial Vol (ml)	Final Vol (ml)	Color Before	Color After	Clarity Before	Clarity After	Comment	Prep Pos
PB169982BL	PBW982	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	1
PB169982BS	LCS982	<2	50	25	Coloriess	Colorless	Clear	Clear	M6180,M6181	2
Q3281-01	001-WILLETS-PT-BLVD(OCT	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	3
Q3281-02	002-35TH-AVE(OCT)	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	4
Q3283-01	001-WILLETS-PT-BLVD(SEP)	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	5
Q3283-02	002-35TH-AVE(SEP)	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	6
Q3283-02MS	002-35TH-AVE(SEP)MS	<2	50	25	Colorless	Colorless	Clear	Clear	M6180,M6181	8
Q3283-02MSD	002-35TH-AVE(SEP)MSD	<2	50	25	Colorless	Colorless	Clear	Clear	M6180,M6181	9
Q3283-02DUP	002-35TH-AVE(SEP)DUP	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	7

## WORKLIST(Hardcopy Internal Chain)

WorkList Name: PB169982 WorkList ID: 192285

Department : Digestion

Date: 10-06-2025 08:32:57

200.7	1.002/2020 200./	-	. 61					
2000	10/00/2025	D41	TUI 1.01	1:1 HNO3 to pH < 2	Metals Group 10	Water	UUZ-351H-AVE(SEP)	70-0202
1.007	10/02/2023	:						03383 03
2002	10/02/2026 200 7	D41	TULL01	1:1 HNO3 to pH < 2	Metals Group 10	Water	סטו-אזוררבו מ-הו-פראח(פרה)	20200
200.7	1.007 52022 200.7	-		-			ספל אייון דדס פד פייים	03283-01
2002	10/03/3035	741	Tul   01	1:1 HNO3 to pH < 2	Metals Group 10	Water	OUZ-301H-AVE(OCT)	70-102030
200.7	10,011,010						OOD DETEL AVE COOK	03281-02
7007	10/02/2025 200 7	D41	TULL01	1:1 HNO3 to pH < 2	Metals Group 10	Water	Water	4020
								03281_01
		Location						
Method	Collect Date Method	Storage	Customer	Freservative			Customer Sample	
		Naw Sample			Tos+	Matrix		Sample
		0						

Raw Sample Received by: Date/Time 10106/2025 08:55

Raw Sample Relinquished by:

Chocken

Date/Time

10/06/2028

15:50

Raw Sample Received by:

Page 1 of 1

Raw Sample Relinquished by:

C(PCSm) GINS metalig



**Instrument ID:** P4

Review By	Janvi	Review On	10/8/2025 2:41:18 PM	
Supervise By	jaswal	Supervise On	10/8/2025 11:43:16 PM	
	<del>-</del>			
STD. NAME	STD REF.#			
ICAL Standard	MP87074,MP87083,MI	P87082,MP87080,MP87079,MF	P87078,MP87077,MP87076,MP87075	
ICV Standard	MP87085,MP87082			
CCV Standard	MP87086			
ICSA Standard	MP87087,MP87088			
CRI Standard	MP87082			
LCS Standard				
Chk Standard	MP87091,MP87092			

Sr#	SampleId	ClientID	QcType	Date	Comment	Operator	Status
1	S0	S0	CAL1	10/07/25 10:29		Jaswal	ОК
2	S1	S1	CAL2	10/07/25 10:34		Jaswal	ОК
3	S2	S2	CAL3	10/07/25 10:38		Jaswal	ОК
4	S3	S3	CAL4	10/07/25 10:42		Jaswal	ОК
5	S4	S4	CAL5	10/07/25 10:46		Jaswal	ОК
6	S5	S5	CAL6	10/07/25 10:50		Jaswal	ОК
7	ICV01	ICV01	ICV	10/07/25 10:54		Jaswal	ОК
8	LLICV01	LLICV01	LLICV	10/07/25 12:01		Jaswal	ОК
9	ICB01	ICB01	ICB	10/07/25 12:06		Jaswal	ОК
10	CRI01	CRI01	CRDL	10/07/25 12:10		Jaswal	ОК
11	ICSA01	ICSA01	ICSA	10/07/25 12:14		Jaswal	ОК
12	ICSAB01	ICSAB01	ICSAB	10/07/25 12:37		Jaswal	ОК
13	ICSADL	ICSADL	ICSA	10/07/25 12:41		Jaswal	ОК
14	ICSABDL	ICSABDL	ICSAB	10/07/25 12:45		Jaswal	ОК
15	CCV01	CCV01	CCV	10/07/25 12:50		Jaswal	ОК
16	CCB01	CCB01	ССВ	10/07/25 12:58		Jaswal	ОК
17	Q3283-01	001-WILLETS-PT-BL\	SAM	10/07/25 13:21		Jaswal	ОК
18	Q3283-02	002-35TH-AVE(SEP)	SAM	10/07/25 13:25		Jaswal	ОК



**Instrument ID:** P4

Review By	Jan	ıvi	Review On	10/8/2025 2:41:18 PM
Supervise By	jasv	wal	Supervise On	10/8/2025 11:43:16 PM
STD. NAME		STD REF.#		
ICAL Standard		MP87074,MP87083,MF	P87082,MP87080,MP87079,MP87078,	MP87077,MP87076,MP87075
ICV Standard		MP87085,MP87082		
CCV Standard		MP87086		
ICSA Standard		MP87087,MP87088		
CRI Standard		MP87082		
LCS Standard				
Chk Standard		MP87091,MP87092		

19	Q3283-02DUP	002-35TH-AVE(SEP)[	DUP	10/07/25 13:29		Jaswal	OK
20	Q3283-02L	002-35TH-AVE(SEP)L	SD	10/07/25 13:33		Jaswal	ок
21	Q3283-02MS	002-35TH-AVE(SEP)N	MS	10/07/25 13:38		Jaswal	ОК
22	Q3283-02MSD	002-35TH-AVE(SEP)N	MSD	10/07/25 13:42		Jaswal	ОК
23	Q3283-02A	002-35TH-AVE(SEP)	PS	10/07/25 13:46		Jaswal	OK
24	LR-1	LR-1	HIGH STD	10/07/25 13:50		Jaswal	OK
25	LR-3	LR-3	HIGH STD	10/07/25 13:59		Jaswal	OK
26	LR-2	LR-2	HIGH STD	10/07/25 14:10		Jaswal	OK
27	CCV02	CCV02	CCV	10/07/25 14:19		Jaswal	OK
28	CCB02	CCB02	ССВ	10/07/25 14:24		Jaswal	OK
29	Q3270-01	SG-1-TEST-PIT	SAM	10/07/25 14:28		Jaswal	ОК
30	Q3271-01	72-11929	SAM	10/07/25 14:32		Jaswal	ОК
31	Q3271-01L	72-11929L	SD	10/07/25 14:40		Jaswal	ОК
32	Q3271-01MS	72-11929MS	MS	10/07/25 14:44		Jaswal	ОК
33	Q3271-01MSD	72-11929MSD	MSD	10/07/25 14:48		Jaswal	ОК
34	Q3271-01A	72-11929A	PS	10/07/25 14:52		Jaswal	ОК
35	Q3272-01	VNJ-235	SAM	10/07/25 14:56		Jaswal	OK
36	Q3272-03	R7	SAM	10/07/25 15:00	Ca is high, need dilution	Jaswal	Dilution
37	Q3277-01	WC1	SAM	10/07/25 15:04		Jaswal	OK
38	CCV03	CCV03	CCV	10/07/25 15:08		Jaswal	OK
						l	



**Instrument ID:** P4

Review By	Jan	ıvi	Review On	10/8/2025 2:41:18 PM
Supervise By	jasv	wal	Supervise On	10/8/2025 11:43:16 PM
STD. NAME		STD REF.#		
ICAL Standard		MP87074,MP87083,MF	P87082,MP87080,MP87079,MP87078,	MP87077,MP87076,MP87075
ICV Standard		MP87085,MP87082		
CCV Standard		MP87086		
ICSA Standard		MP87087,MP87088		
CRI Standard		MP87082		
LCS Standard				
Chk Standard		MP87091,MP87092		

39	CCB03	CCB03	ССВ	10/07/25 15:12		Jaswal	ок
40	Q3269-03	EG1-TP1	SAM	10/07/25 15:17		Jaswal	ОК
41	Q3269-06	EG1-TP2	SAM	10/07/25 15:21		Jaswal	ОК
42	Q3281-01	001-WILLETS-PT-BL\	SAM	10/07/25 15:26		Jaswal	ОК
43	Q3281-02	002-35TH-AVE(OCT)	SAM	10/07/25 15:30		Jaswal	ок
44	Q3272-03DL	R7DL	SAM	10/07/25 15:34	25X for Ca	Jaswal	Confirms
45	Q3271-01DUP	72-11929DUP	DUP	10/07/25 15:38		Jaswal	ОК
46	PB169982BL	PB169982BL	MB	10/07/25 15:43		Jaswal	ОК
47	PB169982BS	PB169982BS	LCS	10/07/25 15:48		Jaswal	ОК
48	PB169979BL	PB169979BL	MB	10/07/25 15:52		Jaswal	ОК
49	PB169979BS	PB169979BS	LCS	10/07/25 15:56		Jaswal	ОК
50	CCV04	CCV04	CCV	10/07/25 16:00		Jaswal	ок
51	CCB04	CCB04	ССВ	10/07/25 16:04		Jaswal	ок
52	PB169996BS	PB169996BS	LCS	10/07/25 16:08		Jaswal	ок
53	Q3266-02	ENV-4-6FT	SAM	10/07/25 16:13		Jaswal	ок
54	Q3266-02DUP	ENV-4-6FTDUP	DUP	10/07/25 16:17		Jaswal	ок
55	Q3266-02L	ENV-4-6FTL	SD	10/07/25 16:20		Jaswal	ок
56	Q3266-02MS	ENV-4-6FTMS	MS	10/07/25 16:25		Jaswal	ок
57	Q3266-02MSD	ENV-4-6FTMSD	MSD	10/07/25 16:29		Jaswal	ок
58	Q3266-02A	ENV-4-6FTA	PS	10/07/25 16:33		Jaswal	ок
	l .	I .		l .			i



**Instrument ID:** P4

Review By	Jar	ıvi	Review On	10/8/2025 2:41:18 PM
Supervise By	jas	wal	Supervise On	10/8/2025 11:43:16 PM
STD. NAME		STD REF.#		
ICAL Standard		MP87074,MP87083,MF	P87082,MP87080,MP87079,MP87078,I	MP87077,MP87076,MP87075
ICV Standard		MP87085,MP87082		
CCV Standard		MP87086		
ICSA Standard		MP87087,MP87088		
CRI Standard		MP87082		
LCS Standard				
Chk Standard		MP87091,MP87092		

59	Q3258-06DL	COMPOSITEDL	SAM	10/07/25 16:37	Not use	Jaswal	Not Ok
60	PB169971TB	PB169971TB	МВ	10/07/25 16:41		Jaswal	ОК
61	Q3262-03	MOO-25-0280	SAM	10/07/25 16:45		Jaswal	ОК
62	CCV05	CCV05	CCV	10/07/25 16:50		Jaswal	ОК
63	CCB05	CCB05	ССВ	10/07/25 17:01		Jaswal	ОК
64	Q3262-06	MOO-25-0281-82	SAM	10/07/25 17:05		Jaswal	ОК
65	Q3262-09	279887	SAM	10/07/25 17:10		Jaswal	ок
66	Q3277-02	WC1	SAM	10/07/25 17:14		Jaswal	ОК
67	Q3289-02	VNJ-240	SAM	10/07/25 17:19		Jaswal	ОК
68	Q3289-04	VNJ-261	SAM	10/07/25 17:23		Jaswal	ОК
69	Q3289-06	72-11966	SAM	10/07/25 17:27		Jaswal	ОК
70	Q3289-06DUP	72-11966DUP	DUP	10/07/25 17:32		Jaswal	ОК
71	Q3289-06L	72-11966L	SD	10/07/25 17:36		Jaswal	ОК
72	Q3289-06MS	72-11966MS	MS	10/07/25 17:40		Jaswal	ОК
73	Q3289-06MSD	72-11966MSD	MSD	10/07/25 17:44		Jaswal	ОК
74	CCV06	CCV06	CCV	10/07/25 17:49		Jaswal	ОК
75	CCB06	CCB06	ССВ	10/07/25 17:59		Jaswal	ОК
76	Q3289-06A	72-11966A	PS	10/07/25 18:03		Jaswal	ОК
77	Q3287-02	TSS-25-0001-0002	SAM	10/07/25 18:07		Jaswal	ОК
78	PB169996BL	PB169996BL	МВ	10/07/25 18:11		Jaswal	ОК



**Instrument ID:** P4

Review By	Jan	ıvi	Review On	10/8/2025 2:41:18 PM
Supervise By	jasv	wal	Supervise On	10/8/2025 11:43:16 PM
STD. NAME		STD REF.#		
ICAL Standard		MP87074,MP87083,MF	P87082,MP87080,MP87079,MP87078,	MP87077,MP87076,MP87075
ICV Standard		MP87085,MP87082		
CCV Standard		MP87086		
ICSA Standard		MP87087,MP87088		
CRI Standard		MP87082		
LCS Standard				
Chk Standard		MP87091,MP87092		

79	PB169983BL	PB169983BL	МВ	10/07/25 18:15		Jaswal	ОК
	БтоооооБЕ	I B 103303BL	IVID	10/01/23 10.13		Jaswai	OK
80	PB169983BS	PB169983BS	LCS	10/07/25 18:20		Jaswal	ОК
81	Q3288-01	TR-01-100325	SAM	10/07/25 18:24		Jaswal	ОК
82	Q3289-01	VNJ-240	SAM	10/07/25 18:28		Jaswal	ОК
83	Q3289-03	VNJ-261	SAM	10/07/25 18:32		Jaswal	ОК
84	Q3289-05	72-11966	SAM	10/07/25 18:36		Jaswal	ОК
85	Q3290-01	CL-02-100325	SAM	10/07/25 18:40		Jaswal	ОК
86	CCV07	CCV07	CCV	10/07/25 18:44		Jaswal	ОК
87	CCB07	CCB07	ССВ	10/07/25 18:48		Jaswal	ОК
88	Q3290-01DUP	CL-02-100325DUP	DUP	10/07/25 18:52		Jaswal	ОК
89	Q3290-01L	CL-02-100325L	SD	10/07/25 18:56		Jaswal	ОК
90	Q3290-01MS	CL-02-100325MS	MS	10/07/25 19:00		Jaswal	ОК
91	Q3290-01MSD	CL-02-100325MSD	MSD	10/07/25 19:04		Jaswal	ОК
92	Q3290-01A	CL-02-100325A	PS	10/07/25 19:08		Jaswal	ОК
93	Q3257-01DL	ENV1-6FTDL	SAM	10/07/25 19:12	5X for Ag	Jaswal	Confirms
94	Q3257-02DL	ENV2-6FTDL	SAM	10/07/25 19:16	5X for Ag	Jaswal	Confirms
95	CCV08	CCV08	CCV	10/07/25 19:20		Jaswal	ОК
96	CCB08	CCB08	ССВ	10/07/25 19:24		Jaswal	ОК



8900, Fax: 908 789 8922

## **Prep Standard - Chemical Standard Summary**

Order I	D	:	Q3281

Test: Metals Group 10

Prepbatch ID: PB169982,

Sequence ID/Qc Batch ID: LB137447,

~ .		 _	
Star			

MP87074, MP87075, MP87076, MP87077, MP87078, MP87079, MP87080, MP87081, MP87082, MP87083, MP87085, MP87086, MP87087, MP87088, MP87090, MP87091, MP87092, MP87148,

### Chemical ID:

M5245, M5658, M5697, M5739, M5798, M5799, M5800, M5801, M5815, M5817, M5962, M5979, M5981, M6021, M6023, M6025, M6026, M6027, M6028, M6030, M6032, M6055, M6079, M6086, M6128, M6137, M6140, M6142, M6145, M6146, M6151, M6153, M6158, M6159, M6163, M6164, M6165, M6171, M6172, M6175, M6176, M6178, M6180, M6181, M6185, M6187, W3112, M6180, M6181, M6181,



 $284 \; Sheffield \; Street, \; Mountainside, \; New \; Jersey \; 07092, \; Phone \; : \; 908 \; 789 \; 8900, \\$ 

Fax: 908 789 8922

## **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME_	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal	
1122	ICPMS CALIB BLANK(S0/ICB/CCB)	MP87074	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP		
	A)								

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
2902	S8 ICPMS	MP87075	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•

**FROM** 

1.00000ml of M6159 + 2.50000ml of M6140 + 2.50000ml of M6142 + 5.00000ml of M6086 + 5.00000ml of M6171 + 5.00000ml of M6172 + 79.00000ml of MP87074 = Final Quantity: 100.000 ml



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## **Metals STANDARD PREPARATION LOG**

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
3947	S7(SFAM,6020,200.8)	MP87076	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	

**FROM** 

0.10000ml of M6153 + 0.40000ml of M6026 + 0.50000ml of M6151 + 1.00000ml of M5799 + 1.00000ml of M5981 + 1.00000ml of M6079 + 1.00000ml of M6137 + 1.00000ml of M6187 + 1.90000ml of M6159 + 10.00000ml of M5979 + 10.00000ml of M6178 + 2.00000ml of M5815 + 2.00000ml of M5817 + 4.00000ml of M6032 + 4.90000ml of M6140 + 4.90000ml of M6142 + 48.50000ml of W3112 + 50.00000ml of M6175 + 9.00000ml of M5697 + 9.00000ml of M6128 + 9.00000ml of M6145 + 9.90000ml of M6086 + 9.90000ml of M6171 + 9.90000ml of M6172 = Final Quantity: 100.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
3948	S6(SFAM,6020,200.8)	MP87077	09/03/2025	10/07/2025	Janvi Patel	None	METALS_PIP ETTE_1 (ICP	•

FROM 0.50000ml of M6151 + 1.00000ml of M6187 + 48.50000ml of W3112 + 50.00000ml of MP87076 = Final Quantity: 100.000 ml



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## **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal	
3949	S5(SFAM,6020,200.8)	MP87078	09/03/2025	10/07/2025	Janvi Patel	None	METALS_PIP ETTE_1 (ICP	,	
	A)								

**FROM** 0.50000ml of M6151 + 1.00000ml of M6187 + 73.50000ml of W3112 + 25.00000ml of MP87076 = Final Quantity: 100.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
3954	S4(SFAM,6020,200.8)	MP87079	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•

FROM 0.50000ml of M6151 + 1.00000ml of M6187 + 86.00000ml of W3112 + 12.50000ml of MP87076 = Final Quantity: 100.000 ml



Fax: 908 789 8922

### Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
3951	S3(SFAM, 6020,200.8)	MP87080	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
							A)	

FROM 0.50000ml of M6151 + 1.00000ml of M6187 + 88.50000ml of W3112 + 10.00000ml of MP87077 = Final Quantity: 100.000 ml

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	PipetteID	Supervised By
3955			09/03/2025	10/07/2025	Janvi Patel	None	METALS_PIP	
							ETTE_1 (ICP	09/09/2025

**FROM** 

0.00500 ml of M6153 + 0.05000 ml of M5798 + 0.05000 ml of M5800 + 0.05000 ml of M5801 + 0.05000 ml of M6023 + 0.05000 ml of M6025 + 0.05000 ml of M6027 + 0.05000 ml of M6028 + 0.05000 ml of M6030 + 0.05000 ml of M6128 + 0.10000 ml of M5658 + 0.10000 ml of M5697 + 0.10000 ml of M6146 + 0.10000 ml of M6159 + 0.25000 ml of M5799 + 0.25000 ml of M5799 + 0.25000 ml of M6140 + 0.25000 ml of M6140 + 0.25000 ml of M6140 + 0.25000 ml of M6178 + 0.50000 ml of M6032 + 0.50000 ml of M6137 + 1.25000 ml of M6171 + 2.50000 ml of M6172 + 2.50000 ml of M6187 + 2.50000 ml of M6181 = Final Quantity: 250.000 ml



Fax: 908 789 8922

## **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal	
3956	S2(SFAM,6020,200.8)	MP87082	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•	
	A)								

FROM 0.50000ml of M6151 + 1.00000ml of M6187 + 98.00000ml of W3112 + 0.50000ml of MP87081 = Final Quantity: 100.000 ml

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	PipetteID	Supervised By
3957			09/03/2025	10/07/2025	Janvi Patel		METALS PIP	Sarabjit Jaswal
	, , , , ,						ETTE_1 (ICP	09/09/2025

FROM 0.50000ml of M6151 + 1.00000ml of M6187 + 88.50000ml of W3112 + 10.00000ml of MP87082 = Final Quantity: 100.000 ml



Fax: 908 789 8922

## **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
4213	NEW ICV-6020B	MP87085	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
							A)	

FROM 0.00800ml of M6164 + 0.00800ml of M6165 + 0.01600ml of M6163 + 49.96800ml of MP87074 = Final Quantity: 50.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
3961	CCV	MP87086	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP	
							ETTE_1 (ICP	09/09/2025

**FROM** 

 $0.20000ml\ of\ M6026+0.50000ml\ of\ M5799+0.50000ml\ of\ M5981+0.50000ml\ of\ M6079+0.50000ml\ of\ M6137+0.50000ml\ of\ M6176+1.00000ml\ of\ M5815+1.00000ml\ of\ M5817+10.00000ml\ of\ M6187+12.45000ml\ of\ M6140+12.45000ml\ of\ M6140+12.45000ml\ of\ M6140+12.45000ml\ of\ M6140+12.45000ml\ of\ M6172+25.00000ml\ of\ M6172+25.00000ml\ of\ M6172+25.00000ml\ of\ M6175+4.50000ml\ of\ M5697+4.50000ml\ of\ M6128+4.50000ml\ of\ M6145+4.95000ml\ of\ M6159+5.00000ml\ of\ M6151+5.50000ml\ of\ M5979+5.50000ml\ of\ M6178+824.10000ml\ of\ W3112=Final\ Quantity:\ 1000.000\ ml$ 



Fax: 908 789 8922

## **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1142	ICSA ICPMS	MP87087	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
							A)	

**FROM** 10.00000ml of M6185 + 90.00000ml of MP87074 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
1143	ICSAB ICPMS	MP87088	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP	
							ETTE_1 (ICP	09/09/2025

FROM 10.00000ml of M5245 + 10.00000ml of M6185 + 80.00000ml of MP87074 = Final Quantity: 100.000 ml





Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
3962	MG 10PPM FOR TUNE	MP87090	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
FROM	0.01000ml of M6171 + 9.99000ml of	MP87074 =	Final Quanti	ty: 100.000 ml			A)	

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	PipetteID	Supervised By
3894	TUNE 200PPB		09/03/2025	10/07/2025	Janvi Patel	None	METALS_PIP	
							ETTE_1 (ICP	09/09/2025

2.00000ml of M6055 + 2.00000ml of MP87090 + 96.00000ml of MP87074 = Final Quantity: 100.000 ml **FROM** 



 $284 \; Sheffield \; Street, \; Mountainside, \; New \; Jersey \; 07092, \; Phone: \; 908 \; 789 \; 8900, \\$ 

Fax: 908 789 8922

## Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
3903	ISS 3PPM	MP87092	09/03/2025	10/07/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
EDOM	5 00000ml of M6187 ± 75 00000ml o	f M5730 ± 1	70 00000ml c	of MD97074 =	Final Quantity: 1	250 000 ml	A)	

FROM	5.00000mi of M6187	+ 75.00000mi of M5739	+ 170.00000ml of MP87074	= Final Quantity: 250.000 mi

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME.	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
170	1:1HCL	MP87148	09/09/2025	02/17/2026	Sagar Kanani	None	None	
								09/10/2025

FROM 1250.00000ml of M6151 + 1250.00000ml of W3112 = Final Quantity: 2500.000 ml



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART B / ICSB (ICPMS) STOCK SOLUTION	CP-MS ICSB-0803	07/01/2026	07/02/2025 / jaswal	02/20/2020 / jaswal	M5245
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58024 / Chromium, Cr, 500 ml, 1000 PPM	060523	06/05/2026	08/28/2023 / jaswal	08/25/2023 / jaswal	M5658
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58029 / Cu, 1000 PPM, 500 ml	102523	10/25/2026	04/03/2024 / jaswal	10/27/2023 / jaswal	M5697
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	6020ISS / 6020ISS, 10 ug/ml, Bi, Ho, In, 6Li, Rh, Sc, TB, Y	T2-MEB709511	09/03/2026	08/07/2024 / jaswal	04/11/2022 / jaswal	M5739
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57004 / Be, 1000 PPM, 125 ml	102523	10/25/2026	02/09/2024 / bin	02/09/2024 / bin	M5798
	16	Lot #	Expiration	Date Opened /	Received Date /	Chemtech Lot #
Supplier	ItemCode / ItemName		Date	Opened By	Received By	LOL #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57027 / CO, 1000 PPM, 125 ml	091923	09/19/2026	05/31/2024 / bin	02/09/2024 / bin	M5800
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57115 / P, 10000 PPM, 125 ml	041723	04/17/2026	05/21/2024 / Jaswal	02/09/2024 / jaswal	M5815
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57116 / S, 10000 PPM, 125 ml	071123	07/11/2026	03/01/2024 / jaswal	02/09/2024 / jaswal	M5817
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	060624	06/06/2027	07/02/2024 / Jaswal	06/14/2024 / Jaswal	M5962
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
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Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57092 / U, 1000 PPM, 125 ml	060724	06/07/2027	07/29/2024 / Jaswal	06/11/2024 / Jaswal	M5981
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57023 / V, 1000 PPM, 125 ml	062424	06/24/2027	09/28/2024 / jaswal	08/05/2024 / Jaswal	M6021
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57081 / TI, 1000 PPM, 125 ml	0624724	06/27/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6023
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57082 / Pb, 1000 PPM, 125 ml	061224	11/09/2026	08/05/2024 / Jaswal	08/05/2024 / Jaswal	M6025
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57182 / Pb, 10000 PPM, 125 ml	110923	11/09/2026	12/05/2024 / janvi	08/05/2024 / Jaswal	M6026
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
			06/20/2027	06/04/2025 /	08/05/2024 /	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57048 / Cd, 1000 PPM, 125 ml	070124	07/01/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6028
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57047 / Ag, 1000 PPM, 125 ml	122823	12/28/2026	08/05/2024 / kareem	08/05/2024 / Jaswal	M6030
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57056 / Ba, 1000 PPM, 125 ml	010924	01/09/2027	01/14/2025 / Jaswal	08/05/2024 / Jaswal	M6032
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	IV-STOCK-12 / ICP-MS TUNING SOLUTION, 125mL	U2-MEB734294	06/21/2028	08/21/2024 / Jaswal	08/19/2024 / Jaswal	M6055
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute	57040 / Zr, 1000 PPM, 125	071423	07/14/2026	01/15/2025 / Jaswal	09/30/2024 / Jaswal	M6079
Standards, Inc.						
Standards, Inc.  Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58025 / Mn, 1000 PPM, 500 ml	101124	10/11/2027	01/13/2025 / kareem	01/13/2025 / kareem	M6128
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGSI1-1 / SILICON 125mL 1000ug/mL	V2-SI744713	07/10/2029	01/14/2025 / Jaswal	10/03/2024 / Jaswal	M6137
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58126 / Fe, 10000 PPM, 500 ml	011025	01/10/2028	06/25/2025 / Janvi	01/13/2025 / Jaswal	M6140
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58119 / K, 10000 PPM, 500 ml	103024	10/30/2027	05/06/2025 / JANVI	01/13/2025 / Jaswal	M6142
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	58030 / Zinc, Zn, 500 ml, 1000 PPM	121724	12/17/2027	02/04/2025 /	01/13/2025 / Jaswal	M6145
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57051 / Sb, 1000 PPM, 125 ml	071724	07/17/2027	01/31/2025 / kareem	10/18/2024 / kareem	M6146



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	22G2862015	02/17/2026	02/18/2025 / Sagar	01/15/2025 / Sagar	M6151
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGSR10 / Strontium (SR), 125mL 10,000ppm	V2-SR754329	02/28/2026	02/28/2025 / JANVI	01/07/2025 / JANVI	M6153
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24D1062002	10/09/2025	03/10/2025 / Eman	02/02/2025 / Sagar	M6158
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58113 / AI, 10000 PPM, 500 ml	011325	03/18/2026	03/18/2025 / kareem	02/09/2025 / kareem	M6159
		011325 Lot #	03/18/2026  Expiration Date			M6159  Chemtech Lot #
Standards, Inc.	500 ml		Expiration	kareem  Date Opened /	kareem  Received Date /	Chemtech
Standards, Inc.  Supplier  Inorganic	ItemCode / ItemName  QCP-CICV-1-125ML / EPA CLP ICP Verification	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By  06/06/2025 /	Chemtech Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	QCP-CICV-3-125ML / EPA CLP ICP Verification Standard3	V2-MEB749572	06/08/2026	06/09/2025 / jaswal	06/09/2025 / jaswal	M6165
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58112 / Mg, 10000 PPM, 500 ml	011525	01/15/2028	07/15/2025 /	02/13/2025 / Janvi	M6171
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGNA10-5 / Sodium, 500 ml, 10000 PPM	V2-NA740547	07/29/2026	07/29/2025 / Janvi	01/25/2025 / Janvi	M6172
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	6020CAL-1 / Calibration Standard Method 6020	V2-MEB742014	07/17/2026	07/17/2025 / Janvi	01/27/2025 / Janvi	M6175
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57038 / Sr, 1000 PPM, 125 ml	092724	09/27/2027	08/06/2025 / Janvi	08/06/2025 / Janvi	M6176
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
I	57042 / Mo, 1000 PPM,	080528	08/05/2028	08/06/2025 /	08/06/2025 /	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	WW-LFS-1 / Laboratory Fortified Stock Solution 1, 125 ml	W2-MEB752149	02/05/2026	08/06/2025 / Janvi	07/22/2025 / Janvi	M6180
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	WW-LFS-2 / Laboratory Fortified Stock Solution 2, 125 ml	V2-MEB7433480	02/05/2026	08/06/2025 / Janvi	07/22/2025 / Janvi	M6181
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART A / ICSA (ICPMS ) STOCK SOLN	MS ICSA-0803	07/01/2026	07/02/2025 /	07/14/2022 / Janvi	M6185
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24H0162012	01/28/2026	08/29/2025 / Sagar	08/08/2025 / Sagar	M6187
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Seidler Chemical	DIW / DI Water	Daily Lab-Certified	07/03/2029	07/03/2024 / lwona	07/03/2024 / lwona	W3112



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

R1815/24

CERTIFIED WEIGHT REPORT: 1. Barium nitrate (Ba) Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): Recommended Storage: **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: IN023 BAD022019A1 RV# 57056 010924 Barium (Ba) **6UTB** 1000 Ambient (20 °C) 010927 Number Pot Conc. (µg/mL) 2000.02 Nominal 1000 0.058 Flask Uncertainty 99.999 5E-05 Balance Uncertainty Purity Uncertainty Assay 3 Purity (%) 0,10 Solvent: 24002546 52.3 8 2% Weight (g) 3.82417 Target Lot # 40.0 Nitric Acid Weight (g) Conc. (µg/mL) 3.82441 Nitric Acid Actual 1000.1 Actual +/- (µg/mL) Reviewed By: Formulated By: Uncertainty Expanded Giovannie 2.0 10022-31-B CAS# (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 Giovanni Esposito Pedro L. Rentas であるとん SDS Information 0.5 mg/m3 orl-rat 355 mg/kg 3104a 010924 010924 NIST SRM

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## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.

  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

## Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



## Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Revel = 10/14/2024 M 6085/M6086/M6087

CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Weight shown below was diluted to (mL): **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: 10000 082324 **BTU9** 082327 58120 Ambient (20 °C) Calcium (Ca) ĕ 4000.1 Nominal 0.15 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Solvent: 24002546 Nitric Acid Assay 2% Lot # <u>a</u> 80.0 Target Nitric Acid Actual Actual Formulated By: Reviewed By: Uncertainty Expanded Thorana (Solvent Safety Info. On Attached pg.) Giovanni Esposito Pedro L. Rentas Broade **SDS Information** 082324 082324 NIST

RM#

Number

Conc. (µg/mL)

38

Purity (%)

8

Weight (g)

Weight (g)

Conc. (µg/ml.)

+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM

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# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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Zr	Zn	ĸ	<del>ነ</del>	۷	U	W	Name of the last		
<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			

(T) = Target analyte

## **Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above)

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

All standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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## Certified Reference Material CRM

R 815/24

Solvent:

24002546

Nitric Acid

Lot #

M6028

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT:

Part Number:

57048 070124

Lot Number: Description:

Cadmium (Cd)

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB

1000

Recommended Storage:

**Expiration Date:** 

070127 Ambient (20 °C)

Weight shown below was dliuted to (mL):

2000.07

0.100 Flask Uncertainty 5E-05 Balance Uncertainty

2%

40.0 (mL) Nitric Acid

Formulated By:

Alban PROBAN

Aleah O'Brady

070124

Reviewed By:

Pedro L. Rentas

070124

Expanded

Weight (g) Conc. (µg/mL) Uncertainty

Cadmium nitrate tetrahydrate (Cd)

IN024 CDM092021A1

1000

99.999

0.10

36.5

5.4797

5.4804

1000.1

2.0

10022-68-1

0.01 mg/m3

orl-rat 60.2mg/kg

3108

RM#

Number Lot

Conc. (µg/mL)

8

8

Weight (g)

Target

Actual

Actual

Nominal

Purity

Uncertainty Assay Purity (%)

+/- (µg/mL)

CAS#

**SDS Information** 

(Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50

**NIST** SRM

m/z-> -z/m m/z-> 1.0E7 2.0E7 5.OE4 1.0E5 2.5E4 5.0M4 [1] Spectrum No.1 010 110 0 220 120 20 [ 12.514 sec]:58148.D# [Count] [Linear] 230 130 30 240 140 40 N00 150 50 2000 160 60 170 70 180 80 061 Ö 200 100

1 of 2

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https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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<li>(T) = Target analyte</li>	40.02	20.02	5	<b>∆</b> 0.2	<0.02		<b>≙</b> 01	<0.02		40.02		vernica	1	
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	<b>40.02</b>	40.02		<b>∆</b>	<b>∆</b> 0,02	20.02	3	40.02	10.02	000		Jg/mL)		
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	Zt	Zn		<	<b>¥</b>	~	7	_ _	*					
	<0.02	<0.02	20.02	3	40.02	20.02		40.02	70.02		MATERIAL SECTION AND ADDRESS OF THE PERSON A			

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All standards should be stored with caps tight and under appropriate laboratory conditions.

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Part # 57048

2 of 2



## QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-MS ICS

## QATS LABORATORY INORGANIC REFERENCE MATERIAL INTERFERENCE CHECK SAMPLE SET FOR ICP-MS (ICSA WITH ICSB)

**NOTE:** These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

**APPLICATION:** For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

## (A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of an Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-0803" and for the ICSAB mixture use "ICSA-0803+ICSB-0803".

<u>CAUTION:</u> The bottle(s) should be protected from light during storage to ensure the stability of silver which is contained in the ICSB solution. The bottle(s) should be stored at room temperature. **Do not allow the solution(s) to freeze.** 

### (B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

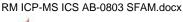
QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
APTIM Federal Services, LLC
2700 Chandler Avenue - Building C
Las Vegas, NV 89120

### (C) ANALYSIS OF SAMPLES

This interference check sample set is to be used to verify elemental isobaric correction factors of inductively coupled plasma-mass spectrometers (ICP-MS). This reference material set consists of two (2) concentrated solutions. The ICSA solution contains several interferent elements and species; for a complete listing refer to the CLP SOW. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for the ICP-MS ICS Part A and Part B target analytes when diluted as directed.

Using Class "A" glassware, preparation and analysis must be performed according to the following instructions:









## QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-MS ICS

ICSB:

M5245

ICSA-0803, Inferferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 1% v/v HNO<sub>3</sub>. Analyze this solution by ICP-MS.

ICSB-0803, Analytes, mixed with ICSA-0803, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 1% v/v HNO<sub>3</sub>. Analyze this ICSAB solution by ICP-MS.

### (D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-MS ICS SOLUTION(S)

The "Certified Value" concentrations of the elements, listed in Table 1 below, were derived from statistically pooled analysis results from the following sources, if available: QATS Laboratory, CLP laboratories, Quarterly Blind (QB)/Proficiency Testing (PT) events, CLP pre-award events, and external referee laboratories.

ICSA: M5244

	Table 1.		VALUES" FOR 303, AND ICSA				MS
Element	CRQL	Part A (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)	Part A +Part B (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)
Al	20	[100000]			[100000]		
Sb	2.0	(1.5)	-2.5	5.5	(22.0)	18.0	26.0
As	1.0	(0.10)	-1.9	2.1	19.0	16.2	21.9
Ва	10	(1.2)	-18.8	21.2	(22.0)	2.0	42.0
Be	1.0	(0.0)	-2.0	2.0	19.0	16.2	21.9
Cd	1.0	(0.70)	-1.3	2.7	20.0	17.0	23.0
Ca	500	[100000]			[100000]		
С		[200000]			[200000]		
CI		[1000000]			[1000000]		
Cr	2.0	(21.0)	17.0	25.0	40.0	34.0	46.0
Со	1.0	(1.0)	-1.0	3.0	20.0	17.0	23.0
Cu	2.0	(8.0)	4.0	12.0	(25.0)	21.0	29.0
Fe	200	[100000]			[100000]		
Pb	1.0	(4.0)	2.0	6.0	25.0	21.3	28.8
Mg	500	[100000]			[100000]		
Mn	1.0	(7.0)	5.0	9.0	27.0	23.0	31.1
Мо		[2000]			[2000]		
Ni	1.0	(6.0)	4.0	8.0	24.0	20.4	27.6
Р		[100000]			[100000]		
K	500	[100000]			[100000]		
Se	5.0	(0.30)	-9.7	10.0	(19.0)	9.0	29.0
Ag	1.0	(0.0)	-2.0	2.0	18.0	15.3	20.7
Na	500	[100000]			[100000]		
S		[100000]			[100000]		
TI	1.0	(0.0)	-2.0	2.0	21.0	17.9	24.2
Ti		[2000]			[2000]		
V	5.0	(0.50)	-9.5	10.5	(19.0)	9.0	29.0
Zn	5.0	(11.0)	1.0	21.0	(29.0)	19.0	39.0

[] Indicates analytes that do not require ICP-MS determination in the ICS.

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value  $\pm$  2 times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value  $\pm$  15 percent of the listed certified value.

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## Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

R: 815/24 M6025

CERTIFIED WEIGHT REPORT: Part Number: 57182 110923 Solvent: 24002546 Lot #

Nitric Acid

Lot Number: Description: Lead (Pb)

Nominal Concentration (µg/mL): Recommended Storage: 10000 Ambient (20 °C)

**Expiration Date:** 

110926

2%

Nitric Acid

Formulated By:

Lawence Barry

110923

110923

Revience

<u>=</u> 40.0

Weight shown below was diluted to (mL): **NIST Test Number: 6UTB** Lot 2000.02 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Actual Uncertainty Reviewed By: Expanded Pedro L. Rentas SDS information

	1. Lead(II) nitrate (Pb)	Compound
[1] Spectrum No.1	IN029 PBD122018A1	Lot Nominal Purity Uncertainty Assay Target Actual RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Weight (g)
17.284 5	11	Nominal Purity Uncertainty Assay Conc. (µg/mL) (%) Purity (%) (%) \(\begin{array}{c}\)
7	99.999	Purity (%)
של מו	0.10	Uncertainty Purity (%)
	62.5	Assay (%)
To a line	32.0006	Target Weight (g)
	10000 99.999 0.10 62.5 32.0006 32.0040	Actual Weight (g)
		Actual Conc. (µg/mL)
	20.0	Actual Uncertainty onc. (µg/mL) +/- (µg/mL)
	10099-74-8	(Solv
	10001.1 20.0 10099-74-8 0.05 mg/m3	Actual Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (ug/mL) +/- (ug/mL) CAS# OSHA PEL (TWA) LD50
	intrvns-rat 93 mg/kg 3128	tached pg.) LD50
	3128	NIST

<b>3</b>	9. O III	m/z->	1.006	m/z-> 2.0E6	5.0E6	1.0E7
N C	ti	110		6		
ง ง		120		N <sub>0</sub>		
		130		30		
3		140		6		
		4				
) 		150		50		
		80		80		
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		200		100		
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Part # 57182

1 of 2



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

							Trace Me	Metals	Verifica	Tti-	by ICP-	NS (	µg/mL)			и и	Ш		
1		-	40.02	Ų	40.02	出	<b>4</b> 0.02		40.02	Z	A).02	_	7	1	<b>40.02</b>	40.02 Se	40.02 Se	- d.02   Se   d02   Tb	- d.02   Se   d02   Tb
	40.02 Ca	, re	<b>6</b> 2	耳	<0.02	Но	<0.02	Ę	<0.02	\$	<0.02	Re		<b>∆</b> .02	<0.02 Si		Si 40.02	Si 40.02	Si <0.02 Te <0.02
As		, O,	<b>∆</b> 0.02	핕	40.02	<b>P</b>	<b>♦</b> 0.02	Mg	40.01	ဝွ	40.02	Rh		40.02		Ag	Ag <0.02	Ag <0.02 TI	Ag <0.02 TI <0.02
		is "	<b>⊕</b> .02	වි	<b>40.02</b>	두	<b>∆0,02</b>	M	<0.02	곱	40.02	공		40.02		Z	Na 40.2	Na <0.2 Th	Na <0.2 Th <0.02
		Hr.	A).02	င္အ	40.02	ॠ	<b>40.2</b>	ВH	<u>6</u> 2	۳	40.02	₽		40,02		Sr.	Sr.	Sr <0.02 Tm	Sr <0.02 Tm
-		6	40.02	ද	A0,02	E	<b>40,02</b>	Мо	<0.02	⊋	40.02	Sm	_	<b>∆</b> 0.02		ω	S 40.02	S <0.02 Sn	S <0.02 Sn <0.02
B A	L	F	<b>⊕</b> .02	Au	<b>40.02</b>	끃	T	Z.	<0.02	×	40.2	Sc	_	40.02		Ta	Ta <0.02	Ta <0.02 Ti	Ta <0.02 Ti

## Physical Characterization:

(T)= Target analyte

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Sor I Mill

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \*Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in
- the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
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  Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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## Certified Reference Material CRM

M6026

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

R: 8/5/24

CERTIFIED WEIGHT REPORT: Part Number: 57182 Solvent: 24002546 Lot# Nitric Acid

Description: Lot Number: 110923 Lead (Pb)

2%

Nitric Acid

Formulated By:

Lawence Barry

110923

Revenue

1 40.0

Recommended Storage: **Expiration Date:** 10000 110926 Ambient (20 °C)

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): NIST Test Number: **6UTB** Cot 2000.02 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By: Expanded

RW#

Nominal

Purity

Uncertainty Assay

 Lead(II) nitrate (Pb) IN029 PBD122016A1 10000 99.999 0.10 62.5 32.0006 32.0040 10001.1 20.0 10099-74-8 0.05 mg/m3 intryns-rat 93 mg/kg 3128

Number Conc. (µg/mL) 38 Purity (%) 36

Weight (g) Target Weight (g) Conc. (µg/mL) Actual Actual +/- (µg/mL) Uncertainty CAS# (Solvent Safety Info. On Attached pg.)

# OSHA PEL (TWA) LD50 OSHA PEL (TWA) SDS information TSIN SRM

Pedro L. Rentas

110923

1.0E7 [1] Spectrum No.1 [ 17.284 sec]:58182.D# [Count] [Linear]

180

190

200

70

80

90

100

Part # 57182

1 of 2



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

							Trace Me	Metals	Verifica	Tti-	by ICP-	NS (	µg/mL)			и и	Ш		
1		-	40.02	Ų	40.02	出	<b>4</b> 0.02		40.02	Z	A).02	_	7	1	<b>40.02</b>	40.02 Se	40.02 Se	- d.02   Se   d02   Tb	- d.02   Se   d02   Tb
	40.02 Ca	, re	<b>6</b> 2	耳	<0.02	Но	<0.02	Ę	<0.02	\$	<0.02	Re		<b>∆</b> .02	<0.02 Si		Si 40.02	Si 40.02	Si <0.02 Te <0.02
As		, O,	<b>∆</b> 0.02	핕	40.02	<b>P</b>	<b>♦</b> 0.02	Mg	40.01	ဝွ	40.02	Rh		40.02		Ag	Ag <0.02	Ag <0.02 TI	Ag <0.02 TI <0.02
		is "	<b>⊕</b> .02	වි	<b>40.02</b>	두	<b>∆0,02</b>	M	<0.02	곱	40.02	공		40.02		Z	Na 40.2	Na <0.2 Th	Na <0.2 Th <0.02
		Hr.	A).02	င္အ	40.02	ॠ	<b>40.2</b>	ВH	<u>6</u> 2	۳	40.02	₽		40,02		Sr.	Sr.	Sr <0.02 Tm	Sr <0.02 Tm
-		6	40.02	ද	A0,02	E	<b>40,02</b>	Мо	<0.02	⊋	40.02	Sm	_	<b>∆</b> 0.02		ω	S 40.02	S <0.02 Sn	S <0.02 Sn <0.02
B A	L	F	<b>⊕</b> .02	Au	<b>40.02</b>	끃	T	Z.	<0.02	×	40.2	Sc	_	40.02		Ta	Ta <0.02	Ta <0.02 Ti	Ta <0.02 Ti

## Physical Characterization:

(T)= Target analyte

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Sor I Mill

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CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: Part **BTU9** 1000 58024 060523 Ambient (20 °C) 060526 Chromium (Cr) Lot 2000.02 Dilution 0.058 5E-05 Initial Flask Uncertainty **Balance Uncertainty** Uncertainty 21110221 Nominal Lot # 2.0% Nitric Acid Solvent: (III) Initial 40.0 Nitric Acid Final Formulated By: Reviewed By: Uncertainty Expanded Lavense (Solvent Safety Info. On Attached pg.) Pedro L. Rentas Lawrence Barry **SDS Information** 060523 060523

Chromium(III) nitrate nonahydrate (Cr) 58124

071122

0.1000

200.0

0.084

1000

10000.1

1000.0

12

7789-02-8

0.5 mg(Cr)/m3

ori-rat 3250 mg/kg 3112a

Compound

Number

Number

Factor

Vol. (mL) Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

TSIN SRM

m/z->	ю П О	m/z-> 5.0E6	5.0E5	m/z->	5000	1.0E4
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Part # 58024



# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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	폺	Мо	В.	Ķ	ВМ	Ē	П	MISSON ISSUE	Metals	1
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	==	Sn	Tm	3	ᄇ	급	176			
	40,02	40.02	40,02	40,02	<0.02	40,02	<0.02	Company of the Company		
	Z	Zn	~	뀱	۷	Ϥ	W	可能を発展		
	<0.02	<b>&lt;</b> 0.02	<0.02	<0.02	40.02	40.02	<0.02	SALES OF STREET		

(I)= larget analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in

the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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M5697

Solvent:

Nitric Acid



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

**CERTIFIED WEIGHT REPORT:** 

Part Number:

58029

Lot Number:

102523

Description:

**Expiration Date:** 

**NIST Test Number:** 

Copper (Cu)

2.0%

Lot #

24002546

40.0 Nitric Acid

(mL)

Formulated By:

Benson Chan

Pedro L. Rentas

102523

102523

Recommended Storage:

102526 Ambient (20 °C)

Nominal Concentration (µg/mL):

1000

**6UTB** 

5E-05 Balance Uncertainty

Volume shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

> Expanded Uncertainty

Reviewed By:

SDS Information (Solvent Safety Info. On Attached pg.)

Compound

Part Number Number Dilution Factor

Initial

Uncertainty

Nominal Pipette (mL) Conc. (µg/mL)

Initial Conc. (µg/mL) Conc. (µg/mL)

Final

+/- (µg/mL)

CAS# OSHA PEL (TWA)

LD50

NIST SRM

Lot

0.1000

0.084

1. Copper(II) nitrate trihydrate (Cu) 58129 100223 200.0 1000 10000.1 1000.0 2.2 10031-43-3 1 mg/m3 ori-rat 794 mg/kg 3114 [1] Spectrum No.1 [ 33.422 sec]:58029.D# [Count] [Linear] 1.0E6 5.0E5 10  $m/z \rightarrow$ 20 30 50 60 70 80 90 100 5.0E7 2.5E7 m/z->110 120 130 140 150 160 170 180 190 200 2.0E7 1.0E7 m/z-> 210 220 230 240 250 260

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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

### Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

0.5			DOM: NO.				Trace M	etals	Verifica	tion	by ICP-M	S (µ	g/mL)						
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Тъ	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	ΰ	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	п	<0.02	v	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Ве	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
В	<0.02	Cu	T	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

### **Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

Box 1. 8/1

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

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ırt # 58029

Lot # 102523

2 of 2

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## CERTIFIED WEIGHT REPORT:

02/09/24 Lot #

24002546

Nitric Acid Solvent:

Part Number: Lot Number: Description: 57004 102523

Beryllium (Be)

Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: 1000 Ambient (20 °C)

**Expiration Date:** 

102526

BTU<sub>9</sub>

Volume shown below was diluted to (mL): 2000.02

0.058

Flask Uncertainty Balance Uncertainty

5E-05

Number

Number Lot

Vol. (mL.)

Part

Dilution Factor

hitia

Uncertainty

Nominal

(IE) 40.0

2.0%

Nitric Acid

Benson Chan

102523

Formulated By:

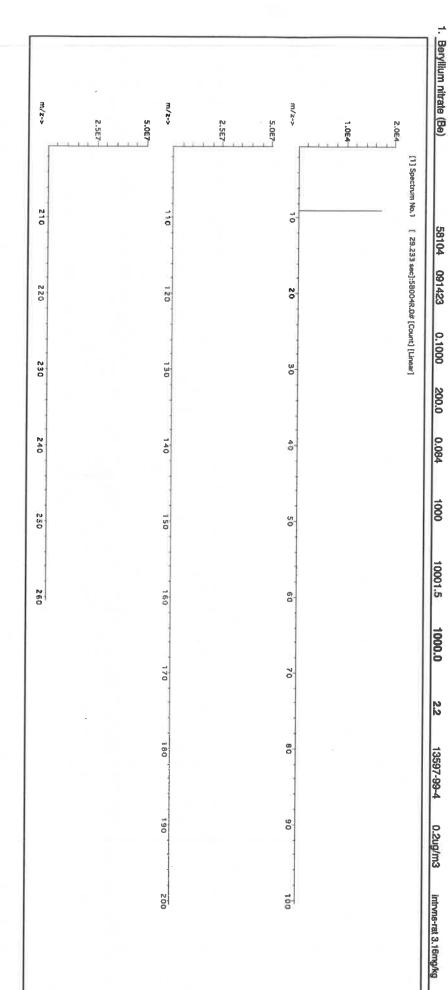
Pedro L. Rentas

102523

Reviewed By:

Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) Final +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information LD50 NIST SRM

₹







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# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

40.02 Cd 40.02 Dy 40.02 Cg 40.02 Br 40.02 Cg 40.02 Br 40.02 Cg 40.02 Gd T Cr 40.02 Gd 40.02 Co 40.02 Gg
40.02 Cd 40.02 40.02 Cc 40.02 40.02 Cc 40.02 7 Cr 40.02 40.02 Cc 40.02 40.02 Cc 40.02 40.02 Cc 40.02 40.02 Cc 40.02
40.02 Cd 40.02 40.02 Cc 40.02 40.02 Cc 40.02 7 Cr 40.02 40.02 Cc 40.02 40.02 Cc 40.02 40.02 Cc 40.02 40.02 Cc 40.02
40.02 40.02 40.02 40.02 40.02 40.02
a B B B B S B

(T) = Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

### Certified by:



All standard containers are meticulously cleaned prior to use.

2 of 2

<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

<sup>\*</sup> Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

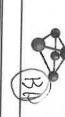
Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

All Standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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## CERTIFIED WEIGHT REPORT:

Part Number:

57050 071123 Tin (Sn) 202109 Salvents: 21110221 Lot # 1224 Nitric Acid

22D0562008

Hydrochloric acid

3 6% 10.0 30.0 Hydrochloric acid Nitric Acid Formulated By:

Benson Chan

071123

Nominal Concentration (µg/mL):

1000

Ambient (20 °C) 071126

Recommended Storage:

Expiration Date:

Description: Lot Number:

Reviewed By: Pedro L. Rentas

Weight shown below was diluted to (mL): **NIST Test Number: BTU9** 499.93 0.058 Flask Uncertainty 5E-05 Balance Uncertainty 071123

1. Ammonium hexafluorostannate(IV) (Sn) [1] Spectrum No.1 IN010 SND042023A1 RM# Number ρţ Conc. (µg/mL) Nominal 1000 (%) Uncertainty Assay
Purity (%) (%) 0.10 44.2 1.13107 Weight (g) Target 1.13286 Weight (g) Conc. (ug/ml.) Actual 1001.6 Actual +/- (µg/mL) Uncertainty Expanded 2.0 CAS# SDS Information
(Solvent Safety Info. On Attached pg.)
LD50 7 mg/m3 ₹ 3161a SRM

m/z-> ---x/m --Z/111 2.5E4 5.0E4 1.0ES 2.0E6 2.5E5 S.OEG 210 110 0 120 220 N [ 15.034 sec]:58150.D# [Count] [Linear] 230 130 8 240 140 40 250 150 Ö 160 260 60 170 70 180 80 190 90 200 100

1 of 2

Part # 57050

Lot # 071123

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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(I) = larget analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. the preparation of all standards.

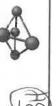
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CERTIFIED WEIGHT REPORT:						Fot#	Solvent:						
Part Number:		57027				24002546	Nitric Acid			2			
Lot Number: Description:		091923 Cobalt (Co)	ī						C fam	) may	D.		
1						2.0%	40.0	Nitric Acid	Formulated By:	Lawr	Lawrence Barry	091923	
Expiration Date:		091926					(Jw.)		1	\	0		
Recommended Storage:		Ambient (20 °C)	<b>်</b>						N.	X			
Nominal Concentration (ug/ml.):		1000							Leens	1	4		
NIST Test Number:		eUTB		5E-05	Balance Uncertainty	<b>\$</b>			Reviewed By:	Pedn	Pedro L. Rentas	091923	
Volume shown below was diluted to (mL):	r was dilute	d to (mL):	2000.02	0.058	0.058 Flask Uncertainty								
									Expanded	S	SDS Information		
	Part	ĕ	Dilution	Initial	Uncertainty	Nominal	Initial	Final	Uncertainty	(Solvent Sal	(Solvent Safety Info. On Attached pg.)	hed pg.)	NIST
Compound	Number	Number	Factor	Vol. (mL)	Vol. (ml.) Pipette (ml.) Conc. (µg/ml.)	nc. (ug/mL)	Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL)	Conc. (µg/ml.)		CAS# OSHA	OSHA PEL (TWA)	LDSO	SRM

[1] Speatrum No.1									Sulfill too willing	0110
	[ 34.243 8ec	34.243 sec]:58027.D# [Count] [Linear]	[Count] [Lit	Lagr						
<b>5.0</b> Е5				70						
m/z-> 10 20		. <b>4</b>	9	<u>.</u>	20	80	0		00	
5.0E7										
TVZ-> 110 120	130	140	150	100	170	180		0	500	
5.0E7										

1 of 2

260

280

240

230

220

010

W/z->

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## Certified Reference Material CRM





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# Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

							Trace M	etals	Verifical	tion	by ICP-M	4S (F	g/mL)						
1							STREET, STREET	No section lives	ALL DESCRIPTION OF THE PERSON	10.000	Market Mark	MINNSH.	Sanday Marine	NAME OF TAXABLE PARTY.	Service of the last	SECOND STATES		No.	A STATE OF STREET
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ౙ	<b>40.02</b>	రే	<b>40</b> 7	占	<0.02	H9	<0.02	.3	₹005	Ź	₹0.02	2	<0.02	Š	40.02	T <sub>e</sub>	40.05	5	40.02
As	40.2	ප	40.02	呂	<b>40.02</b>	ų	<0.02	Mg	10.05	ő	₹0.02	됩	<0.02	Ag	<b>40.02</b>	F	<0.02	>	₩ 40.02
쯃	<b>40.02</b>	చ	<b>40.02</b>	3	<b>4002</b>	ㅂ	<0.02	Ma	<0.02	콘	₹000	2	40.02	N <sub>a</sub>	40.2	Ę	20:0>	g,	Ø.02
2	10.05	ඊ	<b>20.02</b>	පී	<b>40.02</b>	હ	40.2	쁀	\$ 20	م	₹0.02	콥	<0.02	Şt	<b>40.02</b>	Tm	Ø.02	٨	Ø.02
遥	<b>40</b> .02	රි	۳	Ğ,	<b>4002</b>	ដ	<0.02	Mo	<b>40.02</b>	Æ	<b>20'0</b> >	S	<0.02	S	<b>40.02</b>	Sn	40.02	Zn	Ø.02
æ	<0.02	ට්	<0.02	Αn	<0.02	윤	Z0.0>	P	<0.02	м	40.2	S	<b>₩</b>	Fee Fee	<b>40,02</b>	Ħ	Ø.02	Z	Ø.02

(T)= Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.



<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.



Lot # 091923

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## Certified Reference Material CRM

M5801



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CERTIFIED WEIGHT REPORT: 1. Arsenic (As) Compound Nominal Concentration (µg/mL): M/2-> m/z-> -z/m 5.OE4 2.5E4 Recommended Storage: 1.0E5 2.0日5 1000 Volume shown below was diluted to (mL): 500 **NIST Test Number: Expiration Date:** Part Number: Description: Lot Number: [1] Spectrum No.1 210 110 0 58133 Number Part **SUTB** 1000 111326 57033 111323 Ambient (20 °C) Arsenic (As) 020522 Number 120 D D ONN NO [ 34.433 sec]:57033.D# [Count] [Linear] 0.1000 4000.0 Dilution Factor 230 130 30 Vol. (mL) 5E-05 400.0 initial 0.06 Pipette (mL) Conc. (µg/mL) Flask Uncertainty Balance Uncertainty Uncertainty 240 140 40 0.084 24002546 Nominal 2.0% Lot # 100 250 160 50 Conc. (µg/mL) Conc. (µg/mL) Nitric Acid 10001.0 Solvent: Initial 80.0 260 160 60 Nitric Acid 1000.0 Fina 170 0 Formulated By: Reviewed By: +/- (µg/ml.) Uncertainty Expanded 2.0 180 Thomas 80 7440-38-2 (Solvent Safety Info. On Attached pg.) 190 OSHA PEL (TWA) Pedro L. Rentas Lawrence Barry 90 SDS Information 0.5 mg/m3 100 000 orl-rat 500 mg/kg LD50 111323 111323 3103a NIST SRM

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# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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	322428		
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	N H M L L	letals	
9	40.2 40.2 40.2 40.2 40.2	Verifica	
= Target	M R P B O R R	E S S	
Target analyte	40.02 40.02 40.02 40.02	by ICP-N	
	S R R R R R	id) St	
R	4444 444 444 444 444 444 444 444 444 4	g/mL)	
	Ta Sr Na Sc		
	40.2 40.2 40.2 40.2 40.2 40.2		
	######################################		
(e)	40.02 40.02 40.02 40.02 40.02 40.02		
	Z Z Y Z < C &		
	40.02 40.02 40.02 40.02 40.02		

### Physical Characterization:

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Certified by:



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Certified Reference Material CRM

R102109124

MURIC

Solvent: 21110221

Nitric Acid

Lot #

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT:

Part Number: **Lot Number:** 

57115 041723

Description:

Phosphorous (P)

**Expiration Date:** 

041726

Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: 10000 Ambient (20 °C)

**BTUB** 

5E-05 Balance Uncertainty

Weight shown below was diluted to (mL): 2000.02

Number 5 Conc. (µg/mL) Nominal 0.058 Flask Uncertainty Purity 3 Uncertainty Assay Purity (%) E Target

1. Ammonium dihydrogen phosphate (P)

IN008 PV082019A1

10000

99,999

0.10

27.5

RM#

Compound

22%

40.0

Nitric Acid

Formulated By:

Lawrence Barry

041723

into

Reviewed By:

Pedro L. Rentas

Expanded SDS Information 041723

Weight (g) 72.7287 Weight (g) Conc. (ug/mL) 72.7289 Actual 10000.0 Actual +/- (µg/mL) Uncertainty 20.0 7722-76-1 CAS# (Solvent Safety Info. On Attached pg.)

# OSHA PEL (TWA) LD50 5 mg/m3 orl-rat >2000mg/kg 3186 NIST SRM

Part # 57115

1 of 2

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

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	F	3 <u>5</u>	i Re	, OC	AS	- 20	≠ ≥			
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	3	, Ç	, <del>5</del>	ဂ္ဂ	Ç	. Ç	8			
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	17	Sp	Tm	닭	ㅂ	Te	T T			
	<0.02	<0.02	<0.02	<b>∆</b> 0.02	40.02	40,02	40,02	STREET, STREET		
	Zr	Zn	₩.	\$	<	□	W			
	<0.02	<b>6002</b>	A).02	A0.02	& .02 .03	A0.02	40.02	TO THE REAL PROPERTY.		

(I)= larget analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \*Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.
\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\*All Standards should be stored with caps tight and under appropriate laboratory conditions.
\*Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

2 of 2

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com

Certified Reference Material CRM

109/24

M5817

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT:

Part Number: Lot Number: 071123 57116

Solvent:

071123

**ASTM Type 1 Water** 

Burense

Formulated By:

Lawrence Barry

071123

Lot #

**Expiration Date:** Description: 071126 Sulfur (S)

Nominal Concentration (µg/mL): NIST Test Number: 10000 Ambient (20 °C)

Recommended Storage:

EU1B

Weight shown below was diluted to (mL): 1999.48 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas SDS Information

 Ammonium sulfate (S) IN117 SLBR7225V 10000 99.9 0.10 24.3 82.4675 82,4682 10000.1 20.0 7783-20-2 Z orl-rat 4250mg/kg 3181

Number Ĕ Conc. (µg/mL) Purity 8 Uncertainty Assay Purity (%) 8 Weight (g) Target Weight (g) Conc. (µg/mL) Actual Actual +/- (µg/mL) OSHA PEL (TWA)

Expanded

071123

Uncertainty (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 SRM NIST

m/z->	1.005	m/z-> 2.0E5	2.565	5.0E5	1000	2000
0		110		0		
N N O		120		20		
230		30		<b>9</b> 0		
240		140		<b>40</b>		
250		150		50		
260		160		8		
		170		70		
		180		8.		
		190		90		
		200		100		

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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Physical Characterization:

(1)= larger analyte

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. the preparation of all standards.
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- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
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  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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## Certified Reference Material CRM

M5962 R! 06/14/24



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

m/z->		i,	m/z->		10 c	÷ is	1. Selenium (Se)	Compound		<		Nominal Co	Re			CERTIFIED WEIGHT REPORT	מדודודה שובום
210	1.008	2.008	110	1.008	/z-> 10	[1] Spectrum No.1				Volume shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	1	Lot Number: Description:	Part Number:	1 11000H
0			0		Ū	Z	58134	Number	Part	as dilute					in in in	_	
220			120		N 0	r.	071223	Number	Lot	d to (mL):	6UTB	1000	Ambient (20 °C)		060624 Selenium (Se)	57034	
Ŋ			<u></u>		ω	3.702	0.1000	Factor	Dilution	2000.07			<u>೦</u>		Se)		
230			130		90	sec]:58	200.0	Val. (mL	Initial	0.100	5E-05						
240			140		40	33.702 sec]:58034.D# [Count] [Linear]	0.084	Vol. (mL) Pipette (mL) Conc. (µg/mL)	Uncertainty	Flask Uncertainty	Balance Uncertainty						
250			150		50	Count) [L	1000	Conc. (µg/mL)	Nominal	ťγ	ainty			2.0%	24007540	24002546	
260			160		. 60	inear 2	10002.5	Conc. (µg/mL	Initial				(mL)	40.0	No.	Solvent:	
0							1000.0	Conc. (µg/mL) Conc. (µg/mL)	Final					Nitric Acid			(1)
			170		70		2.2	.) +/- (µg/mL)	Uncertainty	Expanded	Reviewed By:	K	N	Formulated By:	M		10
			180		80		7782-49-2	C	(So		y:	200	11	Ву:			
			190		90		2 0.2 mg/m3	OSHA PEL (TWA)	(Solvent Safety Info. On Attached pg.)	SDS Information	Pedro L. Rentas	lenco		Benson Chan	M		
			200		100			NA)	). On Atta	rmation	ntas	,	/	5			
			-		J		orl-rat 6700 mg/kg	LDS0	ched pg.)		060624			060624			
							3149	SRM	NIST		4			4-1		_	

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

							I race M	1etals	Verifica	lion	oy ICP-M	S (H	g/mL)						
A	40.02	CQ.	<0.02	Dy	<0.02	HH	<0.02	11	<0.02	Z.	<0.02	Pr	<0.02	Se	H	-T	40.02	W	40,02
ЗЪ	<0.02	င္ဖ	<0.2	퍜	<0.02	н	<0.02	Į	<0.02	₽	<0.02	Re	<0.02	S:	<0.02	Te	<0.02	U	<0.02
As	<0.2	ზ	<0.02	臣	<0.02	Ħ	<0.02	Mg	<0.01	°	<0.02	Rh	40.02	Ag	<0.02	∄	40.02	٧	<0.02
Ва	<0.02	Ç	<0.02	æ	<0.02	ŀ	<0.02	Mn	<0.02	Pd	40.02	₽.	<0.02	Na	<0.2	Ħ	<0.02	4	<0.02
Ве	<0.01	Ç	40.02	Ga	<0.02	F	<0.2	Ж	402	P	<0.02	R <sub>I</sub>	<0.02	St	<0.02	Tm	<0.02	¥	<0.02
В:	40.02	င္ပ	<0.02	දූ	<0.02	Ľ	<0.02	Mo	<0.02	7	<0.02	Sm	40.02	S	<0.02	Sn	40.02	Zn	<0.02
В	<0.02	Ω	<0.02	Au	<0.02	Рь	<0.02	M	<0.02	×	40.2	Sc	<0.02	Ta	<0.02	Ħ	<0.02	Zr	<0.02

(T) = Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
  \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in
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  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST

  \* Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

### Certificate of Analysis 6652M , 8782M

MORGANIC NE NE SE SEGENE YOU TREST

info@inorganicventures.com P: 800-669-6799/540-585-3030 P: 540-585-3030 R:2/22/24

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com



### ACCREDITATION / REGISTRATION

Number QSR-1034). 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 (GSR Certificate INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for

### PRODUCT DESCRIPTION

Catalog Number:

Single Analyte Custom Grade Solution Product Code:

CGTN

2% (v/v) HNO3 :xintsM T2-TI719972 Lot Number:

muineill 1 000 hg/mL ea: Value / Analyte(s): tr. HF

Starting Material Lot#: 2094 Starting Material: Ti Metal

Starting Material Purity: 99.9975%

1002 ± 5 µg/mL Certified Value: **CERTIFIED VALUES AND UNCERTAINTIES** 

1.012 g/mL (measured at 20  $\pm$  4 °C) Density:

Assay Information:

ICP Assay NIST SRM 3162a Lot Number: 130925 1002 ± 4 µg/mL Assay Method #1

The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance  $\frac{1}{1000}$ 

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mosn of individual results:

XCRANGAM =  $(x_a)$  (ucher a) X =  $x_a$  mass of Assay Method A with  $x_a$  =  $x_a$  the standard uncertainty of

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

Characterization of CRM/RM by One Method Characterization of CRM/RM by Two or More Methods

4.0 TRACEABILITY TO NIST

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

### 4.2 Balance Calibration

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

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

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 III bA-Bitter of ore each element, is reported below, solutions tested by ICP-MS were analyzed in an III bA-Bitter of the property of the property

e2 M 078220.0 > gN O 882000.0 > u3 M 8g < 0.000536 M Eu <

### ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to

Page 2 of 4

INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

> uA M 882000.0

> 9A M 886 0.000.0

> bq M 882000.0 > rq M 888200.0 > rq M 682000.0 > dg M 271100.0

> q O f81200.0 > dq M f82800.0

> iN O 882000.0 > aO M 841200.0

> dN O 322500.0 > N M 862000.0

M - Checked by ICP-MS

Mn < Mg < Li <

> 0H

> 6H

ΉŁ

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

M 976800.0 > 8 | 34500.0 M 576800.0 > 8 M 782600.0

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

> mT M 882000.0 > U M 882000.0 > V M 682000.0 W M

> 6T M 882000.0 > AT M 882000.0

sT M 034450.0 > dT M E70100.0

s 852000.0 M 882000.0

O.000269 O

O.043560 O

n2 M 068010.0 89Z000.0 > mS M 89Z000.0

> II

JS

674000.0 228610.0

892000.0 892000.0

0.000268

699630.0

0.001341

892000.0

0.010560

960000'0

960000.0

73260.0 > nZ O 402100.0 038540.0 > nZ O 267400.0

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

7.7 Storage and Handling Recommendations

oM M 882000.0

0.000268 M K 0.000268 M K 0.000268 M K

0.000872 O Fe > 0.008586 M Ga <

O 892000.0

O S37000.0 M 882000.0

M 882000.0

M 603100.0

M 885800.0

M £83200.0 > 00 M GG8020 O.004577 M Gd <

INTENDED USE

W Et < O Cn <

O B <

IA O

### 4.1 Thermometer Calibration

volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is - This product is traceable to MIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRMINM uncertainty error and the measurement, weighing and

### Page 3 of 4

- Chemical Testing - Accredited / AZLA Certificate Number 863.01

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

- QSR Certificate Number QSR-1034

1.01 ISO 9001 Qualify Management System Registration

### MOITATY STANDARD DOCUMENTATION 0.01

Homogeneity data indicate that the end user should take a minimum ample size of 0.0.2 m L to assume

This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. The Coth series alongs mirranament to be the Coth of the Coth series alongs mirranament to be the Coth series alongs mirranament.

### HOMOGENEITY

Please refer to the Safety Data Sheet for information regarding this CRWRM.

### NOITAMROANI SUOGRASAH HF Note: This standard should not be prepared or stored in glass.

Ollinger		C INTOTINATION (ICP_OEC p	Idoseomeni	
ss radial/axial view):	are given	Estimated D.L. Estimated D.L.	Technique/Line	
Interferences (Underline 11 )	Order	idq 41	ICP-MS 48 amu	
Interferences (underlined indicates severe) 32S16O, 32S14N,	A/N	add		
14N160180,				
14N17N2, 36Ar12C,				
48Ca, [96X=2				
7-V001 (no a				
(where X = Zr, Mo, Ru)]		10000 () 1900 ()	ICP-OES 323.452 nm	
Ce, Ar, Ni		Jm/gu Se000.0 \ +200.0	ICP-0ES 334.941 nm	
		m/pu 820000.0 \ 8500.0	ICP-OES 336.121 nm	
ла, Та, Сг, U М М9 Ω-	1 1		F Note: This standar	ŀ
W, Mo, Co		In/gy 4500000 \ cocos-	nous prepries sur res	٠

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/a

1:1:1 H2O / HF./ H2SO4 or fuse ash with pyrosulfate if oxide is as plastic pigment and likely in brookite Volentily), Oxide - Northere are repetation; and sociation; restore (Dissolved by heating in 1737 HZO / HF / HZSO4); Oxide - Northere history (~800EC) brooklie (fuse in Pt0 with KZSZO7); Ores (fuse in Pt0 with KZZZO7); Ores (fuse in Pt0 with provide it as plastic pigment and likely in brooktie (fuse in Pt0 with provide it as plastic pigment and likely in brooktie TI Containing Samples (Preparation and Solution) - Metal (Soluble in H2O / HF caution -powder reacts

HNO3 / LDPE container. 1-10,000 ppm single element solutions as the Ti(F)6-2 chemically stable for years in 2-5% HNO3 / trace HF in an LDPE container. with a fendency to hydrolyze forming the hydrated oxide in all dilute acids except HE.

Stability - 2-100 ppb levels stable (Alone or mixed with all other metals) as the Ti(F)6-2 for months in 1%

HNO3 / LDPE container. 1-10.000 ppm sincle element solutions as the Ti(F)8-2 chemically stable for year media. Unstable at ppm levels with metals that would pull F-away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions with a tendency to hydrolyze forming the hydrafed oxide in all dilute adds except HF. Chemical Compatibility - Soluble in concentrated HCI, HF, H3PO4 H2SO4 and HNO3. Avoid neutral to basic Atomic Weight, Valence; Coordination Number; Chemical Form in Solution - 47.87 +4 6 Ti(F)6-2

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

reported density. Do not pipette from the container. Do not refurn removed aliquots to container. - After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$  -  $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the renorded density. Do not pipelte from the container. Do not return removed alticular to container.

Twitte sociate in the secied 101 beg, trainspleaded for the orderiver in the shalfy 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. - While stored in the sealed TCT bag, transpiration of this CRWRM is negligible. After opening the sealed TCT bag, transpiration in a negligible in the capture managed in the capture

- Store between approximately  $4^{\circ}$  - 30° C while in sealed TCT bag.

Page 4 of 4

Chairman / Senior Technical Director

- Sealed TCT Bag Open Date:

NAMES AND SIGNATURES OF CERTIFYING OFFICERS

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

CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

norganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.859.5790; 540.855.3030, Fax: 540.555.3012; Inorga - Reference Material Producer - Accredited / A2LA Certificate Number 883.02 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- This CRMRM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRMRM being stored and handled in accordance with the instructions given in Sec. 7.1.

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

- The certification is valid within the measurement uncertainty specified provided the CRWRM is stored and handled in accordance with instructions given in  $Sec\ 7.1$ . This certification is nullified if instructions in  $Sec\ 7.1$  are not followed or if the CRWRM is damaged, confaminated, or otherwise modified.

Thomas Kozikowski Manager, Quality Control Certificate Approved By:

thibils Validity

- June 17, 2027 11.2 Lot Expiration Date

June 17, 2022 11.1 Certification Issue Date

Paul Gaines Certifying Officer:

0.Sr

0.11

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com

## Certified Reference Material CRM

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com			×	18 EZ X	ertified R	eference l	Certified Reference Material CRM	2	72/		ANA AR- https:	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	credited Number ards.com
CERTIFIED WEIGHT REPORT:						Lot #	Solvent:						
Part Number: Lot Number:		57092 060724				24002546	Nitric Acid		2	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	1 parte		020
Description:		Uranium (U)	q						* APV	3			
						2.0%	40.0	Nitric Acid	Formulated By:		Giovanni Esposito	060724	
Expiration Date:		060727					(mf.)		7		2		
Recommended Storage:		Ambient (20 °C)	<b>်</b>							1	V		
Nominal Concentration (µg/mL):		1000							Jan	to the	Code		
NIST Test Number:		<b>6UTB</b>		5E-05 Balance	Balance Uncertainty	inty			Reviewed By:		Pedro L. Rentas	060724	
Volume shown below was diluted to (mL):	was dilute	d to (mL):	2000.07	0.100	0.100 Flask Uncertainty			-					<u> </u>
									Expanded		SDS Information	ion	
	Part	Lot	Dilution	Initial	Initial Uncertainty	Nominal	Initial	Final	Uncertainty	(Solvent	(Solvent Safety Info. On Attached pg.)	Attached pg.)	TSIN
Compound	Number	Number	Factor	Vol. (mL)	Vol. (mL) Pipette (mL) Conc. (µg/mL)	Conc. (µg/mL)	Conc. (µg/mL) Conc. (µg/mL)	Conc. (µg/mL)	+/- (ug/mL)	CAS#	OSHA PEL (TWA)	DSO.	SRM
1. Uranyl nitrate hexahydrate (U)	58192	58192 041524	0.1000		200.0	1000	10001	1000.0	c	4000004	200		
				1	5000	200	2.10001	NOON!	217	13020-83-7	U.US ING/IIIS	on-rat 1040 mg/kg	3164

1.0E6	2 ************************************			3		•				
5.0E5										
m/z-> 5.0E4	10	O	O <sub>E</sub>	6	Og	O O	0,	08	OG	100
2.5E4										
m/z->	0	1 NO	130	64.0	160	160	170	180	190	000
5.0E5				***************************************						
m/a->	OF	8	230	240	250	260				

Lot # 060724





ANAB ISO 17034 Accredited AR-1539 Certificate Number https:///Absolutestandards.com

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

	Se
CP-MS (µg/m	40.02 Re <0.02 40.02 Rh <0.02 40.02 Rh <0.02 40.02 Rb <0.02 40.02 Sm <0.03 40.02 Sm <0.03
ication by I	Z S S Z a & x
letals Verif	Li <0.02 Lu <0.02 Mg <0.03 Mn <0.02 Hg <0.02 Mo <0.02 Nd <0.03
Trace A	Hf
	40.02 40.02 40.02 40.02 40.02 40.02 40.02 40.02 40.02 40.02 40.02 40.02
	0.02 Br 0.02 Br 0.02 Bu 0.02 Gd 0.02 Ga 0.02 Ga
	222222
	40.02 40.02 40.02 40.02 40.02 40.02
	B Bi B

(T) = Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.





2 of 2

<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

All standard containers are meticulously cleaned prior to use.

<sup>\*</sup> Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* All standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



Certificate of Analysis

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:

Multi Analyte Custom Grade Solution

Catalog Number:

IV-STOCK-12

Lot Number:

U2-MEB734294

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

10 µg/mL ea:

Barium, Bismuth, Cobalt, Lithium.

Lead,

Beryllium, Cerium, Indium,

Nickel. Uranium

### 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

ANALYTE	CERTIFIED VALUE	ANALYTE	<b>CERTIFIED VALUE</b>
Barium, Ba	10.01 ± 0.04 µg/mL	Beryllium, Be	10.01 ± 0.05 μg/mL
Blsmuth, Bl	10.01 ± 0.06 µg/mL	Cerium, Ce	10.01 ± 0.04 μg/mL
Cobalt, Co	10.01 ± 0.05 μg/mL	Indium, in	10.01 ± 0.04 μg/mL
Lead, Pb	10.00 ± 0.04 μg/mL	Lithium, Li	10.01 ± 0.04 µg/mL
Nickel, Ni	10.01 ± 0.04 µg/mL	Uranium, U	10.01 ± 0.05 µg/mL

Density: 1.025 g/mL (measured at 20  $\pm$  4 °C)

**Assay Information:** 

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ва	ICP Assay	3104a	140909
Ва	Calculated		See Sec. 4.2
Ва	Gravimetric		See Sec. 4.2
Ве	ICP Assay	3105a	090514
Be	Calculated		See Sec. 4.2
Bi	ICP Assay	3106	180815
Ce	ICP Assay	3110	160830
Ce	EDTA	928	928
Ce	Calculated		See Sec. 4.2
Co	ICP Assay	3113	190630
Co	EDTA	928	928
Co	Calculated		See Sec. 4.2
In	ICP Assay	3124a	110516
In	EDTA	928	928
In	Calculated		See Sec. 4.2
Li	ICP Assay	3129a	100714
Lí	Calculated		See Sec. 4.2
Li	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
Ni	Calculated		See Sec. 4.2
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Pb	Calculated		See Sec. 4.2
U	ICP Assay	traceable to 3164	R2-U689597
U	Calculated		See Sec. 4.2

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 or More Methods

Certified Value, X<sub>CRMRM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

 $X_{CRM/RM} = \Sigma(w_i) (X_i)$ 

 $X_i$  = mean of Assay Method i with standard uncertainty  $u_{char\ i}$ 

 $\mathbf{w}_{\parallel}$  = the weighting factors for each method calculated using the inverse square of the variance:

 $w_i = (1/u_{\text{char }i})^2/\left(\Sigma(1/(u_{\text{char }i})^2)\right)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} \approx k \left(u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts}\right)^{\frac{1}{2}}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{1/2}$  where  $u_{char}$  are the errors from each characterization method

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value,  $X_{CRWRM}$ , where one method of characterization is used is the mean of individual results:

 $X_{CRM/RM} = (X_a) (u_{char} a)$ 

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (2) =  $U_{CRM/RM} = k (u^2_{chars} + u^2_{bb} + u^2_{its} + u^2_{ts})^{\frac{1}{2}}$ 

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

u<sub>ts</sub> = transport stability standard uncertainty

### **Certified Abundance:**

### IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.8 ± 0.1
Uranium 235U	0.19 ± 0.05

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

N/A

### 6.0 INTENDED USE

- **6.1** This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- 6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale.</u>

  <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

### 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

### 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

June 21, 2023

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- June 21, 2028
- 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

<ul> <li>Sealed TCT Bag Open Date</li> </ul>	o:

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. 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 Approved By:

Thomas Kozikowski Manager, Quality Control

### **Certifying Officer:**

Paul Gaines
Chairman / Senior Technical Director

Paul R. Simo

## Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



## Certified Reference Material CRM

9 R19/30

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

m/2>	5.0m/	m/z->>	5.0E7	m/z-*-	G. O. M. G.	*. O M O	Zirconyl chloride octahydrate (Zr)	Compound		Velime	Recommended Storage: Nominal Concentration (μg/mL):	D.		CERTIFIED WEIGHT REPORT:
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https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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	Z;		
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### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.

  \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

  \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.

  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

www.absolutestandards.com

Part Number:

Lot Number:



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT:

Formulated By: Diovannie Giovanni Esposito 2 Septe 101124

Pedro L. Rentas

101124

Recommended Storage: **Expiration Date:** Description: 101124

Manganese (Mn)

Ambient (20 °°)

Manganese (20 °°) 1000

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): **NIST Test Number:** ETUB ត្ត 4000.2 Nominal 0.10 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Actual Reviewed By: Uncertainty Expanded (Solvent Safety Info. On Attached pg.)

RM#

Number

Conc. (µg/mL)

8

Purity (%)

8

Weight (g)

Weight (g) Conc. (µg/ml.)

+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM NIST T SDS Information

 Manganese(II) nitrate hydrate (Mn) IN031 MNM082020A1 1000 99.999 0.10 20.8 19.2322 19.2344 1000.1 2. 0 15710-66-4 5 mg/m3 orl-rat >300mg/kg 3132

m/z->	5.0E7	1.0E8	5.0E7	1.0E8	7-2/2	N UI	5. OE6
							[1] 88
0		110			0		[1] Spectrum No.1
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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Г							Trace Me	etals	Verifica	tion	by ICP-	SM	(µg/mL)						
A	40.02	2	40.02	Dγ	40.02	H	<0.02	<u>E</u>	<0.02	Z	<0.02	꾸	<0.02	Se	40.2	<u>4</u>	<0.02	*	<0.02
dS	<0.02	ರಿ	<0.2	뎍	<0.02	Н	<0.02	Ę	40.02	ş	<0.02	Re	<0.02	ž.	40.02	Te	<0.02	c	<0.02
As	40.2	င္ပ	<0.02	띹	<0.02	In	<0.02	Mg	40.01	0°	<0.02	쫑	<0.02	A	8,02	1	<0.02	<	40.02
Ba	40.02	ς,	40.02	ନୁ	40.02	F.	40.02	Mn	H	Pd	<0.02	<b>&amp;</b>	40.02	Z	40,2	1	<0.02	충	<b>&lt;</b> 0.02
Ве	40.01	ប៉	<0.02	ଦ୍ମ	40.02	7,	40.2	Hg	40.2	Þ	<0.02	Ru	40.02	Sr	0.02	Tm	<0.02	×	<0.02
Bi	0.02	ဝ	<0.02	ନ୍ମ	40.02	La	<0.02	Mo	40.02	7	40.02	Sm	<0.02	S	A.02	Sn	<0.02	Zn	<b>60.02</b>
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	×	40.2	S	<0.02	Ta	40.02	크	<0.02	Zr	<0.02
									}										

(T) = Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

### Certified by:



- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm delonized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

M6137

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:

Single Analyte Custom Grade Solution

Catalog Number:

CGSI1

Lot Number:

V2-SI744713

Matrix:

tr. HNO3

tr. HF

Value / Analyte(s):

1 000 µg/mL ea:

Silicon

Starting Material:

Silica

Starting Material Lot#:

1771

Starting Material Purity:

99.9981%

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Certified Value:** 

999 ± 6 µg/mL

Density:

1.003 g/mL (measured at 20 ± 4 °C)

### **Assay Information:**

Assay Method #1

999 ± 5 µg/mL

ICP Assay NIST SRM Traceable to 3150 Lot Number: S2-Si702546

Assay Method #2

1000 ± 7 µg/mL

Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 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 or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results;

### $X_{CRM/RM} = \Sigma(w_i) \{X_i\}$

 $X_i$  = mean of Assay Method I with standard uncertainty  $u_{char\ i}$   $w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

 $w_i = (1/u_{char})^2 / (\Sigma(1/(u_{char})^2))$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{its} + u^2_{bs})^{1/2}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2/u_{char})^2)]^{1/2}$  where  $u_{char}$  are the errors from each characterization method  $u_{bb}$  = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

### uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

 $X_{CRM/RM} = (X_a) (u_{char})$ 

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u_{chara}^2 + u_{bb}^2 + u_{its}^2 + u_{ts}^2)^{1/2}$ 

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty u<sub>lts</sub> = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

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  $0.3~\mu m$ .

Αl		0.010787					0	Na		0.001656	IVI	Se	<	0.022000	M	Zn	<	0.002500
۸۵		0.010707	М	Fe	<	0.027000	M	Nb	<	0.001300	s	Si	<		0	Zr	<	0.001900
r\s	<	0.001900	М	Ga	<	0.001300	M	Nd	<	0.000310	М	Sm	<	0.000310				
Au	<	0.000910	М	Gd	<	0.000310	M	Ni	<	0.005500	М	Sn		0.000096				
В		0.016180	M	Ge	<	0.001900	M	Os	<	0.000610	0	Sr		0.000092				
Ba		0.000096	M	Hf		0.000423	i	Р	<		M	Ta		0.002542				
Be	<	0.000570	М	Hg	<	0.000610	M	Pb	<	0.000310	М	Tb	<	0.000310				
Bi	<	0.000310	М	Но	<	0.000610	M	Pd	<	0.000610	М	Te	<	0.000910				
Ca		0.011557	М	ln	<	0.000310	M	Pr	<	0.000310	М	Th	<	0.001900				
Cd	<	0.000310	M	lr	<	0.000310	M	Pt	<	0.000310	M	Ti		0.001078				
Ce	<	0.000610	0	K		0.000577	M	Rb	<	0.009100	M	TI	<	0.000310				
Co	<	0.001600	M	La	<	0.000310	M	Re	<	0.000310	M	Tm	<	0.000310				
Cr	<	0.010000	0	Li	<	0.000460	M	Rh	<	0.000310	М	U	<	0.000310				
Cs	<	0.000310	M	Lu	<	0.000310	M	Ru	<	0.000310	0	V	<	0.001300				
Cu	<	0.002500	0	Mg		0.001348	0	S	<	0.570000	М	W	<	0.001900				
Dy	<	0.000310	М	Mn	<	0.002500	M	Sb	<	0.000310	М	Υ	<	0.000310				
Er	<	0.000310	M	Мо	<	0.000310	0	Sc	<	0.000590	M	Yb	<	0.000310				
	Au B Ba Be Bi Ca Cd Ce Co Cr Cs Cu Dy	B Ba Be < Ca Cd < Ce < Co < Cr < Cs < Cu < Dy <	Au < 0.000910 B 0.016180 Ba 0.00096 Be < 0.000570 Bi < 0.000310 Ca 0.011557 Cd < 0.000310 Ce < 0.000610 Co < 0.001600 Cr < 0.010000 Cs < 0.000310 Cu < 0.002500 Dy < 0.000310	Au < 0.000910 M B 0.016180 M Ba 0.000096 M Be < 0.000570 M Bi < 0.000310 M Ca 0.011557 M Cd < 0.000310 M Ce < 0.000610 O Co < 0.001600 M Cr < 0.010000 O Cs < 0.000310 M Cu < 0.002500 O Dy < 0.000310 M	Au < 0.000910 M Gd B 0.016180 M Ge Ba 0.00096 M Hf Be < 0.000570 M Hg Bi < 0.000310 M Ho Ca 0.011557 M In Cd < 0.000310 M Ir Ce < 0.000610 O K Co < 0.001600 M La Cr < 0.010000 O Li Cs < 0.000310 M Lu Cu < 0.002500 O Mg Dy < 0.000310 M Mn	Au < 0.000910 M Gd < B 0.016180 M Ge < Ba 0.00096 M Hf Be < 0.000570 M Hg < Bi < 0.000310 M Ho < Ca 0.011557 M In < Cd < 0.000310 M Ir < Ce < 0.000610 O K Co < 0.000610 O K Co < 0.010000 M La < Cr < 0.010000 O Li < Cs < 0.000310 M Lu < Cu < 0.000310 M Lu < Cu < 0.000310 M M Cu < Co < 0.000310 M Lu < Co < 0.000310 M Lu < Co < 0.000310 M M Cu < Cu < 0.000310 M M Cu < Cu < 0.000310 M M Cu < Cu < 0.000310 M M Cu <	Au          0.000910 M         Gd          0.000310           B         0.016180 M         Ge          0.001900           Ba         0.000570 M         Hg          0.000610           Be         0.000310 M         Ho          0.000610           Ca         0.011557 M         In          0.000310           Cd         0.000310 M         Ir          0.000310           Ce         0.000610 O         K         0.000577           Co         0.001600 M         La          0.000310           Cr         0.010000 O         Li          0.000310           Cu         0.000310 M         Lu          0.000310           Cu         0.000310 M         Lu          0.000310           Cu         0.002500 O         Mg         0.001348           Dy         0.000310 M         Mn          0.002500	Au < 0.000910 M Gd < 0.000310 M B	Au < 0.000910 M Gd < 0.000310 M Ni B	Au < 0.000910 M Gd < 0.000310 M Ni < B	Au         0.000910 M         Gd         0.000310 M         Ni         0.005500           B         0.016180 M         Ge         0.001900 M         Os         0.000610           Ba         0.000096 M         Hf         0.000423 i         P           Be         0.000570 M         Hg         0.000610 M         Pb         0.000310           Bi         0.000310 M         Ho         0.000610 M         Pd         0.000310           Ca         0.011557 M         In         0.000310 M         Pr         0.000310           Cd         0.000310 M         Ir         0.000310 M         Pt         0.000310           Ce         0.000610 O         K         0.000577 M         Rb         0.009100           Co         0.001600 M         La         0.000310 M         Re         0.000310           Cr         0.010000 O         Li         0.000460 M         Rh         0.000310           Cs         0.000310 M         Lu         0.000310 M         Ru         0.000310           Cu         0.0002500 O         Mg         0.001348 O         S         0.570000           Dy         0.000310 M         Mn         0.002500 M         Sb         0.00	Au          0.000910 M         Gd          0.000310 M         Ni          0.005500 M           B         0.016180 M         Ge          0.001900 M         Os          0.000610 O           Ba         0.00096 M         Hf         0.000423 i         P          M           Be          0.000570 M         Hg          0.000610 M         Pb          0.000310 M           Bi          0.000310 M         Ho          0.000610 M         Pr          0.000310 M           Ca         0.011557 M         In          0.000310 M         Pr          0.000310 M           Cd          0.000310 M         Ir          0.000310 M         Pt          0.000310 M           Ce          0.000610 O         K         0.000577 M         Rb          0.009100 M           Co          0.001600 M         La          0.000310 M         Re          0.000310 M           Cr          0.010000 O         Li          0.000310 M         Re          0.000310 M           Cr          0.000310 M         Lu          0.000310 M         Ru          0.000310 M           Cr          0.010000 O         Li          0.000310 M         Ru          0.000310 M           Cu          0.002500 O	Au         0.000910 M         Gd         0.000310 M         Ni         0.005500 M         Sn           B         0.016180 M         Ge         0.001900 M         Os         0.000610 O         Sr           Ba         0.00096 M         Hf         0.000423 i         P         M         Ta           Be         0.000570 M         Hg         0.000610 M         Pb         0.000310 M         Tb           Bi         0.000310 M         Ho         0.000610 M         Pc         0.000310 M         Tb           Ca         0.011557 M         In         0.000310 M         Pr         0.000310 M         Th           Cd         0.000310 M         Ir         0.000310 M         Pt         0.000310 M         Th           Ce         0.000610 O         K         0.000577 M         Rb         0.000310 M         Ti           Co         0.000610 O         K         0.000577 M         Rb         0.000310 M         Ti           Co         0.001600 M         La         0.000310 M         Re         0.000310 M         Ti           Cr         0.000310 M         Lu         0.000310 M         Re         0.000310 M         U           Cs         0.000	Au          0.000910 M         Gd <	Au          0.000910 M         Gd          0.000310 M         Ni          0.000510 M         Sn          0.000092           B         0.016180 M         Ge          0.001900 M         Os          0.000610 O         Sr          0.000092           Ba         0.00096 M         Hf          0.000423 i         P          M Ta         0.002542           Be          0.000570 M         Hg          0.000610 M         Pb          0.000310 M         Tb          0.000310           Bi          0.000310 M         Ho          0.000610 M         Pd          0.000610 M         Tb          0.000910           Ca         0.011557 M         In          0.000310 M         Pr          0.000310 M         Th          0.001900           Cd          0.000310 M         Ir          0.000310 M         Pt          0.000310 M         Ti          0.001078           Ce          0.000610 O         K         0.000577 M         Rb          0.000310 M         Ti          0.000310           Co          0.001600 M         La          0.000310 M         Re          0.000310 M         Ti          0.000310           Cr          0.010000 O         Li          0.000310 M         Re          0.000310 M	As < 0.001900 M Ga < 0.001300 M Nd < 0.000310 M Sm < 0.000310  Au < 0.000910 M Gd < 0.000310 M Ni < 0.005500 M Sn	As < 0.001900 M Ga < 0.001300 M Nd < 0.000310 M Sm < 0.000310  Au < 0.000910 M Gd < 0.000310 M Ni < 0.005500 M Sn  0.000096  B	As < 0.001900 M Ga < 0.001300 M Nd < 0.000310 M Sm < 0.000310  Au < 0.000910 M Gd < 0.000310 M Ni < 0.005500 M Sn  0.000096  B

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

**6.1** This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale</u>, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

### 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

Atomic Welght; Valence; Coordination Number; Chemical Form in Solution - 28.09 +4 6 Si(OH)x(F)y2-Chemical Compatibility -Soluble in HCl, HF, H3PO4 H2SO4 and HNO3 as the Si(OH)x(F)y2-. Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths, or high levels of transition elements unless they are fluorinated. Stable with most inorganic anions with a tendency to hydrolyze forming silicic acid (silicic acid is soluble up to ∼100 ppm in water) in all dilute acids

except HF.

Stability - 2-100 ppb levels - stability unknown - (alone or mixed with all other metals) as the Si(OH)x(F)y2-. 1-10,000 ppm single element solutions as the Si(OH)x(F)y2- chemically stable for years in 2-5 % HNO3 / trace HF in a LDPE container.

Si Containing Samples (Preparation and Solution) -Metal (Soluble in 1:1:1 H2O / HF / HNO3); Oxide - SiO2, amorphic (dissolve by heating in 1:1:1 H2O / HF / HNO3); Oxide - quartz (fuse in Pt0 with Na2CO3); Geological Samples(fuse in Pt0with Na2CO3 followed by HCl solution of the fuseate); Organic Matrices containing silicates and non volatile silicon compounds (dry ash at 4500C in Pt0 and dissolve by gently warming with 1:1:1 H2O / HF / H2SO4 or fuse / ash with Na2CO3 and dissolve fuseate with HCl / H2O); Silicone Oils - dimethyl silicones depolymerize to form volatile monomer units when heated (Measure directly in alcoholic KOH / xylene mixture where sample is treated first with the KOH at 60-1000C to "unzip" the Si- O-Si polymeric structure or digest with conc. H2SO4 / H2O2 followed by cooling and dissolution of the dehydrated silica with HF.) Note that the direct analysis of silicone oils in an organic solvent will result in false high results due to high vapor pressure of volatile monomer units like hexamethylcyclotrisiloxane. The KOH forms the K2+Si(CH3)2O= salt which is not volatile at room temperature.

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 28 amu	4000 - 8000 ppt	N/A	N2, 12C16O
ICP-OES 212.412 nm	0.02/0.01 µg/mL	1	Hf, Os, Mo, Ta
ICP-OES 251.611 nm	0.012/0.003 µg/mL	1	Ta, U, Zn, Th
ICP-OES 288.158 nm	0.03/0.004 µg/mL	1	Ta, Ce, Cr, Cd. Th

HF Note: This standard should not be prepared or stored in glass.

### 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.

### **QUALITY STANDARD DOCUMENTATION** 10.0

### 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

July 10, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- July 10, 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:	
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- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

### NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0 Certificate Prepared By:

**Uyen Truong** Custom Processing Supervisor Mayyand Man
Paul R. Laine

### Certificate Approved By:

Muzzammil Khan Stock Laboratory Supervisor

**Certifying Officer:** 

**Paul Gaines** Chairman / Senior Technical Director

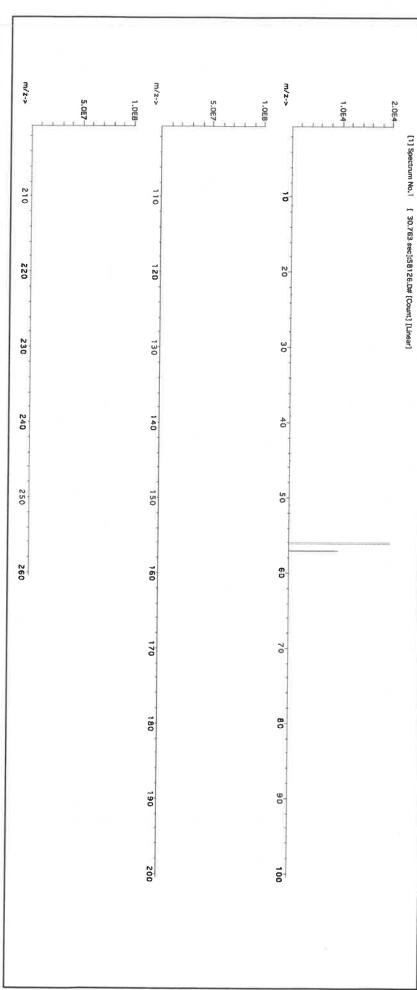
Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: Lot#

Nominal Concentration (µg/mL): Recommended Storage: Weight shown below was diluted to (mL): NIST Test Number: **Expiration Date:** Part Number: Description: Lot Number: 58126 011025 Iron (Fe) **8TB** 10000 011028 Ambient (20 °C) 2000.07 R->1/18/25 M6140 0.100 Flask Uncertainty 5E-05 Balance Uncertainty Solvent: 24012496 22% 40.0 Nitric Acid Nitric Acid Reviewed By: Formulated By: Pedro L. Rentas Benson Chan 011025 011025

 Iron(III) nitrate nonahydrate (Fe) IN028 FED082023A1 RM# Number Q Conc. (µg/mL) 10000 Nominal 886.66 Purity B Purity (%) Uncertainty 0.10 B 153.8534 Weight (g) Target ###### Weight (g) Conc. (µg/mL) Actual 10000.2 Actual +/- (µg/mL) Uncertainty Expanded 20.0 7782-61-8 CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information 1 mg/m3 orl-rat 3250mg/kg 3126A D50 NIST SRM



# Certified Reference Material CRM



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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(T)= Target analyte

# Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

  \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.

  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



# Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: 1. Potassium nitrate (K) Compound Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): Recommended Storage: **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: IN034 KD062022A1 BTU9 57119 103024 Potassium (K) M6141 10000 103027 Ambient (20 °C) Number 5 Conc. (µg/mL) 4000.1 10000 716142 Nominal R->1/13/25 0.15 Flask Uncertainty 99.999 5E-05 Balance Uncertainty Purity 8 Uncertainty Purity (%) 0.10 Solvent: 24002546 Assay 37.7 E 2% Weight (g) 106.1040 Target 80.0 Lot # Nitric Acid Nitric Acid ###### Weight (g) Conc. (µg/mL) Actual 10001.1 Actual Reviewed By: Formulated By: +/- (µg/mL) Uncertainty Expanded 20,0 Tieranie. 7757-79-1 CAS# (Solvent Safety Info. On Attached pg.) Pedro L. Rentas Giovanni Esposito からからかん OSHA PEL (TWA) **SDS Information** 5 mg/m3 orl-rat 3750 mg/kg 3141a LD50 103024 103024 SRM NIST

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https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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(i) = larget analyte

# Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard

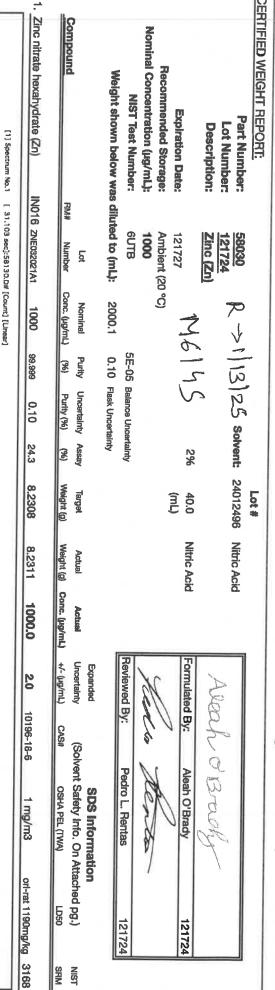
Certified by:

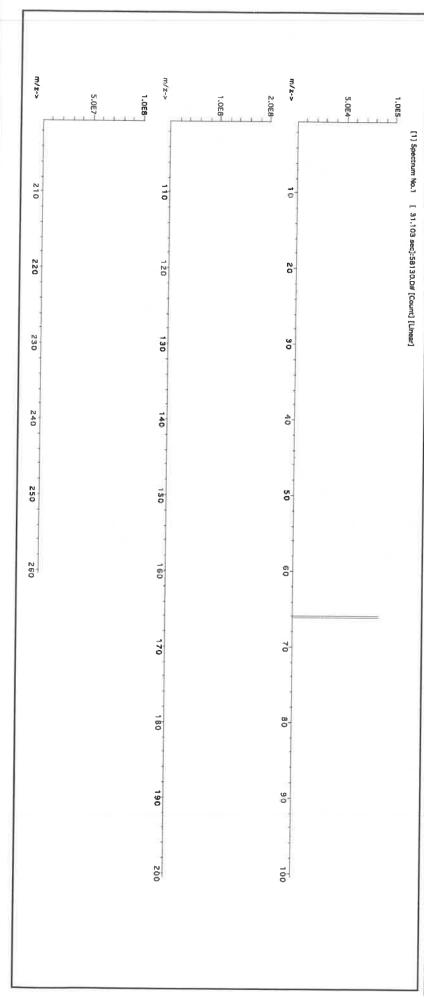
- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.

  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994)

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

# Www.absolutestandards.com CERTIFIED WEIGHT REPORT:





Part # 58030



# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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					1													

(T) = Target analyte

# Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Part # 58030

Hydrochloric Acid, 36.5-38.0% BAKER INSTRA-ANALYZED® Reagent For Trace Metal Analysis





M6151

R-> 1/15/25

Material No.: 9530-33

Batch No.: 22G2862015 Manufactured Date: 2022-06-15

Retest Date: 2027-06-14

Revision No.: 0

# Certificate of Analysis

Test	Specification	Result
ACS - Assay (as HCI) (by acid-base titrn)	36.5 - 38.0 %	
ACS - Color (APHA)	50.5 - 36.0 % ≤ 10	37.9 %
ACS - Residue after Ignition	≤ 3 ppm	5
ACS - Specific Gravity at 60°/60°F		< 1 ppm
ACS – Bromide (Br)	1.185 - 1.192	1.191
ACS - Extractable Organic Substances	≤ 0.005 %	< 0.005 %
ACS - Free Chlorine (as Cl2)	≤ 5 ppm	< 1 ppm
Phosphate (PO <sub>4</sub> )	≤ 0.5 ppm	< 0.5 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.05 ppm	< 0.03 ppm
Sulfite (SO₃)	≤ 0.5 ppm	< 0.3 ppm
Ammonium (NH <sub>4</sub> )	≤ 0.8 ppm	0.3 ppm
Trace Impurities - Arsenic (As)	≤ 3 ppm	< 1 ppm
Trace Impurities - Aluminum (AI)	≤ 0.010 ppm	< 0.003 ppm
Arsenic and Antimony (as As)	≤ 10.0 ppb	1.3 ppb
Trace Impurities - Barium (Ba)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities - Beryllium (Be)	≤ 1.0 ppb	0.2 ppb
Trace Impurities - Bismuth (Bi)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Boron (B)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 20.0 ppb	< 5.0 ppb
Trace Impurities - Calcium (Ca)	≤ 1.0 ppb	< 0.3 ppb
	≤ 50.0 ppb	163.0 ppb
Trace Impurities - Chromium (Cr)	≤ 1.0 ppb	0.7 ppb
Trace Impurities - Cobalt (Co)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities - Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities – Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb
Frace Impurities – Gold (Au)	≤ 4.0 ppb	0.6 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Frace Impurities – Iron (Fe)	≤ 15 ppb	6 ppb

>>> Continued on page 2 >>>

Hydrochloric Acid, 36.5-38.0% BAKER INSTRA-ANALYZED® Reagent For Trace Metal Analysis





Material No.: 9530-33 Batch No.: 22G2862015

Test	Specification	Result
Trace Impurities – Lead (Pb)	≤ 1.0 ppb	< 0.5 ppb
Trace Impurities - Lithium (Li)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Magnesium (Mg)	≤ 10.0 ppb	2.9 ppb
Trace Impurities - Manganese (Mn)	≤ 1.0 ppb	< 0.4 ppb
Trace Impurities – Mercury (Hg)	≤ 0.5 ppb	0.1 ppb
Trace Impurities – Molybdenum (Mo)	≤ 10.0 ppb	< 3.0 ppb
Trace Impurities - Nickel (Ni)	≤ 4.0 ppb	< 0.3 ppb
Trace Impurities - Niobium (Nb)	≤ 1.0 ppb	0.8 ppb
Trace Impurities - Potassium (K)	≤ 9.0 ppb	< 2.0 ppb
Trace Impurities - Selenium (Se), For Information Only		< 1.0 ppb
Trace Impurities - Silicon (Si)	≤ 100.0 ppb	< 10.0 ppb
Trace Impurities - Silver (Ag)	≤ 1.0 ppb	0.5 ppb
Trace Impurities – Sodium (Na)	≤ 100.0 ppb	2.3 ppb
Trace Impurities – Strontium (Sr)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Tantalum (Ta)	≤ 1.0 ppb	1.6 ppb
Trace Impurities – Thallium (TI)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Tin (Sn)	≤ 5.0 ppb	4.0 ppb
Trace Impurities – Titanium (Ti)	≤ 1.0 ppb	1.5 ppb
Trace Impurities – Vanadium (V)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Zinc (Zn)	≤ 5.0 ppb	0.8 ppb
Frace Impurities – Zirconium (Zr)	≤ 1.0 ppb	0.3 ppb

Hydrochloric Acid, 36.5-38.0% BAKER INSTRA-ANALYZED® Reagent For Trace Metal Analysis





Material No.: 9530-33 Batch No.: 22G2862015

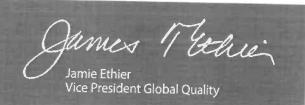
Test

Specification

Result

For Laboratory, Research, or Manufacturing Use Product Information (not specifications): Appearance (clear, fuming liquid) Meets ACS Specifications Storage Condition: Store below 25 °C.

Country of Origin: USA Packaging Site: Phillipsburg Mfg Ctr & DC





# Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

R→1/7/23 M6153 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:** 

Single Analyte Custom Grade Solution

Catalog Number:

CGSR10

Lot Number:

V2-SR745329

Matrix:

2% (v/v) HNO3

Value / Analyte(s):

10 000 μg/mL ea:

Strontium

Starting Material:

Strontium Carbonate

Starting Material Lot#:

2647

Starting Material Purity:

99.9960%

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Certified Value:** 

 $10081 \pm 39 \mu g/mL$ 

Density:

1.030 g/mL (measured at 20 ± 4 °C)

# **Assay Information:**

Assay Method #1

10059 ± 50 μg/mL

ICP Assay NIST SRM Traceable to 3153a Lot Number: K2-SR650985

Assay Method #2

10087 ± 26 µg/mL

EDTA NIST SRM 928 Lot Number: 928

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 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 or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

# $X_{CRM/RMi} = \Sigma(w_i) (X_i)$

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char</sub>

wi = the weighting factors for each method calculated using the inverse square of

$$w_i = (1/u_{\rm char\ i})^2 \, / \, (\Sigma (1/(u_{\rm char\ i})^2)$$

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{\frac{1}{2}}$ 

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{1/2}$  where  $u_{char}$  i are the errors from each characterization method

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

# Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u_{chara}^2 + u_{bb}^2 + u_{its}^2 + u_{ts}^2)^{1/2}$ 

k = coverage factor = 2

 $\mathbf{u}_{\mathbf{char}\;\mathbf{a}}$  = the errors from characterization

 $\mathbf{u}_{\mathbf{b}\mathbf{b}}$  = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

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 µm.

М	Ag	<	0.000960	М	Eu	<	0.000480	0	Na		0.002964	М	Se	<	0.042000	М	Zn	0.004560
М	Αl		0.003420	0	Fe		0.013225	М	Nb	<	0.000480	0	Si		0.012997	М	Zr	0.001847
М	As	<	0.007200	М	Ga	<	0.002900	М	Nd	<	0.000480	M	Sm	<	0.000480			
М	Au	<	0.003900	М	Gd	<	0.000480	0	Ni		0.001482	M	Sn	<	0.000480			
0	В	<	0.003200	M	Ge	<	0.004800	М	Os	<	0.001500	s	Sr	<				
М	Ba		0.638494	М	Hf	<	0.000480	0	Р	<	0.017000	М	Ta	<	0.000480			
0	Be	<	0.000450	М	Hg	<	0.000960	М	Pb		0.010717	М	Tb	<	0.000480			
M	Bi	<	0.002000	M	Но	<	0.000480	M	Pd	<	0.002000	М	Te	<	0.016000			
0	Ca		0.025083	M	In	<	0.008600	M	Pr		0.000547	M	Th	<	0.000480			
М	Cd	<	0.000960	M	lr	<	0.000480	М	Pt	<	0.000480	M	Ti		0.004560			
M	Ce		0.000661	0	K		0.025083	М	Rb	<	0.003400	M	ΤI	<	0.000480			
М	Co		0.001527	М	La	<	0.000480	М	Re	<	0.000480	М	Tm		0.004332			
0	Cr	<	0.004700	0	Li	<	0.005600	0	Rh	<	0.013000	М	U	<	0.000480			
М	Cs	<	0.000480	М	Lu	<	0.000480	М	Ru	<	0.000960	М	V	<	0.000960			
0	Cu	<	0.003800	0	Mg		0.001048	0	S	<	0.045000	M	W	<	0.002400			
М	Dy	<	0.000960	0	Mn		0.000319	М	Sb	<	0.009600	0	Υ	<	0.001200			
M	Er	<	0.000480	M	Мо	<	0.002900	M	Sc	<	0.001500	M	Yb	<	0.000480			

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**

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

**6.2** For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale</u>. <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

# 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 87.62 +2 6 Sr(H2O)6+2 Chemical Compatibility - Soluble in HCl, and HNO3. Avoid H2SO4, HF and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

Stability - 2-100 ppb levels stable for months in 1% HNO3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1 - 3.5% HNO3 / LDPE container.

Sr Containing Samples (Preparation and Solution) -Metal (Best dissolved in diluted HNO3); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (Dry ash and dissolution in dilute HCl). 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 88 amu	1200 ppt	N/A	72Ge16O, 176Yb+2,
			176Lu+2 , 176Hf+2
ICP-OES 407.771 nm	0.0004 / 0.00006 µg/mL	1	U, Ce
ICP-OES 421.552 nm	0.0008 / 0.00004 μg/mL	1	Rb
ICP-OES 460.733 nm	0.07 / 0.003 μg/mL	1	Ce

# 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; Inorganic Ventures.com;

# CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY 11.0

# 11.1 Certification Issue Date

August 26, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- August 26, 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 longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. 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** 

Mayyand Kha Paul R. Laine **Custom Processing Supervisor** 

# Certificate Approved By:

Muzzammil Khan Stock Laboratory Supervisor

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director





R-02/02/2025

M-6158

Material No.: 9606-03 Batch No.: 24D1062002

Manufactured Date: 2024-03-26

Retest Date: 2029-03-25 Revision No.: 0

# Certificate of Analysis

Assay (HNOs) Appearance Appearance Appearance Passes Test Passes Test Passes Test Color (APHA) Residue after Ignition Chloride (Cl) Phosphate (PO4) Sulfate (SO4) Sulfate (SO4) Arsenic and Antimony (as As) Arsenic iand Antimony (as As) Arsenic iand Antimony (as As) Arsenic iand Antimony (as As) Arsenic and Antimony (as As) Arsenic and Interest is Berryllium (Ba) Arace Impurities - Boron (B) Arace Impurities - Cadnium (Cd) Arace Impurities - Calcium (Ca) Arace Impurities - Calcium (Ca) Arace Impurities - Calcium (Ca) Arace Impurities - Color (Co) Arace Impurities - Color (Co) Arace Impurities - Calcium (Ca) Arace Impurities - Color (Co) Arace Impurities - Color (Av) Arace Impurities - Color (Av) Arace Impurities - Lead (Pb) Arace Impurities - Lithium (Li) Arace Impurities - Manganese (Mn) Arace Impurities - Nicke (Ni) Arace Impurities - Manganese (Mn) Arace Impurities - Nicke (Ni) Arace Impurit	Test	Specification	Result
Appearance Color (APHA)  Residue after Ignition  Chloride (Cl)  Phosphate (POa)  Sulfate (SOa)  Trace Impurities - Barium (Ba)  Trace Impurities - Cobalt (Co)  Trace Impurities - Lead (Pb)  Trace Impur	Assay (HNO3)		
Second Capera	Appearance		
Residue after Ignition	Color (APHA)		
Chloride (Cf)  Phosphate (PO <sub>4</sub> )  Sulfate (SO <sub>4</sub> )  Sulfate (SO <sub>4</sub> )  Trace Impurities – Aluminum (AI)  Arsenic and Antimony (as As)  Trace Impurities – Beryllium (Ba)  Trace Impurities – Beryllium (Be)  Trace Impurities – Beryllium (Be)  Trace Impurities – Boron (B)  Trace Impurities – Cadrium (Cd)  Trace Impurities – Cadrium (Cd)  Trace Impurities – Cadrium (Ca)  Trace Impurities – Cadrium (Ca)  Trace Impurities – Cobalt (Co)  Trace Impurities – Cobalt (Co)  Trace Impurities – Cobalt (Co)  Trace Impurities – Copper (Cu)  Trace Impurities – Gallium (Ga)  Trace Impurities – Gold (Au)  Expressible 10.0 ppb  Trace Impurities – Gold (Au)  Expressible 10.0 ppb  Trace Impurities – Code (Au)  Expressible 10.0 ppb  Trace Impurities – Lichium (Li)  Expressible 10.0 ppb  Trace Impurities – Lichium (Li)  Expressible 10.0 ppb  Trace Impurities – Lichium (Li)  Expressible 10.0 ppb  Trace Impurities – Manganese (Mn)  Expressible 10.0 ppb  Trace Impurities – Nickel (Ni)	Residue after Ignition		5
Phosphate (PO <sub>4</sub> )         ≤ 0.10 ppm         < 0.03 ppm	Chloride (CI)		1 ppm
Sulfate (SO <sub>4</sub> ) ≤ 0.2 ppm < 0.2 ppm  Trace Impurities - Aluminum (AI) ≤ 40.0 ppb < 1.0 ppb  Arsenic and Antimony (as As) ≤ 5.0 ppb < 2.0 ppb  Trace Impurities - Barium (Ba) < 10.0 ppb < 1.0 ppb  Trace Impurities - Beryllium (Be) < 10.0 ppb < 1.0 ppb  Trace Impurities - Bismuth (Bi) < 20.0 ppb < 10.0 ppb  Trace Impurities - Boron (B) < 10.0 ppb < 5.0 ppb  Trace Impurities - Cadmium (Cd) < 50 ppb < 1 ppb  Trace Impurities - Calcium (Ca) < 50.0 ppb < 1.0 ppb  Trace Impurities - Chromium (Cr) < 30.0 ppb < 1.0 ppb  Trace Impurities - Chromium (Cr) < 30.0 ppb < 1.0 ppb  Trace Impurities - Cobalt (Co) < 10.0 ppb < 1.0 ppb  Trace Impurities - Copper (Cu) < 10.0 ppb < 1.0 ppb  Trace Impurities - Gallium (Ga) < 10.0 ppb < 1.0 ppb  Trace Impurities - Gold (Au) < 20 ppb < 10 ppb  Trace Impurities - Gold (Au) < 20 ppb < 100 ppb  Trace Impurities - Lithium (E) < 10.0 ppb < 1.0 ppb  Trace Impurities - Lithium (Li) < 10.0 ppb < 1.0 ppb  Trace Impurities - Lithium (Li) < 10.0 ppb < 1.0 ppb  Trace Impurities - Lithium (Li) < 10.0 ppb < 1.0 ppb  Trace Impurities - Mangaese (Mn) < 10.0 ppb < 1.0 ppb	Phosphate (PO <sub>4</sub> )		< 0.03 ppm
Trace Impurities - Aluminum (AI)       ≤ 40.0 ppb       < 1.0 ppb	Sulfate (SO <sub>4</sub> )	• •	< 0.03 ppm
Arsenic and Antimony (as As)	Trace Impurities - Aluminum (AI)		
Trace Impurities - Barium (Ba)       ≤ 10.0 ppb       < 1.0 ppb		• •	• •
Trace Impurities – Beryllium (Be)  Trace Impurities – Bismuth (Bi)  Trace Impurities – Boron (B)  Trace Impurities – Cadmium (Cd)  Trace Impurities – Cadmium (Cd)  Trace Impurities – Calcium (Ca)  Trace Impurities – Chromium (Cr)  Trace Impurities – Chromium (Cr)  Trace Impurities – Cobalt (Co)  Trace Impurities – Cobalt (Co)  Trace Impurities – Copper (Cu)  Trace Impurities – Copper (Cu)  Trace Impurities – Gallium (Ga)  Trace Impurities – Gallium (Ga)  Trace Impurities – Gold (Au)  Trace Impurities – Gold (Au)  Express of the series of the			• •
Trace Impurities – Bismuth (Bi)		• •	< 1.0 ppb
Trace Impurities – Boron (B)			< 1.0 ppb
Trace Impurities - Cadmium (Cd)  Frace Impurities - Calcium (Ca)  Frace Impurities - Chromium (Cr)  Frace Impurities - Chromium (Cr)  Frace Impurities - Cobalt (Co)  Frace Impurities - Copper (Cu)  Frace Impurities - Callium (Ga)  Frace Impurities - Gallium (Ga)  Frace Impurities - Germanium (Ge)  Frace Impurities - Gold (Au)  Frace Impurities - Gold (Au)  Frace Impurities - Fron (Fe)  Frace Impurities - Lead (Pb)  Frace Impurities - Lithium (Li)  Frace Impurities - Magnesium (Mg)  Frace Impurities - Manganese (Mn)  Frace Impurities - Nickel (Ni)			• •
Trace Impurities – Calcium (Ca)		• •	< 5.0 ppb
Trace Impurities - Chromium (Cr)  Trace Impurities - Cobalt (Co)  Trace Impurities - Copper (Cu)  Trace Impurities - Copper (Cu)  Trace Impurities - Gallium (Ga)  Trace Impurities - Garmanium (Ge)  Trace Impurities - Gold (Au)  Heavy Metals (as Pb)  Trace Impurities - Iron (Fe)  Trace Impurities - Lead (Pb)  Trace Impurities - Lead (Pb)  Trace Impurities - Lithium (Li)  Trace Impurities - Magnesium (Mg)  Trace Impurities - Magnesium (Mg)  Trace Impurities - Manganese (Mn)  Trace Impurities - Magnesium (Mg)  Trace Impurities - Manganese (Mn)  Trace Impurities - Nickel (Ni)		• ,	< 1 ppb
Trace Impurities – Cobalt (Co)			2.3 ppb
Trace Impurities - Copper (Cu)  Trace Impurities - Gallium (Ga)  Trace Impurities - Germanium (Ge)  Trace Impurities - Gold (Au)  Example 10.0 ppb			< 1.0 ppb
Trace Impurities – Gallium (Ga)  Trace Impurities – Germanium (Ge)  Trace Impurities – Gold (Au)  Heavy Metals (as Pb)  Trace Impurities – Iron (Fe)  Trace Impurities – Lead (Pb)  Trace Impurities – Lead (Pb)  Trace Impurities – Lithium (Li)  Trace Impurities – Magnesium (Mg)  Trace Impurities – Magnese (Mn)  Trace Impurities – Nickel (Ni)		• •	< 1.0 ppb
Trace Impurities – Germanium (Ge)  Trace Impurities – Gold (Au)  Heavy Metals (as Pb)  Trace Impurities – Iron (Fe)  Trace Impurities – Lead (Pb)  Trace Impurities – Lead (Pb)  Trace Impurities – Lithium (Li)  Trace Impurities – Magnesium (Mg)  Trace Impurities – Magnesium (Mg)  Trace Impurities – Manganese (Mn)  Trace Impurities – Nickel (Ni)		• •	< 1.0 ppb
Trace Impurities – Gold (Au)  4 20 ppb  5 ppb  6 5 ppb  7 Trace Impurities – Iron (Fe)  6 40.0 ppb  6 20.0 ppb  7 Trace Impurities – Lithium (Li)  6 10.0 ppb  7 Trace Impurities – Magnesium (Mg)  7 Trace Impurities – Manganese (Mn)  7 Trace Impurities – Manganese (Mn)  7 Trace Impurities – Mickel (Ni)	· •		< 1.0 ppb
Heavy Metals (as Pb)    Second Policy   Second Policy		• • •	< 10 ppb
Trace Impurities – Iron (Fe)  \$\leq\$ 40.0 ppb \$\leq\$ 40.0 ppb \$\leq\$ 20.0 ppb \$\leq\$ 20.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 20 ppb \$\leq\$ 20 ppb \$\leq\$ 20 ppb \$\leq\$ 20 ppb \$\leq\$ 21.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 20 ppb \$\leq\$ 21.0 ppb			< 5 ppb
Trace Impurities – Lead (Pb)  ≤ 20.0 ppb  ≤ 20.0 ppb  < 10.0 ppb  < 10.0 ppb  < 1.0 ppb		• •	100 ppb
Frace Impurities – Lithium (Li)  Frace Impurities – Magnesium (Mg)  Frace Impurities – Manganese (Mn)  Frace Impurities – Manganese (Mn)  Frace Impurities – Nickel (Ni)  Frace Impurities – Nickel (Ni)		• •	< 1.0 ppb
Frace Impurities – Magnesium (Mg)  Frace Impurities – Manganese (Mn)  ≤ 20 ppb  ≤ 1.0 ppb  < 1 ppb  < 1.0 ppb  < 1.0 ppb		• •	< 10.0 ppb
Frace Impurities – Manganese (Mn) ≤ 10.0 ppb < 1.0 ppb			< 1.0 ppb
race Impurities – Nickel (Ni)			< 1 ppb
≤ 20.0 ppb < 5.0 ppb		• •	< 1.0 ppb
	THERET (INI)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>





Material No.: 9606-03 Batch No.: 24D1062002

Test	Specification	D 1
Trace Impurities – Niobium (Nb)		Result
Trace Impurities – Potassium (K)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Silicon (Si)	≤ 50 ppb	16 ppb
	≤ 50 ppb	< 10 ppb
Trace Impurities – Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Sodium (Na)	≤ 150.0 ppb	
Trace Impurities - Strontium (Sr)	≤ 30.0 ppb	< 5.0 ppb
Trace Impurities – Tantalum (Ta)		< 1.0 ppb
Trace Impurities – Thallium (TI)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Tin (Sn)	≤ 10.0 ppb	< 5.0 ppb
	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Frace Impurities – Vanadium (V)	≤ 10.0 ppb	
Frace Impurities – Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
race Impurities – Zirconium (Zr)		< 1.0 ppb
Particle Count – 0.5 µm and greater	≤ 10.0 ppb	< 1.0 ppb
Particle Count – 1.0 µm and greater	≤ 60 par/mi	10 par/ml
and greater	≤ 10 par/ml	3 par/ml

Nitric Acid 69% **CMOS** 





Material No.: 9606-03 Batch No.: 24D1062002

Test Specification Result

For Microelectronic Use

Country of Origin: USA Packaging Site: Phillipsburg Mfg Ctr & DC

Jamie Croak Director Quality Operations, Bioscience Production



# Certificate of Analysis

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: Multi Analyte Custom Grade Solution

 Catalog Number:
 QCP-CICV-1

 Lot Number:
 V2-MEB744107

 Matrix:
 7% (v/v) HNO3

Value / Analyte(s): 2 500 μg/mL ea:

Calcium, Potassium,
Magnesium, Sodium,

1 000 µg/mL ea:

Aluminum, Barium,

500 μg/mL ea:

Iron,

250 μg/mL ea:

Nickel, Vanadium, Zinc, Cobalt,

Manganese,

125 μg/mL ea:

Silver, Copper,

100 μg/mL ea: Chromium, 25 μg/mL ea: Beryllium

**Second Source**: Whenever possible, this solution was manufactured from a second set of concentrates in our manufacturing facility.

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Aluminum, Al	CERTIFIED VALUE 1 000 ± 4 µg/mL	ANALYTE Barium, Ba	CERTIFIED VALUE 1 000 ± 6 μg/mL
Beryllium, Be	24.98 ± 0.12 μg/mL	Calcium, Ca	2 500 ± 8 μg/mL
Chromium, Cr	99.9 ± 0.6 μg/mL	Cobalt, Co	250.2 ± 1.2 μg/mL
Copper, Cu	125.0 ± 0.5 μg/mL	Iron, Fe	500.0 ± 2.2 μg/mL
Magnesium, Mg	2 500 ± 11 μg/mL	Manganese, Mn	249.9 ± 1.1 μg/mL
Nickel, Ni	250.0 ± 1.2 μg/mL	Potassium, K	2 500 ± 11 μg/mL
Silver, Ag	125.0 ± 0.6 μg/mL	Sodium, Na	2 500 ± 11 μg/mL
Vanadium, V	250.0 ± 1.1 μg/mL	Zinc, Zn	249.9 ± 1.1 μg/mL

**Density:** 1.081 g/mL (measured at 20  $\pm$  4 °C)

# **Assay Information:**

133	mornation.					
	ANALYTE	METHOD	NIST SRM#	SRM LOT#		
	Ag	ICP Assay	3151	160729		
	Ag	Volhard	999c	999c		
	Al	ICP Assay	3101a	140903		
	Al	EDTA	928	928		
	Ва	ICP Assay	3104a	140909		
	Ва	Gravimetric		See Sec. 4.2		
	Be	ICP Assay	3105a	090514		
	Be	Calculated		See Sec. 4.2		
	Ca	ICP Assay	3109a	130213		
	Ca	EDTA	928	928		
	Co	ICP Assay	3113	190630		
	Co	EDTA	928	928		
	Cr	ICP Assay	3112a	170630		
	Cu	ICP Assay	3114	120618		
	Cu	EDTA	928	928		
	Fe	ICP Assay	3126a	140812		
	Fe	EDTA	928	928		
	K	ICP Assay	3141a	140813		
	K	Gravimetric		See Sec. 4.2		
	Mg	ICP Assay	3131a	140110		
	Mg	EDTA	928	928		
	Mn	ICP Assay	3132	050429		
	Mn	EDTA	928	928		
	Na	ICP Assay	3152a	200413		
	Na	Gravimetric		See Sec. 4.2		
	Ni	ICP Assay	3136	120619		
	Ni	EDTA	928	928		
	V	ICP Assay	3165	160906		
	V	EDTA	928	928		
	Zn	ICP Assay	3168a	120629		
	Zn	EDTA	928	928		

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 or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

 $X_{CRM/RM} = \Sigma(w_i) (X_i)$ 

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

 $\mathbf{w_i} = (1/\mathsf{u_{char\;i}})^2 \, / \, (\Sigma (1/(\mathsf{u_{char\;i}})^2)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM}$  = k ( $u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2$ )<sup>1/2</sup>

k = coverage factor = 2

 $\mathbf{u_{char}} = [\Sigma((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)]^{1/2}$  where  $\mathbf{u_{char}}_i$  are the errors from each characterization method

 $egin{align*} \mathbf{u_{bb}} = \mathbf{bottle} \ \mathbf{to} \ \mathbf{bottle} \ \mathbf{homogeneity} \ \mathbf{standard} \ \mathbf{uncertainty} \ \mathbf{u_{lts}} = \mathbf{long} \ \mathbf{term} \ \mathbf{stability} \ \mathbf{standard} \ \mathbf{uncertainty} \ (\mathbf{storage}) \ \end{aligned}$ 

uts = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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

 $X_{CRM/RM} = (X_a) (u_{char a})$ 

Xa = mean of Assay Method A with

u<sub>char a</sub> = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM}$  = k ( $u_{char}^2$  a +  $u_{bb}^2$  +  $u_{lts}^2$  +  $u_{ts}^2$ )  $v_{ts}^{1/2}$ 

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

 $\mathbf{u_{bb}}$  = bottle to bottle homogeneity standard uncertainty  $\mathbf{u_{lts}}$  = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

# 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

N/A

# 6.0 INTENDED USE

- **6.1** This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- **6.2** For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale</u>, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

# 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 <a href="https://www.inorganicventures.com/TCT">www.inorganicventures.com/TCT</a>

**Note**: This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information (https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver)

# 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

# 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

# 11.1 Certification Issue Date

May 22, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- May 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:	

# NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0 **Certificate Prepared By:**

Justin Dirico Stock Processing Supervisor

Juster Dilies Juster Wall Parel R. Laines

**Certificate Approved By:** 

Jodie Wall Stock VSM Coordinator

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director

<sup>-</sup> This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.



# Certificate of Analysis

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: Multi Analyte Custom Grade Solution

Catalog Number: QCP-CICV-2 Lot Number: U2-MEB733713

Matrix: 3% (w/v) Tartaric acid

1% (v/v) HNO3

Value / Analyte(s): 500 µg/mL ea:

Antimony

**Second Source**: Whenever possible, this solution was manufactured from a second set of concentrates in our manufacturing facility.

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE

Antimony, Sb 500.0  $\pm$  2.8  $\mu$ g/mL

**Density:** 1.017 g/mL (measured at 20  $\pm$  4 °C)

**Assay Information:** 

 ANALYTE
 METHOD
 NIST SRM#
 SRM LOT#

 Sb
 ICP Assay
 3102a
 140911

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 or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

 $X_{CRM/RM} = \Sigma(w_i) (X_i)$ 

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

 $\mathbf{w}_i$  = the weighting factors for each method calculated using the inverse square of

 $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2))$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

 $\mathbf{u}_{\mathbf{char}} = [\Sigma((\mathbf{w}_i)^2 (\mathbf{u}_{\mathbf{char}})^2)]^{1/2}$  where  $\mathbf{u}_{\mathbf{char}}$  are the errors from each characterization method

 $\mathbf{u_{bb}}$  = bottle to bottle homogeneity standard uncertainty  $\mathbf{u_{lts}}$  = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

# Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

 $X_{CRM/RM} = (X_a) (u_{char} a)$ 

X<sub>a</sub> = mean of Assay Method A with

u<sub>char a</sub> = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM}$  = k ( $u_{char}^2$  a +  $u_{bb}^2$  +  $u_{lts}^2$  +  $u_{ts}^2$ )  $v_{ts}^{1/2}$ 

k = coverage factor = 2

 $\mathbf{u}_{\mathbf{char}\;\mathbf{a}}$  = the errors from characterization

 $egin{align*} \mathbf{u_{bb}} &= \mathrm{bottle} \ \mathrm{to} \ \mathrm{bottle} \ \mathrm{homogeneity} \ \mathrm{standard} \ \mathrm{uncertainty} \ \mathbf{u_{lts}} &= \mathrm{long} \ \mathrm{term} \ \mathrm{stability} \ \mathrm{standard} \ \mathrm{uncertainty} \ (\mathrm{storage}) \ \end{aligned}$ 

u<sub>ts</sub> = transport stability standard uncertainty

# 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

N/A

# 6.0 INTENDED USE

- **6.1** This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- **6.2** For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale</u>, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

# 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 <a href="www.inorganicventures.com/TCT">www.inorganicventures.com/TCT</a>

# 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

# 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

# 11.1 Certification Issue Date

June 01, 2023

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- June 01, 2028
- 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:	
· Scalcu ICI Dau Obcii Dalc.	

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. 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 Approved By:

Thomas Kozikowski Manager, Quality Control

# Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director

20178Ci.



# Certificate of Analysis

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: Multi Analyte Custom Grade Solution

Catalog Number: QCP-CICV-3

Lot Number: V2-MEB749572

Matrix: 7% (v/v) HNO3

Value / Analyte(s):

500 μg/mL ea:

Arsenic, Lead, Selenium, Thallium,

250 μg/mL ea: Cadmium

**Second Source**: Whenever possible, this solution was manufactured from a second set of concentrates in our manufacturing facility.

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE Arsenic, As 500.0  $\pm$  3.1  $\mu$ g/mL Cadmium, Cd 250.1  $\pm$  1.1  $\mu$ g/mL Lead, Pb 500.0  $\pm$  2.3  $\mu$ g/mL Selenium, Se 500.0  $\pm$  3.2  $\mu$ g/mL

Thallium, TI 500.0  $\pm$  3.0  $\mu$ g/mL

**Density:** 1.040 g/mL (measured at 20  $\pm$  4 °C)

# **Assay Information:**

ANALYTE	METHOD	NIST SRM#	SRM LOT#
As	ICP Assay	3103a	100818
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
TI	ICP Assay	3158	151215

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 or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

 $X_{CRM/RM} = \Sigma(w_i) (X_i)$ 

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

 $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM}$  = k ( $u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2$ )<sup>1/2</sup>

k = coverage factor = 2

 $\mathbf{u_{char}} = [\Sigma((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)]^{1/2}$  where  $\mathbf{u_{char}}_i$  are the errors from each characterization method

 $egin{align*} \mathbf{u_{bb}} = \mathbf{bottle} \ \mathbf{to} \ \mathbf{bottle} \ \mathbf{homogeneity} \ \mathbf{standard} \ \mathbf{uncertainty} \ \mathbf{u_{lts}} = \mathbf{long} \ \mathbf{term} \ \mathbf{stability} \ \mathbf{standard} \ \mathbf{uncertainty} \ (\mathbf{storage}) \ \end{aligned}$ 

u<sub>ts</sub> = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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

 $X_{CRM/RM} = (X_a) (u_{char a})$ 

Xa = mean of Assay Method A with

 $\mathbf{u}_{\mathbf{char}\ \mathbf{a}}$  = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM}$  = k ( $u_{char}^2$  a +  $u_{bb}^2$  +  $u_{lts}^2$  +  $u_{ts}^2$ )  $v_{ts}^{1/2}$ 

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

 $\mathbf{u_{bb}}$  = bottle to bottle homogeneity standard uncertainty  $\mathbf{u_{lts}}$  = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

# 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

N/A

# 6.0 INTENDED USE

- **6.1** This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- **6.2** For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale</u>, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

# 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

# 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

# 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

# 11.1 Certification Issue Date

January 02, 2025

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- January 02, 2030
- 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:	
Ocalca IOI	Day Open Date.	

# NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0 **Certificate Prepared By:**

Justin Dirico Stock Processing Supervisor

Juster Dilies Juster Wall Parel R. Laines

**Certificate Approved By:** 

Jodie Wall Stock VSM Coordinator

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director

<sup>-</sup> This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

Lot # 011525

R->2115124

# Certified Reference Material CRM

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com

CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: 1. Magnesium nitrate hexahydrate (Mg) IN030 мgp05202341 Nominal Concentration (µg/mL): W/Z-> m/z-> m/z-> Recommended Storage: Weight shown below was diluted to (mL): 2.0€4 1.0E4 5.0E5 1.0E6 1000 2000 NIST Test Number: Expiration Date: Part Number: Description: Lot Number: [1] Spectrum No.1 210 110 10 RM# **BTU9** 58112 011525 10000 Ambient (20 °C) 011528 Magnesium (Mg) Number 120 ᅙ 220 20 [ 19.923 sec]:58112.D# [Count] [Linear] Conc. (µg/mL) 2000.07 10000 Nominal M 6171 130 230 30 0.100 Flask Uncertainty 99.999 Purity 5E-05 Balance Uncertainty 8 Uncertainty Assay Purity (%) 240 0.10 140 40 Solvent: 8.51 8 2% 250 24012496 150 234.9183 Weight (g) 50 Target Lot # (<u>m</u>L 40.0 234.9195 Nitric Acid Weight (g) Conc. (µg/mL) Nitric Acid Actual 260 160 60 10000.1 Actual 170 ò Reviewed By: Formulated By: +/- (µg/mL) Uncertainty Expanded 20.0 180 80 13446-18-9 CAS# (Solvent Safety Info. On Attached pg.)
S# OSHA PEL (TWA) LD50 Pedro L. Rentas Benson Chan 190 **SDS Information** ¥ 200 100 orl-rat 5440 mg/kg 3131a 011525 011525 SRM NIST



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

	Al Sb Ba Be Bi
	<0.02 <0.02 <0.02 <0.02 <0.01 <0.01 <0.02
	58585
	40.02 40.02 40.02 40.02 40.02 40.02
	Dy Er Gd Ga
	40.00 40.00 40.00 40.00 40.00 40.00
	Hf Ho In He La Pb
	4000 4000 4000 4000 4000 4000 4000 400
	etals Li Li Mg Mg Mo Nd
(T) = Target analyte	<b>Verific:</b>
get anal	Ation Ni Nb Os Pd Pt K
yte	\$\frac{\phi}{\phi}\$  CP-\$  \$\frac{\phi}{\phi}\$ 2  \$\frac{\phi}{\phi}\$ 2  \$\frac{\phi}{\phi}\$ 2  \$\frac{\phi}{\phi}\$ 2  \$\frac{\phi}{\phi}\$ 2  \$\frac{\phi}{\phi}\$ 2  \$\frac{\phi}{\phi}\$ 2
	Rh Rh Sm Sc
	9/mL)  -0.02 -0.02 -0.02 -0.02 -0.02 -0.02
	Si Sc Na Si
	40.2 40.02 40.02 40.02 40.02 40.02
	Th Th Sn
	4000
	Z;

# Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in

the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All standards should be stored with caps tight and under appropriate laboratory conditions.
\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



# R > 1/25/25 M 6/72. Certificate of Analysis

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:

Single Analyte Custom Grade Solution

Catalog Number:

CGNA<sub>10</sub>

Lot Number:

V2-NA740547

Matrix:

2% (v/v) HNO3

Value / Analyte(s):

10 000 μg/mL ea:

Sodium

Starting Material:

Sodium Carbonate

Starting Material Lot#:

2453 and 2606

Starting Material Purity:

99.9976%

## 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

**Certified Value:** 

 $10018 \pm 30 \, \mu g/mL$ 

Density:

1.033 g/mL (measured at 20  $\pm$  4 °C)

# Assay Information:

Assay Method #1

10026 ± 18 µg/mL

Gravimetric NIST SRM Lot Number: See Sec. 4.2

Assay Method #2

9986 ± 66 µg/mL

ICP Assay NIST SRM 3152a Lot Number: 200413

Assay Method #3

10002 ± 31 µg/mL

Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 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 or More Methods

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

# $X_{CRM/RM} = \Sigma(w_i) (X_i)$

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

$$\mathbf{w_i} = (1/\mathbf{u_{char\,i}})^2/\left(\Sigma(1/(\mathbf{u_{char\,i}})^2)\right.$$

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + v^2_{lts} + u^2_{ts}\right)^{1/2}$ 

k = coverage factor = 2

 $u_{cher} = [\Sigma((w_i)^2 (v_{cher})^2)]^{1/2}$  where  $u_{cher}$  are the errors from each characterization method

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

Characterization of CRM/RM by One Method
Certified Value, X<sub>CRM/RM</sub>, where one method of characterization
is used is the mean of individual results:

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

X<sub>m</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (1) = U<sub>CRM/RM</sub> = k (u<sup>2</sup>char a + u<sup>2</sup>bb + u<sup>2</sup>its + u<sup>2</sup>ts)<sup>1/2</sup>

k = coverage factor = 2

uchar a = the errors from characterization

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uta = transport stability standard uncertainty

# 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

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  $0.3 \ \mu m$ .

O Al	387
M         Au          0.005700 M         Gd          0.000860 O         Ni          0.000980 M         Sn          0.000860           O         B          0.025000 M         Ge          0.003500 M         Os          0.029000 M         Sr          0.000436           M         Ba         0.004494 M         Hf          0.000860 O         P         0.005742 M         Ta          0.000860           O         Be         0.000160 M         Hg          0.002900 M         Pb          0.002600 M         Tb          0.000860           M         Bi         0.000860 M         Ho          0.000860 M         Pd          0.004300 M         Te          0.004300           O         Ca         0.112358 M         In          0.000860 M         Pt          0.000860 M         Th          0.0003500           O         Cd         0.000730 M         Ir          0.000940 M         Pt          0.000860 O         Ti         0.0000860           M         Ce         0.000860 O	800
O B          0.025000 M Ge          0.003500 M Os          0.029000 M Sr         0.000436           M Ba          0.004494 M Hf          0.000860 O P 0.005742 M Ta          0.000086           O Be          0.000160 M Hg          0.002900 M Pb          0.002600 M Tb          0.000860           M Bi          0.000860 M Ho          0.000860 M Pd          0.004300 M Te          0.004300           O Ca          0.112358 M In          0.000860 M Pr          0.000860 M Th          0.003500           O Cd          0.000730 M Ir          0.000940 M Pt          0.000860 O Ti          0.000399           M Ce          0.000860 O K          0.349560 M Rb          0.000436 M Th          0.000860           M Co          0.000860 M La          0.000860 M Re          0.000860 M Tm          0.000860	
M Ba	
O Be < 0.000160 M Hg < 0.002900 M Pb < 0.002600 M Tb < 0.000860 M Bi < 0.000860 M Ho < 0.000860 M Pd < 0.004300 M Te < 0.004300 O Ca 0.112358 M In < 0.000860 M Pr < 0.000860 M Th < 0.003500 O Cd < 0.000730 M Ir < 0.000940 M Pt < 0.000860 O Ti 0.000399 M Ce < 0.000860 O K 0.349560 M Rb 0.000436 M Ti < 0.000860 M Th <	
M Bi < 0.000860 M Ho < 0.000860 M Pd < 0.004300 M Te < 0.004300 O Ca 0.112358 M In < 0.000860 M Pr < 0.000860 M Th < 0.003500 O Cd < 0.000730 M Ir < 0.000940 M Pt < 0.000860 O Ti 0.000399 M Ce < 0.000860 O K 0.349560 M Rb 0.000436 M Ti < 0.000860 M Co < 0.000860 M La < 0.000860 M Re < 0.000860 M Tm < 0.000860	
O         Ca         0.112358 M In         M r         0.000860 M Pr         0.000860 M Th         0.003500           O         Cd         0.000730 M Ir         0.000940 M Pt         0.000860 O Ti         0.000399           M         Ce         0.000860 O K         0.349560 M Rb         0.000436 M Ti         0.000860           M         Co         0.000860 M La         0.000860 M Re         0.000860 M Tm         0.000860	
O Cd          0.000730 M Ir         0.000940 M Pt         0.000860 O Ti         0.000399           M Ce          0.000860 O K         0.349560 M Rb         0.000436 M Ti          0.000860           M Co          0.000860 M La          0.000860 M Re          0.000860 M Tm          0.000860	
M Ce < 0.000860 O K 0.349560 M Rb 0.000436 M Ti < 0.000860 M Co < 0.000860 M La < 0.000860 M Re < 0.000860 M Tm < 0.000860	
M Co < 0.000860 M La < 0.000860 M Re < 0.000860 M Tm < 0.000860	
O Cr < 0.002000 O Li 0.000224 M Pb < 0.000860 M LI < 0.000860	
0 01 - 0.000000	
M Cs 0.000287 M Lu < 0.000860 M Ru < 0.000940 O V < 0.001500	
O Cu < 0.004100 M Mg 0.097377 O S 0.018726 M W < 0.007700	
M Dy < 0.000860 M Mn < 0.007700 M Sb < 0.000860 M Y < 0.000860	
M Er < 0.000860 O Mo < 0.002800 O Sc < 0.000610 M Yb < 0.000860	

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

**6.1** This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale.</u>

<a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain Information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

# 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° ± 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.lnorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 22.99 +1 (6) Na+(aq) largely ionic in nature

Chemical Compatibility -Soluble in HCl, HNO3, H2SO4 and HF aqueous matrices. Stable with all metals and inorganic anions.

Stability - 2-100 ppb levels stable for months in 1% HNO3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO3 / LDPE container.

Na Containing Samples (Preparation and Solution) - Metal (Dissolves very rapidly in water); Ores (Lithium carbonate fusion in graphite crucible followed by HCl dissolution - blank levels of Na in lithium carbonate critical); Organic Matrices (Sulfuric / peroxide digestion or nitric/sulfuric/perchloric acid decomposition).

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 23 amu	310 ppt	n/a	46Ti+2, 46Ca+2
ICP-OES 330.237 nm	2.0 / 0.09 μg/mL	1	Pd, Zn
ICP-OES 588.995 nm	0.03 / 0.006 μg/mL	1	2nd order radiation from R.E.s on some optical designs
ICP-OES 589.595 nm	0.07 / 0.00009 μg/mL	1	2nd order radiation from R.E.s on some optical designs

# 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com;

## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

# 11.1 Certification Issue Date

February 23, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- February 23, 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:	
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- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. 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**  Mayyand Ma Paul R. Laine

# **Certificate Approved By:**

Muzzammil Khan Stock Laboratory Supervisor

**Certifying Officer:** 

**Paul Gaines** Chairman / Senior Technical Director



# Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

R>1/27/28

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

# 1.0 ACCREDITATION / REGISTRATION

M6175

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:

Multi Analyte Custom Grade Solution

Catalog Number:

6020CAL-1

Lot Number:

V2-MEB742014

Matrix:

5% (v/v) HNO3

tr. HF

Value / Analyte(s):

20 µg/mL ea:

Silver,
Arsenic,
Beryllium,
Cadmium,
Chromium,
Iron,
Magnesium,
Sodium,
Lead,
Selenium,

Vanadium,

Aluminum, Barium, Calcium, Cobalt,

Copper, Potassium, Manganese, Nickel,

Antimony, Thallium, Zinc

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Aluminum, Al	CERTIFIED VALUE 20.02 ± 0.08 µg/mL	ANALYTE Antimony, Sb	CERTIFIED VALUE 20.03 ± 0.11 µg/mL
Arsenic, As	20.03 ± 0.16 μg/mL	Barlum, Ba	20.02 ± 0.11 μg/mL
Berylilum, Be	20.02 ± 0.15 μg/mL	Cadmium, Cd	20.02 ± 0.11 μg/mL
Calcium, Ca	20.03 ± 0.09 μg/mL	Chromium, Cr	20.03 ± 0.13 μg/mL
Cobalt, Co	20.03 ± 0.12 μg/ml.	Copper, Cu	20.03 ± 0.10 μg/mL
Iron, Fe	20.04 ± 0.09 μg/ml.	Lead, Pb	20.03 ± 0.11 μg/mL
Magnesium, Mg	20.03 ± 0.10 μg/mL	Manganese, Mn	20.03 ± 0.11 μg/mL
Nickel, NI	20.03 ± 0.11 μg/mL	Potassium, K	20.03 ± 0.10 μg/mL
Selenium, Se	20.03 ± 0.13 μg/mL	Silver, Ag	20.03 ± 0.09 μg/mL
Sodium, Na	20.03 ± 0.10 μg/mL	Thailium, Ti	20.03 ± 0.10 μg/mL
Vanadium, V	20.03 ± 0.11 µg/mL	Zinc, Zn	20.03 ± 0.11 μg/mL

# **Assay Information:**

5	say Information:			
	ANALYTE	METHOD	NIST SRM#	SRM LOT#
	Ag	ICP Assay	3151	160729
	Ag	Volhard	999c	999c
	Al	ICP Assay	3101a	140903
	Al	EDTA	928	928
	As	ICP Assay	3103a	100818
	As	Calculated		See Sec. 4.2
	Ва	ICP Assay	3104a	140909
	Ва	Gravimetric		See Sec. 4.2
	Ве	ICP Assay	3105a	090514
	Ca	ICP Assay	3109a	130213
	Ca	EDTA	928	928
	Cd	ICP Assay	3108	130116
	Cd	EDTA	928	928
	Co	ICP Assay	3113	190630
	Co	EDTA	928	928
	Cr	ICP Assay	3112a	170630
	Cu	ICP Assay	3114	121207
	Cu	EDTA	928	928
	Fe	ICP Assay	3126a	140812
	Fe	EDTA	928	928
	К	ICP Assay	3141a	140813
	K	Gravimetric		See Sec. 4.2
	Mg	ICP Assay	3131a	140110
	Mg	EDTA	928	928
	Mn	ICP Assay	3132	050429
	Mn	EDTA	928	928
	Na	ICP Assay	3152a	120715
	Na	Gravimetric		See Sec. 4.2
	Ni	ICP Assay	3136	120619
	Ni	EDTA	928	928
	Pb	ICP Assay	3128	101026
	Pb	EDTA	928	928
	Sb	ICP Assay	3102a	140911
	Se	ICP Assay	3149	100901
	Ti	ICP Assay	3158	151215
	V	ICP Assay	3165	160906
	V	EDTA	928	928
	Zn	ICP Assay	3168a	120629
	Zn	EDTA	928	928

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 or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

# $X_{CRM/RM} = \Sigma(w_i) (X_i)$

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

wi = the weighting factors for each method calculated using the inverse square of the variance

 $\mathbf{w_i} = (1/\mathsf{u_{char\,i}})^2 \, / \, (\Sigma (1/(\mathsf{u_{char\,i}})^2)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u_{char}^2 + u_{bb}^2 + u_{its}^2 + u_{ts}^2\right)^{1/2}$ 

 $u_{char} = \left[\sum ((w_i)^2 (u_{char})^2)\right]^{\frac{1}{2}}$  where  $u_{char}$  are the errors from each characterization method

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

u<sub>ts</sub> = transport stability standard uncertainty

# Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

 $X_{CRM/RM} = (X_a) (u_{char a})$ 

X<sub>a</sub> = mean of Assay Method A with

ucher a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{chara} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{\frac{1}{2}}$ 

k = coverage factor = 2

uchar a = the errors from characterization

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

# **INTENDED USE** 6.0

- 6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- 6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. https://www.inorganicventures.com/terms-and-conditions-sale. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

# 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

HF Note: This standard should not be prepared or stored in glass.

Low Silver Note: This solution contains "LOW" levels of Silver. Please store this entire bottle inside a sealed glass jar.

**Note:** This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information (https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver)

### 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; Info@inorganicventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

March 11, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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 11, 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 longer than one year (or six months in the case of a 30 mL bottle) from	n the

date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. 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:** 

Muzzammil Khan Stock Laboratory Supervisor Mayyand Man
Paul R. Laine

**Certifying Officer:** 

**Paul Gaines** Chairman / Senior Technical Director



## Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

m/z-y	22.55 Fin	s.oms	7)	1.000	2.5 Ee	8.0E6	1. Strontium nitrate (Sr)	Compound	Weight show	Nominal Concentration (µg/ml.): NIST Test Number:	Expiration Date: Recommended Storage:	De	Part
N.			2	10		[1] Spectrum No.1	INO17	RM#	Weight shown below was diluted to (mL):	centration (µg/mL): NIST Test Number:	Expiration Date: nended Storage:	Description:	Part Number:
0		9	Ď.	O		-	IN017 SRZ022018A1	Lot Number C		607B	092727 Ambient (20 °C)	Strontium (Sr)	57038 092724
0		ğ	1. 3.	<b>9</b> .		4.4 00 01 8	1000	Nominat Conc. (µg/ml.)	2000.07				RV
			,			eo]:681	99.997	Purity (	0.100 FI	5E-05	3	-	8/6
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		0		0		۵	1	Actual Weight (g)				Nitric Acid	Nitric Acid
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							2.0	Expanded Uncertainty +/- (µg/mL)	The state of the s	Reviewed By:	N	Formulated By:	
		180		80			10042-76-9	CAS#	9	P. C.		d By	
		190	, ,	0	athicists for facilities.			SDS Information (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) LC	a control and the land	Parim Bentas	A	Benson Chan	
		NOO		100			orl-rat >2000mg/kg 3153a	nation On Attached pg.) (A) LD50	77700	'	1	092724	



# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Be 40.01 Cr 40.02  B1 40.02 Co 40.02	5 C C C C C C C C C C C C C C C C C C C	\$3 ZO.07	2	&2 Ce	0.02 Ca	<0.02 Cd		
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*	Ţ	"ס	Pd	õ	Ş	Z	tion	
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(I) = Target analyte

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard

Certifled by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in

the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All Standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

	.1 .0 .0	N O O	~~×	O . O . M	m/≥->	O.O.M.4	1.0E5	1. Lead(II) nitrate (Pb)	Compound	NIST Test Number: Weight shown below wa	Recommended Storage: Nominal Concentration (µg/mL):		Part Number: Lot Number: Description:
			110 120		0 0		[1] Spectrum No.1	IN029 PBD122016A1	Lot RM# Number	NIST Test Number: 6UTB Weight shown below was diluted to (mL):			
0 0 0			190		<b>©</b>		14.144 seo]:58082.D# [Count] [Linear]	1000 99.999	Nominai Purity U	2000.07	0°C)	70	57082 S\6\7\5 solve
			140 150		40 80		92.D# [Count] [	0.10 62.5 3.20015	Uncertainty Assay Target Purity (%) (%) Weight (g)	5E-05 Balance Uncertainty 0.10 Flesk Uncertainty	(m)	%	Solvent: 24014457
) 9-			160		8		Linearj	3.20067	Actual Weight (g)		Đ	.0 Nitric Acid	4457 Nitric Acid
			170		70			1000.2 2.0 1	Actual Uncertainty Conc. (µg/mL) +/- (µg/mL)	Reviewed By:	M	Formulated By:	gr.
			180 190		90			10099-74-8 0.05 mg/m3	(Solvent Safety Info. On Attached pg.) CAS# OSHA PEL (TWA) LE	Ped	Ch Rend	By: Giovanni Esposito	iovannie Especi
			200		100			3 intrvns-rat 93 mg/kg 3128	rmation On Attached pg.) NIST NA) LD50 SRM	031525	89	sito 031525	B

www.absolutestandards.com

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

								yte	et analyte	(T) = Target									
40.02	Zr	40,02	Ħ	<0.02	Ta	<0.02	Sc	<0.2	*	<0.02	Z		8	<0.02	Au	<0.02	රී	<0.02	œ
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<0.02	¥	<0.02	41	<0.2	Sc	<0.02	ħ	<0.02	Z	<0.02	Ξ	<0.02	Ж	<0.02	Dy	<0.02	Ω	<0.02	Α
									I		1								
						ug/mL)	VS (	by ICP-I	tion	Verifica	etals	Trace Me							
																	I		Ì

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm delonized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
  \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



### Certificate of Analysis

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:** 

Multi Analyte Custom Grade Solution

Catalog Number:

WW-LFS-1

Lot Number:

W2-MEB752149

Matrix:

5% (v/v) HNO3

M6180 R37/22/23 Value / Analyte(s):

1 000 µg/mL ea: Potassium, 600 µg/mL ea: Phosphorus,

300 µg/mL ea:

Sodium, Iron,

200 μg/mL ea:

Magnesium, Aluminum, Cerium, Selenium,

Thallium,

100 µg/mL ea:

Lead, Calcium,

80 μg/mL ea: Arsenic,

70 μg/mL ea: Mercury, 50 µg/mL ea:

Nickel,

40 µg/mL ea: Chromium,

30 µg/mL ea:

Copper, Boron,

Vanadium,

20 µg/mL ea:

Zinc, Strontium, Barium, Beryllium, Cadmium, Cobalt, Manganese, Lithium,

7.5 µg/mL ea:

Silver

### 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

ANALYTE Aluminum, Al	CERTIFIED VALUE 200.2 ± 0.7 µg/mL	ANALYTE Arsenic, As	CERTIFIED VALUE 80.1 ± 0.5 µg/mL
Barium, Ba	20.02 ± 0.12 μg/mL	Beryllium, Be	20.02 ± 0.11 μg/mL
Boron, B	30.02 ± 0.15 μg/mL	Cadmium, Cd	20.04 ± 0.09 μg/mL
Calclum, Ca	100.1 ± 0.3 µg/mL	Cerlum, Ce	200.2 ± 1.0 μg/mL
Chromium, Cr	40.02 ± 0.26 μg/mL	Cobalt, Co	20.03 ± 0.09 μg/mL
Copper, Cu	30.03 ± 0.13 µg/mL	Iron, Fe	300.3 ± 1.3 μg/mL
Lead, Pb	100.1 ± 0.5 µg/mL	Lithium, Li	20.03 ± 0.09 μg/mL
Magnesium, Mg	200.2 ± 0.9 µg/mL	Manganese, Mn	19.99 ± 0.09 µg/mL
Mercury, Hg	70.0 ± 0.3 μg/mL	Nickel, Ni	50.05 ± 0.22 μg/mL
Phosphorus, P	600.5 ± 2.9 µg/mL	Potassium, K	1 001 ± 4 μg/mL
Selenium, Se	200.2 ± 1.1 μg/mL	Silver, Ag	7.52 ± 0.03 μg/mL
Sodium, Na	300.3 ± 1.3 μg/mL	Strontium, Sr	20.02 ± 0.10 μg/mL
Thallium, Ti	200.2 ± 1.0 μg/mL	Vanadium, V	30.02 ± 0.13 µg/mL
Zinc, Zn	20.05 ± 0.09 μg/mL		

Density:

1.037 g/mL (measured at 20 ± 5 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	160729
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
В	ICP Assay	3107	190605
В	Calculated		See Sec. 4.2
Ва	ICP Assay	3104a	140909
Ва	Gravimetric		See Sec. 4.2
Ве	ICP Assay	3105a	090514
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Ce	ICP Assay	3110	160830
Ce	EDTA	928	928
Co	ICP Assay	3113	190630
Со	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cu	ICP Assay	3114	120618
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
Κ	ICP Assay	3141a	140813
К	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	200413
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni -	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Sr s-	EDTA	928	928
Sr Ti	ICP Assay	Traceable to 3153a	K2-SR650985
V	ICP Assay	3158	151215
V	ICP Assay EDTA	3165	160906
v Zn		928	928
Zn Zn	ICP Assay	3168a	120629
۷.11	EDTA	928	928

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 or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

### $X_{CRM/RM} = \Sigma(w_i) (X_i)$

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of

$$w_i = (1/u_{chari})^2 / (\Sigma (1/(u_{chari})^2))$$

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{1/2}$  where  $u_{char}$  i are the errors from each characterization method

ubb = bottle to bottle homogeneity standard uncertainty

u<sub>its</sub> = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{its} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

### 6.0 **INTENDED USE**

- 6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- 6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale, https://www.inorganicventures.com/terms-and-conditions-sale. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

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

### 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  $4^{\circ}$   $25^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 5^{\circ}$  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

**Note**: This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more Information (https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver)

### 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; Info@inorganicventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

April 08, 2025

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- April 08, 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

<ul> <li>Sealed TCT Bag Open Date:</li> </ul>	

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS Certificate Prepared By:

Justin Dirico Stock Processing Supervisor

Juster Diling

### **Certificate Approved By:**

Jodie Wall Stock VSM Coordinator

### **Certifying Officer:**

**Paul Gaines** Chairman / Senior Technical Director Paul R Laine

<sup>-</sup> This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

M6181 R->7/22/28 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:

Multi Analyte Custom Grade Solution

Catalog Number:

WW-LFS-2

Lot Number:

V2-MEB743480

Matrix:

5% (v/v) HNO3

tr. HF

Value / Analyte(s):

200 µg/mL ea:

Silica,

80 μg/mL ea: Antimony,

70 μg/mL ea:

Tin,

40 μg/mL ea: Molybdenum, 20 μg/mL ea:

Titanium

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Antimony, Sb **CERTIFIED VALUE** 

ANALYTE

CERTIFIED VALUE 40.05 ± 0.22 µg/mL

Silica, SIO2

80.1 ± 0.5 µg/mL 200.3 ± 1.4 µg/mL

Molybdenum, Mo

Tin, Sn

70.1 ± 0.4 µg/mL

Titanium. Ti

20.03 ± 0.12 µg/mL

Density:

1.025 g/mL (measured at 20 ± 4 °C)

### Assay Information:

-uj			
ANALYTE	METHOD	NIST SRM#	SRM LOT#
Мо	ICP Assay	3134	130418
Sb	ICP Assay	3102a	140911
SiO2	Calculated		See Sec. 4.2
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	traceable to 3162a	T2-TI725816

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 or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

 $X_{CRM/RM} = \Sigma(w_i) (X_i)$ 

X<sub>i</sub> = mean of Assay Method I with standard uncertainty u<sub>char I</sub>

 $\mathbf{w_i}$  = the weighting factors for each method calculated using the inverse square of the variance:

 $w_i = (1/u_{char i})^2 / (\Sigma (1/(u_{char i})^2)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{1/2}$  where  $u_{char}$  are the errors from each characterization method

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{chare} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{\frac{1}{2}}$ 

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

N/A

### 6.0 INTENDED USE

- 6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- 6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

### 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

HF Note: This standard should not be prepared or stored in glass.

### 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

May 07, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- May 07, 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:	
-----------------------------	--

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS **Certificate Prepared By:**

Justin Dirico Stock Processing Supervisor

### **Certificate Approved By:**

Thomas Kozikowski Stock VS Manager

209781 Paul R Laine

### **Certifying Officer:**

**Paul Gaines** Chairman / Senior Technical Director

<sup>-</sup> This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

RD: 07/14/2022



### QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-MS ICS

### QATS LABORATORY INORGANIC REFERENCE MATERIAL INTERFERENCE CHECK SAMPLE SET FOR ICP-MS (ICSA WITH ICSB)

**NOTE:** These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

**APPLICATION:** 

For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** 

Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

### (A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of an Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-0803" and for the ICSAB mixture use "ICSA-0803+ICSB-0803".

<u>CAUTION:</u> The bottle(s) should be protected from light during storage to ensure the stability of silver which is contained in the ICSB solution. The bottle(s) should be stored at room temperature. **Do not allow the solution(s) to freeze.** 

### (B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to the Contracting Officer, Ross Miller at <a href="miller.ross@epa.gov">miller.ross@epa.gov</a>. If directed by Ross Miller, return the chain of custody record with appropriate annotations and signatures to the address provided below.

QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
APTIM Federal Services, LLC
2700 Chandler Avenue - Building C
Las Vegas, NV 89120

### (C) ANALYSIS OF SAMPLES

This interference check sample set is to be used to verify elemental isobaric correction factors of inductively coupled plasma-mass spectrometers (ICP-MS). This reference material set consists of two (2) concentrated solutions. The ICSA solution contains several interferent elements and species; for a complete listing refer to the CLP SOW. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for the ICP-MS ICS Part A and Part B target analytes when diluted as directed.

Using Class "A" glassware, preparation and analysis must be performed according to the following instructions:



Page 1 of 2



### QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-MS ICS

ICSA-0803, Inferferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 1% v/v HNO<sub>3</sub>. Analyze this solution by ICP-MS.

ICSB-0803, Analytes, mixed with ICSA-0803, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 1% v/v HNO<sub>3</sub>. Analyze this ICSAB solution by ICP-MS.

### (D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-MS ICS SOLUTION(S)

The "Certified Value" concentrations of the elements, listed in Table 1 below, were derived from statistically pooled analysis results from the following sources, if available: QATS Laboratory, CLP laboratories, Quarterly Blind (QB)/Proficiency Testing (PT) events, CLP pre-award events, and external referee laboratories.



	Table 1.				NCE CHECK S WITH ICSB-08		MS
Element	CRQL	Part A (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)	Part A +Part B (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)
Al	20.0	[100000]			[100000]		in the second
Sb	2.0	(1.5)	-2.5	5.5	(22.0)	18.0	26.0
As	1.0	(0.1)	-1.9	2.1	19.0	16.2	21.9
Ва	10.0	(1.2)	-18.8	21.2	(22.0)	2.0	42.0
Be	1.0	(0)	-2.0	2.0	19.0	16.2	21.9
Cd	1.0	(0.7)	-1.3	2.7	20.0	17.0	23.0
Ca	500	[100000]			[100000]		
С		[200000]			[200000]		
Cl		[1000000]			[1000000]		
Cr	2.0	(21.0)	17.0	25.0	40.0	34.0	46.0
Со	1.0	(1.0)	-1.0	3.0	20.0	17.0	23.0
Cu	2.0	(8.0)	4.0	12.0	(25.0)	21.0	29.0
Fe	200	[100000]			[100000]		
Pb	1.0	(4.0)	2.0	6.0	25.0	21.3	28.8
Mg	500	[100000]	•		[100000]		
Mn	1.0	(7.0)	5.0	9.0	27.0	23.0	31.1
Мо		[2000]			[2000]		
Ni	1.0	(6.0)	4.0	8.0	24.0	20.4	27.6
Р		[100000]			[100000]		
K	500	[100000]			[100000]		
Se	5.0	(0.3)	-9.7	10.3	(19.0)	9.0	29.0
Ag	1.0	(0)	-2.0	2.0	18.0	15.3	20.7
Na	500	[100000]			[100000]		
S		[100000]			[100000]		
TI	1.0	(0)	-2.0	2.0	21.0	17.9	24.2
Ti		[2000]			[2000]		
V	5.0	(0.5)	-9.5	10.5	(19.0)	9.0	29.0
Zn	5.0	(11.0)	1.0	21.0	(29.0)	19.0	39.0

<sup>[]</sup> Indicates analytes that do not require ICP-MS determination in the ICS.

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value  $\pm$  2 times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value  $\pm$  15 percent of the listed certified value.





M6187 R.D:-08108125

Material No.: 9606-03 Batch No.: 24H0162012 Ifactured Date: 2024-06-28

Manufactured Date: 2024-06-28 Retest Date: 2029-06-27

Revision No.: 0

### Certificate of Analysis

Test	Specification	Result
Assay (HNO3)	69.0 – 70.0 %	69.7 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (CI)	≤ 0.08 ppm	0.03 ppm
Phosphate (PO4)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities - Aluminum (AI)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities - Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	0.1 ppb
Trace Impurities – Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	0.3 ppb
Trace Impurities – Chromium (Cr)	≤ 30.0 ppb	0.1 ppb
Trace Impurities – Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 1 ppb
Trace Impurities – Gold (Au)	≤ 20 ppb	< 1 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities - Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Frace Impurities – Lead (Pb)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
race Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
race Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
race Impurities – Nickel (Ni)	≤ 20.0 ppb	< 1.0 ppb

>>> Continued on page 2 >>>





Material No.: 9606-03 Batch No.: 24H0162012

Test	Specification	Result
Trace Impurities - Niobium (Nb)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Potassium (K)	≤ 50 ppb	< 1 ppb
Trace Impurities – Silicon (Si)	≤ 50 ppb	1 ppb
Trace Impurities – Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Sodium (Na)	≤ 150.0 ppb	< 1.0 ppb
Trace Impurities - Strontium (Sr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Tantalum (Ta)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Thallium (TI)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities ~ Tin (Sn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Zirconium (Zr)	≤ 10.0 ppb	< 1.0 ppb
Particle Count - 0.5 µm and greater	≤ 60 par/ml	13 par/ml
Particle Count - 1.0 µm and greater	≤ 10 par/ml	5 par/ml

Nitric Acid 69% CMOS





Material No.: 9606-03 Batch No.: 24H0162012

Test Specification Result

For Microelectronic Use

Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC

Jamie Croak

Director Quality Operations, Bioscience Production

## Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



## Certified Reference Material CRM

M6027

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

R1.8/5/24

CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: **Expiration Date:** Part Number: Lot Number: Description: 062027 57028 062024 Nickel (Ni) 1000 Ambient (20 °C) 24002546 2.0% Lot # Nitric Acid Solvent: 40.0 Nitric Acid Formulated By: Benson Chan

	Nickel(II) nitrate hexahydrate (Ni)	Compound	
	58128	Number	Part
	062023	Number	Lot
	0.1000	Factor	Dilution
	200.0	Vol. (mL)	Initial
	0.084	Pipette (mL)	Uncertainty
	1000	Conc. (µg/mL)	Nominal
	10000.4	Conc. (µg/mL)	Initial
	1000.0	Vol. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL)	Final
	2.2	+/- (µg/mL)	Uncertainty
	13478-00-7		(Solve
Ш	<b>1000.0</b> 2.2 13478-00-7 1 mg/m3	CAS# OSHA PEL (TWA)	(Solvent Safety Info. On Attached pg.)
	orl-rat 1620 mg/kg 3136	LD50	(ttached pg.)
	3136	SRM	TSIN

Volume shown below was diluted to (mL):

2000.07

0.100

Flask Uncertainty

5E-05 Balance Uncertainty

Reviewed By:

Pedro L. Rentas

062024

062024

Expanded

SDS Information

**NIST Test Number:** 

**BTUB** 

~-z/m	5.0E6	m/z->-	2500	m/z->	1.0E5	2.005
						3
N O		0		<b>1</b>		[1] Spectrum No.1
						3 Z 0
N N		200		N		pad pad
						9.136
230		30		30		9.135 sec]:58028.D# [Count] [Linear]
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Part # 57028



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

## Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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Target analyte	<b>⊕</b> 2	40.02	40,02	0.02	40.02	40,02	н		by ICP-N	
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	=	Sn	Ħ	Ħ	∄	Te	4T			
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	40.02	<b>∆</b> 0.02	A).02	40.02	<u>A</u>	<b>∆</b> 0.02	<b>∆</b> 0.02			

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated

\* All Standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



Certificate of Analysis
M5738 M5739 M5740 M5741 M5742

Refine your results. Redefine your industry.

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:** 

Multi Analyte Custom Grade Solution

Catalog Number:

6020ISS

Lot Number:

S2-MEB709511

Matrix:

7% (v/v) HNO3

Value / Analyte(s):

10 µg/mL ea:

Bismuth,

Holmium,

Indium,

6-Lithium.

Rhodium,

Scandium,

Terbium,

Yttrium

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE 6-Lithium, Li6 **CERTIFIED VALUE**  $10.00 \pm 0.03 \,\mu g/mL$ 

**ANALYTE** 

**CERTIFIED VALUE**  $10.00 \pm 0.05 \,\mu g/mL$ 

Bismuth, Bi

Indium, In

10.00 ± 0.04 µg/mL

Holmium, Ho Rhodium, Rh

 $10.00 \pm 0.05 \,\mu g/mL$ 10.00 ± 0.07 µg/mL

Scandlum, Sc

10.00 ± 0.04 µg/mL

Terbium, Tb

10.00 ± 0.04 µg/mL

Yttrium, Y

 $10.00 \pm 0.04 \, \mu g/mL$ 

Density:

1.035 g/mL (measured at 20  $\pm$  4 °C)

**Assay Information:** 

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Bi	ICP Assay	3106	180815
Bi	Calculated		See Sec. 4.2
Но	ICP Assay	3123a	090408
Но	EDTA	928	928
In	ICP Assay	3124a	110516
In	EDTA	928	928
In	Calculated		See Sec. 4.2
Li6	Gravimetric		See Sec. 4.2
Rh	ICP Assay	3144	070619
Sc	ICP Assay	3148a	100701
Sc	EDTA	928	928
Tb	ICP Assay	3157a	100518
Tb	EDTA	928	928
Tb	Calculated		See Sec. 4,2
Υ	ICP Assay	3167a	120314
Υ	EDTA	928	928
Υ	Calculated		See Sec. 4.2

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 or More Methods	Characterization of CRM/RM by One Method
Certified Value, X <sub>CRM/RM</sub> , where two or more methods of characterization are used is the weighted mean of the results:	Certified Value, X <sub>CRMRM</sub> , where one method of characterization is used is the mean of individual results:
$\begin{split} & \textbf{X}_{\text{CRM/RM}} = \Sigma\{w_i\}  \{X_i\} \\ & \textbf{X}_i = \text{mean of Assay Method I with standard uncertainty } \textbf{U}_{\text{char I}} \\ & \textbf{w}_i = \text{the weighting factors for each method calculated using the inverse square of the variance:} \\ & \textbf{w}_i = (1/u_{\text{char I}})^2 /  (\Sigma(1/(u_{\text{char I}})^2)) \end{split}$	X <sub>CRM/RM</sub> = (X <sub>a</sub> ) (u <sub>char a</sub> )  X <sub>a</sub> = mean of Assay Method A with  u <sub>char a</sub> = the standard uncertainty of characterization Method A
CRM/RM Expanded Uncertainty ( $\pm$ ) = $U_{CRM/RM}$ = $k$ ( $u^2_{char} + u^2_{bb} + u^2_{its} + u^2_{ts}$ ) $^{1/2}$ $k$ = coverage factor = 2 $u_{char} = (2((w_i)^2 (u_{char_i})^2))^{1/2}$ where $u_{char_i}$ are the errors from each characterization method $u_{bb}$ = bottle to bottle homogeneity standard uncertainty $u_{its}$ = long term stability standard uncertainty (storage) $u_{ts}$ = transport stability standard uncertainty	CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ k = coverage factor = 2 $U_{char\ a} =$ the errors from characterization $U_{bb} =$ bottle to bottle homogeneity standard uncertainty $U_{lts} =$ long term stability standard uncertainty (storage) $U_{ts} =$ transport stability standard uncertainty

### **Certified Abundance:**

### **IV's Certified Abundance**

<u>Isotope</u>	Atom %
Lithium Li6	95.6 ± 0.3
Lithium Li7	$4.4 \pm 0.1$

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. 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)

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

- 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

### 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

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

September 03, 2021

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification 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

- September 03, 2026
- 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 CRWRM can be supported by long term stability studies conducted on properly stored and handled CRWRMs. 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 longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. 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 Approved By:** 

Michael Booth Director, Quality Control Michael 2 Both

### **Certifying Officer:**

Paul Gaines Chairman / Senior Technical Director

www.absolutestandards.com 800-368-1131 Absolute Standards, Inc.

## Certified Reference Material CRM

M6030



AR-1539 Certificate Number https://Absolutestandards.com ANAB ISO 17034 Accredited

CERTIFIED WEIGHT REPORT: Part Number: 57047 122823 R = 8 | 5 | 24 Lot #

Solvent: 24002546

Nitric Acid

Ambient (20 °C) Silver (Ag) 122826 2% <u>E</u> 80.0 Nitric Acid

Formulated By:

Benson Chan

122823

122823

Recommended Storage:

**Expiration Date:** 

Lot Number:

Description:

Nominal Concentration (µg/mL): NIST Test Number: Weight shown below was diluted to (mL): 1000 **6UTB** 헏 4000.30 Nominal 0.058 Flask Uncertainty Purity Uncertainty Assay 5E-05 Balance Uncertainty Target Actual Actual Uncertainty Reviewed By: Expanded (Solvent Safety Info. On Attached pg.) Pedro L. Rentas SDS Information

1. Silver nitrate (Ag) Compound IN035 J0612AGA1 RM# Number Conc. (µg/mL) 1000.0 8 Purity (%) 0.10 63.7 38 Weight (g) 6.27992 Weight (g) Conc. (µg/mL) 6.27998 1000.0 +/- (µg/mL) 2.0 7761-88-B CAS# 10 ug/m3 Z 3151 NIST SRM

[1] Spectrum No.1 [ 14.044 sec]:58147.D# [Count] [Linear]

www.absolutestandards.com



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Physical Characterization:

(T)= Target analyte

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

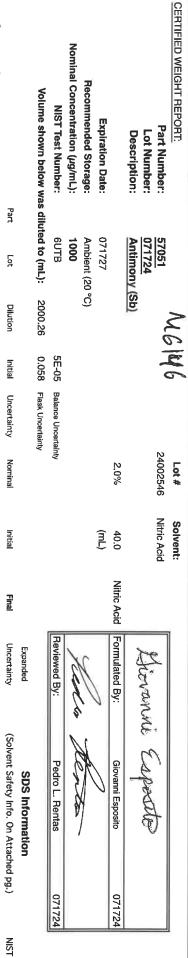
Lot # 071724

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### R:10/18/24 Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com



Compound

Number

Number

Factor

Vol. (mL) Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

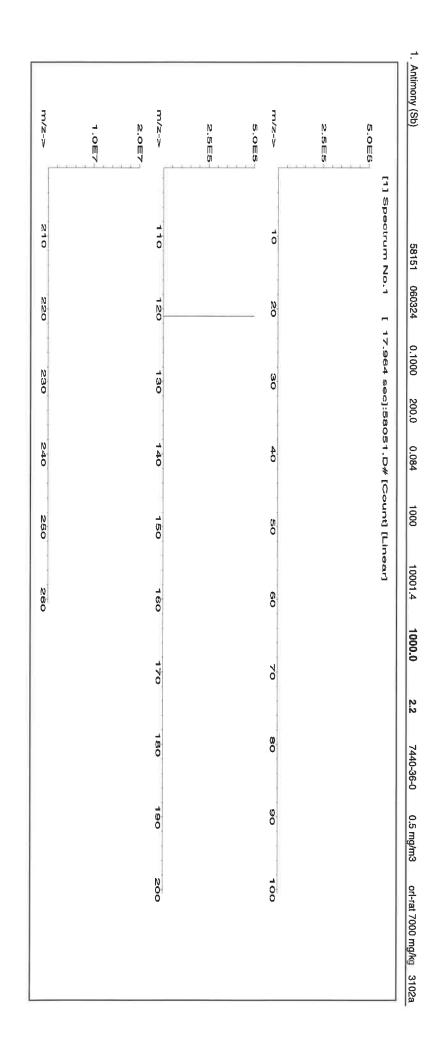
+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM



## Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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										(T) – Target analyte	et analy	ďρ								

(I) = larget analyte

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Homogeneity: No heterogeneity was observed in the preparation of this standard.

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## Certified Reference Material CRM

M6023

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

		Weight shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Expiration Date:		Description:	Lot Number:	Part Number:	CERTIFIED WEIGHT REPORT:
Lot		ted to (mL):	8TUB	1000	Ambient (20 °C)	062727		Thalllum (TI)	062724	57081	
Nominal		2000.1			င္ပိ						
Purity Uncertainty Assay		0.10 Flask Uncertainty	5E-05 Balance Uncertainty				2%			Solvent:	
Target						(mL)	40.0			Solvent: 24002546	Lot #
Actual							Nitric Acid			Nitric Acid	
Actual											
Uncertainty	Expanded		Reviewed By:	Juna	1		Formulated By:	4	TO SE	>	
(Solvent Safety Info. On Attached pg.)	SDS Information		Pedro L. Rentas	" freshies	A A		Aleah O'Brady	0	San O Basin	7	
ched pg.) NIST			062724				062724			,	
7											

RW#

Number

Conc. (µg/mL) (%)

Purity (%) (%)

Weight (g) Weight (g) Conc. (µg/mL) +/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM

~-Z/III	5.0E5	1.0E6	m/z->	5000	1.0€4	1.0E6	2.OE6	
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Part # 57081



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

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\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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## Certified Reference Material CRM

M6021

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: Part Number: Lot Number: 57023 062424 Solvent:

24002546 Nitric Acid

**Expiration Date:** Description: 062427 Vanadium (V) 2.0% (III) 40.0

Nitric Acid

Formulated By:

Aleah O'Brady

062424

062424

AND CORDA

Recommended Storage: **6UTB** 1000 Ambient (20 °C) 5E-05 **Balance Uncertainty** 

Nominal Concentration (µg/mL): Volume shown below was diluted to (mL): **NIST Test Number:** 2000.3 0.06 Flask Uncertainty Reviewed By: Expanded Pedro L. Rentas **SDS Information** 

orl-rat 58.1mg/kg 3165	2.2 7803-55-6 0.05 mg/m3	7803-55-6	2.2	1000.0	1 11	1000	0.084	0.1000 200.0	1 1	58123 021224	58123	Ammonium metavanadate (V)
	# OSHA PEL (TWA)	CAS#	+/- (ua/mL)	Conc. (ua/mL) +/- (ua/mL)	Conc. (ua/mL)	Vol. (mL) Pipette (mL) Conc. (ua/mL)	Pipette (mL)	Vol. (mL)	Factor	Number	Number	Compound
Attac	(Solvent Safety Info. On Attached pg.)	(Solver	Uncertainty	Final	Initial	Nominal	Uncertainty	Initial	Dilution	Lot	Part	

m/z->	2,5E8	m/z->- 5.0E8	1.0E7	m/z-> 2.0∈7	1.006	2.0€6
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230		100		<b>3</b>		
240		140		<u>\$</u> .		
250		150		51		
260		160		60		
		170		70		
		180		90		
		190		90		
		200		100		

Part # 57023

## Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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et analy	~	₽	ס	2	ဝ္ဂ	7	3	NAME AND ADDRESS OF	tion	
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### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.

  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST

  \* Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



### SHIPPING DOCUMENTS



### 284 Sheffield Street, Mountainside, NJ 07092 (908) 789-8900 Fax: (908) 788-9222 www.chemtech.net

CHAIN OF CUSTODY RECORD

Alliance	<b>Project</b>	Number:

(	32	811	82
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COC Number:

	CLIENT IN	FORMATION	4	PR	OJECT	TINFO	PRMATIC	N N						В	LLIN	ig in	FOR	MATI	ON	
COMPANY: Tully Er	nvironmental Inc.			PROJECT NAME: Tra	nsfer St	ation SF	PDES			BILL 1	TO: Sa	me						PO#		
ADDRESS: 57 Seav	iew Blvd			PROJECT #: 252113			LOCATIO	N:		ADDF	RESS:									
CITY: Pt Washingto	n S	STATE: NY	ZIP: 11050	PROJECT MANAGER	l:					CITY:								STAT	ΓE: ZIP:	
ATTENTION: Dean	Devoe			E-MAIL:						ATTE	NTION	l:						PHO	NE:	
PHONE: 718 446 700	00 F	AX;		PHONE:			FAX:						AN	ALY	SIS					
DATA	TURNAROU	ND INFORM	IATION	DATA DE	LIVER	ABLE	INFOR	MATION											1	
FAX: HARD COPY: EDD * TO BE APPROVI	ED BY ALLIANC	E	_DAYS*	* RESULTS ONLY  RESULTS + QC  New Jersey REDU  New Jersey CLP	CED	□ N	SEPA CLP lew York St ew York Sta	ate ASP "B' ate ASP "A'		- Ammonia	™ TSS/ 0&G	∞ Cu, Fe, PB	4 BTEX	т Нg 1631LL	⊕ BOD5	7	8	9		
STANDARD TURN	AROUND TIME	IS 10 BUSINE	SS DAYS	☐ EDD Format									RESE	_					COM	MENTS
CHEMTECH		PROJECT		SAMPLE		/IPLE /PE		IPLE CTION	Bottles										< Specify	Preservatives
SAMPLE ID	SAN	IPLE IDENTIF		MATRIX	COMP	GRAB	DATE	TIME	# of Bot	1	2	3	4	5	6	7	8	9	A-HCI C-H2SO4 E-ICE	B-HNO3 D-NaOH F-Other
1.	001 Willets	Pt Blvd (Oct	)	W		Х	10/2/25	11:15		х	х	х	х	х	х					
2.	002 35th Av	e (Oct)		W		Х	10/2/25	11:15		х	х	х	х	х	х					
		- 11																		
4.																7				
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9.																				
10.																				
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RELINQUISHED BY	17	ATE/TIME Oct , 2025	RECEIVED BY		Condi	tions o	f bottles o	or coolers	at recei	int <sup>,</sup>		omnli	ant	□ No	n Com	nliant	П	Coole	r Temp $\checkmark$	7
1. D Devoe		, 2025	1.		MeOH	extract	ion require	s an additi	onal 4oz	z. Jar fo	r perc	ent so	olid			ipiiaiii		□ Ice	in Cooler?:	<u></u>
RELINQUISHED BY 2.	D	ATE/TIME	RECEIVED BY		Comm	nents:														
RELINQUISHED BY 3.	D	0/3/25	RECEIVED FOR LA	B BY	Pa	age	of		SHIPPED ALLIA	VIA: C					Over				Shipment	Complete □ NO
		, 1 1	WHITE - ALLIANCE	COPYFOR RETURN	TO CL	IENT	YELLO	W - ALLIA	NCE CC	PY	PINK	- SA	MPLE	R CO	PY					



### Laboratory Certification

Certified By	License No.
Connecticut	PH-0830
DOD ELAP (ANAB)	L2219
Maine	2024021
Maryland	296
New Hampshire	255425
New Jersey	20012
New York	11376
Pennsylvania	68-00548
Soil Permit	525-24-234-08441
Texas	TX-C25-00189
Virginia	460312

QA Control Code: A2070148



284 Sheffield Street, Mountainside, New Jersey 07092, Phone: 908 789 8900,

Fax: 908 789 8922

### LOGIN REPORT/SAMPLE TRANSFER

**Order ID**: Q3281

TULL01

Order Date: 10/3/2025 12:41:00 PM

Project Mgr:

Client Name: Tully Environmental, Inc

Project Name: Transfer Station-SPDES

Report Type: Results Only

Client Contact: Dean Devoe

Receive DateTime: 10/3/2025 12:06:00 PM

**EDD Type:** EXCEL NOCLEANUP

Invoice Name: Tully Environmental, Inc.

Purchase Order:

Hard Copy Date:

Invoice Contact: Dean Devoe

Date Signoff:

LAB ID	CLIENT ID	MATRIX SAI	MPLE DATE	SAMPLE TIME	TEST	TEST GROUP	METHOD		FAX DATE	DUE
										DATES
Q3281-01	001-WILLETS-PT-BLVD(OCT)	Water 10/0	02/2025	11:15						
					VOC-BTEX		624.1	5 Bus. Days		
Q3281-02	002-35TH-AVE(OCT)	Water 10/0	02/2025	11:15						
					VOC-BTEX		624.1	5 Bus. Days		

Relinguished By:

Date / Time:

Received By:

18:42 RHS

Storage Area: VOA Refridgerator Room